

ADDENDUM

to

THE CONTINUED ASSAULT ON REPRODUCTIVE FREEDOMS IN POST-DOBBS AMERICA

This Addendum is available at:

<https://www.govinfo.gov/content/pkg/CHRG-118shrg58675/pdf/CHRG-118shrg58675-add1.pdf>

Submitted by Chair Durbin:

American Society for Reproductive Medicine (ASRM), statement	3
Disability Rights Amicus in Z–v–TX–11–23, court document	12
Guttmacher Institute, testimony	61
Manian, Professor Maya, testimony	64
Mutcherson, Kimberly, testimony	76
Planned Parenthood (PPFA), statement	88
Reproductive Freedom for All, statement	91
RESOLVE, The National Infertility Association	95
Ziegler, testimony	97

Submitted by Ranking Member Graham:

The Abortion Absolutist, <i>The Atlantic</i> , article	109
Abortion and Maternal Mortality	128
Addressing the U.S. Maternal Mortality Crisis, On Women’s Health	140
Brief of Biologists as Amici Curiae in Support of Neither Party	186
Embryo Ethics	237
Guttmacher Institute, Is Pregnancy Really Normal?	251
HEINONLINE, The Scientific Consensus on When a Human’s Life Begins	258
Hyde-Smith, Senator Cindy, objection	273
Life Begins at Fertilization with the Embryo’s Conception	274
Mode of Delivery After a Previous Cesarean Birth, and Associated Maternal and Neonatal Morbidity	276
MDs Not Practicing in Pro Life States	285
Morbidity associated with cesarean delivery in the United States: Is placenta accreta an increasingly important contributor?	290
No, Maternal Mortality Did not Spike in Texas after Funding Cuts to Abortion Clinics, <i>The Washington Post</i>	301
2024 NRMP—Main Match Results by State Specialty and App-Type	305
Perceiving and Addressing the Pervasive Racial Disparity in Abortion	323
Systematic Review, The maternal mortality myth in the context of legalized abortion	327
Trends in Maternal Mortality and Severe Maternal Morbidity During Delivery, Related Hospitalizations in the United States, 2008–2021	340

When Does Human Life Begin? The Scientific Evidence and Terminology Revisited	356
Why We Need Federal Limits on Late Abortion to Protect Both Mother and Child	394
Worldwide Decline of IVF Birth Rates	401
Wubbenhorst, Dr. Monique, Amendment to Written Testimony	408

American Society for Reproductive Medicine
Written Testimony for the Senate Judiciary Committee Hearing on
“The Continued Assault on Reproductive Freedoms in a Post-*Dobbs* America”
March 20, 2024

Introduction

The American Society for Reproductive Medicine (ASRM) thanks the Senate Judiciary Committee for its ongoing efforts to spotlight the fallout from the *Dobbs* decision and its devastating impact on women and reproductive rights. This is especially important as we approach the second anniversary of the U.S. Supreme Court ruling and as Congress considers ways to respond to the February 16 Alabama Supreme Court ruling in *LePage v. The Center for Reproductive Medicine and Mobile Infirmary Clinic, Inc.* This case leveraged the *Dobbs* decision to threaten access to fertility treatment, specifically in vitro fertilization (IVF).

For almost a century, ASRM has been the global leader in multidisciplinary reproductive medicine research, ethical practice, and education. ASRM impacts reproductive care and science worldwide by creating funding opportunities for advancing reproduction research and discovery by providing evidence-based education and public health information and by advocating for reproductive health care professionals and the patients they serve. Our members include more than 9,000 scientists, OB/GYN physicians, and health care support personnel.

ASRM is pleased to contribute to the record for the committee’s hearing on “The Continued Assault on Reproductive Freedoms in a Post-*Dobbs* America.” With more than 35 employees located at our offices in Birmingham, Alabama, ASRM is especially grateful for the opportunity to provide written testimony as the committee works to elucidate the impacts of the recent Alabama Supreme Court ruling, to share the stories of our members impacted by the decision, and to offer guidance on actions Members of Congress and this committee can take to ensure we do not see the restrictions on IVF in Alabama replicated in other states.

LePage v. Mobile Infirmary Clinic

As committee members are aware, IVF is a method of assisted reproductive health care essential to modern fertility care and helps individuals and couples build the families of their choice. Its goal is to help patients achieve a live birth. According to the U.S. Centers for Disease Control and Prevention (CDC), around 2 percent of children¹ in the U.S. are born from IVF every year. As a routine matter of care, and to give patients the best chance of achieving a pregnancy and live birth, patients and providers fertilize as many eggs as are retrieved. Not all these fertilized eggs will continue to grow and develop into embryos. To avoid the increased risks associated with fatal genetic conditions or even a twin pregnancy, the embryos are evaluated, and the most suitable are transferred one at a time into the patient in hopes of creating a pregnancy. This evidence-based standard of care allows patients and their providers to

¹ <https://www.cdc.gov/art/artdata/index.html>

determine which embryo may have the best chance of resulting in a pregnancy and a live birth, ultimately helping patients to achieve their family building goals.

On February 16 — in *LePage* — the Alabama Supreme Court issued an extreme and medically and scientifically unfounded decision stating that frozen embryos, cryopreserved by medical providers as patients seek to build their family, should be treated as the legal equivalent of living children. While limited to Alabama's Wrongful Death of a Minor Act, this decision immediately cast uncertainty on the future of IVF in Alabama and other states. However, even before *Dobbs*, Alabama case law set a precedent that fetuses and embryos in utero are considered children. In 2013, the Alabama Supreme Court decided that fetuses and embryos are children under the state's child abuse laws, allowing prosecutors to charge pregnant women with crimes for behavior during their pregnancies.

The Alabama Supreme Court's opinion in *LePage* undermines critical reproductive health care. Treating frozen embryos as legal persons restricts access to IVF and undermines the rights of people in this country to make decisions about family building, including what to do with frozen embryos created via IVF. Treating embryos as legal children has many serious practical implications for patients and providers. It means that patients could face significantly increased costs and additional unnecessary or risky procedures. For providers, this legal standard could be leveraged to force them to perform embryo transfers where the embryos have a low probability of implanting or leading to a live birth. Patients would then have to suffer the physical and emotional anguish of facing a pregnancy that would never lead to a living child. ASRM's concern is that the Alabama Supreme Court's ruling could lead to other states following suit, meaning that fewer people will be able to access the full range of care they want and need, including if, when, and how to have children.

Following the Alabama Supreme Court's ruling, the three largest fertility clinics in the state paused fertility health care because of substantial risks of civil penalties and overall uncertainty. Since the ruling, the situation on the ground has remained fluid. However, ASRM has been encouraged to see democracy in action, with our Alabama members and their patients quickly activating and continuing to motivate their local elected officials to protect IVF.

On March 6, Alabama Governor Kay Ivey (R-AL) signed SB159, a state bill that provides civil and criminal immunity for any individual or entity for the "damage or death of an embryo" when providing or receiving services related to IVF. ASRM acknowledges that these are heartbreaking times for our members and their patients in Alabama. We are pleased that the legislation passed into law will at least allow some of our members in the state to reopen their clinics to care for patients. However, to be clear, this law is only a temporary solution, as it fails to correct the underlying mistake the Alabama Supreme Court made when it conflated an in vitro fertilized egg with a child.

ASRM has yet to see a complete legislative solution that provides the assurances Alabama's fertility physicians need to confidently and indefinitely provide the best standard of care to their patients without subjecting themselves, their colleagues, and their patients at legal risk.

While some of the providers in the state have lifted their pause on IVF services since enactment of SB159, others, have not yet restarted IVF services. The reality is that granting cryopreserved embryos legal personhood means that routine IVF care like thawing cryopreserved embryos, conducting pre-implantation genetic testing, and even transferring thawed embryos renders fertility doctors and other clinic staff open to risks of civil, criminal, or professional penalties. It also undermines their ability to provide patient-centered, evidence-based care to patients.

ASRM continues to work with our members, their patients, and Alabama government officials towards a holistic solution that ensures everyone in the state has access to standard of care medicine and that the law is clear that embryos are not children and essential health care should not be criminalized. Until there is a permanent and more thorough legislative fix, ASRM is concerned this ruling will continue to have unintended negative consequences, including making Alabama a less attractive place for physicians to build their practices and train so that providers can continue to provide the best possible care to Alabamans.

Driven by our desire to set the record straight and to clarify that embryos are not children, on March 1, ASRM submitted an amicus brief² supporting the appellees' request for a rehearing with the Alabama Supreme Court in *LePage*. Aside from the fact that Alabama's Wrongful Death of a Minor Act was enacted in 1872, more than 100 years before IVF was a scientific possibility, ASRM's amicus brief identifies multiple instances in the majority opinion and the chief justice's concurrence that invoke purely hypothetical technology, commit multiple medical and scientific errors, and ignore best practices in reproductive technology. Additionally, ASRM's submission emphasizes how the court's ruling fails to adequately consider the real-world implications of its legally and scientifically erroneous reasoning. While judicial history does not create a reason to believe this request for a rehearing will be effective in overturning the ruling, this is a critical next step in holding the judiciary accountable and weakening the potential for this case to create legal precedent or serve as a model for blocking the availability of IVF in other states.

Testimony from ASRM Alabama Members

The journey of parenthood via IVF is a long one and can mean considerable emotional, physical, and financial hardship. For hopeful Alabama parents who no longer have access to this critical method of family-building, this is a devastating time. IVF's high out-of-pocket costs due to a lack of insurance coverage already put this treatment out of reach for many, and the consequences of the *LePage* ruling could only further increase storage costs to patients, pushing IVF further out of reach. For Alabama providers, including both medical professionals and other clinical staff who handle embryos, such as embryologists and lab technicians, there are ongoing concerns related to their vulnerability to political and ideological whims and the lack of legal protections against civil and criminal charges. This is despite the recent effort by the Alabama legislature to ensure IVF remains legal in the state.

² https://www.asrm.org/globalassets/_asrm/advocacy-and-policy/advocacy-activities/2024/lepage-amicus-brief.pdf

Following the Alabama Supreme Court's ruling in *LePage*, ASRM has remained in constant communication with our members in Alabama, many of whom expressed interest in sharing their experience in the immediate aftermath of the court's decision. ASRM urges the committee to consider the stories of Alabama providers and their patients as it considers federal legislative action to protect IVF. We therefore share the following stories from ASRM Alabama members:

Dr. Janet McClaren Bouknight of Alabama Fertility Services in Birmingham wrote in *The Hill*:³

Following the Alabama State Supreme Court ruling last week that embryos have the same rights as children and that their destruction amounts to wrongful death, my partners and I made the devastating but necessary decision to IVF procedures. I am accustomed to difficult conversations with patients as we together navigate failed treatments and negative pregnancy tests, miscarriages, and ectopic pregnancies.

The phone calls I have made over the past 24 hours to tell my patients that we have to cancel their treatment have been the worst in my career. IVF treatments require weeks if not months of planning and involve medications, injections, and procedures. More importantly, a patient's decision to do IVF requires courage, commitment, and trust in their physician. The abrupt cancellation of IVF in our state has been a tragedy for all. The patients have lost their chance to start or add to their family. Doctors, like me, have been restricted from providing the medical care their patients entrusted them to provide and deserve.

Doctors want and are obliged to provide their patients with safe and effective treatment options. An oncologist would never be expected to treat cancer without chemotherapy or radiation. A surgeon would never be asked to operate without proper surgical equipment. It is unethical to expect a fertility doctor to care for their patients without offering IVF. That is below the standard of our field. No physician would willingly provide care that is substandard. No patient should have to see a doctor that cannot provide them with all of their treatment options.

Dr. Mamie McLean of Alabama Fertility Services in Birmingham wrote in *AL.com*:⁴

When people ask me what it's like to be an infertility specialist, I tell people it's the "highest highs and the lowest lows." Unfortunately, this past week has been the lowest lows of my entire career in medicine. I have never felt so helpless as a physician. If we are unable to use IVF and embryo freezing in my practice, it makes upholding the standard of care for my patients impossible. It also means my patients are having really hard conversations about what this ruling means for them and their families. They are asking themselves, "do we wait and hope this decision is reversed? What options do we have available for our embryos? Do we give up entirely?" Unfortunately, at this juncture, I am unable to give them any clear answers on what comes next and what they should do.

³ [I help people build their families. Now the Alabama Supreme Court's decision won't let me. | The Hill](#)

⁴ [Guest opinion: Alabama Supreme Court ruling 'truly a nightmare' for doctors and patients - al.com](#)

The Alabama Supreme Court ruling is truly a nightmare for the physicians and patients throughout the state. There is no question fewer babies will be born because of this ruling. We are pro-family here in Alabama and we need our state lawmakers to protect our patients' rights to build their families and access the healthcare they need to conceive. Please help us get back to the days when we are anxiously refreshing our computer screen for long-awaited positive pregnancy tests.

Dr. Kathy Miller of Alabama Fertility Specialists, Scientific Laboratory Director, and Chief Scientific Officer at Innovation Fertility wrote to ASRM:

While fertility physicians, nurses, ultrasonographers, and phlebotomists are often recognized for their roles in patient care, it is essential to acknowledge the vital contributions of the laboratory team, which includes andrologists, endocrinology technicians, and embryologists. The laboratory team at a fertility center is one of the most passionate and hardworking groups of professionals found in medicine. They are entrusted with the delicate task of handling, evaluating, and preserving the patients' eggs, sperm, and preimplantation embryos. The work in the IVF laboratory is demanding and requires the utmost attention to detail. One of my responsibilities as the laboratory director is to ensure that my team has a stress and distraction-free environment to perform this important work.

When the medical director notified me of the Alabama Supreme Court ruling, I was not shocked or confused since many states have tried to pass legislation of this type. However, I was shocked, confused, and gravely disappointed when this ruling cast the hard and dedicated actions and work of myself and my fellow laboratorians as unnatural and criminal. While others were debating what "life" or "personhood" meant, I had the unenviable task of meeting with my laboratory team to discuss the ramifications of this ruling for their profession, livelihood, and the standard of care that they so devotedly and diligently provide to infertility patients every day of the week and every day of the year. Witnessing their emotions and hurt as they grappled with the notion that their passion and devotion to assisting patients in building their families could be deemed criminal was truly heart breaking. Despite this, I hoped they would return to work the next day, focused on caring for patients without fear of repercussions.

As we navigate the implications of this ruling, I am deeply concerned about its potential impact on our ability to provide evidence-based care to those in need. I personally vouch that IVF laboratorians approach our responsibilities with the utmost reverence and care, mindful of the importance of our work to our patients and the highly skilled and sensitive care of their preimplantation embryos. It is my hope that you will consider the broader implications and ramifications of this decision and take action to protect the rights of individuals seeking fertility treatment and the medical and laboratory professionals that provide such care.

More generally, as the professional society for reproductive health care providers, ASRM is concerned that the chaos created by the Alabama decision is heightened by uncertainty about how far this dangerous reasoning will be taken. As previously noted, the decision might lead

not only to clinics closing, but fewer medical students deciding to study and/or practice in the state, increasing barriers to care and requiring Alabamans to travel to access care that is no longer available in their state. Further, in the wake of *Dobbs*, [reproductive health care practitioners are already leaving or choosing not to work in states with abortion bans](#)⁵. The *LePage* decision will only exacerbate that trend and leave Alabamans with limited access to care — not just for building their families, but for essential services as well.

If some politicians have their way, pauses on fertility treatments and other reproductive health care like we have seen in Alabama could be the reality for millions more people across the country. Politicians are advancing legislation in states other than Alabama that contains similar personhood language that would jeopardize the ability of families and individuals to build the families of their choice. At both the state and federal levels, personhood language continues to proliferate, putting family planning and family building at risk.

Personhood laws have been advanced to limit abortion, but they do not stop there. As the *Dobbs* decision and now the *LePage* ruling made clear, attacks on abortion cause harm in all manner of sexual and reproductive health care — including IVF and birth control. When personhood language is in criminal codes, not only does it jeopardize standard of care fertility treatment, but it can also be used to investigate and criminalize pregnant people and their medical providers, especially when the person has experienced a negative pregnancy outcome like stillbirth or miscarriage.

ASRM Response and Member Testimony in the Wake of Broader Attacks on Reproductive Rights

Patients and providers across the country are rightfully concerned about the national impact of the shocking and unprecedented Alabama ruling and broader implications of this ruling on access to IVF across the country. This is just the latest attack on the rights of people to make decisions about their own sexual and reproductive health. We must not normalize this deliberate and troubling pattern.

In the wake of *Dobbs*, ASRM encouraged our members to use their voice and to share how abortion restrictions or bans and personhood measures have affected them professionally. What we have found, especially given the deeply personal and intimate nature of the work of fertility physicians and other reproductive health care specialists, is that blatant attacks on reproductive rights have the potential to have serious and far-ranging effects on providers. Considering recent developments, ASRM is compelled to share just a few sentiments from our members who span the country. The following anecdotes come from ASRM members including REIs, embryologists, and licensed clinical social workers in Florida, Iowa, Colorado, Maryland, Washington, Hawaii, California, North Carolina, and Missouri:

⁵ <https://www.aamcresearchinstitute.org/our-work/data-snapshot/training-location-preferences-us-medical-school-graduates-post-dobbs-v-jackson-women-s-health>

- *"I work in the world of fertility and maternal mental health. The women and couples I meet with are extremely emotional and fearful of the upcoming changes and the general sea change of the country after this shocking decision."*
- *"There is a great deal of apprehension about next steps the legislature will take and its impact on access to reproductive care and scope of legislative intent. The absence of clear guidance going forward is already having the effect that draconian legislation would enact. Providers are reluctant to offer essential services such as management of incomplete and missed abortions and ectopic pregnancies that might soon be construed as illegal. The current environment is already achieving many of the aims of the opponents to access to reproductive care without actually enacting legislation, much to their delight."*
- *"I am a retired reproductive health care provider. My patients and staff would have been very anxious about how we could continue to help them in their pursuit of family building."*
- *"Patients are scared for the future of fertility treatments, and they do not deserve to have added stress to the already physical and emotional toll that infertility can cause."*
- *"Patients are very concerned about the safety of their embryos. A small number of patients are so concerned about being a pregnant person in this country at present that they have stopped treatment and trying to conceive."*
- *"It [the Dobbs ruling] has caused increased concern at all levels about potential future legal liability for performing IVF procedures and storing gametes and embryos."*
- *"Patients are concerned about disposition of embryos as well as options available for high order multiples or fetuses with deficits not compatible with life."*
- *"We have had multiple patients call over the last week concerned this type of bill could be proposed or passed in Virginia. They understand how this would almost eliminate access to IVF procedures and they are very worried."*
- *"Patients are very concerned about potential future impacts for IVF. They are very concerned about the potential for a federal law restricting IVF or use/disposal of frozen embryos. My staff is anxious as well, as we cannot truly reassure patients."*
- *"A number of patients have expressed concern regarding their options and are seeking guidance on relocating their cryopreserved embryos."*
- *"I think this decision is an existential threat to reproductive rights and gender equity and everyone needs to do everything possible to oppose this in every way possible."*

Call to Action

Building a family is a fundamental right of all people, no matter where they live. We cannot allow the latest dangerous precedent of judicial overreach in Alabama and its national implications to go unchecked. This committee and the U.S. Congress have a role to play and should act immediately to protect the ability of hopeful parents to build the families of their choice. While not entirely within the committee's jurisdiction, ASRM has identified several opportunities for the federal government to act to ensure that fertility treatment remains not only available but accessible to those who need it, regardless of their zip code.

First, federal legislation is needed to ensure that standard of care fertility treatments are protected in this country. Before the court's decision in Alabama, Senators Tammy Duckworth (D-IL), Patty Murray (D-WA), Tammy Baldwin (D-WI), and Kirsten Gillibrand (D-NY), and Representative Susan Wild (D-PA-7), introduced the Access to Family Building Act (S. 3612/H.R. 7056) to help protect access to fertility care. The bill would establish a statutory right for patients to access assisted reproductive services, including IVF, that many hopeful parents require to have children. The legislation would also establish an individual's statutory right regarding the use or disposition of their reproductive genetic materials, including gametes and embryos.

ASRM is disappointed that Senator Duckworth's effort for Senate passage of the Access to Family Building Act by unanimous consent was blocked. We are continuing to collaborate with our Senate and House champions to strengthen the bill in direct response to the Supreme Court ruling in Alabama. We have worked closely with the bill's sponsors to ensure this legislation preempts action at the state level to block the availability of IVF and empowers the U.S. Department of Justice (DOJ) to enforce these statutory rights. As of March 15, 48 Democratic Senators have signed on in support of the Senate bill, while 144 Representatives (137 Democrats and one Republican) have cosponsored its House companion. ASRM thanks every single Democratic member of the Senate Judiciary Committee for their support for the Access to Family Building Act and encourages Congress to swiftly pass the bill.

Second, as the largest employer in the U.S., the U.S. government can set a positive example by mandating insurance coverage of IVF. We must ensure that federal civilian employees and those who serve in our military and their families have insurance coverage for fertility treatment. ASRM urges Congress to encourage the administration to mandate comprehensive insurance coverage as part of the Federal Employees Health Benefits (FEHB) Program, TRICARE and the Department of Veterans Affairs (VA), as well as Affordable Care Act (ACA) plans. Congress can also act by passing the Access to Infertility Treatment and Care Act (S.2386) introduced by Senator Cory Booker (D-NJ). ASRM was also disappointed that Senator Murray's effort to have the Senate pass the Veteran Families Health Service Act of 2023 (S.2801) by unanimous consent was blocked. There is already a parity issue between benefits available for federal civilian employees and those who serve in our military and their families and veterans.

But starting in 2025, federal employees will have more access to comprehensive fertility benefits than military families and veterans.

Finally, it is critical that Congress invest in research in reproductive medicine, especially as National Institutes of Health (NIH), where funding for key research areas has been slipping for several years. Decisions regarding how to allocate taxpayer dollars illustrate the priorities of an administration. It is time for the Biden Administration and Congress to demonstrate its support for ensuring that the U.S. remains a scientific leader in providing the best care possible to patients looking to become parents by ensuring that reproductive health research is well resourced.

Conclusion

ASRM reiterates its appreciation for the committee's efforts to call attention to the ongoing attacks on sexual and reproductive health care and the opportunity to elevate the voices of our members who provide those in this country who are looking to build the families of their choice with the best care possible. We are eager to work with this committee and the broader U.S. Congress to advance solutions that protect reproductive health care, including fertility treatment, contraception, and abortion. The time to act is now.

Should you have any questions, or if ASRM and our members can serve as a resource to the committee in its work on reproductive rights, please not hesitate to contact Chief Advocacy and Policy Officer Sean Tipton (stipton@asrm.org) and Director of Government Affairs Sarah Bogdan (sbogdan@asrm.org).

No. 23-0629

In The Supreme Court of Texas

STATE OF TEXAS; KEN PAXTON, IN HIS OFFICIAL CAPACITY AS
ATTORNEY GENERAL OF TEXAS; TEXAS MEDICAL BOARD;
AND STEPHEN BRINT CARLTON, IN HIS OFFICIAL CAPACITY AS
EXECUTIVE DIRECTOR
OF THE TEXAS MEDICAL BOARD,

*Defendants-
Appellants,*

v.

AMANDA ZURAWSKI; LAUREN MILLER; LAUREN HALL;
ANNA ZARGARIAN; ASHLEY BRANDT; KYLIE BEATON;
JESSICA BERNARDO; SAMANTHA CASIANO; AUSTIN
DENNARD, D.O.; TAYLOR EDWARDS; KIERSTEN HOGAN;
LAUREN VAN VLEET; ELIZABETH WELLER; DAMLA KARSAN,
M.D., ON BEHALF OF HERSELF AND HER PATIENTS; AND JUDY
LEVISON, M.D., M.P.H.,
ON BEHALF OF HERSELF AND HER PATIENTS,

*Plaintiffs-
Appellees.*

On Direct Appeal from the
353rd Judicial District Court of Travis County

**BRIEF OF DISABILITY RIGHTS ORGANIZATIONS
AND PROFESSORS AS *AMICI CURIAE* IN SUPPORT
OF PLAINTIFFS-APPELLEES**

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**Pro Hac Vice Admission Pending*
***Legal Fellows Awaiting Bar Admission*
Drafting Under Attorney Supervision

TABLE OF CONTENTS

	Page
TABLE OF AUTHORITIES	v
INTEREST OF AMICI CURIAE	1
BACKGROUND	9
ARGUMENT	13
I. TEXAS’ ABORTION BANS AND THE CURRENT CONFUSION REGARDING THE APPLICABILITY OF THE MEDICAL EXCEPTIONS HAVE CAUSED A HEALTH CARE CRISIS THAT DISPROPORTIONATELY HARMS PEOPLE WITH DISABILITIES.....	13
A. People With Disabilities Are More At Risk For Severe Maternal Morbidities And Maternal Mortality During Their Pregnancies Than Non-Disabled People.....	14
B. Pregnancy Can Worsen Disability-Related Health Outcomes And Pre-Existing Conditions For People With Disabilities.	17
C. Non-Disabled Individuals Can Develop Pregnancy-Related Disabilities Or Health Conditions While Pregnant That Put Their Health And Life At Risk.....	19
II. TEXAS’ ABORTION BANS AND THE CURRENT CONFUSION REGARDING THE APPLICABILITY OF THE MEDICAL EXCEPTIONS IMPOSE ESPECIALLY SEVERE HARMS ON PEOPLE WITH DISABILITIES, WHO ALREADY FACE WIDESPREAD DISCRIMINATION, INCLUDING IN HEALTH CARE.....	21
III. RESTRICTING ACCESS TO ABORTION CARE DOES NOT PROTECT PEOPLE WITH DISABILITIES OR ADVANCE ANY CLAIMED STATE INTEREST IN OPPOSING DISCRIMINATION.	28
IV. DISABLED PEOPLE HAVE THE RIGHT TO PROTECT THEIR LIFE AND HEALTH UNDER THE TEXAS CONSTITUTION.....	31

A.	The Texas Constitution Protects Pregnant People With Disabilities From Deprivation Of Their Right To Life.....	31
B.	The Texas Constitution Gives Texans an Affirmative Right to Equality That is Violated by the Bans and Their Confusing Medical Exceptions	32
CONCLUSION		33
CERTIFICATE OF COMPLIANCE.....		35
CERTIFICATE OF SERVICE		36

TABLE OF AUTHORITIES

	Page(s)
<u>Cases</u>	
DEFS.’ AM. PLEA AND RESP.....	28
<i>Dobbs</i> , 142 S. Ct. 2228, 2283 (2022)	8, 28
Fort Worth Osteopathic Hosp., Inc. v. Reese, 148 S.W.3d 94, 96 (Tex. 2004)	31
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<u>Statutes</u>	
Texas Penal Code	
1925 Tex. Penal Code Art. 1191.....	9
1925 Tex. Penal Code Art. 1196.....	9
Texas Constitution	
Tex. Const. art. I, §19.....	31
Texas Health and Safety Code	
Tex. Health & Safety Code §170A.002(c)	10
Tex. Health & Safety Code §§ 170A <i>et seq.</i>	9
Tex. Health & Safety Code §170A.005	10
Tex. Health & Safety Code §171.002.....	9
Tex. Health & Safety Code §171.008.....	11

Tex. Health & Safety Code §§ 171.207-211.	11
Tex. Health & Safety Code §170A.001(4)	10
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Tex. Health & Safety Code §245.002(1)	11

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INTEREST OF AMICI CURIAE¹

The interests of the following amici are implicated in this case because people with disabilities will be uniquely harmed by the confusion caused by the Texas abortion bans' narrow medical exceptions:

Disability Rights Education and Defense Fund (“DREDF”) is a national cross-disability law and policy center that protects and advances the civil and human rights of people with disabilities through legal advocacy, training, education, and legislation and public policy development. It is committed to increasing accessible and equally effective health care for people with disabilities and eliminating persistent health disparities and barriers that affect the length and quality of their lives. DREDF's work is based on the knowledge that people with disabilities of varying racial and ethnic backgrounds, ages, genders, and sexual orientations are fully capable of achieving self-sufficiency and contributing to their communities with access to needed services and support.

Women Enabled International (“WEI”) advances human rights and justice at the intersection of gender and disability to challenge exclusionary, unjust systems and support the leadership and center the voices of women, girls, and gender-diverse people with disabilities globally. It envisions a world where the

¹ No counsel for any party authored this brief in whole or in part, and no person or entity other than amici curiae's pro bono counsel made a monetary contribution intended to fund the brief's preparation or submission.

human rights and inherent dignity of women, girls, and gender-diverse people with disabilities are fully realized and recognized. WEI pioneered the application of an intersectional gender and disability framework to international human rights advocacy and has effectively worked to amplify the voices of women and gender-diverse people with disabilities in spaces where their rights are discussed and where decisions affecting their lives are made.

The American Association of People with Disabilities (“AAPD”) works to increase the political and economic power of people with disabilities and to advance their rights. A national cross-disability organization, AAPD advocates for full recognition of the rights of over 60 million Americans with disabilities.

The Autistic Self Advocacy Network (“ASAN”) is a national, private, nonprofit organization, run by and for autistic individuals. ASAN provides public education and promotes public policies that benefit autistic individuals and others with developmental or other disabilities. ASAN’s advocacy activities include combating stigma, discrimination, and violence against autistic people and others with disabilities; promoting access to health care and long-term supports in integrated community settings; and educating the public about the access needs of autistic people. ASAN takes a strong interest in cases that affect the rights of autistic individuals and others with disabilities to participate fully in community life and enjoy the same rights as others without disabilities.

Autistic Women & Nonbinary Network (“AWN”) provides community support and resources for Autistic women, girls, transfeminine and transmasculine nonbinary people, trans people of all genders, Two Spirit people, and all people of marginalized genders or of no gender. AWN is committed to recognizing and celebrating diversity and the many intersectional experiences in our community. AWN’s work includes solidarity aid, community events, publications, fiscal support, and advocacy to empower disabled and autistic people in their fight for disability, gender, and racial justice. We believe in reproductive health, rights, and justice.

The Bazelon Center for Mental Health Law (“Bazelon Center”) is a non-profit legal advocacy organization dedicated to advancing the rights of people with disabilities, including people with mental health, developmental, and intellectual disabilities, for over 50 years. The Bazelon Center seeks a society where people with disabilities live with autonomy, dignity, and opportunities, supported by law, policy, and practices that help them reach their full potential.

Disability Rights Advocates (“DRA”) is based in Berkeley, California, with offices in New York City, New York and Chicago, Illinois. DRA is a national nonprofit public interest legal center recognized for its expertise on issues affecting people with disabilities. DRA is dedicated to ensuring dignity, equality, and opportunity for people with all types of disabilities, and to securing their civil

rights. To accomplish those aims, DRA represents clients with disabilities who face discrimination or other violations of federal or state civil rights or federal constitutional protections in complex, system-changing class action and impact litigation. DRA is generally acknowledged to be one of the leading public interest disability rights litigation organizations in the country, taking on precedent-setting disability rights class actions across the nation.

The National Health Law Program (“NHeLP”) is a national legal advocacy organization that works on behalf of low-income individuals and families to advocate for a health care system that will ensure all people have access to quality and comprehensive health care.

The Texas Civil Rights Project (“TCRP”) is a nonprofit organization that advocates for the civil rights of Texans in and out of the courts. For more than thirty years, TCRP has brought a wide range of lawsuits on behalf of Texans with disabilities to ensure access to public accommodations and the ballot box, to ensure equitable access to immigration processes, and to challenge injustices in the criminal legal system. Through work with its clients and community partners, TCRP has grown increasingly concerned about the impact of Texas abortion bans on Texas’s most vulnerable populations on whose behalf TCRP advocates--specifically including individuals who are incarcerated and those living in and passing through the Texas borderlands.

Professor Ruth Colker (JD) is a Distinguished University Professor and the Heck Faust Memorial Chair in Constitutional Law at the Moritz College of Law, The Ohio State University. She is the author of 16 books and over 50 law review articles. She is one of the country's preeminent scholars in constitutional law and disability discrimination. The United States Supreme Court has twice cited her work.

Professor Robyn M. Powell (PhD, JD) is an associate professor of law at the University of Oklahoma College of Law, where she teaches Family Law, Disability Law, Professional Responsibility, and Public Health Law. She is a nationally recognized expert on disability rights and justice for disabled parents. Dr. Powell's scholarship focuses on the intersection of disability law, family law, reproductive justice, and health policy. She examines how laws, policies, and stigma impede the reproductive autonomy and parenting rights of people with disabilities. Her research reveals how abortion restrictions disproportionately harm disabled people by infringing on their right to make decisions about their own bodies and futures. As both a scholar and a disabled woman, she champions disability perspectives in conversations about reproductive justice. Her work aims to advance the rights of disabled people to self-determination in all aspects of life, including parenthood and reproduction.

The interests of *amici* and their members and constituents are implicated in this case because people with disabilities will be uniquely harmed by the inconsistency of the statutes in question and resulting confusion regarding when doctors may provide abortion care to their patients under the medical exceptions to Texas' abortion bans. As a result of the statutes' confusing language, Texas medical professionals are deterred from providing necessary abortion care to people whose life, health, or fertility are put at risk by pregnancy for fear of criminal prosecution, harsh civil penalties, and/or revocation of their medical license. This reluctance to provide necessary medical care will disproportionately harm people with disabilities because they are at higher risk for severe pregnancy- and birth-related complications and death than non-disabled people. *See generally* Jessica Gleason et al., *Risk of Adverse Maternal Outcomes in Pregnant Women with Disabilities* (“*Gleason, Adverse Maternal Outcomes*”), JAMA NETWORK OPEN (Dec. 15, 2021), <https://tinyurl.com/58fxzv9> . These higher rates of severe pregnancy-related morbidities and maternal mortality for people with disabilities mean that there is a higher probability that people with disabilities will need to access abortion care under the medical exceptions to the abortion bans. As such, the disability community has a vested interest in the resolution of this uncertainty as well as a broad interpretation of the scope of the medical exceptions.

The interests of *amici* and their members and constituents are also implicated in this case because of the importance of reproductive and bodily autonomy for the disability community, considering the dark history in the United States of reproductive oppression of people with disabilities. This history included eugenic policies favoring forced institutionalization, forced sterilization, and limitations on the ability of people with disabilities to get married and have sex before the age of 45. *See* Robyn Powell, *Disability Reproductive Justice*, 170 UNIV. PENN. L. REV. 1851, 1856-1860 (2022) <https://tinyurl.com/yrdpuwvr> (detailing the history of reproductive oppression of people with disabilities in the United States). In the late nineteenth century and early twentieth century, eugenicists “endorsed policies that encouraged procreation among favored groups of people while restricting procreation, including compulsory sterilization, segregation of institutionalized individuals by sex, and prohibition of marriage of those deemed to have ‘hereditary defects.’” *Id.* at 1857 (citing Adam Cohen, *IMBECILES: THE SUPREME COURT, AMERICAN EUGENICS, AND THE STERILIZATION OF CARRIE BUCK* 5 (2016)). For instance, in 1927, the Supreme Court held that forced sterilization of the “feeble-minded” was constitutional. *Buck v. Bell*, 274 U.S. 200, 205, 207 (1927). Following *Buck*, over 70,000 Americans were forcibly sterilized. *See The Supreme Court Ruling That Led To 70,000 Forced Sterilizations*, NAT’L PUB. RADIO (Mar. 7, 2016), <https://tinyurl.com/4peh4cbm>.

Contemporarily, women with disabilities are far more likely to face sexual violence than their non-disabled counterparts, making access to abortion care an even more essential part of preserving the bodily autonomy of people with disabilities. *See* Erika Harrell, *Crime Against Persons with Disabilities, 2009-2019—Statistical Tables*, U.S. DEP’T OF JUST. 1, 4 (2021), <https://tinyurl.com/muzwjs84> (noting that women with disabilities are greater than three times more likely to be sexually assaulted or raped than people without disabilities.)

This historical and contemporary context makes the legal protection of abortion under the medical exceptions to abortion bans absolutely necessary. Ideally, people with disabilities would be entitled to get abortions without having to experience a medical emergency that threatens their health or lives, but the Supreme Court’s precedent-thwarting decision in *Dobbs v. Jackson Women’s Health Org.* stripped Americans of this right. *See generally, Dobbs*, 142 S. Ct. 2228, 2283 (2022). In light of this reality, the medical exceptions to abortion bans are imperative to protecting the health and lives of people with disabilities who are at higher risk for severe pregnancy and birth-related complications and death than non-disabled people. Given these considerations and the following arguments, *amici* respectfully urge the Court to protect the lives, health, fertility, and bodily autonomy of pregnant people with disabilities by affirming the District Court’s grant of a temporary injunction enjoining the enforcement of the bans against

physicians providing abortion care that they have determined, in their good faith judgment, to be necessary in light of the pregnant person’s health risks.

BACKGROUND

This case considers the language of Texas’s abortion bans, codified at 1925 Tex. Penal Code Arts. 1191–1194, 1196 (the “Pre-Roe Ban”), Tex. Health & Safety Code §§ 170A *et seq.* (the “Trigger Ban”), and Tex. Health & Safety Code §§ 171.002, 171.203-205 (“S.B. 8”). More specifically, this case considers the “medical exceptions” to these Texas abortion bans.

As detailed in the party briefs, the medical exceptions to the several abortion bans are substantially inconsistent and differently worded. Further, the State has provided no guidance on the meaning of important words that affect the scope of the exceptions and do not have a consistent meaning in medical practice (for example, “risk” versus “serious risk”). The Pre-Roe Ban contains an exception for “an abortion procured or attempted by medical advice for the purpose of saving the life of the mother.” 1925 Tex. Penal Code Art. 1196.² Punishment for violation of the Pre-Roe ban is jail time ranging from 2 to 10 years. 1925 Tex. Penal Code Art. 1191. The medical exception to the Trigger Ban applies when:

(1) the person performing, inducing, or attempting the abortion is a licensed physician; (2) in the exercise of reasonable medical judgment, the pregnant

² The Supreme Court found the ban to be unconstitutional in 1973 in *Roe v. Wade*, but Defendant Ken Paxton, the Attorney General of Texas, took the position that the Pre-Roe ban was immediately enforceable after *Roe v. Wade* was overturned in *Dobbs*. PLS. AM. PET. ¶ 319.

female on whom the abortion is performed, induced, or attempted has a life-threatening physical condition aggravated by, caused by, or arising from a pregnancy that places the female at risk of death or poses a serious risk of substantial impairment of a major bodily function unless the abortion is performed or induced; and (3) the person performs, induces, or attempts the abortion in a manner that, in the exercise of reasonable medical judgment, provides the best opportunity for the unborn child to survive unless, in the reasonable medical judgment, that manner would create: (A) a greater risk of the pregnant female's death; or (B) a serious risk of substantial impairment of a major bodily function of the pregnant female.

Tex. Health & Safety Code §170A.002(b). The medical exception does not apply when the abortion is performed to prevent a pregnant person from harming themselves. Tex. Health & Safety Code §170A.002(c). “Reasonable medical judgment” is defined in the Trigger Ban as “a medical judgment made by a reasonably prudent physician, knowledgeable about a case and the treatment possibilities for the medical conditions involved.” Tex. Health & Safety Code §170A.001(4). Punishment for a violation of the Trigger Ban includes civil fines, criminal prosecution, and/or medical license revocation. Tex. Health & Safety Code §§ 170A.005, 170A.004, 170A.007.

Finally, the medical exception under S.B. 8 applies when “a physician believes a medical emergency exists.” Tex. Health & Safety Code §171.205. A “medical emergency” is defined as “a life-threatening physical condition aggravated by, caused by, or arising from a pregnancy that, as certified by a physician, places the woman in danger of death or a serious risk of substantial impairment of a major bodily function unless an abortion is performed.” Tex.

Health & Safety Code §171.002(3). All abortions performed under the exception must be documented in detail by the performing physician and reported to the state. Tex. Health & Safety Code §§ 171.008, 171.205, 245.011(c)(10), (11).

Violators are subject to civil penalties as well as a “bounty hunting” civil enforcement scheme that allows any person to seek statutory damages of \$10,000 or more for each abortion performed by the violator. Tex. Health & Safety Code §§ 171.207-211. While the Trigger Ban and S.B. 8 distinguish medical care for purposes of treating an ectopic pregnancy or spontaneous abortion (miscarriage) from induced abortion covered under these bans, the Pre-Roe ban makes no such distinction. Tex. Health & Safety Code §245.002(1).

As illustrated by the above summary, there are significant inconsistencies in the language of the exceptions. These inconsistencies, a lack of clarity about the meaning of significant words in the statutory scheme (for example, the use of “risk” or “serious risk” in relation to health in both laws compared to the use of “risk of death” in Trigger Ban and “danger of death” in S.B. 8) and inconsistent language about physicians’ discretion and intent under the medical exceptions have led to uncertainty in the medical community in Texas about the scope of the exceptions. As a result, physicians in Texas are deterred from providing abortions under the medical exceptions in light of the professional, civil, and criminal

penalties they may face if their interpretation of the exceptions is wrong. People with disabilities are disproportionately harmed as a result.

SUMMARY OF THE ARGUMENT

This uncertainty and the resulting chilling effect on physicians' willingness to provide abortions under the medical exceptions to Texas' abortion bans disproportionately harms people with disabilities who are more likely to rely on the medical exceptions than non-disabled people. The medical exceptions are more likely to be utilized by disabled people for several reasons: people with disabilities are more at risk for severe maternal morbidities and maternal mortality during their pregnancy than non-disabled people; pregnancy can exacerbate pre-existing conditions and disability-related health outcomes for people with disabilities; and non-disabled people may develop pregnancy-related disabilities or health conditions during pregnancy that put their life and health at risk. All these realities make abortion access under the medical exceptions to the abortion bans incredibly important to protect the lives, health, and fertility of people with disabilities.

Further, people with disabilities already face a multitude of barriers to accessing health care, so the additional uncertainty regarding the scope of the medical exceptions to the abortion bans increases the likelihood of total denial of health-preserving and life-saving care. Additionally, restricting access to abortion care does not protect people with disabilities or advance any claimed state interest

in preventing discrimination—it exacerbates the discrimination that disabled people face by essentially forcing them to carry potentially life-threatening pregnancies to term and stripping them of bodily autonomy and self-determined futures. Finally, people with disabilities have the right to protect their lives, which is inclusive of their health, under the Texas Constitution. As such, access to abortion care under the medical exceptions to the Texas abortion bans is essential to protecting the lives of people with disabilities who are more likely to need abortion care due to serious medical complications related to pregnancy. As such, the Court must clarify that the scope of the medical exceptions includes life-saving and health-preserving care that a provider deems necessary in their good faith, professional discretion.

ARGUMENT

I. TEXAS’ ABORTION BANS AND THE CURRENT CONFUSION REGARDING THE APPLICABILITY OF THE MEDICAL EXCEPTIONS HAVE CAUSED A HEALTH CARE CRISIS THAT DISPROPORTIONATELY HARMS PEOPLE WITH DISABILITIES.

Texas’ abortion bans at issue in this case threaten both the freedom and property of physicians who perform abortions by imposing felony life sentences, revocation of medical licenses, and harsh civil penalties that can be enforced by the State or private citizens. These statutes and the uncertainty about their medical exceptions leave many pregnant people, especially those with disabilities, without

timely access to necessary medical care due to the atmosphere of fear providers face from these laws. People with disabilities become pregnant at roughly equivalent rates to those without disabilities but have a much higher risk for severe pregnancy and birth-related complications and death, and, thus, are more likely to need access to abortion care under the medical exception. *See* Gleason, *Adverse Maternal Outcomes* at 2. Therefore, it is imperative that doctors can confidently use their professional medical judgment to provide life-saving and health-preserving abortion care to people with disabilities without fear of penalty or prosecution.

A. People With Disabilities Are More At Risk For Severe Maternal Morbidities And Maternal Mortality During Their Pregnancies Than Non-Disabled People.

The consequences of being forced to continue a pregnancy can be especially severe for people with disabilities, who are at higher risk of complications during pregnancy or childbirth due to a spectrum of disabilities and related socioeconomic factors. *See* Willi Horner-Johnson et al., *Pregnancy among U.S. Women: Differences by Presence, Type, and Complexity of Disability*, 214(4) AM. J. OBSTET. & GYNECOL. 529e.1, 529e.8 (Apr. 2016). Pregnant people with physical, intellectual, and sensory disabilities have a significantly higher risk of nearly all adverse maternal outcomes. *See* Gleason, *Adverse Maternal Outcomes* at 4. These potentially life-threatening complications include more than twice the risk for

severe preeclampsia; six times the risk for thromboembolism (blood clots in the lungs or veins of the legs); four times the risk for cardiovascular events (including heart attacks and other disorders of the heart and blood vessels); and nearly three times the risk for infection. *Id.* at 4—6. Even more concerning, pregnant people with disabilities are eleven times more at risk for maternal mortality than those without disabilities. *Id.* at 5—6.

Specific types of disability have also been linked with life- and health-threatening pregnancy complications. People with sensory, intellectual, and developmental disabilities face an increased risk of gestational diabetes and hypertensive disorders, as well as a significant risk for cesarean delivery. Lesley A. Tarasoff, et al., *Maternal Disability & Risk for Pregnancy, Delivery, and Postpartum Complications: A Systematic Review & Meta-Analysis*, AM. J. OBSTET. & GYNECOL. (Jan. 2020), <https://tinyurl.com/h45fexs7>. People with physical disabilities may experience “more caesarean complications than nondisabled [people], because they are more prone to infections and poor reactions to anesthesia, more likely to have prior abdominal operations, and less able to perform the tasks necessary to recover from surgery or adapt to the resulting loss of function.” Sonja Sharp, *Disabled Mothers-to-Be Face Indignity: ‘Do you have a man? Can you have sex?’*, LOS ANGELES TIMES (Sept. 30, 2021), <https://tinyurl.com/2y3ccnen> (noting that, despite these risks, “the reflexive thing

[for health care providers] to do is deliver by C-section”). Having epilepsy is linked to pregnancy complications, including increased risk of death, preeclampsia, premature delivery or rupture of membrane, and chorioamnionitis, an infection of the placenta and the amniotic fluid. Sima I. Patel & Page B. Pennel, *Mgmt. of Epilepsy During Pregnancy: An Update*, 9(2) THERAPEUTIC ADVANCES IN NEUROLOGICAL DISORDERS 118, 124 (2016). People with diabetes have increased risks of “spontaneous abortion, fetal anomalies, preeclampsia, fetal demise, macrosomia, neonatal hypoglycemia, and neonatal hyperbilirubinemia, among others,” Am. Diabetes Ass’n, *Standards of Med. Care in Diabetes—2018*, 41 DIABETES CARE S137, S137 (2018). Pregnant people with achondroplasia, the most common type of dwarfism, have an increased risk of cardiac abnormalities, recurrent respiratory infections, issues with anesthetics, increased cesarean delivery rates, and higher preterm birth risk. Rauf Melekoglu et al., *Successful obstetric and anaesthetic management of a pregnant woman with achondroplasia*, BMJ CASE REP. 2017 (Oct. 25, 2017), <https://tinyurl.com/26239dyj>.

If the current chaos of Texas’ abortion bans and their confusing medical exceptions continues, people with disabilities will be one of the groups most harmed. The confusing, inconsistent, and limited health exceptions of the statutes do little to remedy concerns that patients must be actively dying to receive abortion care without penalty. Requiring a pregnant person with a disability to deteriorate

before receiving necessary care is contrary to any other area of medicine and will certainly result in worse health outcomes or even death. With higher rates of maternal mortality and severe pregnancy complications, people with disabilities will face the worst outcomes as a result of the lack of clarity regarding the medical exceptions scope.

B. Pregnancy Can Worsen Disability-Related Health Outcomes And Pre-Existing Conditions For People With Disabilities.

Pregnancy can often worsen the health outcomes for people with disabilities by exacerbating disability-related symptoms, contributing to pregnancy-related complications, or requiring the discontinuation of medications for their disability during pregnancy due to risks of fetal harm. For example, a recent study found that the cessation of a highly effective and well-tolerated treatment for relapsing-remitting multiple sclerosis (MS), Natalizumab, directly before or during pregnancy resulted in MS relapses during pregnancy or postpartum. Kerstin Hellwig et al. *Multiple Sclerosis Disease Activity and Disability Following Discontinuation of Natalizumab for Pregnancy*, JAMA NETWORK OPEN (Jan. 24, 2022), <https://tinyurl.com/yb9x4y7c>. People with disabilities that affect heart health can also face life-threatening risks from pregnancy, which increase stress on the heart and circulatory system and can worsen their health condition. *Heart*

conditions and pregnancy: Know the risks, MAYO CLINIC (Aug. 10, 2023), <https://tinyurl.com/367cw7>.

People with mental health disabilities are often advised or required to avoid or discontinue psychiatric medication for the duration of pregnancy due to the risk of harm to the fetus. However, many of these medications cannot be discontinued immediately without risking severe withdrawal side-effects. For example, people with bipolar disorder are often advised to discontinue mood-stabilizing medication during pregnancy. During pregnancy, 70.8% of the women with bipolar disorder experienced at least one mood episode, and the risk of recurrence was significantly higher in women who discontinued treatment with mood stabilizers (85.5%) than those who maintained treatment (37.0%). Adele C. Viguera, *Risk of recurrence in women with bipolar disorder during pregnancy: prospective study of mood stabilizer discontinuation*, AM. J. PSYCHIATRY 2007 Dec;164(12):1817-24; quiz 1923. doi: 10.1176/appi.ajp.2007.06101639. Abrupt cessation of benzodiazepines, which are commonly used to treat severe anxiety, can cause “life-threatening” symptoms, and therefore, most patients are required to taper the medication over eight to twelve weeks. Jonathan Brett & Bridin Murnion, *Mgmt. of Benzodiazepine Misuse & Dependence*, 38(5) AUSTRALIAN PRESCRIBER 152, 154 (Oct. 2015) (risk of seizures); Jennifer Pruskowski, et al., *Deprescribing & Tapering Benzodiazepines* #355, 21(7) J. PALLIATIVE MED. 1040, 1040 (2018).

The Texas medical exceptions create continued confusion for providers who must assess when they may provide necessary abortion care under an environment of legal uncertainty. For individuals with disabilities, pregnancy can result in long-term or potentially life-threatening health consequences that exacerbate their disabilities. People with psychological conditions, for example, may suffer acute mental health crises when forced to carry a health- or life-threatening pregnancy, especially if they have been required to discontinue medication. Many people with disabilities would face severe risks to their physical and mental health without the ability to terminate a pregnancy, and very few of those risks can be resolved under the Texas statutes' narrow and inconsistent medical exceptions.

C. Non-Disabled Individuals Can Develop Pregnancy-Related Disabilities Or Health Conditions While Pregnant That Put Their Health And Life At Risk.

Pregnancy can result in the development of health- or life-threatening conditions or disabilities for individuals without pre-existing disabilities; therefore, the ability to access abortion without delay is essential healthcare. The vast majority of maternal disabilities stem from health complications that are a direct result of pregnancy or childbirth, including severe bleeding, infection, obstructed or prolonged labor, and pregnancy-induced hypertension, but can also be caused by illnesses that are aggravated by pregnancy, such as anemia, cardiac disease, hepatitis, sexually transmitted infections (STIs, including HIV/AIDS), and

diabetes. Lori Ashford, *Hidden Suffering: Disabilities From Pregnancy and Childbirth in Less Developed Countries*, POPULATION REFERENCE BUREAU (Aug. 2002), <https://tinyurl.com/2sjuxehk>. For example, one study had 138 participants report pregnancy as the cause for their chronic physical disability even when researchers specifically requested participants not to report pregnancy-related difficulties. Lisa Iezzoni et al., *Conditions causing disability and current pregnancy among US women with chronic physical disabilities*, 52(1) MED. CARE. 2014 JAN 20-5. Additionally, gestational diabetes can be associated with progression to type 1 or type 2 diabetes after delivery. Anna-Maaria Auvinen et al., *Type 1 and type 2 diabetes after gestational diabetes: a 23 year cohort study*, DIABETOLOGIA (Jul. 2020), <https://tinyurl.com/2efzswuu>.

Pregnancy can result in life-threatening and/or health-harming conditions or disabilities that continue well after the pregnancy, even for individuals who had no prior disability, which Texas' current medical exceptions do not consider.

Physicians must be able to provide care to patients and counsel them on the best medical options to preserve their health and lives without fear of retribution from the state or other private citizens. The confusing language of the medical exceptions has a chilling effect on providers' ability to provide this quality care, which will result in worse health outcomes for both people with disabilities and people who may develop disabilities or health conditions as a result of pregnancy.

II. TEXAS' ABORTION BANS AND THE CURRENT CONFUSION REGARDING THE APPLICABILITY OF THE MEDICAL EXCEPTIONS IMPOSE ESPECIALLY SEVERE HARMS ON PEOPLE WITH DISABILITIES, WHO ALREADY FACE WIDESPREAD DISCRIMINATION, INCLUDING IN HEALTH CARE.

Individuals with disabilities already face a host of barriers to receiving needed abortion care, and these barriers are only exacerbated by the lack of clarity in Texas' medical exceptions. As noted above, pregnancy can cause dangerous health consequences for people with disabilities, which makes access to care under the medical exceptions even more important. But as it stands, the confusing medical exceptions to Texas' abortion bans create additional barriers to care for people with disabilities who already experience extremely inequitable access to health care services.

According to the Centers for Disease Control, people with disabilities encounter attitudinal, communication, physical, policy, programmatic, social and transportation barriers to accessing health care. *Disability Barriers to Inclusion*, CTRS. FOR DISEASE CONTROL & PREVENTION (accessed Nov. 9, 2023), <https://tinyurl.com/2skdxpaa>. It is no surprise, then, that health care providers generally underserve people with disabilities due to “a lack of provider competency on the needs of people with disabilities, lack of accommodations in [facilities], lack of transportation accessibility, and centuries of abuse and ill treatment by the medical establishment that has undermined trust.” Autistic Self

Advocacy Network, *Access, Autonomy and Dignity: Abortion Care for People with Disabilities* at 12 (“ASAN, *Abortion Care*”) (citing U.S. Centers for Medicare & Medicaid Services, *Improving Health Care for Adults with Disabilities: An Overview of Federal Data Sources* at 1 (Dec. 2020), <https://tinyurl.com/yckj4dnh> (“Adults with disabilities are almost twice as likely to report unmet health care needs due to barriers they face in accessing care.”)).³ Additionally, a 2022 study exploring doctors’ views towards patients with disabilities revealed that many doctors harbor explicitly discriminatory attitudes towards people with disabilities that often bleed into their treatment of these patients:

Many physicians also expressed explicit bias toward people with disabilities and described strategies for discharging them from their practices. Physicians raised concerns about the expense of providing physical and communication accommodations, including insufficient reimbursement for physicians’ efforts and competing demands for staff time and other practice resources. Many participants described caring for very few patients who need accommodations, with little acknowledgment that the barriers to obtaining care and inability to track or respond to accommodation needs could lead to an under-identification of the number of people with disabilities who seek care.

³ The inadequacy of health care for patients with disabilities disparately impacts BIPOC (Black, Indigenous, People of Color) and LGBTQ people with disabilities, who face additional barriers in accessing health care stemming from “a history and current practice of abuse, systemic racism, and bias in health care that also undermines trust in providers.” ASAN, *Abortion Care* at 12. For instance, BIPOC people with disabilities endure “lack of language access, [] not having their symptoms taken seriously, [] having their expressed health goals ignored,” and much more. *Id.* at 10; see also Autistic Self Advocacy Network, *Access, Autonomy & Dignity: People with Disabilities and the Right to Parent* at 8 (Sept. 2021), <https://tinyurl.com/32xavr95> (“ASAN, *Right to Parent*”) (noting the lack of access to high-quality, culturally responsive prenatal health care is “further exacerbated by the structural racism driving the crisis in maternal health outcomes in the United States and the disproportionate harm to BIPOC birthing people”).

Tara Lagu et al., *‘I Am Not the Doctor For You’: Physicians’ Attitudes About Caring For People With Disabilities*, 10 HEALTH AFFAIRS VOL. 41 1387, 1392-1393 (2022), <https://tinyurl.com/cve6t7r5>. Further, many physicians’ offices lack accessible medical equipment, meaning “many people with mobility impairments cannot get on to examination tables and chairs, be weighed, or use X-ray and other imaging equipment.” Elizabeth Pendo, *Reducing Disparities Through Health Care Reform: Disability and Accessible Medical Equipment*, 4 UTAH L. REV. 1057 (2010), <https://tinyurl.com/muxft93j>.

People with disabilities receive particularly inadequate care when it comes to reproductive health. They encounter “frequent discrimination from providers who are ignorant of the specific challenges they face,” particularly in the context of maternal and prenatal health care. ASAN, *Right to Parent* at 9. Providers routinely are unwilling to provide reproductive health care to people with disabilities or are unable to competently do so, including because they are “ill equipped to offer high-quality, culturally responsive care” and do not dedicate the resources necessary to understand disability-specific concerns related to pregnancy and childbirth. *Id.*; see also Lesley A. Tarasoff, “*We don’t know. We’ve never had anybody like you before*”: *Barriers to Perinatal Care for Women with Physical Disabilities*, 10(3) DISABILITY HEALTH J. 426, 426-33 (July 2017), <https://tinyurl.com/2k4dbcbs>; see also Nat’l Council on Disability, *The Current State of Health Care for People with*

Disabilities (“NCD, *Current State of Health*”) (2009), <https://tinyurl.com/bparvcat>. Providers also express “negative attitudes” about people with disabilities being pregnant and becoming parents. ASAN, *Right to Parent* at 8; *see also* Robyn Powell, *Disabled People Still Don’t Have Reproductive Freedom*, DAME (July 26, 2021), <https://tinyurl.com/3y3bjzr> (reporting the experience, as a person with disability, of being offered multiple hysterectomies by doctors on “an assumption that [she] should not have children” and discussing the “enduring belief that disabled people . . . are unfit to raise children”). As a result, people with disabilities often “are deterred from accessing prenatal care” and other forms of reproductive health care. ASAN, *Right to Parent* at 8.

Confusion concerning the medical exceptions to Texas’ abortion bans deter physicians from providing needed abortion care and exacerbate the divide between medical providers and their disabled patients. Providers were already failing to meet adequate standards of care in the provision of reproductive healthcare for people with disabilities before the *Dobbs* decision, and people with disabilities are likely to experience a worsening of reproductive healthcare outcomes post-*Dobbs* due to a combination of physicians’ lack of clarity about the scope of the exceptions, and lack of understanding about disability-specific concerns for pregnancy. Physicians’ deterrence from providing needed abortion care under the medical exceptions will further undermine trust in healthcare providers for people

with disabilities who have experienced a history of bias and barriers in the health care system. Therefore, Texas' medical exceptions must have a clear standard that includes both health-preserving and life-saving care to ensure that people with disabilities can access necessary health care.

Where pregnant people with disabilities are unable to access health- or life-saving abortion care in their own state, it may be necessary to travel to another state where they can lawfully access this needed health care. According to a 2019 study, the average resident was expected to experience a 249-mile increase in travel distance to access abortion care once Roe was overturned. *See* David. S. Cohen et al., *The New Abortion Battleground* 123 Colum. L. Rev. 1, 11 (2023), <https://tinyurl.com/mspnxban> (citing Caitlin Myers, Rachel Jones & Ushma Upadhyay, *Predicted Changes in Abortion Access and Incidence in a Post-Roe World*, 100 Contraception 367, 369 (2019)). This reality is especially troublesome for people with disabilities who face pervasive transportation barriers, even within their city of residence, including “lack of public transportation in suburban and rural areas, difficulty scheduling rides, and difficulty relying on paratransit to get to appointments on time” that affect their ability to access medical care generally. *See* NCD, *Current State of Health*. For people with disabilities who must travel out of their city or state of residence to access necessary care, inaccessible air travel is a common problem. Amanda Morris, *Embarrassing, Uncomfortable and Risky:*

What Flying is Like for Passengers Who Use Wheelchairs, NEW YORK TIMES (Aug. 8, 2022), <https://tinyurl.com/9yh8pm2y> (reporting the experience, as a person with a disability and wheelchair user, of being physically dropped by airline employees assisting him in transferring to his seat, being unable to use airplane restrooms, receiving no help with his checked luggage, and having to wait extended periods of time for assistance getting on and off the plane); *see also* Ned S. Levi, *Airlines Damage Passenger Wheelchairs and Lose Mobility Devices at a Rate of More than 200 a Week*, TRAVELERS UNITED (Aug. 7, 2023), <https://tinyurl.com/yht3eczp> (noting that in 2022, U.S. airlines reported 11,389 mishandled wheelchairs and scooters). While non-disabled pregnant people may be able to travel out of state on short notice to receive needed abortion care, pervasive transportation barriers leave people with disabilities with an increased need for localized care that is protected by Texas' medical exceptions to the abortion bans and is inclusive of both their lives and health.

Further, people with disabilities face a host of financial barriers to care. People with disabilities are two times more likely to live in poverty than non-disabled people, and federally funded Medicaid or Medicare programs are the primary insurance providers for people with disabilities in the United States. Pam Fessler, *Why Disability and Poverty Still Go Hand In Hand 25 Years After Landmark Law*, NAT'L PUBLIC RADIO (Jul.23, 2015),

<https://tinyurl.com/2p995psw>; see also Nat'l Council on Disability, *Rocking the Cradle: Ensuring the Rights of Parents with Disabilities and Their Children* 178 (Sept. 27, 2012), <https://tinyurl.com/5zsh9xam> (“NCD, *Rocking the Cradle*”).

Under the Hyde Amendment, federal funds may not be used to provide abortion care except in cases of rape, incest, or life endangerment of the pregnant person. Congressional Research Service, *The Hyde Amendment: An Overview* 1 (2022), <https://tinyurl.com/3smhyes8>. Some states provide additional state funds for insurance coverage of abortion care for those covered by Medicaid, but Texas does not. *State Funding of Abortions Under Medicaid*, KAISER FAMILY FOUNDATION (Jun. 1, 2023), <https://tinyurl.com/msfwxrd6>. As such, people with disabilities who are likely to be covered by Medicaid lack insurance coverage for medically necessary abortions if they are not at risk of death. This means that abortion care to preserve the health of the pregnant person may be financially inaccessible to people with disabilities who are covered by Medicaid or Medicare, which may have devastating consequences. Because of the confusion regarding the scope of the medical exceptions and the resulting chilling effect on the provision of abortion care under the exceptions in Texas, people with disabilities who need to access health- or fertility-preserving care face the compounding financial barriers of paying for the procedure itself and paying for out-of-state travel (if travel is accessible in the first place). Since people with disabilities are more likely to live

in poverty than non-disabled people, the compounding costs may result in a total denial of necessary care for people with disabilities living in Texas.

The combined effect of these many different barriers to utilizing health care generally and the chilling effect on the provision of abortion care due to Texas' confusing medical exceptions mean that people with disabilities are at extremely high risk of total denial of medically necessary abortion care within Texas, while facing substantial travel and financial barriers to accessing such health-preserving abortion care outside of Texas. As such, the Court must clarify that the scope of the medical exceptions includes both life-saving and health-preserving care that a provider deems necessary in their good faith, professional discretion.

III. RESTRICTING ACCESS TO ABORTION CARE DOES NOT PROTECT PEOPLE WITH DISABILITIES OR ADVANCE ANY CLAIMED STATE INTEREST IN OPPOSING DISCRIMINATION.

Defendants argue that the abortion bans and their medical exceptions are subject to rational basis review because abortion “is not a fundamental constitutional right” after the United States Supreme Court’s decision in *Dobbs*. DEFS.’ AM. PLEA AND RESP. at 42 (citing *Dobbs v. Jackson Women’s Health Org.*, 142 S. Ct. 2228, 2283 (2022)). The State further argues that the medical exceptions pass rational basis review because the state has a legitimate government interest in the “prevention of discrimination on the basis of race, sex, or disability.” *Id.* at 43 (citing *Dobbs*, 142 S. Ct. at 2284).

Making it incredibly difficult for a group of pregnant people, including pregnant people with disabilities, to access abortion does not protect people with disabilities from discrimination, as the State contends. Rather, the medical exceptions' narrowness and inconsistency conflict with core tenets of the disability rights movement, including bodily autonomy and reproductive freedom. As leading disability rights activist Rebecca Cokley has aptly observed, "The right to decide what happens to our bodies is a fundamental principle in the disability community, and with good reason." Rebecca Cokley, *The Anti-Abortion Bill You Aren't Hearing About*, Rewire News Group (May 20, 2019), <https://tinyurl.com/mw96mb32> ; see also ASAN, *Abortion Care* at 4 ("People with disabilities understand all too well how society, the medical establishment, other systems, and even other individuals feel ownership over their own bodies . . . [and] are frequently told how to live, whether they can or should have children, whether they can or should have sex, what interventions they 'need' for their bodies or minds, among other intrusions.").

As scholars and disability rights advocates have underscored, paternalistic justifications for infringing on the autonomy and self-determination of people with disabilities are patronizing and dehumanizing. See Samuel R. Bagenstos & Margo Schlanger, *Hedonic Damages, Hedonic Adaptation, and Disability*, 60 VAND. L. REV. 745, 795 (2007), <https://tinyurl.com/45d8nj6s> ("[P]aternalism has

historically been one of the most significant contributors to the disadvantages people with disabilities experience. Non-disabled parents, teachers, doctors, rehabilitation counselors, employers, and others have arrogated to themselves the prerogative to decide what is best for people with disabilities.”).

Far from protecting people with disabilities from discrimination, the abortion bans and their narrow and confusing medical exceptions disproportionately threaten the health and lives of people with disabilities by making it nearly impossible for them to access life-saving or health-preserving abortion care. Measures like pro-information campaigns about disabilities, improving the quality of education for children with disabilities, strengthening the State’s support for people with disabilities, and ending forced institutionalization, all would advance the lives of people with disabilities without coercion. Texas, however, has declined to adopt many such measures. Instead, it seeks to co-opt the notion of disability rights to dismantle reproductive rights. But in invoking disability rights for this end, the State fails to recognize that both the disability rights movement and the reproductive justice movement are united in the pursuit of autonomy, dignity, equality, and self-determination. Instead, the bans and their confusing medical exceptions exacerbate discrimination against people with disabilities by worsening reproductive care access disparities and endangering lives.

IV. DISABLED PEOPLE HAVE THE RIGHT TO PROTECT THEIR LIFE AND HEALTH UNDER THE TEXAS CONSTITUTION.

A. The Texas Constitution Protects Pregnant People With Disabilities From Deprivation Of Their Right To Life.

The Texas Constitution clearly proclaims that “no citizen of this State shall be deprived of life.” Tex. Const. art. I, §19. As this Court has held, “legal rights [are] contingent upon live birth” under common-law rule, and this legal right would include a right to life for a person from birth to death. *Fort Worth Osteopathic Hosp., Inc. v. Reese*, 148 S.W.3d 94, 96 (Tex. 2004); *see also Witty v. Am. Gen. Capital Distrib., Inc.*, 727 S.W.2d 503, 506 (Tex. 1987). Therefore, it should be indisputable that a pregnant person – including a pregnant person with disabilities – holds a right to life which cannot be infringed upon by the State’s demands to carry a life-threatening pregnancy.

Furthermore, the abortion bans and their unclear medical exceptions cannot survive any level of constitutional review. Where a fundamental right or suspect class is at issue, state action must “be narrowly tailored to serve a compelling government interest.” *Richards v. League of United Latin Am. Citizens*, 868 S.W.2d 306, 311 (Tex. 1993). Fundamental rights are derived from the “express and implied protections of personal liberty recognized in federal and state constitutions.” *Spring Branch I.S.D. v. Stamos*, 695 S.W.2d 556, 560 (Tex.1985). It would be difficult to find a right more deeply rooted than a person’s right to life,

which is explicitly recognized by the Texas Constitution. While the State may argue that they have an interest in protecting “potential life,” it is the actual life of the pregnant person that the State has a clear interest in protecting. The status of pregnancy does not result in the surrender of a person’s legal rights, especially their right to life, inclusive of their health. There is no other form of life-saving healthcare to which Texas has denied its citizens clear access. People with disabilities, who face much higher rates of severe maternal morbidities and maternal mortality, have a vested right to protect their lives, inclusive of their health, under the Texas Constitution.

B. The Texas Constitution Gives Texans an Affirmative Right to Equality That is Violated by the Bans and Their Confusing Medical Exceptions

The Texas Constitution also explicitly protects “equal rights.” Tex. Const. art. 1, § 3. This is an affirmative, inherent right guarantee that is superior to the state’s police powers. Under Texas’ abortion bans and confusing medical exceptions, people with disabilities are not granted equal protection of the laws. Because people with disabilities are more likely than non-disabled people to experience severe maternal morbidities and maternal mortality, people with disabilities are more likely than their non-disabled counterparts to need access to abortion care under the medical exceptions to the abortion bans. As such, the narrow and confusing promulgation of the exceptions discriminates against people

with disabilities by disproportionately denying them life-saving and health-preserving care.

CONCLUSION

In light of these considerations, *amici* respectfully request that the Court affirms the district court's temporary injunction and denial of the plea to the jurisdiction in order to protect the lives and health of pregnant people and pregnant people with disabilities.

Dated: November 21, 2023

Respectfully submitted,

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I certify that this Brief complies with the typeface requirements of Tex. R. App. P. 9.4(3) because it has been prepared in a conventional typeface no smaller than 14-point for text and 12-point for footnotes. This document also complies with the word-count limitations of Tex. R. App. P. 9.4(i), if applicable, because it contains 9,041 words, excluding any parts exempted by Tex. R. App. P. 9.4(i)(1).

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A true and correct copy of the foregoing brief has been served on counsel of record for both parties through electronic service on November 21, 2023.

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Written Testimony from the Guttmacher Institute

Submitted to the Senate Judiciary Committee for the record in the March 20, 2024 hearing
“The Continued Assault on Reproductive Freedom in a Post-Dobbs America”

In the nearly two years since the Supreme Court’s decision in *Dobbs v. Jackson Women’s Health Organization*, the abortion landscape in the United States has become increasingly fractured and chaotic, and people seeking abortion care have suffered as a result. Public health policy should be grounded in evidence, uphold the rights of all people to bodily autonomy, and ensure access to timely, affordable care. Unfortunately, anti-abortion policymakers and advocates have repeatedly ignored scientific evidence and advanced an agenda that would deny people sexual and reproductive health and rights.

The Guttmacher Institute has been tracking state policy developments and trends, national and state estimates of the number of abortions provided within the formal health care system in the United States, contraceptive access and use, and more in order to document, analyze and understand the fallout of the end of *Roe*. While we can expect to document the evidence for years to come, several critical points are already clear.

1. The Guttmacher Institute’s “[State Policy Trends 2023](#)” policy analysis reveals a fractured landscape of abortion access:

“In the chaos and confusion that erupted after the US Supreme Court overturned *Roe* in June 2022, abortion trigger bans that many states had on the books soon went into effect; many other states moved quickly to restrict care. As of mid-December 2023, [14 states are enforcing total bans](#) with limited exceptions, including two new bans enforced [in 2023]. As a result, almost 18 million women of reproductive age, in addition to transgender and nonbinary people who may need an abortion, no longer have access to abortion care in their state of residence. Anyone denied abortion access in their state is forced to either overcome the enormous logistic and financial hurdles of traveling out of state, self-manage an abortion or carry an unwanted pregnancy to term—scenarios that are [most difficult and carry the greatest consequences](#) for those marginalized by economic insecurity and structural racism. “

Further, the *Dobbs* decision did nothing to quell activity in state legislatures:

“In 2023, the first full year since the Supreme Court overturned *Roe v. Wade*, state legislatures took key action on sexual and reproductive health. While many states increased access and piloted new policy solutions to expand and protect abortion and other sexual and reproductive health care, others sought to further curtail access.”

In 2023, 22 states and the District of Columbia enacted 129 measures to protect abortion access – the highest number of protections ever enacted in a single year – and 80 provisions were enacted to restrict access to abortion care.

2. **Guttmacher’s [Monthly Abortion Provision Study](#) has shown that the number of abortions is rising, more abortion patients are traveling out of state for care and there are more medication abortions. The burden of abortion restrictions continues to fall hardest on communities already facing myriad health inequities.**

From Guttmacher’s [policy analysis on traveling out of state](#) for care:

“The proportion of patients traveling to other states to obtain abortion care has doubled in recent years, reaching nearly one in five in the first half of 2023, compared with one in 10 in 2020. This surge in travel has largely been driven by post-*Roe v. Wade* abortion bans and restrictions...

The findings show large increases in patients traveling to states that border those with abortion bans and minimal increases in people traveling to states in regions of the country where abortion access remains largely protected.

Many states have passed policies to protect and expand abortion access in the wake of the *Dobbs* decision, and providers and support networks across the country have made heroic efforts to meet the needs of the growing numbers of people traveling for abortion. However, it will be an ongoing challenge for clinics and support networks to extend their capacity to meet this need. Urgent and sustained policy interventions are required to protect abortion access and meet patients’ needs as states continue banning and restricting abortion.”

From Guttmacher’s [analysis on the number of abortions in 2023](#):

“New findings from the Monthly Abortion Provision Study show that an estimated 1,026,690 abortions occurred in the formal health care system in 2023, the first full calendar year after the US Supreme Court’s decision in *Dobbs v. Jackson Women’s Health Organization* overturned *Roe v. Wade*. This represents a rate of 15.7 abortions per 1,000 women of reproductive age, and a 10% increase since 2020, the last full year in which comprehensive estimates are available. It is also the highest number and rate measured in the United States in over a decade.”

“This increase in abortions does not diminish the impact of *Dobbs* on people’s lives. Instead, the data provide important evidence that people will continue to seek abortion care in spite of the policy barriers that anti-abortion policymakers impose. We know now that over 160,000 patients traveled out of state in 2023 to seek abortion care. Individuals traveling across state borders must overcome significant economic and logistical barriers. We also know that many others were unable to obtain care in the formal health care system, and some were forced to continue their pregnancies.

Communities of color, LGBTQ+ people, young people, immigrants, people living with low incomes and those living with disabilities already contend with multiple barriers to accessing care. Anti-abortion policies exacerbate the health inequities these communities face. For example, states with abortion

restrictions on the books have [fewer maternal care providers and higher maternal death rates, both of which especially harm Black and Brown people](#). Policy solutions must center the lived experience of those who are disproportionately affected by the fall of *Roe*. Policymakers should follow the leadership of these communities as they create policies to mitigate the harm of the abortion crisis.”

From Guttmacher’s analysis on [use of medication abortion](#):

“New Guttmacher Institute research from the Monthly Abortion Provision Study shows that there were approximately 642,700 medication abortions in the United States in 2023, accounting for 63% of all abortions in the formal health care system. This is an increase from 2020, when medication abortions accounted for 53% of all abortions.”

“Medication abortion has proven to be a game changer in expanding abortion care in the United States. Unfortunately, legal attacks and restrictive policies continue to challenge access. When the Supreme Court rules on the case challenging access to mifepristone this spring, it will have to decide whether to ignore the FDA and reimpose unnecessary barriers to access or to respect the scientific evidence that mifepristone is safe and effective.

Any return to restrictions on medication abortion provision via telemedicine would be detrimental for people who either prefer or only have access to abortion using telemedicine. While the current court case only affects use of mifepristone—and a misoprostol-only regimen is also a [safe and effective method](#) of medication abortion—everyone seeking an abortion should have access to the full range of safe, effective options.”

3. From Guttmacher’s [Reproductive Health Impact Study](#):

“A rapidly growing body of research highlights how the overturning of *Roe v. Wade* in June 2022 has led to massive disruptions in sexual and reproductive health (SRH) care, from upending abortion access in entire regions of the country to worsening an already dire maternal health crisis in many states. One issue that is less well understood is how the *Dobbs v. Jackson Women’s Health Organization* Supreme Court decision may have contributed to changes in people’s SRH outcomes beyond abortion. Since decisions around abortion are not isolated from decisions about the rest of one’s reproductive health, we anticipate that the *Dobbs* decision could have much broader consequences for people’s reproductive autonomy—including potentially shaping attitudes toward becoming pregnant, changing their sexual activity and contraceptive strategies, and impacting their ability to access necessary health care.”

This research shows “barriers to accessing contraception increased, reports of receiving high-quality contraceptive care decreased” and that “Between the pre- and post-*Dobbs* survey time points, in Arizona, Iowa, and Wisconsin, we found increases of approximately 4 percentage points in the percentage of reproductive-aged women who reported trouble and/or delays in accessing their preferred contraception.”

Testimony of Professor Maya Manian
Professor of Law and Faculty Director, Health Law and Policy Program
American University Washington College of Law
Before the Senate Judiciary Committee

The Wide Ranging Impact of Abortion Restrictions on Access to Health Care

The Supreme Court's decision in *Dobbs v. Jackson Women's Health Organization* launched a sea change in constitutional law and in the public health landscape.¹ *Dobbs* clawed back the constitutional right to abortion and wreaked havoc in the delivery of medical care, affecting not only patients seeking abortion care but also those not actively seeking to terminate a pregnancy.²

Researchers in the field of public health have revealed the damaging consequences of being denied a wanted abortion. For example, the Turnaway Study, a nation-wide study conducted by researchers at UCSF, demonstrated that denial of abortion care threatens women's physical health, economic security, and aspirations for themselves and their families.³ Public health research also shows that people who are low-income and pregnant people of color disproportionately feel these harmful impacts of abortion restrictions.⁴

While evidence from public health research has exposed the harms and health disparities flowing from being denied a wanted abortion, Americans are also witnessing how abortion bans obstruct access to health care more broadly. In Alabama, a state court ruling that frozen embryos constitute legal persons led to clinics halting fertility treatment for their patients due to fear of civil or even criminal liability for providing in vitro fertilization (IVF) services.⁵ Elizabeth Goldman, a uterine transplant patient who was scheduled to undergo IVF in Alabama, described how her treatment was at a standstill as result of the court decision.⁶ Some feared that the University of Alabama at Birmingham's entire uterine transplant program could be at risk.⁷ Texas' abortion bans have forced patients like Kate Cox to travel out of state for care. At about twenty weeks of pregnancy, Cox received a tragic diagnosis of trisomy 18, a condition

¹ Y. Lindgren, "Dobbs v. Jackson Women's Health and the Post-Roe Landscape," *Journal of the American Academy of Matrimonial Lawyers* 35, (2022): 235-283.

² M. Manian, "The Impact of Dobbs on Health Care Beyond Wanted Abortion Care," *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 592-600.

³ "The Turnaway Study," *Advancing New Standards in Reproductive Health*, available at <<https://www.ansirh.org/research/ongoing/turnaway-study>> (last visited April 22, 2023); D.G. Foster, *The Turnaway Study: The Cost of Denying Women Access to Abortion* (New York: Scribner, 2021): at 21-63; R. Rebouché, "The Public Health Turn in Reproductive Rights," *Washington & Lee Law Review* 78, no. 4 (2021): 1355-1432 (summarizing public health research on the impact of abortion restrictions).

⁴ See K. Watson "The Ethics of Access: Reframing the Need for Abortion Care as a Health Disparity," *American Journal of Bioethics* 22, no. 8 (2022): 22-30; M. Oberman, "Motherhood, Abortion, and the Medicalization of Poverty," *Journal of Law, Medicine & Ethics* 46, no. 3 (2018): 665-671.

⁵ J. Sharfstein, "The Alabama Supreme Court's Ruling on Frozen Embryos," *Johns Hopkins Bloomberg School of Public Health*, February 27, 2024, available at <<https://publichealth.jhu.edu/2024/the-alabama-supreme-courts-ruling-on-frozen-embryos>> (last visited March 12, 2024).

⁶ K. Chandler, "Alabama IVF Patients Describe Heartbreak, Anger After Ruling," *Associated Press*, February 27, 2024, available at <<https://apnews.com/article/alabama-ivf-legislation-0506c070085407b8983bf55409b1465c>> (last visited March 12, 2024).

⁷ M. Wadman, "Alabama IVF Ruling May Halt Uterine Transplant Program," *Science*, February 23, 2024, available at <<https://www.science.org/content/article/alabama-ivf-ruling-may-halt-uterine-transplant-program>> (last visited March 12, 2024).

Cox’s doctor said would cause a stillbirth or death of the baby shortly after birth. Cox’s doctor also advised that going through with her pregnancy would be a severe threat to Cox’s own health and that induced abortion was the proper medical treatment. However, because Texas only allows abortions in the face of life-threatening physical conditions, Cox’s doctor was hesitant to perform the procedure. Hoping to avoid further suffering and harms to her health, Cox filed suit asking a Texas court to allow her doctor to perform her abortion.⁸ The Texas Supreme Court held that state law did not allow an exemption in Cox’s case and Cox fled the state to obtain abortion care.⁹

When most people think about legal restrictions on abortion, they likely do not think about stories like these. The public generally believes abortion laws affect only people with unwanted pregnancies, not people seeking fertility treatment or treatment for pregnancy-related complications. Yet, laws curtailing access to abortion are reshaping these patients’ medical care—or lack of appropriate medical care. Abortion cannot be isolated from the continuum of reproductive health care. Degraded health care across the board is the impact of overturning *Roe v. Wade*, and it is affecting patients across the country. In the post-*Dobbs* world, the links between abortion care and a wide range of health care have become starkly apparent.¹⁰ A growing body of public health evidence demonstrates that laws restricting access to abortion care have inhibited access to medical care for patients seeking treatment for everything from pre-conception care such as contraception and fertility services, to prenatal care and pregnancy-related care, as well as medical care unrelated to pregnancy.¹¹

Stories like those shared by Elizabeth Goldman and Kate Cox expose the reality that abortion care is integral to and deeply integrated with a wide range of health care needs. Abortion bans cause unwarranted government intrusion into a spectrum of interrelated health care decisions.¹² If the public understands that abortion bans threaten access to many types of needed medical treatments—including contraception, fertility treatments, miscarriage management, maternity care, cancer treatment, and rheumatology medications—it could generate more antipathy to government overreach into health care decision-making around abortion. Creating a more nuanced picture of the full breadth of health harms that flow from laws restricting abortion care would help the public develop a more accurate understanding of the public health implications of losing abortion rights. This framing of abortion as a wide ranging public health issue could help persuade voters to protect women and pregnant people’s health by rejecting government interference with reproductive health care including abortion care.¹³ Without constitutional protection for abortion rights, educating the public about how abortion is an essential aspect of health care for a broad swath of patients offers a useful framework for fighting abortion bans at the federal, state, and local level. Reframing abortion bans as government mandates that interfere with the physician-patient relationship and harm women and pregnant people’s health has proven to be a successful strategy for

⁸ Petition for Declaratory Judgment and Application for Temporary Restraining Order and Permanent Injunction at 1-7, *In re State*, 682 S.W.3d 890 (Tex. 2023) (No. 23-0994).

⁹ *In re State*, 682 S.W.3d 890, 890-92 (Tex. 2023).

¹⁰ See, e.g., K. Zernike, “Medical Impact of Roe Reversal Goes Well Beyond Abortion Clinics, Doctors Say,” *New York Times*, September 10, 2022, available at <<https://www.nytimes.com/2022/09/10/us/abortion-bans-medical-care-women.html>> (last visited April 22, 2023).

¹¹ See, e.g., S.M. Suter, “All the Ways *Dobbs* Will Harm Pregnant Women, Whether or Not They Want an Abortion,” *Slate*, June 29, 2022, available at <<https://slate.com/news-and-politics/2022/06/dobbs-pregnant-women-surveillance-ivf-bans-abortion.html>> (last visited April 22, 2023).

¹² K. Watson, M. Paul, S. Yanow and J. Baruch, “Supporting, Not Reporting — Emergency Room Ethics in a Post-Roe Era,” *New England Journal of Medicine* 387, no. 10 (2022) 861-863; K. Watson, “Why We Should Stop Using the Term “Elective Abortion,”” *American Medical Association Journal of Ethics* 20, no. 12 (2018): 1175-1180.

¹³ See, e.g., B.J. Hill, “Reproductive Rights as Health Care Rights,” *Columbia Journal of Gender & Law* 18, no. 2 (2009): 501-549; Y. Lindgren, “The Rhetoric of Choice: Restoring Healthcare to the Abortion Right,” *Hastings Law Journal* 64 (2013): 385-422.

combatting abortion bans in a number of states, when the issue was put to voters through ballot initiatives.¹⁴

Below, I survey the public health impacts of *Dobbs* on health care more broadly. This survey aims to summarize the current state of evidence, including preliminary research studies, on how post-*Dobbs* abortion bans are hindering access to health care across a broad swath of medical issues.

1. Assisted Reproductive Technologies and In Vitro Fertilization

One of the most recent state court legal decisions flowing from *Dobbs*' elimination of abortion rights resulted in a near total ban, practically speaking, on in vitro fertilization (IVF). In *LePage v. Center for Reproductive Medicine, P.C.*, the Alabama Supreme Court held that Alabama's Wrongful Death of a Minor Act covered frozen embryos created using IVF.¹⁵ The Court held that under Alabama law, unborn children qualify as legal persons and defined an unborn child as "a genetically unique human being whose life begins at fertilization" even when fertilization occurs outside the uterus, as in the case of IVF.¹⁶ Immediately following the court's ruling, fertility clinics in Alabama halted treatments and many patients lost their ability to pursue fertility treatment with IVF.¹⁷ Clinics were not comfortable renewing treatment until the Alabama legislature eventually passed a law granting IVF clinics immunity from suit for damaged or destroyed embryos.¹⁸ However, this approach of "IVF exceptionalism"—protecting IVF while criminalizing abortion although both involve the destruction of embryos—"further stratifies the social and health justice inequities that have long defined utilization of these two medical treatments" since IVF is disproportionately accessible to patients of higher socioeconomic status.¹⁹ While the law could temporarily shield IVF providers, it did not reverse the Alabama Supreme Court's ruling that extruterine frozen embryos are legal persons.²⁰

Even before the Alabama Supreme Court's decision, legal scholars noted that *Dobbs* threatens access to fertility treatments such as IVF.²¹ In addition, the American Society for Reproductive Medicine (ASRM) expressed serious concerns about how abortion restrictions will interfere with a range of medical interventions related to fertility treatments. In a July 2022 policy report, the ASRM Center for Policy and Leadership reviewed the implications of state abortion bans for reproductive medicine and emphasized that abortion bans "have the potential to severely limit the ability to provide high-quality, patient-centered maternal health care."²² The ASRM report noted that "IVF may put patients at increased risk for ectopic

¹⁴ R. Rebouché and M. Ziegler, "Why Direct Democracy Is Proving So Powerful for Protecting Abortion Rights," *The Atlantic*, November 11, 2022, available at <<https://www.theatlantic.com/ideas/archive/2022/11/abortion-rights-midterm-election-ballot-initiatives/672071/>> (last visited April 29, 2023); R. Rebouché and M. Ziegler, "Fracture: Abortion Law and Politics After *Dobbs*," *Southern Methodist University Law Review* 76 (2023): 27-76.

¹⁵ *LePage v. Center for Reproductive Medicine, P.C.*, Nos. SC-2022-0515, SC-2022-0579, 2024 Ala. LEXIS 60, at *6 (Feb. 16, 2024).

¹⁶ *Id.* at *6-7.

¹⁷ Sharfstein, *supra* note 5.

¹⁸ S.B. 159, 2024, Regular Session (Ala. 2024); G. Mulvihill, "What to know about Alabama's fast-tracked legislation to protect in vitro fertilization clinics," *Associated Press*, March 6, 2024, available at <<https://apnews.com/article/alabama-ivf-clinic-lawsuit-immunity-things-know-0d16d3be139f42c96bc3ab35c4467f55>> (last visited March 9, 2024).

¹⁹ J. Daar, "Where Does life Begin? Discerning the Impact of *Dobbs* on Assisted Reproductive Technologies," *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 518-527, at 525.

²⁰ P. Somasundaram, "Alabama Governor Signs IVF Bill, Giving Patients, Providers Legal Cover," *Washington Post*, March 6, 2024, available at <<https://www.washingtonpost.com/nation/2024/03/06/alabama-governor-signs-ivf-bill/>> (last visited March 12, 2024).

²¹ See Daar, *supra* note 19, at 519-22.

²² American Society for Reproductive Medicine Center for Policy and Leadership, "The Potential Impact of States'

and heterotopic pregnancy, and trigger laws may have consequences on the management of these and other pregnancy complications....”²³ Increasing the public’s understanding about how abortion bans threaten health care access for patients seeking fertility care could help to create political will to resist abortion bans, which was a successful strategy in the pre-*Dobbs* era to block “personhood” laws—laws that like the Alabama Supreme Court’s decision establish embryos as legal persons.²⁴

2. Contraception and Sterilization

Attempts to restrict access to contraception have already come to pass, even without a direct challenge to the constitutional right protecting access to contraception. In its *Dobbs* briefing, Mississippi argued that contraception reduces the need for access to abortion care.²⁵ Greater public awareness about how *Dobbs* could be used to block access to some of the most effective methods of contraception may help to increase the public’s disfavor of abortion bans.

More restrictions on contraception could arise along the lines of religious objections to insurance coverage for contraceptives, and also from false assertions about contraception operating as an abortion.²⁶ Some anti-abortion advocates have incorrectly claimed that certain forms of contraception act as abortifacients.²⁷ Prior to *Dobbs*, Missouri legislators attempted to ban Medicaid funding for emergency contraception and IUDs, two forms of birth control that anti-abortion groups falsely claim are abortifacients.²⁸ After the *Dobbs* decision, St. Luke’s Health System declared that it would stop providing emergency contraception due to Missouri’s abortion ban, until the state’s Attorney General declared that the ban would not apply to contraception. Still, St. Luke’s expressed concern about liability for providing emergency contraception given the law’s ambiguity.²⁹ When Idaho’s trigger ban on abortion took effect in August 2022, the University of Idaho’s general counsel issued guidance that included not only limits on information about abortion, but also stated the school should no longer offer contraception to students. The University later clarified that condoms would still be provided through the school, but only “for the purpose of not transmitting disease” and not for the purpose of preventing conception.³⁰ In December 2022, a federal district court judge granted summary judgment in favor of a plaintiff challenging the

Abortion Trigger Laws on Reproductive Medicine,” *American Society for Reproductive Medicine*, July 1, 2022, available at <https://www.asrm.org/globalassets/_asrm/advocacy-and-policy/dobbs/cpl-report_impact-of-state-trigger-laws-on-reproductive-medicine_final.pdf> (last visited April 25, 2022).

²³ See *id.*

²⁴ See M. Manian, “Lessons from Personhood’s Defeat: Abortion Restrictions and Side Effects on Women’s Health,” *Ohio State Law Journal* 74, no. 1 (2013): 75-120, at 77.

²⁵ Brief for Petitioners at 29-30, 34, *Dobbs v. Jackson Women’s Health Org.*, 142 S. Ct. 2228 (2022) (No. 19-1392).

²⁶ E. Sepper, “Anti-Abortion Exceptionalism after *Dobbs*,” *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 612-617, at 614; J. Rovner, “A GOP Talking Point Suggests Birth Control Is Not at Risk. Evidence Suggests Otherwise,” *KFF Health News*, August 5, 2022, available at <<https://khn.org/news/article/republican-talking-point-birth-control-risk-abortion-false-claim/>> (last visited April 22, 2023).

²⁷ See G. Donley, R. Rebouché and D.S. Cohen, “The Harsheset Abortion Restrictions Are Yet to Come,” *The Atlantic*, July 11, 2022, available at <<https://www.theatlantic.com/ideas/archive/2022/07/pro-life-legal-strategies-abortion/661517/>> (last visited April 22, 2023).

²⁸ M. Ollove, “Some States Already Are Targeting Birth Control,” *Stateline*, May 19, 2022, available at <<https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/05/19/some-states-already-are-targeting-birth-control>> (last visited April 22, 2023).

²⁹ “Is Plan B Still Legal? In Some States, Confusion Abounds,” *Advisory Board*, March 18, 2023, available at <<https://www.advisory.com/daily-briefing/2022/07/05/emergency-contraceptives>> (last visited April 22, 2023).

³⁰ A. Durkee, “University of Idaho Says New Abortion Guidance Isn’t That Different From Before — But Faculty Could Still Face Criminal Prosecution,” *Forbes*, October 6, 2022, available at <<https://www.forbes.com/sites/alisondurkee/2022/10/06/university-of-idaho-says-new-abortion-guidance-isnt-that-different-from-before---but-faculty-could-still-face-criminal-prosecution/?sh=1c79b2003b04>> (last visited April 22, 2023).

federal Title X program's support of low-income adolescents' access to contraceptive services without parental consent, a first blow against contraception in the federal courts.³¹

Due to confusion about the implications of *Dobbs* for access to contraception, along with more states enacting bans on abortion, reproductive health advocates fear that more people will be implicitly or explicitly coerced into sterilization—particularly those from historically marginalized populations. For example, physicians have been reporting that their patients are asking about whether contraception will still be legal after *Dobbs*, and some are seeking sterilization due to fears that they would not be able to control their fertility:

“We’ve had record numbers of people asking for their tubes to be tied—people with multiple kids and people with no kids. Some are saying, ‘My husband has a vasectomy, but I still need to make sure I’m protected.’ We are going to be doing a lot more surgeries to sterilize women.”³²

Several preliminary studies indicate that requests for sterilization have increased as a result of the *Dobbs* decision.³³ Given the United States’ long history of eugenic sterilization, the increased rates of sterilization following *Dobbs* could indicate a disturbing trend towards a new form of coercive sterilization through the use of abortion bans compounded by restricted access to contraception.³⁴ During the anti-sterilization abuse movements of the 1960s and 1970s, activists, primarily women of color, argued that abortion restrictions like the Hyde Amendment (which prohibits federal Medicaid funding for abortions) combined with cuts in social welfare programs operated in practice as a new form of eugenic sterilization, since sterilization was the only means of fertility control accessible to low-income families.³⁵ Similarly, after *Dobbs*, sterilization is likely the most reliable and affordable form of fertility control available in some states since Medicaid covers sterilization but almost never abortion.

Some advocates are concerned about explicit coerced sterilization of marginalized groups such as people with disabilities.³⁶ The United States has a long history of forced sterilization of disabled people, one that lingers today since courts still make determinations about whether to authorize such

³¹ *Deanda v. Becerra*, No. 2:20-CV-092-Z, 2022 U.S. Dist. LEXIS 222087 (N.D. Tex. Dec. 8, 2022).

³² J. Winter, “The *Dobbs* Decision Has Unleashed Legal Chaos for Doctors and Patients,” *The New Yorker*, July 2, 2022, available at <<https://www.newyorker.com/news/news-desk/the-dobbs-decision-has-unleashed-legal-chaos-for-doctors-and-patients>> (last visited April 22, 2023).

³³ S. Dutt, M. Schissel, M. Mathes, “Post-Roe World: The Effects on Contraception and Sterilization Requests,” *Fertility and Sterility* 120, no. 4 (2023); A. Liang, C. Gliwa, C. Loder, V. Dalton, R. Smith, “Tubal Sterilization Requests at a Single Institution Following the Supreme Court Decision to Overturn the Constitutional Right to Abortion,” *JAMA Network* 330, no. 4 (2023): 374-375; R. Bole, S. Lundy, E. Pei, P. Bajic, N. Parekh & S. Vij, “Rising Vasectomy Volume Following Reversal of Federal Protections for Abortion Rights in the United States,” *International Journal of Impotence Research* Feb 14 (2023): 1-4.

³⁴ See P. Lombardo, “‘A Vigorous Campaign against Abortion’: Views of American Leaders of Eugenics v. Supreme Court Distortions,” *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 473-479, at 477; L.C. Ikemoto, “Infertile by Force and Federal Complicity: The Story of *Relf v. Weinberger*,” in E.M. Schneider and S.M. Wildman, eds., *Women and the Law Stories* (Foundation Press, 2010): at 196; M. Manian, “Coerced Sterilization of Mexican-American Women: The Story of *Madrigal v. Quilligan*,” in M. Murray, K. Shaw and R.B. Siegel, eds., *Reproductive Rights and Justice Stories* (Foundation Press, 2019): at 97; See generally Paul A. Lombardo, *Three Generations, No Imbeciles: Eugenics, the Supreme Court, and Buck v. Bell* (Maryland: Johns Hopkins University Press, 2008).

³⁵ See K.M. Bridges, “Elision and Erasure: Race, Class, and Gender in *Harris v. McRae*,” in M. Murray, K. Shaw and R.B. Siegel, eds., *Reproductive Rights and Justice Stories* (Foundation Press, 2019): at 117.

³⁶ L. Francis, “The Reproductive Injustices of Abortion Bans for Disability,” *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 490-49.

sterilizations.³⁷ These examples of restricted access to contraception and potentially coercive sterilizations directly flow from the *Dobbs* decision's evisceration of abortion rights.

3. Pregnancy-Related Complications

In the aftermath of *Dobbs*, health care providers and patients have been publicly sharing stories of the increasing difficulties women and pregnant people are facing when trying to access pregnancy-related medical care in jurisdictions hostile to abortion. Public health researchers have launched studies to gather empirical data on pregnant patients who have received substandard medical care due to a state's abortion restrictions. Prior to *Dobbs*, abortion restrictions impeded access to a range of health care concerns other than abortion care in ways that were largely invisible to the public. The ripple of effects of anti-abortion laws and policies pre-*Dobbs* included impeded access to miscarriage management and treatment for ectopic pregnancy (particularly in sectarian hospitals), limits on information during prenatal care, and changes to treatment in end-of-life care.³⁸ The pending litigation on continued access to mifepristone—one of two drugs used in the FDA's approved regimen for medication abortion—also impacts the use of the drug in treatment for miscarriages.³⁹ Although laws targeting abortion interfered with a broad array of health care before *Dobbs*, the decision rapidly magnified the problem and impeded access to care in a wider range of clinical settings across the country.

The first indications of how overturning *Roe* would impact the delivery of medical care came from the Texas civil liability “bounty hunter” abortion bill known as SB8, which the Supreme Court failed to enjoin in 2021.⁴⁰ SB8 effectively banned abortion at six weeks of pregnancy, before many people realize they are pregnant. Anecdotal evidence exposed how SB8 hindered access to medical care for people suffering pregnancy-related complications. One woman, Anna, shared her harrowing story after a Texas hospital refused to perform a lifesaving abortion for her miscarriage and she had to fly out of state for her abortion care.⁴¹ Texans also described stories of being forced into interstate travel after SB8 to obtain abortion care for ectopic pregnancies, which are non-viable and life threatening.⁴²

³⁷ See J.E. Harris, “Taking Disability Public,” *University of Pennsylvania Law Review* 169, no. 6 (2021): 1681-1749; R.M. Powell, “Disability Reproductive Justice,” *University of Pennsylvania Law Review* 170, no. 7 (2022): 1851-1903.

³⁸ See M. Manian, “The Consequences of Abortion Restrictions for Women's Healthcare,” *Washington & Lee Law Review* 71, no. 2 (2014): 1317-1337; J. Strasser, C. Chen, S. Rosenbaum, E. Schenk and E. Dewhurst, “Penalizing Abortion Providers Will Have Ripple Effects Across Pregnancy Care,” *Health Affairs*, May 3, 2022, available at <<https://www.healthaffairs.org/doi/10.1377/forefront.20220503.129912>> (last visited April 25, 2023).

³⁹ See G. Donley, “Medication Abortion Exceptionalism,” *Cornell Law Review* 107, no. 3 (2022): 627-704; See also *All. for Hippocratic Med. v. United States FDA*, No. 2:22-CV-223-Z, 2023 U.S. Dist. LEXIS 61474 (N.D. Tex. Apr. 7, 2023); *All. for Hippocratic Med. v. FDA*, No. 23-10362, 2023 U.S. App. LEXIS 8898 (5th Cir. Apr. 12, 2023); *All. for Hippocratic Med. v. FDA*, No. 23-10362, 2023 U.S. App. LEXIS 8898 (5th Cir. Apr. 12, 2023), *cert. granted*, 92 U.S.L.W. 3148 (U.S. Dec. 13, 2023) (No. 23-235).

⁴⁰ S.B. 8, 87th Leg., Reg. Sess. (Tex. 2021); *Whole Woman's Health v. Jackson*, 595 U.S. 30 (2021); K. White, G. Sierra & L. Dixon et al., *Texas Senate Bill 8: Medical and Legal Implications*, Texas Policy Evaluation Project, July 2021, available at <<https://sites.utexas.edu/txpep/files/2021/07/TxPEP-research-brief-senate-bill-8.pdf>> (last visited April 25, 2023).

⁴¹ See S. McCammon and L. Hodges, “Doctors’ worst fears about the Texas abortion law are coming true,” NPR, March 1, 2022, available at <<https://www.npr.org/2022/02/28/1083536401/texas-abortion-law-6-months>> (last visited April 25, 2023).

⁴² G. Donley and J.W. Lens, “Abortion, Pregnancy Loss, & Subjective Fetal Personhood,” *Vanderbilt Law Review* 75, no. 6 (2022): 1649-1727, at 1713.

One research study on the aftermath of SB8 found a wide range of medical impacts of the six-week abortion ban, as abortion is the standard of care for many pregnancy-related complications.⁴³ The Texas physicians in the study reported delayed or denied care for everything from fetal anomalies incompatible with life to rupture of membranes before viability and ectopic pregnancies. A maternal-fetal medicine specialist summarized the hospital climate after SB8: “People have to be on death’s door to qualify for maternal exemptions to SB8.”⁴⁴

In cases that fell within the medical exemption, doctors described using more difficult or riskier procedures such as induction (forcing the patient through labor and birth of a non-viable fetus) or a hysterotomy (slicing into the uterus) rather than the standard method of dilation and evacuation (D&E) for fear that the D&E procedure would appear to be an illegal abortion.⁴⁵ In sum, the study found that “[p]atients with pregnancy complications or preexisting medical conditions that may be exacerbated by pregnancy are being forced to delay an abortion until their conditions become life-threatening and qualify as medical emergencies, or until fetal cardiac activity is no longer detectable.”⁴⁶

After *Dobbs*, researchers published a study examining the public health impact of Texas’ post-*Dobbs* felony criminal abortion bans on treatments for pregnancy-related complications. The study found higher rates of maternal morbidity due to the state’s abortion laws. Among other concerns, the study found that delayed care “resulted in 57% of patients having a serious maternal morbidity compared with 33% who elected immediate pregnancy interruption under similar clinical circumstances reported in states without such legislation.”⁴⁷ Given this data, researchers at UCSF launched a nationwide study and have issued a preliminary report about how abortion restrictions enacted after *Dobbs* are impeding the delivery of medical care for pregnancy-related complications.⁴⁸

Lawsuits have been filed across the country seeking to alleviate at least some of the severe health harms caused by state abortion restrictions.⁴⁹ For example, in Texas, thirteen women and two physicians

⁴³ See W. Arey, K. Lerma and A. Beasley et al., “A Preview of the Dangerous Future of Abortion Bans — Texas Senate Bill 8,” *New England Journal of Medicine* 387, no. 5 (2022): 388-390.

⁴⁴ See *id.* at 389.

⁴⁵ See *id.*

⁴⁶ See *id.*

⁴⁷ A. Nambiar, S. Patel and P. Santiago-Munoz et al., “Maternal morbidity and fetal outcomes among pregnant women at 22 weeks’ gestation or less with complications in 2 Texas hospitals after legislation on abortion,” *American Journal of Obstetrics & Gynecology* 227, no. 4 (2022): 648-650, at 649.

⁴⁸ See “Dobbs Impact Study,” University of California San Francisco, available at <<https://carepostroe.ucsf.edu>> (last visited April 26, 2023); R.A. Stein, A. Katz and F.A. Chervenak, “The far-reaching impact of abortion bans: reproductive care and beyond,” *European Journal of Contraception & Reproductive Health Care* 28, no. 1 (2022): 23-27; L.M. Paltrow, L.H. Harris and M.F. Marshall, “Beyond Abortion: The Consequences of Overturning Roe,” *American Journal of Bioethics*, 22, no. 8, (2022): 3-15; S.R. Easter and C.T. Johnson, “A Case of Restrictions on Comprehensive Reproductive Health Care,” *New England Journal of Medicine Evidence* 2, no. 1 (2022): 1-2.

⁴⁹ Verified Complaint For Declaratory Relief, *Isaacson v. Arizona*, No. CV2022-013091 (Ariz. Superior Ct. Maricopa Cnty. filed Oct. 3, 2022); Complaint, *State v. Planned Parenthood of Sw. & Cent. Fla.*, 342 So. 3d 863 (Fla. Dist. Ct. App. 2022) (No. 1D22-2034); Complaint, *State of Ga. v. SisterSong Women of Color Reprod. Justice Collective*, 894 S.E.2d 1 (Ga. 2023) (No. S23A0421); Complaint, *June Med. Servs. v. Landry*, 343 So. 3d 700 (La. 2022) (No. 2022-OC-01198); Complaint, *Jackson Women’s Health v. Dobbs*, No. G2022-739013 (Miss. Chancery Court of Hinds County filed June 27, 2022); Amended Complaint, *Access Independent Health Services, Inc., v. Wrigley*, No. 08-2022-CV-01608 (N.D. District Court, South Central Judicial District filed June 12, 2023); Complaint, *Okla. Call v. Drummond*, 526 P.3d 1123 (Okla. 2023) (No. 120543); Complaint, *Planned Parenthood S. Atlantic v. State*, 2023 S.C. LEXIS 35 (Feb. 8, 2023) (No. 28127); Complaint, *Whole Woman’s Health v. Paxton*, 2022 Tex. Dist. LEXIS 9691 (No. 2022-38397).

filed a lawsuit pursuing claims under the Texas state constitution.⁵⁰ The complaint alleges the women were unable to obtain obstetric care due to Texas’ anti-abortion laws, including care for miscarriages, pregnancy-induced health complications, and severe fetal abnormalities, and collects similar stories of denials of care in states with post-*Dobbs* abortion restrictions from across the country.⁵¹ In order to address growing concerns about access to life and health-saving abortion care, the Biden Administration issued new Guidance on EMTALA, the Emergency Medical Treatment and Active Labor Act.⁵² The 2022 Guidance asserted that EMTALA can preempt a state’s abortion ban to some extent, and that hospital emergency departments may be required to perform abortion procedures under certain circumstances pursuant to EMTALA’s protections.⁵³ Two federal courts in Idaho and Texas issued conflicting decisions on whether EMTALA preempts state abortion bans that have a chilling effect on medical care, and the U.S. Supreme Court will decide in 2024 whether EMTALA will protect pregnant patients’ health nationwide.⁵⁴

In addition to evidence that abortion bans lead to substandard care for pregnancy-related complications, physicians are also concerned about *Dobbs*’ impact on pregnant patients with cancer. Typically, drugs used to treat cancer are harmful or potentially fatal to a viable pregnancy. For aggressive cancers such as leukemia, treatment cannot be delayed until the completion of a pregnancy. In such circumstances, doctors almost always advise termination of the pregnancy, but in states with abortion bans pregnancy termination may no longer be an option.⁵⁵ Even though some anti-abortion laws have exceptions for the health of the woman, doctors are uncertain whether a patient’s cancer will fit within those exceptions.⁵⁶ An article by two physicians published in *JAMA Oncology* noted that as the maternal childbearing age increases, pregnancy associated cancer is projected to rise and that the estimated twenty-six states that are expected to restrict abortion care account for forty-one percent of U.S. births.⁵⁷ Physicians fear that *Dobbs* will hinder oncologists’ ability to deliver optimal care to pregnant patients.⁵⁸

⁵⁰ Plaintiffs’ First Amended Verified Petition for Declaratory Judgment and Application for Temporary and Permanent Injunction at 1-3, *Zurawski v. Texas*, No. D-1-GN-23-000968 (Dist. Ct. Travis Cnty. May 22, 2023).

⁵¹ Plaintiffs’ Original Petition for Declaratory Judgment and Application for Permanent Injunction, *Zurawski v. Texas*, No. D-1-GN-23-000968 (Dist. Ct. Travis Cnty. Mar. 6, 2023).

⁵² Centers for Medicare & Medicaid Services, Department of Health & Human Services, QSO-22-22-Hospitals, “Reinforcement of EMTALA Obligations specific to Patients who are Pregnant or are Experiencing Pregnancy Loss,” (2022).

⁵³ *Id.*

⁵⁴ *Texas v. Becerra*, 623 F. Supp. 3d 696 (N.D. Tex. 2022); *United States v. Idaho*, 623 F. Supp. 3d 1096 (D. Idaho 2022), *cert. granted*, 92 U.S.L.W. 3166 (U.S. Jan. 5, 2024) (No. 23-727).

⁵⁵ G. Kolata, “After Roe, Pregnant Women With Cancer Diagnoses May Face Wrenching Choices,” *New York Times*, July 25, 2022, available at <<https://www.nytimes.com/2022/07/23/health/pregnant-woman-cancer-abortion.html>> (last visited April 26, 2023); See also J. Abrams, “What Moving from Kentucky to Virginia After I Was Diagnosed With Cancer Reveals About Roe,” *Think*, July 7, 2022, available at <<https://www.nbcnews.com/think/opinion/end-of-roe-kentucky-virginia-divergent-health-care-systems-for-women-rcna37215>> (last visited April 26, 2023).

⁵⁶ M.A. Parks, “For pregnant women with cancer, doctors fear abortion bans ‘could be a death sentence’,” *ABC News* July 19, 2022, available at, <<https://abcnews.go.com/Health/pregnant-women-cancer-doctors-fear-abortion-bans-death/story?id=85948248>> (last visited April 26, 2023).

⁵⁷ J. Silverstein and K.V. Loon, “The Implications of the Supreme Court Decision to Overturn *Roe v. Wade* for Women with Pregnancy-Associated Cancers,” *Journal of the American Medical Association Oncology*, August 11, 2022, available at <<https://jamanetwork.com/journals/jamaoncology/fullarticle/2795172?guestaccesskey=1e7079a1-17fb-4265-81ed-169b633bae1c>> (last visited April 26, 2023).

⁵⁸ *Id.*

Abortion bans are creating life threatening medical emergencies where there need not be any.⁵⁹ Deaths due to delayed care flowing from legal restrictions on abortion have already occurred in Poland and Ireland. In the case of Ireland, the death of Savita Halappanavar helped to instigate changes to Ireland's strict abortion laws.⁶⁰

4. Prenatal Care and Maternal Mortality

Dobbs will have wide ranging long term consequences for prenatal care. Some impacts include potential changes to standard practices in prenatal care regarding disclosure of fetal abnormalities and genetic information, decreased access to prenatal care due to increased shortages of maternity care providers, and changes to medical education in obstetrics that impact pregnancy-related care.

States with strict abortion bans may decide to alter what information is available about a pregnancy, including information about fetal anomalies and prenatal genetic testing.⁶¹ Research shows that prenatal genetic counseling practices and information sharing are changing as a result of the *Dobbs* decision.⁶² Furthermore, prenatal care may become less available as obstetricians are fleeing jurisdictions that are criminalizing obstetric care.⁶³

Medical education could also be changed in ways that impact prenatal care not only due to fewer ob-gyn trainees in anti-abortion states, but also a lack of comprehensive reproductive health care training for clinicians in those states.⁶⁴ One study examining the potential impact of overturning *Roe v. Wade* on medical education estimated that of the approximately 6,000 ob-gyn trainees in accredited U.S. obstetrics

⁵⁹ Donley & Lens, *supra* note 42, at 1713; G. Donley & C. Kelly, "Abortion Disorientation," [Draft submitted for publication]. *Duke Law Journal* 74, <https://ssrn.com/abstract=4729217>.

⁶⁰ J. Valenti, "Searching for Savita," *Abortion, Every Day*, March 5, 2024, available at <<https://jessica.substack.com/p/searching-for-savita>> (last visited March 10, 2024); P. Smith, "This Woman Died Because of an Abortion Ban. Americans Fear They Could Be Next," *NBC News*, July 4, 2022, available at <<https://www.nbcnews.com/news/world/woman-died-ireland-abortion-ban-warning-americans-roe-v-wade-rcna35431>> (last visited April 26, 2023).

⁶¹ See Daar, *supra* note 19; N. Sawicki & E. Kukura, "From Constitutional Protections to Medical Ethics: The Future of Pregnant Patients' Medical Self-Determination Rights After *Dobbs*," *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 528-532.

⁶² S. Suter & L. Hercher, "Reproductive Genetic Medicine in a Post-*Dobbs* World: Will it Make Life Harder for People with Genetic Disease?," *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 511-517, at 513-14; M.A. Allyse and M. Michie, "Prenatal Genetics in a Post-*Roe* United States," *Cell Reports Medicine* 3, no. 7 (2022): 1-3; L. Hercher, "Genetic Counselors Scramble Post-*Roe* to Provide Routine Pregnancy Services without Being Accused of a Crime," *Scientific American*, August 3, 2022, available at <<https://www.scientificamerican.com/article/genetic-counselors-scramble-post-roe-to-provide-routine-pregnancy-services-without-being-accused-of-a-crime/>> (last visited April 26, 2023).

⁶³ See A. Woodcock, G. Carter, J. Baayd, D. Turok et al., "Effects of the *Dobbs v Jackson Women's Health Organization* Decision on Obstetrics and Gynecology Graduating Residents' Practice Plans," *Obstetrics & Gynecology* 142, no. 5 (2023): 1105-1111; S. Bernstein, M. Levy, S. McNeilly, S. Fishbach et al., "Practice Location Preferences in Response to State Abortion Restrictions Among Physicians and Trainees on Social Media," *Journal of General Internal Medicine* 38 (2023): 2419-2423; K. Orgera, H. Mahmood & A. Grover, "Training Location Preferences of U.S. Medical School Graduates Post *Dobbs v. Jackson Women's Health*," *Association of American Medical Colleges*, April 13, 2023, available at <<https://www.aamcresearchinstitute.org/our-work/data-snapshot/training-location-preferences-us-medical-school-graduates-post-dobbs-v-jackson-women-s-health>> (last visited March 12, 2024); M.R. Saxena, E.K. Choo and S. Andrabi, "Reworking Emergency Medicine Resident Education Post-*Dobbs v. Jackson Women's Health Organization*," *Journal of Graduate Medical Education* 15, no. 3 (2023): 283-286, at 283.

⁶⁴ A. Pasha, D. Breitkopf & G. Glaser, "The Impact of *Dobbs* on US Graduate Medical Education," *Journal of Law, Medicine & Ethics* 51, no. 3 (2023): 497-503, at 500-02.

and gynecology programs, 43.9% train at programs in states that are certain or likely to ban abortion once *Roe v. Wade* is overturned.⁶⁵ The study stresses that:

“Abortion training has also been shown to improve general skills and confidence in uterine evacuation and miscarriage management. Furthermore, though some residents choose not to participate fully in abortion training on religious or moral grounds, partial participators in programs that offer routine abortion training benefit from improved procedural, ultrasonography, and pregnancy-counseling skills. Thus, the ramifications of this chasm in training will extend beyond induced abortion care.”⁶⁶

In addition, the study notes that abortion restrictions disproportionately harm communities of color and further studies will be needed to understand whether abortion restrictions “would disproportionately affect training for obstetrics and gynecology residents identifying with racial and ethnic groups underrepresented in medicine, because they are more likely to provide care to underserved populations.”⁶⁷

Dobbs will likely have ripple effects on maternal morbidity and mortality rates not only due to maternity care provider shortages, but also because carrying a pregnancy to term is much more dangerous than abortion. Experts predict more pregnant people will die due to the inability to access a wanted abortion in a post-*Roe* world.⁶⁸ Due to the effects of systemic racism, increases in maternal deaths will disproportionately impact women of color. As has been reported in recent years, maternal mortality in the United States is a crisis borne disproportionately by Black women.⁶⁹ This crisis may very well worsen as abortion access is further cut back since studies show that legal restrictions on abortion and rates of maternal mortality are correlated.⁷⁰ Especially in states that already experience maternity care deserts and that also criminalize abortion, many women will be forced to give birth in unsafe conditions.⁷¹ A University of Colorado study predicts that the US maternal death rate could increase by 24 percent if there were a nationwide ban on abortion.⁷² Forced childbirth may also lead to higher rates of maternal morbidity, particularly among marginalized populations. Low-income women have higher rates of miscarriage and stillbirth than women of higher socioeconomic status.⁷³ Women of color, especially

⁶⁵ K. Vinekar, A. Karlapudi and L. Nathan et al., “Projected Implications of Overturning *Roe v. Wade* on Abortion Training in U.S. Obstetrics and Gynecology Residency Programs,” *Obstetrics & Gynecology* 140, no. 2 (2022): 146-149, at 147.

⁶⁶ *Id.* at 148.

⁶⁷ *See id.*; *See also* L.H. Harris, “Navigating Loss of Abortion Services — A Large Academic Medical Center Prepares for the Overturn of *Roe v. Wade*,” *New England Journal of Medicine* 386, no. 22 (2022): 2061-2064.

⁶⁸ Harris, *supra* note 67, at 2063.

⁶⁹ S. Sgaier and J. Downey, “What We See in the Shameful Trends on U.S. Maternal Health,” *New York Times*, November 17, 2021, available at <<https://www.nytimes.com/interactive/2021/11/17/opinion/maternal-pregnancy-health.html>> (last visited April 27, 2023).

⁷⁰ D. Vilda, M.E. Wallace and C. Daniel et al., “State Abortion Policies and Maternal Death in the United States, 2015-2018,” *American Journal of Public Health* 111, no. 9 (2021): 1696-1704; A.J. Stevenson, L. Root and J. Menken, “The maternal mortality consequences of losing abortion access,” *SocArXiv*, June 29, 2022, available at <osf.io/preprints/socarxiv/7g29k> (last visited April 27, 2023); L. Brubaker and K. Bibbins-Domingo, “Health Care Access and Reproductive Rights,” *Journal of the American Medical Association* 328, no. 17 (2022): 1707-1709.

⁷¹ *See* Harris, *supra* note 67, at 2063; *See also* R.B. Siegel, S. Mayeri and M. Murray, “Equal Protection in *Dobbs* and Beyond: How States Protect Life Inside and Outside of the Abortion Context,” *Columbia Journal of Gender and Law* 43, no. 1 (2023): 67-97.

⁷² Stevenson, Root & Menken, *supra* note 70.

⁷³ Donley & Lens, *supra* note 42, at 1663-65.

Black women, also face higher rates of miscarriage and stillbirth.⁷⁴ Studies show that stillbirth has a higher rate of life-threatening maternal complications than a live birth.⁷⁵

Given the extensive health disparities embedded in interconnected reproductive health issues, public attention should be focused on the links between abortion policy and rates of maternal morbidity and mortality. Public concern about maternal mortality rates in the U.S. is a potential pressure point that could be leveraged to fight abortion restrictions.⁷⁶

5. Non-Pregnancy Related Medical Care

In addition to the many public health implications of *Dobbs* on pregnancy-related health care, abortion bans are impeding access to medical care even when the condition has nothing to do with pregnancy. Concerns about teratogens (drugs that can harm a fetus subject to *in utero* exposure) have resulted in female patients being denied access to needed medications for non-pregnancy related medical concerns. In states with abortion bans, patients are facing obstacles to accessing standard medical care, “including access to medications such as methotrexate (widely used to treat rheumatoid arthritis), isotretinoin (used to treat nodular acne), and valproate (used to treat seizures).”⁷⁷

Post-*Dobbs*, reports quickly surfaced of patients with autoimmune diseases and rheumatological conditions facing hurdles to accessing their medications. For example, Becky Schwarz, who lives with lupus, was notified by her rheumatologist that they would stop all refills of methotrexate because it is considered an abortifacient. Although methotrexate can be used to induce an abortion, in much lower doses methotrexate is used to treat many autoimmune diseases. As a result of losing access to methotrexate, Becky had to suddenly change her medication, a shift which can cause flare-ups and impede normal functioning. Arthritis patients have also had trouble accessing their medications because the drugs are also associated with pregnancy termination.⁷⁸

A 2022 article in the *Annals of Internal Medicine* raised the concerns of rheumatologists about the consequences of *Dobbs* on the delivery of medical care to patients with rheumatic disease. The physician authors expressed fears around three medical issues impacted by abortion restrictions:

“First is a concern about access to medically indicated abortion that has been indicated because of teratogen exposure or active rheumatic disease. Second is a worry about access to necessary medications that are teratogenic. Third is a concern about laws that interfere with patient–clinician discussions about reproductive issues.”⁷⁹

⁷⁴ See *id.* at 1654; See also J.W. Lens, “Miscarriage, Stillbirth, & Reproductive Justice,” *Washington University Law Review* 98, no. 4 (2021): 1059-1115.

⁷⁵ See E. Wall-Wieler, S.L. Carmichael and R.S. Gibbs et al., “Severe Maternal Morbidity Among Stillbirth and Live Birth Deliveries in California,” *Obstetrics & Gynecology* 134, no. 2 (2019): 310-317.

⁷⁶ See K.M. Bridges, “Racial Disparities in Maternal Mortality,” *New York University Law Review* 95, no. 5 (2020): 1229-1318.

⁷⁷ Brubaker & Bibbins-Domingo, *supra* note 70.

⁷⁸ R. Flood, “Anger as Woman Denied ‘Abortifacient’ Medication After Roe v. Wade Ruling,” *Newsweek*, July 4, 2022, available at <<https://www.newsweek.com/anger-woman-denied-abortifacient-medication-roe-v-wade-abortion-1721428>> (last visited April 27, 2023); L. Rath, “New Barrier to Methotrexate for Arthritis Patients,” Arthritis Foundation, June 30, 2022, available at <<https://www.arthritis.org/about-us/news-and-updates/new-barrier-to-methotrexate-for-arthritis-patients>> (last visited April 27, 2023).

⁷⁹ M.E.B. Clowse and K.G. Saag, “Unintended Consequences of SCOTUS Abortion Decision for Patients with Rheumatic Diseases,” *Annals of Internal Medicine* 175, no. 9 (2022): 1328-1329, at 1328.

Female rheumatology patients will also likely face increased challenges to accessing new and potentially better medications.⁸⁰ Furthermore, even if physicians are willing to prescribe teratogens to female patients in states with abortion bans, other providers in the health care system such as pharmacists may deny care as some patients have been reporting.⁸¹ At the very least, rheumatology care has changed post-*Dobbs*. The results of one study showed that some rheumatologists are less likely than they were prior to *Dobbs* to recommend abortion to treat concerns about maternal health or fetal anomaly.⁸² The study also showed that rheumatologists, even in states with legal abortion, have changed their teratogen prescribing practices.⁸³

Conclusion

In Supreme Court opinions, federal health care legislation, and the popular imagination, abortion has long been perceived as primarily an issue of the politics of “choice” rather than as an essential part of health care. The wide ranging public health crisis that is the downstream consequence of *Dobbs* has exposed how abortion is a critical part of an interrelated continuum of reproductive health care. Abortion impacts an extensive array of medical treatments including fertility treatment, contraception, sterilization, prenatal care and childbirth, and non-pregnancy related treatments that effect potential pregnancies. In the post-*Dobbs* legal landscape, Americans are only just beginning to see the ripple effects of abortion bans on access to a wide range of essential medical care. The public needs to better understand the full breadth of health care consequences of the post-*Dobbs* policy landscape. Reframing abortion as a core health care concern for a wide swath of the public is a powerful strategy for restoring abortion rights.

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² B. Bermas, I. Blanco, R. Ramsey-Goldman & A. Blazer et al., “The impact of US abortion policy on rheumatology clinical practice: a cross-sectional survey of rheumatologists,” *Arthritis & Rheumatology* 76, no. 3 (2024): 485-490.

⁸³ *Id.*

**Testimony of Professor Kimberly Mutcherson of Rutgers Law School
Senate Judiciary Committee
Hearing on Reproductive Rights
3-20-24**

Introduction

Thank you for the opportunity to submit this written testimony on reproductive rights in the United States post-*Dobbs v. Jackson Women's Health*. I am a law professor at Rutgers Law School where I teach, write, and lecture on reproductive justice issues through a legal and ethical lens. I have been focused on this work for over two decades and while the landscape is troubling in the present day, what we are seeing now is unsurprising in many ways. Historically, reproductive capacity and pregnancy have served as a primary locus of control over women¹ and women's rights in this country. The women who typically suffer the greatest harm from that control are women of color, poor women, undocumented immigrants, and others who live at the margins of our society. For this reason, I root my work in reproductive justice (RJ), a movement begun by Black women in the late 90s that demands more than securing reproductive rights.² RJ recognizes that rights without resources and other forms of support for those who need it often do very little to substantively change people's lives. Real impact on the lived experiences of marginalized women requires more than rights that they cannot exercise due to structural obstacles.

Reproductive Justice

The RJ movement focuses on 3 central human rights: the right to have a child, the right to not have a child, and the right to raise one's children in safe and healthy environments. RJ recognizes that a woman's reproductive life does not begin or end with the decision to terminate a pregnancy and, therefore, abortion cannot be the only or even the central issue in any movement for reproductive equality for women in the United States. This does not mean that the right to an abortion or other rights related to reproduction and parenting are irrelevant to RJ. Reproductive rights matter deeply in the RJ frame, but so do organizing, mutual aid, community empowerment and education, and other less law focused ways to improve people's lives. Thus, the RJ frame brings a more robust way of thinking about how to create justice, not just rights.

RJ urges state responsibility to its citizens before and after birth along a range of axes including healthcare, education, housing, workplace protections, freedom from environmental toxins, food security, and more. Making progress in any of these areas would have a positive impact on citizens of the state no matter their reproductive choices and would specifically help to create an environment in which more people feel safe and secure enough to pursue pregnancy

¹ I will alternate among using the words woman, women, pregnant people and people with the capacity for pregnancy throughout this testimony. I do so to include the non-binary and trans people, while also recognizing that women have experienced centuries of oppressive policies and coercive control over their bodies specifically as a form of gendered reproductive oppression.

² LORETTA J ROSS and RICKIE SOLINGER, *REPRODUCTIVE JUSTICE: AN INTRODUCTION* (2017).

and family building. For this reason, discussing abortion as an isolated issue misses a great deal. Rather, abortion should be understood within the broader context of a spectrum of reproductive realities that can drastically and irrevocably impact individual's lives. For this reason, it is particularly galling that states with the harshest abortion restrictions tend to have higher maternal mortality rates,³ fund public education at a very low rate, do not have tax policies that assist low-income families like the Earned Income Tax credit, do not provide paid parental leave, and many have a minimum wage that is at or below the federal level.⁴ Banning abortion while eschewing policies that serve those who are already living evinces a hypocrisy that undermines any claims of an allegiance to protecting life.

The Impact of Dobbs on Abortion Access and the Quality of Reproductive Healthcare

The decision in *Dobbs* was a watershed moment. It signaled a radical turn in the Supreme Court's abortion jurisprudence and undermined the foundation for all privacy rights that are not explicitly articulated in the Constitution. It also further entrenched the problematic history and tradition test that the Court has used in some cases to evaluate the existence of fundamental rights protected by though not specifically enumerated in the Constitution.⁵ Nevertheless, *Dobbs* is now the law of the land. In handing decisions about abortion legality to the states, the Court opened the floodgates for the creation of a patchwork of contradictory state laws, ongoing litigation in multiple states, and deep confusion and concern for providers and patients.

According to the Kaiser Family Foundation, as of November 2023, fourteen states had abortion bans in place and eleven states had gestational limits ranging from 6 weeks to 22 weeks after a woman's last menstrual period.⁶ These laws would have been unconstitutional before *Dobbs*. The data on bans and gestational limits tells only part of the story because abortion regulation cuts much deeper than just total bans or gestational limits. States have waiting periods, ultrasound requirements, restrictions on who may perform abortions, restrictions on the use of telehealth for medication abortions, and notice or consent requirements for minors seeking abortions.⁷ Tellingly, none of these requirements are necessary for the health and safety of people receiving abortions but all make abortion more difficult to access.

Clinic Closures

Within the first 100 days after *Dobbs*, sixty-six clinics in the United States that provided abortions and other services closed according to the Guttmacher Institute, a leading resource for

³ Anna Kheyfets, et. al., *The impact of hostile abortion legislation on the United States maternal mortality crisis: a call for increased abortion education*, FRONT PUBLIC HEALTH, Dec 5, available at <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2023.1291668/full>.

⁴ Ana Hanauer, *Abortion Restricting States Skimp on Funding for Children*, JUST TAXES BLOG, November 9, 2023. Available at <https://itep.org/abortion-restricting-states-funding-for-children-child-tax-credit-eitc/#:~:text=All%20but%20two%20of%20the,counting%20D.C.%20as%20a%20state>.

⁵ See, e.g., *Washington v. Glucksberg*, 521 U.S. 702 (1997) (holding that the right to assisted suicide is not firmly rooted in the Nation's history and traditions).

⁶ Kaiser Family Foundation, *Abortion Policy Tracker*, available at <https://www.kff.org/other/state-indicator/abortion-policy-tracker/?activeTab=map&currentTimeframe=0&selectedDistributions=status-of-abortion&sortModel=%7B%22collId%22:%22Location%22,%22sort%22:%22asc%22%7D>.

⁷ Mabel Felix and Laurie Sobel, *A Year After Dobbs: Policies Restricting Access to Abortion in States Even Where It's Not Banned*, June 22, 2023, available at <https://www.kff.org/policy-watch/year-after-dobbs-policies-restricting-access-to-abortion/>.

credible, evidence-based research on abortion in the United States.⁸ In the first year after *Dobbs*, thirteen states banned abortion altogether, while several other states have legislation that bans abortion before viability, even as early as six weeks into a pregnancy. In some cases, the gestational limit is so early into a pregnancy that some women will be too far along to choose an abortion before they even know that they are pregnant. The legal landscape has been anything but static as states face lawsuits that sometimes temporarily stop the enforcement of bans or that ensure that bans will stay in place while litigation continues. This is not an environment conducive to running an independent abortion clinic, so even where bans or other types of regulation are temporarily not being enforced, clinics may choose to close or stop providing abortion care rather than contend with such uncertainty.

Travel for Abortion Care & Increased Patient Load in Safe States

Clinic closures and bans inevitably cause many abortion patients to travel out of state to terminate their pregnancies. The researchers at Guttmacher note that, “[n]ationally, the number of people who crossed state lines to obtain abortion care more than doubled, reaching 92,100 in the first six months of 2023, compared with 40,600 in half of 2020.”⁹ Most of these patients traveled from states with bans or severe abortion restrictions to nearby states where abortion remains accessible. Consequently, those border states have had to manage a substantial influx of new patients. Illinois, an abortion shield state that borders 3 ban states, saw the number of patients traveling to the state for abortion rise from 21% in 2020 to 42% in 2023.¹⁰ Abortion funds and practical support networks have been crucial to maintaining abortion accessibility for thousands of abortion seekers who need money, travel assistance, childcare, and other forms of support in order to make abortion a possibility. Without those private networks and the donations that poured into them post-*Dobbs*, thousands of women and other pregnant people would have been forced to carry pregnancies to term or seek out safe ways to end their pregnancies without access to regulated abortion care. For those who could find no safe alternative, carrying their pregnancies to term became the only option.

Inability to Access Wanted Abortions

Not having an abortion does not just deprive a person of the choice to decide their reproductive fate. The consequences of an inability to terminate a pregnancy can seep into every aspect of the life of a person denied an abortion. This outcome is not speculative but has been well-documented by the Turnaway Study, the largest study of the impact of being denied an abortion on women who carry their pregnancies to term. The researchers found that women denied a wanted abortion experienced multiple negative outcomes.

First, the vast majority of people who do not get the abortions they desire will opt to raise the children to whom they give birth.¹¹ Thus, adoption is not the answer to being forced by

⁸ Marielle Kirstein, et. al., *100 Days Post-Roe: At Least 66 Clinics Across 15 US States Have Stopped Offering Abortion Care*, October 2022, available at <https://www.guttmacher.org/2022/10/100-days-post-roe-least-66-clinics-across-15-us-states-have-stopped-offering-abortion-care>.

⁹ Kimya Forouzan, et. al., *100 Days Post-Roe: At Least 66 Clinics Across 15 US States Have Stopped Offering Abortion Care*, October 2022, available at <https://www.guttmacher.org/2023/12/high-toll-us-abortion-bans-nearly-one-five-patients-now-traveling-out-state-abortion-care>.

¹⁰ *Id.*

¹¹ Liza Fuentes, et. al., “Adoption is just not for me”: How abortion patients in Michigan and New Mexico factor adoption into their pregnancy outcome decisions, *CONTRACEPTION*: X (2023).

circumstances to continue a pregnancy when you do not want to do so. Second, for women who are already low-income having a child exacerbates their financial instability, increases their debt load, and lowers their credit score as compared to women who have abortions. Third, women in abusive relationships find themselves even more entwined with their abusers when they share a child. Reproductive abuse, including forcing abused women to get pregnant or sabotaging their birth control, is a documented way that abusers keep their victims close. These same women are also more likely to be raising their children alone some years after they are not able to have a wanted abortion. Fourth, because most women who seek abortion already have children, their existing children also experience consequences when their mother cannot have a wanted abortion. These children experience negative impact to their development, are more likely to live below the federal poverty level and may experience less successful bonding with their mother. Fifth, and finally, women who remain pregnant despite a desire to have an abortion report more life-threatening pregnancy complications, as well as increased rates of other health issues such as migraines, chronic headaches, and gestational hypertension.¹² The Turnaway study is being revived in the wake *Dobbs* to document how the proliferation of bans has impacted the lives of even more women in the United States.

Miscarriage Mismanagement and Failures to Provide the Proper Standard of Medical Care

Many things can go wrong with a pregnancy at any point during gestation, and when those things go wrong women count on their healthcare providers to act based on the accepted standard of medical care. Unfortunately, *Dobbs* has created a situation in which many state abortion laws make it difficult or even impossible for healthcare providers to offer the care that patients need during times of crisis. This state of affairs has been particularly striking in the area of miscarriage mismanagement. A miscarriage is the loss of a pregnancy before the 20th week, and the rate of miscarriage is estimated to be between 10-20%, though it is likely higher because many pregnant people will miscarry so early in pregnancy that they are not even aware that they were pregnant. A woman can be in the midst of a miscarriage and still have fetal cardiac activity which is where the conflict between abortion restrictions and the medical standard of care arises. The proliferation of Catholic hospitals in the United States where decisions about providing abortions happen based on both sound medical practice and the Ethical and Religious Directives for Catholic Health Care Services authored by the Committee on Doctrine of the National Conference of Catholic Bishops can lead to delays in care as physicians wait until there is no remaining fetal cardiac activity even as a pregnant woman's health deteriorates.¹³ Receiving care in religious hospitals coupled with abortion bans that carry significant penalties and cryptic exceptions means that some women will not get the miscarriage management that is appropriate and that follows the accepted standard of medical care to which all physicians are legally and ethically bound.

State legislators and the anti-choice groups who proliferate abortion bans claim that the medical and emergency exceptions in their laws are sufficient to allow necessary abortions but avoid those that are unnecessary or “elective.”¹⁴ That legislators are creating the bounds of

¹² DIANA GREEN FOSTER, THE TURNAWAY STUDY (2021.)

¹³ Rachana Pradhan and Hannah Recht, *The Powerful Constraints on Medical Care in Catholic Hospitals Across America*, February 17, 2024, available at <https://kffhealthnews.org/news/article/catholic-hospitals-affiliates-ethical-religious-directives-reproductive-care/>.

¹⁴ This framing buys into the dangerous notion that some abortions are acceptable while others are not. Even if this were the case, one must ponder who gets to draw the line between acceptable and unacceptable and on what basis.

necessary and unnecessary healthcare is at odds with how medical care is provided in this country and singles out pregnant people for restricted protection of the right of competent people to make private medical decisions. The fact of being pregnant, therefore, becomes a de facto constraint on a competent patient's right to make her own decisions about healthcare. Additionally, as healthcare providers are acting in the moment, sometimes in emergent circumstances, and no legislative body is competent to determine all circumstances in which abortion is necessary.

In its campaign to control all abortion decisions in the state, Texas has even mounted a legal challenge to the federal government's assertion that The Emergency Medical Treatment and Active Labor Act of 1986 (EMTALA) requires that abortions be provided when needed to stabilize a patient in emergency circumstances.¹⁵ The refusal to accept the basic and longstanding premise that federal law supersedes state law in accordance with the Supremacy Clause of the U.S. Constitution shows the willingness of Texas to undermine foundational concepts of constitutional law in order to support its extreme abortion agenda. Further, the challenge intimates that Texas law would not allow abortions in some emergent circumstances, which belies the state's claim that its exceptions are meaningful.

Prior to *Dobbs*, adherence to Constitutional requirements meant that state abortion laws had to include exceptions for life **and** health of the pregnant person. Many state laws also included exceptions for rape and incest, but those exceptions were not constitutionally required. *Dobbs* ensured that these standard exceptions were no longer required under the federal constitution, and states have used that freedom to craft a variety of exceptions that, predictably, do not use common language and are subject to wide interpretation. While all states that ban abortion currently include an exception to save the life of a pregnant person, only 16 states include an exception to protect the health of the pregnant person and health in this circumstance does not necessarily include mental health.¹⁶ The language used in the exceptions is often written to reliably guarantee that they will only be applied in the clearest cut and most dire circumstances, which has led to disturbing outcomes like women being informed by their healthcare providers that they simply aren't suffering enough and must wait to get sicker before they can receive care.

The "wait for decline" approach is what happened to Amanda Eid. Ms. Eid and her husband were elated when she became pregnant after a year and a half of fertility treatments. At 18 weeks her water broke and there was nothing her doctors could do to save the pregnancy. Though it was clear that the pregnancy would terminate early, and the baby daughter who they had already named Willow would die, Ms. Eid's doctors were unwilling to induce labor and end the pregnancy immediately because there was still some fetal cardiac activity. The Texas medical exception allows for an abortion when, "in the exercise of reasonable medical judgment, the pregnant female . . . has a life-threatening physical condition aggravated by, caused by, or arising from a pregnancy that places the female at risk of

¹⁵ *Texas v. Becerra*, 89 F.4th 529 (2024).

¹⁶ Alabama's statute includes a mental health exception which requires a psychiatrist to diagnose the patient with a "serious mental illness" and that it "is likely the person will engage in behavior that could result in her death or the death of the fetus that due to their mental health condition. Mabel Felix, *et. al.*, *A Review of Exceptions in State Abortion Bans: Implications for the Provision of Abortion Services*, May 18, 2023, available at <https://www.kff.org/womens-health-policy/issue-brief/a-review-of-exceptions-in-state-abortion-bans-implications-for-the-provision-of-abortion-services/>.

death or poses a serious risk of substantial impairment of a major bodily function unless the abortion is performed or induced.¹⁷ Physicians who violate the terms of the abortion statutes in the state may be subject to fines of up to \$10,000 or conviction for a felony.¹⁸

In her own words, Ms. Eid described the terrifying and heartbreaking circumstances in which she found herself:

I could wait however long it took to go into labor naturally, if I did at all, knowing that my baby would be stillborn or pass away soon after; I could wait for my baby's heartbeat to stop, and then we could end the pregnancy; or—most alarmingly—I could develop an infection and become so sick that my life would become endangered. Not until one of those things happened would a single medical professional in the state of Texas legally be allowed to act. It was a waiting game, the most horrific version of a staring contest: Whose life would end first? Mine, or my daughter's?

I knew I was going to lose my baby. And I knew it could be days—or weeks—of living with paralyzing agony before we could move forward.¹⁹

Three days after discovering that her pregnancy was destined to end with a dead baby, a devastating experience for any women with a deeply wanted pregnancy, Ms. Eid got the care she needed and deserved. That care came only after she developed a fever and low blood pressure and was taken to the ICU due to sepsis. This life endangering infection might have been avoided if she had been induced when the pregnancy loss first became inevitable. The physical harm she experienced because of the infection may make it impossible for her to become pregnant again or carry a pregnancy to term. The mental anguish she experienced is likely incalculable.

Mayron Michelle Hollis also experienced an extremely difficult pregnancy in her home state of Tennessee. Ms. Hollis was 10-weeks-pregnant with a fetus that had embedded in her scar from a previous c-section.²⁰ Despite two physicians agreeing that the pregnancy posed serious risk of harm, including the permanent loss of her bladder and uterus or even death, Ms. Hollis was unable to access abortion care in her home state. Tennessee law had no explicit exceptions to its ban and providers faced up to 15 years for providing an abortion if they could not meet their burden of proving that the abortion was necessary. Despite the acknowledgment that the surgery would have been routine prior to the ban, the physician willing to perform the procedure in Tennessee could not do so alone and was unable to find providers in the state willing to run the risks of prosecution even to provide care that they acknowledged was the expected medical standard of care before Tennessee's ban. As one reporter succinctly explained, "Each case now presents doctors with an ethical dilemma: Provide the standard of care accepted by the medical community and face a potential felony charge or try to comply with the broadest interpretation of the law and risk a malpractice case."²¹

¹⁷ TEX. HEALTH & SAFETY CODE § 170A.002(b)(2).

¹⁸ TEX. HEALTH & SAFETY CODE § 170A.002(b)(2).

¹⁹ Amanda Zurawski, *My Pregnancy v. The State of Texas*, available at <https://wearethemetor.com/texas-abortion-ban-stopped-doctors-helping-woman-miscarrying/>.

²⁰ Kavitha Surana, *Doctors Warned Her Pregnancy Could Kill Her. Then Tennessee Outlawed Abortion*, PROPUBLICA, March 14, 2023, available at <https://www.propublica.org/article/tennessee-abortion-ban-doctors-ectopic-pregnancy>.

²¹ *Id.*

Thus, a woman who wanted to save her own life, to maintain her fertility, and who was not equipped to travel out of state for an abortion felt that she had no choice but to run the risk of death or permanent impairment of her fertility. After waking up one night to find that she was bleeding profusely, Ms. Hollis went to the hospital where she eventually delivered a 1lb 5oz premature baby who was intubated immediately after birth and spent the first weeks of life in a NICU. It remains to be seen whether her daughter will face lifelong consequences because of the manner of her birth. Ms. Hollis' lifelong post-birth consequence was the loss of her uterus and her future fertility. She said of her ordeal, "I'm so glad I have my baby. . . . But this was a risk I didn't have any choice in taking."²²

Maternity Care Deserts

In its 2022 report on maternity care deserts, the March of Dimes defined these deserts as an area with "no hospitals providing obstetric care, no birth centers, no OB/GYN and no certified nurse midwives."²³ According to the report, "Nationwide, five percent of counties have less maternity access than just two years ago. These areas of combined low or no access affect up to 6.9 million women and almost 500,000 births in the U.S. In maternity care deserts alone—approximately 2.2 million women of childbearing age and almost 150,000 babies are affected."²⁴ The 2% increase in the number of maternity care deserts from the 2020 report to the 2022 report represents over 1,119 more counties and almost 15,933 women who do not have access to maternity care. In a country with a shockingly high rate of maternal morbidity and mortality, these numbers are unconscionable.

Unsurprisingly, given the challenges that *Dobbs* has created for Ob/Gyns who are grappling with abortion bans that hamstringing their ability to practice medicine, the decision has helped to encourage more physicians to move away from areas that already have low access to maternity care, which will only exacerbate an existing dangerous set of circumstances with potentially life-threatening consequences for pregnant women and the fetuses they carry.²⁵ The drain of Ob/Gyns from underserved communities will only be compounded as new doctors decide not to train or practice in states with bans or significant restrictions on abortion care.

Expanding Fetal and Embryonic Personhood

The recent Alabama Supreme Court decision in *LePage v. Center for Reproductive Medicine*, in which that court declared embryos to be unborn children for purposes of the state's wrongful death act, sent shockwaves across the country, but that decision was inevitable. The anti-choice movement has long had a strain that focuses on the idea that a fetus at any stage of development is no different than a born child. Some go even further and express a belief that life begins at conception and that the state interest, then, should also begin from the moment that sperm meets egg. To the extent that this belief system becomes embedded in laws, the consequences are potentially catastrophic. There are a number of possible scenarios, far too many to comfortably list in this testimony, but I want to share some possibilities that are

²² *Id.*

²³ March of Dimes, *Nowhere to Go: Maternity Care Deserts Across the U.S.* (2022), available at <https://www.marchofdimes.org/maternity-care-deserts-report>.

²⁴ *Id.*

²⁵ Sheryl Gay Stolberg, *As Abortion Laws Drive Obstetricians From Red States, Maternity Care Suffers*, September 6, 2023, NEW YORK TIMES, available at <https://www.nytimes.com/2023/09/06/us/politics/abortion-obstetricians-maternity-care.html>.

extensions or continuations of existing policies and practices that target pregnant women in ways unique to them and only possible because of the biological reality of pregnancy.

As legislators propose and pass new pieces of restrictive regulation that face legal challenges, the Supreme Court has directed that these challenges will be decided under the rational basis standard, the least rigorous standard of constitutional review. Under this standard, legislation must be in service of a legitimate state interest and there must be a rational relationship between that state interest and the means the state has chosen to regulate.²⁶ To the extent that past is prologue, many states will use this blank check to further strip pregnant people of the medical decision-making rights that protect all competent, adult decision-makers.

Civil or criminal punishment for behavior during pregnancy

The issue of pregnancy criminalization has long plagued the United States and the *Dobbs* decision has only exacerbated a problem that should not exist in the first instance. It is fitting that Alabama was the first state to cause a national uproar over its treatment of embryos because Alabama has an extensive history of using criminal sanctions to punish pregnant women, especially, but not only, those with substance use disorder. These punitive efforts tend to target women who are at their most vulnerable and to do so with little pretense of actual assistance. Drug rehabilitation is difficult to access for pregnant women because many facilities will not accept pregnant patients. If a woman already has children at home, which many of these women will, an in-patient experience becomes even more difficult even if she can find a bed and money or insurance to fund her care. Rather than approach substance use disorder as the public health problem that it is, too many states shuffle pregnant women into prisons in which nutrition is wholly inadequate, access to care is spotty at best and the quality of that care can be disastrous. Studies show that pregnant women who are incarcerated have worse pregnancy outcomes,²⁷ including preterm labor and babies who do not grow as expected and a higher rate of miscarriage. Given stories of women giving birth on prison floors and being shackled while in labor—a practice banned in federal prisons since 2018 and now banned in at least 37 states as of 2023, there is little reason to think that an incarcerated pregnant woman or her fetus is better off in prison or jail.²⁸

Other contexts also raise the possibility of more criminalization. Before *Dobbs*, the vast majority of states did not have statutes that criminalized self-managed abortion. Self-managed abortion in this context refers to the use of traditional medicine to induce an abortion and the use of prescribed medications to achieve the same outcome. Unfortunately, there may still also be desperate people who use objects or engage in self-harm in an attempt to end an unwanted pregnancy. In states that have banned abortion altogether or that ban the procedure before viability, women who self-abort or who are suspected of self-aborting may find themselves arrested and charged with any number of crimes. Similarly, women who experience stillbirths may be accused of engaging in behavior that led to fetal demise.²⁹ Evidence of a self-managed

²⁶ *Dobbs v. Jackson Women's Health Organization*, 596 U.S. __ (2022).

²⁷ Anna Roh, *Forced to Give Birth Alone, How Prisons and Jails Neglect Pregnant People Who are Incarcerated*, February 28, 2022, available at <https://www.publichealth.columbia.edu/news/forced-give-birth-alone-how-prisons-jails-neglect-pregnant-people-who-are-incarcerated>.

²⁸ Maggie Freleng, *Shackled: The Devastating Reality of Childbirth Behind Bars*, Rolling Stone, January 9, 2023, available at <https://www.rollingstone.com/culture/culture-commentary/childbirth-behind-bars-shackling-maggie-freleng-1234657748/>.

²⁹ Robert Baldwin, III, *Losing a Pregnancy Can Land You in Jail in Post-Roe America*, NPR.ORG, July 3, 2022, available at <https://www.npr.org/2022/07/03/1109015302/abortion-prosecuting-pregnancy-loss>.

abortion or of harm to a fetus in utero may be difficult to ascertain, thus creating a real concern of false accusations or misunderstandings with drastic consequences.

Criminal prosecutions in this context, besides being frightening for those accused, can bring collateral consequences including the potential for losing employment and housing or state benefits needed for economic stability and involvement with the child welfare system.

None of this is to say that states should ignore pregnant women. In fact, states should be paying much more attention to pregnant women, non-pregnant women, and anyone else within their borders who needs a social safety net. This means ensuring access to high-quality healthcare before, during, and after pregnancy. This means providing access to contraception for those who wish to avoid pregnancy. This means erasing food deserts and cleaning up environmental toxins that are too often sited in poor Black and Brown neighborhoods. It means treating prisoners with the respect that should be accorded to all human beings because in the words of Bryan Stevenson “Each of us is more than the worst thing we’ve ever done.” We do not protect life, fetal or otherwise, by thoughtlessly condemning women to carceral facilities that are ill-equipped to care for their needs or consigning their children to a constrained future lived without their mothers. Major medical organizations make clear that punitive policies that drive women away from care and that create mistrust between providers and patients do not accrue to the benefit of pregnant women or the children they are carrying to term.

Embryos as Abandoned Children

It is difficult to get concrete numbers about the number of embryos being stored in fertility clinics and other facilities around the country, but the estimates range anywhere from 400,000 to 1,000,000.³⁰ No matter which number is more correct, it translates into a prodigious number of “unborn children” being stored in “cryogenic nurseries” to borrow the language used by the Alabama Supreme Court. There is no guarantee, and in fact no likelihood, that any given embryo will successfully implant in a uterus, grow through all of the stages of pregnancy, and emerge healthy after 40 weeks. A host of factors, including the age of the intended mother, the number of embryos transferred in a cycle, and the quality of those embryos impacts the success rate of IVF. Thus, treating every embryo as a future child is as absurd as treating any single ova or sperm as a future child. An acorn has the potential to grow into an oak tree, but many steps have to be taken and many things have to go right in order for that tree to emerge. Potential is possibility and is never a guarantee when it comes to acorns or embryos.

Further, to increase the chance of success, reproductive endocrinologists grade the quality of embryos to determine which should be used and which should be discarded. Embryos are tested to identify disease or possible disabilities that the aspiring parents might want to avoid in their children, including anomalies more likely to lead to miscarriage or to a newborn whose life will be short and painful. In such cases, many aspiring parents will decide not to use embryos of lower quality or that carry genetic markers for devastating diseases. In a world in which embryos are children, all or many of these embryos would need to be transferred into a uterus in an effort to bring them to fruition. The cruelty of such a regime is obvious. No person should be forced to

³⁰ Annalisa Merelli, *Embryo loss is integral to IVF. Alabama’s ruling equating embryos with children jeopardizes its practice*, STAT News, February 22, 2024, available at <https://www.statnews.com/2024/02/22/alabama-frozen-embryo-ruling-threatens-ivf-clinics/#:~:text=Alabama's%20ruling%20equating%20embryos%20with%20children%20jeopardizes%20its%20practice&text=An%20embryo%20is%20one,legal%20protections%20as%20any%20minor>.

risk her health, physical and mental, to attempt to gestate an embryo that will almost certainly miscarry or to carry an embryo to term only to watch the resulting child die. In the same way that some legislators have attempted to control abortion access by banning abortions based on traits, the same could happen with IVF with similar damaging consequences.

If embryos are unborn children, there is also a question about what happens when the people who created those embryos do not want to use them to make babies. Obviously, donating to research or destruction, both options routinely offered to and accepted by today's IVF patients, would no longer be available. The idea of leaving them frozen in perpetuity (at whose cost?) would also seem unseemly. A solution could be to treat those embryos no differently than the state would treat a newborn abandoned at a firehouse under safe haven laws. Those embryos would go into the custody of the state and presumably be placed for "adoption." The implications here are also significant. As we know from the abortion context, most people who carry a pregnancy to term will not choose adoption. It is quite possible that many IVF patients would also balk at the idea of placing their genetic children for adoption thus creating an unfair dilemma in which they are forced to try to carry the embryos to term, no matter their quality or quantity, and no matter the potential health risks involved in pregnancy.

Restoring *Roe* is Not Enough

Lest the above information lead to the conclusion that all was well in the abortion landscape in the United States prior to *Dobbs*, that was decidedly not the case. Restoring *Roe* brings us back to an inadequate status quo that will do little to enhance access to reproductive healthcare for a huge swath of American women of reproductive age. *Roe* certainly had its benefits—reinforcing the idea that there is a right to privacy embedded in the U.S. Constitution; keeping states from banning abortion altogether throughout the entirety of a pregnancy; and requiring that states include exceptions for the life and health of the pregnant woman in any post-viability bans. However, post-*Roe*, the Supreme Court began chipping away at the right to an abortion as legislators found increasingly invasive ways to insert themselves into medical decision-making by pregnant people.

In a series of post-*Roe* cases, the Supreme Court determined that:

Medicaid could exclude payment for necessary abortions for indigent women (*Harris v. McRae*), that pregnant minors could be required to inform their parents about their pregnancy and desire to have an abortion as long as they had the option of a judicial bypass (*Planned Parenthood v. Casey*); that the state's interest in potential life began at the start of a pregnancy and was significant enough to protect a state that sought to dissuade a pregnant person from having an abortion (*Planned Parenthood v. Casey*); and that Congress could ban specific abortion procedures (*Gonzales v. Carhart*).

As a consequence of many of the cases described above, the landscape of abortion access prior to *Dobbs* was already inadequate in many parts of the country. The Hyde Amendment makes it almost impossible for women on Medicaid to receive funds for abortion care. Unnecessary restrictions on abortion providers and patients around the country had created an untenable series of obstacles to operating clinics and accessing abortion in a large number of states.³¹ These restrictions included waiting periods of anywhere from 24-72 hours between informed consent and receiving an abortion, biased informed consent, including sharing

³¹ Guttmacher Institute, *Targeted Regulation of Abortion Providers*, available at <https://www.guttmacher.org/state-policy/explore/targeted-regulation-abortion-providers>

medically unsound information, unnecessary ultrasounds, and multiple in-person visits for abortion care. Many women had to travel long distances for their abortions which, like waiting periods, could lead to multiple missed days of work and the need to pay for travel and childcare even while losing income because of absences from work. Many women and families could not afford to absorb these costs and were unable to have the abortions they desired.

This already tough reality will become even more devastating depending on the Supreme Court's decision in *Food and Drug Administration v. Alliance for Hippocratic Medicine*, a case filed by antiabortion activists with the goal of taking one of the drugs used for medication abortion off of the market. A crucial element of post-*Dobbs* abortion provision has been the availability of medication abortion. Medication abortion is a safe and effective method for terminating pregnancies in the first trimester, and well over 90% of pregnancies in the United States that end in abortion will end in the first trimester. The medication abortion regimen involves two medications, Mifepristone and Misoprostol which, working in tandem, stop the growth of a pregnancy and then expel the contents of the uterus. By 2021, over 50% of U.S. abortions were medication abortions.³²

Medication abortions have been studied for decades and were approved in Europe well before the FDA did so in the United States, a delay caused largely by political pressure from the antichoice movement.³³ The political forces that delayed approval also contributed to the unnecessary protocols first put in place when medication abortion became available in the United States. The FDA initially created significant unnecessary access restrictions including multiple required trips to a healthcare provider and a truncated time frame during pregnancy when medication abortion could be used. Over time, the FDA rightly loosened unnecessary requirements and made accessing this form of abortion significantly less onerous.

If the plaintiffs triumph in *Alliance for Hippocratic Medicine*, the result will be a radically altered landscape of access to medication abortion. Furthermore, it would usher in a fundamental shift to how courts evaluate expert agency decisions across the administrative state marking yet another example of how abortion law has impacts well outside of the arena of reproductive health.

Conclusion

There is much more that can be said about the present state of reproductive injustice in the United States. Abortion care is stifled in many states and other states are struggling to absorb the increased demand. Women are facing horrible experiences at hospitals that will not help them end doomed pregnancies that are destined to miscarry or that will result in children who will live short painful lives. Ob/Gyns are abandoning areas of the country that are most in need of their services. Overzealous state prosecutors are scoring political points by placing pregnant women who need compassionate care for their substance use disorder into prisons where they are subjected to shameful conditions that create even more risks for their fetuses. These are all bad outcomes and all of them can be reversed.

Pregnancy creates inevitable biological vulnerabilities for women many of which can be managed if not eliminated. State laws that carve out pregnancy and capacity for pregnancy as

³² Kaiser Family Foundation, *The Availability and Use of Medication Abortion*, September 28, 2023, available at <https://www.kff.org/womens-health-policy/fact-sheet/the-availability-and-use-of-medication-abortion/>.

³³ Carrie Baker, *History and Politics of Medication Abortion in the United States and the Rise of Telemedicine and Self-Managed Abortion*, 48 JOURNAL OF HEALTH POLITICS, POLICY AND LAW, August 2023..

excuses to treat women as incompetent to make their own healthcare decisions are not inevitable. They are a deliberate choice to transform biological vulnerability into legal incapacity. These laws, in their many forms, are a threat to equality for all women but especially for those women who are already living with extreme vulnerability, especially low-income women, women of color, women living with substance use disorder, and many others. Our Nation's Constitutional commitments to the separation of church and state, protection of bodily integrity, and equal protection of the laws must be strong enough to protect women from being subjected to the faith-based beliefs of legislators who lack the medical training that could allow them to opine on pre-pregnancy and pregnancy with any expertise. In *Roe*, Justice Blackmun wrote, "One's philosophy, one's experiences, one's exposure to the raw edges of human existence, one's religious training, one's attitudes toward life and family and their values, and the moral standards one establishes and seeks to observe, are all likely to influence and to color one's thinking and conclusions about abortion," but the task of law is not to make us all conform to a single vision of the meaning of life, a single belief of when life begins, or a single belief of how to value potential life versus a life in being.

The decisions we make about pregnancy and parenting are some of the most intimate and private decisions that any of us will make in life. They are decisions deeply rooted not in the nation's history and traditions but in our own life experiences, faith traditions, and fervently held personal beliefs. We cannot be a country that achieves reproductive justice if we do not believe that each of us deserves the opportunity to make these most private and impactful decisions for ourselves with the state's support rather than its opposition.



**Statement for the Record from
Planned Parenthood Federation of America and Planned Parenthood Action Fund**

**United States Senate Committee on the Judiciary Hearing Entitled
“The Continued Assault on Reproductive Freedoms in a Post-Dobbs America”**

March 20, 2024

Planned Parenthood Federation of America (“PPFA”) and Planned Parenthood Action Fund (“the Action Fund”) submit these comments for the U.S. Senate Committee on the Judiciary Hearing Entitled “The Continued Assault on Reproductive Freedoms in a Post-Dobbs America” held on March 20, 2024.

Planned Parenthood is a leading provider of high-quality, affordable health care and the nation’s largest provider of sex education. With nearly 600 affiliate health centers across the country, Planned Parenthood provides affordable birth control, vaccinations, lifesaving cancer screenings, testing and treatment for sexually transmitted infections, HIV screenings, and other essential care to 2.1 million patients each year. Planned Parenthood health centers are critical for many underserved communities, specifically communities of color and communities with low-incomes, facing limited access to reliable and affordable health care due to systemic barriers and discrimination.

The Supreme Court’s decision in the Dobbs case, which overturned *Roe v. Wade* and the constitutional right to abortion, had an immediate impact on our public health system. Abortion bans have eliminated some or all access to abortion in 21 states. As a nation, we continue to face the devastating consequences of abortion bans and restrictions on both patients’ health and the greater health care ecosystem. Right now, one in three women — plus more trans and nonbinary people — have lost access to abortion in their home states. There is no doubt that this crisis will continue to worsen. Black, Latino, and Indigenous communities, LGBTQ+ people, people with low incomes, people with disabilities, and other groups who face the greatest barriers to health care due to systemic racism and discrimination, bear the brunt of these attacks. Politicians and judges have no place deciding if, when, and how people become parents or grow their families. Reproductive freedom is essential. People deserve the freedom to make decisions about their own bodies, lives, and futures.

Anti-abortion laws, including “personhood” laws, threaten contraception, fertility care, and all sexual and reproductive health care. Personhood laws were first passed in an

effort to limit abortion, but they don't stop there. Attacks on abortion cause ripples that harm all manner of reproductive health care — including IVF and birth control.

Personhood is a long-term strategy to take away our reproductive freedom. For decades, abortion opponents have seeded state laws with personhood language under the guise of supporting families and pregnant people. Now, the real effect of this language is clear: to rob people of the freedom to decide if, when, and how to become parents.

Last month the Alabama Supreme Court issued a ruling declaring that, under the state's wrongful death statute, a "minor child" includes embryos — even frozen embryos that have not yet been implanted into a uterus. That decision, *LePage v. The Center for Reproductive Medicine, P.C.*, has created chaos and confusion for IVF patients across the state as their providers paused services. While the court's decision came as a shock to many, it is the clearest demonstration yet of the many ways "fetal personhood" laws threaten reproductive health care nationwide. Similar personhood provisions have already caused serious harm and the Alabama ruling might have the most expansive reach. [Last year](#), a woman's ex-husband filed a wrongful death lawsuit in Texas against three people that helped the woman access abortion pills. [In 2022](#), a man in Arizona brought a wrongful death lawsuit against a clinic where his ex-wife had an abortion 4 years prior.

At both the state and federal levels, personhood language continues to proliferate under the guise of supporting families and pregnant people. If some lawmakers have their way, what has happened in Alabama could be the reality for millions more people across the country. State and federal level lawmakers are advancing legislation that contains personhood language and could be used to deny people the freedom to decide if, when, and how to become a parent. Personhood language shows up not just in abortion bans or in wrongful death statutes like Alabama's; state and federal lawmakers with anti-abortion agendas are also trying to embed it in maternal health bills, birth control bills, tax codes, child support laws, college savings plans, and essential safety-net programs like TANF. So far in the 2024 state legislative session more than 40 bills with personhood language have been proposed in 16 states. Bills in Florida, Iowa, and Oklahoma could allow 'wrongful death' claims similar to the law used in the Alabama decision.

These laws are not about supporting pregnant people. From paid family and medical leave to expanding Medicaid to mandating that employers provide reasonable accommodations for pregnant employees, there is a long list of measures lawmakers could enact to make a substantive and positive change in people's lives. Instead, they are purposefully sowing confusion and slowly chipping away at people's rights to make reproductive health decisions. Anti-abortion groups and lawmakers have never been satisfied with overturning *Roe v. Wade*. From the Life at Conception Act in Congress to failed ballot initiatives in Mississippi and Colorado, for more than 40 years, they've tried to codify the dangerous idea that from the moment of fertilization, an embryo or fetus should be legally recognized as a person with constitutional rights.

Abortion opponents were never going to stop with the overturning of *Roe v. Wade*, which had guaranteed the federal constitutional right to abortion. Now, they are trying to: reverse

the FDA's approval of mifepristone — safe, effective abortion medication; take away minors' right to confidential birth control; block access to abortion care for people experiencing medical emergencies; and attack abortion, birth control, and gender-affirming care in must-pass government funding bills. And if that isn't enough — there is litigation to try to shut down Planned Parenthood and strip millions of people in Texas and beyond of critical health care like cancer screenings, birth control, and other essential health care. These attacks have national implications and consequences that could have ripple effects in every single state across the country. They all have the same end goal: banning abortion nationwide and making sexual and reproductive health care inaccessible. Anti-abortion activists and lawmakers are weaponizing the court system and hostile state legislatures to strip people of basic health care.

The chaos created by abortion bans and restrictions is only heightened by uncertainty about how far dangerous rulings will be taken. We can not know what lawmakers and courts will try to do next — but we have already seen how these laws are applied to criminalize pregnant people, particularly those who are Black, Latino, and Indigenous due to systemic racism, and to limit our reproductive health decisions. When personhood language is in criminal codes, they can be used to investigate and criminalize pregnant people and their medical providers, especially when the person has experienced a negative pregnancy outcome like stillbirth or miscarriage. We know that the anti-abortion movement's ultimate goal is a national abortion ban. And they will do whatever it takes to achieve this goal.

Abortion is part of the full spectrum of sexual and reproductive health care, and it should be treated as the normal and common experience that it is. Nearly one in four women in America will have an abortion by age 45. Abortion is health care and should not be politicized. Lawmakers should not be allowed to control anyone's personal medical decisions. Singling out abortion and denying a person the full spectrum of health care services further stigmatizes abortion. Every person who is considering abortion should be able to access care, no matter their income level, immigration status, age, sexuality, gender identity, race, or zip code. Science and evidence should always guide health care policy. Abortion is essential health care, and must not be singled out or treated differently than other forms of health care for political reasons. At a time when abortion rights and access are under threat across the nation, lawmakers must do whatever they can to increase access to health care and information. They shouldn't be talking about limiting health care options.

PPFA and the Action Fund applaud the Senate Judiciary Committee for the historic and record-breaking work that has been done to fill the current judicial vacancies with experientially and demographically diverse nominees, and for holding hearings on the many threats to reproductive freedom since the *Dobbs* decision.



**Statement of Reproductive Freedom for All
U.S. Senate Committee on the Judiciary
"The Continued Assault on Reproductive Freedoms in a Post-Dobbs America"
March 20, 2024**

We thank the Senate Judiciary Committee and Chair Durbin for highlighting the continued assault on reproductive freedoms in the wake of *Dobbs v. Jackson Women's Health Organization*, and for the opportunity to submit a statement to the Committee on this critical issue. Reproductive Freedom for All, formerly NARAL Pro-Choice America, is a national advocacy organization dedicated to protecting and advancing reproductive freedom. For over 50 years, Reproductive Freedom for All has fought to protect and advance reproductive freedom at the federal and state levels—including access to abortion care, birth control, pregnancy and post-partum care, and paid family leave. Through education, organizing, and influencing public policy, Reproductive Freedom for All and our 4 million members from every corner of the country work to guarantee every individual the freedom to make personal decisions about their lives, bodies, and futures, free from political interference. For this reason, we are submitting this statement to highlight the far-reaching impact of the U.S. Supreme Court decision to end the federal constitutional right to abortion and to call on Congress to use its authority to protect reproductive freedom and lock the right to abortion into federal law.

Abortion rights and access are facing a crisis in the United States. Despite overwhelming public support for the legal right to abortion, we are in the midst of an all-out assault on reproductive freedom. The U.S. Supreme Court's decision in *Dobbs v. Jackson Women's Health Organization* overturned *Roe v. Wade*, eliminated the constitutional right to abortion as we knew it and signaled an ominous sign for the future of abortion rights in this country. The Court's ruling has empowered extremist state lawmakers to enforce draconian restrictions or total bans on abortion, which are now in place in 21 states.¹

The negative impacts of this cruel Supreme Court decision cannot be overstated. This horrifying rollback of our fundamental rights is causing immediate and devastating harm to millions of people across the country who can no longer access necessary care in their own communities. Bans on abortion especially harm those already marginalized by our systems and institutions. Losing *Roe* only compounded the problem: Women; Black, Latina/x, Asian American, Native Hawaiian, Pacific Islander, and Indigenous people; those working to make ends meet; the LGBTQ+ community; immigrants; young people; those living in rural communities; people with disabilities, and other historically oppressed communities are disproportionately impacted by these attacks on reproductive freedom.

¹ Interactive Map: US Abortion Policies and Access After *Roe*, Guttmacher Institute, (Mar. 13, 2024), https://states.guttmacher.org/policies/?gad_source=1&gclid=CjwKCAjwzN-vBhAkEiwAYiO7oIQvHxVeB5YEsEnxOxIWogXtFWoBRTThsiID61eqmpJ-X2iNXW1jeZhoCB4wQAvD_BwE.

The *Dobbs* decision that led us to this point was the culmination of a decades-long campaign waged by the anti-abortion movement and the politicians that did its bidding to end *Roe* and decimate reproductive freedom. Even before *Roe* was overturned by the Court, though *Roe*'s protections were never as universal in practice as they should have been, assaults against abortion access had been escalating. In the decade leading up to the *Dobbs* decision, state lawmakers seeking to advance their agenda of power and control had passed hundreds of state-level attacks on abortion access to make care extremely difficult, if not impossible, to access for many people across the country. According to the Guttmacher Institute, in 2022 alone, 563 provisions to restrict abortion access were introduced at the state level.² These systematic attacks on reproductive freedom and abortion access intentionally push access out of reach, and some go as far as criminalizing pregnant people and doctors who provide abortion care. Now, more than ever, the anti-abortion movement is advancing its extremist agenda in plain sight.

Every day we see the harm caused by the Court's decision to end the constitutional right to abortion as we know it. Anti-abortion extremists have made it clear that they want further restrictions, harms, surveillance and criminalization. Extreme efforts to criminalize abortion do not stop at doctors or medical providers. People across the country are already being charged or prosecuted for pregnancy outcomes including pregnancy loss, self-managed abortion care, or even the suspicion of it. Criminalizing people for having an abortion, experiencing a miscarriage or stillbirth, or any other pregnancy outcome only exacerbates racial inequities and is just one of the many ways that Black, Indigenous, and other people of color have been criminalized. Anti-abortion groups' continued silence on disproportionate criminalization is glaring. Their true goal has always been to control and criminalize women and pregnant people.

What we are observing in the aftermath of the *Dobbs* decision is only the beginning. We know that those hostile to abortion never intended to stop at overturning *Roe*. Anti-abortion politicians have only been emboldened by the Supreme Court's disregard for the health and well-being of millions of Americans. After denying that their goal was to ban abortion care nationwide, Republican lawmakers in Congress introduced a federal abortion ban declaring life begins at conception, which they outrageously billed as "moderate." Never in our country's history has such a ban existed, and the consequences on our lives and our freedoms would be catastrophic. Regardless of claims of "moderation," exceptions, or compromise, Republicans and anti-abortion extremists are working in lockstep to pass a national ban. This extreme agenda is fundamentally out of step with what the vast majority of Americans want.

Extremists are utilizing the fringe ideology of "fetal personhood" to push their radical attempts to restrict reproductive freedom. "Fetal personhood" is a concept that attempts to

² Elizabeth Nash & Peter Ephross, *State Policy Trends 2022: In a Devastating Year, US Supreme Court's Decision to Overturn Roe Leads to Bans, Confusion and Chaos*, Guttmacher Institute, (Dec. 19, 2022), <https://www.guttmacher.org/2022/12/state-policy-trends-2022-devastating-year-us-supreme-courts-decision-overturn-roe-leads>.

consider a fetus to be a legal person, and “fetal personhood” measures are a blatant attempt to force religious beliefs into law and continue the crusade against reproductive freedom. Laws that seek to establish that life starts at conception could not only criminalize abortion care, but could also criminalize assisted reproductive technology like IVF, as well as certain birth control methods, based solely on medical disinformation and the goal of forcing select religious beliefs into law. In addition to the aforementioned Life at Conception Act, which defines “human being” to include the moment of fertilization, and fails to include a carveout for IVF, Republicans have sought to establish fetal personhood through other areas of the law including the tax code through bills like the so-called Providing for Life Act. We saw the far-reaching impact of these efforts when the Alabama Supreme Court ruled that frozen embryos used in IVF are children in wrongful death claims, resulting in the cessation of IVF treatment in the state. In response, Senate Democrats – led by Senator Tammy Duckworth – took action to federally protect IVF and other fertility treatments through unanimous consent, but this effort was blocked by Senate Republicans. The Alabama Supreme Court decision is not an isolated incident; ideologues have been working for decades to push through similar policies. This ruling will motivate these extremists to enact similar policies in other communities throughout the country.

The threat to our fundamental rights does not stop there—many of our most cherished rights and freedoms are also at risk. The same anti-abortion, anti-freedom extremists working harder than ever to roll back abortion rights and access are also targeting our other fundamental freedoms, including our freedom to vote, LGBTQ+ rights, civil rights, and more. There are simply no limits in their pursuit of control and political gain.

In *Dobbs*, the Court claimed to be leaving abortion rights up to the states. Yet justices will soon be weighing in on abortion rights again, two more times in the next few months. Both cases are of incredible consequence, and the potential harm is incalculable. We are seeing the right-wing agenda at work in *Alliance for Hippocratic Medicine (AHM) v. U.S. Food and Drug Administration (FDA)*. In November 2022, anti-abortion extremists filed a suit aimed at eliminating medication abortion care – the most common method of abortion – as we know it. They filed this radical, lawless suit specifically in Amarillo, Texas, where it was guaranteed to be ruled on by a Trump-appointed, known anti-reproductive freedom zealot: Judge Matthew Kacsmaryk. Kacsmaryk issued a preliminary ruling which disregarded basic principles of law and parroted extremist talking points, granting the anti-choice plaintiffs’ request to block access to mifepristone while underlying litigation continues. Two of the key cases he cited in his ruling to severely restrict mifepristone have been retracted because of unreliable findings.

On appeal, a three-judge panel on the Fifth Circuit Court of Appeals, two of whom were anti-abortion Trump nominees, refused to grant the request to overturn Kacsmaryk’s ruling. Instead, they decided to reinstate medically unnecessary and outdated restrictions on mifepristone that had been lifted by the FDA based on extensive evidence of the safety and efficacy of the medication. In April 2023, the Supreme Court granted the Department of Justice’s request for a stay, blocking lower courts’ dangerous rulings as the case proceeded.

But in December 2023, the Supreme Court agreed to take up the case. This case has the potential to further devastate access to crucial abortion care if the Supreme Court sides with extremists and reinstates medically unnecessary restrictions that would roll back access – even in states where abortion is protected. This would have devastating effects in a landscape where anti-abortion extremists are working overtime to push abortion care further out of reach.

This is not the only key reproductive freedom case the Court will consider this session. Following *Dobbs*, the U.S. Department of Health and Human Services (HHS) issued guidance to hospitals that under the Emergency Medical Treatment and Active Labor Act (EMTALA), emergency care protected under the act included abortion care. The guidance reiterated that health care providers at hospital emergency rooms must provide abortion care when it is necessary to stabilize a patient, even where there is a state ban or other abortion restrictions in place, because of the general principle that federal law overrides state law when they conflict. Despite attorneys for the federal government arguing that EMTALA protects the right to abortion in these life-saving situations, anti-abortion judges have rejected these arguments out of hand, setting up a crucial battle for reproductive freedom at the Supreme Court. In January of this year, the Supreme Court in *United States v. Idaho* allowed Idaho to enforce its strict abortion ban even when it conflicts with EMTALA, making it a crime to perform an abortion unless a doctor can show the patient's life is at stake. Idaho Republicans are fighting to ensure doctors cannot perform abortion even in cases where the patient's health is in "serious jeopardy", or where they face other serious complications, in direct conflict with federal law.

All people – no matter who they are or where they live – should have the freedom to make their own decisions about whether to start or grow a family, free from political interference. While the Court's egregious decision in *Dobbs* is nothing short of devastating, the fight for reproductive freedom is far from over. The vast majority of Americans are with us, with 8 in 10 Americans supporting the legal right to abortion.³ Lawmakers who interfere with reproductive freedom do not represent the values of the overwhelming majority of people in this country. We urge Congress to pass legislation to lock the right to abortion into federal law.

³ Megan Brennan, *Record-High 47% in U.S. Think Abortion Is Morally Acceptable*, GALLUP, (Jun. 19, 2021), <https://news.gallup.com/poll/350756/record-high-think-abortion-morally-acceptable.aspx>; *Where Do Americans Stand on Abortion?* Gallup, (July 7, 2023), <https://news.gallup.com/poll/321143/americans-stand-abortion.aspx>.

RESOLVE: The National Infertility Association
Written Testimony for the Senate Judiciary Committee Hearing on
“The Continued Assault on Reproductive Freedoms in the Post-Dobbs America”

March 20, 2024

Alabama Supreme Court Ruling

On February 16, 2024, the Alabama Supreme Court, in *LePage v. The Center for Reproductive Medicine and Mobile Infirmary Clinic, Inc.* ruled that a frozen fertilized egg created through the in vitro fertilization (IVF) process should be treated as the legal equivalent of a living child. As a result of this ruling, three fertility medical practices in Alabama paused their medical services impacting hundreds of patients immediately, as well as thousands of patients and would-be patients who need IVF medical care to build their family in Alabama. People across the country, including the 1 in 7 women of reproductive age who have trouble getting pregnant or sustaining a pregnancy, are also terrified that similar rulings or legislative actions will impact their ability to access medical services to build their family.

RESOLVE: The National Infertility Association, a non-profit patient advocacy organization founded in 1974, is dedicated to ensuring that all people challenged in their family building journey reach resolution through being empowered by knowledge, supported by community, united by advocacy, and inspired to act. As soon as the AL Supreme Court ruling was announced, patient advocates in Alabama, with support from RESOLVE, began organizing Alabama residents to speak up and share their stories with their legislators.

Patient advocates held an Advocacy Day in Montgomery, AL on February 28, 2024, where they met with their state lawmakers and attended hearings on bills to fix the issue so that the clinics could safely re-open. However, legislators could not agree on a bill that would satisfy all of the stakeholders and provide clarity for patients and providers to resume their medical treatments. Working with legislators over the next several days, patients and providers raised their voices to ensure that the language in the bill would satisfy the immediate concerns of civil and criminal prosecution due to potential harm to an embryo as part of the IVF process in Alabama. This was an incredible show of strength and bravery from people who are battling infertility, people who are facing a cancer diagnosis, and people who are accessing IVF care as their only hope of having a family.

What the patient advocates knew though, is that this bill, which was signed into law on March 6, 2024, is a short-term fix, as the legal status of a frozen embryo in Alabama has not changed and is still that of a person. In fact, the sponsors of the bill and the Governor all stated that the new law was a temporary solution and that a more comprehensive solution is needed in Alabama that clarifies the status of a fertilized egg outside the uterus.

Future of Care in Alabama

Given that the status of a fertilized egg was not clarified by the recent law in Alabama, patients needing access to IVF remain concerned about their care and the decisions they can or cannot make about their embryos. The new law only grants immunity from prosecution and does not spell out if patients have rights over their own embryos. Patients deserve to know that the care they are receiving is evidence-based and meets the standard of care for their diagnosis. Patients deserve to access the highest quality care regardless of where they live. And patients deserve to get care from healthcare professionals who can practice in an environment free of apprehension and uncertainty. RESOLVE calls on the Alabama legislature and Governor to lay out a plan to clear up this uncertainty, so that people can access care in Alabama and feel confident they have every family building option available to them.

RESOLVE encourages patients and providers across the country to advocate and share their stories with their state and federal lawmakers. RESOLVE also stands ready to work with Members of Congress as well as state lawmakers to advance legislation that protects the availability of IVF and also expands access to family building care through health insurance. We need to work together to remove barriers to family building, not create barriers.

For further information about RESOLVE and our work, please visit our website at www.resolve.org, or contact Barbara Collura, President & CEO, at barb.collura@resolve.org or 703.506.2011.

Chairman Durbin, Ranking Member Graham, and distinguished members of the Committee:

Thank you for the invitation to submit written testimony. I am a law professor at the University of California Davis, where my research and writing focus on the intersection of constitutional law, legal history, and health law. I've written six books on the history of debates about reproductive health and polarization in the United States. As a Guggenheim Fellow in 2023-2024, I am working on a forthcoming book with Yale University Press about fetal personhood. It's a pleasure and honor to contribute to this hearing.

In *LePage v. Center for Reproductive Medicine*, the Alabama Supreme Court held that the state's Wrongful Death of a Minor Law treats an embryo as a "person" or "child." The ruling made it possible that anyone in Alabama who intentionally or accidentally destroyed an embryo could be exposed to devastating civil liability. But the implications of *LePage* reach beyond the state of Alabama.¹

The court's ruling has also drawn new attention to the struggle over fetal personhood. Though there are a variety of definitions of fetal personhood, its champions in the United States generally agree that a fertilized egg, embryo, or fetus qualifies as a unique, separate "person" and thus has rights. The most enduring personhood struggle in the United States has concerned *constitutional* fetal personhood: the idea that the word "person" in the Due Process and Equal Protection Clauses confers constitutional rights on the fetus or unborn child.

Understood in historical context, the Alabama decision is part of a much struggle over fetal rights. In this testimony, I will trace the history of the fight for fetal personhood, illuminate the connection of personhood arguments to *Dobbs*, and discuss how it came to be associated with the criminalization of pregnancy outcomes.

The Origins of a Personhood Movement

As Justice Samuel Alito wrote in *Dobbs*, the first struggle to criminalize abortion began in the nineteenth century. The Boston obstetrician-gynecologist Horatio Storer led the American Medical Association to introduce a resolution in 1859 proclaiming that

¹ *LePage v. Center of Reproductive Medicine*, __ So.3d __, 2024 WL 656591 (Al. 2024).

“physicians have long been united in condemning the act of producing abortion,” which was nothing less than “an unwarrantable destruction of human life.”² Storer and his allies certainly framed the fetus as a separate *biological* person, insisting that life began when an egg was fertilized, not when a pregnant woman could detect fetal movement. But Storer discussed morality, religion, and immigrant birth rates, not constitutional rights. Indeed, he often complained that his contemporaries saw nothing wrong with abortion—a state of affairs he wanted to change, but hardly one that suggests widespread acceptance in the period of fetal rights.³

In the same era, Anthony Comstock, a dry goods salesman, worked with the YMCA to champion state and federal legislation that criminalized the *mailing* of items and information related to contraception and abortion. But Comstock did not focus on fetal protection. He described contraceptives and abortifacients as interchangeable (he often called contraceptive sellers abortionists)⁴ and argued that both were problematic for the same reasons as erotica or medical textbooks: they would encourage to have illicit sex by concealing their “sin.”⁵ None of these movements, however, described the fetus as a rights-holding person.

The fight for *constitutional* personhood got under way in the 1960s. The modern antiabortion movement mobilized when states began adding new exceptions to criminal abortion laws to cover cases of rape, incest, fetal abnormality, and threats to health. Antiabortion groups

² “Report of the Committee on Criminal Abortion,” *Transactions of the American Medical Association, Twelfth Annual Meeting*, May 5-9, 1859, 77-78.

³ *Ibid.*, 75, 77 (1859) (Storer noting “a wide-spread popular ignorance of the true character of the crime—a belief, even among mothers themselves, that the foetus is not alive till after the period of quickening”).

⁴ Heywood Broun and Margaret Leech, *Anthony Comstock: Roundsman of the Lord* (New York: Albert and Boni, 1928), 178.

⁵ In *Our Day*, a purity publication on whose board he served, Comstock framed abortion in similar terms: as being indistinguishable from contraception as a lure for lust, and establishing that his allies worked to suppress “articles for criminal abortion, preventing conception, aiding seduction, and for unreportable immoral use.” Anthony Comstock, “Success in the Suppression of Vice,” *Our Day*, 1888, at 298. The Reverend James Buckley, a prominent evangelical ally of Comstock’s, spoke of abortion in similar terms, arguing that the “sole purpose” of “abortionists” was “the promotion or concealment of licentiousness.” Rev. James Buckley, “The Suppression of Vice,” *North American Review* 135 (1883): 500; see also “A Conspiracy Against Virtue,” *Zion’s Herald*, June 6, 1878, 188 (describing abortion and contraceptive drugs as “the most loathsome appliances for the accomplishment of the lowest crimes without entailing their natural consequences”).

first argued that these reforms were either immoral or unnecessary, because pregnancy after sexual assault was impossible, for example, or because pregnancy was no longer dangerous. When these arguments were unavailing, antiabortion lawyers began arguing instead that laws permitting abortion were unconstitutional. These arguments—that the fetus or unborn child has rights under the Fourteenth Amendment—became an organizing principle for what we think of as the pro-life or anti-abortion movement. From the 1960s to the present, the antiabortion movement has been a fetal personhood movement.⁶

What it meant to enforce personhood was not clear to the Americans who joined the early pro-life movement. Some movement leaders argued that if a fetus were a person, abortion would need to be treated the same as any other homicide. Others argued that personhood would automatically revive nineteenth-century criminal laws. Still others questioned whether there was too much focus on criminalization—and whether personhood would require more government support for pregnant women, such as more government funding for prenatal care or day care.⁷

How Personhood Became Punitive

Following the decision of *Roe v. Wade*, Americans opposed to abortion did not give up on the idea of fetal personhood. Instead, they rallied around an Article V constitutional amendment that they would call the Human Life Amendment, most versions of which redefined the term “person” in the Fourteenth Amendment to apply the moment an egg was fertilized. The quest to pass this amendment brought the antiabortion movement into an alliance with the Republican Party, but even following Ronald Reagan’s election in 1980, which awarded the GOP control of both houses of Congress, there were not enough votes for

⁶ Key early works include Robert Byrn, “Abortion in Perspective,” *Duquesne Law Review* 5 (1966): 132; John T. Noonan, “An Almost Absolute Value in History,” in *The Morality of Abortion: Legal and Historical Perspectives*, John T. Noonan ed. (Cambridge, MA: Harvard University Press, 1970), 51-59; William J. Kenealy, “Law and Morals,” *Catholic Lawyer* 9 (1963): 201-202.

⁷ For these varying perspectives, see Part 3: Senate Judiciary Subcommittee on Constitutional Amendments, 93d Congress, 2d Session (1974), 166 (Statement of Warren Schaller); Nellie Gray to Members of the Right-to-Life Movement, 3 (December 1, 1973), in the American Citizens Concerned for Life Papers, Box 6, Constitutional Amendment 1973 Folder, Gerald Ford Library; Charles Rice to Joseph Witherspoon, September 5, 1973, in the American Citizens Concerned for Life Papers, Box 6, Constitutional Amendment 1973 Folder, Gerald Ford Library; Robert Byrn to Joseph Witherspoon, September 4, 1973, in the American Citizens Concerned for Life Papers, Box 6, Constitutional Amendment 1973 Folder, Gerald Ford Library.

a personhood amendment to pass, and abortion opponents were too divided about possible alternatives, including an amendment that would return the abortion question to the states, to get anything done.⁸

But that hardly meant that fetal personhood arguments went away. Leading antiabortion groups instead tried to write fetal personhood into other areas of law—and this at a time when both political parties were accelerating what they referred to as a war on crime. The Anti-Drug Abuse Act of 1986 made the penalties for possession of crack cocaine equal to the sentence for possession of 100 times the same amount of powder cocaine. The Comprehensive Crime Control Act of 1984 reinstated the federal death penalty, gutted the parole program, created mandatory minimums for certain violent felonies, allowed law enforcement to recover up to 90 percent of the cash and property seized from defendants in drug cases, and established a national clearinghouse to help states construct new prisons.⁹

Antiabortion groups sought to redefine the fetus as the ultimate victim of violent crime. Americans United for Life, a leading pro-life litigator, sponsored fetal homicide laws, which exempted pregnant women from charges but punished anyone who murdered a pregnant woman for two homicides rather than one. Antiabortion groups also championed the prosecution of pregnant drug users, both under existing laws and under new feticide statutes. “A clear, high standard should be placed on the prosecutor to determine willful, malicious child abuse before any woman is charged,” explained Clarke Forsythe of Americans United for Life in 1988. “The principle that the unborn child in the criminal law is a person should be upheld.”¹⁰

From the beginning, prosecutions of pregnant drug users disproportionately targeted people of color. In 1990, Black women were ten times more likely than white women to be reported to the authorities for drug use during pregnancy. Many temporarily or permanently lost custody of their children, and some faced time in

⁸ See Mary Ziegler, *After Roe: The Lost History of the Abortion Debate* (Cambridge: Harvard University Press, 2015), 157-158.

⁹ For the Anti-Drug Abuse Act of 1986, see 21 U.S.C. § 801 et seq. For the Comprehensive Crime Control Act of 1984, see 18 U.S.C. §1. For the Victims of Crime Act, see 18 U.S.C. § 3771.

¹⁰ Marney Rich, “A Question of Rights,” *Chicago Tribune*, September 18, 1988, F1.

prison, fines, or probation.¹¹ By prosecuting pregnant drug users, abortion opponents hoped to set the stage for the recognition of constitutional fetal rights down the road. The new criminal laws, reasoned Forsythe, pointed “to the discrepancy in how the law and culture views the unborn child. How can an unborn child be a human being in one context but not another?”¹²

There were also tensions between IVF and the demand for fetal personhood. IVF providers often created more embryos than would be implanted in a given cycle, recognizing that patients might plan to have more children in the future, or that if an IVF cycle were ineffective, additional embryos could reduce the financial and emotional toll of another attempt at parenthood. Additional embryos, in turn, could be destroyed, stored for future use, or donated to another couple or for medical research. But if an embryo were a rights-holding person, how could anyone choose to store it or donate it for research, much less destroy it? As early as the 1970s and 1980s, leading antiabortion advocates opposed the current practice of IVF, worrying, as Nellie Gray, the founder of March for Life, put it in 1981, that IVF showed “reckless disregard [for] the lives of the tiny human beings who are created in a little glass dish.”¹³

In the 2000s, when President George W. Bush faced bipartisan criticism for the limits he placed on stem cell research, antiabortion groups drew a direct connection between opposition to IVF, opposition to stem cell research, and the fight for fetal personhood. As IVF helped more families across the United States achieve parenthood, more Republicans and Democrats asked why embryos created through IVF and donated for research could not be used to develop potential stem

¹¹ See Gina Kolata, “Bias Seen Against Pregnant Addicts,” *New York Times*, July 20, 1990, A13; see also Michele Goodwin, *Policing the Womb: Invisible Women and the Criminalization of Motherhood* (New York: Cambridge University Press, 2020), 118-134; Dorothy Roberts, *Killing the Black Body: Race, Reproduction, and the Meaning of Liberty* (New York: Penguin, 1997), 155-188; Lynn Paltrow, *Criminal Prosecutions against Pregnant Women: National Update and Overview* (April 1992), <https://advocatesforpregnantwomen.org/wp-content/uploads/1992/01/1992-State-by-State-Case-Summary.pdf>.

¹² “Fetal Homicide Legislation: Protecting the Unborn in a Non-Abortion Setting,” *AUL Forum*, January 1995, 1, in the People for the American Way Papers, Box 9, Folder 7.

¹³ Constitutional Amendments Related to Abortion, Hearings before the Senate Judiciary Subcommittee on the Constitution, 97th Congress 1st Session (1981), 1182 (Statement of Nellie Gray); see also Michael Budde, “Test-Tube Life a Serious Issue,” *Chicago Defender*, August 14, 1979, 9; David Arnold, “Antiabortion Group Holds First State Convention,” *Boston Globe*, November 8, 1981, 38.

cell remedies. Increasingly, antiabortion groups came to see the current practice of IVF as the problem.

Some championed laws like a 1986 Louisiana statute, which treated an embryo as a “juridical person” and prohibited the destruction of embryos deemed “viable.”¹⁴ Others considered laws requiring that any embryo created through IVF would have to be implanted rather than stored, donated, or destroyed.¹⁵ The point of these laws, as personhood proponents saw it, was not only to protect embryos but also to advance the argument for constitutional fetal personhood. “In as many areas as we can, we want to put on the books that the embryo is a person,” Samuel Casey of the Christian Legal Society explained in 2003 of regulations of IVF. “That sets the stage for a jurist to acknowledge that human beings at any stage of development deserve protection.”¹⁶

The *Dobbs* Personhood Connection

Conservative commentators have correctly pointed out that the Alabama Supreme Court’s decision in *LePage* did not flow legally from *Dobbs*.¹⁷ *LePage* involved a state court’s interpretation of a state wrongful death law. *Dobbs* overturned *Roe v. Wade*, which not only recognized a right to choose abortion but also rejected the argument that the word “person” in the Fourteenth Amendment applies the moment an egg is fertilized. But a state could interpret its wrongful death law to apply to embryos before *Dobbs*. Indeed, many states had fetal homicide laws that applied from the moment of fertilization for decades before *Roe* was reversed.

If there is no legal connection between *Dobbs* and *LePage*, the political connection between the two is profound. In *Roe*, the Court held that the word “person” in the Fourteenth Amendment applied only postnatally. That meant that any state ruling like *LePage* would be a dead end. Had a state supreme court recognized constitutional fetal rights, that would have drawn a federal constitutional challenge based on *Roe*. And there seemed to be no realistic chance of *federal* recognition

¹⁴ LA-RS 9 §129.

¹⁵ Judy Peres, “In Vitro New Front in Embryo War,” *Chicago Tribune*, July 6, 2005, 1.

¹⁶ Aaron Zitner, “The Nation: Abortion Foes Attack *Roe* on New Research,” *Los Angeles Times*, January 19, 2003, A1.

¹⁷ Ramesh Ponnuru, “Alabama IVF Decision and *Dobbs*: Inaccurate Reporting,” *National Review*, February 26, 2024, <https://www.nationalreview.com/corner/the-alabama-ivf-decision-and-dobbs/#:~:text=The%20Alabama%20IVF%20Decision%20and%20Dobbs,-Supreme%20Court%20Police&text=The%20Biden%20campaign%20has%20said,opening%20for%20the%20Alabama%20court>.

of fetal rights. Americans did not support the carceral vision of fetal rights on which the antiabortion movement had settled—under twenty-percent thought that virtually all abortions should be criminal¹⁸—and that made ratification of the Human Life Amendment impossible. Nor would the Supreme Court recognize fetal personhood when *Roe* was on the books.

Now, *Roe* is gone. Antiabortion groups need a new cause to rally supporters and donors, and they have found it in the cause that brought many Americans opposed to abortion to the movement in the first place: the belief that a fetus or unborn child is a rights-holding child.

Interpreting *Dobbs*

Dobbs did not directly address fetal personhood. The Court reasoned that “there was no support in American law for a constitutional right to obtain an abortion.”¹⁹ Indeed, wrote Justice Alito, “abortion had long been a crime in every single State.”²⁰

In the Court’s account, abortion had long been a felony after quickening but had been viewed with disfavor throughout pregnancy. By the nineteenth century—at the time of the ratification of the Fourteenth Amendment, in the Court’s view—states were criminalizing abortion throughout pregnancy. These laws were motivated by “a sincere belief that abortion kills a human being.”²¹

Any number of antiabortion groups, including state affiliates, leading scholars, Christian bioethicists, and grassroots activists, raised fetal personhood in amicus briefs in *Dobbs*.²² But the Court did not conclude that a fetus was a rights-holding person. Instead, the majority opinion reasoned that the Constitution recognized no right to abortion and returned the abortion question to “the people and their elected

¹⁸ “Abortion,” *Gallup Historical Trends*, 2024, <https://news.gallup.com/poll/1576/abortion.aspx>.

¹⁹ *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215, 216-217 (2022).

²⁰ *Ibid.*, 254.

²¹ *Ibid.*,

²² Brief Amici Curiae Scholars of Jurisprudence John Finnis and Robert George, 5-23, *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215 (2022) (No. 19-1392); Brief Amicus Curiae of the National Catholic Bioethics Center et al., 7-11, *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215 (2022) (No. 19-1392); Brief Amici Curiae of the Foundation to Abolish Abortion et al., 25-34, *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215 (2022) (No. 19-1392); Brief Amici Curiae of Illinois Right to Life and Dr. Steve Jacobs, 3-12, *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215 (2022) (No. 19-1392); Amicus Brief of Human Coalition Action and Students for Life of America in Support of Petitioners, 14-15, *Dobbs v. Jackson Women’s Health Organization*, 597 U.S. 215 (2022) (No. 19-1392).

representatives.”²³ Justice Brett Kavanaugh, a key vote in the case, even suggested that the Constitution was neither pro-choice nor pro-life, suggesting that for him, the door was closed on personhood for the time being.²⁴

But the lack of a direct reference to the idea hardly deterred personhood champions. Time and again, *Dobbs* referred to a fetus as an “unborn human being” and reiterated that abortion involves the taking of human life—points of view that echoed beliefs about fetal personhood. Moreover, the version of U.S. history adopted by *Dobbs* ignored the consensus of academic historians, instead echoing the narrative echoed by the pro-life scholars Robert George and John Finnis. Reading between the lines, antiabortion leaders believe that the Court may be open to recognizing federal constitutional fetal rights in the future.

And so instead of being a dead end, *LePage* is an invitation to write personhood into more areas of the law. It has energized antiabortion groups, who have celebrated the ruling as a first step toward constitutional fetal rights. It is part of the same strategy that Clarke Forsythe laid out in the 1980s and 1990s. If a fetus has rights in any number of states, in any number of legal contexts, that will make federal constitutional law an outlier. Why, abortion opponents will ask, should we not recognize personhood there too?

The Tensions Between Personhood and the Rights of Pregnant Patients

Republicans have expressed support for IVF in the days since the Alabama ruling, but given the antiabortion movement’s support for fetal personhood, IVF will likely remain in the crosshairs. In Alabama, the state legislature passed a bill that creates immunity for IVF providers and administrators for civil or criminal liability in the event that an embryo is destroyed. At the time I am writing, Governor Kay Ivey has vowed to sign it into law. Republicans, however, rejected a bill that would have limited the state’s recognition of fetal personhood to life in the womb, thereby excluding embryos created through IVF.

The immunities created by pending legislation in Alabama do not lift the cloud of uncertainty surrounding IVF in the state. While the state supreme court ruled only on whether embryos were persons for

²³ *Dobbs*, 597 U.S. at 259.

²⁴ *Ibid.*, 338 (Kavanaugh, J., concurring).

the purposes of the state's wrongful death of a minor law, the logic of the court's ruling suggests that the court may later recognize embryos as persons for *constitutional* persons. If an IVF provider inadvertently destroys an embryo, for example, and a litigant could not pursue relief because of the state law, they might assert that the new immunities violate the state constitution. Access to IVF will remain uncertain in the state in the foreseeable future.²⁵

Honoring prenatal life and the rights of pregnant patients need not be a zero-sum game. The families in *LePage* were pursuing remedies for the tremendous loss they suffered that were unrelated to personhood, including claims for negligence and breach of contract. There may be even ways to reconcile concern for fetal life and access to abortion. In Germany, for example, the nation's Constitutional Court has long recognized a right to fetal life. Yet in 1993, the court held that recognizing such a right does not require the criminalization of abortion—and instead requires the government to balance its commitments to protecting life and honoring reproductive rights by addressing the reasons some women feel they must terminate pregnancies, such as a lack of safe housing or prenatal care.²⁶ Some Americans clearly feel the same way: a 2022 Pew Forum poll found that more than 30 percent of Americans believed that life began at conception, and supported some fetal protections, while opposing the criminalization of IVF, abortion, and pregnancy.²⁷

There are tensions, however, between the contemporary vision of fetal personhood and the rights of pregnant women. Contemporary personhood proponents in the United States insist that equal treatment for the fetus or preborn child requires harsh criminal penalties for those who wrong the fetus. Most often, the focus of these carceral laws is physicians and other medical professionals, who have often stopped delivering critical care to pregnant women, even those with wanted

²⁵ "Alabama Lawmakers Aim to Approve Immunity for IVF Providers," *Associated Press*, March 5, 2024, <https://apnews.com/article/alabama-ivf-frozen-embryos-legislation-immunity-68d773d6ee89107c9a2e569110e7e31f>.

²⁶ *Schwangerschaftsabbruch II*, (1993) 88 BverfGE 203 (Fed Const Ct) (Germany). For discussion of the rules in Germany, see Vanessa MacDonnell and Julia Hughes, "The German Abortion Decisions and the Protective Function in German and Canadian Constitutional Law," *Osgoode Hall Law Journal* 50 (2013): 1006-1022.

²⁷ "America's Abortion Quandary," *Pew Research Center*, May 16, 2022, <https://www.pewresearch.org/religion/2022/05/06/americas-abortion-quandary/>.

pregnancies, for fear of prosecution. Antiabortion groups and some Republican attorneys general have also taken aim at a broad group of those supporting abortion seekers, including abortion funds, friends, and family, who help with expenses, travel, lodging, and more.

Because of the personhood fight, women have been punished too. For years, states like Alabama, the site of *LePage*, have punished pregnant women, overwhelmingly those who are Black and poor, for drug use during pregnancy.²⁸ Since *Dobbs*, we have seen an acceleration of this trend. In Ohio, prosecutors targeted Brittany Watts, a Black woman, for abuse of a corpse after she experienced a miscarriage at home. No one disputed that Watts's pregnancy was not viable when she miscarried, and no one accused her of doing anything to end her pregnancy. And yet Ohio prosecutors faulted Watts, who was grieving her loss, for not manifesting that grief in the way they expected.²⁹

Conservative lawmakers have vowed not to punish women or other pregnant people for abortion itself. Currently, this is a majority position within leading antiabortion groups.³⁰ But the push to punish women for abortion has recently gained momentum. So-called abortion abolitionists have developed model legislation and lobbied lawmakers in conservative states across the country to consider punishing women.³¹ Abolitionism has gained a foothold in the Southern Baptist Convention, which has stopped short of calling for the punishment of women while Even when they are not successful, abolitionists encourage lawmakers to pass more extreme laws to defuse criticism from the right.

And abolitionists are more vocal because of the challenges of regulating abortion medication. A majority of Americans having

²⁸ Pregnancy Justice, "The Rise of Pregnancy Criminalization: A Pregnancy Justice Report," <https://www.pregnancyjusticeus.org/rise-of-pregnancy-criminalization-report/>.

²⁹ "Ohio Woman Who Miscarries at Home Won't Be Charged with Corpse Abuse, Grand Jury Decides," *Associated Press*, January 11, 2024, <https://apnews.com/article/miscarriage-prosecution-ohio-brittany-watts-68145b3044b3cc61017b71a97f7cc036>.

³⁰ See Veronica Stracqualursi, "Leading Anti-Abortion Groups Urge Lawmakers Not to Pass Bills Criminalizing Women for Abortions," *CNN*, May 12, 2022, <https://www.cnn.com/2022/05/12/politics/anti-abortion-groups-letter-criminalizing-women/index.html>, accessed July 5, 2022.

³¹ Elizabeth Dias, "Inside the Extreme Effort to Punish Women for Abortion," *New York Times*, July 1, 2022, <https://www.nytimes.com/2022/07/01/us/abortion-abolitionists.html>, accessed July 5, 2022.

abortions now use pills: mifepristone and misoprostol.³² Nonprofits in Europe and Canada will mail these pills to patients even in countries where abortion is illegal. To date, lawmakers in conservative states have strategized about how to punish doctors in progressive states (or other nations) that make available abortion pills. But as abortion abolitionists likely recognize, it will be much simpler for states to punish their own residents for having abortions than it will be to target those who reside elsewhere. The pressure to punish those who have abortions will grow.

Conservative attorneys have also raised the possibility that women will be punished under the Comstock Act, a nineteenth-century obscenity law that abortion opponents now reinterpret as a de facto ban on all abortions. Looking at nineteenth-century case law and legislative history, courts since the 1930s have interpreted the law to protect items and communications for patient health. But the contemporary antiabortion movement cherry picks parts of a much more sweeping obscenity law to construct an abortion ban that they claim has no exceptions, one that makes it a crime to mail or *receive* any abortion-related item. Understood in this way, the Comstock Act would punish women too.³³

And in pursuit of the recognition of fetal personhood, the antiabortion movement will seek to write personhood into other areas of the law, like wrongful death laws or abuse of corpse laws. The criminalization of pregnant patients will likely continue because of the precedent it sets for recognizing fetal rights elsewhere in the law.

We cannot be sure what will come next in the struggle over fetal personhood. But we can be sure that it will touch on more than abortion. The struggle may pose a risk to contraception, since some

³² Rachel K. Jones et al., “Medication Abortion Now Accounts for More than Half of All U.S. Abortions,” *Guttmacher Institute Policy Analysis*, February 2022, <https://www.guttmacher.org/article/2022/02/medication-abortion-now-accounts-more-half-all-us-abortions>, accessed July 5, 2022.

³³ Mark Lee Dickson, *City of Edgewood Considers First “Sanctuary City for the Unborn” Ordinance Since HB7*, Live Action (Apr. 7, 2023), <https://www.liveaction.org/news/edgewood-new-mexico-sanctuary-city-hb7>; Project 2025, *Mandate for Leadership: The Conservative Promise* 459, 562 (2023).

conservative Christians believe that common drugs, from IUDs to emergency contraceptives to the birth control pill, are abortifacients.

The fight for personhood will continue to create uncertainty for families pursuing IVF. It will justify the increasing criminalization of pregnancy. And it will introduce uncertainty into the future of federal constitutional law.

The Court in *Dobbs* promised that the people and their elected representatives would get to decide what the law had to say about abortion, IVF, and other reproductive rights. But if personhood proponents have their way, the votes of millions of Americans will be ignored, and penalties for providers of abortion and IVF may be held to be required by the Constitution.

POLITICS

THE ABORTION ABSOLUTIST

Warren Hern has been performing late abortions for half a century. After *Roe*,
he is as busy with patients as ever.

By Elaine Godfrey



Photograph by Joanna Kulesza for The Atlantic
MAY 12, 2023

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THE SKY ABOVE Boulder was dark when the abortion doctor picked me up for dinner. I had to squint to recognize Warren Hern in his thick aviator glasses and fur-trapper hat.

At the restaurant—a kitschy Italian spot along a pedestrian mall—Hern ignored the table the waiter offered us, pointed at one in the corner, and clomped over in his

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Hern spent the next two and a half hours of our dinner correcting me. A baby is a fetus until it is “born alive,” he told me as I chewed my bucatini. His dear friend, the Kansas physician George Tiller, was not “murdered” in 2009, he was *assassinated*. The activists who scream outside his clinic are not “pro-life,” they are *fascists*.

Pausing, Hern sighed. He is very busy, he said, and there are many things he’d rather be doing than talking to me. “But I can’t complain that the pro-choice movement has completely failed” at communicating, he said, “and then turn down an opportunity to communicate.”

[Read: What winning did to the anti-abortion movement](#)

I'd met Hern before, so I wasn't surprised by his gruffness. The 84-year-old can be a curmudgeon—he's obstinate, utterly certain of his position, and intolerant of criticism even as he dishes it out. Useful qualities, perhaps, for someone in his line of work.

Hern is now nearing his fifth decade of practice at his Boulder clinic; he has persisted through the entire arc of *Roe v. Wade*, its nearly 50-year rise and fall. He specializes in abortions late in pregnancy—the rarest, and most controversial, form of abortion. This means that Hern ends the pregnancies of women who are 22, 25, even 30 weeks along. Although 14 states now ban abortion in most or all circumstances, Colorado has no gestational limits on the procedure. Patients come to him from all over the country because he is one of only a handful of physicians who can, and will, perform an abortion so late.

During the first 13 weeks of pregnancy, when about 90 percent of abortions in America are carried out, the fetus's appearance ranges from a small clot of phlegm to an alienlike ball of flesh. At 22 weeks, though, a human fetus has grown to about the size of a small melon. The procedures that Hern performs result in the removal of a body that, if you saw it, would inspire a sharp pang of recognition. These are the abortions that provide fodder for the gruesome images on protesters' signs and the billboards along Midwest highways, images that can be difficult to look at for long.

Many of the women who visit Hern's clinic do so because their health is at risk—or because their fetus has a serious abnormality that would require a baby to undergo countless surgeries with little chance of survival. But Hern does not restrict his work to these cases.

The phone at Hern's clinic rings constantly these days. Since the overturning of *Roe* and the corresponding blitz of abortion bans, appointment books are filling up at clinics in states where abortion remains legal. Women who have to wait weeks for an appointment may end up missing the window for a first-trimester procedure. Some book a flight to Boulder to see Hern, who is treating about 50 percent more patients than usual.

These later abortions are the less common cases, and the hardest ones. They are the cases that even stalwart abortion-rights advocates generally prefer not to discuss. But as the pro-choice movement strives to shore up abortion rights after the fall of *Roe*, its members face strategic decisions about whether and how to defend this work.

Most Americans support abortion access, but they support it with limits—considerations about time and pain and fingernail development. Hern is reluctant to acknowledge any limit, any red line. He takes the woman's-choice argument to its logical conclusion, in much the same way that, at this moment, *anti*-abortion activists are pressing their case to its extreme. Hern considers his religious adversaries to be zealots, and many of them are. But he is, in his own way, no less an absolutist.

IN MAY OF 2019, an envelope landed on my desk at work with a nature calendar inside. The photos—an arctic tern landing on a hunk of ice, a shock of mountain maple in the Holy Cross Wilderness, two sandhill cranes taking flight—were all credited to Hern. I'd interviewed him a week earlier for a short article about abortion-rights activism, and it amused me that a working abortion doctor was making wildlife calendars and express-mailing them to journalists. This past December, I flew to Boulder to meet him.

The Boulder Abortion Clinic is a single-story, yellow-brick building, partially hidden from the road by a wooden fence. Someone tried to shoot Hern once, back in 1988, so now the front windows are made of bulletproof glass. You have to show ID to gain access to the waiting room, and the blinds are usually drawn, leaving the whole place slightly dim. Stepping inside is like going back in time: The office is a maze of wood paneling, vinyl chairs, and faded green carpet.

Warren Hern's Boulder Abortion Clinic, which he opened in 1975. (Joanna Kulesza for *The Atlantic*)

The first day I visited, no protesters were chanting outside; it was a Monday, and they tend to show up on Tuesdays, which is patient-intake day. Hern's staff sat me in an office near the front desk, where I could hear calls coming in. I listened as a receptionist told a patient named Lindsey that it was okay to be anxious; she paused a few times while Lindsey cried.

"The fee will be about \$6,000," the receptionist said. Late abortions are expensive because they are medically complex. For patients who need financial aid, the National Abortion Federation may cover some of the cost, and local abortion funds often contribute. The receptionist told this to Lindsey, and offered her the organization's number. "You can do partial cash and credit card, yes," she said. Often, if a woman cannot afford to pay for her hotel, her transportation to Boulder, or some part of her procedure, Hern will foot the bill himself, staff members told me.

Hern stopped performing first-trimester abortions a few years ago; he saw too much need for later abortions, and his clinic couldn't do it all. The procedure he uses takes three or four days and goes like this: After performing an ultrasound, he will use a thin needle to inject a medicine called digoxin through the patient's abdomen to stop the fetus's heart. This is called "inducing fetal demise." Then Hern will insert one or more laminarias—a sterile, brownish rod of seaweed—into the patient's cervix to start the dilation process.

From the May 2022 issue: The future of abortion in post-Roe America

When the cervix is sufficiently dilated after another day or two of adding and removing laminarias, Hern will drain the amniotic fluid, give the patient misoprostol, and remove the fetus. Sometimes, the fetus will be whole, intact. Other times, Hern must remove it in parts. If the patient asks, a nurse will wrap the fetus in a blanket to hold, or present a set of handprints or footprints for the patient to take home.

I interviewed half a dozen of Hern's former patients. Most of the women who agreed to talk had wanted a child. But they'd received serious diagnoses late in pregnancy: disorders with disturbing names such as prune-belly syndrome, trisomy 13, Dandy-Walker malformation, and agenesis of the corpus callosum. Some said they considered their abortions a kind of mercy killing.

"I put my baby down," Kate Carson, who'd gotten an abortion at Hern's clinic in 2012, told me. She'd been 35 weeks into a much-wanted pregnancy when her doctor diagnosed multiple brain anomalies. Carson's daughter, the doctor said, would have trouble walking, talking, holding her head up, and swallowing. "It's euthanasia. That's the kind of killing this is," she said. "But I would do it again a million times if I had to."

Amber Jones, who terminated her pregnancy at about 24 weeks in 2016, told me that her baby's diagnosis meant he would not survive. Hern reassured her, she said, that she "shouldn't be made to carry the pregnancy. That it's bullshit, and we have the right to access health care."

Carson and other patients described Hern as brusque. But they seemed to take comfort in that brusqueness, as though Hern's fierce assurance helped them feel more sure themselves. "I wouldn't say he has a great bedside manner," Carson told me. But "the degree of respect that I felt from him was enormous."

Abortions that come after devastating medical diagnoses can be easier for some people to understand. But Hern estimates that at least half, and sometimes more, of the women who come to the clinic do not have these diagnoses. He and his staff are just as sympathetic to other circumstances. Many of the clinic's teenage patients receive later abortions because they had no idea they were pregnant. Some sexual-assault victims ignore their pregnancies or feel too ashamed to see a doctor. Once, a staffer named Catherine told me, a patient opted for a later abortion because her husband had killed himself and she was suddenly broke. "There isn't a single woman who has ever written on her bucket list that she wants to have a late abortion," Catherine said. "There is always a reason."

The reason doesn't really matter to Hern. Medical viability for a fetus—or its ability to survive outside the uterus—is generally considered to be somewhere from 24 to 28 weeks. Hern, though, believes that the viability of a fetus is determined not by gestational age but by a woman's willingness to carry it. He applies the same principle to all of his prospective patients: If he thinks it's safer for them to have an abortion than to carry and deliver the baby, he'll take the case—usually up until around 32 weeks, with some rare later exceptions, because of the increased risk of hemorrhage and other life-threatening conditions beyond that point.

Even within the abortion-rights community, Hern's position is considered a hard-line one.

Frances Kissling, the founding president of the National Abortion Federation, the professional association for abortion providers, admires Hern and his commitment to women. But she has misgivings about his work. "Later-term abortions are more serious, ethically, than earlier abortions," Kissling, who left NAF after a few years and went on to lead Catholics for Choice, told me—and only more so in cases that involve women who have not received any serious fetal diagnoses. "My ethics are such

that I would say to them, ‘I’m terribly sorry, but I cannot perform an abortion for you. I will do anything I can to help you get through the next two or three months, but I don’t do this,’” she said.

HERN BRISTLES AT the label *abortion doctor*. Too simplistic, he says. He will correct you if you use it. He is a physician, he says, who happens to specialize in abortion. Worse still is *abortionist*. He remains angry about a 2009 story in *Esquire* in which the author referred to him that way, again and again. It’s a pejorative, Hern says. He is more than his profession, he needs you to know. He is many things: an anthropologist, an epidemiologist, an adopted son of the Shipibo Indians in Peru. Abortion was never the destination for Hern, he insists; it was a detour.

As a child growing up in the suburbs of Denver, Hern dreamed of studying diseases in faraway places. During medical school, he worked as the unofficial doctor at a mining camp in Nicaragua, where he learned to speak Spanish. He spent six months in Peru, studying the culture and practices of the Shipibo. In 1966, the Peace Corps sent him to Brazil, where he learned Portuguese and trained under physicians who had started a family-planning association. Hern toured a maternity ward where one room was full of women recuperating from childbirth. Two other rooms held patients suffering from complications related to illegal abortions; at least half of those women ultimately died. This, he says, was formative.

From the June 1969 issue: The right of abortion

In 1970, Hern accepted a job at the now-defunct Office of Economic Opportunity in Washington, D.C., where he led the effort to open family-planning clinics across the country and launched a voluntary-sterilization program for adults in Appalachia. Given the link between the eugenics movement and the early birth-control movement, the word *sterilization* can carry an ominous ring. Hern says, though, that his work was intended to give low-income people choices and reduce their financial hardship. “Families like these,” he wrote in *The New Republic* at the time, require

housing, clean water, food, and sanitation. “But one of the most important needs is freedom from the tyranny of their own biology.”

In 1973, Hern was back in Colorado—the first state to decriminalize abortion in some circumstances—acting as a consultant for family-planning programs when the world shifted. Sarah Weddington, a lawyer friend of Hern’s from D.C., had won the *Roe v. Wade* case before the U.S. Supreme Court, and abortion was now legal in all 50 states. Hern wrote op-eds defending the decision and an explainer about the procedure for *The Denver Post*. One day, he got a call from a Colorado group that wanted to start a nonprofit abortion clinic in Boulder. Would Hern be their medical director? Of course, he told them. Absolutely.

The Boulder Valley Clinic opened in November of that same year. Hern designed the medical protocols and performed all of the abortions himself. Although one major battle for abortion rights had been won, a larger war was just beginning. Demonstrators began gathering outside the new clinic. Two weeks after it opened, Hern received his first death threat—a late-night phone call at his secluded cabin in the mountains. The man on the phone said he was coming for Hern. The doctor began sleeping with a rifle next to his bed.

In 1975, Hern took out a loan and started his own practice. He named it the Boulder Abortion Clinic—avoiding euphemisms like *women’s care* because he wanted patients to be able to find him. At the time, Hern had never performed any second-trimester abortions, for which the standard procedure then was to inject a saline solution into the uterus to induce labor. But Hern had read about another method in a textbook that explained how Japanese doctors were using laminarias to end abnormal or dangerous pregnancies. The method took longer, but it was safer. Hern studied the technique, ordered laminarias, and got to work.

Soon, Hern had published the first research paper on this multiple-laminaria method in American medical literature. Other clinics adopted the procedure, with modifications, and it’s been the dominant method for second- and third-trimester abortions for nearly 50 years. Hern and his staff carry out up to a dozen such terminations every week.

Warren Hern outside his clinic on March 12, 1993 (Gaylon Wampler / Sygma / Getty)

HERN WAS 34 when he performed his first abortion, a year before *Roe v. Wade* would be decided. A friend in D.C. who ran a local clinic invited him to come learn the procedure. Hern's patient was 17 and in her first trimester of pregnancy. She wanted to be an anesthesiologist, he remembers.

Hern had learned how to do a dilation-and-curettage abortion in medical school, but still, he was terrified—and so was she. He recalls that after he finished and told her she wasn't pregnant anymore, she wept with relief. He did too. "I was overwhelmed by the significance of this operation for this young woman's life," he told me. "This was a new definition, for me, for practicing medicine."

But the work sometimes got to him. He would often retreat to his office to compose himself after an abortion. Partly, it was the high-stakes nature of the procedure. But he also needed time to process how the dead fetus looked, how removing it felt. Sometimes he'd sit in his office and think, *What am I doing?*

He had bad dreams too. In the 1970s, physicians did not induce fetal demise during abortion, and once or twice, during a procedure at 15 or 16 weeks, he used forceps to remove a fetus with a still-beating heart. The heart thumped for only a few seconds before stopping. But for a long while after, a vision of that fetus would wake Hern from sleep. He could see it in his mind, the inches-long body and its heart: beating, beating, beating. In one dream, Hern angled his own body to shield his staff from catching a glimpse.

Other people might have decided that this work wasn't worth the haunting images, the pricks of conscience. They might have quit. But for Hern, the psychological stress of the work was the necessary cost of helping patients. He saw it as his job to carry some of the emotional weight. Over time, that stress became easier to manage. He stopped needing to compose himself between procedures. The bad dreams went away.

In 1978, Hern presented a paper before the Association of Planned Parenthood Physicians in San Diego titled "What about us? Staff Reactions to D&E"—dilation-and-evacuation abortion—in which he concluded that, though medically safe, surgical second-trimester abortions are clearly more emotionally difficult for providers than earlier ones.

Some part of our cultural and perhaps even biological heritage recoils at a destructive operation on a form that is similar to our own, even though we know that the act has a positive effect for a living person ... We have reached a point in this particular technology where there is no possibility of denying an act of destruction. It is before one's eyes.

I quoted that paper during a conversation with Hern, as we sat shoulder to shoulder at a bar in downtown Boulder. He was nodding before I finished. Many of his colleagues were annoyed by what he'd written, he said. The abortion-rights movement isn't exactly eager to talk about these visuals, mostly because it gives fodder to the

opposition. Hern's comments about "destruction" still appear on a number of anti-abortion websites as evidence of the horror of the procedure.

But the point of his report was to be honest, Hern said, and he stands by it. Why not face the truth that abortion late in pregnancy is, at least in one way, destructive? He still believes that such destruction can be a profoundly merciful act.

Annie Lowrey: American motherhood

Regardless of the circumstances of pregnancy, in Hern's view, a woman's life—her humanity, her wishes—isn't just more important than her fetus's. It is virtually the only thing that matters. That approach is diametrically opposed to the view of anti-abortion advocates, for whom pregnancy means motherhood and, often, self-sacrifice.

Hern understands that few share his total conviction. "This is a grotesque conversation to many people," he said at the bar. "But this is a surgical procedure for a life-threatening condition."

During that conversation and the ones following it, I prodded for cracks in Hern's certainty. At one point, I thought I'd found one: Hern had told me about a woman who'd sought an abortion because she didn't want to have a baby girl. I thought he had refused. But when I followed up to ask him why, I learned that I had misunderstood. Hern said he had done abortions for sex selection twice: once for this woman; and once for someone who'd desperately wanted a girl. It was their choice to make, he explained.

"So if a pregnant woman with no health issues comes to the clinic, say, at 30 weeks, what would you do?" I asked Hern once. The question irked him. "Every pregnancy is a health issue!" he said. "There's a certifiable risk of death from being pregnant, period."

ERN MET THE Kansas abortion doctor George Tiller at a National Abortion Federation conference in the late 1970s. The two talked on the phone nearly every

H week for 30 years. Tiller was the opposite of Hern—gentle, soft-spoken, churchgoing. “George was a normal person,” Hern told me once. “That distinguishes him from me right away.” Yet Tiller was murdered for doing the same work.

The phone rang at Hern’s house one morning in May 2009, and Jeanne Tiller was on the line. “George is gone,” she told Hern. An anti-abortion fanatic had shot her husband at church, where he was serving as an usher. Hern flew to Wichita for the funeral, and helped carry his friend’s casket down the aisle of the packed College Hill United Methodist Church. Sixty federal marshals stood guard at the service, he said. They told him that he would likely be the next target. Later that week, Hern performed abortions for all of Tiller’s remaining patients at his clinic in Boulder.

Thirteen years after Tiller’s death, Hern and I stayed up late talking in the restaurant of my hotel. Hern was speaking so loudly—about Donald Trump, fascism, and anti-abortion violence—that the bartender had begun to stare. Opposition to abortion has long been “the hammer and tongs to power” for the Republican Party, Hern was saying, “because of their allegiance to the white Christian nationalists and white supremacists.” Christianity, he told me, not for the first time, “is now the face of fascism in America.” That moral arc of the universe bending toward justice? “That’s the belief, but I don’t believe it.”

David Frum: *Roe is the new prohibition*

I asked Hern whether he ever worried that now, in a post-*Roe* world, he might have an even bigger target on his back. I wondered whether it was a bit reckless for him to be so outspoken with reporters like me. Actually, it’s the opposite, Hern replied. Being so vocal “increases the political cost of assassinating me.”

“That’s dark,” I said.

He simply shrugged. “This is what I have to think about.”

Suddenly, he remembered that he'd brought me something. He dug around in his coat pocket, and pulled out a fridge magnet he'd made from a photograph he took a few years ago near the island of South Georgia: penguins diving off an iceberg into the deep blue ocean.

Hern is known for presenting such gifts to people—and for regularly mailing out his latest published works. In addition to the magnet and the calendar, Hern sent me a copy of his poetry collection and his new book on global ecology. In the latter, titled *Homo Ecophagus*, he compares mankind to a cancer on the planet, writing that our unrelenting population growth will ultimately lead to the demise of every species on Earth. To view human beings as a scourge seems a rather ominous perspective for a man who ends pregnancies for a living. Could he see his work as, even subliminally, a form of population control? When I asked about that, Hern shook his head vigorously, waving my question away, as if he'd been ready for it. “Being concerned about population growth is consistent with the idea of helping women and families control their fertility on a *voluntary* basis,” he said.

Hern lives in a modest gray split-level cluttered with landscape photographs, Shipibo pottery, and mounted fossils. Some of the photographs were taken by his wife, Odalys Muñoz Gonzalez, who is 27 years his junior and whom he refers to as “*mi amor*.” Gonzalez is originally from Cuba, though they met at a conference in Barcelona in 2003. Back in Spain, Gonzalez directed her own abortion clinic. Now she works at Hern's, performing nonmedical tasks and translating for Spanish-speaking patients.

Warren Hern's photography work, personal art collection, and various accolades decorate the halls and his office walls at the Boulder Abortion Clinic. (Photograph by Joanna Kulesza for *The Atlantic*)

Gonzalez sometimes worries that Hern comes across as too intense. "I always tell him, 'Don't look like Bernie Sanders,'" she told me, in her thick Cuban accent. Part of her hates that he can be so angry, so severe. "But another part of me loves," she said. "Because how many people do you know that live with the level of passion that Warren does?" Still, Gonzalez wishes he would retire so that they could have more time to travel together and photograph wildlife.

During my stay in Boulder, I did occasionally look at Hern and wonder: *Would I want you in charge of my complex medical procedure?* Next month, he'll be 85, and when he shuffles around the clinic in his turquoise scrubs and white lab coat, he looks it.

Younger providers have opened a handful of new late-abortion clinics in recent years. Some of these providers and others in the field argue that Hern's abortion procedures take longer than they need to, and that his methods are out of date. Hern should have retired decades ago, these critics say. "Being 84 and doing procedures is problematic," one physician, who requested anonymity in order to speak candidly about Hern, told me. (When I asked Hern about the criticism of some of his methods, he said he has always emphasized patient safety and will alter his procedures if they make the abortion safer. "If people don't agree with me, I don't really care," he said. "I don't give a shit.")

Hern is working with two other doctors in the hope that eventually they will take over the clinic. But he's hard to please. "I have to find the right people, train them, get them to know what needs to be done," he says. "Finding physicians willing to do this work—who will do it well, do it carefully—is difficult."

One morning during my visit, Hern and I climbed up the hill behind his house. The ground was muddy, and, thanks to a recent skiing injury, Hern was unsteady on his feet. I briefly wondered if this hike might bring about the end of one of America's most famous abortion physicians. At the top of the hill, Hern pointed up toward a grassy crest of land above us called the Dakota Ridge. A big problem with modern society is that we've forgotten that we're part of all this, he said, waving toward the ridge. The Bible says to "go forth and multiply and dominate the Earth and blah-blah, but that is exactly the wrong advice."

He's read the Bible a few times, he said. But he's not religious; he's spiritual. "The natural world, the forest, is my cathedral," he said. To watch the sunrise, to see a wild animal, "just to be there, that's a spiritual experience for me."

And then, suddenly, Hern was connecting it all, drawing everything together: religion, Republicans, the Supreme Court, the future of American society. “These people believe stuff that’s out of the medieval times. The Pleistocene!”

He sighed. “I’m holding back,” he said, not holding back at all.

Warren Hern in his mountain house outside of Boulder, Colorado, which he and his father built together 50 years ago (Photograph by Joanna Kulesza for *The Atlantic*)

ON MY LAST DAY in Boulder, a few of the clinic staff gathered in the kitchen for an unofficial Christmas party. They’d finished the week’s procedures, and all of the patients had been sent home. Now it was time for eggnog. Gonzalez

poured some into mugs, and the clinic administrator offered to spike it with a bottle of his homemade rum. They passed around a box of chocolate cupcakes that someone had brought in.

Hern congratulated his staff on a good year, and they listened, amused, while he explained that he wasn't able to find any good Audubon calendars at Barnes & Noble for their annual staff Christmas gift. He made a joke that he'd already told me more than once: "I could just give you the calendars from last year to pass on to your Republican friends," he said, with a laugh. "They won't notice for about 300 years that they're out of date."

Read: The Roe baby

A dozen Christmas stockings hung on the bulletin board, each displaying a staff member's name in glitter glue. Buttons were pinned on the board, too, including some emblazoned with George Tiller's face. YOU WILL BE GREATLY MISSED, one said. Someone had propped open an outer door for circulation, and a stack of papers near the phone rustled—instructions for how to talk to someone calling with a bomb threat. "TAKE A DEEP BREATH," they read. "Questions to ask: When is the bomb going to explode? Where is it right now?"

Hern seemed not to notice the strange juxtaposition of it all—the eggnog and the abortions, the cupcakes and the bomb threats. The buttons with the image of his murdered friend and the fact of his own stubborn survival. Of course he didn't. He has spent five decades living with these contradictions.

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Calum Miller

Abortion and maternal mortality

FEBRUARY 10, 2022 / CALUM MILLER

“Abortion is 14 times safer than childbirth”: abortion and mortality risk

Do women die from not receiving abortions?: Savita and Izabela

Does legalising abortion prevent women dying from backstreet abortions?

“Abortion is 14 times safer than childbirth”: abortion and mortality risk

It is sometimes claimed that abortion is 14 times safer than childbirth – meaning that the mortality rate is just one fourteenth of the mortality rate from continuing a pregnancy. This is based on a 2012 [study \(https://pubmed.ncbi.nlm.nih.gov/22270271/\)](https://pubmed.ncbi.nlm.nih.gov/22270271/) by Elizabeth Raymond, a doctor at Gynuity, an abortion advocacy research organisation.

When considering mortality rates after pregnancy and abortion, it is of central importance to discern exactly which deaths are being included and which are not. Deaths from suicide, for example, are often included under maternal deaths (relating to pregnancy), but not under abortion-related deaths. This is important since suicide is, in fact, the [leading cause \(https://pubmed.ncbi.nlm.nih.gov/14519602/\)](https://pubmed.ncbi.nlm.nih.gov/14519602/) of maternal deaths in

many developed countries. Likewise, ectopic pregnancies often count as maternal deaths, though they are clearly irrelevant to the relative safety of childbirth vs abortion, since an ectopic will generally have been discovered and treated by the time a woman has to decide whether or not to have an abortion. Indeed, deaths from abortion are often included as maternal deaths and are cited by abortion advocates as one of the leading causes of maternal mortality in developing countries. This is a strange categorisation if women having abortions are not already mothers, but we will set that concern aside for the moment.

The Raymond and Grimes study at least seems to avoid these typical errors, by specifically looking at deaths from live births, and therefore excluding deaths from ectopic pregnancies and abortions. Nevertheless, a variety of problems remain.

For example, Raymond and Grimes dismiss the long-term evidence on mental health by reference to a study by Charles et al. This review is now long-outdated, and was outdated even by the time of Raymond and Grimes' paper (the Charles review predated the APA report, NCCMH report, and Fergusson's meta-analysis; for specifics on problems with the Charles review please email me); as I show in my section on mental health, the literature on abortion and mental health now clearly shows causal associations between abortion and mental health.

Another problem is that, of course, most women who find themselves pregnant want to continue their pregnancy. This statistic will not help them. What about those women who don't want to be pregnant? Presumably the argument being made by abortion advocates here is that by limiting access to abortion, you will be subjecting such women to a higher risk of death. Some women will die as a result. One of the problems with this argument (and all arguments based on negative outcomes for women refused abortion) is that studies show (<https://press.princeton.edu/books/paperback/9780691130453/sex-and-consequences>) that, generally, limiting abortion access has a very strong effect in preventing women from becoming pregnant in the first place: women who really do not want to be pregnant are typically much more careful not to become pregnant when there are limitations on abortion, just as one would expect. Hence, with moderate limitations on abortion, the abortion rate goes down, but the birth rate *stays the same*. With stronger restrictions on abortion (i.e. a complete ban), this can temporarily increase the birth rate, but often only temporarily and by a surprisingly small amount. So in fact, for most women who desperately do not want to be pregnant, limiting abortion access will not subject them to dangerous pregnancies, but rather will prevent them from the distress of an

unwanted pregnancy in the first place. Hence it is questionable whether any extra women would die from pregnancy-related complications as a result of restricting abortion, even assuming pregnancy was risky and abortion was entirely risk-free (which, of course, is not true). For more on this, see 'Does restricting abortion lead to more unwanted pregnancies?'

Another problem, which the authors concede themselves, is that maternal deaths are often unreported, and differentially by outcome, referencing a study finding that neither of the women dying from abortion in the sample were identified as having had an abortion from death records alone. In fact, this problem is far more widespread than even they imply, as noted by Reardon and Thorp in their systematic review

(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5692130/pdf/10.1177_2050312117740490.pdf).

on this topic. Among others, Calhoun

(<https://pubmed.ncbi.nlm.nih.gov/30083002/>) and Reardon

(<https://scholarship.law.edu/cgi/viewcontent.cgi?article=1159&context=jchlp>)

have detailed the problems with accurately identifying maternal deaths and abortion-related deaths.

In fact, Finnish data have shown

(<https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1365-3016.2004.00591.x>)

that pregnancy is far *less* likely to be mentioned in death records in the case of abortion than in the case of a live birth. This means that deaths from abortion are especially likely to be missed – by a large margin. The references given above contain more detail on this issue. This is not a problem limited to the US: see my chapter on telemedicine abortion for further examples of how abortion complications are massively underreported.

This is obviously a critical problem: if a large proportion of deaths from abortion go unreported – as seems to be widely agreed – there simply isn't a basis for the abortion mortality rate offered by Raymond and Grimes. While their estimate of pregnancy-related deaths is probably fairly accurate – it is not far off the maternal mortality rate in other developed countries – their estimate of abortion mortality is wholly unreliable.

For another critical problem, consider the following quote:

'Chronically high levels of stress can wreak havoc on bodily systems from the brain to the heart, and accelerate the pace of biological aging, according to experts. For people of color, race-based stressors can take a heavy toll on health for a life-time – and even across generations.'

So reported a news release

(<https://www.hsph.harvard.edu/news/hsph-in-the-news/stress-of-racism-health-toll/>) from Harvard's TH Chan School of Public Health, in the context of the impact of racism on the physical health

of people of colour. I have no doubt that this is true. Medical sociology has known for a long time that psychosocial factors have an *enormous* effect on physical health – so much so that they simply cannot be excluded. The problem is that they are rarely reported as causing deaths. Cardiovascular disease certainly is – and is hugely affected by stress. But the psychosocial issues themselves are never mentioned.

Why is this important? It is important because there is inevitably a bias towards counting the riskiness of childbirth and abortion simply by their immediate obstetric complications. Although the data on these are unreliable in the case of abortion (and to some extent for live birth), it is possible that childbirth presents greater immediate obstetric risks than early abortions (for later abortions, things are less clear). But this entirely ignores the myriad ways in which pregnancy outcomes – and legislation relating to them – can affect one's mental and physical health – indeed, across generations.

Another reason this is important is because most of the leading causes of death (<https://www.cdc.gov/women/lcod/2017/all-races-origins/index.htm>) – if not all of them – among younger women are significantly affected by pregnancy outcomes. For example, the 5 leading causes of death of women aged 20-44 are unintentional injuries, cancer, heart disease, suicide, and homicide. All of these are strongly affected by pregnancy experiences, in ways which would very rarely show up on death certificates. It is known that women having an abortion are far more likely to die from unintentional injuries, suicide and homicide than women completing a pregnancy, other things being equal (see evidence below). A significant proportion of this disparity is thought to be causally related to the experiences of pregnancy, childbirth or the abortion. Having a completed pregnancy at a younger age is known to be protective against breast cancer, and most cervical cancer is caused by sexually transmitted disease, whose prevalence is known to increase in countries legalising abortion. Heart disease is hugely affected by psychosocial stressors (see the section on abortion and mental health), smoking and alcohol intake, which are all associated with abortion. As we will see below, death from heart disease is significantly associated with pregnancy outcomes. As I have suggested in 'How abortion harms women', there are *myriad* ways in which the legalisation of abortion contributes to poor psychosocial health through facilitating family breakdown, poverty, and so on. Some of these deaths can be quantified fairly easily; others are very difficult. They show how even women who do not have abortions can be adversely affected (in some cases dying) as a result of the societal and cultural changes resulting from the legalisation of abortion. Moreover, deaths where abortion is a

contributing factor can occur many years later, and even across multiple generations (since e.g. poverty, family breakdown, and mental health difficulties and other conditions are often transmitted down multiple generations).

As I describe under 'How abortion harms women', the legalisation of abortion has been strongly linked with increased family breakdown and poverty, which both affect physical health in a wide variety of ways. It is also associated with preterm birth, the leading cause of death for under 5s worldwide, and increased sexually transmitted diseases, which can cause significant morbidity and even mortality in certain cases (e.g., HIV/AIDS). Of course, legalising abortion also increases the number of pregnancies dramatically, thus subjecting more women to the risks of both pregnancy and abortion.

This is only a brief summary, but it is clear that there a huge number of ways in which both abortion and its legalisation can *significantly* cause increased mortality, probably by a long way exceeding the very low number of women who would die from unwanted pregnancies if abortion were to be restricted. Most of these mechanisms will never show up in death records, of course.

It is therefore helpful to look briefly at the studies which look at overall mortality after abortion and pregnancy, which offer a more holistic picture (I address the question of maternal mortality rates and how they relate to legalisation under 'Does legalising abortion prevent women dying from backstreet abortions?'). There are a number of record-linkage studies – where death records are matched to pregnancy outcomes throughout a country or state, giving a full dataset – in the US, Denmark and Finland. These show repeatedly that, for various reasons, the mortality rate after continued pregnancy is significantly lower than the mortality rate for both non-pregnant women and women having abortions, and this trend becomes stronger for women having multiple births or abortions. For example, in the most recent Finnish [study](https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1111/1471-0528.14484) (<https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1111/1471-0528.14484>) of this kind, the risk of death after abortion was triple the risk of death after giving birth, mainly because of a dramatic increase in the risk of accidents, suicide, and homicide. Even the risk of dying from medical conditions was marginally higher after an abortion than after giving birth, however – for reasons such as lower alcohol and drug abuse, increased health monitoring, and increased healthier behaviours more generally. The risk of a non-pregnant woman dying was double the risk of a woman giving birth.

These studies typically are not able to control for prior physical health, which is a major limiting factor (though many control for age, and some for prior psychiatric history). However, they are at the very least consistent with the idea that abortion causes a higher rate of deaths from suicide and accidents (often from drug use). Given that the studies claiming that birth is much more dangerous than abortion are so problematic in the ways described above, there is no convincing basis for making this sort of claim. At best, we do not know which is overall riskier. But in fact there is powerful evidence that abortion is riskier once indirect mechanisms are taken into account.

Reardon and Thorp have a helpful [systematic review](https://pubmed.ncbi.nlm.nih.gov/29163945/) (<https://pubmed.ncbi.nlm.nih.gov/29163945/>) of the available record-linkage studies, and a fairly comprehensive [overview](https://scholarship.law.edu/cgi/viewcontent.cgi?article=1159&context=jchlp) (<https://scholarship.law.edu/cgi/viewcontent.cgi?article=1159&context=jchlp>) of the ways in which abortion can increase the various causes of death. Calhoun has a good [summary](https://pubmed.ncbi.nlm.nih.gov/30083002/) (<https://pubmed.ncbi.nlm.nih.gov/30083002/>) of some of the specific measurement problems with Raymond and Grimes' initial study.

Do women die from not receiving abortions?: Savita and Izabela

In recent years, there have been major headlines – and protests, and even legislative changes – regarding the deaths of women who did not receive abortions despite their life begin at risk. In Ireland, Savita Halappanavar died of chorioamnionitis (effectively infection of the pregnancy itself – membranes and amniotic fluid; hence delivery of the baby is required to save the woman's life) after not receiving an abortion/having the baby delivered. In Poland, more recently, a woman known only as Izabela died of septic shock, ostensibly after not receiving an abortion, though many of the details remain unclear. In Ireland, it is fair to say that this was one of the major, if not the major, event precipitating legalisation of abortion in the country. In Poland, there have been significant protests domestically and even internationally, since the media has tied this death to Poland's tightening of its abortion law to remove disability-selective/eugenic abortion as a legal ground for abortion.

The deaths of both of these women are tragedies, and were likely preventable in both cases. Clearly something has gone wrong in both cases, that should be fixed. But what exactly was wrong?

In both cases, we should be clear that – as with virtually every other country in the world – abortion to save the life of the mother was legal. If there was a genuine threat to the mother's life, as seems to be the case on both occasions, abortion/delivery *was* legal and should have been performed. There was no legal obstacle to doing so.

The very most that could be said, therefore, is that the law can sometimes be unclear exactly *how much* of a threat the pregnancy has to be to justify early delivery (leading to the baby's death), and there may in theory be reasonable clinical disagreement about how urgent the situation is. If so, there seem to be multiple fairly obvious solutions: clear guidance on when delivery is indicated for the few conditions where these problems can arise (chorioamnionitis, pre-eclampsia, and so on) or even a centralised on-call emergency service which physicians could utilise to obtain authorisation for an abortion in cases of doubt. In practice, this is probably unnecessary, since it is generally so obvious that delivery is required in emergency situations that any competent clinician should not need to discuss it with such a service. But such a service – or clear set of guidance – would minimise the chances of these issues arising from incompetent clinicians or rare genuinely difficult clinical scenarios. Such suggestions do seem to have been made (<https://krakow.wyborcza.pl/krakow/7,44425,27761934,jolanta-budzowska-pelnomocniczka-rodziny-izy-z-pszczyny-lekarze.html>). by Izabela's lawyer.

In the case of Savita, the issues clearly identified by the investigation were incompetent clinical recognition of the condition and incompetent clinical decision-making, among other things. I hesitate to speculate on exactly what went wrong in the case of Izabela, since we know so few details – this is one part of why it is so grossly irresponsible for people to use her case in this way.

Let's look at specifics in both cases.

In Savita's case, as I mentioned, Irish law clearly allowed abortion in these cases – and this possibility was clearly exercised for many years. The investigation identified 3 'key causal factors' leading to her death: 1) inadequate assessment and monitoring preventing the team from recognising her deterioration; 2) failure to offer all management options to the patient; and 3) non-adherence to clinical guidelines relating to the prompt and effective management of sepsis, severe sepsis and septic shock. While 2) relates to the failure to deliver the child – and delivery of the child might well have saved Savita, though not necessarily – this failure was not because the law prohibited it, but because the clinical team made major

errors in recognising the severity of the situation. The report noted that ‘Appropriate monitoring and evaluation of the changing clinical presentation with appropriate clinical investigations would likely have lead to reconsideration of the need to expedite delivery’ – that is to say, if the clinical team had made a correct assessment of the clinical situation, they would likely have delivered the child in accordance with the law. This was fundamentally a clinical failure, not a failure of the law on abortion.

For a more comprehensive examination of Savita’s case, see my blog post on it [here \(https://calumsblog.com/2017/07/11/why-savita-halappanavars-death-has-little-or-nothing-to-do-with-irish-abortion-law/\)](https://calumsblog.com/2017/07/11/why-savita-halappanavars-death-has-little-or-nothing-to-do-with-irish-abortion-law/).

The circumstances leading to Izabela’s death are more complicated – or, rather, less certain. Very few facts are known at all, with only a few media reports of comments from the lawyer or family members. As I said, this is part of what makes the exploitation of her death for ideological purposes so grossly irresponsible. This is made worse by the fact that almost all the information we have is in Polish, making it easier for non-Polish media outlets to exaggerate, omit or fabricate various facts.

Again, Polish law allows – and always has allowed – abortion where the life of the mother is at risk. As Izabela’s lawyer [pointed out \(https://krakow.wyborcza.pl/krakow/7,44425,27761934,jolanta-budzowska-pelnomocniczka-rodziny-izy-z-pszczyny-lekarze.html\)](https://krakow.wyborcza.pl/krakow/7,44425,27761934,jolanta-budzowska-pelnomocniczka-rodziny-izy-z-pszczyny-lekarze.html), the threat does not even need to be direct or serious. This did not change with the recent tightening of the abortion law to prohibit disability-selective/eugenic abortion. The lawyer – our main source *trying* to connect the law with her death, even [said \(https://www.polsatnews.pl/wiadomosc/2021-11-02/pszczyzna-smierc-30-latki-w-ciazy-mecenas-rodziny-o-przyczynach-smierci-kobiety/\)](https://www.polsatnews.pl/wiadomosc/2021-11-02/pszczyzna-smierc-30-latki-w-ciazy-mecenas-rodziny-o-przyczynach-smierci-kobiety/): ‘I am far from saying that the death of this patient is a simple consequence of the judgment of the Constitutional Tribunal. The wording “consistency” means a cause-and-effect relationship, that is, if it were not for the sentence, the patient would not die. We cannot talk about such a relationship here’. The lawyer at the same time noted that an investigation was underway for ‘medical error’ – most likely the same sort of errors as in Savita’s case, at another point [claiming \(https://krakow.wyborcza.pl/krakow/7,44425,27761934,jolanta-budzowska-pelnomocniczka-rodziny-izy-z-pszczyny-lekarze.html\)](https://krakow.wyborcza.pl/krakow/7,44425,27761934,jolanta-budzowska-pelnomocniczka-rodziny-izy-z-pszczyny-lekarze.html) that medical error was likely the main problem. The hospital in question had previously been criticised and [fined \(https://narodowcy.net/matka-izabeli-z-pszczyny-moja-corka-nie-chciala-aborcji-dziecko-bylo-zdrowe-zawinili-lekarze/\)](https://narodowcy.net/matka-izabeli-z-pszczyny-moja-corka-nie-chciala-aborcji-dziecko-bylo-zdrowe-zawinili-lekarze/) for bad conditions in general. And the preliminary report [suggests \(https://www.msn.com/pl-](https://www.msn.com/pl-)

[pl/wiadomosci/polska/%C5%9Bmier%C4%87-30-letniej-izy-z-pszczyny-mia%C5%BCd%C5%BC%C4%85cy-raport-po-kontroli-nfz/ar-AARl8FQ](https://wiadomosci.polska.pl/wiadomosci/polska/C5%9Bmier%C4%87-30-letniej-izy-z-pszczyny-mia%C5%BCd%C5%BC%C4%85cy-raport-po-kontroli-nfz/ar-AARl8FQ)) that the hospital had similar problems at the time of Izabela's death, with clinical failings specifically responsible for Izabela's death. In summary, all the evidence we have suggests that the case was very similar to that of Savita.

It might be thought that, since the baby had a disability which eventually led to the life-threatening situation, allowing abortion for disability would have prevented Izabela's death by allowing her to abort long before her life was threatened. The problem with this claim is that according to both the lawyer (<https://www.wprost.pl/kraj/10536340/smierc-30-letniej-izabeli-w-pszczynie-jolanta-budzowska-zawiedli-slabi-ludzie-dzialajacy-pod-presja-prawa.html>) and Izabela's mother (<https://www.tvp.info/57383457/matka-izabeli-z-pszczyny-oskarza-lekarzy-mogli-uratowac-i-ja-i-leosia>), Izabela *wanted* to keep the baby despite its disability. Izabela's mother even claimed that the baby itself was healthy according to the autopsy. Although it remains unclear which condition the baby was thought to have had, a recent New York Times article pointed out (<https://www.nytimes.com/2022/01/01/upshot/pregnancy-birth-genetic-testing.html>), that many (though not all) prenatal tests are *usually* wrong – not only sometimes – when they detect a disability.

Perhaps some of these claims are false. But even if so, that only strengthens my ultimate point, which is that we simply do not have anywhere near enough details about this case in the public domain to say what was the cause of her death, whether the baby was healthy, whether she would have been saved by a different law, and so on.

For this reason, it is wrong – in my view, appalling – to exploit Izabela's tragic death in service of liberalised abortion laws in Poland or elsewhere. There is no evidence that she would have been saved by a different law, or that she wanted an abortion for disability. Even if there were, there are alternative remedies to prevent deaths attributable to poor clinical decision-making in these situations – clear guidance, or emergency on-call doctors/lawyers to advise in situations of doubt. I think it is fair to call for some of these measures. But to suppose that the law needs to allow for abortion in wider circumstances is completely erroneous and exploitative.

In summary, in neither case was the law responsible for the deaths of Savita or Izabela. In fact, in both cases, the law already clearly allowed for delivery of the child/abortion if the mother's life was at risk, as it was in both cases. To the best of our knowledge, neither

mother sought an abortion until that point, and at that point it was clearly legal. It is highly irresponsible, degrading to the victims, and – in the case of doctors – highly unprofessional to exploit these deaths for ideological purposes.

Does legalising abortion prevent women dying from backstreet abortions?

Perhaps the most common argument for legalising abortion throughout history is that women will get abortions either way; and if it is illegal they will be unsafe and women will die as a result. Hence, it is better to legalise abortion even if you oppose it. This argument is supposed to be powerful because it doesn't rely on arguing a controversial moral position on abortion. It is a simple practical argument.

Since I'm writing a book on this topic I'll try my best to keep this as a summary overview, but will write more in time. I'll just survey the key points rather than giving a full answer. You're welcome to contact me for more details.

The first thing to say is that one of the key premises is known to be false: abortion restrictions do, in fact, stop abortions. For more on this, see 'Do pro-life laws work?'

Second, deaths from abortion are frequently fabricated, outdated or misrepresented. For a recent example of fabrication, see [here](https://www.telegraph.co.uk/global-health/women-and-girls/clarification-malawi-back-street-abortions/) (<https://www.telegraph.co.uk/global-health/women-and-girls/clarification-malawi-back-street-abortions/>). More commonly they are outdated – from the 1980s or (usually at best) 1990s, since when maternal mortality and abortion mortality have changed dramatically. And they are almost always misrepresented. Sometimes this is by taking the upper end of an estimate rather than the average, or most recent, or most robust. More commonly, almost every statistic refers to 'abortion': to most people, 'abortion' means 'induced abortion'. But it also includes spontaneous abortion: that is, miscarriage. In some statistics it even includes ectopic pregnancy as well. So any woman who dies from a miscarriage (these can cause infection and bleeding) or ectopic pregnancy is included in deaths from 'abortion'. These are then attributed to 'unsafe abortion', as if all these deaths were caused by backstreet abortions. Since there is significant evidence that most of

these deaths are caused by ectopics and miscarriages, the number attributable to backstreet abortions is usually less than half this number/percentage.

Third, most abortion mortality can be eliminated with good post-abortion care. This is why abortion mortality was reduced to minimal levels in most Western countries before abortion was legalised.

Fourth, most abortion mortality *has* been eliminated by safer methods of illegal abortion. Of course, unsafe methods remain. But by and large, misoprostol is widely available in the developing world, or surgical abortions (as they were in the US prior to legalisation). And this is widely regarded as safe: so much so that the US Women's March recently asked (<https://twitter.com/womensmarch/status/1444302651299090439>) people not to use coathanger imagery because it would 'reenforce right-wing talking points that self-managed abortions are dangerous, scary and harmful'. So what was once the foremost argument for abortion legalisation (and still is in most of the world) is now branded a 'right-wing talking point'.

Fifth, legal abortion has moved in the opposite direction, moving towards self-managed abortion with misoprostol +/- mifepristone with no in-person contact with a healthcare professional (see 'Is telemedicine abortion safe?'). Hence illegal and legal abortion are becoming increasingly similar in safety.

Sixth, legalising abortion does not necessarily prevent illegal abortions. In fact, in most countries with studies on legalisation, legalisation has not resulted in any decrease in illegal abortions. It has only resulted in an increase in legal abortions for people who otherwise would not have had one.

Seventh, legalising abortion increases the number of overall unwanted pregnancies, thereby exposing more women to the risks of either pregnancy or abortion.

For all these reasons, the empirical evidence shows a variety of trends:

1. Affluent countries with pro-life laws have very few deaths from abortion. Malta has had no maternal deaths from any cause in the last 10 years, and Poland has the lowest maternal mortality rate in the world. Likewise with Chile, South Korea, (pre-legalisation) Ireland, and many parts of the Middle East.
2. Less affluent countries with liberal abortion laws have many deaths from abortion – South Africa, Mozambique, Ethiopia, Ghana, India, and so on.

3. When abortion is legalised, the trend in maternal mortality and abortion mortality is almost always virtually unchanged. In a few cases, mortality and morbidity increase upon liberalisation, as in the Netherlands, Rwanda and Ethiopia.
4. Countries banning abortion continue to see a gradual decline in maternal mortality and abortion mortality.
5. Hence, the overall picture is that women dying from abortion is a function not of the legal status of abortion, but the quality of emergency obstetric care.

All the references for these claims can be found in my published paper (<https://www.mdpi.com/1660-4601/18/19/10506/htm>) on Malawi, summarised on the Journal of Medical Ethics [blog](https://blogs.bmj.com/medical-ethics/2021/11/01/backstreet-abortion-deaths-not-as-common-or-preventable-as-thought/) (<https://blogs.bmj.com/medical-ethics/2021/11/01/backstreet-abortion-deaths-not-as-common-or-preventable-as-thought/>).

In addition, of course, as I pointed out in 'Abortion is 14 times safer than childbirth', abortion and its legalisation cause increased mortality of women and children in a variety of other ways. This was particularly noticeable in South Africa, where legalisation was followed by an enormous increase in maternal deaths from HIV/AIDS. While there would have been an increase anyway, we know that abortion legalisation leads to a 60% increase in STD cases, so this probably caused many more deaths than otherwise would have occurred.

Finally, of course, even if legal abortion did reduce maternal mortality, and even if it made no difference to the number of abortions, it would still be unjust. It used to be argued by defenders of the slave trade that keeping the slave trade 'safe and legal' was better than unsafe and illegal. They even argued this was better for the slaves: by regulating the trade, you could ensure that ships had sufficient space so that the people kidnapped into slavery to move around, as compared with the horrific conditions in the illegal trade. Of course, this is ridiculous: the slave trade was an affront to the dignity of human beings taken into slavery, and the empirical claim (that laws do not suppress the trade) is implausible by a simple look at the evidence. Both are true in the case of abortion.

As I said, I am working on a book project on this topic, and I know there are many related empirical claims worth examining in more detail. I am happy to answer further questions if needed.

Uncategorized

[BLOG AT WORDPRESS.COM.](#)



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On Women's Health
Issue 1 | January 2023

**Handbook of Maternal Mortality:
Addressing the U.S. Maternal Mortality Crisis,
Looking Beyond Ideology**

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The full text of this publication can be found at: <https://lozierinstitute.org/handbook-of-maternal-mortality-addressing-the-us-maternal-mortality-crisis-looking-beyond-ideology/>

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Contents

Introduction:	3
DATA DISCUSSION.....	4
Definitions	4
Best practices for identifying maternal deaths	6
Process of maternal mortality determination in the U.S.....	6
U.S. data deficiencies	9
Unknown numerator of maternal deaths	9
Unknown denominator of all pregnancy events	14
What does the available U.S. data show?.....	15
What does the best data show? U.S. comparison to international records-linkage studies	16
MEDICAL DISCUSSION	18
Method of separation impacts maternal mortality risk.....	18
Direct causes of maternal deaths	21
Indirect causes of maternal deaths.....	23
PREDICTIONS	27
CONCLUSION	31
RECOMMENDATIONS.....	32

Note: An earlier condensed version of this transcript was published in the public record for the September 13-15, 2022 meeting of the Advisory Committee on Infant and Maternal Mortality (ACIMM), available at: <https://www.hrsa.gov/sites/default/files/hrsa/advisory-committees/infant-mortality/acimm-september-2022-minutes.pdf>.

Introduction:

After years of failure to obtain accurate statistics on maternal mortality, researchers noted a sharp increase in the United States' maternal mortality with widening racial disparities.¹ Much discussion has followed about possible etiologies of the rise, but the existence of severe deficiencies in data collection and analysis is agreed upon by all.² Identification, review, and prevention of maternal mortality remain critical, but elusive, goals despite 70 years of attention and effort.³

Additionally, in the wake of the U.S. Supreme Court's recent *Dobbs v. Jackson Women's Health Organization* decision to return induced abortion regulation back to the legislatures, a common narrative has formed that the implementation of legal induced abortion restrictions in many states will worsen the problem of maternal mortality.⁴ In order to discover effective strategies to improve the health of women surrounding pregnancy, it is imperative that we follow the science surrounding maternal mortality, even if it leads to uncomfortable conclusions.

As a practicing obstetrician/gynecologist in Texas for 30 years, I hope to convey what the maternal mortality crisis looks like from the perspective of a physician in the trenches. I have seen how this issue affects patients and their caregivers, and for years I have been digging deeper into the issue to uncover details that others may miss. As an advocate for both of my patients, a woman and her unborn child, I have become aware that there is much unreported maternal mortality and morbidity associated with legal induced abortion, often obscured due to the political nature of the issue.

While an observer might assume all maternal mortality occurs due to catastrophic events during childbirth, the reality is that there are many different causes, temporal relationships, and pregnancy outcomes associated with maternal mortality. A collaborative report by 36 states' Maternal Mortality Review Committees (MMRCs) documented that from 2017-2019, 21.6% of pregnancy-related deaths occurred during pregnancy, 13.2% on the day of delivery, 12% in the week following delivery, 23.3% one to six weeks after delivery, and 30% more than six weeks but less than one year after the end of the pregnancy, demonstrating that only 1/4 of pregnancy-related deaths occur due to complications at or shortly after delivery and half occur one week to one year after the end of the pregnancy.⁵ Only 66% of maternal deaths are associated with a pregnancy that

progressed to delivery, implicating early pregnancy events in approximately 1/3 of maternal deaths.⁶

I have personally cared for two women who died in proximity to pregnancy, and the reasons were surprising. One died from overwhelming sepsis after a legal, second-trimester prostaglandin infusion abortion. Although I was not involved in her abortion, I assumed her care in the emergency room and held her hand in the ICU, as she pleaded with me not to let her die, with fear in her eyes. The other patient was shot by her boyfriend in a murder-suicide six weeks after I delivered her healthy baby at term. It is likely that neither of these women's deaths came to the attention of the U.S. Centers for Disease Control and Prevention (CDC) or entered U.S. maternal mortality statistics. Like most physicians, at the time I was unaware that unless these women's death certificates specifically documented an association with pregnancy, the CDC was unlikely to become aware of their deaths. As will be discussed in more detail below, the CDC relies heavily on death certificate documentation to alert them to maternal deaths, yet there are many reasons that death certificates may not identify an associated pregnancy.

DATA DISCUSSION

Definitions

Data on maternal mortality are compromised by the lack of uniform definitions among organizations responsible for collecting and analyzing maternal mortality data. Deaths are categorized based on their causation and proximity to the end of the pregnancy, often with lack of consistency in these determinations. Additionally, data deficiencies compromise accurate determination of the number of maternal deaths as well as the number of pregnancy events, so any reported U.S. maternal mortality data is widely acknowledged to be inaccurate, as neither the denominator nor the numerator can be known with certainty.⁷

In describing maternal mortality, the broadest category is a **"pregnancy-associated death"**: the death of a woman while pregnant or within 365 days (one year) of the end of pregnancy from any cause. This includes both deaths due to complications of the pregnancy or its management, and deaths due to seemingly unrelated events, such as a car accident, cancer death or homicide, within a year of the pregnancy outcome. When these deaths come to the attention of organizations tasked with data collection and analysis, they are usually analyzed to determine if they should be categorized as pregnancy-related or merely pregnancy-associated. As will be discussed in more detail below, the process of identifying and categorizing such deaths is prone to inconsistencies and data deficiencies, resulting in incomplete or erroneous conclusions.

Upon analysis, a death may be subcategorized as a **"pregnancy-related death"**: the death of a woman while pregnant or within 365 days (one year) of the end of pregnancy,

irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, excluding accidental or incidental causes. An example would include death from sepsis after premature rupture of membranes or cardiac decompensation in a woman with a pre-existing congenital cardiac malformation. This category excludes deaths felt not to be caused by the pregnancy or its sequelae, although there can be subjectivity involved this determination. For example, how do we reliably determine if a mental health related death was caused by or contributed to by the pregnancy? If a woman dies from a pre-existing chronic illness, how do we quantify the effect of the physiologic changes of pregnancy? In the case of a death from cancer, how do we determine whether the pregnancy negatively impacted her treatment or response to treatment? Presumably, epidemiologists and MMRCs investigating these deaths have protocols to assist in these determinations, but unfortunately these protocols are not publicly available.

Pregnancy-related deaths may be **“direct”** – resulting from obstetric complications (as in the first example above), or **“indirect”** – resulting from preexisting disease or disease that developed during pregnancy; not due to direct obstetric causes but aggravated by the physiologic effects of pregnancy (as in the second example).

Pregnancy-related deaths may be further categorized as a **“maternal death”**: the death of a woman while pregnant or within 42 days (six weeks) of the end of her pregnancy, in which pregnancy or its management may have contributed to the cause of death. This could include a new disease caused by the pregnancy such as preeclampsia, ectopic pregnancy or pulmonary embolus, a chronic disease worsened by the physiologic effects of the pregnancy such as worsening of cardiac disease, or hemorrhage due to a surgical mishap during a cesarean section, as long as the death occurred during pregnancy or within six weeks of the end of pregnancy. By definition, “maternal death” excludes deaths caused by injuries from accidents, suicides, and homicides.

A **“late maternal death”** is the death of a woman from direct or indirect obstetric causes more than 42 days (six weeks) but within 365 days (one year) of the end of pregnancy. An example would include a death due to heart failure from postpartum cardiomyopathy two months after delivery or a woman who died after a prolonged course in the ICU resulting from complications at delivery. Intuitively, it is possible that pregnancy complications could contribute to a woman's death even beyond one year, but by convention, such deaths are not documented in maternal mortality statistics.

“Maternal mortality” itself has differing definitions depending on the organization and agency. The World Health Organization (WHO) and the CDC's National Vital Statistics System (NVSS) define maternal mortality as a pregnancy-related death occurring **within six weeks** of a pregnancy (maternal deaths only).⁸ The CDC's Pregnancy Mortality Surveillance System PMSS defines maternal mortality as a pregnancy-related death occurring until **one year** after the pregnancy ends (maternal deaths plus late maternal

deaths).⁹ None of these systems record pregnancy-associated but not pregnancy-related deaths in their data collection. Additional categories include “not pregnancy associated or related” (false positives) or “unable to determine if pregnancy related or associated.”

Different pregnancy outcomes can also be subcategorized. Of particular interest is an “**abortion-related death**”: any death from a direct complication of an induced abortion (legal or illegal), an indirect complication caused by a chain of events initiated by an abortion, or an aggravation of a preexisting medical condition by the physiologic or psychologic effects of abortion without any time limit, reflecting the fact that there is no clear temporal limit on physiological and psychological effects after abortion that may contribute to subsequent death.¹⁰

Best practices for identifying maternal deaths

The most comprehensive way to detect all maternal mortality would be to link all death certificates from women of reproductive age with all pregnancy outcomes, to determine the total number of deaths for each pregnancy outcome within a defined time period of a deceased woman's most recent pregnancy. This methodology has been utilized in Scandinavian countries which have single-payer healthcare and meticulous recordkeeping, so that all pregnancy events documented in the health care system are detected and all complications and deaths from those events are known.¹¹ Once all pregnancy-associated deaths have been detected, then investigation of causality can determine the subset that is pregnancy-related.

Comprehensive records-linkage studies from Finland demonstrate a fact that will implicate the accuracy of the U.S. CDC maternal mortality data drawn primarily from death certificates. In Finland, death certificate documentation alone detects only 26% of deaths after a live birth or stillbirth, 12% of deaths following miscarriage or ectopic pregnancy, and just 1-6% of deaths following induced abortion.¹² Without records-linkage, the association of these deaths with pregnancy would remain unknown. Records-linkage determination of maternal mortality is far superior to death certificate identification.

Process of maternal mortality determination in the U.S.

In the U.S., the maternal mortality data collection process is initiated by attending physicians, funeral directors, coroners and medical examiners at a local level with completion of maternal death certificates. Some states are divided geographically into local registration districts which collect and then submit data to state agencies, whereas others require submission directly to the state vital statistics office.¹³

These death certificates are then provided by the state vital statistics office to the CDC's National Center for Health Statistics (NCHS) which compiles national data and either manually or through an automated system assigns WHO International Classification of Diseases (ICD) O death codes when a death certificate indicates an associated pregnancy to create a “maternal mortality ratio”, defined as maternal deaths while pregnant or within 42

days postpartum compared to 100,000 live births. It then includes this information in a National Vital Statistics System (NVSS) Report titled, "Deaths: Final Data."¹⁴ This provides annual data which can be compared internationally with other countries utilizing ICD coding based on WHO criteria but is limited for purposes of analysis due to the frequent paucity of data provided on a death certificate.¹⁵

ICD O death codes include A34 "Obstetric tetanus," 000-095 (direct deaths) and 098-099 (indirect deaths) coding for events occurring during "pregnancy, childbirth and the puerperium," 096 "late maternal deaths," and 097 "death from obstetric cause more than one year after pregnancy." These codes are comprised of different levels of specificity, ranging from very specific such as 011 "preeclampsia superimposed on chronic hypertension" to vague or including a variety of conditions such as 026.8, "other specified pregnancy-related conditions."¹⁶ It should be noted that these codes are usually assigned solely based on death certificate data without a deeper dive into the woman's full medical record, and thus may be prone to error or may be incomplete. For example, a woman may have recently been pregnant and her cause of death was attributed to hemorrhage. Based on that information, the coder may assign "obstetric hemorrhage" when, in fact, she died from a laceration received in an auto accident unrelated to the pregnancy event. Or the opposite can occur. A woman may die in an auto accident following an abortion. The certifier may conclude the two events were unrelated when, in fact, she began to abuse alcohol and became suicidal due to her distress after being coerced into an unwanted abortion, leading to the accident.

Additionally, the CDC receives maternal mortality data from a second source, its National Center for Chronic Disease Prevention and Health Promotion's Pregnancy Mortality Surveillance System (PMSS) which was developed in 1988. The PMSS uses information obtained from death certificates indicating a current pregnancy or pregnancy within the past year or occasionally uses linked maternal death and infant birth or fetal loss (beyond 20 weeks) certificates in order to identify deaths. Epidemiologists then analyze the medical records of the deceased woman to determine pregnancy-relatedness, producing a national "pregnancy-related mortality ratio."¹⁷ This data is more thorough than the NVSS data, but encompasses a different time period (six weeks versus one year after pregnancy), so direct comparisons are difficult to obtain.

Due to the frequent failure of death certifiers to report a concomitant or prior pregnancy within a year, the CDC recommended the addition of a "pregnancy checkbox" to the U.S. Standard Certificate of Death beginning in 2003. The checkbox asked whether a woman was "not pregnant within past year," "pregnant at the time of death," "pregnant within 42 days of death," "pregnant within 43 days to one year before death," or "unknown if pregnancy within past year." This led to an immediate increase in documentation of maternal mortality and apparent increases in maternal deaths. A review comparing over two thousand known maternal deaths documented three times as many maternal deaths

were detected using the checkbox when compared to analyzing death certificates without the checkbox.¹⁸

Yet inexplicably, much inappropriate use of the checkbox has been documented as well. Studies linking checkbox positive death certificates with hospital records indicate false positive rates as high as 50%, where no documentation of pregnancy was found in the auxiliary records. While it is possible checkboxes were inappropriately marked, consideration needs to be given to the possibility that the death certifier knew of a pregnancy event (induced abortion, miscarriage or birth outside of hospital) that could not be detected through hospital records review alone. Many of the presumed false positive checkboxes were marked in older women, some too old to have any chance of pregnancy. For example, in 2013, 147 deaths in women older than 85 years old had positive pregnancy checkboxes on death certificates. For this reason, the CDC introduced new rules, the “2018 Coding Method”, where they would not allow a pregnancy checkbox alone (without other death certificate documentation of a pregnancy) to be used to indicate a maternal death in a woman older than 45.¹⁹ Little discussion has been given to the question of why and how so many death certifiers inappropriately respond to a straightforward question, impugning the reliability of other information on death certificates as well.

For various reasons, many states delayed the checkbox's implementation on their death certificate forms, so that noncomparable data was obtained for many years, leading the U.S. to be unable to report a maternal mortality rate for international comparison from 2007 to 2018, when all states except California had implemented the recommended checkbox. Even today, California's checkbox asks only if a pregnancy had occurred within a year of death, leaving reviewers unable to separate maternal deaths temporally. California's outright rejection of the CDC's requests has been consistent with their refusal to provide any information to the CDC about abortions performed in their state.²⁰

Once pregnancy-related deaths have been identified, in order to develop more detailed recommendations for action, multi-disciplinary Maternal Mortality Review Committees (MMRCs) have convened at local, state, regional and federal levels to comprehensively review reported maternal deaths, utilizing data from multiple sources, including medical records, social records, autopsy reports, and informant interviews. The MMRCs submit their conclusions to state-level Perinatal Quality Collaboratives (PQCs) to support the implementation of their recommendations of best clinical practice in hospitals, which often include additional screening, communication, training, access to care, and management of mental health conditions.²¹

Organizations such as the Alliance for Innovation on Maternal Health, the American College of Obstetricians and Gynecologists (ACOG), and the California Maternal Quality Care Collaborative have developed toolkits to assess risk and provide preventative treatment of hypertensive disorders, hemorrhage, sepsis, and thromboembolism, and these have been enacted in many hospitals.²² Additionally, the CDC's Levels of Care Assessment

Tool evaluates appropriateness of care depending on resources available in individual hospitals to give guidance on when maternal transfer may be indicated depending on hospital resources.²³ In order to address increasing late maternal mortality, ACOG's Optimizing Postpartum Care Recommendations advise contact with a care team within three weeks postpartum and extending insurance coverage for a full year postpartum, with mental health screening and referrals as appropriate.²⁴

The CDC's Division of Reproductive Health has initiated the "Building U.S. Capacity to Review and Prevent Maternal Deaths" initiative to provide tools and training for data review and sharing and development of best practices to assist MMRCs.²⁵ The Maternal Mortality Review Information Application (MMRIA) has been created as a repository for standardized data generated by these committees, reported as local or state "pregnancy-related mortality ratios."²⁶ Because relatively few deaths occur in individual states, regional MMRC committees have been able to collate greater amounts of data to produce recommendations for action. Not all states have created MMRCs, however. The CDC has given grant funding to create 39 MMRCs.²⁷ The MMRCs have been slow to collaborate also. In 2018, nine committees collaborated to publish a report,²⁸ followed in 2019 by reports from 13 and 14 committees,²⁹ and most recently, 36 MMRCs published a report.³⁰ The data from the remaining states remains elusive to the public.

U.S. data deficiencies

Unknown numerator of maternal deaths

The CDC relies primarily upon the individual states' vital statistics death certificate documentation (via ICD death codes or pregnancy checkboxes), or deaths that happen to come to its attention from other sources, in order to calculate maternal mortality statistics. The CDC states it also searches for additional deaths through hospital discharge data, media reports and obituary searches, but fails to document how systematically, proactively, and vigorously they seek to discover additional maternal deaths.³¹ Concerns about the inadequacy of the CDC's ad hoc system for identifying abortion-related deaths is underscored by the fact that in a given 10-year time span, a single journalist identified 39% more abortion-related deaths from court records and autopsies alone than were identified by CDC.³²

Differentiating pregnancy-related from pregnancy-associated deaths can be difficult and prone to interpretation or bias. Nationwide, comprehensive protocols for making such determinations are not publicly available, potentially leaving the process susceptible to reviewer preferences or bias. Determining pregnancy relatedness is particularly difficult in the case of mental health or accidental deaths. Even cancer-related deaths can be difficult to determine, as treatment options may have been limited or modified based on pregnancy status, resulting in potentially different outcomes. Likewise, determinations about the effect of pregnancy on chronic health conditions may be difficult to delineate, especially as

time progresses from the end of a pregnancy. In such cases, the MMRC may simply note that it was unable to determine pregnancy-relatedness.³³

For example, those who believe that mental health complications often follow abortion might conclude that a suicide following an induced abortion is related to that event, whereas those who believe mental health complications cannot be caused by abortion would reject this interpretation.³⁴ Even regarding term births, researchers often will not consider mental health deaths to be pregnancy-related unless there is clear documentation in the obstetric record that the woman was distressed by her pregnancy.³⁵

Texas has been implicated in having a very high MMR, and examination of their 2022 MMRC report is illustrative. One hundred forty-one maternal death certificates from 2019 were brought to the committee's attention. They analyzed only 118 of these deaths and concluded that only 52 (44%) were actually pregnancy-related. The committee was unable to determine pregnancy relatedness for 24 (20%) of the reviewed cases. No discussion was given in the report as to the reasons for the data deficiencies or failure to analyze every potential death.³⁶

The numbers of deaths reported by the CDC's two different systems -- National Vital Statistics System (NVSS) and Pregnancy Mortality Surveillance System (PMSS) -- have differed dramatically, partly but not completely, due to different temporal definitions, i.e., six weeks vs. one year. A 2005 article documented that only half of maternal deaths were reported in both systems. For the years 1995-1997, the NVSS reported 898 maternal deaths, because they did not classify a death as maternal if it was coded outside a specific ICD-9 range (630-676), while the more inclusive PMSS reported 1,387 pregnancy-related deaths. The authors concluded that changes in guidelines for coding maternal deaths under ICD-10 might improve data collection. Additional codes became available with implementation of ICD-10 in 2015, resulting in additional deaths being reported, but there is no evidence that this has resulted in better correlation between PMSS and NVSS numbers since that time.³⁷

Studies estimate 39-93% of all U.S. maternal deaths are not reported as pregnancy-associated on death certificates, documenting the extreme uncertainty regarding the reliability of this data. The secrecy associated with induced abortion reporting makes it likely that the problem is even worse with abortion-related deaths.³⁸ While MMRCs have concluded that more thorough data collection could be obtained by linking death certificates of reproductive-aged women with infant birth or death certificates, this is rarely performed. Additionally, the lack of any mandatory documentation of induced or spontaneous pregnancy losses prior to 20 weeks gestation leaves deaths associated with early pregnancy events unobtainable through records-linkage.³⁹



Reasons that maternal deaths may not be documented on death certificates

1. **Preceding pregnancy not known:** Often, maternal deaths are separated from the end of pregnancy by weeks or even months. Unless the woman is pregnant at the time of death, the death certifier may not have knowledge of any preceding spontaneous or induced abortions. In many cases, even a live birth within the prior year may be unknown.
2. **Initiating pregnancy event known but not documented:** It is recommended that the cause of death section of a death certificate include the immediate cause of death and underlying causes in Part One, and reporting of all other significant diseases, conditions or injuries that may have contributed to death in Part Two.⁴⁰ In many deaths due to catastrophic events at delivery, a cascade of events may result in death, but only the most proximate events may be listed on the death certificate. For example: 1. Arrest of dilation in labor > C-section delivery > injury of uterine vessels > hemorrhage > hypotension from blood loss > cerebral vascular event (stroke) from hypoperfusion. 2. Dysfunctions in multiple organ systems may cumulatively lead to death: hemorrhage > disseminated intravascular coagulation (DIC) > acute renal failure; or thromboembolism (clots) > pulmonary embolus > lung failure. 3. Hypoperfusion from hemorrhage could also lead to cardiac damage > cardiac dysfunction > myocardial infarction (heart attack). The same woman could experience all three adverse outcomes noted above after a hemorrhage. With so many events occurring, it is easy to see how the initiating events might be omitted due to space limitations on the death certificate or provider time constraints. It is not unusual for documentation of a maternal death to record the immediate cause of death (for example, embolism, sepsis or hemorrhage) without mention of initiating event (for example, legal induced abortion). Thus, depending on how a death certificate is completed, the cause of death might be listed as “hemorrhage,” when it should more accurately be reported as “legal induced abortion,” without which the hemorrhage would never have occurred. A well-publicized case from New Mexico documents that Keisha Atkins died while undergoing an induction abortion at 24 weeks gestation. She developed a uterine infection and rapidly decompensated. She was taken to the operating room for completion of the abortion where she died. Her death certificate lists her cause of death as “pulmonary embolism due to pregnancy.”⁴¹ Based on this diagnosis, her death would be recorded by the CDC as a pregnancy-related death, not an abortion-related death.
3. **Technologic limitations:** Physicians may have difficulty operating the complex electronic death registries, particularly if they use the systems infrequently or have technologic limitations, which may lead to incomplete documentation. The electronic medical record search engine may fail to discover the limited O-codes that document obstetric death. For example, the Texas “TxEVER” death registration system requires the funeral home to initiate the death record process, then notify



the medical certifier to complete the medical data entry. Due to preset deadlines, often the certifier is given only a short period of time to complete the document and may complete the certificate with incomplete recollection of the events or without access to autopsy results.⁴²

4. **Incomplete or unavailable autopsy results:** It should be noted that autopsies are not mandated after a suspected maternal death, nor is there a standardized protocol for performing an autopsy. For example, toxicology testing is often not performed after an accidental or mental health maternal death. These inadequacies may lead to incomplete or erroneous documentation.⁴³
5. **Mental health related deaths are often not considered to be pregnancy-related:** Epidemiologists determining pregnancy-relatedness may not consider a mental health related death to be related to the pregnancy outcome, even though the way the pregnancy was resolved may have contributed to the death (such as a stillbirth or coerced abortion leading to suicide). A traumatic pregnancy outcome may worsen or initiate interpersonal or maladaptive behaviors, which can cause diminished mental or physical health, and eventually lead to death. Anxiety and depression related to pregnancy may lead to self-harm and high-risk taking behavior, resulting in deaths from suicide, homicide, fatal accidents, substance abuse and overdoses.⁴⁴
6. **Complete medical records are often unavailable:** State and local MMRCs are provided with maternal death certificates and can usually obtain hospital or obstetric clinic records for review, but records related to early pregnancy events such as a miscarriage occurring outside of a hospital or an induced abortion (often performed in an independent abortion clinic, or with pills obtained outside of the medical system) are usually not available to MMRCs. Since most induced abortions are paid for privately rather than through insurance, one cannot link insurance payment records to detect adverse events related to abortion.⁴⁵
7. **Coding deficiencies related to induced abortion are common:** According to the National Center for Health Statistics, “the number of maternal deaths does not include all deaths occurring to pregnant or recently pregnant women, but only those deaths with the underlying cause of death assigned to International Statistical Classification of Diseases, 10th Revision code numbers A34, 000–095, and 098–099.”⁴⁶ A perusal of the WHO ICD-10 coding book documents few codes related to complications or deaths from legal induced abortion: 004=medical abortion, 005=other abortion, 006=unspecified abortion, 007=failed attempted abortion. (Note that the first digit is the letter O and the subsequent digit(s) the number 0.) A code is lacking for surgical abortion, even though most abortion deaths from physical complications occur following surgical abortion, leaving the coder to choose between the imprecise categories of “other” or “unspecified” abortion. Each code can be made more precise by adding numbers after the decimal: 0.0-



0.4=incomplete, that is, the death occurred before the pregnancy tissue was completely removed or 0.5-0.9=complete or unspecified, that is the death occurred after completion of the procedure or timing not known. Specifically, adding 0.5=complete or unspecified abortion complicated by genital tract and pelvic infection, 0.6=complicated by delayed or excessive hemorrhage, 0.7=complicated by embolism, 0.8=with other or unspecified complications, and 0.9=without complication. Strangely, it seems intuitive that an “induced abortion without complication” would not result in a maternal death, which is undoubtedly the worst kind of complication, and this code would be unnecessary. Additional codes related to deaths following cardiac, cerebrovascular, anesthetic, or mental health complications do not exist.⁴⁷

8. **Induced abortion complications may be miscoded as resulting from spontaneous abortion (miscarriage):** If death occurs following an induced abortion, even if a preceding pregnancy is identified, the certifier may mistakenly believe a spontaneous and not induced abortion preceded death. Abortion providers often do not maintain hospital privileges, so when serious complications occur after induced abortion, frightened women often present to an emergency room rather than return to the abortion clinic.⁴⁸ Other physicians will then provide emergent care but may be unaware that the pregnancy loss was induced rather than spontaneous if the woman withholds that information, or the physician may be hesitant to ask a woman specifically if she had an abortion. There is also often a failure to distinguish between legal and illegal induced abortion complications as many states have imposed abortion restrictions and illegal chemical abortion pills are being widely promoted in those states. A study of all Medicaid-financed abortions in 17 states documented that in 2015, 61% of women presenting for emergency care for complications following a legal induced chemical abortion and 39% presenting following surgical abortion complications were miscoded as having had a spontaneous abortion. An analysis of the FDA’s Adverse Event Reports (AERs) data for chemical abortions revealed that only 40% of surgical procedures for failed chemical abortions were provided by the abortion provider, demonstrating the frequency with which abortion providers are unavailable to care for their patient’s complications.⁴⁹
9. **Induced abortion history may be intentionally concealed:** Abortion-related deaths may be concealed (if the abortion is known) by the family to protect the deceased family member and family from anticipated shame.
10. And finally, due to the political nature of abortion, **ideologic commitments may cause the death certifier to omit notation of induced abortion** as the precipitating event. This discussion makes it clear that reported abortion-related mortality data probably represent only the tip of the iceberg.

Pregnancy-related death may be falsely attributed to mere association

Once a potential maternal death is identified on a death certificate, either the ICD-10 coding specialists (NVSS) or CDC epidemiologists (PMSS) review the data available on the death certificate to determine if it was “pregnancy-related.” Subjective opinions and ideology may impact this determination, as may paucity of data on the death certificate. There is not publicly available information to determine the criteria a death of despair would need to meet to assign blame to the pregnancy through the PMSS. By definition, the National Vital Statistics System (NVSS) rejects suicide, homicide and accidental deaths as pregnancy-related. Additionally, as noted in the prior discussion on pregnancy checkboxes, a positive checkbox in a woman older than 45 years old is automatically rejected unless additional evidence of pregnancy is also documented on the death certificate.⁵⁰ Each of these factors may lead to falsely rejecting a pregnancy-related death from CDC statistics, instead labelling it merely pregnancy-associated.

A 2018 report of nine MMRCs reported that 48.2% of deaths in non-Hispanic Black women were pregnancy-related, whereas it documented only 30.2% in Hispanic women and 28.4% in non-Hispanic white women were pregnancy-related. It has been documented on many occasions that maternal mortality in non-Hispanic Black women is higher than in other racial groups. What if there was an unrecognized bias causing a committee to be more likely to categorize a death in a non-Hispanic Black mother as pregnancy-related, but less likely to do so in other racial groups?⁵¹

Unknown denominator of all pregnancy events

Ideally, the CDC would report a “**maternal mortality rate**” comparing all maternal deaths to the total number of pregnancies, for a true analysis of “at-risk” individuals. It could also compare risks for different pregnancy outcomes by calculating rates specific for childbirth, induced abortion, and natural losses. But in the U.S., these calculations are impossible to perform due to incomplete pregnancy outcome data. The reporting of the numbers of spontaneous pregnancy losses, including miscarriages, ectopic pregnancies, molar pregnancies and stillbirths (together estimated as 15-17% of pregnancies) and intentional losses by induced abortions (estimated as 18-20% of pregnancies) are not mandated and thus unavailable.⁵² Fetal death certificates are required only after 20 weeks gestation or if the birth weight is greater than 350 grams, and even then fetuses who die of induced abortions after 20 weeks are excluded from reporting requirements.⁵³ No serious attempts have been made to document all spontaneous losses or to mandate national legal induced abortion reporting.⁵⁴ Even pro-choice medical organizations have documented the deficiencies resulting from the interest only in pregnancy outcomes that occur in the second half of pregnancy.⁵⁵ Resistance has followed any recommendations for improving this data collection by mandating reporting of early pregnancy events based on the argument that this would breach a woman’s right to privacy.⁵⁶

Since only the number of live births can be accurately measured due to mandated reporting on birth certificates, the number of live births has become the default

denominator.⁵⁷ This data is collected in the CDC's Wide-ranging Online Data for Epidemiologic Research (WONDER) database.⁵⁸ Thus, the CDC has chosen to report a "**maternal mortality ratio**," which is defined as the number of maternal deaths per 100,000 live births. Using a maternal mortality ratio instead of a maternal mortality rate introduces inaccuracies because the denominator (live births) is disconnected from the numerator (deaths related to any pregnancy outcome). Only two-thirds of maternal deaths occur in conjunction with a live birth, so many events occur in the numerator (deaths due to ectopic pregnancies, molar pregnancies, miscarriages, stillbirths and induced abortions) that are not represented in the denominator, resulting in an overly inflated maternal mortality ratio.⁵⁹

Abortion-related deaths should be calculated based on the number of deaths per 100,000 legal induced abortions. As mentioned earlier, the numerator of abortion-related deaths is unreliable, but this is also true of the denominator. The estimated number of legal induced abortions is voluntarily provided by local and state health departments to the CDC, and independently estimated by abortion providers who report to the Guttmacher Institute, with a large disparity between the two sources. In 2020, the CDC documented 620,327 abortions⁶⁰ while the Guttmacher Institute documented 930,160.⁶¹ In 2020, the CDC acknowledged that three of 52 reporting areas (50 states plus District of Columbia and New York City) did not report abortion data at all (California, Maryland, and New Hampshire). Because of this, CDC researchers turn to the Guttmacher Institute's data to calculate the denominator for abortion-related deaths, basing their statistics on a hybrid data collection system. Even the states that do consistently report data do not use standardized forms, so the collected data may differ by state. For example, in 2020, four reporting areas did not report maternal age, 12 did not report marital status, nine did not report the number of previous live births, 10 didn't report the number of previous abortions, 22 did not report race, 11 did not report gestational age, and six did not report on abortion methods.⁶² It is documented that women report fewer than half of past abortions in interviews, so health complications related to previous abortions often remain undiscovered.⁶³ Regarding the numerator, abortion-related deaths should be determined by investigation of all deaths of women with a history of abortion, and should include comprehensive investigation of deaths from suicide, substance abuse, risk-taking, and other self-destructive behaviors. But presently, there is no systematic collection of data regarding abortion-associated deaths as few are noted on maternal death certificates. The CDC's Abortion Surveillance System only identifies and counts deaths which are voluntarily reported or sporadically discovered.⁶⁴

What does the available U.S. data show?

The most recent data from 36 states' MMRCs, reflecting deaths from 2017-2019, reported that 81.8% of pregnancy related deaths occurred in urban areas, and 18.2% in rural areas. 84% were considered preventable, defined as "a chance it could have been averted with one or more reasonable changes to patient, community, provider, facility and/or systems factors."⁶⁵

In 2019, 14 states' MMRCs, reflecting deaths from 2008-2017, reported that 36% of pregnancy-associated deaths documented by death certificates were pregnancy-related, surprisingly rejecting pregnancy as a contributing factor in nearly 2/3 of deaths occurring in proximity to pregnancy. They determined that 65.8% were preventable. Demonstrating the importance of patient responsibility and familial support, the reviewers determined that 38.2% of deaths might have been prevented if the patient or family's actions had changed, whereas 33.9% might have been prevented if the provider's actions had changed.⁶⁶

Researchers have also documented that about 1/3 of pregnancy-related maternal deaths occurred outside medical facilities.⁶⁷ Also, about a third of the pregnancy-related deaths occurred in women who either did not receive any prenatal care or initiated such care late in pregnancy.⁶⁸

Data deficiencies were again identified. Of these deaths, 1.6% had no documentation of timing related to pregnancy, and 1.7% did not have enough information to rule out suicide or homicide as the manner of death. In 1.4% the underlying cause of death could not be determined.⁶⁹

The most recent U.S. maternal mortality statistics from NVSS documented that 861 women died of pregnancy-related causes in 2020 (23.8/100,000 live births) and 754 died in 2019 (20.1/100,000 live births).⁷⁰ Only two abortion-related deaths were documented by the CDC in 2019.⁷¹

What does the best data show? U.S. comparison to international records-linkage studies

A frequently referenced 2012 study misrepresented the compromised U.S. maternal and abortion-related mortality data, inaccurately reporting legal induced abortion to be 14 times safer than childbirth, by comparing the maternal mortality ratio to the abortion mortality rate. One of the authors, a vocal abortion advocate, previously headed the CDC's Abortion Surveillance Division, and so was aware of the deficiencies in the data. The discrepancies were even acknowledged in the article, which stated, "weaknesses include the likely underreporting of deaths, possibly differential by pregnancy outcome (abortion or childbirth)." In addition to the non-comparable denominators and the reality that an abortion-related death is counted in both numerators, the authors also ignored the disparity in lengths of the pregnancy events: the average induced abortion is performed at eight weeks gestation, whereas the average length of pregnancy resulting in childbirth is 37 weeks gestation, allowing a much longer period for untoward events to occur when a pregnancy is carried to term.⁷² A former director of the CDC, Dr. Julie Gerberding, has clarified that maternal mortality ratios and abortion mortality rates "are conceptually different and are used by the CDC for different public health purposes."⁷³ Additionally,

although the authors reportedly performed a literature review, they ignored many high-quality records-linkage studies demonstrating far more deaths after induced abortion than after childbirth.⁷⁴ While this study was meaningless for data-driven science, it provided powerful disinformation to accomplish its purpose for abortion advocacy propaganda.

As mentioned previously, the best method of detecting maternal mortality would be to document “how likely is a woman to remain alive after a pregnancy ends?”, linking all death certificates from women of reproductive age with all documented pregnancy events (usually through a single-payer insurance database), to determine the total number of deaths for each pregnancy outcome within a certain time period of a deceased woman’s most recent pregnancy. Studies that have employed this methodology have documented findings contrary to the common assumption that induced abortion is safer than pregnancy.

Studies documenting more deaths following abortion than childbirth

California Medicaid. An eight-year records-linkage study of California Medicaid recipients found that a woman was 162% more likely to die from all causes in the year after an abortion than after childbirth, 182% more likely to die in an accident, and 254% more likely to commit suicide. The death rate two years after childbirth was 112/100,000 pregnancies and after abortion was 228.9/100,000.⁷⁵

Finland. High-quality records-linkage studies from Finland revealed that the risk of death in a given year for a non-pregnant woman is 57/100,000 person-years, after term pregnancy is 28.2/100,000 pregnancies, after miscarriage is 51.9/100,000 and after induced abortion rises to 83.1/100,000. The risk of death from any violent cause was six times higher after abortion than childbirth, suicide six times higher, accidental death five times higher, and death by homicide 10 times higher.⁷⁶

Denmark. Similar records-linkage studies from Denmark revealed that after a first-trimester induced abortion or miscarriage, a woman had an 244% increased risk of death within 180 days (19/100,000 pregnancies), and a 615% increased risk of death within 180 days for second-/third-trimester abortion (55/100,000) compared to childbirth (7.8/100,000). The death rate within a year after childbirth is 17.9/100,000 pregnancies, after miscarriage is 31.2/100,000, after first-trimester abortion is 33.8/100,000, and after second-/third-trimester abortion is 110/100,000. Additionally, a dose-response was noted, with mortality rates increasing with the more abortions a woman had.⁷⁷

Meta-Analysis. Finally, a 2017 meta-analysis of all available records-linkage studies documented that the risk of death is twice as high within six months following abortion than childbirth and remains elevated for many years, with a documented dose-effect, as each additional abortion increased a woman’s risk of dying by 50%. The review documented a curious lack of interest in the issue of maternal mortality and pregnancy

loss, as only eleven of 989 identified studies contained enough information to make a determination related to all types of pregnancy losses.⁷⁸

While it is probable that records-linkage studies will produce many pregnancy-associated deaths that are not necessarily pregnancy-related deaths, wouldn't it be preferable to cast a broad net and have an extensive list of deaths for MMRCs to investigate in order to more completely detect pregnancy-related deaths, than to have a known incomplete system that does not detect all maternal deaths? It is both the starting point for all investigations, but also useful in and of itself, to identify differences in pregnancy-associated mortality that are not easily determined by a forensic examination. For example, unless there are suicide notes or other public expressions, it is difficult to identify all contributing factors to a mental health related death. But statistically strong differences in suicides and accidental deaths after abortion compared to childbirth, such as shown by the Finnish researchers, are certainly very telling. Therefore, pregnancy-associated mortality rates are useful for public health policy and informed consent, even if causality cannot be definitively determined.

MEDICAL DISCUSSION

Method of separation impacts maternal mortality risk

When a pregnancy progresses to childbirth, delivery may occur by several methods. Term spontaneous or induced vaginal delivery (SVD) has the lowest risk of maternal death compared to other methods of term deliveries.⁷⁹ Operative vaginal delivery, assisted with vacuum or forceps, has a higher risk of complications such as hemorrhage and adjacent tissue damage than an SVD.⁸⁰ Cesarean section delivery has much higher risks of maternal death, both because pregnancy complications may necessitate the cesarean section, as well as increased risks of hemorrhage, infection, thrombotic complications, and direct organ damage from this major intraabdominal surgery. Studies indicate maternal mortality from cesarean section may be as much as 100 times higher than vaginal birth.⁸¹ One-third of U.S. births occur by cesarean section, a relatively large percentage compared to many other developed nations, and this may also contribute to the U.S.'s higher maternal mortality ratios.⁸²

Preterm deliveries (< 37 weeks gestation) may occur by vaginal delivery, operative vaginal delivery or cesarean section, and are inherently riskier than a term delivery due to complications that lead to early delivery. For example, premature separation of the mother and fetus may be required due to a hypertensive crisis, bleeding emergency or other conditions. Preterm births also have an increased likelihood of cesarean section due to malpresentation, fetal intolerance of labor, failed medically-indicated labor induction or other factors. Medical interventions to delay preterm birth when labor commences early may also increase risks, such as toxicity from magnesium sulfate administration or increased risk of sepsis from expectant management of preterm, premature rupture of membranes.⁸³

Early natural losses, also known as spontaneous abortions or miscarriages, may resolve spontaneously without intervention, may require medications such as misoprostol or mifepristone, or may be treated with surgical dilatation and suction aspiration, with or without sharp curettage. Some may require a combination of these procedures. The gestational age at the time of the pregnancy loss impacts risk, as later miscarriages have higher risks of retained tissue leading to excessive hemorrhage or infection.⁸⁴

An ectopic pregnancy is implanted in a location outside of the uterus (or rarely within the cervix or cornual junction between the uterus and tube). Most commonly, it implants in the fallopian tube where continued growth can stretch the tube to the point of rupture, resulting in catastrophic internal bleeding. Once diagnosed, it must be treated surgically or with an injection of methotrexate unless there is clear evidence it is resolving through miscarriage.⁸⁵

Gestational trophoblastic disease, also called hydatidiform mole, is a rare abnormal pregnancy that has the potential for invasion and metastasis of the pregnancy tissue. When diagnosed, it is treated with surgical removal of the abnormal tissue. Close follow-up is required to rule out systemic invasion, which is treated with chemotherapy or additional surgery if it occurs.⁸⁶

Induced abortion is the intentional ending of fetal life within the uterus.⁸⁷ The gestational age when the abortion is performed impacts risk, as maternal mortality increases as the gestational age increases. The CDC documents a 38% increase in mortality for each week that an abortion is performed beyond eight weeks, with 14.7-fold increased mortality early in the second trimester, 29.5-fold increase in the mid-second trimester, and 76.6-fold increase in the risk of death to a woman from abortion after viability (second half of pregnancy).⁸⁸

Medical (chemical) abortion is usually performed with mifepristone to withdraw hormonal support for the developing fetus and misoprostol to induce uterine contractions. It has been associated with excessive hemorrhage and atypical infections, accounting for at least 28 reported maternal deaths in the U.S.⁸⁹ It is also associated with pharmacologically induced anxiety and depression in the animal model.⁹⁰ Complications occur four times as often as with surgical abortions. Surgical completion due to retained pregnancy tissue is required in approximately three to eight percent of first-trimester procedures. Abortion initiated medically but completed surgically compounds these risks.⁹¹ Data regarding chemical abortion complications are often unobtainable, especially since abortion advocates have begun advising women to withhold disclosure of a previous chemical abortion if they should happen to seek emergency care for abortion-related complications.⁹²

In 2021, the FDA removed the in-person dispensing requirement from mifepristone's Risk Evaluation and Mitigation Strategy (REMS) safeguards, allowing chemical abortion pill distribution outside of medical supervision through online ordering and mail-order delivery.⁹³ On January 3, 2023, the FDA officially modified the REMS and related materials, detailing how brick-and-mortar pharmacies are also now permitted to dispense chemical abortion drugs after submitting a pharmacy agreement form.⁹⁴ These unsupervised chemical abortions are being increasingly promoted to women, especially in states with abortion restrictions. However, failed abortion from underestimation of gestational age (resulting in more tissue to be expelled and often requiring surgery), missed diagnosis of ectopic pregnancy due to failure to perform ultrasound (these medications do not treat an ectopic), and missed opportunity for RhoGAM immunoprophylaxis (if not given, may cause the mother to produce an immune response against the fetus in future pregnancies) are all events that can increase the risk of maternal mortality in current or future pregnancies.⁹⁵

Later chemical abortions, performed after the first trimester, are usually induced by oral or vaginal prostaglandins (misoprostol), or mifepristone and misoprostol, but may require surgical suction or sharp curettage for retained pregnancy tissue in up to 39% of women.⁹⁶ Feticide (injecting medications to stop the fetal heart) is often performed prior to induction, but this may lead to maternal cardiac complications if digoxin or potassium chloride enters a woman's bloodstream;⁹⁷ and if feticide is not performed, a live birth may occur and the abortionist may perform active or passive infanticide.⁹⁸ Intraamniotic instillation procedures such as saline infusion, prostaglandin infusion or urea infusion are rarely performed due to deaths from electrolyte imbalances, infections and hemorrhage.⁹⁹

Surgical abortions require opening the cervix by osmotic dilatation, prostaglandin dilatation or mechanical dilatation or a combination of the above. Cervical damage or creation of a false passage during dilatation and/or perforation of the uterus during surgical curettage may lead to catastrophic hemorrhage or infection requiring emergency surgical intervention or to complications in a subsequent pregnancy.¹⁰⁰ First-trimester dilatation and suction aspiration may occur with or without sharp curettage (D&C), and sharp curettage has been linked to uterine damage. Second-/third-trimester dilatation and evacuation/extraction (D&E) may deliver the fetus intact ("partial-birth" abortion) or non-intact ("dismemberment" abortion), although an intact D&E is illegal by federal and many state laws. A non-intact D&E requires many blind passes of surgical instruments into the uterus, which can also lead to damage of the uterus or retained tissue.¹⁰¹ Hysterotomy (cesarean section) or hysterectomy abortions, though rarely performed, are associated with high maternal mortality.¹⁰² Later surgical abortions are associated with increased complications from uterine perforation or adjacent organ damage due to the relaxed uterine musculature, which may increase the risk of sepsis, hemorrhage, and thrombosis.¹⁰³ After 18 weeks gestation, the mortality rate from induced abortion (7.4 deaths/100,000) is more than twice that for vaginal childbirth (3.6 deaths/100,000).¹⁰⁴

Direct causes of maternal deaths

The triad of infection, hemorrhage, and hypertensive disorders of pregnancy, which in the past accounted for >90% of all pregnancy-related deaths, now accounts for only about one-third of these deaths. New causes of death have emerged, and currently about half of pregnancy-related deaths involve cardiovascular, cerebrovascular, and other medical conditions.¹⁰⁵ “Deaths of despair” from mental health disorders are also increasingly common causes of maternal deaths.¹⁰⁶

Cardiovascular conditions are the most common physiologic category identified by MMRCs as causing maternal mortality, accounting for 12.8% (2017-2019)¹⁰⁷ to 13.8% (2008-2017)¹⁰⁸ of pregnancy-related deaths. This number excludes deaths from cardiomyopathy and preeclampsia, which will be discussed below.¹⁰⁹ Many women who had complex cardiac repairs as infants due to congenital anomalies have now lived to reproductive age. While their repaired anatomy is sufficiently functional to allow them to mature to adulthood, it may decompensate when dramatic vascular changes occur during pregnancy.¹¹⁰ Additionally, the poor preconceptual health of many American women -- advanced age, obesity, diabetes, hypertension -- may predispose them to cardiovascular disease.

Poor preconceptual health may also predispose women to extreme and difficult-to-control blood pressure fluctuations which can lead to seizures, strokes, liver rupture and other catastrophic complications. Deaths due to accelerated hypertension from preeclampsia or eclampsia occur most commonly at delivery or within a week of delivery, accounting for an additional 6.5% (2008-2017) to 8.3% (2017-2019) of deaths.

Cardiomyopathy, accounting for an additional 8.5% (2017-2019) to 9.3% (2008-2017) of deaths, a pregnancy-related inflammation of the heart, is relatively rare, but has a 10% mortality rate and is the most common cause of late maternal death. Although maternal mortality is measured (at most) until a year after the end of a pregnancy, it should be noted that a history of abortion or miscarriage is associated with an increased risk of cardiovascular disease in subsequent pregnancies¹¹¹ and an increased risk of death from cardiovascular disease over many years.¹¹²

Hemorrhage accounts for 13.1% (2008-2017) to 13.7% (2017-2019) of deaths.¹¹³ This most commonly occurs due to atony-failure of the uterus to contract sufficiently to shut off the massive blood flow through the enlarged uterus. Safety toolkits and hemorrhage drills are utilized in most hospital systems, but sometimes, even in the best equipped and prepared hospitals, death may be unavoidable.

One increasingly common cause of hemorrhagic maternal death is an abnormally invasive placenta. “Placenta accreta spectrum disorder” occurs in 1:272 pregnancies and is associated with uterine damage from prior uterine surgery (cesarean section, myomectomy or sharp curettage for miscarriage or induced abortion). Catastrophic

bleeding due to inability to separate the placenta from the uterus may require many blood products that can overwhelm a hospital's blood supply. If diagnosed before birth, these women should be electively delivered in a tertiary medical center with a specialized multidisciplinary program and the ability to perform mass transfusion protocols. Often a hysterectomy is required.¹¹⁴ Placental abruption has also been associated with faulty placental attachment due to prior uterine damage and is also linked to excessive blood loss and poor maternal and neonatal outcomes.¹¹⁵

Early in pregnancy, a ruptured ectopic pregnancy can also lead to catastrophic internal bleeding and death. Undiagnosed ectopic pregnancies that rupture in women undergoing unsupervised chemical abortions are 30% more likely to result in death than if the woman had not sought an abortion, because she may interpret the pain and bleeding as a sign the medication is working rather than a sign her life is in danger.¹¹⁶

Infection accounts for 9.2% (2017-2019) to 11.4% (2008-2017) of deaths,¹¹⁷ but early diagnosis and treatment of sepsis have also been well addressed with safety toolkits in most hospital systems, increased awareness and use of broad-spectrum antibiotics.

Maternal death due to sepsis may be associated with expectant management of extremely early premature rupture of membranes to optimize fetal outcomes. Cervical incompetence (painless dilation), associated with risk of extreme premature delivery, may be increased with prior cervical or uterine instrumentation (conization for dysplasia, or dilatation and curettage for spontaneous or induced abortion). We have poor ability to predict or prevent preterm delivery, which occur in 10% of U.S. deliveries, but it should be noted that there is a dose-dependent increase in premature delivery after prior induced abortions. Large meta-analyses have demonstrated 25-35% increase in preterm birth after one induced abortion, and 32-72% increase after more than one.¹¹⁸

Embolism describes an occlusion of vascular flow with potentially deadly consequences, accounting for 8.7% (2017-2019) to 9.5% (2008-2017) of deaths.¹¹⁹ A woman may form an accentuated clotting response due to physiologic changes in pregnancy or complications from pregnancy management (venous thromboembolism), leading to obstructed vessels in the lungs (pulmonary embolus) or brain (cerebrovascular accident). Air or amniotic fluid can also enter the circulation and lead to a vascular obstruction. Fortunately, these events are rare but are often deadly. Embolisms may occur spontaneously during labor but are also associated with vascular complications from surgical abortions or cesarean sections when instruments have lacerated vessels and introduced foreign matter.¹²⁰

Mental health conditions have been determined to be causative in 8.8% (2008-2017) to 22.7% (2017-2019) of maternal deaths,¹²¹ even though researchers often do not attribute mental health

conditions to the woman's death, labeling them "pregnancy-associated" rather than "pregnancy-related" deaths. While there are many ways in which an adverse pregnancy outcome could affect a woman's mental health, there is a high likelihood that these deaths are often missed and unaccounted for in U.S. maternal mortality statistics. No standardized protocols exist for determination of whether a mental health condition contributed to a woman's death, so researchers may use subjective criteria to determine causality.¹²²

Anesthetic reactions, complications or overdose are rare, accounting for < 2% of maternal deaths.¹²³

Demonstrating the difficulty in accurately determining causes of death, approximately 7.5% of maternal deaths have **undetermined causes**.¹²⁴

Indirect causes of maternal deaths

Indirect contributions to maternal mortality, sometimes referred to as "upstream determinants of health," are highlighted by the known disparities in U.S. maternal mortality. Non-Hispanic Black women have 2.9 times the maternal mortality ratio of non-Hispanic white women,¹²⁵ with conversation often limited to suggesting institutional factors of systemic racism. Yet, in a military study that controlled for social factors such as economics and health care access, non-Hispanic Black women receiving the same health care as non-Hispanic white women were still 2.8 times as likely to be admitted to an intensive care unit and 1.7 times as likely to experience severe maternal morbidity compared to non-Hispanic white women.¹²⁶ There are many factors potentially contributing to maternal morbidity and mortality and these should be more fully explored as we strive to understand the disparities.

It is important to note that the outcomes of pregnancy differ among subpopulations. Spontaneous abortion (miscarriage) rates are similar among all, approximately 16%. The rates of legal induced abortion vary dramatically, however, affecting 34% of the pregnancies in non-Hispanic Black women but only 11% in white women. Abortions after the first trimester, which are more dangerous to women, are also more common in the non-Hispanic Black population, accounting for 13% of abortions among non-Hispanic Blacks compared to 9% among non-Hispanic whites. As a result of these factors, only 48% of pregnancies among the non-Hispanic Black population result in childbirth as compared to 65% of pregnancies among the non-Hispanic white population.¹²⁷ It is worth investigating if there are risk factors associated with abortion that may contribute to the excessive maternal mortality documented in the non-Hispanic Black population.

Preconceptual health risk factors impact maternal mortality. Obesity affects 47% of the non-Hispanic Black population and 47% of the Hispanic population, but only 38% of the non-Hispanic white population.¹²⁸ Hypertension affects 40% of the non-Hispanic Black population, but only 26% of the Hispanic population and 27% of the non-Hispanic white population.¹²⁹ Diabetes affects 13% of the non-Hispanic Black population and 12% of the

Hispanic population, but only 7% of the non-Hispanic white population.¹³⁰ An inherited thrombophilia will increase the propensity to form blood clots that block blood vessels and this occurs more commonly in the non-Hispanic Black population.¹³¹ These preconceptual factors may directly predispose to mortality due to disease-related complications, and they are also associated with early delivery and increased cesarean section rates, which indirectly raise mortality risk. Chronic hypertension may lead to preeclampsia or eclampsia, which accounts for 11.4% of deaths in non-Hispanic Black women, but only 6.5% of deaths in non-Hispanic white women.¹³²

Poverty is a risk factor for failure to obtain appropriate medical care and may contribute to the racial disparity noted in maternal mortality. Additionally, poverty is associated with the preconceptual health risk factors mentioned above: obesity, hypertension, and diabetes. Twenty percent of non-Hispanic Black women live in poverty compared to 16 percent of Hispanic women and 8 percent of non-Hispanic white women.¹³³ Only five percent of married couples live in poverty, so the high rates of unmarried childbirth in minority populations may be associated with poverty. Unmarried birth occurs in 67% of non-Hispanic Black women, 39% of Hispanic women, and 27% of non-Hispanic white women.¹³⁴ But independent of financial status, giving birth and caring for a child without a partner place a woman at an obvious disadvantage. If she should become ill, she may not seek timely emergency care due to lack of social support, childcare, or transportation.

Location: Where a woman lives in proximity to health care may affect her outcome in the event of a health care emergency. Many rural hospitals have closed or no longer offer obstetric services, so a woman dwelling in a “health care desert” may not find emergency care as readily as an urban woman. A 2015 analysis by Scientific American demonstrated that MMR is higher in rural areas at 29.4 deaths/100,000 live births vs. 18.2/100,000 in urban areas.¹³⁵ Protocols and partnerships for transport of critically ill women from low-level to higher-level hospitals are essential so life-saving care can be provided quickly in an emergency. So, too, is incentivizing training and recruitment for reproductive specialists to locate to rural areas.¹³⁶

Advanced maternal age: There are societal pressures for women to have children at older ages due to delayed marriage, education and career prioritization, access to birth control and abortion, infertility, and other factors. The average age at first birth has increased from 21 (1970) to 27 (1990) to 30 (2019).¹³⁷ Advanced maternal age is associated with an increased risk of maternal death. The CDC documents that from 2003 to 2016 U.S. maternal mortality in the population 25-34 years old was 7/100,000 but this skyrocketed to 79/100,000 in the 45-54 years old group.¹³⁸ Assisted reproductive technology has advanced dramatically and become widespread. Physicians can perform miraculous interventions to help infertile women, but they may have difficulty saying “no” to the requests of those who have preexisting conditions that dramatically raise their risk of maternal mortality, such as morbid obesity or significantly advanced age. Reproductive

specialists should seek to prioritize preconceptual counseling and optimize control of medical comorbidities prior to natural or assisted conception and should carefully consider the risks vs benefits of reproductive assistance at the upper extreme of maternal age.¹³⁹

Mental health factors may impact pregnancy outcomes. As noted above, 8.8-22.7% of maternal deaths have been attributed by MMRCs to mental health causes, but the lack of a standardized protocol to determine causality likely means that many mental health deaths exacerbated by pregnancy or its outcome are not identified as such. The maternal mental health deaths that have been identified are usually related to childbirth rather than an early pregnancy loss because, as documented throughout this discussion, an abortion-related death due to mental health complications is almost impossible to detect due to inadequacies in the system.

The association between legal induced abortion and mental health consequences is controversial, but there is no longer any dispute over the fact that abortion is associated with higher rates of mental illness. The only dispute is over when, if ever, abortion is the sole cause of subsequent mental illness.¹⁴⁰ In either case, it is intuitive that the delivery of a desired baby and the lifestyle changes that accompany that should be protective of a mother's health, whereas a pregnancy loss might be expected to have a detrimental effect on her mental health.

A 2011 meta-analysis of 22 studies found an 81% overall increased risk of mental health problems after abortion. Specifically, it found 34% increased risk of anxiety, 37% increased depression, 110% increased alcohol abuse, 230% increased marijuana abuse, and 155% increased suicidal behavior.¹⁴¹

A 2013 meta-analysis of all available studies, performed by a respected pro-choice researcher, concluded that there is "no credible evidence to support the research hypothesis that abortion reduces any mental health risks associated with unwanted/unplanned pregnancies that come to term".¹⁴² This researcher had previously documented a 30% increase in substance abuse and anxiety after abortion in a 30-year longitudinal study which controlled for confounding variables.¹⁴³

A 2016 study examining data from the U.S. National Longitudinal Study of Adolescent to Adult Health revealed that abortion is linked to a 45% higher risk of subsequent mental health problems, after controlling for prior mental health and a host of other confounding factors. A dose effect was demonstrated, with each additional abortion associated with a 23% increased risk of subsequent mental health disorders.¹⁴⁴

Finally, a 2019 comprehensive review of the available literature revealed that two thirds (49 out of 75) of the available studies showed a positive correlation between abortion and adverse mental health outcomes.¹⁴⁵

Additionally, the American Psychological Association has identified some sub-groups of women undergoing abortion known to be at higher risk of adverse mental health outcomes, including those who experience pressure from others to terminate, those who end a pregnancy that is meaningful due to coercion or concern for maternal or fetal health, those who lack social support, those who are ambivalent about the decision, those with a history of mental health problems, those with previous abortions, and those who have an abortion later in pregnancy.¹⁴⁶

“Deaths of despair” are an increasing but often underrecognized cause of maternal mortality. A review of 11,782 maternal deaths in 33 states from 2010-2019 documented 11.4% were attributed to drug-related causes, 5.4% due to suicide and 5.4% due to homicide (constituting over a quarter of all deaths).¹⁴⁷ Breakdown of the family unit and single motherhood may predispose a woman to domestic violence leading to homicide.¹⁴⁸ Suicide is a leading cause of maternal death in many countries.¹⁴⁹ Numerous studies have documented that childbirth protects a woman from suicide, whereas induced or spontaneous pregnancy loss increases her risk.¹⁵⁰

Other high risk-taking behavior, including that associated with substance abuse, may result in death from motor vehicle accidents or other accidents. These deaths could be linked to a preceding pregnancy outcome but are often excluded per protocol in the U.S.¹⁵¹ It has been reported that 30% of Swedish maternal deaths were related to motor vehicle accidents and other accidents.¹⁵² Mental health professionals counseling women struggling with pregnancy loss have documented increased risk-taking and self-destructive behaviors, which may contribute to a higher risk of accidents.¹⁵³

In determination of causation, MMRCs often neglect to identify pregnancy contributions to mental health deaths unless they can document clear evidence from a mental health profile form in the prenatal records, even though they concede this likely leads to under-attribution of pregnancy events and childbearing to mental health deaths.¹⁵⁴ Comprehensive analysis necessitates that MMRCs begin investigating accidental deaths within the framework of mental health conditions and pregnancy outcomes.

Preterm birth: There are several potential mechanisms by which an induced abortion may increase the risk of subsequent premature deliveries. Forced dilatation of an unripe cervix may result in cervical trauma, and later cervical incompetence. Instrumental trauma of the uterus may result in faulty adherence of the placenta in subsequent pregnancies, resulting in abruption (premature separation) or placenta previa/accreta/increta (invasion of the placenta into the cervix, uterine wall, or other adjacent organs) which may require early delivery. In addition, the abortion procedure may alter the bacterial composition of the uterus, resulting in intraamniotic infection in subsequent pregnancies.¹⁵⁵

Obstetric interventions to delay delivery in the setting of premature labor or premature rupture of membranes can increase a woman's risk of medication toxicity and infection/sepsis which can lead to maternal death. Early deliveries are more frequently performed by cesarean section due to fetal malpresentation or other complications, which increases the risk of maternal mortality. Mothers who deliver preterm are also at a higher risk of medical complications later in life, including cardiovascular disease and stroke. Prematurity is the number one cause of infant deaths as well as the cause of substantial lifelong morbidity for many children.¹⁵⁶

The overwhelming evidence from 168 studies over 50 years demonstrates a connection between abortion and preterm birth.¹⁵⁷ One meta-analysis found that there was a 25% increased risk of premature birth in a subsequent pregnancy after one abortion, 32% after more than one, and 51% after more than two abortions.¹⁵⁸ Likewise, another meta-analysis found a 35% increased risk of delivery of a very low birthweight infant after one abortion, and 72% after two or more abortions.¹⁵⁹ Despite the widespread knowledge of an abortion-preterm birth link in the academic literature, women are often not warned by their physicians that an induced abortion could increase the risk for premature birth of subsequent children. Abortion advocates downplay this link, as demonstrated by a 2018 National Academy of Sciences, Engineering and Medicine report, which considered only five of the 168 available studies, to falsely reassure the public that there was no link between induced abortion and preterm birth.¹⁶⁰

PREDICTIONS

Maternal mortality predictions as state-level abortion restrictions are enacted:

In the politically polarized climate following the Supreme Court's decision in *Dobbs v. Jackson Women's Health*, reversing *Roe v. Wade*, and allowing legislatures to regulate abortion, allegations have arisen that this action will increase maternal mortality. One researcher even went so far as to predict that a total abortion ban in the U.S. would result in a 7% increase in pregnancy-related deaths in the first year and 21% increases yearly thereafter.¹⁶¹ Fortunately, there are many reasons to expect abortion restrictions to decrease, rather than increase, maternal mortality.

Abortion restrictions will not prohibit medical interventions for life-threatening emergencies because all states have exemptions in their pro-life laws to save the life of the mother if her pregnancy poses a risk to her life.¹⁶² The necessity for an abortion in this situation is extremely rare, however, because usually these heartbreaking situations do not occur until the second half of pregnancy, when a woman's obstetrician can deliver her in a safer, medically standard way, by induction or cesarean section, and often the baby's life can be saved also. An entire subspecialty of obstetrics — maternal-fetal medicine — exists to help high-risk women and their children make it safely through

pregnancy and delivery. In the rare event that a dilation and evacuation is the only or best option, however, all states will allow this intervention.

Health care providers ranging from the American Association of Pro-Life Obstetricians and Gynecologists to Planned Parenthood have all acknowledged that treatment of an ectopic pregnancy is not the same as abortion and all states will allow treatment of this life-threatening condition.¹⁶³

Management of miscarriages is also not affected by legislation restricting elective abortion. Although the treatment of a deceased fetus can be similar to procedures used to induce abortion, there is a clear difference in the intent of actively ending fetal life versus caring for a woman once that life has ended. It is extraordinarily rare for a life-threatening miscarriage event to occur while a fetus is still alive, but if it does the provider can provide the necessary treatment under the exemption for life-saving treatment.¹⁶⁴

As previously noted, the population most impacted by maternal mortality, non-Hispanic Black women, has abortion rates that mirror their maternal mortality. High maternal mortality and high abortion rates shouldn't coexist if abortion reduces maternal mortality. Clearly abortion is not protecting non-Hispanic Black women from maternal mortality and may be increasing their risk. The following are reasons that allowing fewer abortions will lower the risk of maternal mortality:

Abortion restrictions will limit dangerous, later abortions. Approximately 8-10% of U.S. abortions occur after the first trimester and 1% occur in the second half of pregnancy (after viability when the baby can survive separated from his mother). Non-Hispanic Black women have a higher percentage of later abortions (13%) than non-Hispanic white women (9%), raising their risk of death from the procedure.¹⁶⁵ These abortions are usually performed by dilatation and evacuation (D&E), which is much more dangerous than earlier abortion procedures, as it requires forcibly dilating a strong muscular cervix and multiple blind passes of surgical instruments to disarticulate the fetus and remove the pregnancy tissue, with risks of hemorrhage, infection, retained tissue, damage to adjacent organs, anesthetic complications and stroke, heart attacks and deaths, if severe. Even though the CDC's data on maternal mortality is known to be incomplete, the available data documents that a woman's risk of death from abortion increases dramatically as the pregnancy progresses.¹⁶⁶

Abortion restrictions will reduce the incidence of repeat abortions. As previously mentioned, abortion is associated with an increase in all-cause mortality rates, especially when women are exposed to multiple abortions.¹⁶⁷ To the degree abortion restrictions contribute to a reduction in exposure to multiple abortions, this should reduce the overall mortality rate of women of reproductive age.

Abortion restrictions will prevent some future pregnancy complications.

Abortion can predispose to future pregnancy complications, although there is no way to document this causality with our current poor documentation systems. For example, surgical trauma to the uterine lining in a dilation and suction, curettage or evacuation procedure may cause an abnormal placental attachment in the next pregnancy. Placental abruption (premature separation) can occur if the attachment is not secure, and placental accreta syndrome (pathologic invasion) can occur if the attachment is too strong. Both of these abnormal placental attachments can lead to life-threatening bleeding at delivery. Also, abortion has been documented to increase the risk of a subsequent preterm birth which is associated with higher maternal mortality.¹⁶⁸ Limiting abortion will decrease women's risk of maternal mortality in subsequent pregnancies for these reasons.

Abortion restrictions will prevent future mental health disorders in some women. Abortion is linked to mental health disorders such as anxiety, depression, substance abuse or overdose, excessive risk-taking behavior, self-harm and suicide, all of which can contribute to maternal mortality.¹⁶⁹ Unfortunately, our inadequate maternal mortality reporting system often does not detect these "deaths of despair" related to abortion, but as previously documented, such deaths undoubtedly occur. Conversely, delivery of a new baby often leads a woman to reduce her risk of accidents by staying at home to care for her new child.

Abortion restrictions may lead to more fathers taking responsibility for their children and decrease the rates of single motherhood. Abortion has devastated the family structure and social relationships in our country. The narrative that reproduction is a "woman's choice" has led many men to be absent fathers if a woman chooses to give birth to her child. This increases the odds that she lives in poverty as a single mother, which is associated with medical conditions such as obesity, hypertension, diabetes, and lack of insurance. Without a supportive partner or other family support to encourage her to seek help in a medical emergency, access to transportation, or childcare for other children, she may delay life-saving medical care until it is too late. It is beyond the scope of this discussion, but absent fathers have also been documented to contribute to many other societal ills.¹⁷⁰

Abortion restrictions will encourage more women to give birth and are unlikely to result in illegal septic abortions. The frightening and erroneous narrative that a woman denied abortion will seek it in an unsafe way, resulting in 5,000-10,000 deaths yearly, drove its widespread legalization in 1973, and is being recycled today as states pose restrictions.¹⁷¹ Yet, in the years prior to *Roe v. Wade*, the CDC documented fewer than 100 deaths yearly from both legal and illegal abortions.¹⁷² Abortion had been becoming safer long before it was legalized due to improved surgical techniques, safer anesthesia, and widespread antibiotic use. Even then, 90% of abortions were performed by physicians, albeit illegally.¹⁷³ Today, abortion advocates are aggressively promoting unsupervised chemical abortion to women in states with restrictions. Although more likely

to result in complications than surgical abortion, only 28 deaths have been attributed to chemical abortion in the U.S. since 2000, so it is unlikely that restrictions will contribute to excessive maternal deaths. Besides, the most likely outcome for a woman who encounters obstacles to abortion is that she will carry her pregnancy to term and grow to love her child.

Abortion restrictions may encourage both men and women to change their sexual behavior. Studies of changes in abortion laws, both in the U.S. and internationally, show that with moderate limitations on abortion, the abortion rate goes down, while the birth rate stays the same. With tighter restrictions, such as a complete ban, this may temporarily increase the birth rate by a small amount, but this stabilizes over time. As the “cost” of abortion rises, men and women often modify their behavior by decreasing promiscuous sexual activity and increasing use of more effective contraception.¹⁷⁴

Abortion restrictions may reduce the number of unwanted abortions. As many as 64% of women with a history of abortion report feeling pressured into their abortions by other people, such as their male partner or parents.¹⁷⁵ Since “perceived pressure from others” to have an abortion is one of the risk factors for mental health problems after abortion that has been identified by the APA, it is reasonable to hope that abortion restrictions, especially those requiring abortion providers to screen for mental health risk factors, will reduce the rate of

abortion in women at greatest risk of negative psychological reactions. This will reduce the rate of suicide and self-destructive behaviors that have been observed among women exposed to unwanted or coerced abortions.

Abortion restrictions in other countries have not been shown to increase maternal mortality. Examination of international trends demonstrates that maternal mortality does not increase after abortion restrictions are adopted. Chile, which had legal abortion from 1957-1988 and prohibited abortion from 1989-2007, found that maternal mortality declined despite the change in legal status of abortion as education and obstetrical care improved.¹⁷⁶ Similarly, Mexican data showed the 32 states that permitted abortion had a 30% higher maternal mortality ratio and 89% higher abortion mortality rate than states with restrictive abortion laws.¹⁷⁷ Likewise, comparing demographically similar countries of the Republic of Ireland and the United Kingdom with disparate abortion laws,¹⁷⁸ restrictive Ireland demonstrated a lower maternal mortality rate¹⁷⁹ than in the permissive UK.¹⁸⁰ El Salvador, Poland, and Nicaragua, which all enacted abortion restrictions, have seen their maternal mortality improve afterwards. South Africa, on the other hand, has seen maternal mortality worsen after the legalization of abortion.¹⁸¹

Due to political polarization in the U.S., some have implicated conservative southern states with elevated maternal mortality ratios, implying that policy recommendations and abortion restrictions are to blame. A comparison is in order: Mississippi, which restricts abortion, has one of the highest MMRs at 35.2/100,000 live births. However, some urban centers managed by progressive politicians with permissive abortion laws have similar ratios: Baltimore 35.2/100,000, Bronx County, NY 40.1/100,000, New York County, NY 25.8/100,000. Since these populations have similarly poor maternal mortality but don't share abortion restrictions, one must ask what they do have in common that may contribute to poor maternal outcomes. The answer, of course, is poverty. In Mississippi, 18.7% of the population lives in poverty, Baltimore City 20%, Bronx County 24.4%, and New York County 16.3%.¹⁸²

Throwing more money at the problem is unlikely to be the solution if we fail to address the root causes of poverty and other maternal factors discussed above. While the U.S. spends \$10,103 per person per year on health care, one of the poorest countries in Europe, Moldova, spends \$244.¹⁸³ Yet, in 2017, they had the same maternal mortality ratio of 19/100,000 live births.¹⁸⁴ In fact, the U.S. has the worst maternal mortality ratio compared to other developed countries while simultaneously documenting one of the highest abortion rates, particularly those performed later in pregnancy.¹⁸⁵

CONCLUSION

The issue of maternal mortality deserves rigorous discourse. America's maternal mortality rate is the worst in the developed world, calling for careful discernment of the underlying factors, driven by a genuine concern for the wellbeing of women and their children. Instead, politics and ideological rhetoric shroud the conversation. Full and open dialogue requires transparent data, beginning with the documentation of all pregnancy events, all complications, and all maternal deaths. Efforts to address maternal mortality will continue to be hindered until complete data allows us to understand the breadth of the issue and begin to untangle its underlying causes. The demand for accurate maternal mortality data is one of common sense and should draw bipartisan support.

It is crucial to increase awareness that maternal mortality can follow *any* pregnancy event—including induced abortion—and that these tragic deaths often occur outside of the healthcare system and temporally separated from the end of pregnancy. Acknowledging the wide range of causes behind maternal mortality compels a wide range of approaches in ameliorating their effects. The detection of adverse events in early pregnancy must be expanded, particularly when related to legal induced abortion. Mental health disorders must be thoroughly investigated, and diligence applied to determining how a pregnancy event may have contributed to a “death of despair.” These are not “quick fixes” and will require work beyond current efforts to improve medical intervention in hospitals for

obstetric emergencies. While emergency intervention at the time of delivery is an important place to start, the issue of maternal mortality spans far beyond a hospital room. In boldness and unfettered by ideological pressure, our care for mothers must reach beyond the hospital room too.

RECOMMENDATIONS

Policy recommendations to improve data accuracy and protect women from maternal deaths:

United States Department of Health and Human Services:

- Mandate reporting of all pregnancy outcomes (term and preterm live births and stillbirths, legal induced abortions, ectopic pregnancies, gestational trophoblastic disease and miscarriages) by local providers, collected by state health departments, and then relayed to the CDC. Do not permit a reporting exemption for induced abortion fetal deaths after 20 weeks as is currently allowed.
- Standardize reporting forms to be consistent in all reporting areas. Ideally this would be in the form of “fetal loss certificates” throughout an entire pregnancy much as live births and stillbirths after 20 weeks are currently documented on birth certificates. To allay privacy concerns, all the same privacy protection mechanisms used in other medical reports filed with state health officials (such as with cancer registries, venereal disease reports, birth defect registries) should apply to protect personal identifying information.
- Mandate reporting of all complications and deaths associated within a year of any pregnancy outcome to state health departments, with special emphasis on reporting of complications that occur outside of the standard medical system (hospitals usually have comprehensive reporting systems but abortion and private gynecologic clinics often do not). Be aware that severe maternal morbidity is closely related to maternal mortality and accurate reporting of “near-miss” events should also be prioritized and mandated. Enforce strict noncompliance penalties for failure to report or misrepresentation of events (for example, induced abortion complications intentionally misreported as resulting from a miscarriage).
- Enforce these mandatory reports by linking requirements to federal CMS reimbursement, with monetary penalties for withholding data. Do not allow states to refuse to report abortions or abortion-associated deaths for ideologic reasons as California, Maryland and New Hampshire do currently.

States' Departments of Health:

- Link reproductive age women's death certificates, birth certificates, and fetal loss certificates (at all gestational ages in pregnancy) to publish a report each year tabulating the total number of pregnancy-associated deaths for each pregnancy



outcome within 42 days and within one year of the deceased woman's most recent pregnancy.

- Streamline and standardize the death certification electronic medical records system.
- Create an easy-to-use electronic reporting form for "near-miss" pregnancy complications that do not result in death and ensure that doctors are aware that it is available and encouraged to report.
- Make tutorials readily available for physicians to ensure accurate use of death and complication reporting forms, engaging state medical societies to assist with dissemination of this information.
- Provide the reporting forms in a timely fashion and make submission as simple as possible through direct electronic transmission.

Hospital Associations, Joint Commission on Accreditation of Healthcare Organizations, State Medical and Pharmacy Boards:

- Educate physicians on accurate reporting of pregnancy outcomes and complications with specific recommendations on how this should be done through email blasts, required CME, residency training requirements, etc.
- Provide oversight on complication trends related to the various ends of pregnancy and require the same standards of care from abortion providers as from all other health care providers.
- When states implement new legal induced abortion restrictions, state medical boards should engage with legal counsel, and state attorneys general to provide interpretation of the new legislation to health care providers to minimize confusion and misinterpretation of the laws. Hospital systems should create medical oversight quality committees that provide advanced guidance and can also be convened rapidly to facilitate decisions on emergency care in situations where medical compliance with state law may be unclear. Similarly, state boards of pharmacy should give guidance regarding protocols and medical oversight of potentially teratogenic and embryocidal medications, such as methotrexate and misoprostol.
- All hospitals should utilize maternal safety toolkits to assess risk and provide preventative treatment for hypertensive disorders, sepsis, thromboembolism and hemorrhage and hospitals should require frequent emergency drills to train staff to more effectively manage emergent situations.
- Improve rural healthcare by creating algorithms for care and transfer from low-level rural hospitals to higher-level hospitals for complex cases. Provide community education notifying residents of facilities where obstetric care is available. Prioritize and incentivize recruiting and retention of rural physicians and support of vulnerable rural hospitals.



- Develop new primary care and ob/gyn community residency programs in rural areas. Currently, only 93% of allopathic medical students and 90% of osteopathic medical students obtain their desired residency opportunity after medical school graduation. While we bemoan a shortage of rural physicians, resulting in “health care deserts,” Congress has failed to allocate additional residency funding in over 30 years. Prioritizing funding to train ethical healthcare providers who desire to provide primary and obstetric care in underserved areas will improve outcomes in those areas and optimize the investment we have made in training physicians.

ICD-10 Coding Registry:

- Expand induced abortion complication and death causes coding to account for all possible complications following abortion that may result in maternal death and optimize search engine discovery.

Reproductive Health Specialists:

- Reproductive specialists should optimize health of women prior to assisting them in attaining pregnancy. Primary care physicians and ob/gyns should prioritize discussion of pregnancy intent, with effective family planning options offered if pregnancy not desired; and if pregnancy is desired, pre-pregnancy optimization of high-risk medical conditions.
- Attention should be directed to improving obstetric management of high-risk pregnant women with advanced age, obesity, diabetes, hypertension, thrombophilia, cardiac disease, congenital cardiac disorders and/or prior poor pregnancy outcomes, as well as managing new onset pregnancy complications such as multiple gestation, gestational diabetes, pregnancy-induced hypertension and thromboembolism.
- Women should be counseled regarding the increased risks associated with induced abortion on reproductive and mental health and with childbirth at more advanced ages.

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No. 19-1392

IN THE
Supreme Court of the United States

THOMAS E. DOBBS, STATE HEALTH OFFICER OF
THE MISSISSIPPI DEPARTMENT OF HEALTH, *et al.*,

Petitioners,

v.

JACKSON WOMEN'S HEALTH ORGANIZATION, *et al.*,

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES
COURT OF APPEALS FOR THE FIFTH CIRCUIT

**BRIEF OF BIOLOGISTS AS *AMICI CURIAE*
IN SUPPORT OF NEITHER PARTY**

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TABLE OF CONTENTS

	<i>Page</i>
TABLE OF CONTENTS.....	i
TABLE OF CITED AUTHORITIES	iv
STATEMENT OF INTEREST OF <i>AMICI</i> <i>CURIAE</i>	1
SUMMARY OF ARGUMENT.....	2
ARGUMENT.....	6
I. “WHEN DOES A HUMAN’S LIFE BEGIN?” IS WIDELY RECOGNIZED AS A BIOLOGICAL QUESTION.....	6
II. ANALYZING VIEWS ON WHEN A HUMAN’S LIFE BEGINS REVEALS THAT FERTILIZATION IS THE LEADING BIOLOGICAL VIEW	8
A. Some biologists believe that a human’s life begins at some point during the human life cycle.....	8
1. Some support the view that a human’s life begins at birth or first breath	8
2. Some support the view that a human’s life begins at fetal viability	9

Table of Contents

	<i>Page</i>
3. Some support the view that a human's life begins at the first heartbeat, brainwave, or moment of pain capability	11
B. Most biologists affirm that a human's life begins at the start of the human life cycle	12
C. The fertilization view on when a human's life begins is the leading biological view	15
III. THE FERTILIZATION VIEW IS THE LEADING BIOLOGICAL VIEW ON WHEN A HUMAN'S LIFE BEGINS AND HAS BEEN SINCE THE 19 TH CENTURY...	16
A. The discovery of fertilization took place over a century ago.....	16
B. Peer-reviewed journals present the fertilization view on when a human's life begins as a fact that requires no explanation or citation.....	18
C. Scientists' legislative testimony affirms the consensus on the fertilization view.....	22

Table of Contents

	<i>Page</i>
D. 96% of 5,577 biologists from 1,058 academic institutions affirmed that a human's life begins at fertilization.....	24
1. The survey questions solely focused on the biological perspective on when a human's life begins	24
2. The results showed that biologists affirm the fertilization view	27
E. Abortion advocates and abortion doctors affirm that a human's life begins at fertilization.....	28
CONCLUSION	29
APPENDIX.....	1a

TABLE OF CITED AUTHORITIES

	<i>Page</i>
CASES	
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STATEMENT OF INTEREST OF *AMICI CURIAE*¹

Amici curiae are biologists who work at colleges, universities, and other institutions in 15 countries around the world. On average, they have 10 years of undergraduate and graduate training, they have 27 years of experience working in academia, and overall they have dedicated 37 years to the study of life and to promoting science awareness.

Their expertise bears directly on the question presented in this case. The Court will assess the constitutionality of *Roe v. Wade*'s viability standard, which was used as a proxy by the Court, in 1973, after it could not determine when a human's life begins because it could not find a consensus view among experts. Today, *amici* provide the Court with evidence that shows most biologists affirm fertilization as the leading biological view.

As scientists, the *amici curiae* are solely committed to providing the Court with the best available science in service of promoting science awareness and combatting science miscommunication on both the fertilization view and the broader discussion on when a human's life begins. Thus, the *amici curiae* take no position on the present case and merely offer this brief in hopes that it will be of assistance to the Court as it analyzes the relevant facts of the present case.

1. All parties have consented to the filing of this amicus brief. In accordance with Rule 37.3, counsel affirms that no counsel for any party authored this brief in whole or in part and that no person or entity other than *amici* made a monetary contribution to fund the preparation and submission of this brief.

A full list of *amici* is attached as an appendix to this brief.

SUMMARY OF ARGUMENT

In granting Mississippi’s Petition For a Writ Of *Certiorari* in *Dobbs v. Jackson Women’s Health*, the Court agreed to consider “[w]hether all pre-viability prohibitions on elective abortions are unconstitutional”². The question addresses *Roe*’s viability standard, which held that fetal viability is the point at which a state’s “important and legitimate”³ interest in protecting life is compelling and thus constitutionally adequate to overcome a woman’s constitutional right to have an abortion. This viability standard, which the Court ultimately claimed had biological justifications⁴, was established after the Court could not find a consensus of relevant experts who agreed on when a human’s life begins⁵. The Court considered Texas’s fertilization standard, but after Texas’s assistant attorneys general created doubt on the fertilization view—in both the oral argument⁶ and the oral

2. Grant of *Certiorari*, <https://www.supremecourt.gov/qp/19-01392qp.pdf>.

3. *Roe v. Wade*, 410 U.S. 113, 163 (1973).

4. *Id.* at 163.

5. *Id.* at 159.

6. After Justice Thurgood Marshall questioned Floyd about the scientific basis for Texas’s stance on when a human’s life begins, Floyd eventually relented: “Mr. Justice, there are un-answerable questions in this field.” Transcript of Oral Argument, *Roe v. Wade*, 1971, at 45.

reargument⁷ sessions—the Court rejected the standard by claiming that the fertilization view was merely “one theory of life”⁸. The Court also claimed that the fertilization view had “[s]ubstantial problems”⁹ because embryological data had raised questions on whether fertilization was a process or event.

Despite the Court’s use of fetal viability as a proxy for when a human’s life begins, which it described as the point that a fetus “has the capability of meaningful life outside the mother’s womb”¹⁰, the majority opinion stated that the Court was “not in a position to speculate” on the “difficult question of when life begins... at [that] point in the development of man’s knowledge.”¹¹ However, no current member of the Court would have to speculate, today. The fertilization view is widely recognized—in the literature and by biologists—as the leading biological view on when a human’s life begins.

7. Justice Blackmun also questioned Floyd’s replacement, Texas Assistant Attorney General Robert C. Flowers, on when a human’s life begins during the *Roe* reargument session, but he also cast doubt on the fertilization view: “QUESTION:... Is it not true, or is it true that the medical profession itself is not in agreement as to when life begins?... MR. FLOWERS: I think that’s true, sir. But from a layman’s standpoint, medically speaking, we would say that at the moment of conception from the chromosomes, every potential that anybody in this room has is present, from the moment of conception.... QUESTION: But then you’re speaking of potential of life... MR. FLOWERS: Yes, sir.” Transcript of Oral Reargument of *Roe v. Wade*, 1972, at 23.

8. *Roe*, 410 U.S. at 162.

9. *Id.* at 161.

10. *Id.* at 163.

11. *Id.* at 159.

The fertilization view was first discovered in the early 1800s. (See *infra* at Argument III.A). However, it was such a self-evident fact that little work was done to study or communicate that consensus since it was difficult for scientists to imagine that it could ever be challenged or if there would ever be a time the view would not be common knowledge.¹² Since the *Roe* Court issued its decision in 1973, the scientific consensus¹³ on the fertilization view has been established.

Recent surveys have shown that biologists are viewed as objective experts in the study of life and as the experts most qualified to determine when a human's life begins (See *infra* at Argument I). The fertilization view on when a human's life begins has been shown to be the leading biological view, and it can only be supplanted by an alternative view if there are paradigmatic shifts to axiomatic concepts within biology (See *infra* at Argument II). This is made clear by a review of: (1) the biological and life sciences literature, as peer-reviewed articles represent the fertilization view as a fact of biology that requires no explanation or citation (See *infra* at Argument III.B), (2) legislative testimony from scientists that suggests there is no alternative view in the scientific literature (See *infra* at Argument III.C), (3) an international survey of academic biologists' views on when a human's life begins that reported 96% of 5,577 participants affirmed the fertilization view (See *infra* at Argument III.D), and (4) statements by prominent abortion doctors and abortion advocates who affirm the fertilization view (See *infra* at Argument III.E).

12. See *infra* n.91.

13. *Amici* represent there is general, yet overwhelming, agreement, not that it is a unanimous view.

Thus, *amici* respectfully offer the Court this brief to provide information on the biological perspective on when a human's life begins: fertilization, generally, marks the beginning of a sexually reproducing organism's life and, specifically, marks the beginning of a human's life, as it is the point at which a human first comes into physical existence as an organism that is biologically classified as a member of the *Homo sapiens* species.

This brief is not offered in support of either party. It takes no position on how the question being considered in this case should be answered by the Court, no position on whether the lower court's ruling should be upheld or overturned, and no position on whether *Roe* should be upheld, revised, or overturned. It takes no position on the morality, legality, or constitutionality of abortion access.¹⁴ It takes no position on whether a single-celled human zygote is a person¹⁵ within the meaning of the U.S. Constitution, or if a human zygote, embryo, or fetus deserves legal protections or constitutional rights.

14. If *amici* were accused of taking a stance on abortion since they affirm that human zygotes are biological humans—as that classification could be used to argue that human zygotes are humans who deserve legal protections—*amici* would explain that this fact alone is not determinative. Without legal precedents, legal principles, or legal arguments, the fact that a human zygote is biologically classified as a human does not necessitate any position on the legality of abortion access; affirming the biological reality does not preclude one from taking any position on related legal issues.

15. If “person” is fungible with “human,” or if all members of the *Homo sapiens* species are recognized as persons, then the genetics-based classification method dictates that a human zygote is a person. If that is not the case, and some living humans are not deemed persons, then *amici* state no opinion on whether a human zygote is a person.

It is simply offered to provide the members of the U.S. Supreme Court with an analysis of the fertilization view in hopes that they will correct the *Roe* Court's outmoded factual record on the fertilization view and the question of whether there is a consensus on when a human's life begins. *Amici* encourage the Court to discuss the relevant science and consider whether the best science available in 2021 affirms that fertilization is the ontogenetic starting point of a human's life.

ARGUMENT

I. “WHEN DOES A HUMAN’S LIFE BEGIN?” IS WIDELY RECOGNIZED AS A BIOLOGICAL QUESTION.

In the oral reargument session for *Roe*, Justice Potter Stewart signaled the importance of resolving who should determine when a human's life begins: “Now, how should that question be decided, is it a legal question, a constitutional question, a medical question, a philosophical question, or a religious question, or what is it?”¹⁶ The majority opinion in *Roe* similarly suggested there are multiple dimensions to the question: “When those trained in the respective disciplines of medicine, philosophy, and theology are unable to arrive at any consensus, the judiciary, at this point in the development of man's knowledge, is not in a position to speculate as to the answer.”¹⁷

16. Transcript of Oral Reargument, *Roe v. Wade*, 1972, at 23.

17. *Roe*, 410 U.S. at 159.

Americans were recently surveyed on how they interpret the question “When does a human’s life begin?”¹⁸ Based on the Court’s discussion of relevant disciplines, a list of five groups of arbiters was developed and presented to participants: biologists, philosophers, religious leaders, Supreme Court Justices, and voters.¹⁹

80% of the 4,107 Americans²⁰ surveyed “selected biologists as the group most qualified to determine when a human’s life begins.”²¹ In response to a follow-up essay question on why they made their selection, 91% of those who selected biologists wrote that they viewed biologists as “objective experts in the study of life.”²²

When biologists were asked who is most qualified to determine when a human’s life begins, a majority selected biologists (64%); when asked to assess Americans’ selection of biologists as the most qualified group, 68% of biologists agreed.²³ Given this agreement between the American public and its chosen experts, it is clear that most view the question as biological in nature.

18. Steven A. Jacobs, *Balancing Abortion Rights and Fetal Rights: A Mixed Methods Mediation of the U.S. Abortion Debate*, KNOWLEDGE@UCHICAGO, 2019, at 206, <https://perma.cc/GZT2-8JDN>.

19. *Id.* at 207–08.

20. *Id.* at 164. “[T]he sample was predominantly pro-choice (62%), liberal (63%), socialist (54%), and Democratic (66%). The sample was well-educated (63% graduated from college) and had more females (57%) than males (43%).”

21. *Id.* at 208.

22. *Id.*

23. *Id.* at 243.

While it can be argued that philosophical or theological beliefs bear on the moral worth of a human's life, they have no relevance on the biological view of the ontogenetic starting point of a human's life—the duration of one's physical existence as a living human organism with genes from a human mother and a human father. To make that determination, and to assess whether a human zygote is a human, biological concepts can be considered.

II. ANALYZING VIEWS ON WHEN A HUMAN'S LIFE BEGINS REVEALS THAT FERTILIZATION IS THE LEADING BIOLOGICAL VIEW.

- A. Some biologists believe that a human's life begins at some point during the human life cycle.**
 - 1. Some support the view that a human's life begins at birth or first breath.**

12% of biologists (343 out of 2794) represented the birth view in response to an essay question on when a human's life begins.²⁴ For this view to gain widespread acceptance, there would need to be a rejection of the human life cycle²⁵ and the genetics-based method²⁶ of

24. *See supra* n.17 at 252.

25. The “human life cycle” is another phrase for the human life span—both describe the series of events that occur throughout the duration of each human's physical existence as a living human organism.

26. With recent technological advancements, biologists are now able to use observable genomic DNA to biologically classify a single-celled organism as a member of a species. *See generally, e.g.,*

classifying organisms. The practical consequences could be that it would make obsolete any biological basis for providing independent care to a fetus, as a patient, or performing fetal surgery²⁷; it would also remove the biological basis of fetal homicide laws²⁸, as a state could not rightfully convict someone for the homicide of a fetus since one would no longer be properly classified as a human.²⁹

2. Some support the view that a human's life begins at fetal viability.

10% of biologists (284 out of 2794) represented the viability view in response to an essay question on when a human's life begins.³⁰ For this theory to take hold, biologists would have to replace the objective genetics-based method of biologically classifying humans with a

Mariko Kouduka, Daisuke Sato, Manabu Komori, Motohiro Kikuchi, Kiyoshi Miyamoto, Akinori Kosaku, Mohammed Naimuddin, Atsushi Matsuoka, & Koichi Nishigaki, *A Solution for Universal Classification of Species Based on Genomic DNA*, INT'L J. PLANT GENOMICS, 2007, <https://perma.cc/X3YT-W4X6>.

27. *Fetal Surgery*, MAYO CLINIC, <https://perma.cc/JS4Z-XTKX>.

28. A listing of the states with fetal homicide laws can be found at: *State Laws on Fetal Homicide and Penalty-Enhancement for Crimes Against Pregnant Women*, NATIONAL CONFERENCE OF STATE LEGISLATURES, May 1, 2018, <https://perma.cc/5M47-4Y3Y>.

29. This could also create a case in which a 9-ounce, 21-week premature infant, who cannot survive outside of the womb without machines, would be biologically classified as a human while a more developed 9-pound, 40-week fetus, who can survive outside of the womb without machines, would not be biologically classified as a human since he or she has not yet been born.

30. *See supra* n.17 at 252.

subjective determination based on the changing state of technology. Consider the practical consequences. A human's life could be biologically determined to begin at a different point for a fetus in Mt. Sinai Hospital in New York than in a medical clinic in a rural area, as the leading physicians of the former might be able to help a 22-week premature infant survive while physicians at the latter might not be able to. Further, one would have to say that a 27-week-old fetus in 1973 was not a human—as 28 weeks was the viability line at the time since that was when technology was capable of supporting life outside of the womb—but that a younger 24-week-old fetus, today, is a human. This standard could even one day be set at fertilization if an artificial womb is developed.³¹ Finally, it is important to note that, today, human embryos survive outside of the womb for years³² before being transferred and implanted. In fact, a human zygote is viable for a short period after fertilization, then loses the ability to survive outside of the womb and regains it sometime soon after the 20th week of his or her life.³³

31. Justice O'Connor has said that "[t]he *Roe* framework . . . is clearly on a collision course with itself," *Akron v. Akron Ctr. for Reprod. Health*, 462 U.S. 416, 458–61 (1983) (O'Connor, J., dissenting).

32. *See infra* n.45.

33. If this is used as an ability-based standard, by which human organisms without this ability are not classified as humans, it could also create a case in which a human who is temporarily on life support would cease to be biologically classified as a human since he or she is not then capable of meaningful life. Similarly, when it is framed as physiological independence, this standard could be used to preclude conjoined twins—who cannot be safely separated—from being classified as humans.

3. Some support the view that a human's life begins at the first heartbeat, brainwave, or moment of pain capability.

10% of biologists (268 out of 2794) represented one of these views in response to an essay question on when a human's life begins.³⁴ For this view to gain prominence, the modern method of genetics-based biological classifications would need to revert to the primitive method of morphology-based biological classifications, whereby organisms are classified based on their physical appearance and abilities rather than their genetics.³⁵ The practical consequences could be that people can capriciously use arbitrary criteria to classify some biological humans as humans and to deliberately exclude others, such that a human fetus could be regarded as no different from a human sperm or any other human body cell that is not an organism developing in the human life cycle.

For instance, given the history of sex-selective abortion in China and India³⁶, such dehumanization could lead to Americans learning the sex of their fetus and either continuing or terminating their pregnancies based on son-preference or daughter-preference; this could then lead to severely unbalanced sex ratios in the U.S. that bring about challenges such as those China currently faces³⁷, which

34. *See supra* n.17 at 252.

35. *See supra* n.25 for a discussion of genetics-based classifications.

36. Ross Douthat, *160 Million and Counting*, NEW YORK TIMES, Jun. 26, 2011, <https://perma.cc/Y9JP-T2MW>.

37. Simon Denyer & Annie Gowen, *Too Many Men*, WASHINGTON POST, Apr. 18, 2018, <https://perma.cc/Q8H5-DJBS>.

have led to its one-child policy giving way to a two-child policy and now a three-child policy to address plummeting birth rates^{38, 39}.

B. Most biologists affirm that a human’s life begins at the start of the human life cycle.

68% of biologists (1898 out of 2794) represented the fertilization view in response to an essay question on when a human’s life begins.⁴⁰ A review of recent discoveries and the development of scientific literature since *Roe* reveals a strong consensus that agrees fertilization—a process which starts with sperm-egg binding and is completed by sperm-egg pronuclear fusion⁴¹—is the starting point of

38. Stephen McDonnell, *China allows three children in major policy shift*, BBC NEWS, May 31, 2021, <https://perma.cc/B8W2-8BKN>.

39. If these ability-based standards are used as requirements for one to be biologically classified as a human, it would mean that those who were born without the capacity to feel pain, those whose hearts temporarily stop, and those who might one day undergo a brain transplant are not biological humans.

40. *See supra* n.17 at p. 252.

41. The only genuine debate about the biological perspective of when a human’s life begins focuses on the precise moment, within the one-day fertilization process, that a zygote is classified as a human; this is so because having a human genome is required to be classified as a human, and biologists discuss whether the two pronuclei from the parents need to fuse to be considered a genome or whether the genome can be said to be present at sperm-egg binding: (1) Under the syngamy view, the pronuclei must fuse and form the genome before a zygote can be said to have a human genome (*see, e.g.*, “Once fertilized, the egg is called a zygote. Fertilization is not complete, however, until the two haploid nuclei (called pronuclei) have come together

the self-directed development⁴² and life cycle of a human organism and thus the life of a human.

and combined their chromosomes into a single diploid nucleus,” Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, & Peter Walter, *Molecular Biology of the Cell*, 4th edition, New York: GARLAND SCIENCE, 2002, Chapter on Fertilization available at: <https://perma.cc/8SPB-3NTK>; “[T]he only point at which a clear demarcation line between what is and what is still not an embryo can be drawn is the moment of nuclear syngamy at the outset of the first cleavage division,” Jan Tesarik & Ermanno Greco, *A Zygote is not an Embryo: Ethical and Legal Considerations*, MOLECULAR ASSISTED REP. AND GENETICS Jul. 2004, 9(1), 13-16; (2) Under the sperm-egg binding view, since the contents of the cell are the same throughout fertilization, the zygote is going through routine developmental processes and the genome is present even if it is not fully formed (see, e.g., “[S]yngamy does not form the mature genome of the zygote; the full genome of the zygote is present at sperm-egg fusion and the definitive, diploid genome is formed at the completion of meiosis II,” Maureen L. Condic, *When Does Human Life Begin? The Scientific Evidence and Terminology Revisited*, 8 U. ST. THOMAS J.L. & PUB. POL’Y 44, 56 (2013), <https://perma.cc/7QYM-39NG>); “The essential problem with the view that life begins at syngamy is the notion that a cell can change from one type (a “pre-zygote” that exists following sperm-egg fusion but prior to syngamy) into another type (the zygote that exists after syngamy) without any actual change in the material state or behavioral trajectory of the cell. This argument is simply not consistent with the scientific method,” Maureen L. Condic, *When Does Human Life Begin? A Scientific Perspective*, THE WESTCHESTER INSTITUTE, Oct. 2008, Vol. 1, No. 1, <https://perma.cc/HD4C-YZL6>.

42. Marta N. Shahbazi, Agnieszka Jedrusik, Sanna Vuoristo, Gaelle Recher, Anna Hupalowska, Virginia Bolton, Norah M. E. Fogarty, Alison Campbell, Liani G. Devito, Dusko Ilic, Yakoub Khalaf, Kathy K. Niakan, Simon Fishel & Magdalena Zernicka-Goetz, *Self-organization of the human embryo in the absence of maternal tissues*. NAT CELL BIOL, 2016, 18, 700-708, <https://perma.cc/2E3U-MSTT>.

As will be covered in this brief, this is the leading biological view on when a human's life begins. This is made clear by a review of the scientific literature, legislative testimony from scientists, an international study of biologists' views on when a human's life begins, and statements by abortion doctors and advocates. As it is the leading view, nothing would have to change or come to be seen differently in order for the fertilization view to be recognized; a human zygote is, from a biological perspective, a human organism⁴³ classified as a member of the *Homo sapiens* in the same way⁴⁴ as an infant, a teenager,⁴⁵ or an adult; a human zygote is simply a human

43. "[B]y common understanding and scientific terminology, a fetus is a living organism while within the womb, whether or not it is viable outside the womb. We do not understand this point to be contested by the parties." *Gonzales v. Carhart*, 550 U.S. 124, 147 (2007).

44. All cellular life with human DNA can be said to be human (*adjective*). However, since the human life cycle and the human life span both begin at fertilization, only an organism with human DNA developing in one of the stages of the human life cycle can be said to be a human (*noun*) who is biologically classified as a member of the *Homo sapiens* species.

45. Dr. Alfred Bongiovanni, University of Pennsylvania School of Medicine, concluded in his testimony for the 1981 U.S. Senate hearing on the Human Life Bill that: "I am no more prepared to say that these early stages [of development] represent an incomplete human being than I would be to say that the child prior to the dramatic effects of puberty... is not a human being. This is human life at every stage" *The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the Comm. on the Judiciary*, 97th Cong. 45 (1981).

being in the first stage of a human's development, whether fertilization be deemed a process or an event.^{46, 47}

C. The fertilization view on when a human's life begins is the leading biological view.

Rejecting the fertilization view, or accepting a different view⁴⁸, would require redefining or reconceptualizing

46. Today, a pronuclear one-cell embryo—an embryo that underwent sperm-egg binding but did not complete syngamy, which is the observed developmental stage in which the male and female pronuclei move together in the one-cell embryo—can be transferred to the womb of a non-biological mother almost twenty years after the sperm-egg binding (Donna Dowling-Lacey, Jacob F. Mayer, Estella Jones, Silvina Bocca, Laurel Stadtmauer, & Sergio Oehninger, *Live birth from a frozen-thawed pronuclear stage embryo almost 20 years after its cryopreservation*, FERTILITY AND STERILITY, Mar. 2011, Vol. 95, Iss. 3, <https://perma.cc/6DMD-JL6X>). This is clear and convincing evidence that the developmental process of a new human being is separate from either genetic parent, and this can then be used to suggest that a human's life begins at the moment of sperm-egg binding and not a later point at which some would consider the fertilization process complete. After all, a human's life is a developmental process. Whether a human is a zygote, morula, blastocyst, fetus, infant, child, teenager, or an adult, the same biological human is present in each developmental stage.

47. From a practical perspective, some fear that this view could lead to women being investigated or prosecuted for miscarrying a pregnancy. However, it is important to note that abortion was treated as homicide and child-murder for over a century, throughout the Nation, and yet women were not prosecuted for abortions. *See, e.g.,* Clarke Forsythe, *Why the States Did Not Prosecute Women for Abortion Before Roe v. Wade*, AMERICANS UNITED FOR LIFE, Apr. 23, 2010, <https://perma.cc/348R-DEC4>.

48. While some might quibble and argue that a human's life precisely begins when the sperm and egg first bind or when the

what it means to be a biological human, rejecting the mammalian life cycle paradigm, or regressing the modern system of genetics-based biological classifications back to the outmoded system of morphology-based classifications; it would require one to hold the view that the start of the life cycle is not the start of one's life; it would require one to conclude that a human zygote is not biologically classified as a member of the *Homo sapiens* species and is not a biological human, which is defined as an organism with a human genome who is growing and developing in the human life cycle.

III. THE FERTILIZATION VIEW IS THE LEADING BIOLOGICAL VIEW ON WHEN A HUMAN'S LIFE BEGINS AND HAS BEEN SINCE THE 19TH CENTURY.

A. The discovery of fertilization took place over a century ago.

Over two-thousand years ago, Aristotle correctly observed that new individuals are formed through a fusion

genome forms (*see, e.g., supra* nn.41,45), these events occur within hours of each other during the one-day process of fertilization; similarly, while some might propound cleavage, gastrulation, organogenesis, or some other moment or process in the 6-12 days following fertilization and preceding implantation, all seem to be distinctions without practical differences for the present case since these points all occur many weeks before pregnancy is discovered and many months before a fetus is viable. For a discussion of chimerism and twinning, *see*: Maureen L. Condit, *Untangling Twinning: What Science Tells Us about the Nature of Human Embryos*, UNIVERSITY OF NOTRE DAME PRESS, Indiana, USA, 2020.

of material from a male and a female.⁴⁹ However, it wasn't until 1784 that a scientist established that a male's sperm and a female's ovum interact to form a zygote.⁵⁰ In 1827, Karl Ernst von Baer was the first scientist to record an observation of a mammalian egg; he then proposed the four laws of animal development based on the view that most animals commonly start their lives as embryos and then become morphologically distinct organisms based on the uniqueness of their genetic codes.⁵¹

The early discoveries on the fertilization process, by which spermatozoa enter eggs, took place between 1843 until 1880: "From these observations, in the main, the realization came that fertilization involved the union of egg and sperm nuclei and represented therefore the cytological mechanism underlying biparental inheritance"⁵², which is

49. Jane Maienschein, *The first century of cell theory: From structural units to complex living systems*, 2017, In: Friedrich Stadler (eds.), *Integrated History and Philosophy of Science*, p. 43, Vienna Circle Institute Yearbook. Institute Vienna Circle, University of Vienna, Vienna Circle Society, Society for the Advancement of Scientific World Conceptions, vol 20. SPRINGER, Cham, <https://perma.cc/V275-TFAZ>.

50. Tim R. Birkhead & Robert Montgomerie, *Three centuries of sperm research*, 2009, pp 1-42 in: Tim R. Birkhead, Dave J. Hosken, & Scott S. Pitnick, *Sperm Biology: An Evolutionary Perspective*, ELSEVIER/ACADEMIC PRESS, Amsterdam, <https://perma.cc/TR8T-7HGC>.

51. M. Elizabeth Barnes, *Karl Ernst von Baer's Laws of Embryology*, EMBRYO PROJECT ENCYC. (Apr. 15, 2014, 4:15 PM), <https://perma.cc/G772-J5FB>.

52. C.R. Austin, *The mammalian egg*, 1961, BLACKWELL SCIENTIFIC PUBLICATIONS OXFORD, p. 4. <https://perma.cc/EH8A-XURG>.

sexual reproduction. Most notably, in 1876, Oscar Hertwig has been said to have first established the fertilization view when he described the fusion of the nuclei of a male's spermatozoa and a female's ovum.

B. Peer-reviewed journals present the fertilization view on when a human's life begins as a fact that requires no explanation or citation.

A recent review⁵³ of scientific journals in the biological and life sciences literature reported that peer-reviewed articles contain statements that definitively represent the fertilization view; they continue to do so, today, with the most recent being published in May of 2021.⁵⁴ Since these statements are often offered without explanation or citation, researchers, referees, and editors likely accept the fertilization view on when a human's life begins as such a well-known and well-accepted biological view⁵⁵

53. Maureen L. Condic, *The Origin of Human Life at Fertilization: Quotes Compiled*, BIOETHICS DEFENSE FUND, Nov. 2017, <https://perma.cc/H9ED-9LCC>; see also: Samuel B. Condic & Maureen L. Condic, *Human Embryos, Human Beings: A Scientific and Philosophical Approach*, CATHOLIC UNIVERSITY OF AMERICA PRESS, 2018.

54. "Fertilization is a key process in biology to the extent that a new individual will be born from the fusion of two cells," María Jiménez-Movilla, Julieta G. Hamze, & Raquel Romar, *Oolemma Receptors in Mammalian Molecular Fertilization: Function and New Methods of Study*, FRONT CELL DEV BIOL, 2021 May 19;9:662032, <https://perma.cc/4D7X-D9J5>.

55. For a list of journal articles, medical textbooks, and scientists' legislative testimonies affirming this scientific view, see: *Scientific Sources on When a Human's Life Begins*, WHENDOESLIFEBEGIN.ORG.

that they do not know of a viable alternative view in the scientific literature.

First, consider journals that have published articles with statements that specifically reference the fertilization view as marking the beginning of a human's life: *Reproduction*: "Human life begins with sperm and oocyte fusion,"⁵⁶ *Zygote*: "Such activity is particularly important at the beginning of human life, i.e. at fertilization, immediately after and at the very onset of embryonic development,"⁵⁷ *Australian and New Zealand Journal of Obstetrics and Gynaecology*: "The time of our conception is when we are most vulnerable to survival and growing as a healthy human being,"⁵⁸ *California Medicine*: "[T]he scientific fact, which everyone really knows, that human life begins at conception,"⁵⁹ and *Trends in Cell Biology*: "Most readers of this review originated from a sperm-egg fusion event."⁶⁰

56. Bikem Soygur & Leyla Sati, *The role of syncytins in human reproduction and reproductive organ cancers*, *REPRODUCTION*, 2016, 152(5):R167-78, <https://perma.cc/A7RD-68TF>.

57. Yves Ménézo, Brian Dale, & Marc Cohen, *DNA damage and repair in human oocytes and embryos: a review*, *ZYGOTE*, 2010 Nov;18(4):357-65, <https://perma.cc/ZQ6P-QCP2>.

58. Robert J. Norman, 2015 *RANZCOG Arthur Wilson Memorial Oration 'From little things, big things grow: The importance of periconception medicine'*, *AUST N Z J OBSTET GYNAECOL.*, 2015, 55(6):535-40, <https://perma.cc/4WMH-9PH5>.

59. *A New Ethic for Medicine and Society*, Editorial, *CALIFORNIA MEDICINE* 113, Sep. 1970, p. 67-68, <https://perma.cc/D232-XM4G>.

60. Meital Oren-Suissa & Benjamin Podbilewicz, *Cell fusion during development*, *TRENDS CELL BIOL.*, 2007, 17(11):537-46, <https://perma.cc/KK7X-96VE>.

Other articles contain statements that do not make specific reference to humans, but instead make general reference to the view that fertilization marks the point at which a zygote can be classified as a new individual or as a new life: *Nature*: “Fertilization is a fundamental process in sexual reproduction, creating a new individual through the combination of male and female gametes,”⁶¹ *Cell*: “Recognition between sperm and the egg surface marks the beginning of life in all sexually reproducing organisms,”⁶² *Physiological Reviews*: “A proper dialogue between spermatozoa and the egg is essential for conception of a new individual in sexually reproducing animals,”⁶³ *Journal of Assisted Reproduction and Genetics*: “[A] new individual is derived from the fusion of a single sperm and egg,”⁶⁴ *Nature Reviews Molecular Cell Biology*: “During fertilization of an egg with a sperm,

61. Umeharu Ohto, Hanako Ishida, Elena Krayukhina, Susumu Uchiyama, Naokazu Inoue, & Toshiyuki Shimizu, *Structure of IZUMO1-JUNO reveals sperm-oocyte recognition during mammalian fertilization*, *NATURE*, 2016 Jun;534(7608):566-9, <https://perma.cc/3SDM-DJLY>.

62. Isha Raj, Hamed Sadat Al Hosseini, Elisa Dioguardi, Kaoru Nishimura, Ling Han, Alessandra Villa, Daniele de Sanctis, & Luca Jovine, *Structural Basis of Egg Coat-Sperm Recognition at Fertilization*, *CELL*, 2017, 169(7):1315-1326, <https://perma.cc/5LUK-PZUA>.

63. Alberto Darszon, Takuya Nishigaki, Carmen Beltran, & Claudia L. Treviño, *Calcium channels in the development, maturation, and function of spermatozoa*, *PHYSIOL REV*, 2011, 91(4):1305-55, <https://perma.cc/XN6N-9NGL>.

64. Martin Wilding, Gianfranco Coppola, Francesco De Icco, Laura Arenare, Loredana Di Matteo, & Brian Dale, *Maternal non-Mendelian inheritance of a reduced lifespan? A hypothesis*, *J ASSIST REPROD GENET*, 2014, 31(6):637-43, <https://perma.cc/5NW4-XD74>.

the haploid genomes of each parent are unified to form the diploid genome of a new and unique individual,”⁶⁵ and *Cell and Tissue Research*: “[F]ertilization is the process by which male and female haploid gametes (sperm and egg) unite to produce a genetically distinct individual.”⁶⁶

Similarly, some articles include statements that represent the fertilization view in terms of how it connects one generation to the next: *Science*: “Fertilization is the sum of the cellular mechanisms that pass the genome from one generation to the next and initiate development of a new organism,”⁶⁷ *Current Opinion in Genetics & Development*: “In mammals, a new generation begins when an oocyte is fertilized by a sperm to form a zygote,”⁶⁸ and *Methods in Molecular Biology*: “As representatives of the 60 trillion cells that make a human body, a sperm and an egg meet, recognize each other, and fuse to create a new generation.”⁶⁹

65. Dean Clift & Melina Schuh, *Restarting life: Fertilization and the transition from meiosis to mitosis*, NAT REV MOL CELL BIOL., 2013, 14(9): 549-562, <https://perma.cc/7MWS-XD64>.

66. Janetti Signorelli, Emilce S. Diaz, & Patricio Morales, *Kinases, phosphatases and proteases during sperm capacitation*, CELL TISSUE RES, 2012, 349(3):765, <https://perma.cc/R5YD-YS2N>.

67. Paul Primakoff & Diana G. Myles, *Penetration, adhesion, and fusion in mammalian sperm-egg interaction*, SCIENCE, 2002, 296(5576):2183-5, <https://perma.cc/X5SF-GQ2C>.

68. Cheun Yan Leung & Magdalena Zernicka-Goetz, *Mapping the journey from totipotency to lineage specification in the mouse embryo*, CURR OPIN GENET DEV, 2015, 34:71-6, <https://perma.cc/Z3LP-V4EH>.

69. Naokazu Inoue & Masaru Okabe, *Sperm-egg fusion assay in mammals*, METHODS MOL BIOL, 2008, 475:335-45, <https://perma.cc/8XH4-KCHB>.

While these statements vary in their framing of the fertilization view on when a human's life begins—as some specifically state that fertilization marks the beginning of a human's life while others generally state that fertilization marks the beginning of a new life, individual, or generation—they all fundamentally represent and lend credence to fertilization as the leading biological view on when a human's life begins.⁷⁰

C. Scientists' legislative testimony affirms the consensus on the fertilization view.

During hearings conducted by the Senate Judiciary Subcommittee on Senate Bill 158, the "Human Life Bill," numerous scientific experts testified on the question of when a human's life begins. After hours of testimony by scientists and medical doctors, the Official Senate Report reached the following conclusion: "Physicians, biologists, and other scientists agree that conception marks the beginning of the life of a human being—of a being that is alive and is a member of the human species. There is overwhelming agreement on this point in countless medical, biological, and scientific writings."⁷¹

70. This view is not merely shared by academics in the literature; it is also the view that college and medical students are taught in their biological and medical textbooks. *See, e.g., Harper Collins Illustrated Medical Dictionary*, New York: HARPER PERENNIAL, 1993, p. 146.; Keith L. Moore., *The Developing Human: Clinically Oriented Embryology*, 8th ed., Philadelphia: SAUNDERS, 2007. p. 2.

71. STAFF OF THE SUBCOMM. ON SEPARATION OF POWERS OF THE COMM. ON THE JUDICIARY, 97TH CONG., REP. ON THE HUMAN LIFE BILL 7 (1981).

French geneticist Dr. Jerome Lejeune testified that “[l]ife has a very, very long history, but each individual has a very neat beginning—the moment of its conception” because “[t]o accept the fact that after fertilization has taken place a new human has come into being is no longer a matter of taste or of opinion . . . it is plain experimental evidence.”⁷² Dr. Hymie Gordon, professor of medical genetics and physician at the Mayo Clinic, testified that “now we can say, unequivocally, that the question of when life begins—is no longer a question for theological or philosophical dispute. It is an established scientific fact. Theologians and philosophers may go on to debate the meaning of life or the purpose of life, but it is an established fact that all life, including human life, begins at the moment of conception.”⁷³ Experts also testified that there are no alternative theories on when a human’s life begins in the scientific literature.

Dr. Gordon claimed: “I have never encountered in my reading of the scientific literature—long before I became concerned with abortion, euthanasia, and so on—anyone who has argued that life did not begin at the moment of conception, or that it was not a human conception if it resulted from the fertilization of a human egg by a human sperm. As far as I know, there has been no argument about these matters.”⁷⁴ This lack of any alternative biological views in the literature was also attested to by Dr. Micheline Matthew-Roth, who worked as a principal

72. *The Human Life Bill: Hearing on S. 158 Before the Subcomm. on Separation of Powers of the S. Comm. on the Judiciary*, 97th Cong. 8–10 (1981) (statement of Dr. Jerome Lejeune, Professor of Fundamental Genetics, Medical College of Paris, France).

73. *Id.* at 13–17.

74. *Id.* at 21.

research associate in the Department of Medicine at the Harvard Medical School.⁷⁵

In 2005, the legislature in South Dakota also took up this question.⁷⁶ Their report concluded that “[t]here can no longer be any doubt that each human being is totally unique from the very beginning of his or her life at fertilization.”⁷⁷

D. 96% of 5,577 biologists from 1,058 academic institutions affirmed that a human’s life begins at fertilization.

1. The survey questions solely focused on the biological perspective on when a human’s life begins.

Since the fertilization view on when a human’s life begins has been shown to be the leading view among Americans⁷⁸, public health students⁷⁹, and *in vitro*

75. See *supra* n.72 at 16; Some have noted there was not “a single expert witness who would specifically testify that life begins at any point other than conception or implantation. Only one witness said no one can tell when life begins,” Landrum Shettles & David Rorvik, *Rites of Life: The Scientific Evidence of Life Before Birth*, Grand Rapids, MI: ZONDERVAN PUBLISHING HOUSE, 1983, 113.

76. H.B. 1233, 2005 Leg. Assemb., 80th Sess. (S.D. 2005).

77. *S.D. Abortion Task Force, Report of The South Dakota Task Force to Study Abortion*, 25 (2005).

78. *National Tracking Poll #190555 by Morning Consult*, May 28-30, 2019, <https://perma.cc/Z2V4-XUP9>; *Americans’ Opinions on Abortion*, KNIGHTS OF COLUMBUS MARIST POLL, Jan. 2018, <https://perma.cc/2PCU-UYSP>.

79. Andie L. Knutson, *When does a human life begin?* *Viewpoints of public health professionals*, Vol. 57, No. 12, AMERICAN

professionals⁸⁰—and since it has been stated without explanation or citation in articles published in peer-reviewed journals such as *Science*⁸¹, *Nature*⁸², and *Cell*⁸³—a survey was designed to assess whether biologists affirm the fertilization view.

Participants⁸⁴ were presented five statements (Q1-Q5) that represented various semantic framings of the

JOURNAL OF PUBLIC HEALTH, Dec. 1967, <https://perma.cc/XK5J-REDX>.

80. T.A. Elliott, J.A. Friedman, E.T. Siegel, H.I. Kort, & Z.P. Nagy, 'When does life begin?' *Results of an online survey*, FERTILITY AND STERILITY, Vol. 90, S65 - S66, <https://perma.cc/XR5X-67XF>.

81. *See supra* n.72.

82. *See supra* n.66; *see also*: Yuki Okada, Kazuo Yamagata, Kwonho Hong, Teruhiko Wakayama, & Yi Zhang, *A role for the elongator complex in zygotic paternal genome demethylation*, NATURE, 2010, 463(7280):554-8, <https://perma.cc/38A2-SRVS>; Naokazu Inoue, Masahito Ikawa, Ayako Isotani, & Masaru Okabe, *The immunoglobulin superfamily protein Izumo is required for sperm to fuse with eggs*, NATURE, 2005, 434(7030):234-8; Enrica Bianchi, Brendan Doe, David Goulding, & Gavin J. Wright, *Juno is the egg Izumo receptor and is essential for mammalian fertilization*, NATURE, 2014, 508(7497):483-7, <https://perma.cc/ZMP3-KT8E>.

83. *See supra* n.67.

84. Participation in the survey was sought from members of biology departments around the world. Of the participants who provided analyzable data, 5,577 biologists from 1,058 institutions provided analyzable data on operative questions. Most of the biologists in the sample identified as male (63%), non-religious (63%) and the majority held a Ph.D. (95%). Ideologically, most of the sample identified as liberal (89%) and pro-choice (85%). The sample was comprised of biologists from 86 countries. *See supra* n.17 at 239.

fertilization view. Participants were asked to affirm or reject the statements, and they were then presented an open-ended essay question on the biological perspective on when a human's life begins (Q6)⁸⁵:

Question 1: The end product of mammalian fertilization is a fertilized egg ('zygote'), a new mammalian organism in the first stage of its species' life cycle with its species' genome.

Question 2: The development of a mammal begins with fertilization, a process by which the spermatozoon from the male and the oocyte from the female unite to give rise to a new organism, the zygote.

Question 3: A mammal's life begins at fertilization, the process during which a male gamete unites with a female gamete to form a single cell called a zygote.

Question 4: In developmental biology, fertilization marks the beginning of a human's life since that process produces an organism with a human genome that has begun to develop in the first stage of the human life cycle.

Question 5: From a biological perspective, a zygote that has a human genome is a human because it is a human organism developing in the earliest stage of the human life cycle.

85. See *supra* n.17. at 240-241.

Question 6: From a biological perspective, how would you answer the question “When does a human’s life begin?”

While some focus on mammals and others focus on humans; while some are in the form of a declaration and others are in the form of an argument; all fundamentally represent the view that fertilization marks the beginning of a human’s life.

2. The results showed that biologists affirm the fertilization view.

The statement in Q1 was affirmed by 91% of participants (4555 out of 4993). The statement in Q2 was affirmed by 88% of participants (3984 out of 4510). The statement in Q3 was affirmed by 77% of participants (3153 out of 4078). The statement in Q4 was affirmed by 75% of participants (2500 out of 3334). The statement in Q5 was affirmed by 69% of participants (2744 out of 3980).⁸⁶

Of those who assessed at least one of the five statements, 96% of participants affirmed at least one (5337 out of 5577) and 4% did not (240 out of 5577). Similarly, of those who assessed multiple statements, 96% affirmed at least one (4463 out of 4650) while 4% affirmed none (187 of 4650), and 85% affirmed at least half of the statements they assessed (3936 out of 4650).⁸⁷

Consistent with their affirmation rates of the fertilization view in Q1-Q5, 68% of biologists represented the fertilization view (1898 out of 2794) in response to the

86. *See supra* n.18 at 244-246.

87. *Id.* at 249-250.

open-ended essay question on when a human's life begins (Q6). 10% represented some point between fertilization and the moment a fetus is viable (268 out of 2794), 10% represented the viability view (284 out of 2794), and 12% represented the view that a human's life begins at birth (343 out of 2794).⁸⁸

The strictest measure of biologists' views assessed the responses of participants who answered each question consistently—those who either affirmed each statement (Q1-Q5) and represented the fertilization view in response to the essay question (Q6) or rejected each statement and represented some later point. There was a greater number of participants who consistently affirmed the fertilization view (97%; 1011 out of 1044) than the number of participants who consistently did not affirm the fertilization view (3%; 33 out of 1044).⁸⁹

E. Abortion advocates and abortion doctors affirm that a human's life begins at fertilization.

Ethicist Peter Singer supports abortion rights and has promoted the fertilization view: "Whether a being is a member of a given species is something that can be determined scientifically, by an examination of the nature of the chromosomes in the cells of living organisms," because "there is no doubt that from the first moments of its existence an embryo conceived from human sperm and eggs is a human being."⁹⁰

88. *Id.* at 252.

89. *Id.* at 256.

90. Peter Singer, *Practical Ethics*, 2nd ed., CAMBRIDGE UNIVERSITY PRESS, 85–86, 1993.

Margaret Sanger, the founder of Planned Parenthood, once affirmed that: “[N]o new life begins unless there is conception.”⁹¹ Dr. Alan Guttmacher, an OB-GYN and former president of Planned Parenthood, wrote that:

We of today know that man . . . starts life as an embryo within the body of the female; and that the embryo is formed from the fusion of two single cells, the *ovum* and the *sperm*. This all seems so simple and evident to us that it is difficult to picture a time when it was not part of the common knowledge.⁹²

While there might be ideological, strategic, or psychological motivations to dispute the view that a human’s life begins at fertilization, proponents of abortion rights have conceded that there is no credible opposition to the scientific observation that fertilization marks the moment at, and process by which, a human begins his or her physical existence as an organism with a human genome developing in the human life cycle.

CONCLUSION

This brief does not represent the fertilization view as an incontrovertible fact of science, as the nature of science requires that any observation, view, or determination be subject to falsification. However, following the scientific method, and taking notice of scientific progress, also

91. Margaret Sanger, *The Pope’s Position on Birth Control*, 1932, <https://www.thenation.com/article/archive/popes-position-birth-control>.

92. Alan Guttmacher, *Life in the Making: the Story of Human Procreation*, VIKING PRESS, 1933, p. 3.

requires accepting fertilization as the leading biological view on when a human's life begins, today, and being open to the possibility of a paradigmatic shift, or scientific revolution, that causes the fertilization view to be supplanted at some point in the future.

The fertilization view is as subject to change due to new information as is the number of hydrogen atoms in a molecule of water: the number might not be two if scientists abandon the modern understanding of hydrogen, oxygen, atoms, molecules, and water—just as a human's life might no longer be deemed to begin at fertilization if scientists abandon the modern understanding of fertilization, the human life cycle, and the genetics-based method of biologically classifying organisms.

For all of the foregoing reasons, as true 'friends of the Court', the *amici curiae* do not ask anything of the Court, but instead respectfully submit this brief in case the Court uses *Dobbs* as an opportunity to analyze and discuss the biological perspective of when a human's life begins. *Amici* hope that the brief helps the Court in issuing a holding that is consistent with the best science available in 2021.

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7a

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Embryo Ethics

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Source: *Daedalus*, Vol. 137, No. 1, On Life (Winter, 2008), pp. 23-35

Published by: The MIT Press on behalf of American Academy of Arts & Sciences

Stable URL: <https://www.jstor.org/stable/20028162>

Accessed: 27-03-2024 19:56 +00:00

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Embryo ethics

If we were to contemplate killing mentally handicapped infants to obtain transplantable organs, no one would characterize the controversy that would erupt as a debate about organ transplantation. The dispute would be about the ethics of killing handicapped children to harvest their vital organs. We could not resolve the issue by considering how many gravely ill people we could save by extracting a heart, two kidneys, a liver, etc., from each mentally handicapped child. Instead, we would have to answer this question: is it right to relegate a certain class of human beings – the handicapped – to the status of objects that can be killed and dissected to benefit others?

By the same token, strictly speaking ours is not a debate about stem cell research. No one would object to the use of pluripotent stem cells in biomedical

research or therapy if they could be obtained from non-embryonic sources, or if they could be acquired by using embryos lost in miscarriages.¹ The point of

¹ It appears that we will soon be able to obtain embryonic stem cells, or their equivalent, by means that do not require the destruction of human embryos. Important successes in producing pluripotent stem cell lines by reprogramming (or 'de-differentiating') human somatic cells have been reported in highly publicized papers by James A. Thomson's research group, "Induced Pluripotent Stem Cell Lines Derived from Human Somatic Cells," *Scienceexpress*, www.sciencexpress.org/22 November 2007/ 10.1126science.1151526, and Shinya Yamanaka's research group, "Induction of Pluripotent Stem Cells from Adult Fibroblasts by Defined Factors," *Cell* (published online, November 20, 2007). Citing these successes, Ian Wilmut of Edinburgh University, who is credited with producing Dolly the sheep by cloning, has decided not to pursue a license granted by British authorities to attempt to produce cloned human embryos for use in biomedical research. According to Wilmut, embryo-destructive means of producing the desired stem cells will be unnecessary: "The odds are that by the time we make nuclear transfer [cloning] work in humans, direct reprogramming will work too. I am anticipating that before too long we will be able to use the Yamanaka approach to achieve the same, without making human embryos." Wilmut is quoted in Roger Highfield, "Dolly Creator Ian Wilmut Shuns Cloning," *Telegraph.co.uk*, November 16, 2007. For a survey of possible non-embryo-destructive methods of obtain-

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controversy is the ethics of deliberately destroying human embryos to produce stem cells. The threshold question is whether it is right to kill members of a certain class of humans – those in the embryonic stage of development – to benefit others.

Supporters of embryo-destructive research insist, however, that human embryos are not human beings – or if they are human beings, that they are not yet ‘persons.’ It is therefore morally acceptable, they say, to ‘disaggregate’ them for the sake of research aimed at finding cures or treatments for juvenile diabetes and other horrible afflictions.

At the heart of the debate over embryo-destructive research, then, are two questions: is a human embryo a human being, and, if so, what is owed to an embryonic human as a matter of justice?

I will say nothing about religion or theology. This is not a tactical decision; rather, it reflects my view about how to think about the dispute over killing human embryos. It is sometimes said that opposition to embryo-destructive research is based on a controversial theology of ‘ensoulment.’ But one need not engage questions of whether human beings have spiritual souls in considering whether human embryos are human beings. Nor must one appeal to any theology of ensoulment to show that there is a rational basis for treating all human beings – including those at the embryonic stage – as creatures possessing intrinsic worth and dignity.²

ing pluripotent stem cells, see The President’s Council on Bioethics, “White Paper: Alternative Sources of Pluripotent Stem Cells,” May 2005, available at www.bioethics.gov.

2 It is worth pointing out that contrary to a common misunderstanding, the Catholic

We should resolve our national debate over embryo-destructive research on the basis of the best scientific evidence as to when the life of a new human being begins, and the most careful philosophical reasoning as to what is owed to a human being at any stage of development. Religious conviction can motivate us to stand up and speak out in defense of human life and dignity. And religious people should never hesitate to do that. But we need not rely on religious authority to tell us whether a human embryo is a new living member of the species *Homo sapiens* or whether all human beings – irrespective of not only race, ethnicity, and sex but also age, size, stage of development, and condition of dependency – possess full moral worth and dignity. The application of philosophical princi-

Church does not try to draw *scientific* inferences about the humanity or distinctness of the human embryo from *theological* propositions about ensoulment. It works the other way around. The theological conclusion that an embryo is ‘ensouled’ would have to be drawn on the basis of (among other things) scientific findings about the self-integration, distinctness, unity, determinateness, etc., of the developing embryo. Contrary to another misunderstanding, the Catholic Church has not declared a teaching on the ensoulment of the early embryo. Still, the Church affirms the rational necessity of recognizing and respecting the dignity of the human being at all developmental stages, including the embryonic stage, and in all conditions. For a clear statement of Catholic teaching and its ground, see the document *Donum Vitae*, issued by the Congregation for the Doctrine of the Faith on February 22, 1987, http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html: “[T]he conclusions of science regarding the human embryo provide a valuable indication for discerning by the use of reason a personal presence at the moment of this first appearance of a human life: how could a human individual not be a human person?” (Section 5, I, 1, para. 3)

ples in light of facts established by modern embryological science is more than sufficient for that task.³

The adult human being that is now you or me is the same being who, at an earlier stage, was an adolescent and, before that, a child, an infant, a fetus, and an embryo.⁴ Even in the embryonic stage, you and I were undeniably whole living members of the species *Homo sapiens*. We were then, as we are now, distinct and complete – though, in the beginning, developmentally immature – human organisms. We were not mere parts of other organisms.

A human embryo is not something different *in kind* from a human being, like a rock, or a potato, or a rhinoceros. A human embryo is a human individual in the earliest stage of his or her natural

³ My point here is not to make light of, much less to denigrate, the important witness of many religious traditions to the profound, inherent, and equal dignity of all members of the human family. Religious conviction can, and many traditions do, reinforce ethical propositions that can be rationally affirmed even apart from religious authority.

⁴ Thus, “recollecting (at her birth) his appreciation of Louise Brown [the first IVF baby] as one or two cells in his petri dish, [Robert] Edwards [said]: ‘She was beautiful then and she is beautiful now.’” John Finnis, “Some Fundamental Evils in Generating Human Embryos by Cloning,” in Cosimo Marco Mazzoni, ed., *Etica della Ricerca Biologia* (Florence: Leo Olschki, 2000), 116. Edwards and his coauthor, Patrick Steptoe, accurately described the embryo as “a microscopic human being – one in its very earliest stages of development.” Robert Edwards and Patrick Steptoe, *A Matter of Life* (London: Hutchinson’s, 1981), 83. The human being in the embryonic stage of development is “passing through a critical period in its life of great exploration: it becomes magnificently organised, switching on its own biochemistry, increasing in size, and preparing itself quickly for implantation in the womb.” *Ibid.*, 97.

development.⁵ Unless severely damaged or deprived of a suitable environment, an embryonic human being will, by directing his or her own integral organic functioning, develop himself or herself to each new stage of developmental maturity along the gapless continuum of a human life. The embryonic, fetal, infant, child, and adolescent stages are just that: *stages* in the development of a determinate and enduring entity – a human being – who comes into existence as a single-celled organism (zygote) and grows, if all goes well, into adulthood many years later.⁶

⁵ Keith Moore and T. V. N. Persaud, in *The Developing Human: Clinically Oriented Embryology*, perhaps the most widely used embryology text, make the following unambiguous statement about the beginning of a new and distinct human individual: “Human development begins at fertilization when a male gamete or sperm (spermatozoon) unites with a female gamete or oocyte (ovum) to form a single cell – a zygote. This highly specialized, totipotent cell marked the beginning of each of us as a unique individual.” Keith Moore and T. V. N. Persaud, *The Developing Human: Clinically Oriented Embryology* (Philadelphia: Saunders/Elsevier, 2008), 15 (emphasis added).

⁶ A human embryo (like a human being in the fetal, infant, child, or adolescent stage) is not a ‘prehuman’ organism with the mere potential to become a human being. No human embryology textbook known to me presents, accepts, or remotely contemplates such a view. Instead, leading embryology textbooks assert that a human embryo *is* – already and not merely potentially – a new individual member of the species *Homo sapiens*. His or her potential, assuming a sufficient measure of good health and a suitable environment, is to develop by an internally directed process of growth through the further stages of maturity on the continuum that is his or her life. Nor is there any such thing as a ‘pre-embryo.’ That concept was invented, as Lee Silver pointed out in his book *Remaking Eden* (New York: Avon Books, 1997), 39, for political, and not scientific, reasons.

By contrast, the gametes whose union brings into existence the embryo are not whole or distinct organisms. Each is functionally (and genetically) identifiable as *part* of the male or female (potential) parent. Moreover, each gamete has only half the genetic material needed to guide the development of an immature human being toward full maturity. They are destined either to combine with an oocyte or spermatozoon and generate a new and distinct organism, or simply to die. When fertilization occurs, they do not survive; rather, their genetic material enters into the composition of a new organism.

But none of this is true of the human embryo, from the zygote and blastula stages onward. The combining of the chromosomes of the spermatozoon and of the oocyte generates what human embryology identifies as a new, distinct, and enduring organism. Whether produced by fertilization, Somatic Cell Nuclear Transfer (SCNT), or some other cloning technique, the human embryo possesses all of the genetic material and other qualities needed to inform and organize its growth.⁷ The direction of its growth is not extrinsically determined, but is in accord with the information

within it.⁸ Nor does it merely possess organizational information for maturation; it actively uses that information in an internally directed process of development. The human embryo, then, is a whole and distinct human organism – an embryonic human being.

If the embryo is not a complete organism, what can it be? Unlike the spermatozoa and the oocytes, it is not merely a part of a larger organism, namely, the mother or the father. Nor is it a disordered growth or gamete tumor, such as a complete hydatidiform mole or teratoma.

Someone might say that the early embryo is an intermediate form, something which regularly emerges into a whole human organism but is not one yet. But what could cause the emergence of the whole human organism, and cause it with regularity? As I have already observed, from the zygote stage forward the development of this organism is *directed from within*, or by the organism itself. So, after the embryo comes into being, no event or series of events occur that we could construe as the production of a new organism – that is, nothing extrinsic to the developing organism itself acts on it to produce a new character or a new direction in development.⁹

A supporter of embryo-destructive research might concede that a human

7 A cloned human embryo is not a subhuman organism. Cloning produces a human embryo by combining what is normally fused and activated in fertilization, that is, a properly epigenetically disposed human genome and the oocyte cytoplasm. Cloning, like fertilization, generates a new and complete, though immature, human organism. Cloned embryos therefore ought to be treated as having the same moral status, whatever that might be, as other human embryos. I respond to the arguments of my colleague on the President's Council on Bioethics, Paul McHugh, who claims that cloned embryos are not human beings but "clonotes," in the latter half of Robert P. George and Patrick Lee, "Acorns and Embryos," *New Atlantis* 7 (2005): 90–100.

8 The first one or two divisions, in the first thirty-six hours, occur largely under the direction of the messenger RNA acquired from the oocyte. Still, the embryo's genes are expressed as early as the two-celled stage and are required for subsequent development to occur normally. See Ronan O'Rahilly and Fabiola Mueller, *Human Embryology and Teratology* (New York: John Wiley & Sons, 2000), 38.

9 For a fuller explanation, see Patrick Lee and Robert P. George, "The First Fourteen Days of Human Life," *New Atlantis* 13 (2006).

embryo is a human being in a biological sense, yet deny that we owe human beings in the early stages of their development full moral respect, such that we may not kill them to benefit more fully developed human beings who are suffering from afflictions.

But to say that embryonic human beings do not deserve full respect, one must suppose that not every human being deserves full respect. And to do that, one must hold that those human beings who warrant full respect deserve it not by virtue of *the kind of entity they are*, but, rather, because of some acquired characteristic that some human beings (or human beings at some stages) have and others do not, and which some human beings have in greater degree than others do.

This position is untenable. One need not be *actually* or immediately conscious, reasoning, deliberating, making choices, etc., in order to be a human being who deserves full moral respect, for plainly we should accord people who are asleep or in reversible comas such respect. But if one *denied* that human beings are valuable by virtue of what they are, and required an additional attribute, it would have to be a capacity of some sort, and, obviously, a capacity for certain mental functions.

Of course, human beings in the embryonic, fetal, and early infant stages lack immediately exercisable capacities for mental functions characteristically carried out by most human beings at later stages of maturity. Still, they possess these very capacities *in principe vel radice*, that is, in radical or 'root' form. Precisely by virtue of the kind of entity they are, they are from the beginning actively developing themselves to the stages at which these capacities will (if all goes well) be immediately exercisable. Although, like infants, they have

not yet developed themselves to the stage at which they can perform intellectual operations, it is clear that they are *rational animal organisms*.¹⁰ That is the *kind* of entity they are.

Here, it is important to distinguish two senses of the 'capacity' for mental functions: an immediately exercisable capacity, and a basic natural capacity, which develops over time. We have good reason to believe that the second sense, and not the first, provides the basis for regarding human beings as ends in themselves, and not as means only – as subjects possessing dignity and human rights, and not as mere objects.

First, the developing human being does not reach a level of maturity at which he or she performs a type of mental act that other animals do not perform – even animals such as dogs and cats – until at least several months after birth. A six-week-old baby lacks the *immediately exercisable* capacity to form abstract concepts, engage in deliberation, and perform many other characteristically

10 For an entity to have a rational nature is for it to be a certain type of substance; *having a rational nature*, unlike, say, being tall, or Croatian, or gifted in mathematics, is not an accidental attribute. Each individual of the human species has a rational nature, even if disease or defect blocks its full development and expression in some individuals. If the disease or defect could somehow be corrected, it would perfect the individual as the kind of substance he is; it would not transform him into an entity of a different nature. Having a rational nature is, in Jeff McMahan's terms, a "status-conferring intrinsic property." So my argument is not that every member of the human species should be accorded full moral respect based on the fact that the more mature members have a status-conferring intrinsic property, as McMahan interprets the "nature-of-the-kind argument." See his "Our Fellow Creatures," *The Journal of Ethics* 9 (2005): 355 ff. Rather, my proposition is that having a rational nature is the basis for full moral worth, and every human individual possesses that status-conferring feature.

human mental functions. If we owed full moral respect only to those who possess immediately exercisable capacities for characteristically human mental functions, it would follow that six-week-old infants do not deserve full moral respect.¹¹ Therefore, if we may legitimately destroy human embryos to advance biomedical science, then logically, subject to parental approval, the body parts of human infants should also be fair game for scientific experimentation.¹²

Second, the difference between these two types of capacity is merely a difference between stages along a continuum. The immediately exercisable capacity for mental functions is only the development of an *underlying* potentiality that the human being possesses simply by virtue of the kind of entity it is. The capacities for reasoning, deliberating, and making choices are gradually brought toward maturation, through gestation, childhood, adolescence, and so on. But the difference between a being that deserves full moral respect and a being that does not (and can therefore legitimately be killed to benefit others) cannot consist only in the fact that while both have some feature, one has *more* of it than the other. A mere *quantitative* difference cannot by itself provide a justification

11 Clear-headed and unsentimental believers that full moral respect is due only to those human beings who possess immediately exercisable capacities for characteristically human mental functions do not hesitate to say that young infants do not deserve full moral respect. See, for example, Peter Singer, "Killing Babies is Not Always Wrong," *The Spectator* 16 (September 1995): 20–22.

12 Not long ago, Peter Singer was asked whether there would be anything wrong with a society that bred children for spare parts on a massive scale. "No," was his reply. See "Blue State Philosopher," *World Magazine*, November 27, 2004.

for treating entities in radically different ways.¹³

Third, the acquired qualities proposed as criteria for personhood, such as self-consciousness or rationality, come in an infinite number of degrees. If human beings are worthy of full moral respect only because of such qualities, and those qualities come in varying degrees, humans should possess rights in varying degrees. The proposition that all human beings are created equal would be relegated to the status of a myth: since some people are more rational than others (that is, have developed that capacity to a greater extent than others have), some people would be greater in dignity than others, and the rights of the superiors would trump those of the inferiors.¹⁴

So it cannot be the case that some human beings and not others are intrinsically valuable by virtue of a certain de-

13 Michael Gazzaniga has suggested that the embryo is to the human being what Home Depot is to a house, i.e., a collection of unintegrated components. According to Gazzaniga, "it is a truism that the blastocyst has the potential to be a human being. Yet at that stage of development it is simply a clump of cells An analogy might be what one sees when walking into a Home Depot. There are the parts and potential for at least 30 homes. But if there is a fire at Home Depot, the headline isn't 30 homes burn down. It's Home Depot burns down." Quoted as "Metaphor of the Week" in *Science* 295 (5560) (March 1, 2002): 1637. Gazzaniga gives away the game, however, in conceding, as he must, that the term 'blastocyst' refers to a *stage of development* in the life of a determinate, enduring, integrated, and, indeed, self-integrating entity. If we must draw an analogy to a Home Depot, then it is the gametes (or the materials used in cloning to generate an embryo), and not the embryo, that constitute the "parts and potential."

14 This conclusion would follow regardless of the acquired quality we chose as qualifying some human beings (or human beings at some developmental stages) for full respect.

gree of development. Rather, *all* human beings are intrinsically valuable (in the way that enables us to ascribe to them equality and basic rights) because of the *kind* of being they are.

Since human beings are intrinsically valuable and deserve full moral respect by virtue of *what* they are, it follows that they are intrinsically and equally valuable *from the point at which they come into being*. Even in the embryonic stage of our lives, each of us was a human being and, as such, worthy of concern and protection. Embryonic human beings, whether brought into existence by union of gametes, SCNT, or other cloning technologies, should be accorded the respect given to human beings in other developmental stages.¹⁵

I wish to turn now to some arguments that advocates of embryo-destructive research have advanced to cast doubt on the proposition that human embryos deserve to be accorded full moral status.

In defending research involving the destruction of human embryos, Ronald Bailey, a science writer for *Reason* magazine, developed an analogy between embryos and somatic cells in light of the possibility of human cloning.¹⁶ Bailey claims that every cell in the human body has as much potential for development as any human embryo. Embryos therefore have no greater dignity or higher moral status than ordinary somatic cells. Bailey observes that each cell in the hu-

man body possesses the entire DNA code; each has become specialized (as muscle, skin, etc.) because most of that code has been turned *off*. In cloning, those previously deactivated portions of the code are reactivated. So, Bailey says, quoting Australian bioethicist Julian Savulescu, "if all our cells could be persons, then we cannot appeal to the fact that an embryo could be a person to justify the special treatment we give it." Since plainly we are not prepared to regard all of our cells as human beings, we should not regard embryos as human beings.

Bailey's analogy between somatic cells and human embryos collapses, however, under scrutiny. The somatic cell is something from which (together with extrinsic causes) a new organism can be *generated* by the process of somatic cell nuclear transfer, or cloning; it is certainly not, however, a distinct organism. A human embryo, by contrast, already is a distinct, self-developing, complete human organism.

Bailey suggests that the somatic cell and the embryo are on the same level because both have the 'potential' to develop to a mature human being. The kind of 'potentiality' possessed by somatic cells that might be used in cloning differs profoundly, however, from the potentiality of the embryo. A somatic cell has a potential only in the sense that something can be done to it (or done with it) so that its constituents (its DNA molecules) enter into a distinct whole human organism, which is a human being, a person. In the case of the embryo, by contrast, he or she already is actively – indeed dynamically – developing himself or herself to the further stages of maturity of the distinct organism – the human being – he or she already is.

True, the whole genetic code is present in each somatic cell; and this code can

¹⁵ For a more complete presentation of this argument, see Patrick Lee and Robert P. George, "The Wrong of Abortion," in Andrew I. Cohen and Christopher Wellman, eds., *Contemporary Debates in Applied Ethics* (New York: Blackwell Publishers, 2005), 13–26.

¹⁶ Ronald Bailey, "Are Stem Cells Babies?" available at <http://www.reason.com/rb/rb071101.html>.

guide the growth of a new entire organism. But this point does nothing to show that a somatic cell's potentiality is the same as a human embryo's. When scientists remove the nucleus of an ovum, insert the nucleus of a somatic cell into the remainder of the ovum, and give it an electric stimulus, they are doing more than merely placing the somatic cell in an environment hospitable to its continuing maturation and development. They are generating a wholly distinct, self-integrating, entirely new organism – an embryo, in other words. The entity – the embryo – brought into being by this process is radically different from the constituents that entered into its generation.

Somatic cells, in the context of cloning, then, are analogous not to embryos, but to the gametes whose union results in the generation of an embryo in the case of ordinary sexual reproduction. You and I were never either a sperm cell or an ovum. Nor would a person who was brought into being by cloning have once been a somatic cell. To destroy an ovum or a skin cell whose constituents might have been used to generate a new and distinct human organism is not to destroy a new and distinct human organism – for no such organism exists or ever existed. But to destroy a human embryo is precisely to destroy a new, distinct, and complete human organism – an embryonic human being.¹⁷

17 Lee and I replied to Bailey in a series of exchanges on *National Review Online* here: 1) (Our critique) <http://www.nationalreview.com/comment/comment-george072001.shtml>; 2) (Bailey's response) <http://www.nationalreview.com/comment/comment-bailey072501.shtml>; 3) (Our response) <http://www.nationalreview.com/comment/comment-george073001.shtml>.

We have responded to similar arguments recently advanced by Lee Silver in his book *Challenging Nature* here: 1) (Our critique) <http://article.nationalreview.com/?q=OTNiYWM2ZjJ>

Michael Gazzaniga, a psychologist and neuroscientist at the University of California, Santa Barbara, has proposed a different argument. While agreeing that a human embryo is an entity possessing a human genome, he has suggested that a 'person' comes into being only with the development of a brain. Prior to that point we have a human organism, but one lacking the dignity and rights of a person.¹⁸ We may therefore legitimately treat human beings in the earliest stages of development as we would treat organs available for transplantation (assuming, as with transplantable organs, that proper consent for their use is given, etc.).

In presenting his case, Gazzaniga observes that modern medicine treats the death of the brain as the death of the person – authorizing the harvesting of organs from the remains of the person, even if some physical systems are still functioning. If a human being is no longer a person with rights once the brain has died, then surely a human being is not yet a person prior to the development of the brain.

This argument suffers, however, from a damning defect. Under prevailing law and medical practice, the rationale for brain death is not that a brain-dead body

iYWVlN2IyMzFjOWYwMDZmMTc4MzU2MGU=; 2) (Silver's response) <http://article.nationalreview.com/?q=Mjg2Y2RkNDM1MzlkMGMyMjI3NjhkYmEoZTRjOTgyZDE=>; 3) (Our response) <http://article.nationalreview.com/?q=MjNmZmYyN2NhNjFkYWRRhNmExMDA2YzhiMDY5YzMyYT1=>; 4) (Silver's second response, followed by our second response) <http://article.nationalreview.com/?q=ZDk5ZTE4MjBiMDFmZjcoM2EyNjEoMDc2ZjA4YmRmN2U=>.

18 President's Council on Bioethics, Session 5 meeting, January 18, 2002, transcript available at <http://bioethics.gov/transcripts/jano2/jan18session5.html>.

is a living human organism but no longer a person. Rather, brain death is accepted because the irreversible collapse of the brain is believed to destroy the capacity for self-directed integral organic functioning in human beings who have matured to the stage at which the brain performs a key role in integrating the organism. In other words, at brain death a unitary organism is believed no longer to exist.¹⁹ By contrast, although an embryo has not yet developed a brain, it is clearly exercising self-directed integral organic functioning, and so it is a unitary organism. Its capacity to develop a brain is inherent and progressing, just as the capacity of an infant to develop its brain sufficiently for it actually to *think* is also intrinsic and unfolding.

Unlike a corpse – the remains of what was once a human organism but is now dead, even if particular systems may be artificially sustained – a human organism in the embryonic stage of development is a complete, unified, self-integrating human individual. It is not dead but very much alive, even though its self-integration and organic functioning are not brain-directed at this stage. Its future lies ahead of it, unless it is cut off or not permitted to develop its inherent capacities. Therefore, defenders of embryonic human life insist that the embryo is not a ‘potential life,’ but is rather a life *with potential*. It is a potential *adult*, in the same way that fetuses, infants, children, and adolescents are potential adults. It has the potential for agency, just as fetuses, infants, and small

children do. Just like human beings in the fetal, infant, child, and adolescent stages, human beings in the embryonic stage are already, and not merely potentially, human beings.²⁰

In an essay in the *New England Journal of Medicine*, Harvard political theorist Michael Sandel claimed that human embryos are different *in kind* from human beings at later developmental stages. This argument truly takes us to the heart of the matter: is a human embryo a human being? At its core is this analogy:

Although every oak tree was once an acorn, it does not follow that acorns are oak trees, or that I should treat the loss of an acorn eaten by a squirrel in my front yard as the same kind of loss as the death of an oak tree felled by a storm. Despite their developmental continuity, acorns and oak trees are different kinds of things.

He maintains that just as acorns are not oak trees, embryos are not human beings.

Sandel’s argument begins to go awry with his choice of analogates. The acorn is analogous to the embryo, and the oak tree (he says) is analogous to the human being. But in view of the developmental continuity that science fully establishes and Sandel concedes, the proper analogate of the oak tree is the *mature* human being, viz., the adult. Sandel’s analogy has its apparent force because we feel a sense of loss when a mature oak is felled – assuming it is a magnificent or beautiful oak. But while it is true that we do not feel the same sense of loss at the de-

19 Recent research has raised questions about whether ‘brain death’ is always equated with the irreversible loss of integral organic functioning. See D. Alan Shewmon, “The Brain and Somatic Integration: Insights into the Standard Biological Rationale for Equating ‘Brain Death’ with Death,” *The Journal of Medicine and Philosophy* 26 (2001): 457–478.

20 Lee and I have replied to other arguments that identify the human ‘person’ as the brain or brain activity, and the human ‘being’ as the bodily animal, in Robert P. George and Patrick Lee, “Dualistic Delusions,” *First Things* 150 (2005).

struction of an acorn, it is also true that we do not feel the same sense of loss at the destruction of an oak *sapling*. But clearly the oak tree does not differ in kind from the oak sapling.

This example shows that we value oak trees not because of the kind of entity they are, but because of their magnificence. The magnificence of an oak tree reflects either accidental properties or instrumental worth; a mature tree provides our house with shade and is aesthetically pleasing to behold. Neither acorns nor saplings are magnificent, so we do not experience a sense of loss when they are destroyed. If oak trees were valuable by virtue of the *kind* of entity they are, then it would follow that it is just as unfortunate to lose an acorn as an oak tree.

But the basis for our valuing human beings is profoundly different from the basis for valuing oak trees. As Sandel concedes, we value human beings precisely because of the *kind* of entities they are. Indeed, that is why we consider all human beings to be equal in basic dignity and human rights. We most certainly do not believe that especially magnificent human beings – such as Michael Jordan or Albert Einstein – are of greater *fundamental* worth and dignity than human beings who are physically frail or mentally impaired. We would not tolerate the killing of a handicapped child or a person suffering from, say, brain cancer in order to harvest transplantable organs to save Jordan or Einstein.

And we do not stand for the killing of infants, *which on Sandel's analogy would be precisely analogous to the oak saplings whose destruction we do not necessarily regret*. Managers of oak forests freely kill saplings, just as they might destroy acorns, to ensure the health of the more mature trees. No one gives it a second thought. This is precisely because we do not value mem-

bers of the oak species – as we value human beings – because of the *kind* of entity they are. If we did value oaks in this way, then we would have no less reason to regret the destruction of saplings, and possibly even acorns, than that of mature oak trees. Conversely, if we valued human beings in a way analogous to the way we value oak trees, then we would have no grounds to object to killing human infants or even mature human beings who are ‘defective.’

Sandel's defense of human embryo-killing on the basis of an analogy between embryos and acorns collapses the moment one brings into focus the profound difference between the basis on which we value oak trees, and that on which we ascribe value to human beings. We value oaks for their accidental properties and their instrumental worth. But we value human beings because of the intrinsic worth and dignity they possess by virtue of the kind of entity they are.²¹

I now consider a final objection. Some have claimed that the phenomenon of monozygotic twinning shows that the embryo in the first several days of its gestation is not a human individual. The suggestion is that as long as twinning can occur what exists is not yet a unitary human being, but only a mass of cells – each cell being totipotent and allegedly independent of the others.

It is true that if a cell or group of cells is detached from the whole at an early stage of embryonic development, the detached part can become an organism with the potential to develop to maturity as distinct from the embryo from which it was detached. But this does nothing to show that before detachment the cells

21 Lee and I responded to Sandel in George and Lee, “Acorns and Embryos.”

within the human embryo constituted only an incidental mass.²²

Consider the parallel case (discussed by Aristotle) of the division of a flatworm. Parts of a flatworm have the potential to become a whole flatworm when isolated from the present whole of which they are a part. Yet no one would suggest that prior to the division of a flatworm, the original flatworm was not a unitary individual. Likewise, at the early stages of human embryonic development, before specialization by the cells has progressed very far, cells or groups of cells can become whole organisms if they are divided and exist in an appropriate environment after the division. But that fact does not in the least indicate that prior to the twinning event, the embryo is other than a unitary, self-integrating, actively developing human organism. It certainly does not show

that the embryo is a mere “clump of cells.”

Based on detailed studies of other mammals, it is highly likely that in the first two weeks, the cells of the developing embryonic human being already manifest a degree of specialization and differentiation. From the beginning, even at the two-celled stage, the cells of mouse embryos differ in their developmental fates; they will ultimately contribute to distinct tissues within the embryo.²³ By the four-celled stage, there are clear molecular²⁴ and developmental²⁵ differences between cells of the developing mouse. At no time is the embryo a mere ‘ball of cells,’ i.e., a collection of homogeneous cells that do not function together as an organismic whole.

Now some people have claimed that the human embryo does not become a human being until implantation, be-

22 William Hurlbut of Stanford University has pointed out that “[m]onozygotic twinning (a mere 0.4 percent of births) does not appear to be either an intrinsic drive or a random process within embryogenesis. Rather, it is a disruption of normal development by a mechanical or biochemical disturbance of fragile cell relationships that provokes a compensatory repair, but with the restitution of integrity within two distinct trajectories of embryological development.” He goes on to explain that “the fact that these early cells retain the ability to form a second embryo is testimony to the resiliency of self-regulation and compensation within early life, not the lack of individuation of the first embryo from which the second can be considered to have ‘budded’ off. Evidence for this may be seen in the increased incidence of monozygotic twinning associated with IVF by Blastocyst Transfer. When IVF embryos are transferred to the uterus for implantation at the blastocyst stage, there is a two- to tenfold increase in the rate of monozygotic twinning, apparently due to disruption of normal organismal integrity.” *Human Cloning and Human Dignity: An Ethical Inquiry*, Report of the President’s Council on Bioethics, Washington, D.C., July 2002, personal statement of William Hurlbut.

23 For example, the plane of cleavage of the zygote predicts which cells will contribute to the inner cell mass and which will contribute to the trophectoderm; B. Plusa et al., “The First Cleavage of the Mouse Zygote Predicts the Blastocyst Axis,” *Nature* 434 (7031) (March 17, 2005): 391–395; R. L. Gardner and T. J. Davies, “The Basis and Significance of Pre-Patterning in Mammals,” *Philosophical Transactions of the Royal Society B: Biological Sciences* 358 (2003): 1338–1339; J. Rossant and P. P. Tam, “Emerging Asymmetry and Embryonic Patterning in Early Mouse Development,” *Developmental Cell* 7 (2004): 155–164.

24 M. E. Torres-Padilla et al., “Histone Arginine Methylation Regulates Pluripotency in the Early Mouse Embryo,” *Nature* 445 (7124) (January 11, 2007): 214–218; J. A. Stanton, A. B. Macgregor, D. P. Green, “Gene Expression in the Mouse Preimplantation Embryo,” *Reproduction* 125 (2003): 457–468.

25 K. Piotrowska-Nitsche et al., “Four-Cell Stage Mouse Blastomeres Have Different Developmental Properties,” *Development* 132 (3) (February 2005): 479–490.

cause (they assume) the embryo cannot establish a basic body plan until it receives external maternal signals at implantation. Only then is it a self-directing human organism. According to this view, these signaling factors somehow transform what was hitherto a mere bundle of cells into a unitary human organism.

However, embryologists argue about whether any such maternal signaling actually occurs. As Hans-Werner Denker observed, it was once assumed that in mammals, in contrast to amphibians and birds, polarity in the early embryo depends upon some external signal, since no clear indications of bilateral symmetry had been found in oocytes, zygotes, or early blastocysts.²⁶ But this view has been revised in the light of emerging evidence: “[I]ndications have been found that in mammals the axis of bilateral symmetry is indeed determined (although at first in a labile way) by sperm penetration, as in amphibians. Bilateral symmetry can already be detected in the early blastocyst and is not dependent on implantation.”

Denker refers specifically to the work of Magdalena Zernicka-Goetz and her colleagues at Cambridge University, and that of R. L. Gardner at Oxford University, which show that polarity exists even at the two-celled stage. In contrast, Davor Solter and Takashi Hiragi of the Max Planck Institute for Immunobiology in Freiburg argue that in the early embryo (prior to compaction and differentiation into inner cell mass and trophoblast), external factors determine the fate of each cell, rather than an internal

polarity.²⁷ In other words, the issue is not definitively settled. However, whichever of the two is true, it is less than candid for anyone to assert the older view without acknowledging that credible scientists from leading universities have published research contradicting it in major peer-reviewed scientific journals.

Moreover – and here is the most important point – even if it is the case that polarity does not emerge until a maternal signal is received at implantation, that would *not* provide any evidence that such a signal transformed a bundle of cells into a unitary, multicellular human organism. Just as the lungs begin to breathe at birth only in response to certain external stimuli, so it would make sense (if the older view is true) that differentiation into the rudiments of the distinct body parts (basic bilateral polarity) would begin only in response to some external stimuli. And this is exactly how embryology texts interpreted such signals, even prior to the publications of Zernicka-Goetz and Gardner and their teams.

There is much evidence that the human embryo is from the first day onward a unitary organism, and never a mere bundle of cells. Development in the embryo is complex and coordinated, including compaction, cavitation, and other activities in which the embryo is preparing itself for implantation.

And here is the clearest evidence that the embryo in the first two weeks is not a mere mass of cells but a unitary organism: if each cell within the embryo before twinning were independent, there would be no reason why each would not develop on its own. Instead, these allegedly independent, noncommunicating

²⁶ Hans-Werner Denker, “Early Human Development: New Data Raise Important Embryological and Ethical Questions Relevant for Stem Cell Research,” *Naturwissenschaften* 91 (1) (2004): 21 ff.

²⁷ See Gretchen Vogel, “Embryologists Polarized Over Early Cell Fate Determination,” *Science* 308 (May 6, 2005).

cells regularly function together to develop into a single, more mature member of the human species. This fact shows that the cells are interacting from the very beginning (even within the zona pellucida, before implantation), restraining them from individually developing as whole organisms and directing each of them to function as a relevant part of a single, whole organism continuous with the zygote. The evidence indicates that the human embryo, from the zygote stage forward, is a unitary human organism.²⁸

Supporters of embryo-destructive research have advanced other arguments against the proposition that human embryos are embryonic human beings bearing basic dignity and full moral worth. I have focused in this essay on the strongest arguments against my position and laid aside the weaker ones, such as those proposing to infer something of moral relevance from the fact that human embryos are tiny and not yet sentient; or from the fact that a high percentage of human embryos are naturally lost early in pregnancy; or from the claim that people typically either do not grieve for the loss of embryos in early miscarriages, or grieve but not as intensely as they do for children who die later in gestation or as infants.

If there is a valid argument to show that human embryos are something other than human beings in the embryonic stage of development, or that embryonic human beings lack the basic dignity and moral worth of human beings in later developmental stages, it is one of the arguments I address here. I have given my reasons for believing that none of

these arguments can withstand critical scrutiny.

The debate about the value of embryonic human life is sure to continue. But if that debate is informed by serious attention to the facts of embryogenesis and early human development, and of the profound, inherent, and equal dignity of human beings, then we, as a nation, will ultimately reject the deliberate killing of embryonic humans, regardless of the promised benefits.

This does not necessarily mean we must sacrifice such benefits. Scientists have already made tremendous progress toward the goal of producing fully pluripotent stem cells by non-embryo-destructive methods. If such methods are pursued with vigor, the future might see the promise of stem cell science fulfilled, with no stain on our national conscience.

²⁸ Lee and I presented this information in George and Lee, "The First Fourteen Days of Human Life."



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Source: *Family Planning Perspectives*, Jan., 1971, Vol. 3, No. 1 (Jan., 1971), pp. 5-10

Published by: Guttmacher Institute

Stable URL: <https://www.jstor.org/stable/2133950>

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Is Pregnancy Really Normal?

By Warren M. Hern, M.D.

During the past decade we have witnessed an increasing amount of clamorous debate about birth control, sterilization and abortion. These discussions have been enlightened at times, but more often, they have been both confused and confusing. The medical profession has offered ambivalent and vacillating leadership, at best, on these very perplexing issues. This may be partially because of the life sustaining and extending philosophy which, historically, has been the honored and historic underpinning of medical education, and which may make physicians tend to shun activities they consider to be avoidance or termination of 'new life'.¹

It would appear, however, that a more basic reason for this ambivalence is that most physicians accept, implicitly or explicitly, the widely shared teleological definition of a female as essentially a reproductive machine. One physician has suggested that woman be defined as "a uterus surrounded by a supporting organism and a directing personality."² Adherence to this perspective clearly tends to inhibit critical examination of the corollary assumption that human pregnancy is not only a 'normal' but is an especially *desirable* event from the viewpoint of woman's physiological, psychological and

social functioning, and that failure (or, worse, refusal) to become or remain pregnant is, therefore, pathological. In this context, it is not surprising that even the major textbooks of obstetrics pay little or no attention to how a *woman* feels when she is pregnant, how *she* feels after an abortion, whether *she* regarded her pregnancy as normal or desirable.

Suchman has pointed out that the way an individual perceives his health status may be more predictive of how he behaves in the face of illness than the actual medical diagnosis.³ However, physicians trained in the Western traditions of medical practice tend to be much more disease-oriented than patient-oriented. Thus, their definitions of normality and abnormality tend to be stated in terms of the physician's perceptions and cognitive categories rather than those of the patient.⁴

Normality in pregnancy is defined in many ways, directly and indirectly. Medical professionals, and particularly obstetricians, almost all of whom are men, have certain personal role investments in defining pregnancy as woman's most normal and desirable health state. This view derives from a broader cultural inheritance, including Calvinist puritanism, whereby sex, the details of reproduction and the desire to know about them (as well as about reliable means of contraception) are stigmatized. According to this view it is a woman's duty (and function) to carry a pregnancy to term even if she does not want a baby. This is especially true in the case of out-of-wedlock pregnancies, which are traditionally viewed as punishment for unsanctioned sexual activity. Since so few women have become doctors, ministers or theologians, they have had little opportunity to dispute these doctrines on an official level.

The institutionalized view of pregnancy as a hypernormal state is perpetuated and enhanced by the linguistic categories of medical education and practice. The typical, routine pregnancy in a young and otherwise healthy female is called a 'normal' pregnancy unless it is complicated by various problems such as Rh incompatibility, preeclampsia, polyhydramnios, threatened abortion, abruptio placentae, hypofibrinogenemia, amniotic fluid embolism, or any one of the other numerous clinical syndromes associated with pregnancy.

In the 1961 edition of Eastman and Hellman's standard textbook, *Williams' Obstetrics*, the authors state:

From a biologic point of view pregnancy and labor represent the highest function of the female reproductive system and a priori should be considered a normal process. But when we recall the manifold changes which occur in the maternal organism it is apparent that the borderline between health and disease is less distinctly marked during gestation than at other times, and derangement so slight as to be of but little consequence under ordinary circumstances may readily be the precursor of pathologic conditions which may seriously threaten the life of the mother or the child or both. It accordingly becomes necessary to keep pregnant patients under strict supervision and to be constantly on the alert for the appearance of untoward symptoms. . . . It is in the prevention of such calamities (as eclampsia and dystocia) that care and supervision of the pregnant woman has been found to be of such value. Indeed, antepartum care is an absolute necessity if a substantial number of women are to avoid disaster; and it is helpful to all.⁵

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The authors then describe in detail a very sound regimen of antepartum care. The implications of this preface to the chapter on antepartum care are clear: Pregnancy is normal — “the highest function” of woman’s reproductive system. Ergo, that “highest function” is not reached while a woman remains not pregnant. Yet the risks of serious morbidity and mortality are so much increased over the nonpregnant state that constant medical supervision is required when pregnancy occurs, particularly at the extreme ends of the reproductive spectrum.⁶ If the risks were not so considerable, there would be no need for medical supervision.

There is a contradiction here: Pregnancy is a process in which the normal (nonpregnant) physiology is markedly altered for a period of time and which carries a significantly higher risk of morbidity and mortality than nonpregnancy. But if nonpregnancy is normal, how is it possible that pregnancy also is normal? Answer: If we say it is normal, it is normal. Eastman and Hellman, of course, are seeking primarily to describe the difference between an uncomplicated (normal) and a complicated (abnormal) pregnancy, a highly useful distinction in the context of obstetrical practice. Their “highest function” argument, however, is extended by others to define woman as most ‘normal’ when she is pregnant or delivering.*

‘Normality’ has always been subject to social and cultural definition. If normal health is defined as the existing average, it is likely to have a different connotation than if it is regarded as a goal to be attained.⁷ For example, if almost every child in the village has such a heavy roundworm burden that his stools look like spaghetti and the existing average is taken as ‘normal’, it is ‘normal’ for a child to have worms. If the average woman in the same village is pregnant for 50 or 60 percent of her reproductive years, it is more ‘normal’ for her to be pregnant than it is for the middle-class housewife in Greenwich, Connecticut, who may be pregnant for only five percent of her fertile years. Medical sociologist David Mechanic points out that many diseases are not defined as illness states because they occur so frequently as to be regarded as the common

* Edgar Guest once wrote: “A man’s most a man when he’s fishin’,” leaving one to wonder whatever man might be when he’s not fishing, and therefore *less* of a man. The similar notion that “a woman’s most a woman when she’s reproducin’” implies the question: What is she for the other “lesser” 65-70 years of her life?



state of humanity.⁸ Perhaps pregnancy is such a condition, which previously had certain advantages for the species.

Our culturally defined linguistic categories have accordingly come to shape our perceptions of biological reality and thereby reinforce patterns with survival value. It is worth pointing out, however, that other groups such as the Cuna Indians and the Tikopia have held markedly different views of pregnancy and childbearing.⁹ The more recent plight of rapid population growth documented by Firth¹⁰ among the Tikopia may be seen to some degree to be the result, through Western contact, of disruption of their previous patterns of belief and practice which included abortion and infanticide. In general, however, human pregnancy can be seen in the evolutionary process as a successful biological adaptation to the survival needs of the species. The view of pregnancy as ‘normal’ by most human societies, and particularly Western society, has been a *cultural* adaptation with a high survival value until very recently. As Medawar¹² and others have pointed out, however, adaptations with advantages for the group may have adverse consequences for individuals,¹³ and even, in the long run, certain disadvantages for the group itself.

The present situation is changed in

three significant respects from previous human evolutionary experience:

- A greater assurance of individual survival has lessened anxiety that the majority of a given couple’s offspring will not survive to adulthood.
- Technological developments such as effective contraception and safe abortion techniques now provide new choices and offer new perspectives about pregnancy which previously were unavailable.
- Under current conditions of phenomenal human population growth, ‘normal’ (unlimited) reproduction, if anything, endangers survival of the species.

There has been a cultural lag, however, with respect to our view of pregnancy. We cling to the outmoded view of pregnancy as women’s highest, most ‘normal’ function, even though, functionally speaking, Western medicine has begun treating pregnancy as a specialized kind of illness requiring prenatal care, obstetrical supervision and postpartum follow-up with positive results which the patients themselves recognize and seek out. Clearly, the view that pregnancy is woman’s most ‘normal’ state has low survival value for the individual in terms of our growing understanding of the morbidity and mortality risks inherent in pregnancy; and it has a decreasing survival value for the species in the context of rapid population growth.

The use of the term 'normal pregnancy' in obstetrical practice, then, is the extension of the broader cultural influence into the professional setting. The term is useful, in a specialized sense, to distinguish pregnancies which are complicated from those which are routine. Unfortunately, its continued use by physicians is carried back to the nonprofessional context and reinforces the folk idea that pregnancy is more 'normal' than the nonpregnant state. Its use within the medical profession results in certain awkward dilemmas, particularly when the pregnancy is unwanted.

This reaches to the core of our current difficulties and controversy about abortion, since pregnancy has traditionally been defined in Western culture as 'normal', and the desire to terminate the pregnancy therefore, as, 'pathological'. It follows that every woman who wants an abortion must need to have her head examined, and that is exactly what has happened. Liberalized abortion laws in several states have resulted in a situation in which psychiatric consultation is mandatory for women seeking a legal hospital abortion; and hospital boards and the medical community still maintain this ritual in some places where there are no legal reasons for its maintenance.

According to this logic, deviation from the accepted norm of pregnancy, especially once the pregnancy has occurred, is *prima facie* evidence of abnormality. Thus, psychoanalyst May Romm in 1953 declared that intense conflict about a pregnancy or about giving birth to a child is "psychopathological."¹⁴ The treatment suggested for unfortunate women with these allegedly psychopathological tendencies has been, variously, psychotherapy, marriage, offering the baby for adoption or some combination of those measures.

In fact, a woman seeking an abortion is making a circumstantial self-definition of pregnancy as an illness for which she considers the appropriate treatment to be abortion. She is displaying "illness behavior," in David Mechanic's terminology.¹⁵ Similarly, the woman who perceives the signs and symptoms of a wanted pregnancy may also display illness behavior and seek medical attention in the form of prenatal care.

With this introduction in mind, we may examine the phenomenon of pregnancy from several perspectives to determine whether it is an illness in comparison with the nonpregnant state. These perspectives are:

- the subjective feelings of the pregnant woman and other psycho-cultural aspects,
- the physiological and metabolic changes that accompany pregnancy,
- epidemiological patterns (i.e., risk factor of pregnancy vs. nonpregnancy), and
- socio-economic aspects.

Subjective and Psycho-Cultural Aspects

In most textbooks of obstetrics, the subjective feelings and symptoms of the pregnant woman receive only cursory attention in comparison with other, more technical details. It is widely recognized, however, that the early stages of pregnancy bring about marked changes from the subjective sense of physical and emotional well-being in most women, although reliable epidemiological studies of this are not available. Aside from amenorrhea, authorities cite nausea and vomiting as among the most prominent signs and symptoms of early pregnancy, being seen in half or more of all pregnant women.¹⁶

Women who experience these symptoms describe a continuous sense of discomfort accompanied at times by powerful waves of nausea; these occur most often upon arising but may happen at any time during the day. The nausea may or may not be accompanied by vomiting, which itself may become so frequent as to require hospitalization. Later on, the nausea may disappear and be replaced by a ravenous appetite and a craving for unusual foods and substances such as dirt, coal or toothpaste.¹⁷

Another commonly reported symptom of pregnancy is severe fatigue and lassitude with a loss of interest in one's surroundings. In addition, many women report an increased irritability with a tendency to burst into tears at the slightest provocation, unusual fears of rejection, feelings of depression and marked fluctuations in libido.^{17a}

Other symptoms of early pregnancy include breast tenderness and tingling, increased urinary urgency and frequency and constipation. The later stages of pregnancy bring leg cramps, abdominal pain due to round-ligament stretching and Braxton-Hicks contractions, backache and dyspnea.

In this context of subjective feelings of discomfort, it is worthwhile noting the effects of therapeutic abortion, particularly during the first trimester when the symptoms of nausea, vomiting and lassitude are most pronounced. Clinicians

have noted that, in many patients, evacuation of the uterine contents under anesthesia results in an immediate and dramatic relief of symptoms which is experienced as soon as the effects of anesthesia have worn off. Although such experiences are commonly reported by physicians who perform abortions in their clinical practice, there is virtually no mention of this phenomenon in the medical literature so far as the author can determine.

The symptomatic aspects of pregnancy, while based on certain physiological changes, are undoubtedly accentuated when the pregnancy is unwanted or when it occurs in the context of disturbed interpersonal relationships or other forms of stress. This has been demonstrated by Grimm,¹⁸ Rosengren,¹⁹ Poffenberger,²⁰ and other investigators.²¹ Sontag and others have suggested that this may also have adverse effects on the fetus.²² There is clearly an interaction between physiological changes, cultural patterns and psychological stress, and this is particularly true when the pregnancy does not occur under socially approved circumstances. Accordingly, it appears that 'unwantedness' may be regarded as a major complication of pregnancy with surgical intervention in the form of abortion as the indicated treatment, rather than medical management as would be the case with a wanted pregnancy.

In spite of a woman's desire to terminate a pregnancy or a certain physiological basis for a sense of physical illness or discomfort, the behavior and statements of health professionals often summarize the predominant cultural view that it is not the woman's physical condition or the fact of pregnancy which is the 'illness' but her *thinking* which is 'diseased'.

Newman has described certain kinds of ritualistic and symbolic communications with pregnant women by nonphysicians which imply urgency and danger while calling attention to the status of pregnancy.²³ These communications, while tacitly or unconsciously recognizing the pregnancy itself as an 'illness', may be seen as magical attempts to ward off such 'unhealthy' or dangerous patterns of thinking by ritual affirmation of the pregnant status.

Physiological Changes

The physical and functional alterations of pregnancy involve all the body systems,

although some are affected much more than others.²⁴ The most obvious change is the enlargement of the uterus within the abdominal cavity with the subsequent displacement and compression of other abdominal contents. This has a direct effect on the circulation of blood, for example, and increases venous pressure leading in many cases to varicose veins, thrombophlebitis, hemorrhoids and other maladies.²⁵ It also has an adverse effect on the urinary tract.²⁶

Among the many other metabolic and physiological changes which occur, estrogen and progesterone levels increase significantly during pregnancy.²⁷ The rise in estrogen may account for the symptoms of nausea and vomiting when they occur early in pregnancy,²⁸ and it appears that the increase in progesterone is directly related to the feelings of fatigue, lassitude and inability to concentrate which are often reported in early pregnancy.²⁹

Other important changes include sodium and water retention,³⁰ calcium depletion,³¹ hypercoagulability of blood,³² a high incidence of folic acid deficiency and depletion of iron stores.³³

It should be noted that all the alterations mentioned here are present in a so-called 'normal' pregnancy. Since such alterations contribute directly to the increased morbidity and mortality associated with pregnancy and cannot be regarded as 'normal' in comparison with the usual physiological state, perhaps it would be better to divide pregnancies into two categories: uncomplicated and complicated.

Epidemiological Patterns

Space does not permit an extensive discussion of epidemiological and socio-economic considerations, but they deserve a brief mention.

In the beginning of this century, deaths in the United States due to causes associated with pregnancy and the puerperium accounted for a large proportion of mortality among women of childbearing

age. By 1930, maternity directly or indirectly caused 11 percent of all deaths in women aged 15-45, whereas this proportion declined to three percent by 1959.³⁴

Since the 1920s, maternal mortality has declined from 680 per 100,000 to 38 per 100,000.³⁵ Tietze estimates 20 per 100,000 as the current standard for the United States.³⁶

While the statistical trend is downward, pregnancy and the puerperium are still among the leading causes of death for women of childbearing age.³⁷ The decrease in maternal risk has come about in large part due to the assiduous efforts of physicians in both the preventive phase and the medical management of pregnancy. Better living conditions appear to have had a great impact on these statistics. Studies regarding the disadvantages for both mother and offspring of short birth intervals suggest that these improvements in mortality may also be the consequence of greater practice of fertility control with resultant smaller completed family size and greater intervals between births.³⁸ Indeed, the greater 'normality' of pregnancies in recent years (that is, fewer complications and risks to the average mother) is certainly to some extent the result of a greater prevalence of normal *nonpregnancy*.

Socio-economic Aspects

Recent studies by Bumpass and Westoff indicate that from 750,000 to more than one million births annually in the United States are unwanted by one or both parents.³⁹

Other studies indicate that the reasons for this large proportion of unwanted births are primarily those which may be broadly defined as socio-economic. Either the additional child results in increased economic hardship for the family unit or the birth occurs in the context of disturbed social relationships, or some variation of this theme.⁴⁰

In addition to this large number of unwanted births, an estimated one million or more abortions occur annually in the United States.⁴¹ Fragmentary statistical evidence and consistent clinical impressions indicate that the majority of these abortions are sought for socio-economic reasons.⁴² Until very recently, nearly all of these abortions have been clandestine, and many have been performed by unskilled and often unscrupulous persons

under poor hygienic conditions. In 1965, Gold, et al., reported that nearly 50 percent of all maternal mortality in New York City was due to complications resulting from abortion during some periods, and this figure exceeded 60 percent for Puerto Ricans.⁴³ Similar high proportions of maternal mortality have been reported elsewhere as the consequence of illicit abortion.⁴⁴

In spite of these risks, however, it appears that one-fifth to one-fourth of all pregnant American women each year define pregnancy as an illness for which they regard the appropriate treatment to be abortion. The 'illness' is not just biological but social and economic; and it is not just social, but has a biological basis in fact.

Viewing Pregnancy as Normal

These statistics to some extent reflect the ambivalent attitudes of medical professionals towards pregnancy. Pregnancy is regarded as 'normal', yet it is treated in practice as a specialized form of illness. This may be regarded as an example of cognitive dissonance.⁴⁵ If illness is ordinarily viewed as a departure from the usual state of well-being, it is a *priori*, therefore, not 'normal'.

The basis for these contradictions lies in the medical profession's failure to recognize the bio-social nature of illness and treatment and the role of the patient in their determination.⁴⁶ Recognition of the patient's role in the identification of illness and the choice of treatment invades the realm of professional exclusivity, with its attendant prestige and status. This dilemma becomes particularly acute when a pregnant woman defines her own pregnancy as an illness for which she considers the appropriate treatment to be abortion.

The dilemma is made obvious in the use of psychiatric consultation prior to legal abortion which is sought for basically socio-economic reasons. Ostensibly, the psychiatrist must ascertain that continuation of the pregnancy is likely to result in self-destructive behavior or permanent damage to the woman's mental health. Such a prognosis is impossible to determine, and as such has been admitted by prominent psychiatrists on both sides of the question.⁴⁷

The 'mental health' clause in regard to abortion is, then, a euphemism for 'socio-economic reasons'. As such, it symbolizes the last vestige of irrational professional

exclusivity (whether the professional desires it or not) in the definition of illness and determination of appropriate treatment with regard to unwanted pregnancy.

Since routine psychiatric consultation is widely recognized, even within the profession, as having practically no medical function in the determination of indications for therapeutic abortion, it must be seen as a legitimizing ritual demanded by society in which the woman acknowledges unsanctioned behavior or thinking and expresses contrition in exchange for both expiation of 'guilt' and safe treatment of her circumstantially self-defined illness of pregnancy. The ritual of bureaucratic procedure and delay, however, may be more painful, anxiety-provoking and threatening to her mental — as well as physical — health than the abortion itself.

An Alternative View of Pregnancy

The foregoing discussion should allow us to abandon the erroneous assumption that pregnancy is per se a normal and desirable state, and to consider instead a more accurate view that human pregnancy is an episodic, moderately extended chronic condition with a definable morbidity and mortality risk to which females are uniquely though not uniformly susceptible, and which:

- is almost entirely preventable through the use of effective contraception, and entirely so through abstinence;
- when not prevented, is the individual result of a set of species specific bio-social adaptations with a changing significance for species survival;
- may be defined as an illness requiring medical supervision through (a) cultural traditions, functional or explicit, (b) circumstantial self-definition of illness or (c) individual illness behavior;
- may be treated by evacuation of the uterine contents;
- may be tolerated, sought, and/or valued for the purpose of reproduction; and
- has an excellent prognosis for complete, spontaneous recovery if managed under careful medical supervision.

Accordingly, the open recognition and legitimation of pregnancy as an illness would be consistent with the individual self-interest of those experiencing pregnancy, good standards of medical practice, and the continued survival of human and other species.



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Jacobs, Steven Andrew. (2021). The scientific consensus on when human's life begins. Issues in Law & Medicine, 36(2), 221-[iii].

Chicago 17th ed.

Steven Andrew Jacobs, "The Scientific Consensus on When a Human's Life Begins," Issues in Law & Medicine 36, no. 2 (Fall 2021): 221-[iii]

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The Scientific Consensus on When a Human's Life Begins

Steven Andrew Jacobs, J.D., Ph.D.*

ABSTRACT: Peer-reviewed journals in the biological and life sciences literature have published articles that represent the biological view that a human's life begins at fertilization ("the fertilization view"). As those statements are typically offered without explanation or citation, the fertilization view seems to be uncontested by the editors, reviewers, and authors who contribute to scientific journals. However, Americans are split on whether the fertilization view is a "philosophical or religious belief" (45%) or a "biological and scientific fact" (46%), and only 38% of Americans view fertilization as the starting point of a human's life. In the two studies that explored experts' views on the matter, the fertilization view was the most popular perspective held by public health and IVF professionals. Since a recent study suggested that 80% of Americans view biologists as the group most qualified to determine when a human's life begins, experts in biology were surveyed to provide a new perspective to the literature on experts' views on this matter. Biologists from 1,058 academic institutions around the world assessed survey items on when a human's life begins and, overall, 96% (5337 out of 5577) affirmed the fertilization view. The founding principles of the field Science Communication suggest that scientists have an ethical and professional obligation to inform Americans, as well as people around the world, about scientific developments so members of the public can be empowered to make life decisions that are consistent with the best information available. Given that perspective—and a recent study's finding that a majority of Americans believe they deserve to know when a human's life begins in order to make informed reproductive decisions—science communicators should work to increase the level of science awareness on the fertilization view, as it

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stands alone as the leading biological perspective on when a human's life begins.

Keywords: fertilization; when life begins; when a human's life begins; science communication; abortion; human rights; personhood; scientific consensus

1. Introduction

A recent national poll suggested that 38% of Americans believe a human's life begins at fertilization ("the fertilization view").¹ Another recent national poll reported that 46% of Americans recognize the fertilization view as a "biological and scientific fact", and 45% view it as a "philosophical or religious belief".² While Americans' views on when a human's life begins have been assessed in numerous polls in recent years, there is scant evidence of experts' opinions on this matter. This form of inquiry—assessing a factual dispute by surveying those with the relevant expertise—has been prominent in the debate about anthropogenic climate change,^{3,4} but it has yet to be used to assess a large sample of relevant experts' views on when a human's life begins.

Two small-scale studies have been conducted to assess experts' views on this matter: in 1967, researchers surveyed public health professionals,⁵ and in 2008, researchers surveyed professionals working in the *in vitro* fertilization field.⁶ In both studies, fertilization was the most common view held by the experts: 35% of public health professionals (27 out of 76) and 26% of IVF professionals (67 out of 255) affirmed the fertilization view. However, given the scientific literature's recognition of the fertilization view, it is surprising that it has been affirmed by a plurality of Americans and experts, rather than a majority.

A recent review of the abstracts of peer-reviewed journals in the biological and life sciences literature reported that dozens of journals have published articles containing statements that affirm the fertilization view.⁷ Since journals publish these statements without explanation or citation, it suggests that researchers, reviewers, and journal editors seem to accept the fertilization view as a well-known and well-accepted biological observation. As previewed in Table 1 below, efforts to compile citations to peer-reviewed articles that contain such statements have continued⁸—these articles can be categorized based on how explicitly they represent the fertilization view.

Table 1. Peer-reviewed journals that represent the fertilization view.

A. Fertilization marks the beginning of a human's life

1. *California Medicine*: "[T]he scientific fact, which everyone really knows, that human life begins at conception."⁹
2. *Australian and New Zealand Journal of Obstetrics and Gynaecology*: "The time of our conception is when we are most vulnerable to survival and growing as a healthy human being."¹⁰

3. *Trends in Cell Biology*: "Most readers of this review originated from a sperm-egg fusion event."¹¹
 4. *Reproduction*: "Human life begins with sperm and oocyte fusion."¹²
- B. Fertilization marks the beginning of a new individual
5. *Frontiers in Cell and Developmental Biology*: "Fertilization is a key process in biology to the extent that a new individual will be born from the fusion of two cells."¹³
 6. *Journal of Assisted Reproduction and Genetics*: "[A] new individual is derived from the fusion of a single sperm and egg."¹⁴
 7. *Cell and Tissue Research*: "[F]ertilization is the process by which male and female haploid gametes (sperm and egg) unite to produce a genetically distinct individual."¹⁵
 8. *Nature Reviews Molecular Cell Biology*: "During fertilization of an egg with a sperm, the haploid genomes of each parent are unified to form the diploid genome of a new and unique individual."¹⁶
- C. Fertilization marks the beginning of life
9. *Physiological Reviews*: "A proper dialogue between spermatozoa and the egg is essential for conception of a new individual in sexually reproducing animals. Ca(2+) is crucial in orchestrating this unique event leading to a new life."¹⁷
 10. *Cell*: "Recognition between sperm and the egg surface marks the beginning of life in all sexually reproducing organisms."¹⁸
 11. *Molecular & Cellular Proteomics*: "Sperm are remarkably complex cells with a singularly important mission: to deliver paternal DNA and its associated factors to the oocyte to start a new life."¹⁹
 12. *Communicative & Integrative Biology*: "It is intuitive that fertilization-the start of life-involves communication between a sperm cell and an egg."²⁰
- D. Fertilization is the transmission of genes from parents to their children
13. *Science*: "Fertilization is the sum of the cellular mechanisms that pass the genome from one generation to the next and initiate development of a new organism."²¹
 14. *Methods in Molecular Biology*: "As representatives of the 60 trillion cells that make a human body, a sperm and an egg meet, recognize each other, and fuse to create a new generation."²²
 15. *Animal Reproduction Science*: "In higher animals, the beginning of new life and transfer of genetic material to the next generation occurs in the oviduct when two distinct gametes cells unite resulting in the formation of a zygote."²³
 16. *Current Opinion in Genetics & Development*: "In mammals, a new generation begins when an oocyte is fertilized by a sperm to form a zygote."²⁴
- E. Fertilization marks the beginning of development and the life cycle
17. *Nature*: "The life cycle of mammals begins when a sperm enters an egg."²⁵
 18. *Molecular Neurobiology*: "Aging is a developmental process that begins with fertilization and ends up with death involving a lot of environmental and genetic factors."²⁶
 19. *Journal of Cellular Physiology*: "At the time of fertilization, an increase in the intracellular Ca(2+) concentration ([Ca(2+)](i)) underlies egg activation and initiation of development in all species studied to date."²⁷
 20. *Seminars in Cell and Developmental Biology*: "At fertilization, eggs unite with sperm to initiate developmental programs that give rise to development of the embryo. Defining the molecular mechanism of this fundamental process at the beginning of life has been a key question in cell and developmental biology."²⁸

These statements vary in their framing of the fertilization view, as some specifically state that fertilization marks the beginning of a human's life and others generally state that fertilization marks the beginning of a new individual, a new life, or the life cycle

of an organism. Still, all of these statements represent the fertilization view since they directly or indirectly state that fertilization marks the point at which a male's spermatozoon (sperm) and a female's oocyte (egg) unite to form a genetically unique organism (zygote)—that a zygote with a human genome is a human since he or she would then be biologically classified as a member of the *Homo sapiens* species whose life has started on the developmental path that can continue through the zygotic, embryonic, fetal, infant, child, adolescent, and adult stages of the human life cycle. Thus, taken together, these statements suggest the fertilization view is common in the biological and life sciences literature.

In a recent study,²⁹ Americans were asked who among the following list of authorities is most qualified to determine when a human's life begins: biologists, philosophers, religious leaders, Supreme Court Justices, and voters. A large majority of the 4,107 Americans surveyed selected biologists (80%). When participants were asked why they selected biologists, 91% stated that they "view biologists as objective experts in the study of life". Thus, a study was designed to assess biologists' views on the ontogenetic starting point of a human's life.

2. Materials and Methods

Participation in the survey was sought from members of biology and life sciences departments of colleges, universities, and research institutes around the world. First, a list of academic institutions was generated from rankings of biology programs.^{30, 31} Second, contact information for post-doctoral researchers, lecturers, professors, and professors *emeriti* was collected from the institutions' biology and life sciences departmental faculty webpages.

62,469 academic biologists were recruited through e-mail and 7,402 participated in the online survey (12% response rate). Of the participants, 5,577 biologists from 1,058 institutions provided analyzable data on operative questions. This response rate was comparable to a recent study that used professors' publicly available e-mail addresses to recruit them to participate in a survey on their views on controversial topics.³² The demographics of the participants suggest the sample was representative of the population of academic biologists around the world.

A majority of the participants held a Ph.D. (95%), and most identified as male (63%) and non-religious (63%). Ideologically, a majority identified as liberal (89%) and pro-choice (85%). Previous studies have shown that 61% of biologists identify as atheist or agnostic³³ and that members of the academy are likely to hold liberal beliefs.³⁴ Thus, since there was no indication of non-response or self-selection bias, the sample's religious and ideological breakdowns suggest the sample was likely representative of the overall population of academic biologists. Overall, the sample comprised biologists from 86 countries.

2.1. Survey Questions

First, biologists were asked whether they view the question of when a human's life begins as a scientific matter. Participants were presented the question: "Which group

is most qualified to answer the question ‘When does a human’s life begin?’” They were then asked to select from the following five options: biologists, philosophers, religious leaders, Supreme Court Justices, and voters. The participants were also asked to assess Americans’ selection of biologists as the most credible authority on the matter: “In a recent survey, a large majority of participants selected biologists as the group most qualified to answer the question ‘When does a human’s life begin?’. Do you agree that biologists are most qualified to define when a human’s life begins?”

Since the fertilization view is the leading view among Americans,^{1,2} public health professionals,⁵ and *in vitro* professionals⁶—and since it has been stated without explanation or citation in articles published in numerous peer-reviewed journals such as *Science*,²¹ *Nature*,^{25, 35, 36} and *Cell*¹⁸—survey items were designed to assess whether biologists affirm the fertilization view.

Participants were presented five statements (Q1-Q5) that represented various semantic framings of the fertilization view, and they were asked to affirm or reject the statements. Finally, they were presented an open-ended essay question on the biological perspective on when a human’s life begins (Q6):

- **Question 1:** The end product of mammalian fertilization is a fertilized egg (‘zygote’), a new mammalian organism in the first stage of its species’ life cycle with its species’ genome.
- **Question 2:** The development of a mammal begins with fertilization, a process by which the spermatozoon from the male and the oocyte from the female unite to give rise to a new organism, the zygote.
- **Question 3:** A mammal’s life begins at fertilization, the process during which a male gamete unites with a female gamete to form a single cell called a zygote.
- **Question 4:** In developmental biology, fertilization marks the beginning of a human’s life since that process produces an organism with a human genome that has begun to develop in the first stage of the human life cycle.
- **Question 5:** From a biological perspective, a zygote that has a human genome is a human because it is a human organism developing in the earliest stage of the human life cycle.
- **Question 6:** From a biological perspective, how would you answer the question “When does a human’s life begin?”

As shown in Table 1 above, peer-reviewed journals’ statements that represent the fertilization view vary in how explicitly they state that a human’s life begins at fertilization. These statements (Q1-Q5) similarly varied in their explicitness. Q1 and Q2 reference the beginning of a new organism, Q3 references the beginning of a new life, and Q4 and Q5 explicitly reference the beginning of a human’s life. Some statements focused on mammals (Q1-Q3) and others focused on humans (Q4-Q5); while some were in the form of a declarative statement (Q1-Q3), others took the form of an argument (Q4-Q5); however, all fundamentally represented the view that fertilization marks the beginning

of a human's physical existence as an organism with a human genome who is developing in the human life cycle.

3. Results

3.1. Assessments of Who is Most Qualified to Determine When a Human's Life Begins

As shown in Figure 1 below, 64% of participants (2395 out of 3773) selected biologists as the group most qualified to answer the question “When does a human's life begin?”, 23% selected philosophers (865 out of 3773), 1% selected religious leaders (53 out of 3773), 4% selected Supreme Court Justices (135 out of 3773), and 9% selected voters (325 out of 3773). In a separate measure, 68% of participants (2365 out of 3457) agreed with Americans' selection of biologists as the group most qualified to determine when a human's life begins, and 32% disagreed (1092 out of 3457). These data suggest that biologists do not only view experts in biology as most qualified to make this determination—they primarily view the question of when a human's life begins as a matter of biology.

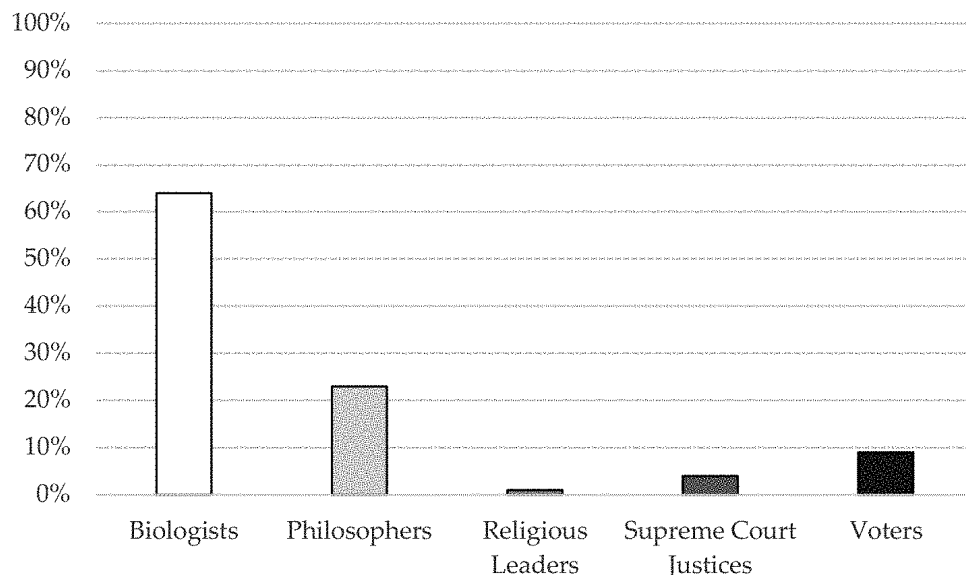


Figure 1. Percentage of biologists who selected different authorities in response to a question on who is most qualified to determine when a human's life begins.

3.2. Assessments of the Fertilization View

The statement in Q1 was affirmed by 91% of participants (4555 out of 4993). The statement in Q2 was affirmed by 88% of participants (3984 out of 4510). The statement in Q3 was affirmed by 77% of participants (3153 out of 4078). The statement in Q4 was affirmed by 75% of participants (2500 out of 3334). The statement in Q5 was affirmed by 69% of participants (2744 out of 3980). For a comparison of these affirmation rates, see Figure 2 below.

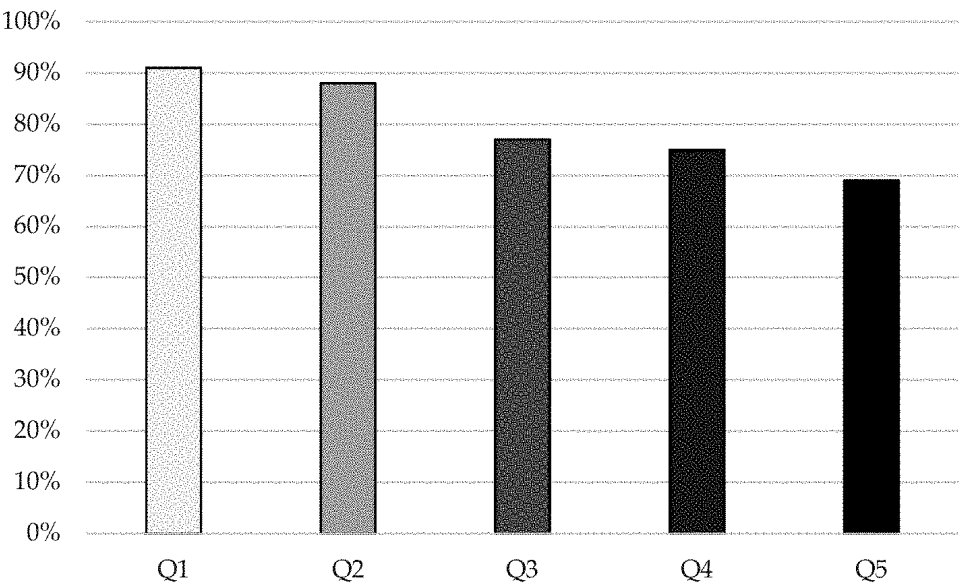


Figure 2. Percentage of biologists who assessed and affirmed the five statements that represented the fertilization view.

As shown in Figure 3 below, of those who assessed at least one of the five statements, 96% of participants affirmed at least one statement (5337 out of 5577) and 4% did not (240 out of 5577). Further, of those who assessed multiple statements, 96% affirmed at least one (4463 out of 4650) and 85% affirmed at least half of the statements they assessed (3936 out of 4650).

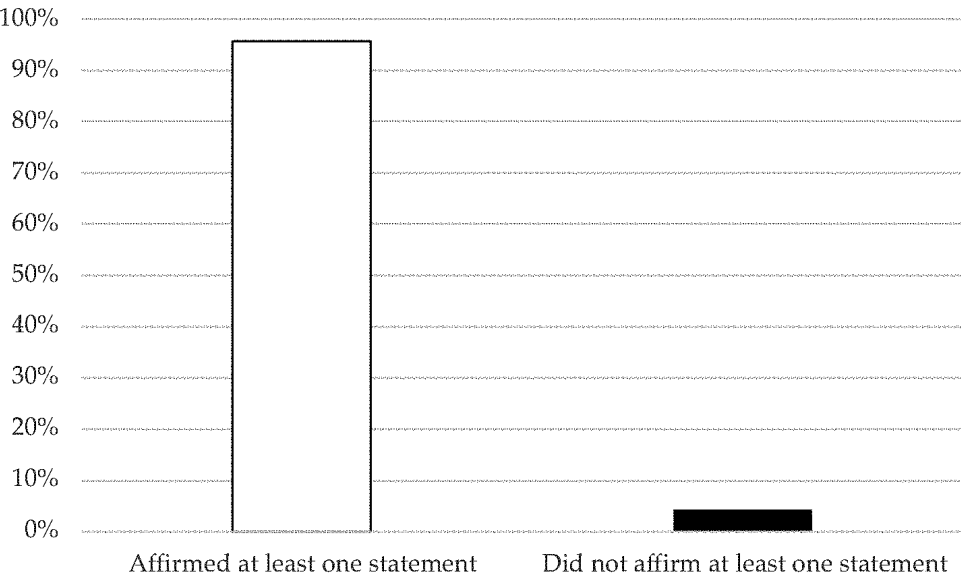


Figure 3. Percentage of biologists who assessed and affirmed at least one statement (Q1-Q5), and the percentage of biologists who assessed at least one statement but did not affirm any.

3.3. An Assessment of the Biological View on When a Human's Life Begins

Consistent with their affirmation rates of the fertilization view in Q1-Q5, Figure 4 below shows that 68% of biologists (1898 out of 2793) represented the fertilization view in response to Q6's open-ended essay question. Among the biologists who did not write about fertilization: 10% (268 out of 2793) represented some point between fertilization and viability (i.e., when a fetus can first survive outside of the womb), 10% (284 out of 2793) represented the viability view, and 12% (343 out of 2793) represented the view that a human's life begins at birth.

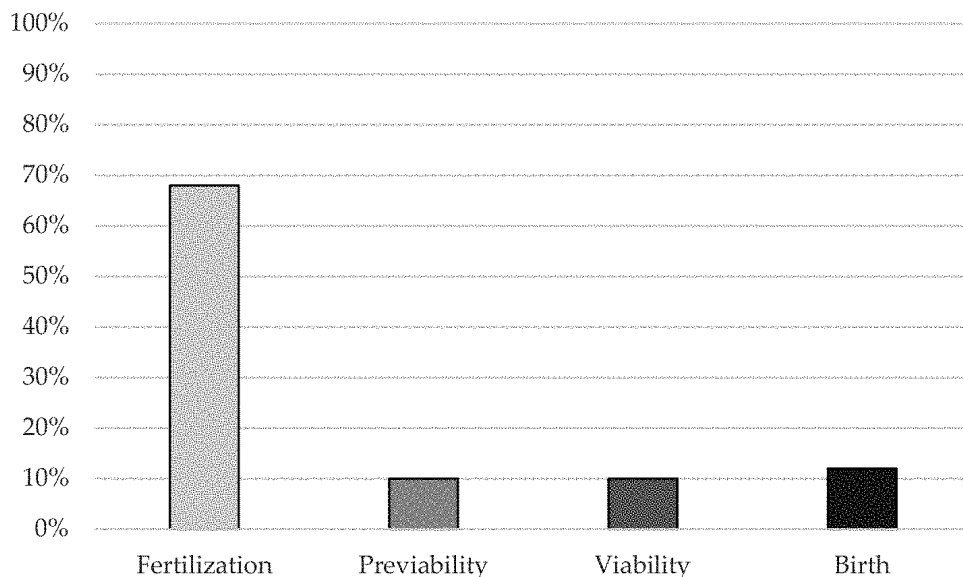


Figure 4. Percentage of biologists who represented different views in response to an open-ended essay question on the biological perspective on when a human's life begins.

The strictest measure of biologists' views assessed the responses of participants who answered each item consistently: (1) those who either affirmed each statement (Q1-Q5) and wrote about the fertilization view in response to the essay question (Q6), and (2) those who rejected each statement and wrote about some later point in development. As shown in Figure 5 below, there was a greater number of participants who consistently affirmed the fertilization view (97%; 1011 out of 1044) than those who consistently rejected the fertilization view (3%; 33 out of 1044).

4. Discussion

The use of the scientific method to assess experts' opinions on controversial topics has been effective in promoting science awareness of the effect of human behavior on climate change.^{3, 4} Consensus cannot prove that the most commonly held view is true, but it can establish the leading view that can be recognized and relied upon as the best science available. However, a leading view can be most trusted if there is no reasonable

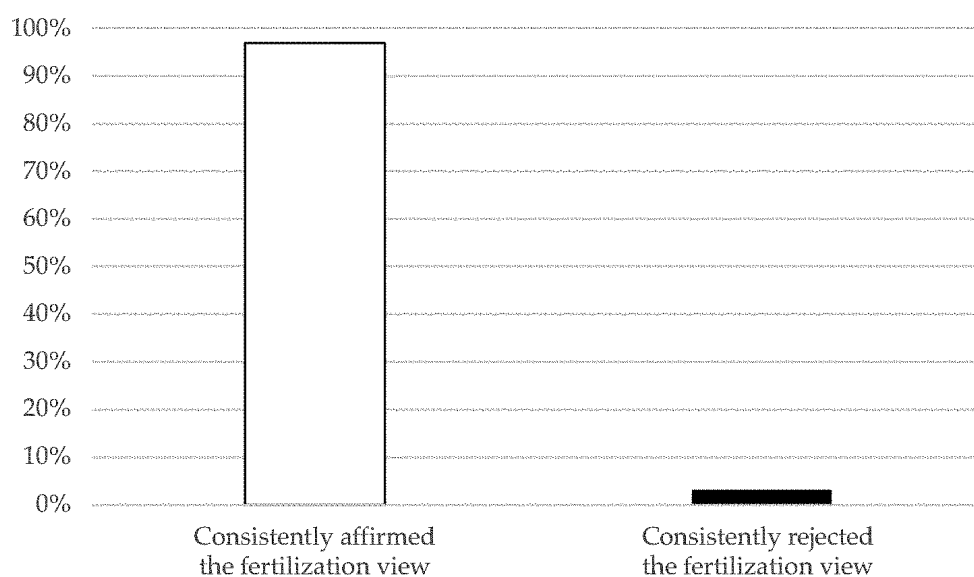


Figure 5. Percentage of biologists who responded consistently across all measures. Biologists who assessed and affirmed each statement (Q1-Q5) and represented the fertilization view in response to an open-ended essay question on when a human's life begins (Q6), and biologists who assessed and rejected each statement and represented some point other than fertilization in response to the essay question.

expectation that the consensus is driven by experts' financial, political, ideological, or personal motivations.

For instance, in the case of anthropogenic climate change, climate scientists might have financial incentives to affirm that human behavior is causing global warming³⁷ (e.g., increased grant funding, better speaking engagements, and even lucrative job opportunities in the corporate and finance sectors.)³⁸ They might also have personal motivations to affirm it; discussions of global warming have made climate science research more prominent, and climate scientists have never been more important or had more of an impact on policy, the economy, and politics. However, in the present study, since 85% of the sample identified as pro-choice and the fertilization view is typically associated with those who identify as pro-life,^{1,2} there is no indication that the present study's results were affected by such bias.

Based on the totality of the biological and life sciences literature's recognition of the fertilization view,⁸ principles of the modern genetics-based method of biologically classifying organisms,³⁹ and the data reported in the present study, the fertilization view stands alone as the leading biological view on when a human's life begins. Thus, using the common meaning of "consensus" (i.e., general agreement), one can reasonably conclude that there is a scientific consensus on the view that a human's life begins at fertilization. Simply put, fertilization marks the point at which a human begins his or her physical existence as a human organism developing in the human life cycle, so he

or she is then properly biologically classified as a human and a member of the *Homo sapiens* species.

Given the high levels of agreement on the fertilization view in the scientific community, the low levels of agreement among the American public suggest an issue of low science awareness on when a human's life begins. Since 96% of biologists affirm the fertilization view but only 38% of Americans do,¹ there seems to not only be a large expert/public opinion gap but perhaps the largest gap on any contentious issue.

The *Pew Research Center* recently analyzed various knowledge gaps between the American public and experts, and it found that the largest gap (51 points) between Americans (37%) and scientists (88%) was on whether it is "[s]afe to eat genetically modified foods."⁴⁰ However, as suggested by the results of the present study, the expert/public opinion gap on when a human's life begins is even larger (58 points), as Americans are less likely to affirm the fertilization view (38%) than scientists (96%).

Since polls on Americans' views are typically conducted in the context of the abortion issue, it is possible that Americans' affirmation rate of the fertilization view would be higher, and the expert/public opinion gap would be smaller, if such questions are asked in isolation from discussions about abortion—Americans who support abortion rights might be more likely to affirm the fertilization view if they are not primed to think about abortion. Thus, researchers seeking to directly assess this expert/public opinion gap should consider asking both Americans and biologists their views in a non-abortive context. Indeed, it is important to understand and address this gap, as the question of when a human's life begins is no trivial or purely academic matter.

Americans were recently surveyed on the importance of this question, and 76% of participants suggested that Americans deserve to know when a human's life begins so they can make informed reproductive decisions.²⁹ The burgeoning field of Science Communication promotes the precept that scientists have a responsibility to communicate scientific findings to members of the public who can then base their life decisions on the best information available.^{41, 42} The field's principles suggest that scientists are responsible for communicating the leading scientific view on when a human's life begins to the public, as it would enable Americans to make reproductive decisions informed by biological knowledge.

Given the size and breadth of the international sample of biologists in the present study, its results represent strong support for the claim that there is a scientific consensus on the view that a human's life begins at fertilization. However, as with any study, follow-up studies should be conducted to replicate these findings, to further assess biologists' stances on the fertilization view, and to perhaps assess why some biologists rejected the fertilization view by arguing that, from a biological perspective, a human's life begins at birth. If this study's findings are confirmed, then the fertilization view can be promoted by scientists and shared with members of the public to ensure they are informed on the biological perspective on when a human's life begins, as this would empower them to make informed reproductive decisions.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was approved by The University of Chicago's Social and Behavioral Sciences Institutional Review Board (IRB16-1228-CR002 on 8/20/18).

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: Any and all data can be made available before publication.

Conflicts of Interest: The author declares no conflict of interest.

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Senator Hyde-Smith's Objection to Senator Duckworth's Live UC of the Access to Family Building Act – February 28, 2024

“I support the ability for mothers and fathers to have total access to IVF and bring new life into the world. I also believe human life should be protected. There are not mutually exclusive. Let’s be clear about what the Alabama case is about. This was a case brought by families whose human embryos were killed when an unauthorized individual walked into a fertility clinic through an unsecured door, removed several human embryos and dropped them causing their deaths. The court’s holding in favor of the parents found that these frozen human embryos are children under Alabama law. It did not ban IVF, nor has any state banned IVF. The bill before us today is a vast overreach that is full of poison pills that go way too far. Far beyond ensuring legal access to IVF, the Act explicitly waives the Religious Freedom Restoration Act and would subject religious and Pro-Life organizations to crippling lawsuits. Religious and Pro-Life organizations can be forced to facilitate procedures that violate their core beliefs including their health insurance plans. This would be the first time the bipartisan Religious Freedom Restoration Act, introduced by then Representative Chuck Schumer, was explicitly waived. The bill’s expansion definition of artificial reproductive technologies, sweeps in much more than IVF and has far-reaching implications. It would legalize human cloning, it would legalize commercial surrogacy including for young girls without parental involvement. It would legalize gene-edited designer babies and lift the federal ban on the creation of three parent embryos. It would legalize the creation of human animal chimeras. Other developed countries like Germany, New Zealand and Australia, as well as states like Louisiana, have policies that allow for IVF coupled with commonsense protections to respect human life. Creating lives through human cloning, the genetic engineering of human embryos and surrogacy is too extreme and goes far beyond IVF. This bill misses the mark. We should strive to do both, and that this bill does not do that, therefore I object.”

Life Begins at Fertilization

The following references illustrate the fact that a new human embryo, the starting point for a human life, comes into existence with the formation of the one-celled zygote:

"Development of the embryo begins at Stage 1 when a sperm fertilizes an oocyte and together they form a zygote."
[England, Marjorie A. *Life Before Birth*. 2nd ed. England: Mosby-Wolfe, 1996, p.31]

"Human development begins after the union of male and female gametes or germ cells during a process known as *fertilization* (conception).
"Fertilization is a sequence of events that begins with the contact of a *sperm* (spermatozoon) with a *secondary oocyte* (ovum) and ends with the fusion of their *pronuclei* (the haploid nuclei of the sperm and ovum) and the mingling of their chromosomes to form a new cell. This fertilized ovum, known as a *zygote*, is a large diploid cell that is the beginning, or *primordium*, of a *human being*."
[Moore, Keith L. *Essentials of Human Embryology*. Toronto: B.C. Decker Inc, 1988, p.2]

"Embryo: the developing organism from the time of fertilization until significant differentiation has occurred, when the organism becomes known as a fetus."
[*Cloning Human Beings*. Report and Recommendations of the National Bioethics Advisory Commission. Rockville, MD: GPO, 1997, Appendix-2.]

"Embryo: An organism in the earliest stage of development; in a man, from the time of conception to the end of the second month in the uterus."
[Dox, Ida G. et al. *The Harper Collins Illustrated Medical Dictionary*. New York: Harper Perennial, 1993, p. 146]

"Embryo: The early developing fertilized egg that is growing into another individual of the species. In man the term 'embryo' is usually restricted to the period of development from fertilization until the end of the eighth week of pregnancy."
[Walters, William and Singer, Peter (eds.). *Test-Tube Babies*. Melbourne: Oxford University Press, 1982, p. 160]

"The development of a human being begins with fertilization, a process by which two highly specialized cells, the *spermatozoon* from the male and the oocyte from the female, unite to give rise to a new organism, the *zygote*."
[Langman, Jan. *Medical Embryology*. 3rd edition. Baltimore: Williams and Wilkins, 1975, p. 3]

"Embryo: The developing individual between the union of the germ cells and the completion of the organs which characterize its body when it becomes a separate organism.... At the moment the sperm cell of the human male meets the ovum of the female and the union results in a fertilized ovum (zygote), a new life has begun.... The term embryo covers the several stages of early development from conception to the ninth or tenth week of life."
[Considine, Douglas (ed.). *Van Nostrand's Scientific Encyclopedia*. 5th edition. New York: Van Nostrand Reinhold Company, 1976, p. 943]

"I would say that among most scientists, the word 'embryo' includes the time from after fertilization..."
[Dr. John Eppig, Senior Staff Scientist, Jackson Laboratory (Bar Harbor, Maine) and Member of the NIH Human Embryo Research Panel -- Panel Transcript, February 2, 1994, p. 31]

"The development of a human begins with fertilization, a process by which the *spermatozoon* from the male and the *oocyte* from the female unite to give rise to a new organism, the *zygote*."

[Sadler, T.W. *Langman's Medical Embryology*. 7th edition. Baltimore: Williams & Wilkins 1995, p. 3]

"The question came up of what is an embryo, when does an embryo exist, when does it occur. I think, as you know, that in development, life is a continuum.... But I think one of the useful definitions that has come out, especially from Germany, has been the stage at which these two nuclei [from sperm and egg] come together and the membranes between the two break down."

[Jonathan Van Blerkom of University of Colorado, expert witness on human embryology before the NIH Human Embryo Research Panel -- Panel Transcript, February 2, 1994, p. 63]

"Zygote. This cell, formed by the union of an ovum and a sperm (Gr. *zyg tos*, yoked together), represents the *beginning of a human being*. The common expression 'fertilized ovum' refers to the zygote."

[Moore, Keith L. and Persaud, T.V.N. *Before We Are Born: Essentials of Embryology and Birth Defects*. 4th edition. Philadelphia: W.B. Saunders Company, 1993, p. 1]

"The chromosomes of the oocyte and sperm are...respectively enclosed within *female* and *male pronuclei*. These pronuclei fuse with each other to produce the single, diploid, 2N nucleus of the fertilized *zygote*. This moment of zygote formation may be taken as the beginning or zero time point of embryonic development."

[Larsen, William J. *Human Embryology*. 2nd edition. New York: Churchill Livingstone, 1997, p. 17]

"Although life is a continuous process, fertilization is a critical landmark because, under ordinary circumstances, a new, genetically distinct human organism is thereby formed.... The combination of 23 chromosomes present in each pronucleus results in 46 chromosomes in the *zygote*. Thus the diploid number is restored and the embryonic genome is formed. The embryo now exists as a genetic unity."

[O'Rahilly, Ronan and Müller, Fabiola. *Human Embryology & Teratology*. 2nd edition. New York: Wiley-Liss, 1996, pp. 8, 29. This textbook lists "pre-embryo" among "discarded and replaced terms" in modern embryology, describing it as "ill-defined and inaccurate" (p. 12)]

"Almost all higher animals start their lives from a single cell, the fertilized ovum (zygote)... The time of fertilization represents the starting point in the life history, or ontogeny, of the individual."

[Carlson, Bruce M. *Patten's Foundations of Embryology*. 6th edition. New York: McGraw-Hill, 1996, p. 3]

"[A]nimal biologists use the term *embryo* to describe the single cell stage, the two-cell stage, and all subsequent stages up until a time when recognizable humanlike limbs and facial features begin to appear between six to eight weeks after fertilization....

"[A] number of specialists working in the field of human reproduction have suggested that we stop using the word *embryo* to describe the developing entity that exists for the first two weeks after fertilization. In its place, they proposed the term *pre-embryo*....

"I'll let you in on a secret. The term pre-embryo has been embraced wholeheartedly by IVF practitioners for reasons that are political, not scientific. The new term is used to provide the illusion that there is something profoundly different between what we nonmedical biologists still call a six-day-old embryo and what we and everyone else call a sixteen-day-old embryo.

"The term pre-embryo is useful in the political arena -- where decisions are made about whether to allow early embryo (now called pre-embryo) experimentation -- as well as in the confines of a doctor's office, where it can be used to allay moral concerns that might be expressed by IVF patients. 'Don't worry,' a doctor might say, 'it's only pre-embryos that we're manipulating or freezing. They won't turn into real human embryos until after we've put them back into your body.'"

[Silver, Lee M. *Remaking Eden: Cloning and Beyond in a Brave New World*. New York: Avon Books, 1997, p. 39]

Mode of delivery after a previous cesarean birth, and associated maternal and neonatal morbidity

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■ Cite as: *CMAJ* 2018 May 7;190:E556-64. doi: 10.1503/cmaj.170371

ABSTRACT

BACKGROUND: The mode of delivery for women with a previous cesarean delivery remains contentious. We conducted a study comparing maternal and infant outcomes after attempted vaginal birth after cesarean delivery versus elective repeat cesarean delivery.

METHODS: We used data from the Discharge Abstract Database that includes all hospital deliveries in Canada (excluding Quebec). In our analysis, we included singleton deliveries to women between 37 and 43 weeks gestation who had a single prior cesarean delivery between April 2003 and March 2015. The primary outcomes were severe maternal morbidity and mortality, and serious neonatal

morbidities and mortality. We used logistic regression to estimate adjusted rate ratios (RRs) and 95% confidence intervals (CIs).

RESULTS: Absolute rates of severe maternal morbidity and mortality were low but significantly higher after attempted vaginal birth after cesarean delivery compared with elective repeat cesarean delivery (10.7 v. 5.65 per 1000 deliveries, respectively; adjusted RR 1.96, 95% CI 1.76 to 2.19). Adjusted rate differences in severe maternal morbidity and mortality, and serious neonatal morbidity and mortality were small (5.42 and 7.09 per 1000 deliveries, respectively; number needed to treat 184 and 141, respectively). The association between

vaginal birth after cesarean delivery, and serious neonatal morbidity and mortality showed a temporal worsening (adjusted RR 0.94, 95% CI 0.77 to 1.15 in 2003–2005; adjusted RR 2.07, 95% CI 1.83 to 2.35 in 2012–2014).

INTERPRETATION: Although absolute rates of adverse outcomes are low, attempted vaginal birth after cesarean delivery continues to be associated with higher relative rates of severe morbidity and mortality in mothers and infants. Temporal worsening of infant outcomes after attempted vaginal birth after cesarean delivery highlights the need for greater care in selecting candidates, and more careful monitoring of labour and delivery.

Vaginal birth after cesarean delivery is increasingly contentious as rates of cesarean delivery rise and prior cesarean delivery serves as the most common single indication for a cesarean delivery. Planning mode of delivery for women with a previous cesarean delivery is challenging both for the patient and the care provider. An elective repeat cesarean delivery is associated with an increased risk of surgical complications, as well as an increased risk of abnormal placentation in subsequent pregnancies.^{1–11} On the other hand, attempted vaginal birth after cesarean delivery is associated with a higher risk of uterine rupture and other maternal and infant complications.^{1–11} In addition, a substantial proportion of women attempting a vaginal birth after cesarean delivery will require an emergency cesarean delivery,^{7,10} which increases the risk of maternal and infant complications.¹¹

Historically, rates of vaginal birth after cesarean delivery in Canada and the United States increased in the 1980s and early 1990s after endorsements by various groups including the Society of Obstetricians and Gynaecologists of Canada, and the

American College of Obstetricians and Gynecologists.^{12–17} However, studies in the mid-1990s, which showed high rates of severe maternal and infant morbidity associated with vaginal birth after cesarean delivery, resulted in cautionary guidelines from the American College of Obstetricians and Gynecologists in 1998 and 1999, and subsequent declines in rates of vaginal birth after cesarean delivery.^{1,2,18,19} The National Institutes of Health Consensus Development Conference Panel summarized the risks and benefits associated with vaginal birth after cesarean delivery in 2010, and in 2013, the American College of Obstetrics and Gynecology stated that most women with 1 previous cesarean delivery could be considered candidates for vaginal birth.^{9,20} Rates of vaginal birth after cesarean delivery have begun to increase again in the US from a low of about 8.4% of all births in 2008 and 2009 to 11.3% in 2014.²¹ In British Columbia, Canada, the proportion of women with a previous cesarean delivery who were deemed eligible for vaginal birth after cesarean delivery increased from 75% in 2010 to 80% in 2014.²²

It is important to monitor population rates of maternal and infant adverse outcomes after attempted vaginal birth after cesarean delivery because a uterine scar is a strong risk factor for uterine rupture. We conducted a study to assess whether contemporary obstetrical care has improved maternal and infant outcomes after attempted vaginal birth after cesarean delivery.

Methods

Setting and design

We conducted a retrospective cohort study, with all hospital deliveries to women in Canada between April 2003 and March 2015 serving as the source population.

Study population

For the primary analysis, we restricted the study population to women with a parity of 1, a previous cesarean delivery (ensuring that all women had only 1 previous cesarean delivery) and, in the current pregnancy, a singleton delivery at 37 to 43 weeks gestation. The comparison of interest was between elective repeat cesarean delivery and attempted vaginal birth after cesarean delivery. We also conducted analyses that compared outcomes in women who had an elective repeat cesarean delivery with those in women who had a successful or failed vaginal birth after cesarean delivery to obtain insight into the mechanisms underlying potential differences in outcomes. Definitions of different modes of delivery, and the diagnostic and procedure codes used are provided in Appendix 1, supplementary Table 1, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170371/-/DC1.

Data sources

We obtained data for the study from the Discharge Abstract Database of the Canadian Institute for Health Information. This database, which contains records for about 98% of all deliveries in Canada (excluding Quebec), is based on information that is routinely abstracted from medical charts by trained personnel using standardized definitions and processes.²³ The abstracted information includes details regarding maternal and infant characteristics, labour and delivery, and diagnoses and procedures. All diagnoses during the study period were coded using the International Statistical Classification of Diseases and Related Health Problems, 10th revision, Canadian version, whereas procedures were coded using the Canadian Classification of Health Interventions. The validity of the perinatal information in the Discharge Abstract Database has been assessed previously and found to be accurate.^{24,25}

Outcomes

The primary maternal outcome was composite severe maternal morbidity and mortality, which included severe postpartum hemorrhage (i.e., postpartum hemorrhage requiring blood transfusion, cesarean hysterectomy, hysterectomy or procedures to control bleeding such as ligation or embolization of pelvic vessels, and B-lynch suture of the uterus), disseminated intravascular coagulation, cardiac arrest, cardiopulmonary resuscitation, acute myocardial infarction, heart failure, pulmonary edema,

cardiac complications from anesthesia, assisted ventilation, adult respiratory distress syndrome, acute or unspecified renal failure, repair of injury to the bladder or urethra and maternal death.^{26,27} We also evaluated a second composite maternal outcome, restricted severe maternal morbidity and mortality, which included the same components except for postpartum hemorrhage requiring blood transfusion (the most common severe morbidity). We also assessed the following maternal outcomes: uterine rupture (including and excluding dehiscence of the uterine scar) and postpartum hemorrhage that required blood transfusion, procedures to control bleeding or hysterectomy.

The primary infant outcome was composite severe neonatal morbidity and mortality, which included neonatal seizures, any assisted ventilation (including assisted ventilation requiring endotracheal intubation or continuous positive airway pressure) and neonatal death.^{28,29} We also evaluated a second composite neonatal outcome that included neonatal death, neonatal seizures and assisted ventilation requiring endotracheal intubation (excluding assisted ventilation requiring continuous positive airway pressure). We also evaluated the following outcomes: neonatal death, assisted ventilation, neonatal seizures and respiratory distress syndrome.

Infant outcomes were evaluated after we restricted the population to infants without congenital anomalies.

Statistical analysis

The comparisons in maternal and infant outcomes between the groups of interest were quantified using rates, rate ratios (RRs) and 95% confidence intervals (CI), with women who had elective repeat cesarean deliveries as the reference group. Logistic models included maternal age, diabetes mellitus, hypertension and labour induction. We calculated adjusted rate differences from the absolute outcome rates for the elective repeat cesarean delivery group and adjusted RRs for attempted vaginal birth after cesarean delivery group, which we used to compute the number needed to treat (NNT). We evaluated temporal changes in maternal and infant effects from attempted vaginal birth after cesarean delivery by comparing adjusted RRs in early and later study periods (2003–2005 v. 2012–2014). We tested modification of the effect of attempted vaginal birth after cesarean delivery (on composite maternal and neonatal morbidity and mortality) by year using interaction terms.

We repeated these analyses for all women who had a previous cesarean delivery (i.e., without restriction by parity). We also conducted post hoc sensitivity analyses in women at 40 weeks gestation or more to address potential misclassification of elective repeat cesarean and attempted vaginal birth after cesarean delivery (because women planning an elective repeat cesarean delivery would have had this procedure before 40 wk). We used a 2-sided *p* value less than 0.05 to guide inference. All analyses were conducted using SAS version 9.2 (SAS Institute).

Ethics approval

The study was based on anonymized data and conducted under the surveillance mandate of the Public Health Agency of Canada, and ethics approval was not required.

Results

The source population included 3047401 women who delivered between 2003 and 2014. There were 197540 women with a parity of 1 and a previous cesarean delivery who had a singleton delivery at 37 to 43 weeks gestation in the current pregnancy. Of these women, 77426 (39.2%) were 30 to 34 years of age, 7026 (3.6%) had hypertension, 1510 (0.8%) had diabetes mellitus and 7307 (3.7%) had labour induction (Table 1). Women who had an elective repeat cesarean delivery were older and had slightly higher rates of hypertension and diabetes mellitus than women who delivered after an attempted vaginal birth after cesarean delivery. The attempted vaginal birth after cesarean delivery rate was 32.8% (7733/23565) in 2003–2004, decreased to 28.2% (9633/34205) in 2007–2008 and then increased to 31.4% (11636/37070) in 2013–2014. Among women who attempted vaginal birth after cesarean delivery, success rates declined from 50.2% (1689/3368) in 2003 to 47.8% (2347/4909) in 2008, before increasing to 50.8% (2987/5878) in 2014 (Appendix 2, supplementary Figure 1A, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170371/-/DC1).

Table 2 shows rates of severe maternal morbidity and mortality after elective repeat cesarean delivery and attempted vaginal birth after cesarean delivery in the study population. Women who had an attempted vaginal birth after cesarean delivery had significantly higher rates of uterine rupture, severe postpartum hemorrhage and composite severe maternal morbidity and mor-

tality compared to women who had an elective repeat cesarean delivery. The adjusted RR for composite severe maternal morbidity and mortality among women who had an attempted vaginal birth after cesarean delivery was 1.96 (95% CI 1.76 to 2.19) and 6.41 (95% CI 4.84 to 8.50) for uterine rupture (not including dehiscence). Analyses stratified by success/failure of the vaginal birth after cesarean delivery attempt showed that women who had a successful vaginal birth after cesarean delivery had significantly lower rates of restricted severe maternal morbidity and mortality (adjusted RR 0.57, 95% CI 0.45 to 0.73), whereas women with a failed vaginal birth after cesarean delivery had substantially higher rates (adjusted RR 2.58, 95% CI 2.25 to 2.95).

Rates of severe neonatal morbidity and mortality followed a mostly similar pattern, with rates of composite severe neonatal morbidity and mortality being significantly higher among women who delivered after an attempted vaginal birth after cesarean delivery compared with those delivering by elective repeat cesarean (adjusted RR 1.49, 95% CI 1.38 to 1.61; Table 3). Rates of neonatal seizures and assisted ventilation were significantly higher, whereas rates of neonatal death were nonsignificantly higher among women who delivered after an attempted vaginal birth after cesarean delivery. However, rates of neonatal respiratory distress syndrome were significantly lower among women delivering after an attempted vaginal birth after cesarean delivery (adjusted RR 0.90, 95% CI 0.86 to 0.94). Women with a successful vaginal birth after cesarean delivery had significantly lower rates

Table 1: Maternal characteristics and mode of delivery*

Characteristic	No. (%) of participants with a previous cesarean delivery <i>n</i> = 197 540	No. (%) of participants with an elective repeat cesarean <i>n</i> = 138 836	No. (%) of participants with an attempted VBAC <i>n</i> = 58 704	Rate of attempted VBAC delivery, %
Maternal age,† yr				
< 20	1716 (0.9)	1084 (0.8)	632 (1.1)	36.8
20–24	17 075 (8.6)	11 063 (8.0)	6012 (10.2)	35.2
25–29	46 936 (23.8)	31 600 (22.8)	15 336 (26.1)	32.7
30–34	77 426 (39.2)	54 267 (39.1)	23 159 (39.5)	29.9
≥ 35	54 385 (27.5)	40 821 (29.4)	13 564 (23.1)	24.9
Had hypertension	7026 (3.6)	5001 (3.6)	2025 (3.4)	28.8
Had diabetes mellitus	1510 (0.8)	1191 (0.9)	319 (0.5)	21.1
Had labour induction	7307 (3.7)	0 (0.00)	7307 (12.5)	100.0
Delivery occurred during				
2003–2004	23 565 (11.9)	15 832 (11.4)	7733 (13.2)	32.8
2005–2006	30 764 (15.6)	22 037 (15.9)	8727 (14.9)	28.4
2007–2008	34 205 (17.3)	24 572 (17.7)	9633 (16.4)	28.2
2009–2010	35 713 (18.1)	25 406 (18.3)	10 307 (17.6)	28.9
2011–2012	36 223 (18.3)	25 555 (18.4)	10 668 (18.2)	29.5
2013–2014	37 070 (18.8)	25 434 (18.3)	11 636 (19.8)	31.4

Note: VBAC = vaginal birth after cesarean.

*Our study was restricted to women with a parity of 1 who had a previous cesarean delivery and who delivered a singleton at 37 to 43 weeks gestation in the current pregnancy in Canada (excluding Quebec) from 2003 to 2014. Participants with missing values were excluded.

†For maternal age, the denominators used were 197 538 (no. of participants with a previous cesarean delivery), 138 835 (no. of participants with an elective repeat cesarean) and 58 703 (no. of participants with an attempted VBAC).

of neonatal respiratory distress syndrome, whereas those with a failed vaginal birth after cesarean delivery had significantly higher rates. Failed vaginal birth after cesarean delivery was associated with a threefold higher rate of neonatal death (Table 3).

Table 4 provides adjusted rate differences for maternal and infant outcomes and the NNT for attempted vaginal birth after cesarean delivery; 135 women attempting a vaginal birth after cesarean delivery would have to be delivered by elective repeat

Table 2: Severe maternal morbidity and mortality, by type of delivery*

Outcome	No. of deliveries	Rate per 1000 deliveries	Crude RR (95% CI)	Adjusted RR† (95% CI)
Uterine rupture				
Elective repeat cesarean	243	1.75	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	583	9.93	5.72 (4.92 to 6.65)	5.24 (4.48 to 6.12)
Successful VBAC	38	1.30	0.74 (0.53 to 1.04)	0.64 (0.45 to 0.90)
Failed VBAC	545	18.5	10.8 (9.24 to 12.5)	9.62 (8.23 to 11.3)
Rupture not including dehiscence				
Elective repeat cesarean	69	0.50	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	194	3.30	6.67 (5.07 to 8.78)	6.41 (4.84 to 8.50)
Successful VBAC	15	0.51	1.03 (0.59 to 1.80)	0.94 (0.54 to 1.66)
Failed VBAC	179	6.08	12.3 (9.32 to 16.2)	11.6 (8.77 to 15.5)
PPH and blood transfusion				
Elective repeat cesarean	226	1.63	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	264	4.50	2.77 (2.32 to 3.31)	2.80 (2.33 to 3.37)
Successful VBAC	153	5.23	3.22 (2.63 to 3.96)	3.34 (2.69 to 4.14)
Failed VBAC	111	3.77	2.32 (1.85 to 2.91)	2.32 (1.84 to 2.92)
PPH and procedures for bleeding				
Elective repeat cesarean	213	1.53	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	125	2.13	1.39 (1.11 to 1.73)	1.44 (1.15 to 1.82)
Successful VBAC	19	0.65	0.42 (0.26 to 0.68)	0.44 (0.28 to 0.72)
Failed VBAC	106	3.60	2.35 (1.86 to 2.97)	2.33 (1.83 to 2.97)
PPH and hysterectomy				
Elective repeat cesarean	76	0.55	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	32	0.55	1.00 (0.66 to 1.51)	1.05 (0.68 to 1.62)
Successful VBAC	5	0.17	0.31 (0.13 to 0.77)	0.33 (0.13 to 0.84)
Failed VBAC	27	0.92	1.68 (1.08 to 2.60)	1.67 (1.06 to 2.64)
Maternal morbidity and mortality‡				
Elective repeat cesarean	784	5.65	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	629	10.7	1.91 (1.72 to 2.12)	1.96 (1.76 to 2.19)
Successful VBAC	209	7.14	1.27 (1.09 to 1.48)	1.32 (1.13 to 1.55)
Failed VBAC	420	14.3	2.55 (2.26 to 2.87)	2.54 (2.25 to 2.87)
Restricted severe morbidity¶				
Elective repeat cesarean	645	4.65	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	422	7.19	1.55 (1.37 to 1.76)	1.63 (1.43 to 1.85)
Successful VBAC	73	2.49	0.54 (0.42 to 0.68)	0.57 (0.45 to 0.73)
Failed VBAC	349	11.9	2.57 (2.26 to 2.93)	2.58 (2.25 to 2.95)

Note: CI = confidence interval, PPH = postpartum hemorrhage, RR = rate ratio, VBAC = vaginal birth after cesarean.

*There were 138 836 elective repeat cesarean deliveries, 58 704 attempted VBAC deliveries, 29 261 successful VBAC deliveries and 29 443 failed VBAC deliveries. Our study was restricted to women with a parity of 1 who had a previous cesarean delivery and who delivered a singleton at 37 to 43 weeks gestation in the current pregnancy in Canada (excluding Quebec) from 2003 to 2014.

†Logistic models included maternal age, diabetes mellitus, hypertension and labour induction.

‡Severe maternal morbidity and mortality included death, acute myocardial infarction, heart failure, pulmonary edema, disseminated intravascular coagulation, cardiac arrest, assisted ventilation, cardiac complications from anesthesia, cardiopulmonary resuscitation, adult respiratory distress syndrome, acute/unspecified renal failure, blood transfusion given PPH, shock procedures to control bleeding given PPH, cesarean hysterectomy given PPH, total hysterectomy open approach given PPH, subtotal hysterectomy open approach given PPH and repair of injury to bladder and urethra.

¶Restricted severe morbidity included the same conditions as for severe maternal morbidity and mortality, except blood transfusion given PPH.

cesarean to prevent 1 case of uterine rupture. The NNT was 184 for severe maternal morbidity and mortality, and 141 for severe neonatal morbidity and mortality.

Analyses comparing the association of vaginal birth after cesarean delivery with maternal and infant morbidity and mortality in

2003–2005 versus 2012–2014 showed no significant differences in adjusted RRs for adverse maternal outcomes but did show significantly higher adjusted RRs for severe neonatal morbidity and mortality in the later period (Table 5). Attempted vaginal birth after cesarean delivery was not associated with severe neonatal morbidity and

Table 3: Neonatal death and serious neonatal morbidity, by type of delivery*

Outcome	No. of births	Rate per 1000 deliveries	Crude RR (95% CI)	Adjusted RR† (95% CI)
Neonatal death				
Elective repeat cesarean	11	0.08	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	12	0.22	2.58 (1.14 to 5.84)	2.32 (0.99 to 5.48)
Successful VBAC	< 5	< 0.18	1.71 (0.55 to 8.57)	1.46 (0.45 to 4.78)
Failed VBAC	8	0.29	3.45 (1.39 to 8.57)	3.22 (1.26 to 8.24)
Assisted ventilation				
Elective repeat cesarean	1835	14.0	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	1111	20.0	1.44 (1.33 to 1.55)	1.49 (1.38 to 1.62)
Successful VBAC	400	14.3	1.03 (0.92 to 1.14)	1.08 (0.96 to 1.20)
Failed VBAC	711	25.6	1.86 (1.70 to 2.03)	1.88 (1.72 to 2.06)
Assisted ventilation excluding CPAP				
Elective repeat cesarean	396	3.01	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	362	6.50	2.17 (1.88 to 2.50)	2.15 (1.85 to 2.49)
Successful VBAC	118	4.22	1.40 (1.14 to 1.73)	1.38 (1.12 to 1.71)
Failed VBAC	244	8.79	2.94 (2.50 to 3.45)	2.87 (2.44 to 3.39)
Neonatal seizures				
Elective repeat cesarean	79	0.60	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	77	1.38	2.30 (1.68 to 3.15)	2.30 (1.65 to 3.19)
Successful VBAC	30	1.07	1.79 (1.17 to 2.72)	1.78 (1.15 to 2.76)
Failed VBAC	47	1.69	2.82 (1.97 to 4.05)	2.77 (1.91 to 4.01)
Respiratory distress syndrome				
Elective repeat cesarean	7231	55.0	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	2699	48.5	0.88 (0.84 to 0.92)	0.90 (0.86 to 0.94)
Successful VBAC	1032	36.9	0.66 (0.62 to 0.70)	0.68 (0.63 to 0.72)
Failed VBAC	1667	60.1	1.10 (1.04 to 1.16)	1.12 (1.06 to 1.18)
Neonatal mortality and morbidity‡				
Elective repeat cesarean	1903	14.5	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	1157	20.8	1.45 (1.34 to 1.56)	1.49 (1.38 to 1.61)
Successful VBAC	420	15.0	1.04 (0.93 to 1.16)	1.08 (0.97 to 1.21)
Failed VBAC	737	26.6	1.86 (1.71 to 2.03)	1.88 (1.72 to 2.05)
Restricted mortality and morbidity¶				
Elective repeat cesarean	469	3.57	1.00 (Ref.)	1.00 (Ref.)
Attempted VBAC	415	7.45	2.10 (1.84 to 2.40)	2.07 (1.81 to 2.38)
Successful VBAC	140	5.01	1.41 (1.16 to 1.70)	1.38 (1.13 to 1.68)
Failed VBAC	275	9.91	2.80 (2.41 to 3.25)	2.73 (2.34 to 3.19)

Note: CI = confidence interval, CPAP = continuous positive airway pressure, RR = rate ratio, VBAC = vaginal birth after cesarean.

*There were 131 493 elective repeat cesarean births, 55 691 attempted VBAC births, 27 947 successful VBAC births and 27 744 failed VBAC births without congenital anomalies. Our study was restricted to women with a parity of 1 who had a previous cesarean delivery and who delivered a singleton at 37 to 43 weeks gestation in the current pregnancy in Canada (excluding Quebec) from 2003 to 2014. Births with congenital anomalies were excluded.

†Logistic models included maternal age, diabetes mellitus, hypertension and labour induction.

‡Neonatal mortality and morbidity included neonatal death, neonatal seizures and assisted ventilation including CPAP.

¶Restricted mortality and morbidity included neonatal death, neonatal seizures and assisted ventilation not including CPAP.

Table 4: Adjusted rate differences for maternal and fetal outcomes (per 1000 deliveries) and number needed to treat for vaginal birth after cesarean delivery, by delivery type*

Outcome	Adjusted rate difference	
	Point estimate (95% CI)	NNT
Attempted VBAC delivery†		
Maternal		
Uterine rupture	7.42 (6.09 to 8.96)	135
Uterine rupture not including dehiscence	2.69 (1.91 to 3.73)	372
PPH and blood transfusion	2.93 (2.17 to 3.86)	341
Severe morbidity	5.42 (4.29 to 6.72)	184
Restricted morbidity	2.93 (2.00 to 3.95)	342
Neonatal		
Death	0.11 (0.00 to 0.37)	9056
Assisted ventilation	6.84 (5.30 to 8.65)	146
Assisted ventilation excluding CPAP	3.46 (2.56 to 4.49)	289
Seizures	0.78 (0.39 to 1.32)	1280
Respiratory distress syndrome	-5.50 (-7.70 to -3.30)	-182
Mortality and morbidity	7.09 (5.50 to 8.83)	141
Restricted mortality and morbidity	3.82 (2.89 to 4.92)	262
Successful VBAC†		
Maternal		
Uterine rupture	-0.63 (-0.96 to -0.18)	-1587
Uterine rupture not including dehiscence	-0.03 (-0.23 to 0.33)	-33 535
PPH and blood transfusion	3.81 (2.75 to 5.11)	263
Severe morbidity	1.81 (0.73 to 3.11)	553
Restricted morbidity	-2.00 (-2.56 to -1.25)	-501
Neonatal		
Assisted ventilation	1.12 (-0.56 to 2.79)	896
Respiratory distress syndrome	-17.6 (-20.4 to -15.4)	-57
Mortality and morbidity	1.16 (-0.43 to 3.04)	864
After failed VBAC delivery†		
Maternal		
Uterine rupture	15.1 (12.7 to 18.0)	66
Uterine rupture not including dehiscence	5.27 (3.86 to 7.21)	190
PPH and blood transfusion	2.15 (1.37 to 3.13)	465
Severe morbidity	8.70 (7.06 to 10.6)	115
Restricted morbidity	7.34 (5.81 to 9.06)	136
Neonatal		
Death	0.19 (0.02 to 0.61)	5385
Assisted ventilation	12.3 (10.1 to 14.8)	81
Assisted ventilation excluding CPAP	5.63 (4.34 to 7.20)	178
Seizures	1.06 (0.55 to 1.81)	940
Respiratory distress syndrome	6.60 (3.30 to 9.90)	152
Mortality and morbidity	12.7 (10.4 to 15.2)	79
Restricted mortality and morbidity	6.17 (4.78 to 7.81)	162

Note: CI = confidence interval, CPAP = continuous positive airway pressure, NNT = number needed to treat, PPH = postpartum hemorrhage, VBAC = vaginal birth after cesarean.

*Selected maternal and neonatal outcomes after attempted vaginal birth among women with a single previous pregnancy that resulted in a cesarean, who subsequently delivered a singleton at 37 to 43 weeks gestation in the current pregnancy in Canada (excluding Quebec) from 2003 to 2014. See footnotes to Table 2 and Table 3 for components of maternal and neonatal morbidity.

†Women who delivered by elective repeat cesarean served as the reference group.

mortality in 2003–2005 (adjusted RR 0.94, 95% CI 0.77 to 1.15), whereas this association was significant in 2012–2014 (adjusted RR 2.07, 95% CI 1.83 to 2.35; p value for difference in rate ratios < 0.05). The interaction term between attempted vaginal birth after cesarean delivery and year was significant for the neonatal morbidity outcomes ($p = 0.36$ for composite severe maternal morbidity, $p < 0.001$ for composite serious neonatal morbidity and $p < 0.001$ for respiratory distress syndrome; Appendix 2).

We found that analyses conducted for all women with a previous cesarean delivery showed essentially the same results (Appendix 1, supplementary Tables 1–6) with slight attenuation in adjusted RRs. Sensitivity analyses that were restricted to women at 40 weeks or more gestation also showed similar results for maternal outcomes (Appendix 1, supplementary Table 7) and significantly larger effects for neonatal outcomes (Appendix 1, supplementary Table 8). The adjusted RR expressing the association between attempted vaginal birth after cesarean delivery and severe neonatal morbidity and mortality, which was 1.49 (95% CI 1.38 to 1.61) in the primary analysis, was 2.37 (95% CI 1.91 to 2.96) in this sensitivity analysis (difference in RRs $p < 0.05$).

Interpretation

Our study showed that absolute rates of severe maternal and neonatal morbidity and mortality were low among women who attempted a vaginal birth after cesarean delivery and those who had an elective repeat cesarean delivery. However, relative rates of severe maternal and serious neonatal morbidity and mortality were substantially higher following attempted vaginal birth after cesarean delivery. Perhaps the most concerning finding was the temporal change in the effect of attempted vaginal birth after cesarean delivery on infant outcomes: severe neonatal morbidity and mortality rates were not significantly different following an attempted vaginal birth after cesarean delivery in 2003–2005, whereas such morbidity and mortality was 2-fold higher following an attempted vaginal birth after cesarean delivery in 2012–2014.

Although the number of women with a previous cesarean delivery increased from 2003 to 2014, rates of attempted vaginal birth after cesarean delivery and rates of success after a trial of labour were essentially unchanged. These stable rates likely conceal substantial changes in attitudes toward attempted vaginal birth after

cesarean delivery over the study period among women who are pregnant and health care providers. In 1998, the American College of Obstetricians and Gynecologists recommended that vaginal birth after cesarean delivery be attempted only in well-equipped

hospitals with “ready availability” emergency care.¹⁵ This ready availability terminology gave way to “immediate availability of emergency care” in 1999.¹⁶ The subsequent sharp decline in rates of vaginal birth after cesarean delivery led to a moderation of the

Table 5: Maternal and neonatal outcomes for vaginal birth after cesarean delivery for 2003–2005 versus 2012–2014, by delivery type*

Outcome	Adjusted RR (95% CI)†‡	
	2003–2005	2012–2014
Attempted VBAC		
Maternal		
Uterine rupture	6.74 (4.74 to 9.58)	5.47 (4.14 to 7.23)
Uterine rupture not including dehiscence	7.01 (3.71 to 13.2)	9.08 (5.20 to 15.9)
Severe morbidity	1.80 (1.32 to 2.46)	1.93 (1.62 to 2.30)
Neonatal		
Assisted ventilation	0.91 (0.74 to 1.12)	2.08 (1.84 to 2.36)
Assisted ventilation excluding CPAP	1.42 (0.96 to 2.10)	3.11 (2.40 to 4.03)
Seizures	1.62 (0.81 to 3.25)	2.92 (1.54 to 5.55)
Respiratory distress syndrome	0.81 (0.74 to 0.89)	1.07 (0.98 to 1.18)
Mortality and morbidity	0.94 (0.77 to 1.15)	2.07 (1.83 to 2.35)
Restricted mortality and morbidity	1.43 (1.01 to 2.02)	2.97 (2.32 to 3.79)
Successful VBAC		
Maternal		
Uterine rupture	0.71 (0.33 to 1.53)	0.69 (0.38 to 1.25)
Uterine rupture not including dehiscence	0.66 (0.15 to 2.95)	1.30 (0.47 to 3.59)
Severe morbidity	0.81 (0.47 to 1.39)	1.15 (0.89 to 1.49)
Neonatal		
Assisted ventilation	0.58 (0.42 to 0.80)	1.63 (1.38 to 1.92)
Assisted ventilation excluding CPAP	0.97 (0.56 to 1.69)	2.30 (1.64 to 3.22)
Seizures	1.58 (0.65 to 3.84)	2.61 (1.19 to 5.72)
Respiratory distress syndrome	0.60 (0.53 to 0.70)	0.82 (0.72 to 0.93)
Mortality and morbidity	0.64 (0.47 to 0.86)	1.64 (1.39 to 1.93)
Restricted mortality and morbidity	1.10 (0.69 to 1.76)	2.26 (1.65 to 3.10)
Failed VBAC		
Maternal		
Uterine rupture	12.4 (8.72 to 17.7)	10.3 (7.78 to 13.6)
Uterine rupture not including dehiscence	12.9 (6.81 to 24.4)	17.0 (9.69 to 29.7)
Severe morbidity	2.67 (1.92 to 3.73)	2.69 (2.22 to 3.25)
Neonatal		
Assisted ventilation	1.22 (0.96 to 1.55)	2.53 (2.19 to 2.93)
Assisted ventilation excluding CPAP	1.84 (1.19 to 2.86)	3.93 (2.94 to 5.24)
Seizures	1.66 (0.72 to 3.82)	3.22 (1.55 to 6.70)
Respiratory distress syndrome	1.01 (0.90 to 1.13)	1.34 (1.20 to 1.49)
Mortality and morbidity	1.22 (0.97 to 1.54)	2.50 (2.17 to 2.89)
Restricted mortality and morbidity	1.73 (1.17 to 2.57)	3.67 (2.79 to 4.83)

Note: CI = confidence interval, CPAP = continuous positive airway pressure, RR = rate ratio, VBAC = vaginal birth after cesarean.

*Our study contrasted women with an attempted vaginal birth after cesarean delivery compared with elective cesarean delivery among women with a single prior pregnancy that resulted in a cesarean (reference group), who subsequently delivered a singleton at 37 to 43 weeks gestation in the current pregnancy in Canada (excluding Quebec) from 2003 to 2005 ($n = 38\,752$ for maternal outcomes; $n = 36\,684$ for neonatal outcomes) and from 2012 to 2014 ($n = 55\,246$ for maternal outcomes; $n = 51\,991$ for neonatal outcomes).

†Text in boldface type indicates a statistically significant temporal change in the adjusted RR ($p < 0.05$).

‡Logistic models for maternal and neonatal outcomes included maternal age, diabetes mellitus, hypertension and labour induction.

position about the need for specialized services: in 2005, the Society of Obstetricians and Gynaecologists of Canada recommended that vaginal birth after cesarean deliveries be done in hospitals where a timely cesarean delivery was possible.³⁰

Evidence related to attempted vaginal birth after cesarean delivery and the changes to the guidelines mentioned previously likely explains the finding of no association between attempted vaginal birth after cesarean delivery and severe neonatal morbidity and mortality in 2003–2005. A seminal study showing a near 2-fold increase in major maternal complications after a trial of labour was published in 1996,¹ another study showing an 11-fold increase in perinatal death was published in 2002,²³ and a third study showing higher rates of maternal and infant complications was published in 2004.²⁴ The climate of concern created by these studies likely affected the selection of candidates and labour management for attempted vaginal birth after cesarean delivery and ensured better perinatal outcomes during 2003–2005. The increase in the adverse effects for attempted vaginal birth after cesarean delivery more recently may indicate a less rigorous approach to selection of candidates and management of attempted vaginal birth after cesarean delivery. A reduction in the availability of obstetricians with expertise in vaginal birth after cesarean delivery and temporal changes in maternal characteristics are other possibilities.

The evaluation and interpretation of risks associated with attempted vaginal birth after cesarean delivery presents a challenge because risk perspectives vary widely. Both the relative increase in rates of severe maternal and neonatal morbidity and mortality after attempted vaginal birth after cesarean delivery compared with elective repeat cesarean delivery and the absolute difference in these rates need to be weighed carefully before a decision is made about whether the excess risks are acceptable or high. In addition, women planning large families need to be cognizant of the risks of morbid placentation in subsequent pregnancies, because such risks increase with repeated cesarean deliveries.⁹ These inputs into decision-making may also be affected by desire for vaginal birth, the severity of the outcomes in question and other personal valuations. Health care providers need to help women to contextualize risks better so that they are able to make informed and personalized decisions.

Limitations

The limitations of our study include reliance on data from a large perinatal database, which may contain some transcription and other errors. Although codes for major diagnoses and procedures in our data source have been validated and found to be accurate, misclassification of some women scheduled for elective repeat cesarean delivery is possible. However, this would have served to minimize differences between elective repeat cesarean delivery and attempted vaginal birth after cesarean delivery, and sensitivity analyses restricted to women at 40 weeks or more gestation support this assumption.

Conclusion

Attempted vaginal birth after cesarean delivery is associated with low absolute rates of severe maternal and infant morbidity and mortality, although relative rates of such adverse outcomes

are higher than for elective repeat cesarean delivery. Temporal trends in the effects of attempted vaginal birth after cesarean delivery on serious neonatal morbidity and mortality have shown a concerning increase in recent years, and further study is required to identify the cause of this unexpected development. Attempts at ensuring the safety of attempted vaginal birth after cesarean delivery must continue to focus on appropriate selection of candidates and careful monitoring of labour and delivery among women with a previous cesarean delivery.

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Competing interests: None declared.

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Funding: Giulia Muraca received a Vanier Canada Graduate Scholarship and is supported by a Canadian Institutes of Health Research (CIHR) grant to study severe maternal morbidity (MAH-15445). K.S. Joseph is supported by the British Columbia Children's Hospital Research Institute and holds a CIHR Chair in maternal, fetal, and infant health services research (APR-126338). This study was conducted under the auspices of the Canadian Perinatal Surveillance System.

Accepted: Feb. 7, 2018

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Practice Location Preferences in Response to State Abortion Restrictions Among Physicians and Trainees on Social Media



J Gen Intern Med 38(10):2419–23
DOI: 10.1007/s11606-023-08096-5
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INTRODUCTION

The United States (U.S.) Supreme Court's *Dobbs* decision overturned the constitutional right to abortion. Abortion restrictions are in place or are expected in 26 states.¹ While not all physicians perform abortions, the bans broadly impact healthcare delivery for reproductive age patients, including many physicians themselves or their family members. Previous research demonstrates 67% of physicians support abortion access.² Despite wide speculation by media or policy-makers, no published study to date has described how state abortion restrictions may influence practice location preferences for physicians and trainees.³

METHODS

Between August 12 and 23, 2022, a non-probabilistic sample of physicians and trainees was recruited via social media communities (physician and student Facebook groups, Instagram stories on influential medical accounts, Twitter hashtags #MedTwitter #MedStudentTwitter). U.S. medical students and international medical graduates (IMGs) applying to U.S. residency programs, residents, fellows, and physicians in all specialties were eligible. A Qualtrics bot detector identified and removed likely bots ($n = 5$, 0.2%), and duplicate responses were disabled.

The survey collected demographics (age, gender, race, ethnicity, sexuality, relationship status, specialty, and practice location by state). Questions included respondents' intent to apply to train or work in states with abortion restrictions (complete or early ban, emergency contraception ban, legal consequences for providing abortions).

States were classified by abortion laws in effect during the study.⁴ Chi-square tests examined differences in perceptions by level of training. Analyses were conducted using SPSS 25 with $p < 0.05$ denoting statistical significance. This survey study followed the American Association for Public Opinion

Research reporting guidelines, and was exempt by The University of Chicago Institutional Review Board.⁵

RESULTS

In total, 2063 respondents completed the survey, including 890 respondents from states with current or likely abortion bans (43.9%) (see Table 1).⁴ Most (1575 [76.3%]) respondents identified as women. There were 757 U.S. medical students and 134 IMGs (combined 891 [43.2%]), 513 (24.9%) residents and fellows, and 659 (31.9%) practicing physicians.

Outcomes by level of training appear in Fig. 1. Most respondents reported (82.3%) they preferred to apply to work or train in states with preserved abortion access. Three-quarters (76.4%) of respondents would not apply to states with legal consequences for providing abortion care. While these preferences were stronger among those in states without abortion bans, most respondents living in ban/likely ban states still preferred not to work in states with complete (61.3%, $p < 0.001$) or early (56%, $p < 0.001$) bans. Reasons for these preferences included preserving patients' access to care (77.8%) and preserving access to care for themselves or their partner (56.1%). Few (11.1%) reported the *Dobbs* decision would not affect their preferences. Of note, the majority of male physicians in our sample also preferred to train and practice in states where abortion access is preserved (66.4%).

Current and future abortion care providers ($n = 560$) reported a stronger preference to apply to work in states preserving abortion access (99.3% abortion provider vs 87.0% others, $p < 0.001$), and more often attributed this preference to preserving abortion access for their patients (95% abortion provider vs 71.3% others, $p < 0.001$), or themselves or a family member (70.4% abortion provider vs 51.6% others, $p < 0.001$).

DISCUSSION

In this social media survey study, the majority of physicians and trainees preferred to apply to train and practice in states that preserved abortion access. While those who provide abortions had stronger preferences, the majority of non-abortion providers also preferred practicing in states without complete or early abortion bans, a ban on Plan B, or legal consequences for abortion providers.

Our study limitations include self-selection bias and a non-representative sample of U.S. physicians, with more female

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Received November 2, 2022

Accepted February 8, 2023

Published online February 23, 2023

Table 1 Demographics of Medical Students (*n* = 891), Residents and Fellows (*n* = 513), and Practicing Physicians (*n* = 1172)

Characteristic	Total <i>n</i> (%)	Medical students <i>n</i> (%) ^a	Residents and fellows <i>n</i> (%)	Practicing physicians <i>n</i> (%)
Gender^b				
Woman	1575 (76.3)	654 (73.4)	399 (77.8)	523 (79.2)
Man	403 (19.5)	180 (20.2)	102 (19.9)	121 (18.3)
Transgender male	5 (0.2)	2 (0.2)	2 (0.4)	1 (0.2)
Transgender female	0	2 (0.2)	0	0
Gender queer	28 (1.4)	21 (2.4)	3 (0.6)	4 (0.6)
Prefer to describe	7 (0.3)	4 (0.4)	0	3 (0.5)
Prefer not to answer	43 (2.1)	28 (3.1)	7 (1.4)	8 (1.2)
Ethnicity				
Hispanic	171 (8.3)	103 (11.6)	36 (7.0)	32 (4.9)
Not Hispanic	1826 (88.5)	757 (85.0)	463 (90.3)	606 (92.0)
Prefer not to answer	66 (3.2)	31 (3.5)	14 (2.7)	21 (3.2)
Race^c				
American Indian or Alaskan Native	6 (0.3)	3 (0.3)	2 (0.4)	1 (0.2)
Asian	262 (12.7)	116 (13.0)	62 (12.1)	84 (12.7)
Black, African American, or African	110 (5.3)	62 (7.0)	36 (7.0)	12 (1.8)
Native Hawaiian or Other Pacific Islander	3 (0.1)	1 (0.1)	2 (0.4)	0
Multiracial ^{††}	102 (4.9)	43 (4.8)	28 (5.5)	31 (4.7)
White	1408 (68.3)	566 (63.5)	349 (68.0)	493 (74.8)
Prefer to describe	53 (2.6)	35 (3.9)	7 (1.4)	11 (1.7)
Prefer not to answer	119 (5.8)	65 (7.3)	27 (5.3)	27 (4.1)
Sexual orientation				
Bisexual	181 (8.8)	105 (11.8)	41 (8.0)	35 (5.3)
Gay or lesbian	80 (3.9)	29 (3.3)	18 (3.5)	33 (5.0)
Heterosexual	1632 (79.1)	659 (74.0)	427 (83.2)	546 (82.9)
Queer, pansexual, and/or questioning	90 (4.4)	47 (5.3)	17 (3.3)	26 (3.9)
Don't know	10 (0.5)	10 (1.1)	0	0
Prefer to describe	10 (0.5)	7 (0.8)	0	3 (0.5)
Prefer not to answer	60 (2.9)	34 (3.8)	10 (1.9)	16 (2.4)
Age^d				
≤ 44	1849 (89.6)	891 (99.6)	508 (99.0)	454 (68.9)
≥ 45	214 (10.4)	4 (0.4)	5 (1.0)	205 (31.1)
Relationship status				
Single	521 (25.3)	324 (36.4)	119 (23.2)	78 (11.8)
Partnered	534 (25.9)	352 (39.5)	143 (27.9)	39 (5.9)
Married	943 (45.7)	194 (21.8)	241 (47.0)	508 (77.1)
Widowed	6 (0.3)	0	0	6 (0.9)
Divorced	20 (1.0)	2 (0.2)	2 (0.4)	16 (2.4)
Other	8 (0.4)	3 (0.3)	1 (0.2)	4 (0.6)
Prefer not to answer	31 (1.5)	16 (1.8)	7 (1.4)	8 (1.2)
Children				
Yes	612 (29.7)	73 (8.2)	95 (18.5)	444 (67.4)
No	1451 (70.3)	818 (91.8)	418 (81.5)	215 (32.6)
Respondent's current state of residence, by anticipated abortion restriction^e				
Ban/likely ban ^f	890 (43.9)	430 (50.1)	209 (40.7)	251 (38.3)
Legal ^g	1137 (56.1)	429 (49.9)	304 (59.3)	404 (61.7)
Intend to provide abortion care^h				
Yes	560 (27.1)	322 (36.2)	130 (25.3)	108 (16.4)
No	1503 (72.9)	569 (63.9)	383 (74.7)	551 (83.6)

^{††} Respondents who selected more than one option are considered multiracial for the purpose of this study

^a Includes U.S. medical students (*n* = 757) and international medical graduates applying to U.S. residency programs (*n* = 134)

^b Nationally, medical students 47.9% female and 52.9% male,⁷ residents and fellows 46.8% female and 53.0% male,⁷ and practicing physicians 35.9% female and 64.1% male⁷

^c Nationally, medical students 0.2% American Indian or Alaskan Native, 54.6% White, 21.6% Asian, 6.2% Black or African American, 5.3% Hispanic, 8% multiple races, and 3.5% other.⁷ Nationally, residents and fellows 0.11% American Indian or Alaskan Native, 48.9% White, 26.6% Asian, 6.0% Black or African American, 9.2% Hispanic, 4.0% multiple races, and 3.1% other.⁸ Nationally, practicing physicians 0.1% American Indian or Alaskan Native, 63.9% White, 19.2% Asian, 3.6% Black or African American, 5.5% Hispanic, 2.0% multiple races, and 5.6% other⁷

^d Age 44 per CDC³

^e Includes all 50 states, Puerto Rico, and the District of Columbia. Excludes the 36 respondents who indicated "other" on their location

^f Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Indiana, Iowa, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Montana, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, West Virginia, Wisconsin, and Wyoming⁴

^g Alaska, California, Colorado, Connecticut, Delaware, District of Columbia, Hawaii, Illinois, Kansas, Maine, Maryland, Massachusetts, Minnesota, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Puerto Rico, Rhode Island, Vermont, Virginia, and Washington⁴

^h Includes physicians, residents, fellows, and medical students in all fields

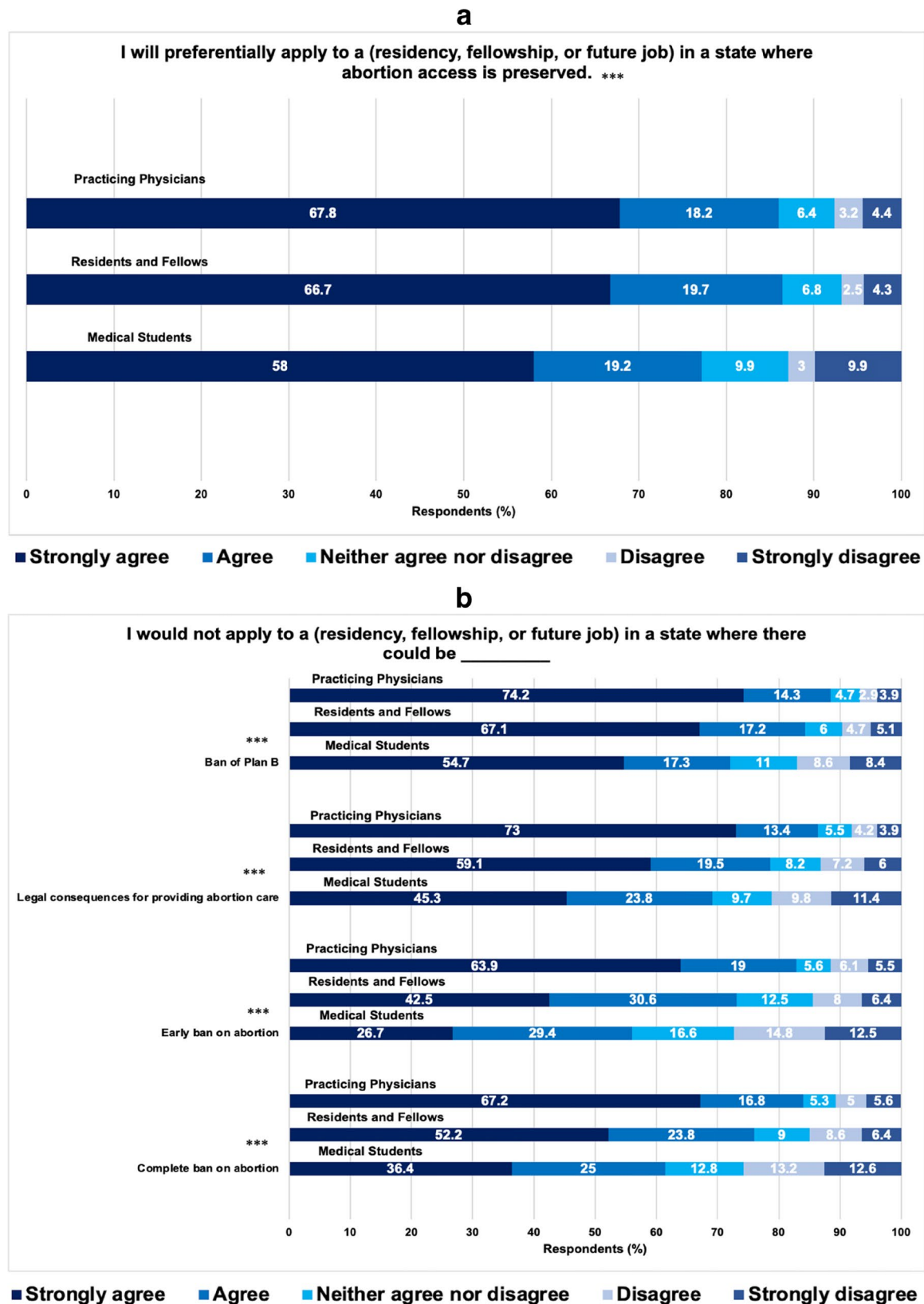


Fig. 1 a Impact of *Roe v. Wade* on preferential application to states where abortion access is preserved for medical students ($n = 891$), residents and fellows ($n = 513$), and practicing physicians ($n = 1172$). b Impact of *Roe v. Wade* on applications to states with reproductive health care restrictions for medical students ($n = 891$), residents and fellows ($n = 513$), and practicing physicians ($n = 1172$). c Why will overturning *Roe v. Wade* impact where you apply? Medical students ($n = 891$), residents and fellows ($n = 513$), and practicing physicians ($n = 1172$)

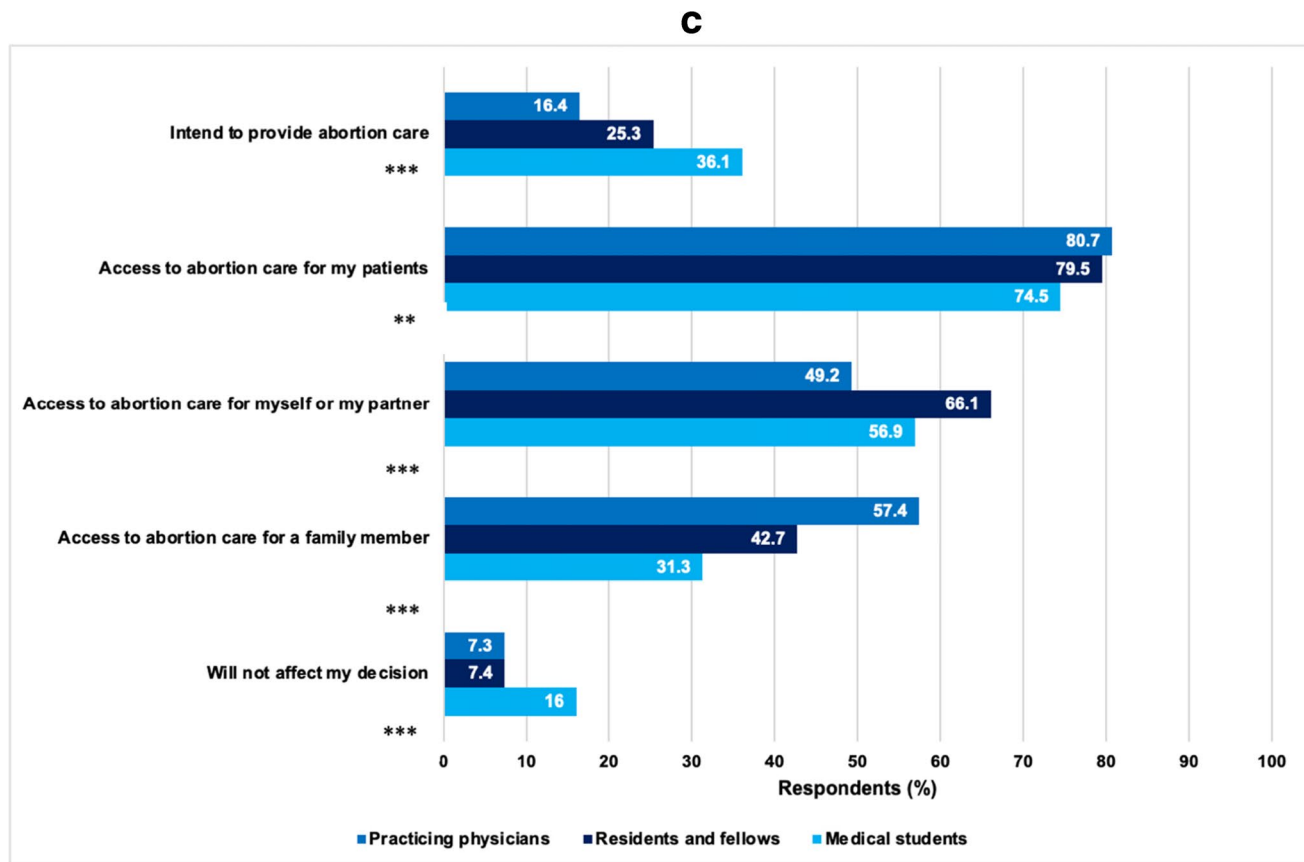


Fig. 1 (continued)

and white participants. Our results may not generalize to physicians not using social media. Actual geographic preferences are also influenced by factors other than abortion access.

Of the 12 states with current or anticipated abortion bans as of August 23, 2022, 11 have below-average numbers of active physicians per 100,000 people.^{4,6} Our data highlight that even if a fraction of the many physicians and trainees with strong geographic preferences to avoid practicing in states that ban abortion follow through on their preferences, states that ban abortion are at risk for exacerbating these existing physician shortages, and worsening health outcomes for their citizens.

Data Availability The datasets generated during the current study are not publicly available to respect the privacy of participants.

Declarations

Conflict of Interest The authors declare that they do not have a conflict of interest.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

OBSTETRICS

Morbidity associated with cesarean delivery in the United States: is placenta accreta an increasingly important contributor?

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OBJECTIVE: The purpose of this study was to examine cesarean delivery morbidity and its predictors in the United States.

STUDY DESIGN: We used 2000-2011 Nationwide Inpatient Sample data to identify cesarean deliveries and records with 12 potential cesarean delivery complications, including placenta accreta. We estimated cesarean delivery morbidity rates and rate changes from 2000-2011, and fitted Poisson regression models to assess the relative incidence of morbidity among repeat vs primary cesarean deliveries and explore its predictors.

RESULTS: From 2000-2011, 76 in 1000 cesarean deliveries (97 in 1000 primary and 48 in 1000 repeat cesarean deliveries) were accompanied by ≥ 1 of 12 complications. The unadjusted composite cesarean delivery morbidity rate increased by 3.6% only among women with a primary cesarean delivery ($P < .001$); the unadjusted rate of placenta accreta increased by 30.8% only among women with a repeat cesarean deliveries ($P = .025$). The adjusted rate of overall composite cesarean delivery morbidity

decreased by 1% annually from 2000-2011 ($P < .001$). Compared with women with a primary cesarean delivery, those women who underwent a repeat cesarean delivery were one-half as likely (incidence rate ratio, 0.50; 95% CI, 0.49–0.50) to experience a complication, but 2.13 (95% CI, 1.98–2.29) times more likely to have a placenta accreta diagnosis. Both cesarean delivery morbidity and placenta accreta were positively associated with age >30 years, non-Hispanic black race/ethnicity, the presence of a chronic medical condition, and delivery in urban, teaching, or larger hospitals.

CONCLUSION: Overall, cesarean delivery morbidity declined modestly from 2000-2011, but placenta accreta became an increasingly important contributor to repeat cesarean delivery morbidity. Clinicians should maintain a high index of suspicion for abnormal placentation and make adequate preparations for patients who need cesarean deliveries.

Key words: cesarean delivery, United States

Cite this article as: Creanga AA, Bateman BT, Butwick AJ, et al. Morbidity associated with cesarean delivery in the United States: is placenta accreta an increasingly important contributor? *Am J Obstet Gynecol* 2015;213:384.e1-11.

Cesarean delivery is the most common major operating room procedure performed in the United States¹; almost 1.3 million women had a cesarean delivery in 2012, the most recent year with available information.² The

cesarean delivery rate reached an all-time high of 32.9% of all births in 2009 and remained stable at 32.8% from 2010-2012.² Contemporary cesarean rates represent a 60% rise since 1996, a year that marked the end of a brief

period of decline in cesarean delivery rates because of a decrease in primary cesarean deliveries and a parallel increase in vaginal births after cesarean delivery.^{3,4}

Short-term maternal risks of cesarean delivery include peri- and postoperative complications such as infection; hemorrhage that requires transfusion or hysterectomy; bowel, bladder, or ureteral injury; thromboembolic disease; and maternal death. In the long-term, cesarean delivery can be associated with decreased subsequent fertility or increased risk of ectopic pregnancy, miscarriage, abnormal placentation, and uterine rupture in subsequent pregnancies.^{5,6} Concerns that are related to the latter condition lead to women with a previous cesarean delivery usually being offered a repeat cesarean delivery.⁷ In

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Received Dec. 29, 2014; revised March 16, 2015; accepted May 2, 2015.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

The authors report no conflict of interest.

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0002-9378/\$36.00 • Published by Elsevier Inc. • <http://dx.doi.org/10.1016/j.ajog.2015.05.002>

turn, pregnancies after cesarean deliveries, especially after multiple cesarean deliveries, are accompanied by significantly higher risks of abnormal placentation and peripartum hysterectomy.^{5,8-11} Given the increase in the proportion of deliveries by cesarean section, the incidence of placenta accreta appears to have risen in the United States over the last 2 decades.¹² Placenta accreta can result in major obstetric morbidity, notably life-threatening obstetric hemorrhage, unplanned cesarean hysterectomy, and complications related to the abnormal invasion of the placenta into adjacent organs.^{8,10} In addition to health and safety risks for women and newborn infants, hospital charges for cesarean delivery are almost double those for a vaginal delivery.⁴

The high frequency of cesarean delivery in the United States may have contributed to a sense of confidence on

the part of both women and providers about the safety of the procedure, irrespective of women's obstetric histories,⁵ and warrants an analysis of morbidity and in-hospital mortality that is associated with cesarean delivery. Thus, the objectives of this study were to (1) examine morbidity that is associated with primary and repeat cesarean delivery with a focus on placenta accreta and (2) explore patient- and hospital-related factors that are associated with such morbidity and separately with placenta accreta in the United States from 2000-2011.

MATERIALS AND METHODS

We used 2000-2011 data from the Nationwide Inpatient Sample, which is the largest all-payer hospital inpatient care database in the United States and is maintained by the Agency for Healthcare Research and Quality as part of its

Healthcare Cost and Utilization Project. The Nationwide Inpatient Sample is a stratified sample of approximately 20% of all community hospitals in the United States and includes all discharges from an average of 1000 hospitals each year.¹³ Thus, when weights are applied during analysis to account for the complex survey design, nationwide estimates can be derived. Each discharge record has the potential to list up to 15 *International Classification of Disease*, 9th Revision, Clinical Modification (ICD-9-CM) diagnoses and 15 ICD-9-CM procedures as well as diagnosis-related group codes. Because this analysis used publicly available data lacking personal identifiers, the Centers for Disease Control and Prevention's Institutional Review Board determined it to be research that does not involve human subjects.

We identified all delivery hospitalization records using the algorithm developed by Kuklina et al.¹⁴ This algorithm uses ICD-9-CM diagnosis codes for delivery outcomes, ICD-9-CM procedure codes for selected delivery-related procedures, and diagnosis-related group delivery codes. Cesarean deliveries were identified by the presence of an ICD-9-CM procedure code for cesarean delivery (74.0, 74.1, 74.2, 74.4, 74.99). Among cesarean deliveries, those with an ICD-9-CM diagnosis code 654.2 were classified as repeat cesarean deliveries and those without such code were considered primary cesarean deliveries. We used the ICD-9-CM diagnosis or procedure codes shown in Table 1 to identify records with the following 11 complications or conditions that potentially are associated with cesarean delivery: (1) urinary bladder operations, (2) cystotomy, (3) anesthesia complications, (4) obstetric wound complications, (5) blood transfusion, (6) ventilation support, (7) renal failure, (8) sepsis, (9) shock, (10) prolonged hospital stay defined as stay longer than five days (ie, 90th percentile of the length of hospital stay distributions for all cesarean deliveries in the sample), and (11) death during the delivery hospitalization.

In addition, of special interest for this analysis was the identification of

TABLE 1
ICD-9-CM codes for cesarean delivery complications and chronic conditions examined in the analysis

Condition	Diagnosis or procedure codes
Cesarean delivery complications	
Urinary bladder operations	57.x
Cystotomy	57.1
Anesthesia complications	668.0x, 668.1x, 668.2x
Blood transfusion	99.0x
Ventilation support	93.90, 96.01-96.05, 96.7x
Renal failure	669.3, 584.x
Sepsis	038.0-038.4, 038.8, 038.9, 995.91, 995.92
Shock	669.1, 998.0, 995.0, 995.4, 785.5x
Obstetric wound complications	674.10, 674.12, 674.14, 674.30, 674.32, 674.34
Chronic conditions	
Preexisting diabetes mellitus	249.x, 250.x, 648.0x
Chronic hypertensive disease	401.x-405.x, 642.0x, 642.1x, 642.2x, 642.7x
Chronic heart disease	412.x, 413.x, 414.x, 394.x, 395.x, 396.x, 397.x, 424.x, 428.22, 428.23, 428.32, 428.33, 428.42, 428.43
Chronic respiratory disease	491.x-496.x
Chronic renal disease	581.x-583.x, 585.x, 587.x, 588.x, 646.2x
Chronic liver disease	571.x, 572.x
HIV/AIDS	042.x, V08.x

ICD-9-CM, *International Classification of Disease*, 9th Revision, Clinical Modification.

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

records from patients with placenta accreta, since this condition poses serious maternal risks in pregnancies after a cesarean delivery and contemporary national-level data on this condition are lacking. Because there is no specific ICD-9-CM code for placenta accreta, we developed and validated an ICD-9-CM code–based algorithm to identify diagnoses and procedures that, when concurrently coded and in the absence of uterine rupture (ICD-9-CM codes: 665.0x, 665.10, 665.11), identify placenta accreta with a high positive predictive value among women with a previous cesarean delivery. This algorithm identified patients with a diagnosis of placenta previa (ICD-9-CM codes: 641.0, 641.1) or retained placenta (ICD-9-CM codes: 666.0, 667.x), and a hysterectomy procedure code (ICD-9-CM codes: 68.3, 68.4, 68.5, 68.6, 68.7, 68.8, 68.9). Specifically for this analysis, this algorithm was validated at the Massachusetts General Hospital and the Stanford University School of Medicine by a comparison of recorded ICD-9-CM codes in administrative hospital data against medical record data for the periods between Jan. 1, 2001, to Dec. 31, 2011, and Jan. 1, 2000, and Dec. 31, 2013, respectively. Validation exercises were approved by Institutional Review Boards at Partner's Healthcare and Stanford University, respectively. The medical record review was conducted by 2 obstetrics anesthesia residents (A.M. and L.R.), 1 at each validation site. Of the 15 probable accreta cases at Massachusetts General Hospital and 54 probable accreta cases at Stanford University that were identified based on our ICD-9-CM code algorithm, 14 and 47 cases, respectively, were confirmed by 1 of the following items: (1) radiologic evidence, (2) a presumptive clinical diagnosis made surgically during cesarean delivery or laparotomy after vaginal delivery, (3) pathology report, or (4) a description in the patient discharge summary that was written by the obstetrician. The 2-site positive predictive value of our ICD-9-CM–based accreta algorithm in women with a previous cesarean delivery was 88.4% (95% confidence interval [CI], 78.4–94.6). For consistency among all analyses that were performed, we used

the same algorithm to identify accreta cases among women with a primary cesarean delivery.

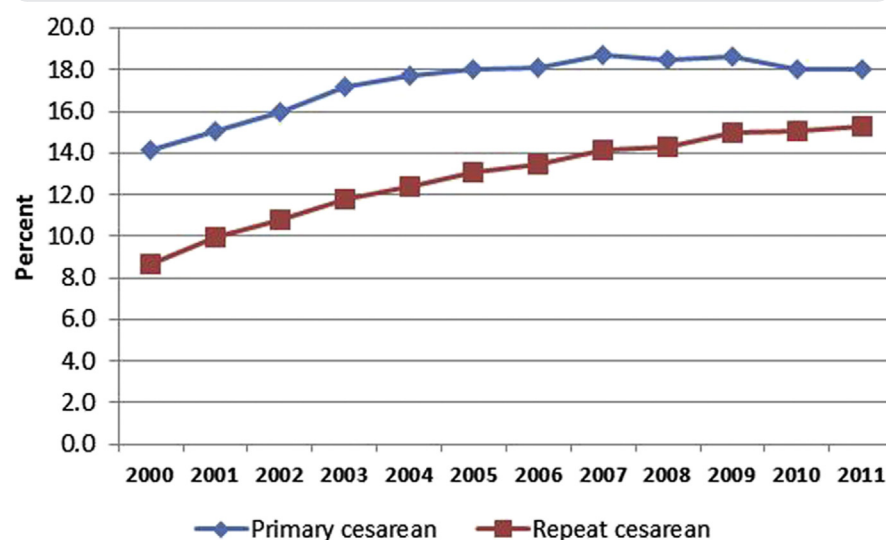
We first examined trends in primary and repeat cesarean delivery between 2000 and 2011. Next, we used pooled 2000–2011 data to estimate rates for each of the 11 complications or conditions noted earlier, placenta accreta that was identified with our validated ICD-9-CM–based algorithm, and a composite cesarean delivery morbidity measure that included at least 1 of these 12 conditions by type of cesarean delivery: primary vs repeat. Also by type of cesarean delivery, we examined rate differences and percentage rate changes between 2000 and 2011 for each of the 12 conditions and for the composite cesarean delivery morbidity measure. On the pooled dataset, we fitted year-adjusted Poisson regression models to assess the relative incidence of each of the 12 conditions and of the composite cesarean delivery morbidity measure among repeat vs primary cesarean deliveries; incidence rate ratios (IRRs) and corresponding 95% CIs were estimated.

Characteristics of women without cesarean delivery complications, those with placenta accreta, and those with at

least 1 of the 12 conditions examined in each of the 2 groups (primary vs repeat cesarean deliveries) were examined with chi square tests; similarly, we assessed characteristics of the hospitals where cesarean deliveries were obtained during the study period. The maternal characteristics examined were age (15–19, 20–24, 25–29, 30–34, ≥ 35 years); race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, Asian, American Indian or Alaska native, other); insurance coverage for delivery (Medicaid, private, self-pay, other); household income quartile for patient by ZIP code; and presence of at least 1 of the following chronic medical conditions: preexisting diabetes mellitus, chronic hypertensive disease, chronic heart disease, chronic respiratory disease, chronic renal disease, chronic liver disease, and HIV/AIDS (the corresponding ICD-9-CM codes are shown in Table 1). The hospital characteristics examined were location (urban/rural), teaching status (yes/no), ownership (public, private for-profit, private not-for-profit), bed size (small, medium, large), and total hospital charges as submitted by each hospital and reported in 2011 US dollars after adjustment for inflation with the

FIGURE 1

Trends in primary and repeat cesarean delivery: Nationwide Inpatient Sample, United States, 2000–2011



Statistical significance of rate trends was assessed with the use of the Cuzick test-for-trend.

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

TABLE 2
Morbidity associated with cesarean delivery: United States, 2000–2011

Type of morbidity	Pooled 2000–2011 cases, n		Pooled 2000–2011 rate (standard error) ^a		2011 vs 2000 rate difference, (95% confidence interval) ^b		Adjusted-incidence rate ratio (95% confidence interval) ^c
	Primary cesarean deliveries (n = 8,560,005)	Repeat cesarean deliveries (n = 6,317,911)	Primary cesarean deliveries	Repeat cesarean deliveries	Primary cesarean deliveries	Repeat cesarean deliveries	
Cystotomy	292	729	0.17 (0.007)	0.56 (0.02)	−0.04 (−0.12 to 0.05)	−0.24 (−0.47 to −0.01) ^d	3.40 (3.20–3.62)
Death	448	93	0.25 (0.01)	0.07 (0.007)	−0.07 (−0.20 to 0.05)	−0.06 (−0.14 to 0.03)	0.29 (0.26–0.32)
Anesthesia complication	963	382	0.55 (0.02)	0.29 (0.01)	−0.54 (−0.75 to −0.35) ^d	−0.51 (−0.71 to −0.31) ^d	0.55 (0.52–0.58)
Placenta accreta	1178	2281	0.67 (0.02)	1.76 (0.04)	−0.10 (−0.31 to 0.11)	0.45 (0.07–0.84) ^d	2.61 (2.53–2.70)
Shock	1228	559	0.70 (0.02)	0.43 (0.02)	0.74 (0.53–0.95) ^d	0.37 (0.19–0.55) ^d	0.60 (0.58–0.63)
Sepsis	1634	267	0.93 (0.02)	0.21 (0.01)	−0.07 (−0.29 to 0.14)	−0.17 (−0.30 to −0.03) ^d	0.22 (0.21–0.24)
Renal failure	2451	496	1.39 (0.03)	0.38 (0.02)	1.07 (0.79–1.35) ^d	0.37 (0.19–0.54) ^d	0.27 (0.26–0.28)
Ventilation support	3627	1022	2.06 (0.03)	0.79 (0.02)	0.27 (−0.08 to 0.61)	0.25 (−0.02 to 0.51)	0.38 (0.37–0.39)
Urinary bladder operation	5671	5014	3.22 (0.04)	3.86 (0.05)	−0.12 (−0.57 to 0.33)	−0.93 (−1.57 to −0.30) ^d	1.19 (1.17–1.21)
Obstetric wound complication	17,126	14,622	9.73 (0.07)	11.26 (0.09)	−0.73 (−1.47 to −0.02) ^d	−4.01 (−5.01 to −3.00) ^d	1.17 (1.15–1.18)
Blood transfusion	32,048	16,403	18.22 (0.10)	12.63 (0.10)	16.42 (15.44–17.44) ^d	12.04 (11.05–13.03) ^d	0.68 (0.67–0.68)
Prolonged hospital stay	129,207	31,615	73.44 (0.20)	24.33 (0.14)	−8.54 (−10.57 to −6.51) ^d	−7.09 (−8.55 to −5.62) ^d	0.33 (0.33–0.34)
≥1 complication listed	171,023	62,688	97.21 (0.22)	48.25 (0.19)	3.99 (1.69–6.28) ^d	−1.63 (−3.66 to 0.39)	0.50 (0.49–0.50)

^a Rates reported per 1000 deliveries; ^b Rate differences reported per 1000 deliveries; ^c Poisson regression models adjusted for type of cesarean delivery (primary cesarean delivery group used as reference) and year; ^d Statistically significant at $P < .05$.

Creanga. Cesarean delivery morbidity in the United States. Am J Obstet Gynecol 2015.

use of the Consumer Price Indices that are released annually by the US Bureau of Labor Statistics.¹⁵ In separate models, we investigated factors that are associated with placenta accreta and composite cesarean delivery morbidity (defined by the presence of at least 1 of the 12 complications) by fitting multivariable Poisson regression models that are adjusted for all the patient and hospital characteristics mentioned earlier, except for hospital charges. All analyses were conducted in Stata software (version 13; StataCorp, College Station, TX) and were adjusted for the complex survey design of the Nationwide Inpatient Sample.

RESULTS

The percentage of all hospital deliveries in the United States that were cesarean deliveries increased significantly from 22.8% in 2000 to 33.3% in 2011, with a peak at 33.6% in 2009 ($P < .05$; Figure 1). The increase was steeper for repeat (8.7% in 2000 vs 15.3% in 2011; $P < .05$) than for primary (14.2% in 2000 vs 18.0% in 2011; $P < .05$) cesarean deliveries. Moreover, the increase in repeat cesarean deliveries was monotonic from 2000–2011; the percentage of all deliveries that were primary cesarean deliveries peaked at 18.6% in 2009.

From 2000–2011, approximately 76 in 1000 cesarean deliveries (97 in 1000 primary cesarean deliveries and 48 in 1000 repeat cesarean deliveries) were accompanied by at least 1 of the 12 conditions of interest; of these, approximately three-quarters of primary cesarean deliveries and approximately one-half of repeat cesarean deliveries were associated with a hospital stay of >5 days (Table 2). The prevalence of 5 specific medical complications (renal failure, need for ventilation support, urinary bladder operations, obstetric wound complications, and need for blood transfusion) was greater than 1 per 1000 primary cesarean deliveries; notably, approximately 18 in every 1000 women with a primary cesarean delivery received a blood transfusion. Among repeat cesarean deliveries, placenta accreta, urinary bladder operations, obstetric wound complications, and blood transfusion had a prevalence of >1 per

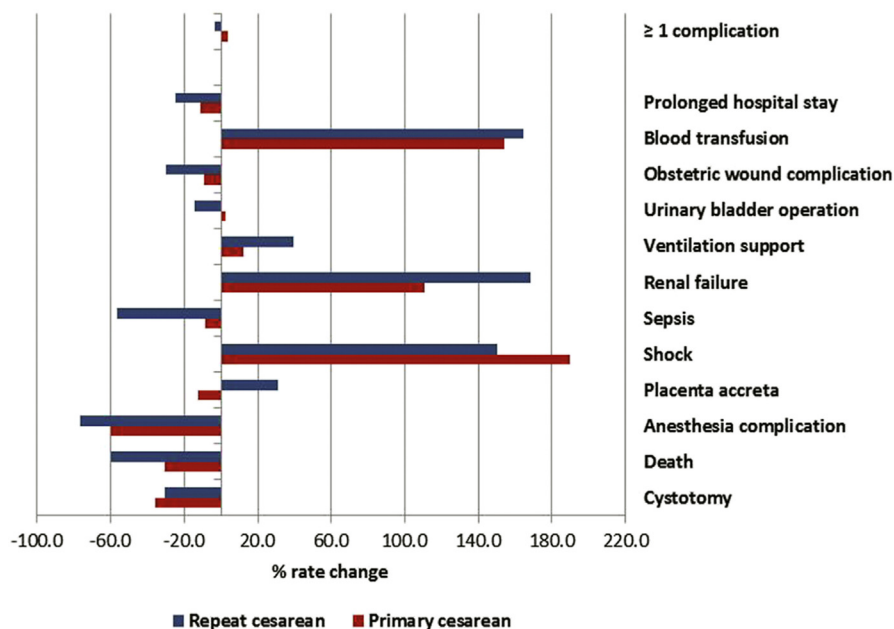
1000 such deliveries; placenta accreta was associated with approximately 1.8 of 1000 repeat cesarean deliveries, and blood transfusion was part of clinical treatment for 13 of 1000 women with a repeat cesarean delivery during the study period.

The rate of the composite cesarean delivery morbidity increased by 3.6% ($P < .001$; Figures 2 and 3) among women with a primary cesarean delivery but did not change significantly among those with repeat cesarean delivery from 2000–2011. The rate of placenta accreta increased significantly only among women with a repeat cesarean delivery, from 1.6 to 2.0 per 1000 repeat cesarean deliveries, a 30.8% increase during the same time period ($P = .025$; Figures 2 and 3). Several significant complication rate changes stand out among women with both primary and repeat cesarean deliveries (Figure 2). Between 2000 and 2011, rates of anesthesia complications, obstetric wound complications, and especially prolonged hospital stay decreased among women with both primary and repeat cesarean deliveries; rates of sepsis, cystotomy, and urinary bladder operations declined significantly only among women with a repeat cesarean delivery (all $P < .05$). Conversely, during the same period, the rates of shock, renal failure, and blood transfusion increased by 190.0%, 110.9%, and 154.3%, respectively, among women with primary cesarean deliveries and by 150.0%, 168.2%, and 164.6%, respectively, among women with repeat cesarean deliveries (all $P < .05$).

After controlling for year-to-year variations, we found that, when compared with women having a first cesarean delivery, those who obtained a repeat cesarean delivery were approximately one-half as likely (IRR, 0.50; 95% CI, 0.49–0.50) to have experienced at least 1 of the conditions of interest, but more likely to have had a cystotomy (IRR, 3.40; 95% CI, 3.20–3.62), placenta accreta (IRR, 2.61; 95% CI, 2.53–2.70), a urinary bladder operation (IRR, 1.19; 95% CI, 1.17–1.21), or wound complications (IRR, 1.17; 95% CI, 1.15–1.18); all other specific complications were significantly less prevalent in women

FIGURE 2

Percentage rate changes in morbidity associated with cesarean delivery complications: United States, 2000–2011



Percentage rate changes are statistically significant at a probability value of $< .05$, based on Stata pretests for equality of proportions except for the following events: cystotomy, in-hospital death, placenta accreta, sepsis, ventilation support, and urinary bladder operation among women with primary cesarean deliveries; in-hospital death, ventilation support, and ≥ 1 complications among women with repeat cesarean deliveries.

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

with repeat rather than primary cesarean deliveries (Table 2).

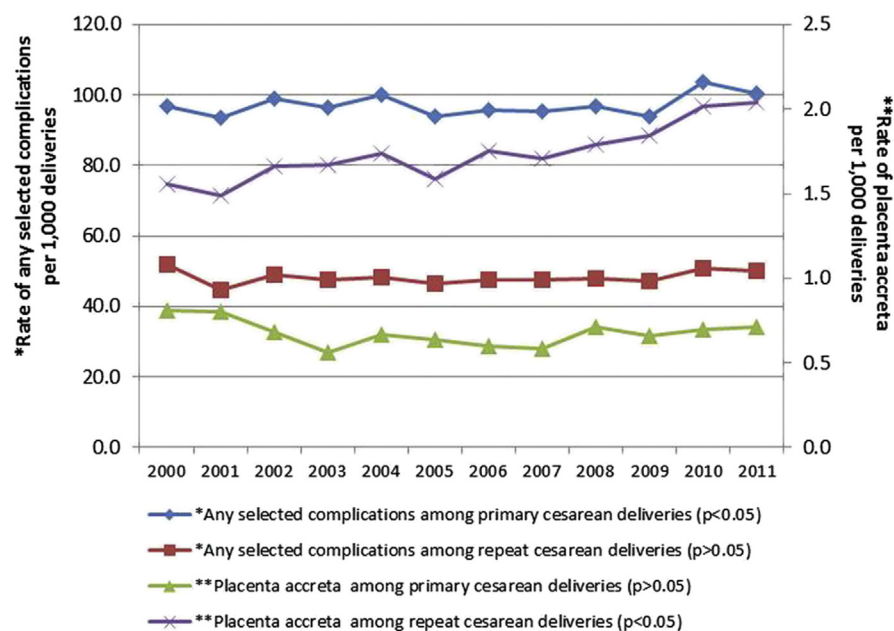
Overall, women with at least 1 cesarean delivery complication, and especially those with a repeat cesarean delivery, were older, in higher proportion black, insured by Medicaid, and with a chronic medical condition than were women without a cesarean delivery complication (Table 3); they also had ≥ 2 additional diagnoses at discharge and more of their cesarean deliveries took place in urban, teaching, public facilities than in other types of facilities when compared with women without a cesarean delivery complication. Notably, median total hospital charges were overall lower for women with repeat (\$10,866.50) than for women with primary (\$12,547.70) cesarean deliveries who had no complications. For women with at least 1 cesarean delivery complication, median total hospital charges were more than double (\$23,672.30 if primary and \$19,033.00 if

repeat cesarean delivery). Moreover, for women with placenta accreta, median total hospital charges were \$34,035.50 if primary cesarean delivery and \$33,944.1 if repeat cesarean delivery.

After controlling for women's socio-demographic and hospitalization characteristics, we found that the rate of composite cesarean delivery morbidity decreased by approximately 1% annually ($P < .001$; Table 4). Compared with women with a primary cesarean delivery, those with a repeat cesarean delivery were one-half as likely (IRR, 0.50; 95% CI, 0.49–0.50) to experience a complication, but 2.13 (95% CI, 1.98–2.29) times more likely to have a placenta accreta diagnosis. Women with at least 1 cesarean delivery complication and women with an accreta diagnosis were more likely to be older than 30 years of age and non-Hispanic black than non-Hispanic white, to have chronic medical conditions than not, and to deliver in

FIGURE 3

Trends in morbidity associated with cesarean delivery complications: United States, 2000–2011



Statistical significance of rate trends was assessed with the use of the Cuzick test-for-trend.

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

larger, urban, or teaching hospitals than in small, rural, or non-teaching hospitals, respectively; conversely, they were less likely to have private insurance or self-pay for delivery than to receive Medicaid coverage and less likely to live in a wealthy neighborhood (3rd or 4th highest income quartile for patient ZIP code) than in poorer neighborhoods (lowest income quartile for patient ZIP code). Notably, when compared with non-Hispanic white women, American Indian/Alaska Native women were more likely to have at least 1 cesarean delivery complication (IRR, 1.30; 95% CI, 1.24–1.37), and Hispanic women were more likely to have an accreta diagnosis (IRR, 1.28; 95% CI, 1.16–1.41).

COMMENT

This study provides contemporary national data on cesarean delivery morbidity during a period when cesarean delivery rates were rising. Other developed countries have experienced increases in cesarean delivery rates over time, but current rates in these countries are considerably lower than in the United

States.¹⁶ For example, in 2012, cesarean delivery rates were 24.4% in the United Kingdom and 16.2–16.6% in Finland, Norway, and Sweden.¹⁶ The higher cesarean delivery rates in the United States may be driven by changes in physician practices coupled with changes in maternal risk profiles (ie, more women entering pregnancy with preexisting medical conditions¹⁷). Additionally, the contribution of maternal request for cesarean delivery to the overall cesarean delivery rate is unknown.¹⁸

From 2000–2011, approximately 1 in 10 and 1 in 20 women who underwent primary and repeat cesarean delivery, respectively, had at least 1 of the 12 complications that were examined in this study. Our multivariable analyses showed that the overall rate of composite cesarean delivery morbidity decreased by approximately 1% annually and that women with a repeat cesarean delivery were approximately one-half as likely as those with a primary cesarean delivery to experience 1 of the complications that were considered. This difference appears mainly to be due to higher rates

of prolonged hospital stay and blood transfusion that was associated with primary than repeat cesarean deliveries from 2000–2011; because our data lack the necessary clinical details to further decompose and explain these differences, future studies should aim to do so. Placenta accreta was a rare condition that accompanied <1.2% of all cesarean deliveries during the period. Yet, rates of placenta accreta have been rising among women with a repeat procedure, which makes placenta accreta an increasingly important contributor to repeat cesarean delivery morbidity in the United States. Notably, for women with a repeat cesarean delivery, mean hospital charges that are associated with placenta accreta were almost 4 times higher than for women with no complication and this clearly places an important burden on the health system; insofar as hospital costs reflect the need for the provision of additional services, women themselves bear the burden.

In line with recent studies that have substantiated the rarity of severe anesthesia complications in obstetrics^{19,20} and the documented decline in anesthesia-related mortality rates in the United States,²¹ our study shows that anesthesia-related complications occurred rarely among women who underwent primary or repeat cesarean deliveries. Furthermore, rates of anesthesia-related complications that were associated with cesarean delivery declined from 2000–2011, which was a period when neuraxial blocks have become the preferred methods for providing anesthesia for cesarean delivery.^{22,23} Conversely, during the same period, rates of blood transfusion, shock, and renal failure at least doubled among women with both primary and repeat cesarean deliveries. These findings are consistent with national trends in overall severe maternal morbidity during the delivery hospitalization documented by Callaghan et al.¹⁷ The extent to which these rates and their patterns of increase differ for vaginal vs cesarean deliveries should be investigated by future studies.

By and large, women with at least 1 cesarean delivery complication were older, in higher proportion black, insured by Medicaid, and experiencing chronic

TABLE 3
Characteristic of primary and repeat cesarean deliveries: United States, 2000–2011

Characteristic	Primary cesarean deliveries			Repeat cesarean deliveries		
	No complication (n = 7,722,632)	≥1 complication (n = 837,373)	Accreta (n = 5734)	No complication (n = 5,996,357)	≥1 complication (n = 321,554)	Accreta (n = 11,092)
Maternal characteristics, %						
Age, y						
15–19	10.6	10.9	0.7	2.3	2.3	0.6
20–24	22.9	21.6	6.5	17.8	16.0	7.0
25–29	26.3	23.8	17.0	26.9	24.6	17.3
30–34	23.8	23.4	28.6	30.2	29.2	32.9
>35	16.4	20.2	47.1	22.8	28.0	42.2
Race/ethnicity						
Non-Hispanic white	42.6	37.9	39.4	40.7	35.4	35.7
Non-Hispanic black	10.8	16.8	12.3	10.6	17.7	12.4
Hispanic	16.6	15.6	19.0	21.0	19.6	27.3
Asian	4.0	3.6	6.0	3.3	3.0	3.4
American Indian or Alaska Native	0.5	0.7	0.5	0.6	0.7	0.6
Other	3.8	4.0	3.3	3.6	3.7	3.6
Missing	21.7	21.6	19.6	20.3	19.9	17.1
Insurance coverage						
Medicaid	36.3	40.2	33.2	40.0	45.1	43.0
Private	57.7	53.3	60.3	53.5	47.4	50.4
Self-pay	2.6	2.6	3.5	3.1	3.3	2.7
Other	3.3	3.7	3.0	3.3	3.9	3.8
Missing	0.2	0.2	0.0	0.2	0.2	0.2
Income quartile for patient ZIP code						
1st (lowest)	24.9	27.1	23.7	26.7	30.2	27.2
2nd	24.1	23.7	22.3	24.2	23.9	22.5
3rd	24.5	23.4	25.0	23.3	22.0	22.4
4th (highest)	24.8	23.7	27.0	24.0	21.7	25.4
Missing	1.7	2.1	1.9	1.7	2.2	2.4

Creanga. Cesarean delivery morbidity in the United States. Am J Obstet Gynecol 2015.

(continued)

TABLE 3

Characteristic of primary and repeat cesarean deliveries: United States, 2000–2011 (continued)

Characteristic	Primary cesarean deliveries			Repeat cesarean deliveries		
	No complication (n = 7,722,632)	≥1 complication (n = 837,373)	Accreta (n = 5734)	No complication (n = 5,996,357)	≥1 complication (n = 321,554)	Accreta (n = 11,092)
Chronic conditions ^a						
Yes	7.3	16.6	12.5	7.3	17.6	10.3
No	92.7	83.4	87.5	92.7	82.4	89.7
Hospital/hospitalization characteristics						
Discharge diagnoses, mean ± standard deviation	5.1 ± 2.4	7.6 ± 3.2	8.9 ± 4.1	4.6 ± 2.3	7.8 ± 3.3	9.3 ± 3.8
Hospital procedures, mean ± standard deviation	1.9 ± 1.1	2.5 ± 1.6	4.5 ± 2.5	1.7 ± 0.9	2.6 ± 1.6	4.8 ± 2.4
Location, %						
Urban	88.4	92.7	95.2	87.7	90.8	94.9
Rural	11.6	7.3	4.8	12.3	9.2	5.1
Teaching status, %						
Teaching	45.5	62.7	68.2	43.9	59.2	66.5
Nonteaching	54.5	37.3	31.8	56.1	40.8	33.5
Ownership, %						
Public	63.8	74.7	77.9	62.5	72.2	77.4
Private not-for-profit	21.5	16.1	13.2	21.8	16.5	13.8
Private for profit	14.7	9.2	8.9	15.7	11.3	8.8
Bed size, %						
Small	10.5	7.9	6.5	10.7	8.2	5.8
Medium	25.9	22.7	22.2	26.0	23.7	23.6
Large	63.7	69.4	71.3	63.2	68.1	70.6
Hospital costs, median (interquartile range) ^b	12,547.9 (8833.0–17,767.4)	23,672.3 (15,002.2–38,609.3)	34,035.5 (18,624.6–67,803.6)	10,866.5 (7569.3–15,391.0)	19,033.0 (11,193.1–32,663.5)	33,944.1 (17,832.5–64,232.4)

^a Presence of at least 1 of 7 chronic medical conditions (preexisting diabetes mellitus chronic hypertensive disease, chronic heart disease, chronic respiratory disease, chronic renal disease, chronic liver disease, and HIV/AIDS); ^b Total hospital charges reported in 2011 US dollars after adjustment for inflation with the use of the Consumer Price Indices released annually by the US Bureau of Labor Statistics.

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

medical conditions than were women without a cesarean delivery complication. Since 1994, non-Hispanic black women had higher rates of cesarean delivery than non-Hispanic white women; also, Hispanic women had lower cesarean delivery rates than both non-Hispanic white and non-Hispanic black women.² Our analysis shows that Hispanic women are at a higher risk for placenta accreta than non-Hispanic white women. This result should be interpreted with caution because race/ethnicity data were missing for approximately 20% of the sample because of state variations in reporting this specific information. As expected, the risk of placenta accreta was higher for women who had a repeat cesarean delivery and those over 30 years old.

The analysis has additional limitations. We relied on administrative data and ICD-9-CM codes that usually are used for billing purposes to examine cesarean delivery morbidity; coding errors or differences in the way hospitals record these data could have led to errors in the estimation of rates and relative risks. The hospital discharge is the unit of analysis, and there were no patient identifiers. Thus, we could not control potentially for having women with >1 delivery in the pooled data. The identification of repeat cesarean deliveries was based on an ICD-9-CM code, which might have led to misclassification of primary vs repeat cesarean deliveries. Of note, using administrative data from California, Yasmeen et al²⁴ report sensitivity of 87% and positive predictive value of 98% for identification of previous cesarean delivery as well as sensitivity and positive predictive values of 100% for identification of the procedure cesarean delivery. We also used an ICD-9-CM algorithm to identify records from women with placenta accreta; it is possible that a fraction of these cases were misclassified. Despite our efforts to validate this algorithm among women with a repeat cesarean delivery and its high positive predictive value in this subpopulation, it has not been validated among women with a primary cesarean delivery. Thus, misclassification is more likely to have

TABLE 4

Predictors of cesarean delivery complications: United States, 2000–2011

Characteristic	Adjusted incidence rate ratio (95% confidence interval) ^a	
	≥1 complication	Accreta
Maternal characteristics		
Age, y (reference, 25–29 y)		
15–19	1.05 (1.04–1.07)	0.13 (0.08–0.21)
20–24	0.98 (0.97–0.99)	0.49 (0.42–0.57)
30–34	1.07 (1.06–1.09)	1.85 (1.67–2.05)
>35	1.27 (1.26–1.29)	3.46 (3.14–3.81)
Race/ethnicity (reference, non-Hispanic white) ^b		
Non-Hispanic black	1.36 (1.35–1.38)	1.12 (0.99–1.26)
Hispanic	0.96 (0.95–0.97)	1.28 (1.16–1.41)
Asian	0.97 (0.94–0.99)	1.00 (0.84–1.19)
American Indian or Alaska Native	1.30 (1.24–1.37)	1.22 (0.78–1.93)
Other	1.07 (1.05–1.09)	0.92 (0.75–1.12)
Insurance coverage (reference, Medicaid) ^b		
Private	0.82 (0.81–0.83)	0.66 (0.61–0.72)
Self-pay	0.92 (0.89–0.94)	0.73 (0.59–0.90)
Other	1.03 (1.01–1.05)	0.90 (0.74–1.08)
Income quartile for patient ZIP code (reference, 1st [lowest])		
2nd	0.97 (0.96–0.98)	0.96 (0.87–1.06)
3rd	0.92 (0.91–0.93)	0.88 (0.80–0.98)
4th/highest	0.91 (0.89–0.92)	0.82 (0.74–0.91)
Chronic conditions: yes (reference, no) ^c	2.02 (2.00–2.04)	1.11 (0.99–1.24)
Hospitalization/hospital characteristics		
Type of delivery: repeat cesarean (reference, primary cesarean delivery)	0.50 (0.49–0.50)	2.13 (1.98–2.29)
Location: urban (reference, rural)	1.20 (1.18–1.22)	1.49 (1.25–1.77)
Teaching status: teaching (reference, nonteaching)	1.70 (1.68–1.72)	2.07 (1.87–2.30)
Ownership (reference, public)		
Private not-for-profit	1.03 (1.01–1.04)	0.95 (0.84–1.08)
Private for profit	0.94 (0.93–0.96)	1.00 (0.86–1.16)
Bed size (reference, small)		
Medium	1.12 (1.11–1.14)	1.50 (1.29–1.74)
Large	1.37 (1.35–1.39)	1.87 (1.63–2.15)
Year	0.99 (0.99–0.99)	1.00 (0.99–1.01)

^a Adjusted for all the factors shown and for the complex survey design; ^b Adjusted for missing data indicator; ^c Presence of at least 1 of 7 chronic medical conditions (preexisting diabetes mellitus, chronic hypertensive disease, chronic heart disease, chronic respiratory disease, chronic renal disease, chronic liver disease, and HIV/AIDS).

Creanga. Cesarean delivery morbidity in the United States. *Am J Obstet Gynecol* 2015.

occurred among women with a primary than a repeat cesarean delivery. In a prospective study of >39,000 cesarean deliveries, 82% of those patients with placenta accreta had had a previous cesarean delivery,²⁵ whereas in our study, the corresponding percentage was 66%. Taken together, these potential biases may have led to an underestimation of the relative risk of placenta accreta among women with a repeat rather than a primary cesarean delivery. However, among women with a repeat cesarean delivery, our placenta accreta incidence (1.8 per 1000 deliveries from 2000-2011) is within the range provided by studies conducted in the United Kingdom (0.9 per 1000 deliveries from 2010-2011)²⁶ and Ireland (2.4 per 1000 deliveries from 2003-2010).²⁷ Unfortunately, we could not differentiate between women with ≥ 1 previous cesarean deliveries or between placenta accreta and its variants increta/percreta; the severity of hemorrhage and perioperative morbidity is known to differ with the degree of placental invasion.²⁸ Also, the analysis does not differentiate between cesarean deliveries without labor and those with induction of labor. Studies consistently suggest that cesarean delivery after labor is associated with small but measurable increased maternal and neonatal risks when compared with cesarean delivery without labor^{5,29}; in our study, this increased risk likely is reflected in the observed higher burden of complications and the higher hospital charges in the primary rather than repeat cesarean delivery group. Clinical guidelines that were aimed at the reduction of non-medically indicated cesarean delivery and the induction of labor at <39 completed weeks of gestation were released by the American College of Obstetricians and Gynecologists.^{30,31} Efforts to reduce such births have been associated with an annual 2% decline in cesarean delivery at 38 weeks of gestation and a corresponding 2% annual increase in cesarean deliveries at 39 weeks of gestation between 2009 and 2012² and may account partly for the stabilization of primary cesarean delivery rates in recent years.

Operative techniques likely have an impact on long-term complications after cesarean delivery. Thus, adherence to recommended surgical techniques, which include gentle tissue handling, hemostasis, and careful restoration of normal anatomy, may reduce maternal complications.⁹ For women with a previous cesarean delivery, there is a need to maintain a high index of suspicion of abnormal placental invasion and to make adequate preparations for delivery. The latter should consider the potential need for blood transfusion and the availability of clinicians with appropriate skills and experience in the management of potentially catastrophic hemorrhage. ■

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🕒 This article was published more than **4 years ago**

The Washington Post

Democracy Dies in Darkness

No, maternal mortality did not spike in Texas after funding cuts to abortion clinics



Analysis by [Glenn Kessler](#)

The Fact Checker

May 21, 2019 at 3:00 a.m. EDT

“Anti-abortion bills increase maternal mortality and infant mortality. Texas is the best case. The reported rate of maternal deaths in Texas doubled when the state closed their abortion clinics and cut funding for Planned Parenthood. The fact is that if Texas was a country it would have the highest maternal mortality rate of any developed country in the world.”

— **Rep. Don Beyer (D-Va.), in remarks [at a House Ways and Means Committee hearing on maternal mortality, May 16, 2019](#)**

Many times, the corrections receive far less attention than the original headline. Here’s a good example.

In arguing that laws that limit abortion rights increase maternal and infant mortality, Rep. Beyer cited some alarming data about Texas and asked a witness about the connection between the two.

The witness, [Lisa Hollier](#), the immediate past president and interim chief executive of the American College of Obstetricians and Gynecologists, sidestepped the question. But, in as polite a way as possible, she told Beyer that his data was bunk. She should know: She chairs [the Texas task force](#) that examined the original findings that were quoted by Beyer.

“When we analyzed the data, we identified there was significant over-reporting of deaths based on the death certificate data,” she testified, saying the death certificates were not accurate and so the maternal mortality rate was “not as high as previously reported.”

When The Fact Checker contacted Beyer’s office, the lawmaker immediately admitted error. “We weren’t trying to deceive people here, we just hadn’t seen the subsequent reporting on the study in question,” said Aaron Fritschner, Beyer’s communications director. “An honest mistake.”

Regular readers know that we generally do not award Pinocchios when a politician admits an error, but this is still worthy of a fact check. In fact, we found a witness at the hearing submitted testimony with the same error, so clearly the news about the new data has not traveled far enough.

The Facts

The original study, by a team of researchers headed by Marian F. MacDorman and published in Obstetrics & Gynecology in 2016, made headlines. The maternal mortality rate in Texas had climbed sharply – in fact, doubled – between 2010 and 2012, even though it had only modestly increased from 2000 and 2010. The study found that 148 Texas mothers died of pregnancy-related complications in 2012, compared with 72 in 2010.

The researchers admitted they found the result puzzling and even dubious.

“There were some changes in the provision of women’s health services in Texas from 2011–2015, including the closing of several women’s health clinics,” the report said. “Still, in the absence of war, natural disaster, or severe economic upheaval, the doubling of a mortality rate within a 2-year period in a state with almost 400,000 annual births seems unlikely.”

The reference to the closing of women’s health clinics – with a footnote to Texas barring Planned Parenthood affiliates from participation in a state health program for the poor – spawned speculation by abortion rights advocates that the startling jump in deaths was tied to the Texas law. Beyer did more than speculate; he made a causal connection between the funding cut and the maternal mortality rate.

But when the task force headed by Hollier examined and cross-referenced the actual records of 147 women listed as having died of pregnancy-related complications, they found many had been erroneously counted. Only 56 of the deaths fell under the definition of maternal mortality – any pregnancy-related death while a woman is pregnant or within 42 days of giving birth, excluding accidental or incidental causes such as car crashes or homicides.

That changed the 2012 Texas maternal mortality rate from 38.4 deaths per 100,000 live births to 14.6 per 100,000 live births. The task force only examined data from that year, so it’s still unclear how much the mortality rate changed from 2010, but the task force is continuing its research.

“We will use this new method to confirm maternal deaths and calculate maternal mortality ratios for additional years so that trends can be assessed,” the report said. “We do know that when using the standard method for identifying maternal deaths, the Texas maternal mortality ratio has decreased from 2012 to 2015.”

The task force's study on the revised Texas data was also published in Obstetrics & Gynecology in May 2018 – a year ago. So it's not as if this is recent news.

As ProPublica has documented, maternal mortality statistics in the United States are incomplete and highly suspect, prone to undercounting and overcounting. Since 2003, states have added a checkbox to death certificates, asking whether a person was pregnant when they died or had been in the previous year. But the data collection is not consistent, and the addition of a checkbox appears to have resulted in many false positives.

As a result, since 2007 the United States hasn't had an official annual count of pregnancy-related fatalities, or even an official maternal mortality rate. So anyone trying to tie a link between abortion laws and mortality rates is going to run into trouble.

Interestingly, on the same congressional panel as Hollier was Patrice Harris, president-elect of the American Medical Association Board of Trustees. Her prepared testimony also contained a reference to the original flawed numbers – and, like Beyer, drew a direct connection to the cut in Texas funding to Planned Parenthood.

“In Texas, maternal mortality rates were stable from 2006-2010. The passage of Texas House Bill 2 led to the defunding of health clinics offering family planning and the closure of half of family planning clinics relied on by poor women and women of color (MacDornan). Following this, the rate of maternal death in Texas doubled, with other states' rates increasing more slowly and California's rates diminishing. Conclusions of this paper hypothesized a connection with these two events (Ravich).”

Chuck Donovan, president of the Charlotte Lozier Institute, which opposes abortion rights, sent a letter the day before the hearing to members of the committee, warning that witness testimony had been submitted citing the flawed data. He pointed out to lawmakers the original study had been corrected. But the missive apparently got lost in the mail room.

A spokesman for AMA said the testimony had relied on a CNN report about the original study, but staff had missed an editor's note at the top of the article saying that a subsequent study found the numbers had been inflated by two-thirds. He said the AMA would be contacting the Ways and Means Committee to correct the record.

The Pinocchio Test

In ordinary circumstances, Beyer would have received Four Pinocchios. We try not to play gotcha here at The Fact Checker, and he quickly admitted his mistake. In fact, he was corrected on the spot, during the hearing, given the unusual circumstance that he directed his question to the very person who had debunked the data he cited.

2024 NRMP Main Residency Match®: Match Rates by Specialty and State

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ALABAMA	Pos.	No. Filled	Applicant Type								% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth				
Anesthesiology (PGY-1)	21	21	18	1	2	0	0	0	0	85.7	100		
Child Neurology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Dermatology (PGY-2)	5	5	3	2	0	0	0	0	0	60.0	100		
Emergency Medicine (PGY-1)	18	18	11	0	5	0	2	0	0	61.1	100		
Family Medicine (PGY-1)	81	68	23	1	15	3	15	11	0	28.4	84.0		
Internal Medicine (PGY-1)	191	173	52	2	24	3	20	72	0	27.2	90.6		
Internal Medicine/Pediatrics (PGY-1)	6	6	4	0	1	0	1	0	0	66.7	100		
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100	100		
Neurological Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100	100		
Neurology (PGY-1)	14	14	7	0	3	0	0	4	0	50.0	100		
Obstetrics and Gynecology (PGY-1)	12	12	10	0	1	0	0	1	0	83.3	100		
Orthopaedic Surgery (PGY-1)	12	12	7	3	2	0	0	0	0	58.3	100		
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	10	10	3	0	3	0	2	2	0	30.0	100		
Pediatrics (PGY-1)	36	34	23	0	1	0	0	10	0	63.9	94.4		
Pediatrics/Medical Genetics (PGY-1)	1	0	0	0	0	0	0	0	0	0.0	0.0		
Physical Medicine and Rehabilitation (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	20	20	11	0	5	0	1	3	0	55.0	100		
Radiation Oncology (PGY-2)	3	2	1	0	0	0	0	1	0	33.3	66.7		
Radiology-Diagnostic (PGY-1)	4	4	2	0	2	0	0	0	0	50.0	100		
Radiology-Diagnostic (PGY-2)	15	15	11	0	3	1	0	0	0	73.3	100		
Radiology-Diagnostic (Physician)	1	1	0	0	0	1	0	0	0	0.0	100		
Surgery (PGY-1)	29	24	18	0	4	0	0	2	0	62.1	82.8		
Transitional Year (PGY-1)	32	29	23	0	3	0	1	2	0	71.9	90.6		
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		

ALASKA	Pos.	No. Filled	Applicant Type								%		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth	MD	Sr	Tot	
Family Medicine (PGY-1)	12	7	5	0	0	0	2	0	0	41.7	58.3		
Internal Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		

ARIZONA	Pos.	No. Filled	Applicant Type								% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth				
Anesthesiology (PGY-1)	11	11	9	0	2	0	0	0	0	81.8	100		
Anesthesiology (PGY-2)	7	7	3	0	1	2	1	0	0	42.9	100		
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100		
Child Neurology (PGY-1)	3	3	1	0	1	0	0	1	0	33.3	100		
Child Neurology (Physician)	1	0	0	0	0	0	0	0	0	0.0	0.0		
Dermatology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Dermatology (PGY-2)	4	4	3	1	0	0	0	0	0	75.0	100		
Emergency Medicine (PGY-1)	57	57	18	2	36	0	1	0	0	31.6	100		
Family Medicine (PGY-1)	92	87	20	1	45	3	6	12	0	21.7	94.6		

Internal Medicine (PGY-1)	181	179	67	5	56	3	20	28	0	37.0		98.9	
Internal Medicine/Pediatrics (PGY-1)	6	6	6	0	0	0	0	0	0	100		100	
Interventional Radiology (Integrated) (PGY-2)	3	3	3	0	0	0	0	0	0	100		100	
Neurological Surgery (PGY-1)	6	6	4	0	0	0	1	1	0	66.7		100	
Neurology (PGY-1)	24	24	14	1	4	0	2	3	0	58.3		100	
Obstetrics and Gynecology (PGY-1)	22	22	17	1	4	0	0	0	0	77.3		100	
Orthopaedic Surgery (PGY-1)	11	11	11	0	0	0	0	0	0	100		100	
Otolaryngology (PGY-1)	5	5	5	0	0	0	0	0	0	100		100	
Pathology (PGY-1)	5	5	2	0	0	1	0	2	0	40.0		100	
Pediatrics (PGY-1)	56	48	16	0	26	0	4	2	0	28.6		85.7	
Pediatrics/Emergency Medicine (PGY-1)	3	3	2	0	1	0	0	0	0	66.7		100	
Physical Medicine and Rehabilitation (PGY-1)	4	4	1	0	3	0	0	0	0	25.0		100	
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Psychiatry (PGY-1)	25	25	16	1	8	0	0	0	0	64.0		100	
Radiation Oncology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100	
Radiation Oncology (PGY-2)	1	1	0	0	0	1	0	0	0	0.0		0.0	
Radiology-Diagnostic (PGY-1)	6	6	4	0	1	0	1	0	0	66.7		100	
Radiology-Diagnostic (PGY-2)	17	17	9	1	6	1	0	0	0	52.9		100	
Surgery (PGY-1)	79	66	27	3	12	6	14	4	0	34.2		83.5	
Transitional Year (PGY-1)	28	28	18	1	9	0	0	0	0	64.3		100	
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100	

ARKANSAS	Pos.	No. Filled	Applicant Type								% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth				
Anesthesiology (PGY-1)	13	13	8	1	1	0	2	1	0	61.5	100		
Anesthesiology (Physician)	2	2	0	2	0	0	0	0	0	0.0	100		
Child Neurology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Dermatology (PGY-1)	3	3	3	0	0	0	0	0	0	100	100		
Emergency Medicine (PGY-1)	16	16	3	1	8	1	3	0	0	18.8	100		
Family Medicine (PGY-1)	91	66	18	1	14	0	20	13	0	19.8	72.5		
Internal Medicine (PGY-1)	123	107	14	0	17	0	23	53	0	11.4	87.0		
Internal Medicine/Pediatrics (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100		
Interventional Radiology (Integrated) (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100		
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Neurology (PGY-1)	4	4	2	0	0	0	0	2	0	50.0	100		
Obstetrics and Gynecology (PGY-1)	5	5	5	0	0	0	0	0	0	100	100		
Orthopaedic Surgery (PGY-1)	5	5	5	0	0	0	0	0	0	100	100		
Otolaryngology (PGY-1)	3	3	3	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	4	4	1	0	1	0	1	1	0	25.0	100		
Pediatrics (PGY-1)	25	25	7	0	5	0	3	10	0	28.0	100		
Physical Medicine and Rehabilitation (PGY-1)	4	4	1	0	3	0	0	0	0	25.0	100		
Psychiatry (PGY-1)	19	19	7	1	10	0	0	1	0	36.8	100		
Radiation Oncology (PGY-2)	1	0	0	0	0	0	0	0	0	0.0	0.0		

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ARKANSAS (cont.)	Pos.	No. Filled	Applicant Type							%		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG Oth	MD Sr	MD Gr	Tot	
Radiology-Diagnostic (PGY-1)	7	7	1	0	2	0	0	4	0	14.3	100	
Surgery (PGY-1)	10	7	6	0	1	0	0	0	0	60.0	70.0	
Transitional Year (PGY-1)	25	13	9	0	3	0	1	0	0	36.0	52.0	
Vascular Surgery (PGY-1)	1	1	0	0	0	1	0	0	0	0.0	100	

CALIFORNIA	Pos.	Applicant Type								% MD Sr		% Tot
		No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US Oth				
Anesthesiology (PGY-1)	175	175	145	1	24	1	3	0	1	82.9	100	
Anesthesiology (PGY-2)	46	46	43	3	0	0	0	0	0	93.5	100	
Anesthesiology (Physician)	6	6	0	6	0	0	0	0	0	0.0	100	
Child Neurology (PGY-1)	18	18	17	0	0	0	0	1	0	94.4	100	
Child Neurology (PGY-2)	1	1	1	0	0	0	0	0	0	100	100	
Child Neurology (Physician)	4	2	0	0	0	0	1	1	0	0.0	50.0	
Dermatology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Dermatology (PGY-2)	45	45	39	4	0	0	0	2	0	86.7	100	
Diagnostic Radiology/Nuclear	2	2	1	0	1	0	0	0	0	50.0	100	
Emergency Medicine (PGY-1)	290	284	162	3	87	3	26	3	0	55.9	97.9	
Family Medicine (PGY-1)	577	552	214	12	162	5	108	51	0	37.1	95.7	
Internal Medicine (PGY-1)	1107	1064	670	6	179	2	93	114	0	60.5	96.1	
Internal Medicine/Anesthesiology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Internal Medicine/Pediatrics (PGY-1)	20	20	20	0	0	0	0	0	0	100	100	
Internal Medicine/Preventive Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-1)	4	4	3	0	1	0	0	0	0	75.0	100	
Interventional Radiology (Integrated) (PGY-2)	14	14	13	0	1	0	0	0	0	92.9	100	
Neurological Surgery (PGY-1)	21	21	19	0	0	1	0	1	0	90.5	100	
Neurology (PGY-1)	71	71	56	0	12	0	1	2	0	78.9	100	
Neurology (PGY-2)	20	20	19	0	0	0	0	1	0	95.0	100	
Nuclear Medicine (PGY-2)	2	2	1	1	0	0	0	0	0	50.0	100	
Obstetrics and Gynecology (PGY-1)	130	128	109	3	13	0	3	0	0	83.8	98.5	
Orthopaedic Surgery (PGY-1)	78	78	61	5	9	3	0	0	0	78.2	100	
Otolaryngology (PGY-1)	36	36	35	1	0	0	0	0	0	97.2	100	
Pathology (PGY-1)	62	62	41	2	10	2	1	6	0	66.1	100	
Pediatrics (PGY-1)	308	294	200	5	56	1	20	12	0	64.9	95.5	
Pediatrics/Anesthesiology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Pediatrics/Medical Genetics (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Physical Medicine and Rehabilitation (PGY-1)	6	6	4	0	2	0	0	0	0	66.7	100	
Physical Medicine and Rehabilitation (PGY-2)	26	26	21	0	4	0	0	1	0	80.8	100	
Plastic Surgery (Integrated) (PGY-1)	21	21	21	0	0	0	0	0	0	100	100	

Psychiatry (PGY-1)	230	230	178	1	36	1	12	2	0	77.4	100	
Psychiatry/Family Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Radiation Oncology (PGY-2)	23	22	17	1	2	0	0	2	0	73.9	95.7	
Radiology-Diagnostic (PGY-1)	4	4	3	0	1	0	0	0	0	75.0	100	
Radiology-Diagnostic (PGY-2)	95	95	88	3	2	0	1	1	0	92.6	100	
Radiology-Diagnostic (Physician)	2	2	0	2	0	0	0	0	0	0.0	100	
Surgery (PGY-1)	234	185	150	5	10	0	9	10	1	64.1	79.1	
Thoracic Surgery (PGY-1)	9	9	8	1	0	0	0	0	0	88.9	100	
Transitional Year (PGY-1)	160	155	125	1	16	1	7	5	0	78.1	96.9	
Vascular Surgery (PGY-1)	9	9	9	0	0	0	0	0	0	100	100	

COLORADO	Pos.	No. Filled	Applicant Type								% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US Oth					
Anesthesiology (PGY-1)	16	16	9	0	6	0	1	0	0	56.3	100		
Anesthesiology (PGY-2)	7	7	6	0	1	0	0	0	0	85.7	100		
Anesthesiology (Physician)	5	5	0	4	0	1	0	0	0	0.0	100		
Child Neurology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Child Neurology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100		
Dermatology (PGY-2)	6	6	4	2	0	0	0	0	0	66.7	100		
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100		
Emergency Medicine (PGY-1)	17	17	17	0	0	0	0	0	0	100	100		
Family Medicine (PGY-1)	86	85	38	1	41	1	3	1	0	44.2	98.8		
Internal Medicine (PGY-1)	105	100	64	1	21	1	0	13	0	61.0	95.2		
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100	100		
Neurological Surgery (PGY-1)	3	3	2	0	0	0	0	1	0	66.7	100		
Neurology (PGY-1)	15	15	10	0	5	0	0	0	0	66.7	100		
Neurology (Physician)	2	2	0	1	0	0	0	1	0	0.0	100		
Obstetrics and Gynecology (PGY-1)	15	14	13	0	1	0	0	0	0	86.7	93.3		
Orthopaedic Surgery (PGY-1)	7	7	7	0	0	0	0	0	0	100	100		
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	9	9	3	0	2	1	1	2	0	33.3	100		
Pediatrics (PGY-1)	28	28	27	0	1	0	0	0	0	96.4	100		
Pediatrics/Medical Genetics (PGY-1)	2	2	1	0	0	0	0	1	0	50.0	100		
Pediatrics/PM&R (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Physical Medicine and Rehabilitation (PGY-2)	6	6	4	0	2	0	0	0	0	66.7	100		
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	23	22	16	0	5	1	0	0	0	69.6	95.7		
Radiation Oncology (PGY-2)	2	2	1	0	0	0	1	0	0	50.0	100		
Radiation Oncology (Physician)	2	2	0	2	0	0	0	0	0	0.0	100		
Radiology-Diagnostic (PGY-2)	10	10	6	0	4	0	0	0	0	60.0	100		
Surgery (PGY-1)	39	26	17	1	5	0	0	3	0	43.6	66.7		
Transitional Year (PGY-1)	8	8	2	0	6	0	0	0	0	25.0	100		
Vascular Surgery (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100		

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CONNECTICUT	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	30	30	24	2	1	0	2	1	0	80.0		100
Anesthesiology (PGY-2)	9	9	2	1	3	0	1	2	0	22.2		100
Anesthesiology (Physician)	5	5	0	3	0	1	1	0	0	0.0		100
Child Neurology (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Dermatology (PGY-2)	10	10	10	0	0	0	0	0	0	100		100
Emergency Medicine (PGY-1)	37	37	16	2	13	0	5	1	0	43.2		100
Family Medicine (PGY-1)	29	24	11	0	6	0	1	6	0	37.9	82.8	
Internal Medicine (PGY-1)	283	283	98	3	22	0	20	140	0	34.6		100
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Internal Medicine/Preventive Medicine (PGY-1)	3	3	0	0	0	0	0	3	0	0.0		100
Interventional Radiology (Integrated) (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Neurology (PGY-1)	7	7	0	0	0	0	2	5	0	0.0		100
Neurology (PGY-2)	12	12	9	0	0	0	0	3	0	75.0		100
Neurology (Physician)	2	2	0	1	0	0	0	1	0	0.0		100
Obstetrics and Gynecology (PGY-1)	35	35	27	0	3	0	3	2	0	77.1		100
Orthopaedic Surgery (PGY-1)	10	10	8	1	1	0	0	0	0	80.0		100
Otolaryngology (PGY-1)	7	7	6	0	1	0	0	0	0	85.7		100
Pathology (PGY-1)	15	15	6	1	0	0	2	6	0	40.0		100
Pediatrics (PGY-1)	43	43	30	1	6	0	1	5	0	69.8		100
Physical Medicine and Rehabilitation (PGY-1)	8	8	3	0	4	0	0	1	0	37.5		100
Plastic Surgery (Integrated) (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	39	39	25	2	3	0	2	7	0	64.1		100
Radiation Oncology (PGY-2)	3	3	2	0	1	0	0	0	0	66.7		100
Radiology-Diagnostic (PGY-2)	28	28	10	2	3	0	2	11	0	35.7		100
Radiology-Diagnostic (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Surgery (PGY-1)	52	41	18	3	3	1	4	12	0	34.6	78.8	
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100

DELAWARE	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Emergency Medicine (PGY-1)	19	18	9	0	4	0	2	3	0	47.4	94.7	
Emergency Medicine/Family Medicine (PGY-1)	3	3	2	0	1	0	0	0	0	66.7		100
Family Medicine (PGY-1)	27	25	5	0	10	0	4	6	0	18.5	92.6	
Internal Medicine (PGY-1)	26	26	5	0	18	0	0	3	0	19.2		100
Internal Medicine/ Emergency Med (PGY-1)	4	4	3	0	1	0	0	0	0	75.0		100
Internal Medicine/Pediatrics (PGY-1)	5	5	4	0	1	0	0	0	0	80.0		100
Interventional Radiology (Integrated) (PGY-1)	1	1	0	0	1	0	0	0	0	0.0		100
Obstetrics and Gynecology (PGY-1)	7	7	6	1	0	0	0	0	0	85.7		100
Psychiatry (PGY-1)	6	6	1	0	4	0	0	1	0	16.7		100

Radiology-Diagnostic (PGY-1)	4	4	3	0	0	0	1	0	0	75.0	100	
Surgery (PGY-1)	9	9	1	0	5	1	1	1	0	11.1	100	

DISTRICT OF COLUMBIA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	17	17	14	2	1	0	0	0	0	82.4		100
Anesthesiology (PGY-2)	3	3	1	1	0	0	1	0	0	33.3		100
Anesthesiology (Physician)	2	2	0	2	0	0	0	0	0	0.0		100
Child Neurology (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	9	9	7	2	0	0	0	0	0	77.8		100
Dermatology (Physician)	1	1	0	0	0	0	1	0	0	0.0		100
Emergency Medicine (PGY-1)	22	22	15	1	4	1	0	1	0	68.2		100
Family Medicine (PGY-1)	10	10	4	1	2	0	1	2	0	40.0		100
Internal Medicine (PGY-1)	146	145	75	2	12	1	8	47	0	51.4	99.3	
Internal Medicine/Dermatology	2	2	1	1	0	0	0	0	0	50.0		100
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	1	1	0	0	1	0	0	0	0	0.0		100
Neurological Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Neurology (PGY-1)	13	13	11	0	1	0	0	1	0	84.6		100
Neurology (PGY-2)	2	2	0	0	0	0	0	2	0	0.0		100
Neurology (Physician)	1	1	0	0	0	1	0	0	0	0.0		100
Obstetrics and Gynecology (PGY-1)	22	22	17	1	0	0	2	2	0	77.3		100
Orthopaedic Surgery (PGY-1)	8	8	7	1	0	0	0	0	0	87.5		100
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Pathology (PGY-1)	10	10	2	0	2	0	2	4	0	20.0		100
Pediatrics (PGY-1)	47	47	28	0	5	0	4	10	0	59.6		100
Pediatrics/Medical Genetics (PGY-1)	2	2	1	0	0	0	1	0	0	50.0		100
Physical Medicine and Rehabilitation (PGY-1)	6	6	5	0	1	0	0	0	0	83.3		100
Plastic Surgery (Integrated) (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	26	26	20	1	1	0	1	3	0	76.9		100
Radiation Oncology (PGY-2)	1	1	0	0	1	0	0	0	0	0.0		100
Radiology-Diagnostic (PGY-2)	10	10	10	0	0	0	0	0	0	100		100
Surgery (PGY-1)	35	26	18	4	0	0	3	1	0	51.4	74.3	
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100

FLORIDA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	78	78	52	2	16	0	2	6	0	66.7		100
Anesthesiology (PGY-2)	18	18	3	1	7	0	7	0	0	16.7		100
Anesthesiology (Physician)	10	10	0	3	0	4	3	0	0	0.0		100
Child Neurology (PGY-1)	3	3	2	0	0	0	0	1	0	66.7		100
Child Neurology (PGY-2)	2	2	0	0	2	0	0	0	0	0.0		100
Child Neurology (Physician)	3	2	0	1	0	1	0	0	0	0.0	66.7	
Dermatology (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	35	34	20	1	8	2	1	2	0	57.1	97.1	

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FLORIDA (cont.)	Applicant Type												
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	%	%
Dermatology (Physician)	4	4	0	2	0	2	0	0	0	0.0	100		
Emergency Medicine (PGY-1)	236	226	68	1	103	8	42	4	0	28.8	95.8		
Family Medicine (PGY-1)	239	219	50	4	70	0	59	36	0	20.9	91.6		
Internal Medicine (PGY-1)	907	744	173	13	175	12	173	198	0	19.1	82.0		
Internal Medicine/Pediatrics (PGY-1)	10	10	10	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-2)	6	6	4	0	0	0	0	2	0	66.7	100		
Neurological Surgery (PGY-1)	8	8	8	0	0	0	0	0	0	100	100		
Neurology (PGY-1)	58	57	19	0	12	0	11	15	0	32.8	98.3		
Neurology (PGY-2)	9	9	1	0	4	0	0	4	0	11.1	100		
Neurology (Physician)	2	2	0	1	0	0	1	0	0	0.0	100		
Obstetrics and Gynecology (PGY-1)	76	76	45	2	20	1	3	5	0	59.2	100		
Orthopaedic Surgery (PGY-1)	45	45	34	2	6	2	1	0	0	75.6	100		
Osteopathic Neuromusculoskeletal	6	0	0	0	0	0	0	0	0	0.0	0.0		
Otolaryngology (PGY-1)	12	12	12	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	21	19	8	0	2	1	5	3	0	38.1	90.5		
Pediatrics (PGY-1)	192	171	43	2	57	1	23	45	0	22.4	89.1		
Physical Medicine and Rehabilitation (PGY-1)	9	9	2	0	7	0	0	0	0	22.2	100		
Physical Medicine and Rehabilitation (PGY-2)	36	36	16	0	11	1	6	2	0	44.4	100		
Physical Medicine and Rehabilitation (Physician)	8	8	0	5	0	3	0	0	0	0.0	100		
Plastic Surgery (Integrated) (PGY-1)	10	10	7	0	1	0	0	2	0	70.0	100		
Psychiatry (PGY-1)	154	153	53	2	49	2	32	15	0	34.4	99.4		
Radiation Oncology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100		
Radiation Oncology (PGY-2)	7	7	6	0	0	0	1	0	0	85.7	100		
Radiation Oncology (Physician)	3	1	0	0	0	1	0	0	0	0.0	33.3		
Radiology-Diagnostic (PGY-1)	13	13	8	0	4	0	0	1	0	61.5	100		
Radiology-Diagnostic (PGY-2)	51	50	30	5	9	1	3	2	0	58.8	98.0		
Radiology-Diagnostic (Physician)	5	5	0	4	0	1	0	0	0	0.0	100		
Surgery (PGY-1)	189	157	69	18	17	4	21	28	0	36.5	83.1		
Transitional Year (PGY-1)	232	170	77	2	58	0	24	9	0	33.2	73.3		
Vascular Surgery (PGY-1)	3	3	2	0	1	0	0	0	0	66.7	100		

GEORGIA	Applicant Type												
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	%	%
Anesthesiology (PGY-1)	23	23	17	1	4	1	0	0	0	73.9	100		
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100		
Child Neurology (PGY-1)	6	4	4	0	0	0	0	0	0	66.7	66.7		
Child Neurology (Physician)	2	0	0	0	0	0	0	0	0	0.0	0.0		
Dermatology (PGY-2)	9	9	6	3	0	0	0	0	0	66.7	100		
Emergency Medicine (PGY-1)	58	58	32	0	18	0	7	1	0	55.2	100		
Family Medicine (PGY-1)	131	114	18	1	34	1	39	21	0	13.7	87.0		

Internal Medicine (PGY-1)	317	297	105	8	46	1	41	96	0	33.1	93.7		
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-2)	5	5	3	0	0	0	2	0	0	60.0	100		
Neurological Surgery (PGY-1)	5	5	5	0	0	0	0	0	0	100	100		
Neurology (PGY-1)	8	8	4	0	0	0	1	3	0	50.0	100		
Neurology (PGY-2)	10	10	7	0	2	0	0	1	0	70.0	100		
Obstetrics and Gynecology (PGY-1)	30	30	23	0	5	0	2	0	0	76.7	100		
Orthopaedic Surgery (PGY-1)	14	14	12	2	0	0	0	0	0	85.7	100		
Otolaryngology (PGY-1)	7	7	6	0	0	0	1	0	0	85.7	100		
Pathology (PGY-1)	12	12	4	0	3	0	0	5	0	33.3	100		
Pediatrics (PGY-1)	65	49	34	1	6	0	5	3	0	52.3	75.4		
Pediatrics/Medical Genetics (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100		
Physical Medicine and Rehabilitation (PGY-2)	6	6	6	0	0	0	0	0	0	100	100		
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	53	49	26	1	14	0	4	4	0	49.1	92.5		
Radiation Oncology (PGY-2)	4	4	4	0	0	0	0	0	0	100	100		
Radiology-Diagnostic (PGY-2)	27	27	21	1	1	0	1	3	0	77.8	100		
Radiology-Diagnostic (Physician)	2	2	0	1	0	0	0	1	0	0.0	100		
Surgery (PGY-1)	52	46	23	4	8	3	2	6	0	44.2	88.5		
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Transitional Year (PGY-1)	102	94	68	1	14	0	4	7	0	66.7	92.2		
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		

HAWAII	Applicant Type												
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	%	%
Family Medicine (PGY-1)	13	11	5	0	4	0	0	2	0	38.5	84.6		
Internal Medicine (PGY-1)	38	38	16	1	3	2	5	11	0	42.1	100		
Obstetrics and Gynecology (PGY-1)	6	6	5	0	1	0	0	0	0	83.3	100		
Orthopaedic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	2	1	0	0	0	0	0	1	0	0.0	50.0		
Pediatrics (PGY-1)	8	8	7	0	1	0	0	0	0	87.5	100		
Psychiatry (PGY-1)	8	8	6	0	1	0	0	1	0	75.0	100		
Radiology-Diagnostic (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100		
Surgery (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100		

IDAHO	Applicant Type												
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	%	%
Family Medicine (PGY-1)	47	47	23	0	22	0	1	1	0	48.9	100		
Internal Medicine (PGY-1)	25	20	9	0	7	1	2	1	0	36.0	80.0		
Pediatrics (PGY-1)	4	4	2	0	2	0	0	0	0	50.0	100		
Psychiatry (PGY-1)	8	8	1	1	6	0	0	0	0	12.5	100		

ILLINOIS	Applicant Type												
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	%	%
Anesthesiology (PGY-1)	96	96	66	5	12	0	6	7	0	68.8	100		

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ILLINOIS (cont.)	Pos.	No. Filled	Applicant Type							% Tot		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-2)	15	15	15	0	0	0	0	0	0	100		100
Anesthesiology (Physician)	12	11	0	6	0	3	1	1	0	0.0		91.7
Child Neurology (PGY-1)	6	6	5	0	0	0	0	1	0	83.3		100
Child Neurology (Physician)	1	1	0	0	0	0	0	1	0	0.0		100
Dermatology (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	23	22	20	2	0	0	0	0	0	87.0		95.7
Dermatology (Physician)	3	3	0	3	0	0	0	0	0	0.0		100
Emergency Medicine (PGY-1)	145	145	77	4	51	2	9	2	0	53.1		100
Family Medicine (PGY-1)	223	190	75	2	53	0	35	25	0	33.6		85.2
Internal Medicine (PGY-1)	539	532	255	5	85	2	33	152	0	47.3		98.7
Internal Medicine/ Emergency Med (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Internal Medicine/Dermatology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Internal Medicine/Pediatrics (PGY-1)	24	24	23	0	1	0	0	0	0	95.8		100
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	6	6	6	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	14	14	12	0	0	0	0	2	0	85.7		100
Neurology (PGY-1)	31	31	16	0	6	0	3	6	0	51.6		100
Neurology (PGY-2)	18	18	16	0	1	0	0	1	0	88.9		100
Neurology (Physician)	2	2	0	1	0	0	0	1	0	0.0		100
Obstetrics and Gynecology (PGY-1)	70	70	52	1	11	1	3	2	0	74.3		100
Orthopaedic Surgery (PGY-1)	35	35	28	3	4	0	0	0	0	80.0		100
Otolaryngology (PGY-1)	17	17	17	0	0	0	0	0	0	100		100
Pathology (PGY-1)	30	30	13	0	5	0	2	10	0	43.3		100
Pediatrics (PGY-1)	143	135	77	2	19	0	11	26	0	53.8		94.4
Physical Medicine and Rehabilitation (PGY-1)	8	8	7	0	1	0	0	0	0	87.5		100
Physical Medicine and Rehabilitation (PGY-2)	19	19	14	0	4	1	0	0	0	73.7		100
Plastic Surgery (Integrated) (PGY-1)	13	13	12	0	0	0	0	1	0	92.3		100
Psychiatry (PGY-1)	70	70	44	5	15	0	2	4	0	62.9		100
Radiation Oncology (PGY-1)	1	1	0	0	1	0	0	0	0	0.0		100
Radiation Oncology (PGY-2)	8	8	6	0	2	0	0	0	0	75.0		100
Radiation Oncology (Physician)	2	2	0	2	0	0	0	0	0	0.0		100
Radiology-Diagnostic (PGY-1)	14	14	7	1	6	0	0	0	0	50.0		100
Radiology-Diagnostic (PGY-2)	41	41	30	1	6	0	1	3	0	73.2		100
Radiology-Diagnostic (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Surgery (PGY-1)	106	77	44	9	13	2	4	5	0	41.5		72.6
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Transitional Year (PGY-1)	58	53	51	0	1	0	0	1	0	87.9		91.4
Vascular Surgery (PGY-1)	4	4	2	0	0	0	0	2	0	50.0		100

INDIANA	Pos.	No. Filled	Applicant Type							% Tot		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	4	4	3	0	1	0	0	0	0	75.0		100
Anesthesiology (PGY-2)	26	26	16	1	4	2	1	2	0	61.5		100
Anesthesiology (Physician)	2	2	0	1	0	0	0	1	0	0.0		100
Child Neurology (PGY-1)	2	0	0	0	0	0	0	0	0	0.0		0.0
Dermatology (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	2	2	2	0	0	0	0	0	0	100		100
Emergency Medicine (PGY-1)	21	21	14	0	7	0	0	0	0	66.7		100
Family Medicine (PGY-1)	116	92	20	2	39	1	11	19	0	17.2		79.3
Internal Medicine (PGY-1)	93	93	32	2	24	0	9	26	0	34.4		100
Internal Medicine/Pediatrics (PGY-1)	14	14	14	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100		100
Neurodevelopmental Disabilities (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Neurology (PGY-1)	10	10	8	0	2	0	0	0	0	80.0		100
Obstetrics and Gynecology (PGY-1)	20	20	13	0	7	0	0	0	0	65.0		100
Orthopaedic Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100		100
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Pathology (PGY-1)	5	5	4	0	0	0	0	1	0	80.0		100
Pediatrics (PGY-1)	31	30	17	1	7	0	1	4	0	54.8		96.8
Pediatrics/Emergency Medicine (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Pediatrics/Medical Genetics (PGY-1)	1	0	0	0	0	0	0	0	0	0.0		0.0
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Physical Medicine and Rehabilitation (PGY-2)	6	6	3	1	2	0	0	0	0	50.0		100
Physical Medicine and Rehabilitation (Physician)	2	2	0	1	0	1	0	0	0	0.0		100
Plastic Surgery (Integrated) (PGY-1)	2	2	1	1	0	0	0	0	0	50.0		100
Psychiatry (PGY-1)	26	26	8	0	14	0	3	1	0	30.8		100
Radiation Oncology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0		100
Radiation Oncology (PGY-2)	1	1	1	0	0	0	0	0	0	100		100
Radiology-Diagnostic (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Radiology-Diagnostic (PGY-2)	9	9	7	1	1	0	0	0	0	77.8		100
Surgery (PGY-1)	21	18	9	3	3	0	2	1	0	42.9		85.7
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Transitional Year (PGY-1)	56	55	46	0	9	0	0	0	0	82.1		98.2
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100

IOWA	Pos.	No. Filled	Applicant Type							% Tot		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	15	15	8	1	2	0	0	4	0	53.3		100
Child Neurology (PGY-1)	2	2	1	0	0	0	0	1	0	50.0		100
Dermatology (PGY-2)	7	7	7	0	0	0	0	0	0	100		100
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Emergency Medicine (PGY-1)	16	16	4	0	10	0	2	0	0	25.0		100

Key: Pos.=number of positions in the match; No. Filled=number of positions filled; MD Sr=U.S. allopathic seniors; MD Gr=prior U.S. allopathic graduates; DO Sr=U.S. osteopathic seniors; DO Gr=prior U.S. osteopathic graduates; US IMG=U.S. citizen graduates of international medical schools; IMG=non-U.S. citizen graduates of international medical schools; Oth=5th Pathway and Canadian medical schools graduates; % MD Sr=percent of positions filled by U.S. allopathic seniors; % Tot = percent of positions filled.

2024 NRMP Main Residency Match®: Match Rates by Specialty and State

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IOWA (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Family Medicine (PGY-1)	58	48	7	1	21	1	8	10	0	12.1	82.8		
Internal Medicine (PGY-1)	63	63	34	0	16	1	2	10	0	54.0	100		
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-1)	1	1	0	1	0	0	0	0	0	0.0	100		
Neurological Surgery (PGY-1)	2	2	0	0	0	0	1	1	0	0.0	100		
Neurology (PGY-1)	8	8	7	0	0	0	0	1	0	87.5	100		
Obstetrics and Gynecology (PGY-1)	6	6	6	0	0	0	0	0	0	100	100		
Orthopaedic Surgery (PGY-1)	7	7	7	0	0	0	0	0	0	100	100		
Otolaryngology (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100		
Pathology (PGY-1)	3	3	1	0	0	0	0	2	0	33.3	100		
Pediatrics (PGY-1)	22	22	6	1	8	0	2	5	0	27.3	100		
Plastic Surgery (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	17	17	8	0	8	0	1	0	0	47.1	100		
Psychiatry/Family Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Radiology-Diagnostic (PGY-1)	4	4	2	0	0	0	0	2	0	50.0	100		
Radiology-Diagnostic (PGY-2)	3	3	1	1	0	0	0	1	0	33.3	100		
Surgery (PGY-1)	19	17	12	1	3	0	0	1	0	63.2	89.5		
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Transitional Year (PGY-1)	8	8	7	0	1	0	0	0	0	87.5	100		
Vascular Surgery (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100		

KANSAS	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Anesthesiology (PGY-1)	15	15	9	0	6	0	0	0	0	60.0	100		
Anesthesiology (Physician)	2	2	0	1	0	1	0	0	0	0.0	100		
Dermatology (PGY-2)	5	5	4	1	0	0	0	0	0	80.0	100		
Emergency Medicine (PGY-1)	11	11	5	0	3	1	2	0	0	45.5	100		
Family Medicine (PGY-1)	43	41	29	1	10	0	0	1	0	67.4	95.3		
Internal Medicine (PGY-1)	54	54	29	0	9	0	2	14	0	53.7	100		
Internal Medicine/Pediatrics (PGY-1)	3	3	3	0	0	0	0	0	0	100	100		
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100	100		
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Neurology (PGY-1)	5	5	2	0	0	0	0	3	0	40.0	100		
Obstetrics and Gynecology (PGY-1)	10	10	7	0	3	0	0	0	0	70.0	100		
Orthopaedic Surgery (PGY-1)	8	8	8	0	0	0	0	0	0	100	100		
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Pathology (PGY-1)	4	4	1	0	2	0	1	0	0	25.0	100		
Pediatrics (PGY-1)	5	5	0	0	2	0	0	3	0	0.0	100		
Physical Medicine and Rehabilitation (PGY-2)	4	4	3	0	0	0	1	0	0	75.0	100		

Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	14	14	5	0	6	0	1	2	0	35.7	100		
Radiation Oncology (PGY-2)	2	2	0	0	0	0	0	2	0	0.0	100		
Radiology-Diagnostic (PGY-2)	9	9	7	1	0	0	0	1	0	77.8	100		
Surgery (PGY-1)	13	13	6	1	5	0	0	1	0	46.2	100		

KENTUCKY	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Anesthesiology (PGY-1)	27	27	16	2	9	0	0	0	0	59.3	100		
Child Neurology (PGY-1)	5	5	3	0	0	0	0	2	0	60.0	100		
Child Neurology (Physician)	2	1	0	0	0	0	0	1	0	0.0	50.0		
Dermatology (PGY-2)	2	2	0	2	0	0	0	0	0	0.0	100		
Emergency Medicine (PGY-1)	25	25	19	0	5	0	1	0	0	76.0	100		
Family Medicine (PGY-1)	58	45	17	0	17	1	6	4	0	29.3	77.6		
Internal Medicine (PGY-1)	91	90	49	2	25	0	3	11	0	53.8	98.9		
Internal Medicine/Pediatrics (PGY-1)	11	11	11	0	0	0	0	0	0	100	100		
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Neurological Surgery (PGY-1)	4	4	2	1	0	0	0	1	0	50.0	100		
Neurology (PGY-1)	13	13	2	0	1	0	0	10	0	15.4	100		
Neurology (PGY-2)	1	1	0	0	0	0	0	1	0	0.0	100		
Obstetrics and Gynecology (PGY-1)	14	14	11	0	3	0	0	0	0	78.6	100		
Orthopaedic Surgery (PGY-1)	10	10	8	2	0	0	0	0	0	80.0	100		
Otolaryngology (PGY-1)	7	7	6	1	0	0	0	0	0	85.7	100		
Pathology (PGY-1)	7	7	4	1	0	0	2	0	0	57.1	100		
Pediatrics (PGY-1)	36	34	17	0	12	1	1	3	0	47.2	94.4		
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100	100		
Physical Medicine and Rehabilitation (PGY-1)	6	6	3	0	2	1	0	0	0	50.0	100		
Physical Medicine and Rehabilitation (PGY-2)	4	4	1	0	3	0	0	0	0	25.0	100		
Physical Medicine and Rehabilitation (Physician)	1	1	0	0	0	1	0	0	0	0.0	100		
Plastic Surgery (Integrated) (PGY-1)	4	4	4	0	0	0	0	0	0	100	100		
Psychiatry (PGY-1)	15	15	8	0	3	1	1	2	0	53.3	100		
Radiation Oncology (PGY-2)	4	2	0	1	0	0	0	1	0	0.0	50.0		
Radiology-Diagnostic (PGY-2)	13	13	11	0	1	0	0	1	0	84.6	100		
Radiology-Diagnostic (Physician)	2	2	0	1	0	1	0	0	0	0.0	100		
Surgery (PGY-1)	39	22	17	2	1	1	0	1	0	43.6	56.4		
Thoracic Surgery (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100		
Transitional Year (PGY-1)	12	8	4	0	4	0	0	0	0	33.3	66.7		

LOUISIANA	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Anesthesiology (PGY-1)	34	34	24	2	4	0	4	0	0	70.6	100		
Anesthesiology (Physician)	3	3	0	1	0	1	1	0	0	0.0	100		
Child Neurology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100		
Dermatology (PGY-2)	10	10	8	2	0	0	0	0	0	80.0	100		

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LOUISIANA (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth			
Emergency Medicine (PGY-1)	42	38	14	4	15	0	5	0	0	33.3	90.5	
Emergency Medicine/Family Medicine (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Family Medicine (PGY-1)	71	54	18	0	6	0	13	17	0	25.4	76.1	
Internal Medicine (PGY-1)	189	183	75	1	31	0	16	60	0	39.7	96.8	
Internal Medicine/ Emergency Med (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Internal Medicine/Pediatrics (PGY-1)	15	15	9	0	4	0	1	1	0	60.0	100	
Internal Medicine/Psychiatry (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Interventional Radiology (Integrated) (PGY-1)	2	2	0	0	0	0	2	0	0	0.0	100	
Interventional Radiology (Integrated) (PGY-2)	2	2	1	1	0	0	0	0	0	50.0	100	
Interventional Radiology (Integrated) (Physician)	1	1	0	1	0	0	0	0	0	0.0	100	
Neurological Surgery (PGY-1)	5	5	4	0	0	0	1	0	0	80.0	100	
Neurology (PGY-1)	17	17	5	1	0	0	5	6	0	29.4	100	
Obstetrics and Gynecology (PGY-1)	29	29	22	2	2	0	3	0	0	75.9	100	
Orthopaedic Surgery (PGY-1)	16	16	14	2	0	0	0	0	0	87.5	100	
Otolaryngology (PGY-1)	10	10	7	2	0	0	0	1	0	70.0	100	
Pathology (PGY-1)	9	9	2	0	0	0	3	4	0	22.2	100	
Pediatrics (PGY-1)	56	53	20	3	6	1	10	13	0	35.7	94.6	
Pediatrics/Emergency Medicine (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100	
Pediatrics/Psych/Child Psych (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Physical Medicine and Rehabilitation (PGY-1)	6	6	2	1	3	0	0	0	0	33.3	100	
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Psychiatry (PGY-1)	42	42	28	2	3	1	3	5	0	66.7	100	
Radiology-Diagnostic (PGY-1)	10	10	7	0	2	0	1	0	0	70.0	100	
Radiology-Diagnostic (PGY-2)	10	10	4	2	3	0	1	0	0	40.0	100	
Surgery (PGY-1)	53	40	28	4	3	0	4	1	0	52.8	75.5	
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	

MAINE	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth			
Anesthesiology (PGY-1)	8	8	4	1	2	0	1	0	0	50.0	100	
Emergency Medicine (PGY-1)	10	10	9	0	1	0	0	0	0	90.0	100	
Family Medicine (PGY-1)	35	33	12	0	10	0	1	10	0	34.3	94.3	
Internal Medicine (PGY-1)	17	17	3	0	14	0	0	0	0	17.6	100	
Internal Medicine/Pediatrics (PGY-1)	4	4	3	0	1	0	0	0	0	75.0	100	
Interventional Radiology (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Neurology (PGY-1)	3	3	1	0	1	0	0	1	0	33.3	100	
Neurology (PGY-2)	1	1	0	1	0	0	0	0	0	0.0	100	
Obstetrics and Gynecology (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100	

Pediatrics (PGY-1)	8	8	6	0	2	0	0	0	0	75.0	100	
Psychiatry (PGY-1)	11	11	6	1	2	0	1	1	0	54.5	100	
Radiology-Diagnostic (PGY-1)	4	4	1	0	2	0	1	0	0	25.0	100	
Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100	100	
Vascular Surgery (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100	

MARYLAND	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth			
Anesthesiology (PGY-1)	12	12	8	0	2	0	2	0	0	66.7	100	
Anesthesiology (PGY-2)	31	31	26	0	1	1	0	3	0	83.9	100	
Anesthesiology (Physician)	3	3	0	3	0	0	0	0	0	0.0	100	
Child Neurology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	
Dermatology (PGY-2)	10	10	7	2	0	0	1	0	0	70.0	100	
Diagnostic Radiology/Nuclear	1	1	0	0	0	0	1	0	0	0.0	100	
Emergency Medicine (PGY-1)	25	23	19	1	2	0	1	0	0	76.0	92.0	
Emergency Medicine/Anesthesiology	2	1	1	0	0	0	0	0	0	50.0	50.0	
Family Medicine (PGY-1)	27	22	5	0	10	0	3	4	0	18.5	81.5	
Family Medicine/Preventive Medicine (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Internal Medicine (PGY-1)	300	300	143	1	8	0	21	127	0	47.7	100	
Internal Medicine/ Emergency Med (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Internal Medicine/Medical Genetics (PGY-1)	0	0	0	0	0	0	0	0	0	0.0	0.0	
Internal Medicine/Pediatrics (PGY-1)	8	8	8	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-2)	6	6	5	0	0	0	0	1	0	83.3	100	
Neurodevelopmental Disabilities (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100	
Neurodevelopmental Disabilities (PGY-2)	1	1	1	0	0	0	0	0	0	100	100	
Neurological Surgery (PGY-1)	7	7	7	0	0	0	0	0	0	100	100	
Neurology (PGY-1)	7	7	7	0	0	0	0	0	0	100	100	
Neurology (PGY-2)	10	10	8	0	0	0	0	2	0	80.0	100	
Obstetrics and Gynecology (PGY-1)	25	25	21	0	4	0	0	0	0	84.0	100	
Orthopaedic Surgery (PGY-1)	18	18	15	1	1	0	0	1	0	83.3	100	
Otolaryngology (PGY-1)	7	7	6	0	0	0	1	0	0	85.7	100	
Pathology (PGY-1)	15	15	8	1	2	0	0	4	0	53.3	100	
Pediatrics (PGY-1)	48	43	28	0	4	0	5	6	0	58.3	89.6	
Pediatrics/Anesthesiology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Pediatrics/Emergency Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Pediatrics/Medical Genetics (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Physical Medicine and Rehabilitation (PGY-2)	12	12	3	0	5	0	2	2	0	25.0	100	
Plastic Surgery (Integrated) (PGY-1)	4	4	2	1	0	0	0	1	0	50.0	100	
Psychiatry (PGY-1)	27	27	25	0	2	0	0	0	0	92.6	100	
Radiation Oncology (PGY-2)	7	7	4	1	2	0	0	0	0	57.1	100	
Radiology-Diagnostic (PGY-2)	15	15	9	1	1	0	0	4	0	60.0	100	

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MARYLAND (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Surgery (PGY-1)	59	49	17	1	9	1	5	16	0	28.8			83.1
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100			100
Transitional Year (PGY-1)	10	10	9	0	0	0	0	1	0	90.0			100

MASSACHUSETTS	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Anesthesiology (PGY-1)	114	114	79	5	8	0	9	13	0	69.3			100
Anesthesiology (PGY-2)	17	17	12	1	0	1	1	2	0	70.6			100
Anesthesiology (Physician)	8	8	0	7	0	1	0	0	0	0.0			100
Child Neurology (PGY-1)	9	9	7	0	0	0	0	1	1	77.8			100
Child Neurology (PGY-2)	1	1	1	0	0	0	0	0	0	100			100
Child Neurology (Physician)	2	1	0	1	0	0	0	0	0	0.0			50.0
Dermatology (PGY-2)	22	22	19	2	0	0	0	1	0	86.4			100
Emergency Medicine (PGY-1)	72	72	56	2	14	0	0	0	0	77.8			100
Family Medicine (PGY-1)	53	53	36	0	9	1	4	3	0	67.9			100
Internal Medicine (PGY-1)	504	498	358	3	13	0	19	105	0	71.0			98.8
Internal Medicine/Dermatology	2	2	2	0	0	0	0	0	0	100			100
Internal Medicine/Pediatrics (PGY-1)	20	20	18	0	1	0	0	1	0	90.0			100
Interventional Radiology (Integrated) (PGY-1)	5	5	5	0	0	0	0	0	0	100			100
Interventional Radiology (Integrated) (PGY-2)	5	5	5	0	0	0	0	0	0	100			100
Neurodevelopmental Disabilities (PGY-2)	1	1	1	0	0	0	0	0	0	100			100
Neurological Surgery (PGY-1)	10	10	10	0	0	0	0	0	0	100			100
Neurology (PGY-1)	15	15	15	0	0	0	0	0	0	100			100
Neurology (PGY-2)	34	34	28	0	1	0	0	5	0	82.4			100
Neurology (Physician)	1	1	0	0	0	1	0	0	0	0.0			100
Obstetrics and Gynecology (PGY-1)	40	40	33	1	6	0	0	0	0	82.5			100
Orthopaedic Surgery (PGY-1)	26	26	23	1	1	0	1	0	0	88.5			100
Otolaryngology (PGY-1)	14	14	14	0	0	0	0	0	0	100			100
Pathology (PGY-1)	45	44	22	1	2	1	2	16	0	48.9			97.8
Pediatrics (PGY-1)	79	78	62	0	6	0	2	7	1	78.5			98.7
Pediatrics/Anesthesiology (PGY-1)	2	2	1	0	0	0	0	1	0	50.0			100
Pediatrics/Medical Genetics (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Physical Medicine and Rehabilitation (PGY-2)	11	11	9	0	1	0	0	1	0	81.8			100
Plastic Surgery (Integrated) (PGY-1)	9	9	9	0	0	0	0	0	0	100			100
Psychiatry (PGY-1)	97	97	73	7	10	0	1	6	0	75.3			100
Psychiatry/Family Medicine (PGY-1)	2	2	1	0	0	0	1	0	0	50.0			100
Psychiatry/Neurology (PGY-1)	1	1	1	0	0	0	0	0	0	100			100
Radiation Oncology (PGY-2)	9	7	7	0	0	0	0	0	0	77.8			77.8
Radiology-Diagnostic (PGY-2)	64	64	49	1	3	2	0	9	0	76.6			100

Radiology-Diagnostic (Physician)	2	2	0	1	0	0	0	1	0	0.0			100
Surgery (PGY-1)	95	84	55	6	4	1	1	17	0	57.9			88.4
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Transitional Year (PGY-1)	53	50	39	0	1	0	2	8	0	73.6			94.3
Vascular Surgery (PGY-1)	5	5	5	0	0	0	0	0	0	100			100

MICHIGAN	Pos.	No. Filled	Applicant Type							% MD Sr			% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr		
Anesthesiology (PGY-1)	72	72	40	2	19	1	2	8	0	55.6			100
Anesthesiology (PGY-2)	6	6	1	0	1	1	2	1	0	16.7			100
Anesthesiology (Physician)	1	1	0	0	0	0	1	0	0	0.0			100
Child Neurology (PGY-1)	6	6	5	0	1	0	0	0	0	83.3			100
Child Neurology (PGY-2)	2	2	0	0	0	0	1	1	0	0.0			100
Child Neurology (Physician)	1	0	0	0	0	0	0	0	0	0.0			0.0
Dermatology (PGY-1)	4	4	0	0	4	0	0	0	0	0.0			100
Dermatology (PGY-2)	23	23	17	1	4	1	0	0	0	73.9			100
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0			100
Emergency Medicine (PGY-1)	244	212	64	5	88	2	30	23	0	26.2			86.9
Family Medicine (PGY-1)	258	219	59	3	73	3	31	50	0	22.9			84.9
Internal Medicine (PGY-1)	506	486	99	3	83	3	76	222	0	19.6			96.0
Internal Medicine/ Emergency Med (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Internal Medicine/Pediatrics (PGY-1)	29	29	20	0	3	0	1	5	0	69.0			100
Interventional Radiology (Integrated) (PGY-1)	9	9	7	0	1	0	0	1	0	77.8			100
Neurological Surgery (PGY-1)	8	8	6	1	1	0	0	0	0	75.0			100
Neurology (PGY-1)	48	48	15	0	18	0	3	12	0	31.3			100
Obstetrics and Gynecology (PGY-1)	100	97	46	1	40	1	4	5	0	46.0			97.0
Orthopaedic Surgery (PGY-1)	64	64	37	2	24	1	0	0	0	57.8			100
Osteopathic Neuromusculoskeletal	6	3	0	0	2	1	0	0	0	0.0			50.0
Otolaryngology (PGY-1)	21	21	12	0	9	0	0	0	0	57.1			100
Pathology (PGY-1)	19	19	6	0	4	1	2	6	0	31.6			100
Pediatrics (PGY-1)	124	113	35	1	20	0	13	44	0	28.2			91.1
Pediatrics/Medical Genetics (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Physical Medicine and Rehabilitation (PGY-1)	13	13	6	0	7	0	0	0	0	46.2			100
Physical Medicine and Rehabilitation (PGY-2)	14	14	10	1	3	0	0	0	0	71.4			100
Plastic Surgery (Integrated) (PGY-1)	7	7	7	0	0	0	0	0	0	100			100
Psychiatry (PGY-1)	85	85	54	1	16	1	5	8	0	63.5			100
Radiation Oncology (PGY-1)	3	3	1	0	1	0	0	1	0	33.3			100
Radiation Oncology (PGY-2)	5	4	2	0	1	0	0	1	0	40.0			80.0
Radiation Oncology (Physician)	2	2	0	2	0	0	0	0	0	0.0			100
Radiology-Diagnostic (PGY-1)	33	33	20	1	10	0	2	0	0	60.6			100
Radiology-Diagnostic (PGY-2)	17	17	10	1	0	0	0	6	0	58.8			100
Surgery (PGY-1)	135	108	49	3	34	2	10	10	0	36.3			80.0
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100			100
Transitional Year (PGY-1)	94	91	64	2	11	0	4	10	0	68.1			96.8
Vascular Surgery (PGY-1)	3	3	2	1	0	0	0	0	0	66.7			100

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MINNESOTA	Applicant Type										% %	
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth	MD Sr	MD Gr	Tot
Anesthesiology (PGY-1)	27	27	16	0	1	0	2	8	0	59.3		100
Child Neurology (PGY-1)	2	2	1	0	0	0	0	1	0	50.0		100
Child Neurology (Physician)	1	0	0	0	0	0	0	0	0	0.0		0.0
Dermatology (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	14	13	10	1	0	1	0	1	0	71.4		92.9
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Emergency Medicine (PGY-1)	32	32	25	0	6	0	0	1	0	78.1		100
Family Medicine (PGY-1)	93	93	42	1	22	3	9	16	0	45.2		100
Internal Medicine (PGY-1)	118	117	92	1	6	0	2	16	0	78.0		99.2
Internal Medicine/ Emergency Med (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Internal Medicine/Dermatology	2	2	2	0	0	0	0	0	0	100		100
Internal Medicine/Pediatrics (PGY-1)	10	10	10	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	1	1	1	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	6	6	4	0	0	0	0	2	0	66.7		100
Neurology (PGY-1)	17	17	12	0	3	0	0	2	0	70.6		100
Obstetrics and Gynecology (PGY-1)	14	14	12	0	1	0	0	1	0	85.7		100
Orthopaedic Surgery (PGY-1)	20	20	18	1	0	1	0	0	0	90.0		100
Otolaryngology (PGY-1)	9	9	9	0	0	0	0	0	0	100		100
Pathology (PGY-1)	11	10	7	0	0	0	1	2	0	63.6		90.9
Pediatrics (PGY-1)	39	39	29	0	3	0	2	5	0	74.4		100
Physical Medicine and Rehabilitation (PGY-1)	6	6	5	0	1	0	0	0	0	83.3		100
Physical Medicine and Rehabilitation (PGY-2)	7	7	6	1	0	0	0	0	0	85.7		100
Plastic Surgery (Integrated) (PGY-1)	6	6	3	0	0	0	1	2	0	50.0		100
Psychiatry (PGY-1)	27	27	15	0	4	0	2	6	0	55.6		100
Radiation Oncology (PGY-2)	4	4	3	0	0	0	0	1	0	75.0		100
Radiology-Diagnostic (PGY-1)	8	8	6	0	1	0	0	1	0	75.0		100
Radiology-Diagnostic (PGY-2)	14	14	13	1	0	0	0	0	0	92.9		100
Radiology-Diagnostic (Physician)	1	1	0	0	0	1	0	0	0	0.0		100
Surgery (PGY-1)	43	43	16	1	4	0	1	21	0	37.2		100
Transitional Year (PGY-1)	1	1	0	0	0	0	0	1	0	0.0		100
Vascular Surgery (PGY-1)	3	3	1	0	1	0	0	1	0	33.3		100

MISSISSIPPI	Applicant Type										% %	
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth	MD Sr	MD Gr	Tot
Anesthesiology (PGY-1)	10	10	7	0	2	0	1	0	0	70.0		100
Anesthesiology (Physician)	2	2	0	1	0	1	0	0	0	0.0		100
Child Neurology (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Dermatology (PGY-2)	4	4	3	1	0	0	0	0	0	75.0		100
Emergency Medicine (PGY-1)	22	20	9	0	7	1	2	1	0	40.9		90.9
Family Medicine (PGY-1)	63	36	11	0	10	0	6	9	0	17.5		57.1

Internal Medicine (PGY-1)	101	95	37	0	22	0	7	29	0	36.6		94.1
Internal Medicine/Pediatrics (PGY-1)	5	5	5	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-1)	1	0	0	0	0	0	0	0	0	0.0		0.0
Neurological Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Neurology (PGY-1)	4	4	1	0	1	0	1	1	0	25.0		100
Obstetrics and Gynecology (PGY-1)	7	7	2	1	4	0	0	0	0	28.6		100
Orthopaedic Surgery (PGY-1)	5	5	3	2	0	0	0	0	0	60.0		100
Otolaryngology (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Pathology (PGY-1)	4	4	1	0	0	0	1	2	0	25.0		100
Pediatrics (PGY-1)	16	16	10	0	4	0	1	1	0	62.5		100
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	12	12	4	1	5	0	2	0	0	33.3		100
Radiation Oncology (PGY-2)	1	1	0	0	0	0	0	1	0	0.0		100
Radiology-Diagnostic (PGY-1)	7	7	3	0	1	0	0	3	0	42.9		100
Surgery (PGY-1)	11	7	4	2	1	0	0	0	0	36.4		63.6
Transitional Year (PGY-1)	12	12	6	0	3	0	1	2	0	50.0		100

MISSOURI	Applicant Type										% %	
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth	MD Sr	MD Gr	Tot
Anesthesiology (PGY-1)	43	43	26	4	8	2	0	3	0	60.5		100
Anesthesiology (PGY-2)	1	1	1	0	0	0	0	0	0	100		100
Anesthesiology (Physician)	1	1	0	0	0	1	0	0	0	0.0		100
Child Neurology (PGY-1)	10	8	3	0	3	0	0	2	0	30.0		80.0
Dermatology (PGY-2)	22	22	12	3	6	1	0	0	0	54.5		100
Dermatology (Physician)	2	2	0	0	0	2	0	0	0	0.0		100
Emergency Medicine (PGY-1)	47	46	22	2	13	0	7	2	0	46.8		97.9
Family Medicine (PGY-1)	98	82	30	2	36	0	5	9	0	30.6		83.7
Internal Medicine (PGY-1)	207	197	105	5	29	1	7	50	0	50.7		95.2
Internal Medicine/Pediatrics (PGY-1)	10	10	6	0	2	0	0	2	0	60.0		100
Interventional Radiology (Integrated) (PGY-2)	5	5	3	1	0	0	0	1	0	60.0		100
Interventional Radiology (Integrated) (Physician)	1	1	0	0	0	0	0	1	0	0.0		100
Neurological Surgery (PGY-1)	5	5	3	1	0	0	0	1	0	60.0		100
Neurology (PGY-1)	26	26	17	0	3	0	0	6	0	65.4		100
Obstetrics and Gynecology (PGY-1)	38	38	32	0	2	0	1	3	0	84.2		100
Orthopaedic Surgery (PGY-1)	26	26	17	2	5	1	1	0	0	65.4		100
Osteopathic Neuromusculoskeletal	3	0	0	0	0	0	0	0	0	0.0		0.0
Otolaryngology (PGY-1)	12	12	10	0	2	0	0	0	0	83.3		100
Pathology (PGY-1)	16	14	7	1	2	0	1	3	0	43.8		87.5
Pediatrics (PGY-1)	88	73	36	1	20	0	4	12	0	40.9		83.0
Pediatrics/Medical Genetics (PGY-1)	2	2	0	0	0	0	0	2	0	0.0		100
Physical Medicine and Rehabilitation (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Physical Medicine and Rehabilitation (PGY-2)	7	7	3	1	3	0	0	0	0	42.9		100

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MISSOURI (cont.)	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Plastic Surgery (Integrated) (PGY-1)	8	8	8	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	46	46	26	0	7	0	4	9	0	56.5		100
Radiation Oncology (PGY-2)	4	4	4	0	0	0	0	0	0	100		100
Radiology-Diagnostic (PGY-2)	34	34	26	1	3	2	1	1	0	76.5		100
Surgery (PGY-1)	55	45	21	2	12	1	2	7	0	38.2		81.8
Transitional Year (PGY-1)	7	7	6	0	0	0	1	0	0	85.7		100
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100

MONTANA	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Family Medicine (PGY-1)	19	19	11	0	8	0	0	0	0	57.9		100
Internal Medicine (PGY-1)	12	12	9	0	2	0	0	1	0	75.0		100
Psychiatry (PGY-1)	3	3	0	0	3	0	0	0	0	0.0		100

NEBRASKA	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Anesthesiology (PGY-1)	10	10	9	1	0	0	0	0	0	90.0		100
Anesthesiology (PGY-2)	2	2	0	1	0	1	0	0	0	0.0		100
Dermatology (PGY-2)	4	4	4	0	0	0	0	0	0	100		100
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Emergency Medicine (PGY-1)	12	12	9	0	3	0	0	0	0	75.0		100
Family Medicine (PGY-1)	37	37	11	0	9	0	7	10	0	29.7		100
Internal Medicine (PGY-1)	58	58	28	2	19	0	4	5	0	48.3		100
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	1	1	1	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Neurology (PGY-1)	9	9	2	0	1	0	1	5	0	22.2		100
Obstetrics and Gynecology (PGY-1)	9	9	7	0	1	0	1	0	0	77.8		100
Orthopaedic Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100		100
Otolaryngology (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Pathology (PGY-1)	6	6	3	0	1	0	1	1	0	50.0		100
Pediatrics (PGY-1)	15	15	10	0	5	0	0	0	0	66.7		100
Physical Medicine and Rehabilitation (PGY-1)	4	4	3	1	0	0	0	0	0	75.0		100
Plastic Surgery (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	13	13	6	0	1	1	2	3	0	46.2		100
Radiation Oncology (PGY-2)	1	1	1	0	0	0	0	0	0	100		100
Radiology-Diagnostic (PGY-2)	9	9	7	0	0	0	1	1	0	77.8		100
Surgery (PGY-1)	13	12	10	0	2	0	0	0	0	76.9		92.3

NEVADA	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Anesthesiology (PGY-1)	8	8	4	1	3	0	0	0	0	50.0		100
Emergency Medicine (PGY-1)	23	23	7	1	12	2	1	0	0	30.4		100
Family Medicine (PGY-1)	38	34	12	0	18	0	3	1	0	31.6		89.5

Internal Medicine (PGY-1)	125	89	15	0	29	0	22	23	0	12.0		71.2
Neurology (PGY-1)	5	5	1	0	3	0	1	0	0	20.0		100
Obstetrics and Gynecology (PGY-1)	8	8	4	0	4	0	0	0	0	50.0		100
Orthopaedic Surgery (PGY-1)	6	6	5	0	1	0	0	0	0	83.3		100
Otolaryngology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Pediatrics (PGY-1)	14	9	1	0	4	0	2	2	0	7.1		64.3
Physical Medicine and Rehabilitation (PGY-2)	6	6	3	1	2	0	0	0	0	50.0		100
Plastic Surgery (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	30	30	14	2	10	2	2	0	0	46.7		100
Radiology-Diagnostic (PGY-2)	5	5	3	0	2	0	0	0	0	60.0		100
Surgery (PGY-1)	24	14	3	3	3	3	2	0	0	12.5		58.3
Transitional Year (PGY-1)	39	27	15	0	9	0	0	3	0	38.5		69.2

NEW HAMPSHIRE	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Anesthesiology (PGY-1)	7	7	5	0	2	0	0	0	0	71.4		100
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Dermatology (PGY-2)	3	3	3	0	0	0	0	0	0	100		100
Emergency Medicine (PGY-1)	6	6	4	0	2	0	0	0	0	66.7		100
Family Medicine (PGY-1)	22	19	5	0	4	0	6	4	0	22.7		86.4
Internal Medicine (PGY-1)	35	35	21	0	4	0	3	7	0	60.0		100
Interventional Radiology (Integrated) (PGY-2)	2	2	1	0	1	0	0	0	0	50.0		100
Neurological Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Neurology (PGY-1)	5	5	2	0	1	0	2	0	0	40.0		100
Obstetrics and Gynecology (PGY-1)	4	4	3	1	0	0	0	0	0	75.0		100
Orthopaedic Surgery (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Otolaryngology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Pathology (PGY-1)	3	3	2	0	1	0	0	0	0	66.7		100
Pediatrics (PGY-1)	7	3	0	0	2	0	0	1	0	0.0		42.9
Plastic Surgery (Integrated) (PGY-1)	1	1	0	1	0	0	0	0	0	0.0		100
Psychiatry (PGY-1)	15	15	12	0	3	0	0	0	0	80.0		100
Radiation Oncology (PGY-2)	1	0	0	0	0	0	0	0	0	0.0		0.0
Radiology-Diagnostic (PGY-2)	3	3	3	0	0	0	0	0	0	100		100
Radiology-Diagnostic (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Surgery (PGY-1)	10	10	6	0	1	0	0	3	0	60.0		100
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100

NEW JERSEY	Applicant Type											
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	% MD Sr	% MD Gr	% Tot
Anesthesiology (PGY-1)	37	37	18	3	11	0	5	0	0	48.6		100
Anesthesiology (PGY-2)	12	12	2	4	2	0	4	0	0	16.7		100
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Child Neurology (PGY-1)	3	3	1	0	1	0	1	0	0	33.3		100
Dermatology (PGY-2)	6	5	4	0	1	0	0	0	0	66.7		83.3
Emergency Medicine (PGY-1)	120	115	21	3	46	1	32	12	0	17.5		95.8

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NEW JERSEY (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Family Medicine (PGY-1)	135	101	17	2	39	2	28	13	0	12.6	74.8	
Internal Medicine (PGY-1)	508	489	95	4	72	5	102	211	0	18.7	96.3	
Internal Medicine/Pediatrics (PGY-1)	5	5	5	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-2)	1	1	1	0	0	0	0	0	0	100	100	
Neurological Surgery (PGY-1)	4	4	2	1	0	0	0	1	0	50.0	100	
Neurology (PGY-1)	20	20	1	0	0	0	2	17	0	5.0	100	
Neurology (PGY-2)	5	2	1	0	1	0	0	0	0	20.0	40.0	
Obstetrics and Gynecology (PGY-1)	67	67	41	0	20	1	4	1	0	61.2	100	
Orthopaedic Surgery (PGY-1)	35	35	20	2	12	0	1	0	0	57.1	100	
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	
Pathology (PGY-1)	5	5	1	0	1	1	1	1	0	20.0	100	
Pediatrics (PGY-1)	88	76	10	0	18	1	18	29	0	11.4	86.4	
Physical Medicine and Rehabilitation (PGY-1)	4	4	0	0	4	0	0	0	0	0.0	100	
Physical Medicine and Rehabilitation (PGY-2)	13	13	6	2	5	0	0	0	0	46.2	100	
Plastic Surgery (Integrated) (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100	
Psychiatry (PGY-1)	79	79	30	2	26	1	15	5	0	38.0	100	
Radiation Oncology (PGY-2)	1	1	1	0	0	0	0	0	0	100	100	
Radiology-Diagnostic (PGY-2)	28	28	17	1	7	1	1	1	0	60.7	100	
Surgery (PGY-1)	105	88	46	5	16	3	10	8	0	43.8	83.8	
Transitional Year (PGY-1)	85	72	34	1	24	0	4	9	0	40.0	84.7	
Vascular Surgery (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	

NEW MEXICO	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Anesthesiology (PGY-1)	6	6	4	0	0	0	0	2	0	66.7	100	
Anesthesiology (PGY-2)	1	1	1	0	0	0	0	0	0	100	100	
Anesthesiology (Physician)	1	1	0	0	0	1	0	0	0	0.0	100	
Child Neurology (PGY-1)	2	2	0	0	2	0	0	0	0	0.0	100	
Dermatology (PGY-2)	4	4	4	0	0	0	0	0	0	100	100	
Dermatology (Physician)	1	1	0	0	0	0	0	1	0	0.0	100	
Emergency Medicine (PGY-1)	12	12	9	0	2	0	1	0	0	75.0	100	
Family Medicine (PGY-1)	39	33	11	2	5	0	8	7	0	28.2	84.6	
Internal Medicine (PGY-1)	35	35	16	1	7	2	1	8	0	45.7	100	
Neurological Surgery (PGY-1)	1	1	0	1	0	0	0	0	0	0.0	100	
Neurology (PGY-1)	7	7	0	0	3	0	0	4	0	0.0	100	
Neurology (Physician)	1	1	0	0	0	0	0	1	0	0.0	100	
Obstetrics and Gynecology (PGY-1)	6	6	6	0	0	0	0	0	0	100	100	
Orthopaedic Surgery (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100	
Otolaryngology (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	
Pathology (PGY-1)	4	4	1	2	0	0	1	0	0	25.0	100	
Pediatrics (PGY-1)	21	16	3	0	10	1	1	1	0	14.3	76.2	
Physical Medicine and Rehabilitation (PGY-1)	6	6	4	0	1	0	0	1	0	66.7	100	

Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Psychiatry (PGY-1)	16	16	11	2	2	0	0	1	0	68.8	100	
Radiology-Diagnostic (PGY-2)	8	8	5	2	1	0	0	0	0	62.5	100	
Radiology-Diagnostic (Physician)	1	1	0	0	0	0	1	0	0	0.0	100	
Surgery (PGY-1)	12	8	3	2	0	0	2	1	0	25.0	66.7	

NEW YORK	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Anesthesiology (PGY-1)	215	215	161	7	27	7	6	7	0	74.9	100	
Anesthesiology (PGY-2)	46	46	37	1	4	0	4	0	0	80.4	100	
Anesthesiology (Physician)	26	26	0	18	0	4	1	3	0	0.0	100	
Child Neurology (PGY-1)	17	17	14	0	0	0	1	2	0	82.4	100	
Child Neurology (Physician)	1	0	0	0	0	0	0	0	0	0.0	0.0	
Dermatology (PGY-2)	54	54	45	5	1	0	1	2	0	83.3	100	
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100	
Emergency Medicine (PGY-1)	390	359	140	6	125	2	55	31	0	35.9	92.1	
Family Medicine (PGY-1)	288	268	57	6	53	2	67	83	0	19.8	93.1	
Internal Medicine (PGY-1)	1645	1617	630	17	186	5	169	609	1	38.3	98.3	
Internal Medicine/ Emergency Med (PGY-1)	5	5	3	0	1	0	1	0	0	60.0	100	
Internal Medicine/Medical Genetics (PGY-1)	0	0	0	0	0	0	0	0	0	0.0	0.0	
Internal Medicine/Pediatrics (PGY-1)	23	23	17	0	4	0	1	1	0	73.9	100	
Internal Medicine/Preventive Medicine (PGY-1)	1	1	0	0	1	0	0	0	0	0.0	100	
Interventional Radiology (Integrated) (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-2)	18	16	15	0	1	0	0	0	0	83.3	88.9	
Neurological Surgery (PGY-1)	26	26	22	2	0	0	1	1	0	84.6	100	
Neurology (PGY-1)	98	98	58	1	13	0	7	19	0	59.2	100	
Neurology (PGY-2)	43	43	29	0	9	0	1	4	0	67.4	100	
Neurology (Physician)	6	6	0	1	0	0	1	4	0	0.0	100	
Obstetrics and Gynecology (PGY-1)	191	189	137	4	20	2	15	11	0	71.7	99.0	
Orthopaedic Surgery (PGY-1)	102	101	88	3	8	1	1	0	0	86.3	99.0	
Osteopathic Neuromusculoskeletal	4	0	0	0	0	0	0	0	0	0.0	0.0	
Otolaryngology (PGY-1)	35	35	32	2	1	0	0	0	0	91.4	100	
Pathology (PGY-1)	81	81	23	5	10	1	12	30	0	28.4	100	
Pediatrics (PGY-1)	422	392	141	2	52	0	46	151	0	33.4	92.9	
Pediatrics/Medical Genetics (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Physical Medicine and Rehabilitation (PGY-1)	31	31	17	0	9	1	1	3	0	54.8	100	
Physical Medicine and Rehabilitation (PGY-2)	60	60	24	1	26	3	3	3	0	40.0	100	
Physical Medicine and Rehabilitation (Physician)	4	4	0	2	0	0	2	0	0	0.0	100	
Plastic Surgery (Integrated) (PGY-1)	19	19	19	0	0	0	0	0	0	100	100	
Psychiatry (PGY-1)	309	305	160	1	43	0	49	49	3	51.8	98.7	

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NEW YORK (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Psychiatry/Neurology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100	
Radiation Oncology (PGY-2)	27	27	17	3	2	1	1	3	0	63.0	100	
Radiation Oncology (Physician)	3	3	0	1	0	0	0	2	0	0.0	100	
Radiology-Diagnostic (PGY-1)	2	2	0	0	2	0	0	0	0	0.0	100	
Radiology-Diagnostic (PGY-2)	136	136	93	15	14	1	7	6	0	68.4	100	
Surgery (PGY-1)	381	301	155	14	26	6	34	66	0	40.7	79.0	
Thoracic Surgery (PGY-1)	10	10	10	0	0	0	0	0	0	100	100	
Transitional Year (PGY-1)	159	143	89	4	36	0	10	4	0	56.0	89.9	
Vascular Surgery (PGY-1)	14	13	10	0	1	0	1	0	1	71.4	92.9	

NORTH CAROLINA	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Anesthesiology (PGY-1)	43	43	39	0	3	1	0	0	0	90.7	100	
Anesthesiology (Physician)	2	2	0	2	0	0	0	0	0	0.0	100	
Child Neurology (PGY-1)	6	6	5	0	1	0	0	0	0	83.3	100	
Child Neurology (Physician)	1	0	0	0	0	0	0	0	0	0.0	0.0	
Dermatology (PGY-2)	17	17	15	0	2	0	0	0	0	88.2	100	
Emergency Medicine (PGY-1)	87	77	46	2	19	1	7	2	0	52.9	88.5	
Family Medicine (PGY-1)	151	126	58	1	43	0	14	10	0	38.4	83.4	
Internal Medicine (PGY-1)	277	271	165	2	41	3	19	41	0	59.6	97.8	
Internal Medicine/ Emergency Med (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Internal Medicine/Pediatrics (PGY-1)	18	18	15	0	3	0	0	0	0	83.3	100	
Internal Medicine/Psychiatry (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Interventional Radiology (Integrated) (PGY-2)	6	6	5	0	1	0	0	0	0	83.3	100	
Neurological Surgery (PGY-1)	8	8	7	1	0	0	0	0	0	87.5	100	
Neurology (PGY-1)	13	13	8	1	3	0	1	0	0	61.5	100	
Neurology (PGY-2)	7	7	5	0	0	0	0	2	0	71.4	100	
Neurology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100	
Obstetrics and Gynecology (PGY-1)	47	46	37	0	5	1	2	1	0	78.7	97.9	
Orthopaedic Surgery (PGY-1)	25	25	23	2	0	0	0	0	0	92.0	100	
Otolaryngology (PGY-1)	11	11	9	1	0	0	1	0	0	81.8	100	
Pathology (PGY-1)	19	19	10	1	4	1	1	2	0	52.6	100	
Pediatrics (PGY-1)	78	67	41	1	20	0	1	4	0	52.6	85.9	
Pediatrics/Medical Genetics (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Physical Medicine and Rehabilitation (PGY-1)	9	9	3	0	6	0	0	0	0	33.3	100	
Physical Medicine and Rehabilitation (PGY-2)	5	5	3	0	2	0	0	0	0	60.0	100	
Plastic Surgery (Integrated) (PGY-1)	8	8	6	2	0	0	0	0	0	75.0	100	
Psychiatry (PGY-1)	77	76	53	1	14	1	3	4	0	68.8	98.7	
Radiation Oncology (PGY-2)	7	6	6	0	0	0	0	0	0	85.7	85.7	

Radiation Oncology (Physician)	1	1	0	0	0	1	0	0	0	0.0	100	
Radiology-Diagnostic (PGY-2)	28	28	25	2	0	0	0	1	0	89.3	100	
Surgery (PGY-1)	67	57	42	3	9	0	0	3	0	62.7	85.1	
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	
Transitional Year (PGY-1)	66	29	17	0	8	0	1	3	0	25.8	43.9	
Vascular Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	

NORTH DAKOTA	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Family Medicine (PGY-1)	29	26	6	1	3	0	3	13	0	20.7	89.7	
Internal Medicine (PGY-1)	7	7	2	1	2	0	1	1	0	28.6	100	
Neurology (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	
Orthopaedic Surgery (PGY-1)	3	3	1	2	0	0	0	0	0	33.3	100	
Pediatrics (PGY-1)	4	4	0	0	1	0	2	1	0	0.0	100	
Psychiatry (PGY-1)	6	6	3	0	0	0	1	2	0	50.0	100	
Surgery (PGY-1)	8	7	1	1	2	0	1	2	0	12.5	87.5	
Transitional Year (PGY-1)	5	5	3	0	1	0	0	1	0	60.0	100	

OHIO	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	IMG	Oth			
Anesthesiology (PGY-1)	83	83	43	2	28	2	3	5	0	51.8	100	
Anesthesiology (PGY-2)	4	4	2	0	0	0	2	0	0	50.0	100	
Anesthesiology (Physician)	6	6	0	6	0	0	0	0	0	0.0	100	
Child Neurology (PGY-1)	14	14	10	0	3	0	1	0	0	71.4	100	
Dermatology (PGY-1)	8	8	7	0	1	0	0	0	0	87.5	100	
Dermatology (PGY-2)	15	15	11	3	1	0	0	0	0	73.3	100	
Emergency Medicine (PGY-1)	154	149	50	4	61	5	21	8	0	32.5	96.8	
Family Medicine (PGY-1)	209	177	45	2	76	0	18	36	0	21.5	84.7	
Internal Medicine (PGY-1)	537	492	185	6	118	4	32	147	0	34.5	91.6	
Internal Medicine/ Emergency Med (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	
Internal Medicine/Medical Genetics (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100	
Internal Medicine/Pediatrics (PGY-1)	27	27	26	0	0	1	0	0	0	96.3	100	
Interventional Radiology (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Interventional Radiology (Integrated) (PGY-2)	5	5	3	0	1	0	0	1	0	60.0	100	
Neurological Surgery (PGY-1)	11	11	11	0	0	0	0	0	0	100	100	
Neurology (PGY-1)	54	54	25	1	13	0	2	13	0	46.3	100	
Neurology (PGY-2)	4	4	0	0	0	0	1	3	0	0.0	100	
Obstetrics and Gynecology (PGY-1)	88	88	51	1	31	0	3	2	0	58.0	100	
Orthopaedic Surgery (PGY-1)	64	64	36	4	22	2	0	0	0	56.3	100	
Otolaryngology (PGY-1)	22	22	18	0	4	0	0	0	0	81.8	100	
Pathology (PGY-1)	24	24	7	2	0	0	3	12	0	29.2	100	
Pediatrics (PGY-1)	182	167	97	1	40	1	7	21	0	53.3	91.8	
Pediatrics/Medical Genetics (PGY-1)	4	2	2	0	0	0	0	0	0	50.0	50.0	
Pediatrics/PM&R (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Pediatrics/Psych/Child Psych (PGY-1)	4	4	3	0	1	0	0	0	0	75.0	100	

2024 NRMP Main Residency Match®: Match Rates by Specialty and State

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OHIO (cont.)	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Physical Medicine and Rehabilitation (PGY-1)	14	14	7	0	6	0	1	0	0	50.0		100
Physical Medicine and Rehabilitation (PGY-2)	9	9	4	0	4	0	0	1	0	44.4		100
Plastic Surgery (Integrated) (PGY-1)	11	11	8	1	1	0	1	0	0	72.7		100
Psychiatry (PGY-1)	73	72	42	0	17	1	2	10	0	57.5		98.6
Psychiatry/Family Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Radiation Oncology (PGY-2)	8	8	5	1	0	0	0	2	0	62.5		100
Radiation Oncology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Radiology-Diagnostic (PGY-2)	52	52	27	3	16	0	2	4	0	51.9		100
Radiology-Diagnostic (Physician)	3	3	0	1	0	0	0	2	0	0.0		100
Surgery (PGY-1)	127	110	60	6	29	5	2	8	0	47.2		86.6
Thoracic Surgery (PGY-1)	5	5	5	0	0	0	0	0	0	100		100
Transitional Year (PGY-1)	65	63	42	0	16	0	1	4	0	64.6		96.9
Vascular Surgery (PGY-1)	7	7	5	0	0	0	0	2	0	71.4		100

OKLAHOMA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	15	15	9	1	5	0	0	0	0	60.0		100
Dermatology (PGY-2)	4	4	1	1	1	0	1	0	0	25.0		100
Emergency Medicine (PGY-1)	35	34	1	0	33	0	0	0	0	2.9		97.1
Family Medicine (PGY-1)	90	77	19	1	51	0	2	4	0	21.1		85.6
Internal Medicine (PGY-1)	60	54	16	2	28	0	1	7	0	26.7		90.0
Internal Medicine/Pediatrics (PGY-1)	3	3	2	0	0	0	0	1	0	66.7		100
Neurological Surgery (PGY-1)	2	2	1	0	0	0	0	1	0	50.0		100
Neurology (PGY-1)	8	8	6	0	0	0	0	2	0	75.0		100
Neurology (Physician)	2	2	0	0	0	0	0	2	0	0.0		100
Nuclear Medicine (PGY-2)	1	1	0	1	0	0	0	0	0	0.0		100
Obstetrics and Gynecology (PGY-1)	20	20	7	1	11	0	1	0	0	35.0		100
Orthopaedic Surgery (PGY-1)	9	9	8	0	1	0	0	0	0	88.9		100
Otolaryngology (PGY-1)	5	5	3	0	2	0	0	0	0	60.0		100
Pathology (PGY-1)	3	3	2	0	1	0	0	0	0	66.7		100
Pediatrics (PGY-1)	45	39	8	0	20	1	2	8	0	17.8		86.7
Psychiatry (PGY-1)	27	27	7	1	16	0	1	2	0	25.9		100
Radiation Oncology (PGY-2)	2	2	1	0	0	0	1	0	0	50.0		100
Radiology-Diagnostic (PGY-2)	14	14	4	2	7	0	1	0	0	28.6		100
Surgery (PGY-1)	13	13	7	3	3	0	0	0	0	53.8		100
Transitional Year (PGY-1)	6	6	5	0	1	0	0	0	0	83.3		100

OREGON	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	14	14	10	1	2	0	0	1	0	71.4		100
Anesthesiology (PGY-2)	2	2	1	1	0	0	0	0	0	50.0		100
Child Neurology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0		100
Dermatology (PGY-2)	7	7	4	1	2	0	0	0	0	57.1		100

Dermatology (Physician)	1	1	0	0	0	0	1	0	0	0.0		100
Emergency Medicine (PGY-1)	11	11	7	0	3	0	1	0	0	63.6		100
Family Medicine (PGY-1)	59	57	38	0	14	0	5	0	0	64.4		96.6
Internal Medicine (PGY-1)	99	99	48	3	38	0	5	5	0	48.5		100
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Neurology (PGY-1)	5	5	4	0	1	0	0	0	0	80.0		100
Obstetrics and Gynecology (PGY-1)	8	8	7	1	0	0	0	0	0	87.5		100
Orthopaedic Surgery (PGY-1)	8	8	5	0	3	0	0	0	0	62.5		100
Otolaryngology (PGY-1)	3	3	3	0	0	0	0	0	0	100		100
Pathology (PGY-1)	4	4	1	0	3	0	0	0	0	25.0		100
Pediatrics (PGY-1)	18	18	11	0	6	0	1	0	0	61.1		100
Plastic Surgery (Integrated) (PGY-1)	3	3	2	1	0	0	0	0	0	66.7		100
Psychiatry (PGY-1)	12	12	9	0	3	0	0	0	0	75.0		100
Radiology-Diagnostic (PGY-2)	6	6	5	0	0	0	0	1	0	83.3		100
Surgery (PGY-1)	27	19	13	2	2	2	0	0	0	48.1		70.4
Transitional Year (PGY-1)	6	6	5	1	0	0	0	0	0	83.3		100
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100		100

PENNSYLVANIA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD	Sr	Tot
Anesthesiology (PGY-1)	94	94	58	1	27	3	0	5	0	61.7		100
Anesthesiology (PGY-2)	19	19	5	4	3	5	2	0	0	26.3		100
Anesthesiology (Physician)	3	3	0	3	0	0	0	0	0	0.0		100
Child Neurology (PGY-1)	14	14	12	0	2	0	0	0	0	85.7		100
Child Neurology (Physician)	2	1	0	0	0	0	1	0	0	0.0		50.0
Dermatology (PGY-2)	36	36	33	0	3	0	0	0	0	91.7		100
Dermatology (Physician)	2	2	0	1	0	1	0	0	0	0.0		100
Emergency Medicine (PGY-1)	225	216	63	11	90	10	22	20	0	28.0		96.0
Emergency Medicine/Family Medicine (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Family Medicine (PGY-1)	350	302	83	5	93	6	40	75	0	23.7		86.3
Internal Medicine (PGY-1)	746	736	276	2	128	4	46	280	0	37.0		98.7
Internal Medicine/ Emergency Med (PGY-1)	5	5	1	0	4	0	0	0	0	20.0		100
Internal Medicine/Dermatology	1	1	1	0	0	0	0	0	0	100		100
Internal Medicine/Pediatrics (PGY-1)	19	19	14	0	5	0	0	0	0	73.7		100
Interventional Radiology (Integrated) (PGY-2)	17	17	9	0	7	0	0	1	0	52.9		100
Neurodevelopmental Disabilities (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	17	17	16	0	1	0	0	0	0	94.1		100
Neurology (PGY-1)	61	61	34	1	14	0	0	12	0	55.7		100
Neurology (PGY-2)	18	18	6	1	5	0	1	5	0	33.3		100
Neurology (Physician)	1	1	0	0	0	0	0	1	0	0.0		100
Obstetrics and Gynecology (PGY-1)	95	95	66	1	21	2	1	4	0	69.5		100
Orthopaedic Surgery (PGY-1)	68	68	50	4	13	0	1	0	0	73.5		100
Otolaryngology (PGY-1)	30	30	23	0	6	0	0	1	0	76.7		100

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PENNSYLVANIA (continued)	Pos.	No. Filled	Applicant Type							% MD		% Tot	
			Sr	Gr	Sr	Gr	IMG	IMG	Oth	MD	Sr	MD	Tot
Pathology (PGY-1)	37	37	15	0	7	2	5	8	0	40.5		100	
Pediatrics (PGY-1)	166	151	93	2	42	0	7	7	0	56.0		91.0	
Pediatrics/Anesthesiology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100	
Pediatrics/Medical Genetics (PGY-1)	3	3	3	0	0	0	0	0	0	100		100	
Pediatrics/PM&R (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100	
Pediatrics/Psych/Child Psych (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Physical Medicine and Rehabilitation (PGY-1)	21	21	4	1	13	0	3	0	0	19.0		100	
Physical Medicine and Rehabilitation (PGY-2)	33	33	18	0	15	0	0	0	0	54.5		100	
Physical Medicine and Rehabilitation (Physician)	2	1	0	0	0	1	0	0	0	0.0		50.0	
Plastic Surgery (Integrated) (PGY-1)	11	11	9	0	1	0	0	1	0	81.8		100	
Psychiatry (PGY-1)	109	109	61	2	39	1	2	4	0	56.0		100	
Psychiatry/Family Medicine (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Radiation Oncology (PGY-1)	5	5	5	0	0	0	0	0	0	100		100	
Radiation Oncology (PGY-2)	6	5	2	0	1	0	1	1	0	33.3		83.3	
Radiation Oncology (Physician)	2	1	0	0	0	0	0	1	0	0.0		50.0	
Radiology-Diagnostic (PGY-1)	3	3	0	0	0	0	0	3	0	0.0		100	
Radiology-Diagnostic (PGY-2)	67	67	48	0	13	4	0	2	0	71.6		100	
Surgery (PGY-1)	173	146	71	9	32	5	10	19	0	41.0		84.4	
Thoracic Surgery (PGY-1)	4	4	3	1	0	0	0	0	0	75.0		100	
Transitional Year (PGY-1)	109	92	50	3	31	1	2	5	0	45.9		84.4	
Vascular Surgery (PGY-1)	10	10	7	0	1	0	2	0	0	70.0		100	

PUERTO RICO	Pos.	No. Filled	Applicant Type							% MD		% Tot	
			Sr	Gr	Sr	Gr	IMG	IMG	Oth	MD	Sr	MD	Tot
Anesthesiology (PGY-1)	4	4	4	0	0	0	0	0	0	100		100	
Child Neurology (PGY-1)	1	1	1	0	0	0	0	0	0	100		100	
Dermatology (PGY-2)	2	2	2	0	0	0	0	0	0	100		100	
Emergency Medicine (PGY-1)	17	14	6	1	0	0	7	0	0	35.3		82.4	
Family Medicine (PGY-1)	8	8	2	0	0	0	5	1	0	25.0		100	
Internal Medicine (PGY-1)	90	87	37	18	0	0	32	0	0	41.1		96.7	
Internal Medicine/Pediatrics (PGY-1)	2	2	1	0	0	0	1	0	0	50.0		100	
Neurology (PGY-1)	3	3	0	0	0	0	3	0	0	0.0		100	
Obstetrics and Gynecology (PGY-1)	10	10	5	2	0	0	3	0	0	50.0		100	
Orthopaedic Surgery (PGY-1)	4	4	2	2	0	0	0	0	0	50.0		100	
Otolaryngology (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Pathology (PGY-1)	2	2	1	1	0	0	0	0	0	50.0		100	
Pediatrics (PGY-1)	20	17	9	1	0	0	6	1	0	45.0		85.0	
Physical Medicine and Rehabilitation (PGY-1)	6	6	5	1	0	0	0	0	0	83.3		100	
Psychiatry (PGY-1)	12	12	8	1	0	0	3	0	0	66.7		100	
Radiology-Diagnostic (PGY-2)	4	4	3	1	0	0	0	0	0	75.0		100	
Surgery (PGY-1)	16	14	11	2	0	0	1	0	0	68.8		87.5	

Transitional Year (PGY-1)	29	29	17	0	0	0	11	1	0	58.6		100	

RHODE ISLAND	Pos.	No. Filled	Applicant Type							% MD		% Tot	
			Sr	Gr	Sr	Gr	IMG	IMG	Oth	MD	Sr	MD	Tot
Anesthesiology (PGY-2)	20	20	20	0	0	0	0	0	0	100		100	
Dermatology (PGY-2)	4	4	4	0	0	0	0	0	0	100		100	
Emergency Medicine (PGY-1)	22	22	12	0	4	0	6	0	0	54.5		100	
Family Medicine (PGY-1)	16	16	9	1	5	1	0	0	0	56.3		100	
Internal Medicine (PGY-1)	100	97	58	0	12	2	2	23	0	58.0		97.0	
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100		100	
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100		100	
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Neurology (PGY-2)	7	7	6	0	0	0	0	1	0	85.7		100	
Neurology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100	
Obstetrics and Gynecology (PGY-1)	8	8	8	0	0	0	0	0	0	100		100	
Orthopaedic Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100		100	
Pathology (PGY-1)	4	4	1	1	0	0	0	2	0	25.0		100	
Pediatrics (PGY-1)	16	16	16	0	0	0	0	0	0	100		100	
Pediatrics/Psych/Child Psych (PGY-1)	3	3	3	0	0	0	0	0	0	100		100	
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Psychiatry (PGY-1)	10	10	10	0	0	0	0	0	0	100		100	
Radiology-Diagnostic (PGY-2)	6	6	5	1	0	0	0	0	0	83.3		100	
Surgery (PGY-1)	13	8	7	0	0	0	0	1	0	53.8		61.5	

SOUTH CAROLINA	Pos.	No. Filled	Applicant Type							% MD		% Tot	
			Sr	Gr	Sr	Gr	IMG	IMG	Oth	MD	Sr	MD	Tot
Anesthesiology (PGY-1)	24	24	16	6	2	0	0	0	0	66.7		100	
Child Neurology (PGY-1)	1	1	0	0	1	0	0	0	0	0.0		100	
Dermatology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0		100	
Dermatology (PGY-2)	4	4	2	2	0	0	0	0	0	50.0		100	
Dermatology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100	
Emergency Medicine (PGY-1)	55	52	18	5	24	3	2	0	0	32.7		94.5	
Family Medicine (PGY-1)	133	106	20	0	58	1	15	12	0	15.0		79.7	
Internal Medicine (PGY-1)	101	95	38	3	28	0	4	22	0	37.6		94.1	
Internal Medicine/Pediatrics (PGY-1)	9	9	9	0	0	0	0	0	0	100		100	
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100		100	
Neurological Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100	
Neurology (PGY-1)	20	20	7	0	2	1	2	8	0	35.0		100	
Obstetrics and Gynecology (PGY-1)	21	21	20	0	1	0	0	0	0	95.2		100	
Orthopaedic Surgery (PGY-1)	13	13	13	0	0	0	0	0	0	100		100	
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100		100	
Pathology (PGY-1)	5	5	1	0	2	0	0	2	0	20.0		100	
Pediatrics (PGY-1)	43	37	26	0	10	1	0	0	0	60.5		86.0	

Key: Pos.=number of positions in the match; No. Filled=number of positions filled; MD Sr=U.S. allopathic seniors; MD Gr=prior U.S. allopathic graduates; DO Sr=U.S. osteopathic seniors; DO Gr=prior U.S. osteopathic graduates; US IMG=U.S. citizen graduates of international medical schools; IMG=non-U.S. citizen graduates of international medical schools; Oth=5th Pathway and Canadian medical schools graduates; % MD Sr=percent of positions filled by U.S. allopathic seniors; % Tot = percent of positions filled.

2024 NRMP Main Residency Match®: Match Rates by Specialty and State

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SOUTH CAROLINA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr	MD Gr	Tot
Plastic Surgery (Integrated) (PGY-1)	3	3	1	2	0	0	0	0	0	33.3		100
Psychiatry (PGY-1)	35	35	23	0	11	0	1	0	0	65.7		100
Psychiatry/Neurology (PGY-1)	1	1	0	0	1	0	0	0	0	0.0		100
Radiation Oncology (PGY-2)	2	2	0	0	0	0	1	1	0	0.0		100
Radiology-Diagnostic (PGY-2)	11	11	7	1	2	1	0	0	0	63.6		100
Surgery (PGY-1)	54	36	18	5	10	1	1	1	0	33.3		66.7
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Transitional Year (PGY-1)	37	32	30	0	2	0	0	0	0	81.1		86.5
Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100		100

SOUTH DAKOTA	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr	MD Gr	Tot
Family Medicine (PGY-1)	19	19	6	0	9	0	2	2	0	31.6		100
Internal Medicine (PGY-1)	9	9	4	0	0	0	0	5	0	44.4		100
Neurology (PGY-1)	3	3	0	0	0	0	1	2	0	0.0		100
Pathology (PGY-1)	3	3	1	1	0	0	1	0	0	33.3		100
Pediatrics (PGY-1)	6	6	1	0	0	0	0	5	0	16.7		100
Psychiatry (PGY-1)	7	7	3	0	3	0	1	0	0	42.9		100
Surgery (PGY-1)	4	4	1	1	1	0	0	1	0	25.0		100
Transitional Year (PGY-1)	6	6	6	0	0	0	0	0	0	100		100

TENNESSEE	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr	MD Gr	Tot
Anesthesiology (PGY-1)	34	34	30	2	2	0	0	0	0	88.2		100
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0		100
Child Neurology (PGY-1)	6	6	3	0	3	0	0	0	0	50.0		100
Dermatology (PGY-2)	12	12	8	1	2	0	1	0	0	66.7		100
Dermatology (Physician)	3	3	0	2	0	1	0	0	0	0.0		100
Emergency Medicine (PGY-1)	55	55	26	1	14	0	12	2	0	47.3		100
Family Medicine (PGY-1)	126	90	23	0	35	2	17	13	0	18.3		71.4
Internal Medicine (PGY-1)	252	206	78	6	33	0	25	64	0	31.0		81.7
Internal Medicine/Pediatrics (PGY-1)	18	18	17	0	0	0	1	0	0	94.4		100
Interventional Radiology (Integrated) (PGY-2)	3	3	3	0	0	0	0	0	0	100		100
Neurological Surgery (PGY-1)	6	6	5	0	0	0	0	1	0	83.3		100
Neurology (PGY-1)	10	10	7	0	0	0	0	3	0	70.0		100
Neurology (PGY-2)	11	11	4	0	1	0	3	3	0	36.4		100
Obstetrics and Gynecology (PGY-1)	36	36	28	1	6	1	0	0	0	77.8		100
Orthopaedic Surgery (PGY-1)	19	19	17	1	1	0	0	0	0	89.5		100
Osteopathic Neuromusculoskeletal	6	1	0	0	1	0	0	0	0	0.0		16.7
Osteopathic Neuromusculoskeletal	4	2	0	0	0	2	0	0	0	0.0		50.0
Otolaryngology (PGY-1)	10	10	9	1	0	0	0	0	0	90.0		100
Pathology (PGY-1)	17	17	8	1	3	0	1	4	0	47.1		100
Pediatrics (PGY-1)	69	52	37	0	13	0	1	1	0	53.6		75.4
Pediatrics/Medical Genetics (PGY-1)	1	0	0	0	0	0	0	0	0	0.0		0.0

Physical Medicine and Rehabilitation (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Physical Medicine and Rehabilitation (PGY-2)	4	2	0	0	2	0	0	0	0	0.0		50.0
Physical Medicine and Rehabilitation (Physician)	4	3	0	1	0	2	0	0	0	0.0		75.0
Plastic Surgery (Integrated) (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Psychiatry (PGY-1)	35	35	25	0	4	0	5	1	0	71.4		100
Radiation Oncology (PGY-2)	3	3	2	0	0	0	0	1	0	66.7		100
Radiology-Diagnostic (PGY-2)	22	22	12	6	2	2	0	0	0	54.5		100
Surgery (PGY-1)	78	53	34	8	4	0	1	6	0	43.6		67.9
Transitional Year (PGY-1)	53	36	24	1	8	0	1	2	0	45.3		67.9

TEXAS	Pos.	No. Filled	Applicant Type							% Match		
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr	MD Gr	Tot
Anesthesiology (PGY-1)	123	123	95	3	21	1	2	1	0	77.2		100
Anesthesiology (PGY-2)	3	3	3	0	0	0	0	0	0	100		100
Anesthesiology (Physician)	16	16	0	12	0	4	0	0	0	0.0		100
Child Neurology (PGY-1)	15	14	10	0	2	0	0	2	0	66.7		93.3
Dermatology (PGY-2)	43	42	37	3	1	0	1	0	0	86.0		97.7
Dermatology (Physician)	3	3	0	1	0	2	0	0	0	0.0		100
Emergency Medicine (PGY-1)	187	185	95	0	75	1	9	5	0	50.8		98.9
Family Medicine (PGY-1)	334	318	120	7	99	1	54	37	0	35.9		95.2
Internal Medicine (PGY-1)	785	742	315	10	135	3	84	195	0	40.1		94.5
Internal Medicine/Medical Genetics (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Internal Medicine/Pediatrics (PGY-1)	21	21	19	0	2	0	0	0	0	90.5		100
Internal Medicine/Preventive Medicine (PGY-1)	0	0	0	0	0	0	0	0	0	0.0		0.0
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100		100
Interventional Radiology (Integrated) (PGY-2)	8	8	8	0	0	0	0	0	0	100		100
Neurodevelopmental Disabilities (PGY-1)	2	2	1	0	1	0	0	0	0	50.0		100
Neurological Surgery (PGY-1)	14	14	10	2	1	0	0	1	0	71.4		100
Neurology (PGY-1)	75	75	42	1	8	0	3	21	0	56.0		100
Neurology (PGY-2)	4	4	0	0	1	2	1	0	0	0.0		100
Obstetrics and Gynecology (PGY-1)	126	124	88	2	30	0	1	3	0	69.8		98.4
Orthopaedic Surgery (PGY-1)	56	56	51	2	3	0	0	0	0	91.1		100
Otolaryngology (PGY-1)	23	22	22	0	0	0	0	0	0	95.7		95.7
Pathology (PGY-1)	54	54	20	3	7	0	3	21	0	37.0		100
Pediatrics (PGY-1)	221	218	123	2	38	0	14	41	0	55.7		98.6
Pediatrics/Medical Genetics (PGY-1)	3	3	2	0	0	0	0	1	0	66.7		100
Pediatrics/Psych/Child Psych (PGY-1)	4	4	4	0	0	0	0	0	0	100		100
Physical Medicine and Rehabilitation (PGY-1)	26	26	14	0	11	0	0	1	0	53.8		100
Physical Medicine and Rehabilitation (PGY-2)	16	16	7	2	7	0	0	0	0	43.8		100

2024 NRMP Main Residency Match®: Match Rates by Specialty and State

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TEXAS (cont.)	Applicant Type										% MD Sr	% Tot
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr		
Physical Medicine and Rehabilitation (Physician)	1	1	0	0	0	1	0	0	0	0.0	100	100
Plastic Surgery (Integrated) (PGY-1)	16	16	16	0	0	0	0	0	0	100	100	100
Psychiatry (PGY-1)	160	160	94	6	33	1	10	16	0	58.8	100	100
Psychiatry/Neurology (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	100
Radiation Oncology (PGY-2)	14	13	11	1	0	0	0	1	0	78.6	92.9	92.9
Radiology-Diagnostic (PGY-1)	11	8	6	1	0	0	1	0	0	54.5	72.7	72.7
Radiology-Diagnostic (PGY-2)	72	72	52	4	6	0	1	9	0	72.2	100	100
Radiology-Diagnostic (Physician)	1	1	0	1	0	0	0	0	0	0.0	100	100
Surgery (PGY-1)	192	165	102	11	17	2	7	26	0	53.1	85.9	85.9
Thoracic Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	100
Transitional Year (PGY-1)	69	69	52	0	13	0	2	2	0	75.4	100	100
Vascular Surgery (PGY-1)	8	8	5	0	2	0	0	1	0	62.5	100	100

UTAH	Applicant Type										% MD Sr	% Tot
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr		
Anesthesiology (PGY-1)	10	10	6	1	1	0	0	2	0	60.0	100	100
Anesthesiology (PGY-2)	4	4	3	0	1	0	0	0	0	75.0	100	100
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100	100
Child Neurology (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Dermatology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	100
Dermatology (PGY-2)	3	3	2	1	0	0	0	0	0	66.7	100	100
Emergency Medicine (PGY-1)	12	12	12	0	0	0	0	0	0	100	100	100
Family Medicine (PGY-1)	29	29	19	1	8	0	0	1	0	65.5	100	100
Internal Medicine (PGY-1)	38	37	30	1	1	0	2	3	0	78.9	97.4	97.4
Internal Medicine/Pediatrics (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Interventional Radiology (Integrated) (PGY-2)	1	1	0	0	1	0	0	0	0	0.0	100	100
Neurological Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Neurology (PGY-1)	8	8	5	0	0	0	0	3	0	62.5	100	100
Obstetrics and Gynecology (PGY-1)	7	7	7	0	0	0	0	0	0	100	100	100
Orthopaedic Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100	100	100
Otolaryngology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	100
Pathology (PGY-1)	6	6	3	0	1	0	2	0	0	50.0	100	100
Pediatrics (PGY-1)	23	23	21	0	0	1	0	1	0	91.3	100	100
Pediatrics/Medical Genetics (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100	100
Pediatrics/Psych/Child Psych (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Physical Medicine and Rehabilitation (PGY-1)	7	7	4	0	3	0	0	0	0	57.1	100	100
Plastic Surgery (Integrated) (PGY-1)	3	3	2	1	0	0	0	0	0	66.7	100	100
Psychiatry (PGY-1)	14	14	9	0	2	0	1	2	0	64.3	100	100
Radiation Oncology (PGY-2)	2	2	2	0	0	0	0	0	0	100	100	100
Radiology-Diagnostic (PGY-1)	2	2	2	0	0	0	0	0	0	100	100	100

Radiology-Diagnostic (PGY-2)	6	6	6	0	0	0	0	0	0	100	100	100
Surgery (PGY-1)	6	6	6	0	0	0	0	0	0	100	100	100
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	100
Transitional Year (PGY-1)	8	8	8	0	0	0	0	0	0	100	100	100

VERMONT	Applicant Type										% MD Sr	% Tot
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr		
Anesthesiology (PGY-1)	6	6	4	1	1	0	0	0	0	66.7	100	100
Dermatology (PGY-2)	2	2	2	0	0	0	0	0	0	100	100	100
Emergency Medicine (PGY-1)	6	6	5	0	1	0	0	0	0	83.3	100	100
Family Medicine (PGY-1)	6	6	5	0	1	0	0	0	0	83.3	100	100
Internal Medicine (PGY-1)	18	18	15	1	2	0	0	0	0	83.3	100	100
Neurological Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	100
Neurology (PGY-1)	5	5	2	0	3	0	0	0	0	40.0	100	100
Obstetrics and Gynecology (PGY-1)	3	3	2	0	1	0	0	0	0	66.7	100	100
Orthopaedic Surgery (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Otolaryngology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	100
Pathology (PGY-1)	4	4	2	0	2	0	0	0	0	50.0	100	100
Pediatrics (PGY-1)	7	7	3	0	2	0	0	2	0	42.9	100	100
Psychiatry (PGY-1)	5	5	5	0	0	0	0	0	0	100	100	100
Radiology-Diagnostic (PGY-2)	6	6	3	3	0	0	0	0	0	50.0	100	100
Surgery (PGY-1)	8	8	5	2	1	0	0	0	0	62.5	100	100

VIRGINIA	Applicant Type										% MD Sr	% Tot
	Pos.	No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth	MD Sr		
Anesthesiology (PGY-1)	25	25	20	1	3	0	1	0	0	80.0	100	100
Anesthesiology (PGY-2)	2	2	2	0	0	0	0	0	0	100	100	100
Anesthesiology (Physician)	6	6	0	6	0	0	0	0	0	0.0	100	100
Child Neurology (PGY-1)	2	2	1	0	0	0	0	1	0	50.0	100	100
Dermatology (PGY-2)	11	11	8	1	2	0	0	0	0	72.7	100	100
Emergency Medicine (PGY-1)	59	54	21	2	25	3	2	1	0	35.6	91.5	91.5
Family Medicine (PGY-1)	125	103	32	1	42	1	20	7	0	25.6	82.4	82.4
Internal Medicine (PGY-1)	237	196	92	3	62	1	15	23	0	38.8	82.7	82.7
Internal Medicine/ Emergency Med (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100	100
Internal Medicine/Pediatrics (PGY-1)	4	4	4	0	0	0	0	0	0	100	100	100
Interventional Radiology (Integrated) (PGY-1)	3	3	3	0	0	0	0	0	0	100	100	100
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100	100	100
Neurological Surgery (PGY-1)	7	7	6	1	0	0	0	0	0	85.7	100	100
Neurology (PGY-1)	10	10	5	0	1	0	0	4	0	50.0	100	100
Neurology (PGY-2)	8	8	3	0	5	0	0	0	0	37.5	100	100
Neurology (Physician)	1	1	0	0	0	1	0	0	0	0.0	100	100
Obstetrics and Gynecology (PGY-1)	29	29	21	3	5	0	0	0	0	72.4	100	100
Orthopaedic Surgery (PGY-1)	14	14	14	0	0	0	0	0	0	100	100	100
Osteopathic Neuromusculoskeletal	3	2	0	0	1	1	0	0	0	0.0	66.7	66.7
Otolaryngology (PGY-1)	10	10	9	0	1	0	0	0	0	90.0	100	100

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VIRGINIA (cont.)	Pos.	Applicant Type								% MD Sr % Tot	
		No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth		
Pathology (PGY-1)	10	10	4	0	3	1	0	2	0	40.0	100
Pediatrics (PGY-1)	76	68	22	1	23	0	8	14	0	28.9	89.5
Physical Medicine and Rehabilitation (PGY-1)	2	2	2	0	0	0	0	0	0	100	100
Physical Medicine and Rehabilitation (PGY-2)	11	11	1	3	7	0	0	0	0	9.1	100
Plastic Surgery (Integrated) (PGY-1)	8	8	6	2	0	0	0	0	0	75.0	100
Psychiatry (PGY-1)	44	44	23	0	16	0	2	3	0	52.3	100
Radiation Oncology (PGY-2)	3	3	3	0	0	0	0	0	0	100	100
Radiology-Diagnostic (PGY-2)	19	19	15	1	3	0	0	0	0	78.9	100
Surgery (PGY-1)	47	34	24	4	4	0	2	0	0	51.1	72.3
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100
Transitional Year (PGY-1)	43	37	23	0	13	0	1	0	0	53.5	86.0
Vascular Surgery (PGY-1)	2	2	1	0	1	0	0	0	0	50.0	100

WASHINGTON	Pos.	Applicant Type								% MD Sr % Tot	
		No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth		
Anesthesiology (PGY-1)	32	32	23	1	4	0	2	2	0	71.9	100
Anesthesiology (PGY-2)	4	4	4	0	0	0	0	0	0	100	100
Anesthesiology (Physician)	1	1	0	1	0	0	0	0	0	0.0	100
Child Neurology (PGY-1)	4	4	4	0	0	0	0	0	0	100	100
Dermatology (PGY-2)	4	4	4	0	0	0	0	0	0	100	100
Emergency Medicine (PGY-1)	18	18	18	0	0	0	0	0	0	100	100
Family Medicine (PGY-1)	163	146	67	2	45	3	14	15	0	41.1	89.6
Internal Medicine (PGY-1)	127	127	72	5	35	0	4	11	0	56.7	100
Interventional Radiology (Integrated) (PGY-2)	3	3	3	0	0	0	0	0	0	100	100
Neurological Surgery (PGY-1)	4	4	4	0	0	0	0	0	0	100	100
Neurology (PGY-1)	10	10	9	0	1	0	0	0	0	90.0	100
Obstetrics and Gynecology (PGY-1)	13	13	12	1	0	0	0	0	0	92.3	100
Orthopaedic Surgery (PGY-1)	8	8	8	0	0	0	0	0	0	100	100
Otolaryngology (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100
Pathology (PGY-1)	8	8	6	0	1	0	0	1	0	75.0	100
Pediatrics (PGY-1)	48	46	35	1	3	1	3	3	0	72.9	95.8
Pediatrics/Medical Genetics (PGY-1)	0	0	0	0	0	0	0	0	0	0.0	0.0
Physical Medicine and Rehabilitation (PGY-1)	3	3	3	0	0	0	0	0	0	100	100
Physical Medicine and Rehabilitation (PGY-2)	11	11	4	1	6	0	0	0	0	36.4	100
Plastic Surgery (Integrated) (PGY-1)	5	5	5	0	0	0	0	0	0	100	100
Psychiatry (PGY-1)	23	23	21	0	2	0	0	0	0	91.3	100
Radiation Oncology (PGY-2)	3	3	3	0	0	0	0	0	0	100	100
Radiology-Diagnostic (PGY-1)	2	2	1	1	0	0	0	0	0	50.0	100
Radiology-Diagnostic (PGY-2)	11	11	8	3	0	0	0	0	0	72.7	100
Surgery (PGY-1)	46	34	31	0	2	1	0	0	0	67.4	73.9
Thoracic Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100
Transitional Year (PGY-1)	16	16	15	0	1	0	0	0	0	93.8	100

Vascular Surgery (PGY-1)	2	2	2	0	0	0	0	0	0	100	100

WEST VIRGINIA	Pos.	Applicant Type								% MD Sr % Tot	
		No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth		
Anesthesiology (PGY-1)	9	9	8	0	1	0	0	0	0	88.9	100
Anesthesiology (Physician)	1	1	0	0	0	1	0	0	0	0.0	100
Dermatology (PGY-2)	3	3	2	1	0	0	0	0	0	66.7	100
Dermatology (Physician)	2	2	0	2	0	0	0	0	0	0.0	100
Emergency Medicine (PGY-1)	13	10	7	0	3	0	0	0	0	53.8	76.9
Family Medicine (PGY-1)	41	32	5	2	10	0	5	10	0	12.2	78.0
Internal Medicine (PGY-1)	75	69	23	1	11	0	3	31	0	30.7	92.0
Internal Medicine/Pediatrics (PGY-1)	5	5	4	0	1	0	0	0	0	80.0	100
Internal Medicine/Psychiatry (PGY-1)	2	2	1	0	0	0	0	1	0	50.0	100
Neurological Surgery (PGY-1)	2	2	0	2	0	0	0	0	0	0.0	100
Neurology (PGY-1)	15	15	7	0	2	0	1	5	0	46.7	100
Neurology (PGY-2)	1	1	0	0	0	0	0	1	0	0.0	100
Obstetrics and Gynecology (PGY-1)	8	7	4	0	3	0	0	0	0	50.0	87.5
Orthopaedic Surgery (PGY-1)	8	8	7	1	0	0	0	0	0	87.5	100
Osteopathic Neuromusculoskeletal	2	2	0	0	2	0	0	0	0	0.0	100
Otolaryngology (PGY-1)	3	3	2	0	0	0	0	1	0	66.7	100
Pathology (PGY-1)	1	1	0	0	0	0	0	1	0	0.0	100
Pediatrics (PGY-1)	18	13	3	1	2	0	2	5	0	16.7	72.2
Plastic Surgery (Integrated) (PGY-1)	1	1	1	0	0	0	0	0	0	100	100
Psychiatry (PGY-1)	22	22	12	0	9	0	0	1	0	54.5	100
Radiation Oncology (PGY-2)	1	1	0	0	1	0	0	0	0	0.0	100
Radiology-Diagnostic (PGY-2)	7	7	3	1	2	0	1	0	0	42.9	100
Radiology-Diagnostic (Physician)	1	1	0	1	0	0	0	0	0	0.0	100
Surgery (PGY-1)	26	23	11	0	9	0	2	1	0	42.3	88.5
Transitional Year (PGY-1)	13	13	12	0	1	0	0	0	0	92.3	100
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100

WISCONSIN	Pos.	Applicant Type								% MD Sr % Tot	
		No. Filled	MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth		
Anesthesiology (PGY-1)	35	35	24	0	8	0	0	3	0	68.6	100
Anesthesiology (PGY-2)	0	0	0	0	0	0	0	0	0	0.0	0.0
Anesthesiology (Physician)	3	3	0	1	0	2	0	0	0	0.0	100
Child Neurology (PGY-1)	3	3	1	0	1	0	0	1	0	33.3	100
Dermatology (PGY-2)	12	12	9	1	1	0	0	1	0	75.0	100
Emergency Medicine (PGY-1)	25	25	20	0	5	0	0	0	0	80.0	100
Family Medicine (PGY-1)	101	93	44	0	15	2	21	11	0	43.6	92.1
Internal Medicine (PGY-1)	112	110	81	1	10	0	5	13	0	72.3	98.2
Internal Medicine/Pediatrics (PGY-1)	8	8	5	0	1	0	1	1	0	62.5	100
Internal Medicine/Psychiatry (PGY-1)	2	2	2	0	0	0	0	0	0	100	100
Interventional Radiology (Integrated) (PGY-1)	3	3	2	0	1	0	0	0	0	66.7	100
Interventional Radiology (Integrated) (PGY-2)	2	2	2	0	0	0	0	0	0	100	100

Key: Pos.=number of positions in the match; No. Filled=number of positions filled; MD Sr=U.S. allopathic seniors; MD Gr=prior U.S. allopathic graduates; DO Sr=U.S. osteopathic seniors; DO Gr=prior U.S. osteopathic graduates; US IMG=U.S. citizen graduates of international medical schools; IMG=non-U.S. citizen graduates of international medical schools; Oth=5th Pathway and Canadian medical schools graduates; % MD Sr=percent of positions filled by U.S. allopathic seniors; % Tot = percent of positions filled.

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WISCONSIN (cont.)	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth			
Neurological Surgery (PGY-1)	5	5	4	0	0	0	0	1	0	80.0	100	
Neurology (PGY-1)	13	13	7	0	3	0	0	3	0	53.8	100	
Obstetrics and Gynecology (PGY-1)	15	15	11	1	2	0	0	1	0	73.3	100	
Orthopaedic Surgery (PGY-1)	11	11	11	0	0	0	0	0	0	100	100	
Otolaryngology (PGY-1)	7	7	7	0	0	0	0	0	0	100	100	
Pathology (PGY-1)	10	10	5	0	2	0	1	2	0	50.0	100	
Pediatrics (PGY-1)	46	45	21	0	13	0	3	8	0	45.7	97.8	
Pediatrics/Anesthesiology (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	
Physical Medicine and Rehabilitation (PGY-2)	10	10	9	1	0	0	0	0	0	90.0	100	
Plastic Surgery (Integrated) (PGY-1)	5	5	5	0	0	0	0	0	0	100	100	
Psychiatry (PGY-1)	25	25	18	0	6	0	0	1	0	72.0	100	
Radiation Oncology (PGY-2)	4	4	2	1	0	0	0	1	0	50.0	100	
Radiology-Diagnostic (PGY-1)	4	4	2	0	2	0	0	0	0	50.0	100	
Radiology-Diagnostic (PGY-2)	15	15	14	0	1	0	0	0	0	93.3	100	
Surgery (PGY-1)	31	24	16	2	1	0	3	2	0	51.6	77.4	
Transitional Year (PGY-1)	35	35	33	0	2	0	0	0	0	94.3	100	
Vascular Surgery (PGY-1)	1	1	1	0	0	0	0	0	0	100	100	

WYOMING	Pos.	No. Filled	Applicant Type							% MD Sr		% Tot
			MD Sr	MD Gr	DO Sr	DO Gr	US IMG	US IMG	Oth			
Family Medicine (PGY-1)	15	12	1	0	6	0	3	2	0	6.7	80.0	

Key: Pos.=number of positions in the match; No. Filled=number of positions filled; MD Sr=U.S. allopathic seniors; MD Gr=prior U.S. allopathic graduates; DO Sr=U.S. osteopathic seniors; DO Gr=prior U.S. osteopathic graduates; US IMG=U.S. citizen graduates of international medical schools; IMG=non-U.S. citizen graduates of international medical schools; Oth=5th Pathway and Canadian medical schools graduates; % MD Sr=percent of positions filled by U.S. allopathic seniors; % Tot = percent of positions filled.

Perceiving and Addressing the Pervasive Racial Disparity in Abortion

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Health Services Research and
Managerial Epidemiology
Volume 7: 1-4
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DOI: 10.1177/2333392820949743
journals.sagepub.com/home/hme



Abstract

Black women have been experiencing induced abortions at a rate nearly 4 times that of White women for at least 3 decades, and likely much longer. The impact in years of potential life lost, given abortion's high incidence and racially skewed distribution, indicates that it is the most demographically consequential occurrence for the minority population. The science community has refused to engage on the subject and the popular media has essentially ignored it. In the current unfolding environment, there may be no better metric for the value of Black lives.

Keywords

abortion, racial disparity, Black abortion rate, premature death, YPLL

While induced abortion remains a contentious political issue, there is no credible scientific doubt that a unique human life begins at conception and, therefore, ends with an abortion. Even the Obama administration and the abortion-friendly Bill and Melinda Gates Foundation have acknowledged “the critical importance of a child’s first 1,000 days after conception in determining a healthy and productive life trajectory . . . to ensure that all children . . . have an equal opportunity to survive and thrive.”¹

Yet, the evidence is clear that for many decades Black children in the United States have not had, and do not have today, an equal opportunity to survive until birth. The most recent CDC report on abortion in the United States indicates that, in 2016, the Non-Hispanic Black abortion rate (25.1 abortions per 1,000 women age 15-44) was 3.8 times the Non-Hispanic White rate of 6.6.² One could reasonably hope, given the pattern of declining abortion rates for 3 decades, that the racial disparity in abortion also would be decreasing. However, between 2007-2016, the Black rate declined 29% and the White rate declined 33%-meaning that the racial disparity actually increased rather than decreased during that time period. It is also important to note that 5 states that did not report race-specific abortion data (or no data at all in the case of California) to the CDC (California, New York, Texas, Florida and Illinois) account for fully half of all U.S. abortions and a third of all Black women of child bearing age. Further, the CDC notes that non-reporting states have “populations of minority women so that the absence of their data reduces the representativeness of the CDC data.” This means that the existing CDC reports possibly underestimate the size of the racial disparity in abortion nationwide.

The racial disparity in abortion rates in the U.S. is pervasive and persistent. Between 1990-2014, 43 states and the District of

Columbia reported race-specific abortion data to the CDC.³ Many states reported intermittently and only 22 states reported for all 25 years. The national average (aggregating all available states and years) Black/White abortion rate disparity for the entire period was 3.44. The 1990 disparity was 3.00 (B 25.87/W 8.63) and by 2014 it was 3.64 (B 12.68/W 3.48). In data collected directly from the individual states (not from CDC) for the more recent calendar year 2018, the 27 reporting states average a Black abortion rate of 21.78 and a White abortion rate of 6.38 for a racial disparity of 3.41. Some noteworthy states and their racial disparity in abortion include: Wisconsin (5.59), Michigan (5.41), Minnesota (4.78) and Pennsylvania (4.80).⁴ Therefore, despite incomplete reporting especially from high-volume abortion states with large populations of minority women, Black women have been experiencing abortions at a rate nearly 4 times that of White women for more than 30 years. It is very likely that the disparity existed even before there was any reporting.

One way to measure the impact of race-specific abortion rates on the size and demographic composition of the U.S. population is to calculate the years of potential life lost (YPLL) from abortion and to compare its impact to other causes of death. YPLL is the preferred public health metric for quantifying the social, economic and demographic loss resulting from premature death.

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Submitted July 13, 2020. Revised July 17, 2020. Accepted July 17, 2020.

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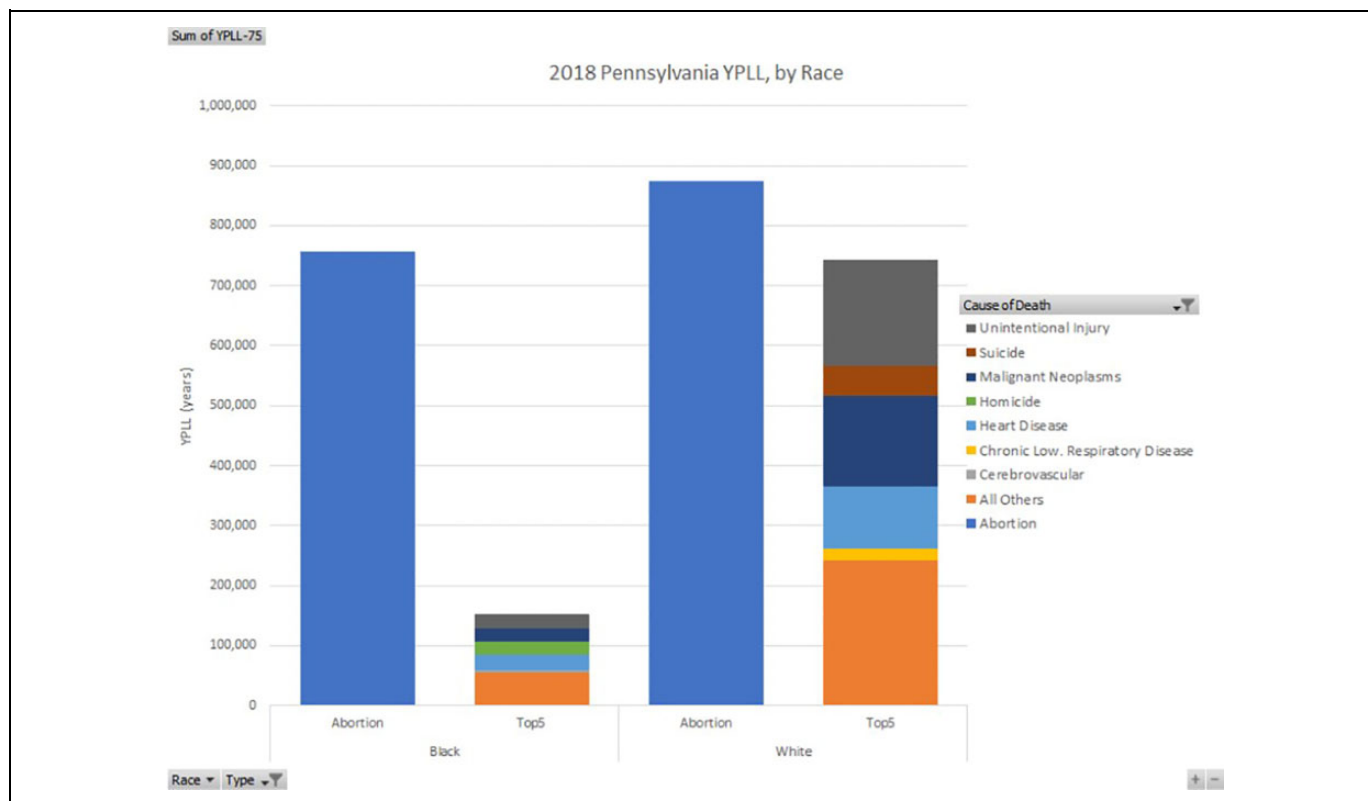


Figure 1. Pennsylvania 2018 YPLL by race and cause of death.

It allows the estimation of the burden of premature death for any cause and can assess socioeconomic inequalities by race (as in our application), education, gender or other available characteristics.⁵ YPLL 75 is calculated by accumulating all years from the age at death up to 75, for all deaths for each cause of death. We selected the state of Pennsylvania (2018) to illustrate the YPLL construct because of its relatively high abortion volume ($n = 30,364$), very high black abortion rate (37.16) and a high racial disparity in abortion rates (4.80).

In Pennsylvania in 2018, there were 61,011 White deaths (these are premature recorded deaths of all deceased persons up to age 75, plus abortions) from all causes and 20,976 Black deaths.⁶ Abortions were 23.9% of White deaths and 62.7% of Black deaths. To calculate YPLL we subtracted 23.8% of Black abortions and 20.9% of White abortions to reflect estimated natural fetal losses. Total White YPLL was 1,610,908 years and White abortions accumulated 866,916 YPLL or 53.8%. Total Black YPLL was 911,955 years and Black abortions accumulated 751,522 YPLL or 82.4% (Figure 1). In Pennsylvania in 2018, there were 472 Black homicide deaths that generated 20,964 YPLL. For comparison purposes, Black abortions represented 28 times more deaths and 36 times as many YPLL as Black homicides.

A vivid national-level illustration of the gap between the crucial demographic importance of abortion and its relative scientific and media obscurity can be found in its comparison with maternal mortality. The racial disparity in maternal mortality, that is, non-accidental death related to pregnancy, has received an abundance of attention both in the popular media and the professional

community. Stories expressing alarm over the high rate and racial disparity in maternal mortality have recently appeared in every major newspaper in the United States. Many states have formed expert committees to determine the causes of pregnancy-related maternal deaths and to implement preventive programs. The racial disparities in maternal mortality and induced abortion are of the same magnitude and in the same direction, a ratio of about 3–4 times. Yet, maternal mortality, in stark contrast to the high incidence of abortion, is an extraordinarily rare event. During the 5-year period 2011–2015, there was an average of 682 maternal deaths per year in the entire nation.⁷ That is an average annual age-adjusted YPLL of 29,996 years. In 2015, there were 900,135 abortions, derived from a linear interpolation of Guttmacher Institute 2014 and 2016 estimates. The fetal-loss-adjusted YPLL was over 52 million years. Therefore, there were 1,320 abortion deaths for every maternal death and 1,744 years of potential life lost to abortion for every year lost to a maternal death!

Abortion has been euphemistically described as a “choice” or a human “right.” The undeniable objective reality, whatever one’s political persuasion or ideological posture, is that each abortion is a death. Death by abortion, however, has proven to be an inconvenient reality for many of our politicians and scientists alike. Mortality and fertility are 2 of the 3 principal determinants, along with migration, of the size and demographic composition of the U.S. population.⁸ Given its high incidence and racially skewed distribution, abortion is unquestionably the most demographically consequential occurrence for the minority community. Its impact on the size and racial composition of the nation

is undeniable. The exclusion of the major cause of death from the vital statistics system and the national psyche, one which disproportionately affects a racial minority, is a distressing denial of science. Cause-specific mortality rightly remains a major influence on public policy and resource allocation, and research suggests that notions about the relative importance of the mortality patterns of certain subpopulations often reflect subjective beliefs about the nature of the society.^{9,10} The silence of the popular media and the lack of a robust scientific dialogue on the longstanding racial disparity in induced abortion suggest that a disconnect exists between its overwhelming demographic importance and the willingness of thought leaders to engage on the subject. The current upheaval unfolding may portend at last, hopefully, a return to serious scientific inquiry, public transparency, and effective response.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Author Biographies

James Studnicki is currently Vice President and Director of Data Analytics at the Charlotte Lozier Institute in Arlington, Virginia. Over a span of four decades, he held academic appointments at the Johns Hopkins University School of Hygiene and Public Health, the University of South Florida College of Public Health, and the University of North Carolina, Charlotte, where for ten years he served as the Irwin Belk Endowed Chair in Health Services Research. Dr. Studnicki holds Doctor of Science (ScD) and Master of Public Health (MPH) degrees from Johns Hopkins and a Master of Business Administration (MBA) from the George Washington University.

John W. Fisher is currently an Associate Scholar at the Charlotte Lozier Institute. Following a 22 year career as a nuclear submarine officer, he served as the Director of Life Support and Engineering at the Florida Aquarium, Chief Financial Officer of Technology Transfer Services, and 10 years as an Assistant Professor at the University of North Carolina at Charlotte College of Health and Human Services. Dr. Fisher holds a PhD in Information Systems and Decision Sciences from the University of South Florida, a JD from Massachusetts School of Law, and Master's degrees from the Massachusetts Institute of Technology (Ocean Engineering), University of Notre Dame (Administration), Indiana University (Business Administration), the United States Naval War College (National Security Policy), and the University of South Florida (Management Information Systems). He is a member of the bar in New Hampshire and Massachusetts.

James L. Sherley graduated from Harvard College in 1980 with a BA degree in biology; and he completed joint MD and PhD degrees at the Johns Hopkins University School of Medicine in 1988. After post-doctoral studies in cancer cell molecular biology at Princeton University, he joined the Fox Chase Cancer Center as a principal investigator in 1991. In 1998, he joined the faculty of the future Department of Biological Engineering at Massachusetts Institute of Technology, where he undertook research and teaching in the areas of cancer cell molecular biology, tissue stem cell bioengineering, toxicology, and environmental health science until moving to Boston Biomedical Research Institute (BBRI) in 2007. As a Senior Member of BBRI's research programs in Regenerative Biology and Cancer Biology, Dr. Sherley established an academic center for developing adult stem cell-based technologies for advancing cellular medicine. After leaving

BBRI, in October 2013 he founded stem cell biotechnology development company Asymmetrex, LLC, which he now directs. Asymmetrex has the mission of advancing technologies for stem cell medicine. The company recently developed the first method for determining the dosage of therapeutic stem cell treatments. Dr. Sherley's awards

include 1993 Pew Biomedical Research Scholar, 2003 Ellison Medical Foundation Senior Scholar in Aging Research, and 2006 NIH Director's Pioneer Award. Since 2016, he has served as an Associate Scholar of the Charlotte Lozier Institute, the education and research institute of the Susan B. Anthony List.

Systematic Review

The maternal mortality myth in the context of legalized abortion

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It was quoted recently in the literature that “The risk of death associated with childbirth is approximately 14 times higher than with abortion.” This statement is unsupported by the literature and there is no credible scientific basis to support it. A reasonable woman would find any discussion about the risk of dying from a procedure as material, i.e., important and significant. In order for the physician–patient informed consent dialogue to address this critical issue, the physician must rely upon objective and accurate information concerning abortion. There are numerous and complicated methodological factors that make a valid scientific assessment of abortion mortality extremely difficult. Among the many factors responsible are incomplete reporting, definitional incompatibilities, voluntary data collection, research bias, reliance upon estimations, political correctness, inaccurate and/or incomplete death certificate completion, incomparability with maternal mortality statistics, and failing to include other causes of death such as suicides. Given the importance of this disclosure about abortion mortality, the lack of credible and reliable scientific evidence supporting this representation requires substantial discussion.

Keywords: Maternal mortality, Childbirth, Elective abortion

ABORTION MORTALITY: MYTHOLOGY AND METHODOLOGY

It was quoted recently in the literature that “The risk of death associated with childbirth is approximately 14 times higher than with abortion” (Raymond and Grimes 2012). This statement is unsupported by the literature and there is no credible scientific basis to support it.

A reasonable woman would find any discussion about the risk of dying from a procedure as material, i.e. important and significant. In order for the physician–patient informed consent dialogue to

address this critical issue, the physician must rely upon objective and accurate information concerning abortion. There are numerous and complicated methodological factors that make a valid scientific assessment of abortion mortality extremely difficult. Among the many factors responsible are incomplete reporting, definitional incompatibilities, voluntary data collection, research bias, reliance upon estimations, political correctness, inaccurate and/or incomplete death certificate completion, incomparability with maternal mortality statistics, and failing to include other causes of death such as suicides.

Given the importance of this disclosure about abortion mortality, the lack of credible and reliable scientific evidence supporting this representation requires substantial discussion.

Abortion data are unreliable

For any assessment of the health risks of abortion, it is necessary to obtain complete statistics on the incidence and prevalence of abortion as well as its mortality and morbidity in the USA. But, there is no federal reporting requirement and thus, only *estimates* are available (see, for example, Grimes 2006; Raymond and Grimes 2012). Only 26 states require providers to report abortion complications to the Centers for Disease Control (CDC) (Saul 1998; Guttmacher Institute 2009). States that do report incidence data are plagued by incomplete and inconsistent reporting, underreporting, and the lack of a national legal mandate to report.¹ Abortion data are simply not complete and those provided are merely *estimates* with huge variance, and are subject to considerable error. Current incidence *estimates* by the CDC exclude abortions in California, District of Columbia, New Hampshire, and New Jersey. The CDC data are unreliable because they base their *estimates* on voluntary submissions by state health departments, whose accuracy is widely acknowledged to be inconsistent and unreliable. “Many state health departments are able to obtain only incomplete data from abortion providers, and in some states, only 40–50 percent of abortions are reported” (Jones et al. 2008). Furthermore, CDC data regarding maternal mortality are collected by two different agencies using two different definitions and data sources: the National Vital Statistics System (NVSS) and the Pregnancy Mortality Surveillance System (PMSS). For

the years 1995–1997, the NVSS reported 898 maternal deaths and the PMSS system reported 1,387 pregnancy related deaths. Therefore the total number of pregnancy related deaths for the time period was the 1,387 documented in the PMSS system. However, only 54 percent of pregnancy related deaths were reported in both systems (MacKay et al. 2005). This disparity in reporting demonstrates that even within the CDC, there is lack of comparability of data regarding pregnancy related deaths. It is from this inaccurate data that abortion mortality data is derived, and, as a result, the CDC has cautioned medical professionals to not make comparative statements based upon CDC data.

The only other institution which collects abortion data is the Guttmacher Institute (GI).

The abortion reporting by GI is based on voluntary submissions in their periodic polling of abortion providers who are simply asked to guesstimate the number of procedures performed, by trimester, proximity to provider, etc. The scientific validity and utility of this unconventional data gathering method is minimal since it does not capture all providers, who in turn are simply estimating annual data. It cannot be relied upon in identifying national incidence. Despite this, in this case, GI submitted a sworn affidavit that the only data they rely upon is that provided by the CDC, which is inherently unreliable. GI is a special affiliate of Planned Parenthood Federation of America, the largest single provider of abortions in this country. GI is an advocacy center whose expressed purpose is to broadly support abortion rights and to limit abortion regulation: “The Institute works to protect, expand and equalize access to information, services and rights that will enable women and men to...exercise the right to choose abortion...” (<http://www.guttmacher.org/about/mission.html>).

Because GI seeks to protect abortion rights, it would be disinclined to provide data which could interfere with unrestricted abortion. Also, in GI's periodic survey of abortion providers, physicians performing abortions face an obvious conflict of interest: disclosure of abortion complications may fuel state laws restricting access if GI publishes all data gathered. In short, GI data are not credible as it is incomplete and inherently biased. Even GI's own publications confirm this: "Without question, reputable published science should tell readers about potential conflicts of interest" (Sonfield 2005), which it obviously does not do.

There are other methodological problems with abortion data that make it largely unreliable:

- (a) It is widely acknowledged that abortion is underreported in the U.S. with less than half of all abortions reported by women in face-to-face interviews (Jones and Kost 2007). The most likely effect of this systematic underreporting across studies is an overly favorable assessment of health risks due to abortion since women often do not report their abortion history (Jones and Kost 2007).
- (b) There are no fetal death certificates issued when an abortion occurs. Abortions are often underreported by women and thus do not appear in their medical records. As a result, disease state or complications are not linked to abortion since it is largely not reported and thus, invisible in epidemiological research. When the patient's medical records are incomplete, any aggregated abortion mortality or morbidity reporting and analyses reflect this systematic bias.
- (c) Most women do not return to the abortion clinic for follow-up care and assessment. Many abortion providers do not have after hours contact numbers or merely send patients with

problems post-abortion to local emergency rooms to be seen by other healthcare providers. It has been estimated that more than two out of three women do not return for follow-up appointments at the abortion clinic (Picker Institute 1999).

Definitional issues regarding maternal mortality are problematic and not comparable

The numbers of women who die from abortion are largely unknown due to poor quality reporting and definitional issues. Abortion-related deaths are captured in some standardized definitions but not in others where they are undifferentiated from spontaneous abortions (Chang et al. 2003; Harrison 2009). The World Health Organization (WHO) has acknowledged: "...all existing estimates of maternal mortality are subject to greater or lesser degrees of uncertainty" (World Health Organization 2004). Because the data are so incomplete, the WHO has used seven different methods to estimate maternal death (World Health Organization 2004, 2007). Maternal mortality is difficult to measure precisely because routine recording of deaths tend not to be complete within civil registration systems. Even if such deaths were recorded, the woman's pregnancy status may not have been known and the death would therefore not have been reported as a maternal death even if the woman had been pregnant. Horon (2005) estimated that physicians completing death certificates after a maternal death fail to report that the woman was pregnant or had a recent pregnancy in 50 percent or more of the cases. In most developing-country settings where medical certification of cause of death does not exist, accurate attribution of female deaths as maternal death is difficult to impossible. Even in developed countries

where routine registration of deaths is in place, maternal deaths may be considerably underreported (World Health Organization 2007). Additionally, reliance upon death certificates in maternal mortality assessments has been shown to be considerably unreliable and underestimates abortion related mortality (Reardon et al. 2004a).

Abortion-related deaths are not easily or accurately identified. Among the definitions used to capture abortion mortality are:

- *Maternal deaths* are defined by the WHO as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Suicide, unintentional injuries, or homicide are not included as causes of death in this definition (Deneux-Tharaux et al. 2005). In WHO's International Classification of Diseases, coding criteria obfuscated deaths by requiring only complications be reported versus the treatment itself. According to the WHO (2004, 4) "all existing estimates of maternal mortality are subject to greater or lesser degrees of uncertainty."
- *Late maternal deaths* are defined as "the deaths of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy."
- *Pregnancy-related deaths*, including from direct and indirect obstetric causes, are defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death." *Direct obstetric deaths*: "those resulting from obstetric complications of the pregnant state (pregnancy, labor, and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events

resulting from any of the above." *Indirect obstetric deaths*: "...those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy" (Hoyert 2007). In the U.S. Abortion Mortality Surveillance System, Elam-Evans et al. (2003) concluded that existing methods and systems for capturing abortion related deaths are inadequate and underreported.

- *Pregnancy-associated deaths*, developed by the Centers for Disease Control and Prevention, and with the Maternal Mortality Special Interest Group of the American College of Obstetricians and Gynecologists, define a death from any cause during pregnancy or within 1 calendar year of delivery or pregnancy termination, regardless of the duration or anatomical site of the pregnancy (Wilcox and Marks 1995). Pregnancy-associated deaths include not only deaths commonly associated with pregnancy such as hemorrhage, pregnancy-induced hypertension, and embolism—which are captured in the WHO definition—but also deaths not traditionally considered to be related to pregnancy such as accidents, homicide, and suicide. Pregnancy associated death also includes deaths occurring 43–365 days following termination of pregnancy. Because cause-of-death information on death certificates cannot identify deaths from non-maternal causes or deaths occurring 43 or more days following termination of pregnancy as associated with pregnancy, additional sources of data must be used for complete assessment of all pregnancy-associated deaths (Horon and Cheng 2001). Even with pregnancy-associated deaths there is considerable differentiation between states as to case definition and comparability to

CDC estimates of pregnancy associated maternal mortality ratios (Mascola et al. 2004; Horon 2005).

Yet another way of examining abortion related mortality is calculating a national case-fatality rate: the number of known legal induced abortion-related deaths per 100,000 reported legal induced abortions. This would assume that all abortion deaths are identified from direct and indirect causes, as well as immediate and delayed causes up to 1 year after termination of pregnancy. Even if this were possible, which it is not at this time, this rate could not be calculated because a substantial number of abortions occur in non-reporting states. Thus, the denominator (total number of abortions in the United States) is unknown.

The above definitions indicate that there are only two criteria used in indentifying maternal deaths: (1) medical causes of death and (2) timing of pregnancy-related death. By excluding all other categories that are not due to physical complications, other deaths are simply not captured, including suicide and other indirect deaths which result from physical, psychological, interpersonal, or behavioral problems linked to abortion as the marker event. Causes of deaths resulting directly from abortion are identified. However, abortion may also worsen or initiate physical, psychological, interpersonal, and maladaptive behavioral pathways which can lead to diminished mental or physical health and eventuate in death. These cumulative risk factors which can substantially contribute to abortion mortality are identified. Research by Gissler et al. (2005), Reardon et al. (2004a), Christiansen et al. (2006), and Kavanaugh et al. (2009) support such a broadened assessment of pregnancy associated deaths. The impact of substance abuse, depression, anxiety, and suicide resulting from

abortion is considerable. As a result, indirect abortion-associated deaths are likely to be many times higher than those deaths directly caused by obstetric complications.

Measurement issues of maternal mortality are problematic

The computation of maternal mortality is most commonly a ratio of the number of maternal deaths during a given period per 100,000 live births during the same period. But other measures are also in use: maternal mortality rate (number of maternal deaths in a given period per 100,000 women of reproductive age during the same time period) and lifetime risk of maternal death (risk of death once a woman has become pregnant). The difficulty and complexity of measuring maternal mortality are evident in the following areas:

- (a) There are gross difficulties inherent in measuring maternal mortality and definitions regarding precisely what constitutes a death due to pregnancy/birth are evolving.
- (b) There is a lack of consensus regarding how long after pregnancy resolution a death is appropriately linked with the pregnancy.
- (c) The two national sources of abortion statistics (CDC and the Guttmacher Institute) are plagued by significant levels of underreporting. Further, discrepancies exist between the two national sources, a minimum 12 percent discrepancy was reported (Strauss et al. 2007).
- (d) For various reasons (incomplete medical records, lack of fetal death records), deaths due to abortion are often not recorded as resulting from the procedure, with only the immediate cause of death (e.g., embolism, sepsis, and hemorrhage) provided.

- (e) Women, who experience serious, life-threatening health complications as a result of abortion usually go to a hospital emergency room and are not seen by their abortion providers. Their deaths will therefore not be counted.
- (f) Abortion-related deaths (from physical complications of the procedure) are reported as maternal deaths.
- (g) The death statistics tabulated for abortion focus on “uncomplicated abortion”; whereas the statistics for childbirth incorporate complicated delivery (e.g., caesarian delivery). If “uncomplicated delivery” is compared to “uncomplicated abortion,” the risk of dying from abortion is twice as high. Maternal mortality caused by abortion is *twice* as high compared to women with vaginal deliveries, when caesarean deliveries are excluded (Lanska et al. 1983). Further, analyses do not control for co-morbidities in relation to abortion and pregnancy.
- (h) The available statistics do not address long-term and less direct causes of death associated with abortion and childbirth. Over time the risk of death associated with abortion increases due to enhanced likelihood of substance abuse, cancer, future pregnancy complications, and suicide ideation, whereas with the risk of dying from these causes are lessened dramatically after completion of a term pregnancy without abortion.

The contemporary definition of pregnancy-related deaths that restricts inclusion of a maternal death to within 42 days of delivery is likely to capture the majority of deaths associated with a full-term pregnancy (see Figure 1 adopted from Chang et al. 2003). However, many of the most serious health risks associated with abortion noted above are more

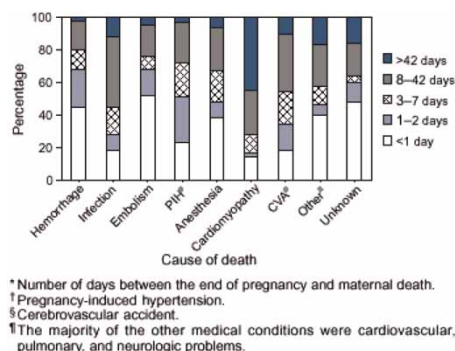


Figure 1. *Distribution of pregnancy-related deaths, by cause of death and time interval—United States, 1991–1999.*

insidious and occur over a much less compressed time period.

National data compare deaths associated with term pregnancies to deaths associated with abortion at any point in pregnancy. This is a flawed technique that has produced an over-estimation of maternal mortality and an under-estimation of abortion mortality. The two central issues are detailed below:

- (a) Maternal mortality is determined by dividing maternal deaths by live births as opposed to pregnancies. Deaths due to ectopic pregnancies (the leading cause of death in the first trimester), molar pregnancies, miscarriage, and stillbirth are represented in the numerator, but not in the denominator. According to the CDC only 60 percent of pregnancy-related deaths occur in conjunction with a live birth. This means that 40 percent of the deaths are never represented in the denominator, resulting in a dramatically over-inflated maternal mortality rate. Moreover, the majority of women who survive ectopic pregnancies, molar pregnancies, miscarriage, and stillbirth will not be in the data at all since their pregnancies do not result in live births.

- (b) Maternal mortality and abortion mortality statistics are not analogous because maternal mortality statistics do not take into consideration the stage of gestation, whereas abortion mortality statistics are predominantly based on first trimester losses. Appropriate comparisons would be prospective in nature with same gestational point comparisons related to the risk of death associated with the two reproductive outcomes. Existing statistics compare maternal deaths at any point in pregnancy and the post-partum period to abortion deaths, which primarily occur in the second and third months of pregnancy since most abortions are in the first trimester. Bartlett et al. (2004) examined national U.S. data from 1988 to 1997 and found: the relative risk of abortion-related mortality increased dramatically with gestational age of the procedure increasing from 14.7/100,000 procedures at 13–15 weeks gestation, to 29.5/100,000 procedures at 16–20 weeks gestation, and to an astounding 76.6/100,000 procedures at/or after 21 weeks gestation.

Comparisons conducted with no regard for the gestational stage in which the death occurs are flawed for several reasons:

- (a) Deaths occurring during the first 6 weeks of pregnancy (when maternal morbidity and mortality are highest) are classified as maternal deaths and are lumped together with deaths associated with birth and delivery. This is inappropriate in that the intended outcome of these early pregnancies is unknown.
- (b) Women who reach the common point of awareness that they are pregnant and make the decision to abort (2 weeks late on the menstrual period or 6 weeks pregnant) have already survived beyond the period of the pregnancy's greatest risk.
- (c) Abortions do not typically occur very early and are impossible beyond 9 months of gestation when most maternal deaths comprising the maternal mortality statistics occur. Therefore, valid gestational period comparisons can only logically be made in the latter half of the first trimester through the end of the third trimester. During the second and third trimesters, abortion-related mortality is equal to and then exceeds that of childbirth (Bartlett et al. 2004).

Gestational period comparisons would only be valid with sophisticated controls for a variety of socio-demographic factors (age, income, education, marital status) based on sound evidence that women belonging to particular socio-demographic groups (e.g., very young and older women) are more at risk for adverse pregnancy events occurring during pregnancy and the post-partum period.

As indicated earlier in this report, maternal mortality and morbidity are largely based on incomplete data and estimates. In the case of WHO and maternal mortality, definitional issues together with rampant statistical manipulation generate even more inaccurate estimates. In an attempt to identify abortion-related mortality, WHO researchers advocated combining the incidence of spontaneous and induced abortion together, and then correcting for the incidence of spontaneous abortion. According to Harrison (2009), one of the WHO researchers acknowledged: "We make huge adjustments to make the numbers turn out right. More than fifty percent of some numbers are 'adjusted'" (Harrison 2009, 4).

There are powerful financial, socio-political, and interpersonal forces potentially

driving the concealment of abortion-related deaths. The same facilities that report the data run the risk of being more closely scrutinized or even closed if there are deaths at their facilities. Deaths associated with abortion are likely to become highly publicized and could result in legal restrictions. Finally, abortion-related deaths may be concealed, because the family is unaware there was a termination or if the family is privy to the information there is likely to be a strong motivation to hide it in order to protect the family from further grief or shame.

ABORTION MORTALITY COMPARED TO CHILDBIRTH: RESEARCH EVIDENCE

According to Kaunitz (1985), induced abortion is the fifth leading cause of maternal mortality in the U.S. Even so, this finding is likely to be an underestimation as most abortion-related deaths are either not reported, or not captured in the existing definitions and national data collection from state health departments. Other deaths resulting from abortion remain excluded: suicide, avoidable deaths due to injuries, accidents, substance abuse, and cumulative and contributory disease states.

A number of factors enter into the relative risks of dying from abortion compared to childbirth, in addition to the methodological issues identified above. These include patient age, operator skill and experience, race, gestational age, type of procedure employed, pre-existing physical and mental health, etc.

In a growing body of literature, childbirth is protective against death from non-obstetric causes, including breast cancer and suicide in both the immediate and long term (Gissler et al. 1996, 2005; Marzuk et al. 1997; Thorp et al. 2003; Carroll 2007). In a large, health record-linked U.S. study spanning 8 years,

women who aborted compared to those who delivered, were 62 percent more likely to die from any cause. Suicide carried a 154 percent increased risk (Reardon et al. 2002). In Finland, using a comprehensive health data linkage system, Gissler et al. (1997) examined death rates up to 1 year after abortion and found a 4 times higher risk among women who aborted versus those who carried to term. Similar adverse findings were reported in subsequent studies: mortality was lower after a birth (28.2/100,000) than after an induced abortion (83.1/100,000)—a 3 times higher mortality risk for abortion compared to childbirth (Gissler et al. 2004b); abortion was associated with a 6 times higher risk for suicide compared to birth (Gissler et al. 2005). Without such record-linkage, 73 percent of all pregnancy-associated deaths would have been missed if they were based only upon death certificates. The percentage of deaths due to abortion would have been even higher (Gissler et al. 2004a). In the U.K., Morgan et al. (1997) reported a similar increased risk of suicide for women electing abortion versus delivery: 8.1 suicide attempts per thousand among those who had abortions compared to only 1.9 suicide attempts per thousand among those who had given birth. Both Hoyer and Lund (1993) and Appleby (1991) found childbirth overall to be risk protective against suicide.

Most striking are the findings by Gissler et al. (2005) that the age group from 15 to 24 years is significantly prone to suicide in the context of an abortion with an increase of almost 50 percent in the suicide rate compared to non-pregnant women (Christiansen et al. 2006). For U.S. women aged 15–19 years, suicide is the third leading cause of death corresponding to 7.5 percent of deaths.

According to Chang et al. (2003), the literature commonly reports three main causes of abortion-related death: infection

(33.9%), hemorrhage (21.8%), and embolism (13.9%); additional abortion-related causes of death include ectopic pregnancy, perforation or rupture of the uterus, and anesthesia complications among others. Hemorrhage and infection deaths from abortion are nearly 8 times and 9 times greater when compared to the percentage of maternal deaths attributed to these causes in live-birth.

Gissler et al. (2004a) compared the pregnancy-associated mortality ratio for the different pregnancy outcomes (live births and stillbirths, spontaneous abortions and ectopic pregnancies, and induced abortions) for all childbearing Finnish women. They reported: "The pregnancy associated mortality ratio per 100,000 pregnancies increased only slightly for live births and stillbirths, but became sevenfold for spontaneous abortions and ectopic pregnancies, and 5.5-fold for induced abortions. The outcome-specific denominator also revealed that the crude risk of a pregnancy-associated death was more than twice as high after a spontaneous abortion or an ectopic pregnancy and more than three times as high after an induced abortion than after a live birth or stillbirth" (Gissler et al. 2004a, 453). Pregnancy-associated deaths have usually been calculated using the number of live births as the denominator. Gissler et al. (2004a) demonstrated that calculating pregnancy-associated deaths per 100,000 pregnancies with a specific pregnancy outcome gives a very different and improved picture (Gissler et al. 2004a).

Reardon et al. (2004b) estimated that there were between 2,132 and 7,036 excess deaths per year among women who abort and 766 to 4,021 deaths due to violent causes. These researchers further reported that abortion-related increases in smoking are likely to result in 3,740 more lung cancer deaths in the lifetimes of the

1.4 million women who abort each year in the U.S. (Reardon et al. 2004b). Available evidence points to numerous unexamined pathways where abortion can increase a woman's chance of dying from either direct and immediate complications or after prolonged exposure to adverse disease and dysfunctional coping in the future.

The true number of deaths related to pregnancy might increase from 30 to 150 percent with active surveillance (Chang et al. 2003; Deneux-Tharaux et al. 2005). Until more robust research is undertaken accounting for multiple confounders in national prospective studies, statements about abortion being many times safer than childbirth are unreliable and false. Existing research does not support this allegedly factual assertion. A reasonable patient would want to be informed of the risks of death related to abortion *from all causes*.

ABORTION MORTALITY: MOST RECENT RESEARCH EVIDENCE

In a carefully done study using 42 years of United Kingdom National Health data comparing England, Wales, and Scotland with Northern Ireland and parallel national data from the Republic of Ireland found that countries with legal abortion actually had a higher maternal mortality rate per 100,000 live births (Ireland's Gain 2011). In fact, Carroll's maternal mortality rates of 8/100,000 and 10/100,000 live births in England, Wales, and Scotland are eerily familiar to the maternal mortality rate of 8.8/100,000 quoted for the U.S. in Raymond and Grimes (2012). The Raymond and Grimes (2012) mortality rate of 0.6/100,000 for abortion is simply not supported by good data (i.e., real data from a national database not estimates) and the present literature. In fact such assertions about abortion mortality seem

to represent a biased misuse of statistics and maternal mortality calculations.

Koch et al. (2012a, b) demonstrated in their study of Mexico and abortion the problem of significant overestimation of maternal mortality when not utilizing actual data from a national database (Coleman et al. 2012). Koch et al. (2012a, b) accessed the national database to compare the Federal District of Mexico (Mexico City) with the remainder of Mexico and found a *10-fold* overestimation of abortion mortality in the Federal District of Mexico. Previously, maternal mortality in Mexico had been thought to be linked to lack of access to legal abortion. However, maternal deaths fell 30 percent in Mexico in spite of the lack of access to legal abortion. Koch et al. (2012a, b) noted that abortion legalization in the Federal District of Mexico did nothing to lower maternal mortality in the Federal District of Mexico City. In fact, the maternal mortality ratio of maternal deaths compared to abortion deaths per 100,000 live-births decreased from 1.48 to 1.14 in Mexico during the interval from 2007 to 2012 (Koch et al. 2012a, b). Koch's conclusion was that maternal health in Mexico would be better served with better access to emergency and specialized obstetrical care not abortion (Koch et al. 2012a, b).

Coleman et al. (2012) review mortality rates in Denmark's linked data base for the 25-year interval from 1962 to 1993, which included over 1 million women with complete reproductive outcomes including abortions, live births, and spontaneous miscarriages. They found that the risk of death was 6 times greater among women who had never been pregnant compared to women who delivered. There was increased risk of death was 45, 114, and 191 percent for 1, 2, and 3 abortions, respectively, compared to women who had ever given birth during the same time

period (Coleman et al. 2012). Maternal death rates compared to abortions were reduced by 108 percent for 2 births and reduced by 63 percent for 3 or more births (Coleman et al. 2012). This significant study with linked, database data overturns previous assertions based on limited and incomplete data demonstrating increased death rates with abortion compared to live births. Further, it shows the dose-related effects of multiple abortions on increasing maternal death rates compared to giving birth.

Abortion laws have been liberalized in countries where there have been large numbers of deaths attributable to clandestine abortions. Those who favor liberalizing abortion laws assume that the health of women is better served by providing abortion. Koch et al. (2012a, b) challenged this assertion recently in their paper covering 50 years of maternal deaths in Chile. Koch et al. (2012a, b) found by utilizing national birth registry statistics over two separate epochs: one with legal abortion covering 1957–1988 and one with prohibition of abortion covering 1989–2007. They found by careful analysis that the legal status of abortion had no relationship to the reduction in maternal mortality. Rather, the reduction in maternal deaths during pregnancy was related to the better education and obstetrical care for women available in the different time periods (Koch et al. 2012a, b).

Certainly critically important issue of maternal mortality in women's health requires the use of accurate data that is only available with the collection of data at a national level in a comprehensive national health database that includes all of women's reproductive outcomes linked to abortion and all other health variables. Such a database must also provide open access to all researchers to evaluate this critical women's health issue. We urge the

establishment and financial support of a national healthcare database for the United States with the inclusion of *all* reproductive outcome variables and associations: including elective abortions.

ENDNOTE

1. See, for example, the Guttmacher Institute's critique of CDC incidence data: "The estimates presented in this report are subject to some limitations and should be considered provisional. First, not all states are included; the estimates assume that changes in abortion incidence in the excluded states are similar to the overall trend seen in the reporting states. Second, the completeness of abortion reporting to state health departments can vary from year to year. We attempted to exclude all states that had inconsistent reporting, but if (for example) reporting improved in some states we included, it would mean that earlier state reports were too low and that the percentage decline we calculated was too small. In such cases, our new estimates of the number of abortions would be too high" (Finer and Henshaw 2006, 3).

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Original Investigation | Obstetrics and Gynecology

Trends in Maternal Mortality and Severe Maternal Morbidity During Delivery-Related Hospitalizations in the United States, 2008 to 2021

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Abstract

IMPORTANCE Maternal mortality and severe maternal morbidity (SMM) are important focus areas in public health. Further understanding trends, health disparities, and risk factors for these adverse outcomes is vital to public health decision-making.

OBJECTIVE To describe trends and risk factors for delivery-related maternal deaths and SMM in the United States.

DESIGN, SETTING, AND PARTICIPANTS This is a retrospective cross-sectional study using data from a large, geographically diverse, all-payer hospital administrative database. Hospital discharges from January 2008 to December 2021 with any Medicare Severity Diagnosis Related Group, *International Classification of Diseases, Ninth Revision, Clinical Modification*, or *International Classification of Diseases, Tenth Revision, Clinical Modification* delivery diagnosis or procedure code were included. Data analysis took place from February 2021 to March 2023.

EXPOSURES Year, quarter (Q), age, race and ethnicity, delivery method.

MAIN OUTCOMES AND MEASURES Maternal mortality, SMM during delivery-related hospitalization.

RESULTS Overall, 11 628 438 unique hospital discharges were analyzed, with a mean (SD) age of 28 (6) years. There were 437 579 (3.8%) Asian, 92 547 (0.8%) American Indian, 1 640 355 (14.1%) Black, 1 762 392 (15.2%) Hispanic, 83 189 (0.7%) Pacific Islander, and 6 194 139 (53.3%) White patients. Regression-adjusted maternal mortality per 100 000 discharges declined from 10.6 deaths in Q1 2008 to 4.6 deaths in Q4 2021. Mortality was significantly higher among patients with advanced maternal age (eg, age 35-44 years vs 25-34 years: adjusted odds ratio [aOR], 1.49; 95% CI, 1.22-1.84). Other significant risk factors for mortality included cesarean delivery, comorbid conditions, complications, and COVID-19 diagnosis (eg, cesarean delivery: aOR, 2.28; 95% CI, 1.87-2.79). The prevalence of any SMM increased from 146.8 per 10 000 discharges in Q1 of 2008 to 179.8 per 10 000 discharges in Q4 of 2021. SMM risk factors included age 24 years or younger or age 35 years or older, belonging to a racial or ethnic minority group, cesarean delivery, Medicaid insurance, and having 1 or more comorbidities (eg, age 10-19 years: aOR, 1.39; 95% CI, 1.36-1.42).

CONCLUSIONS AND RELEVANCE This cross-sectional study found that delivery-related mortality in US hospitals decreased for all racial and ethnic groups, age groups, and modes of delivery during 2008 to 2021, likely demonstrating the impact of national strategies focused on improving maternal quality of care provided during delivery-related hospitalizations. SMM prevalence increased for all patients, with higher rates for racial and ethnic minority patients of any age. Advanced maternal age,

(continued)

Key Points

Question What were trends of and risk factors associated with maternal mortality and severe maternal morbidity (SMM) among women giving birth in US hospitals during 2008 to 2021?

Findings In this cross-sectional study of more than 11.6 million delivery-related hospitalizations, regression-adjusted in-hospital maternal delivery-related mortality per 100 000 discharges declined from 10.6 to 4.6, while the prevalence of SMM per 10 000 discharges increased from 146.8 to 179.8 during 2008 to 2021. Differences were found across racial and ethnic groups, age, mode of delivery, and comorbidities for mortality and SMM.

Meaning In this study, in-hospital maternal mortality improved between 2008 and 2021 despite increases in SMM prevalence and presence of comorbidities for the overall population.

+ Supplemental content

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Abstract (continued)

racial or ethnic minority group status, cesarean delivery, and comorbidities were associated with higher odds of mortality and SMM.

JAMA Network Open. 2023;6(6):e2317641. doi:10.1001/jamanetworkopen.2023.17641

Introduction

Complications from pregnancy and childbirth are leading contributors to mortality and severe morbidities, resulting in significant burden on pregnant patients and their babies. Among developed countries, the United States has the highest maternal mortality ratio.¹ In 2019, there were 3 747 540 births in the United States, with an estimated birth rate of 11.4 per 1000 population.² According to US Pregnancy Mortality Surveillance System (PMSS) data, the pregnancy-related mortality ratio in the United States had increased since 1987 from 7.2 deaths per 100 000 live births to 17.3 deaths per 100 000 live births in 2017, although the trend slowed substantially after 2008.³

Maternal mortality has been described as the “tip of the iceberg” and maternal morbidity as a larger problem, “the base.”⁴ For every individual who dies as a result of their pregnancy, it is estimated that 20 or 30 more experience significant lifelong complications that affect their health and well-being.^{5,6} Severe maternal morbidity (SMM), which the US Centers for Disease Control and Prevention (CDC) defines as “unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman’s health,”¹ has steadily increased in the United States in recent years and is estimated to affect more than 50 000 patients annually.

Causes of maternal deaths and SMM at the time of delivery are multifactorial and are not well documented.⁷ Measuring specific outcomes occurring during delivery and hospitalization could improve understanding of how to predict, manage, and mitigate maternal outcomes. In addition, enhanced understanding of the causes of delivery-related death and SMM can inform potential strategies to improve overall maternal health outcomes in the United States. This study aimed to provide evidence to enhance understanding of patterns, trends, and risk factors associated with delivery-related deaths and SMM in US hospitals using a large maternal sample in the hospital setting.

Methods

Study Design

This retrospective cross-sectional study was conducted to examine trends associated with delivery-related maternal in-hospital mortality and SMM between January 2008 and December 2021, using data from the Premier PNC AI Healthcare Database (PHD). All data were statistically deidentified and adherent to the Health Insurance Portability and Accountability Act. Based on US Title 45 Code of Federal Regulations, Part 46, this study was exempted from institutional review board approval and informed consent. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

Data Source

The PHD is a large, all-payer (including Medicaid), geographically diverse administrative database comprising more than 1200 US hospitals and health systems.⁸ This database represents approximately 25% of all US inpatient admissions. All data were validated at both facility and patient levels. The CDC, the National Institute of Health, and academic and industry researchers have used PHD data for studies in a variety of disease areas.⁹⁻¹⁵

Study Population

This study reviewed inpatient hospitalizations between January 1, 2008, and December 31, 2021, with any Medicare Severity Diagnosis Related Group (MS-DRG) or *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* diagnosis or procedure codes (on or before September 30, 2015) or *International Classification of Diseases and Related Health Problems, Tenth Revision, Clinical Modification (ICD-10-CM)* codes (on or after October 1, 2015) indicating delivery (eTable 1 in [Supplement 1](#)). Hospitalizations for patients younger than 10 years at time of admission and those with evidence of abortive outcomes were excluded from the study. The index date was defined as the discharge date for the qualifying hospitalization. Missing data for categorical variables were included in the other or unknown group. Only a small percentage of patients had missing data, which should not have affected the trend analysis.

Study Variables

SMM

Complications or procedures indicative of SMMs were examined during the delivery-related hospitalization; these included acute myocardial infarction, acute kidney failure, amniotic fluid embolism, aneurysm, cardiac arrest or ventricular fibrillation, cardioversion, disseminated intravascular coagulation, eclampsia, heart failure or arrest during procedure, puerperal cerebrovascular disorders, acute heart failure or pulmonary edema, severe anesthesia complications, sepsis, shock, sickle cell anemia with crisis, air and thrombotic embolism, blood transfusion, hysterectomy, temporary tracheostomy, and ventilation. The diagnosis and procedure codes to identify the complications are listed in eTable 2 in [Supplement 1](#). The presence of any SMM was used as a measure for the adverse event occurring during delivery. Morbidities were reported as number of patients with each SMM or any SMM of interest per 10 000 eligible discharges.

In-Hospital Delivery-Related Mortality

Death was defined as having delivery-related hospitalization discharge status as deceased. In-hospital mortality was reported as the number of patients who died during index hospitalization per 100 000 eligible discharges.

Patient, Hospital, and Visit Characteristics

Patient characteristics included age (10-19, 20-24, 25-34, 35-44, ≥ 45 years), race and ethnicity (categorized as American Indian, Asian, Black, Hispanic, Pacific Islander, White, and other or unknown), and primary insurance payer. The other or unknown category captures all patients who selected other category for race, had missing data for race or ethnicity, or had a hospital-reported race that could not be matched to the standard race categories used in this article. Race and ethnicity were reported by the hospital. For the purposes of this study, we defined racial or ethnic minority patients as those with race or ethnicity classifications other than White. Hospital characteristics included population served (urban, rural), teaching status, US census divisions (ie, Middle Atlantic, Mountain, East North Central, East South Central, New England, Pacific, South Atlantic, West North Central, and West South Central), and hospital size (1-299, 300-499, and ≥ 500 beds). Visit information, such as index year, quarter (Q), admission type (elective, emergency, urgent, or trauma center), and an indicator for pre-*ICD-10-CM* or post-*ICD-10-CM* coding system change on October 1, 2015, were also examined.

Clinical Characteristics

The individual conditions in the Maternal Comorbidity Index (MCI)¹⁶ were assessed as potential risk factors of maternal mortality or morbidity, including pulmonary hypertension, placenta previa, sickle cell disease, gestational hypertension, mild or unspecified preeclampsia, severe preeclampsia, chronic kidney disease, preexisting hypertension, chronic ischemic heart disease, congenital heart disease, systemic lupus erythematosus, HIV, multiple gestation, substance use disorder, alcohol

abuse, tobacco use, cardiac valvular disease, chronic congestive heart failure, asthma, preexisting diabetes, gestational diabetes, obesity, cystic fibrosis, and previous cesarean delivery (eTable 3 in Supplement 1). The type of delivery (vaginal, cesarean) and COVID-19 status were also examined.

All SMMs were included as covariates for the mortality analysis. Because of overlap across comorbid conditions, certain SMMs were grouped together. Per CDC recommendations, cardiac conditions (including acute myocardial infarction, cardiac arrest or ventricular fibrillation, conversion of cardiac rhythm, heart failure or arrest during surgery or procedure, and pulmonary edema or acute heart failure) were grouped into 1 binary variable called cardiovascular complications for multivariable modeling. Acute respiratory conditions (including acute respiratory distress syndrome, temporary tracheostomy, and ventilation) were grouped into a binary variable called respiratory complications.¹⁷ Hemorrhage and blood transfusion were combined into bleeding complications with 3 categories: no bleeding, hemorrhage with no blood transfusion, and blood transfusion. Eclampsia, severe preeclampsia without eclampsia, mild or unspecified preeclampsia without eclampsia, or severe preeclampsia, and no preeclampsia or eclampsia were grouped into one 4-level covariate.

Statistical Analysis

Descriptive analysis was performed to assess the distribution of demographics and hospital and clinical characteristics for each year. Categorical variables were expressed as counts and percentages. Owing to space limitations, we only included specific descriptive results for 2008, 2014 (ie, the year before the *ICD-9-CM* to *ICD-10-CM* coding change), 2016 (ie, the year after the *ICD-9-CM* to *ICD-10-CM* coding change), 2019 (ie, the year before the COVID-19 pandemic), 2020, and 2021 (ie, years during the COVID-19 pandemic), rather than for all years in this study.

Two separate multivariable logistic regression models were created to assess the independent associations of potential risk factors with delivery-related maternal mortality and SMM, adjusting for confounders. For both models, patient demographics, hospital and visit characteristics, and MCI conditions were included as covariates. In the mortality regression, the SMM complications were added to the model to account for disease conditions that happened during the delivery-related hospitalization before the occurrence of mortality. In addition, a logistic regression of mortality without SMMs as covariates was performed as a sensitivity analysis. Backward selection with $P < .05$ was used to select final models, with the exception that patient age, race and ethnicity, delivery type, and study year and Q were kept in the model regardless of P values. For the mortality model, SMM conditions that were closely related to each other were combined. Combined variables included bleeding complications, cardiovascular complications, respiratory complications, and an eclampsia or preeclampsia category. In the regression of SMM, eclampsia was 1 component of the SMM outcome, while the preeclampsia conditions were used as separate covariates in the model.

Adjusted mortality and SMM rates for the overall study population were calculated using recycled prediction methods^{16,18} based on estimates from the regressions. Adjusted mortality and SMM rates were also reported by age group, race and ethnicity, and type of delivery, based on additional regression models that included interaction terms between year and the variable of interest.

All analyses were conducted using Python Scikit-Learn package version 0.22.1 (Python Software Foundation). Analysis of the data took place from February 2021 through March 2023. P values were 2-sided, and statistical significance was set at $P < .05$.

Results

Patient Characteristics

Among the 11 628 438 eligible discharges related to delivery, more than half (6 498 217 [55.9%]) were among patients aged 25 to 34 years, 1 885 571 (16.2%) were among patients aged 35 years or older, and 759 301 (6.5%) were among patients aged 10 to 19 years. There were 437 579 (3.8%) Asian patients, 92 547 (0.8%) American Indian patients, 1 640 355 (14.1%) Black patients, 1 762 392

(15.2%) Hispanic patients, 83 189 (0.7%) Pacific Islander patients, and 6 194 139 (53.3%) White patients. Medicaid was identified as the primary payer for 4 958 174 discharges (42.6%). The census region distribution reflected the geographic distribution of the PHD patient population. Approximately one-third of the sample underwent cesarean delivery. The proportion of discharges in younger age groups decreased while the proportion in older age groups increased over the study period. The distribution of race and ethnicity, primary payer type, census region, and delivery type did not differ significantly across years (Table 1).

Maternal Comorbid Conditions

As shown in Table 1, obesity (91.0 per 1000 discharges), gestational diabetes (74.3 per 1000 discharges), and tobacco use (58.2 per 1000 discharges) were the most common comorbidities, followed by gestational hypertension, asthma, preeclampsia, preexisting hypertension, and substance use disorder. Compared with the prevalence in 2008, higher prevalence of sickle cell disease, gestational hypertension, severe preeclampsia, preexisting hypertension, substance use disorder, asthma, gestational diabetes, obesity, and hemorrhage were observed in 2021 (Table 1).

Prevalence and Trend of SMMs

The unadjusted prevalence of any SMM was estimated to be 163.3 per 10 000 discharges for the overall sample from 2008 to 2021, with higher prevalence observed in 2021 (206.1 per 10 000 discharges) compared with 2008 (135.2 per 10 000 discharges). Blood transfusion was the most common SMM observed, with a prevalence of 108.4 per 10 000 discharges. Other relatively common SMMs included disseminated intravascular coagulation (24.7 per 10 000 discharges), hysterectomy (11.0 per 10 000 discharges), acute respiratory distress syndrome (9.8 per 10 000 discharges), acute kidney failure (9.7 per 10 000 discharges), sepsis (7.4 per 10 000 discharges), eclampsia (7.2 per 10 000 discharges), shock (6.1 per 10 000 discharges), and acute heart failure or pulmonary edema (5.6 per 10 000 discharges). Prevalence of acute kidney failure, acute respiratory distress syndrome, sepsis, shock, mechanical ventilation, blood transfusion, and hysterectomy were higher in 2021 than in 2008 (Table 1).

As seen in Figure 1A, the adjusted prevalence of any SMM increased from Q1 2008 (146.8 per 10 000 discharges) to Q4 2021 (179.8 per 10 000 discharges). The increasing trend was observed in all age groups with the greatest change observed in patients aged 45 years or older and those aged 10 to 19 years (Figure 1B). Consistent increasing trend was also observed in all racial and ethnic groups, with the biggest increase observed among Pacific Islander patients (from 132.0 per 10 000 discharges in Q1 2008 to 298.8 per 10 000 discharges in Q4 2021), American Indian patients (from 156.5 per 10 000 discharges in Q1 2008 to 245.0 per 10 000 discharges in Q4 2021), and Asian patients (from 133.4 per 10 000 discharges in Q1 2008 to 238.2 per 10 000 discharges in Q4 2021) (Figure 1C). A significant increase in adjusted SMM prevalence was observed in patients undergoing cesarean delivery (from 252.4 per 10 000 discharges in Q1 of 2008 to 312.1 per 10 000 discharges in Q4 of 2021), and a similarly increasing trend was seen in patients with vaginal delivery (from 84.4 per 10 000 discharges in Q1 of 2008 to 108.4 per 10 000 discharges in Q4 of 2021) (Figure 1D).

Unadjusted and Adjusted Trend of In-Hospital Delivery-Related Mortality

As shown in Figure 2A, a downward trend was observed for in-hospital mortality among deliveries after adjusting for changes in patient demographic, visit, hospital, and clinical characteristics. From Q1 of 2008 to Q4 of 2021, the adjusted in-hospital mortality decreased from 10.6 per 100 000 discharges to 4.6 per 100 000 discharges. Each subsequent year after 2008 had an 11% decrease in odds of death compared with the previous year (adjusted odds ratio [aOR], 0.89; 95% CI, 0.87-0.92) (Table 2). There was an increase in mortality from Q2 of 2020 through Q4 of 2021 that may be associated with the COVID-19 pandemic. However, after controlling for COVID-19 diagnosis, the adjusted trend decreased consistently across the full study period. The downward trend for in-hospital mortality was observed in all age groups, with the biggest decrease occurring in patients

Table 1. Demographic and Clinical Characteristics of Hospital Inpatient Discharges for Newborn Delivery From 2008 to 2021							
Characteristic	Overall (2008-2021) (N = 11 628 438)	2008 (n = 545 297)	2014 (n = 959 874)	2016 (n = 947 865)	2019 (n = 895 086)	2020 (n = 816 259)	2021 (n = 737 241)
Demographic characteristics, No. (%)							
Age group, y							
10-19	759 301 (6.5)	54 859 (10.1)	61 862 (6.4)	50 844 (5.4)	43 283 (4.8)	37 984 (4.7)	31 551 (4.3)
20-24	2 485 349 (21.4)	131 265 (24.1)	214 382 (22.3)	193 547 (20.4)	172 562 (19.3)	155 545 (19.1)	135 711 (18.4)
25-34	6 498 217 (55.9)	280 481 (51.4)	537 605 (56.0)	546 059 (57.6)	517 947 (57.9)	472 928 (57.9)	430 853 (58.4)
35-44	1 863 674 (16.0)	77 861 (14.3)	144 381 (15.0)	155 624 (16.4)	159 443 (17.8)	147 978 (18.1)	137 560 (18.7)
≥45	21 897 (0.2)	831 (0.2)	1644 (0.2)	1791 (0.2)	1851 (0.2)	1824 (0.2)	1566 (0.2)
Race and ethnicity							
American Indian	92 547 (0.8)	3614 (0.7)	7400 (0.8)	7031 (0.7)	7078 (0.8)	6452 (0.8)	5998 (0.8)
Asian	437 579 (3.8)	97 (<0.1)	40 970 (4.3)	45 423 (4.8)	38 467 (4.3)	37 268 (4.6)	33 805 (4.6)
Black	1 640 355 (14.1)	76 464 (14.0)	127 521 (13.3)	130 219 (13.7)	130 805 (14.6)	121 362 (14.9)	107 857 (14.6)
Hispanic	1 762 392 (15.2)	71 490 (13.1)	133 203 (13.9)	127 114 (13.4)	149 926 (16.7)	146 098 (17.9)	142 558 (19.3)
Pacific Islander	83 189 (0.7)	2 (<0.1)	7432 (0.8)	7584 (0.8)	7236 (0.8)	6745 (0.8)	5991 (0.8)
White	6 194 139 (53.3)	267 502 (49.1)	516 803 (53.8)	539 920 (57.0)	483 398 (54.0)	437 934 (53.7)	396 643 (53.8)
Other or unknown	1 418 237 (12.2)	126 128 (23.1)	126 545 (13.2)	90 574 (9.6)	78 176 (8.7)	60 400 (7.4)	44 389 (6.0)
Payer							
Medicaid	4 958 174 (42.6)	225 608 (41.4)	408 037 (42.5)	395 360 (41.7)	382 978 (42.8)	352 971 (43.2)	314 442 (42.7)
Commercial	5 828 008 (50.1)	276 056 (50.6)	481 244 (50.1)	485 290 (51.2)	451 857 (50.5)	409 232 (50.1)	376 045 (51.0)
Charity or indigent	18 816 (0.2)	1076 (0.2)	1792 (0.2)	1711 (0.2)	1240 (0.1)	964 (0.1)	706 (0.1)
Other	823 440 (7.1)	42 557 (7.8)	68 801 (7.2)	65 504 (6.9)	59 011 (6.6)	53 092 (6.5)	46 048 (6.2)
Census region							
West North Central	706 715 (6.1)	31 165 (5.7)	62 499 (6.5)	64 931 (6.9)	58 928 (6.6)	48 407 (5.9)	45 065 (6.1)
South Atlantic	3 134 865 (27.0)	154 102 (28.3)	241 336 (25.1)	244 261 (25.8)	234 747 (26.2)	217 066 (26.6)	184 555 (25.0)
East South Central	782 615 (6.7)	24 419 (4.5)	74 856 (7.8)	69 372 (7.3)	65 104 (7.3)	62 533 (7.7)	60 427 (8.2)
East North Central	1 639 978 (14.1)	62 432 (11.4)	135 177 (14.1)	134 357 (14.2)	145 291 (16.2)	135 827 (16.6)	127 165 (17.2)
Middle Atlantic	1 385 382 (11.9)	75 875 (13.9)	94 350 (9.8)	107 311 (11.3)	118 432 (13.2)	101 991 (12.5)	85 193 (11.6)
Pacific	1 585 909 (13.6)	100 431 (18.4)	136 760 (14.2)	153 325 (16.2)	79 905 (8.9)	74 353 (9.1)	68 644 (9.3)
West South Central	1 411 885 (12.1)	59 814 (11.0)	122 417 (12.8)	108 469 (11.4)	112 469 (12.6)	97 420 (11.9)	85 263 (11.6)
Mountain	705 575 (6.1)	25 806 (4.7)	68 574 (7.1)	44 687 (4.7)	63 908 (7.1)	62 070 (7.6)	63 692 (8.6)
New England	275 514 (2.4)	11 253 (2.1)	23 905 (2.5)	21 152 (2.2)	16 302 (1.8)	16 592 (2.0)	17 237 (2.3)
Delivery type							
Vaginal	7 748 427 (66.6)	359 909 (66.0)	641 973 (66.9)	629 087 (66.4)	604 494 (67.5)	547 666 (67.1)	493 125 (66.9)
Cesarean	3 830 448 (32.9)	184 583 (33.8)	316 392 (33.0)	306 935 (32.4)	285 510 (31.9)	263 072 (32.2)	239 587 (32.5)
Unknown	49 563 (0.4)	805 (0.1)	1509 (0.2)	11 843 (1.2)	5082 (0.6)	5521 (0.7)	4529 (0.6)
Maternal comorbid conditions, No. (rate per 1000 discharges)							
Pulmonary hypertension	2692 (0.2)	115 (0.2)	205 (0.2)	177 (0.2)	232 (0.3)	220 (0.3)	233 (0.3)
Placenta previa	70 431 (6.1)	2976 (5.5)	5537 (5.8)	5894 (6.2)	5934 (6.6)	5639 (6.9)	5177 (7.0)
Sickle cell disease	48 352 (4.2)	720 (1.3)	1922 (2.0)	5461 (5.8)	6375 (7.1)	6256 (7.7)	5536 (7.5)
Gestational hypertension	584 415 (50.3)	17 728 (32.5)	39 796 (41.5)	47 693 (50.3)	60 811 (67.9)	60 194 (73.7)	60 685 (82.3)

(continued)

Table 1. Demographic and Clinical Characteristics of Hospital Inpatient Discharges for Newborn Delivery From 2008 to 2021 (continued)

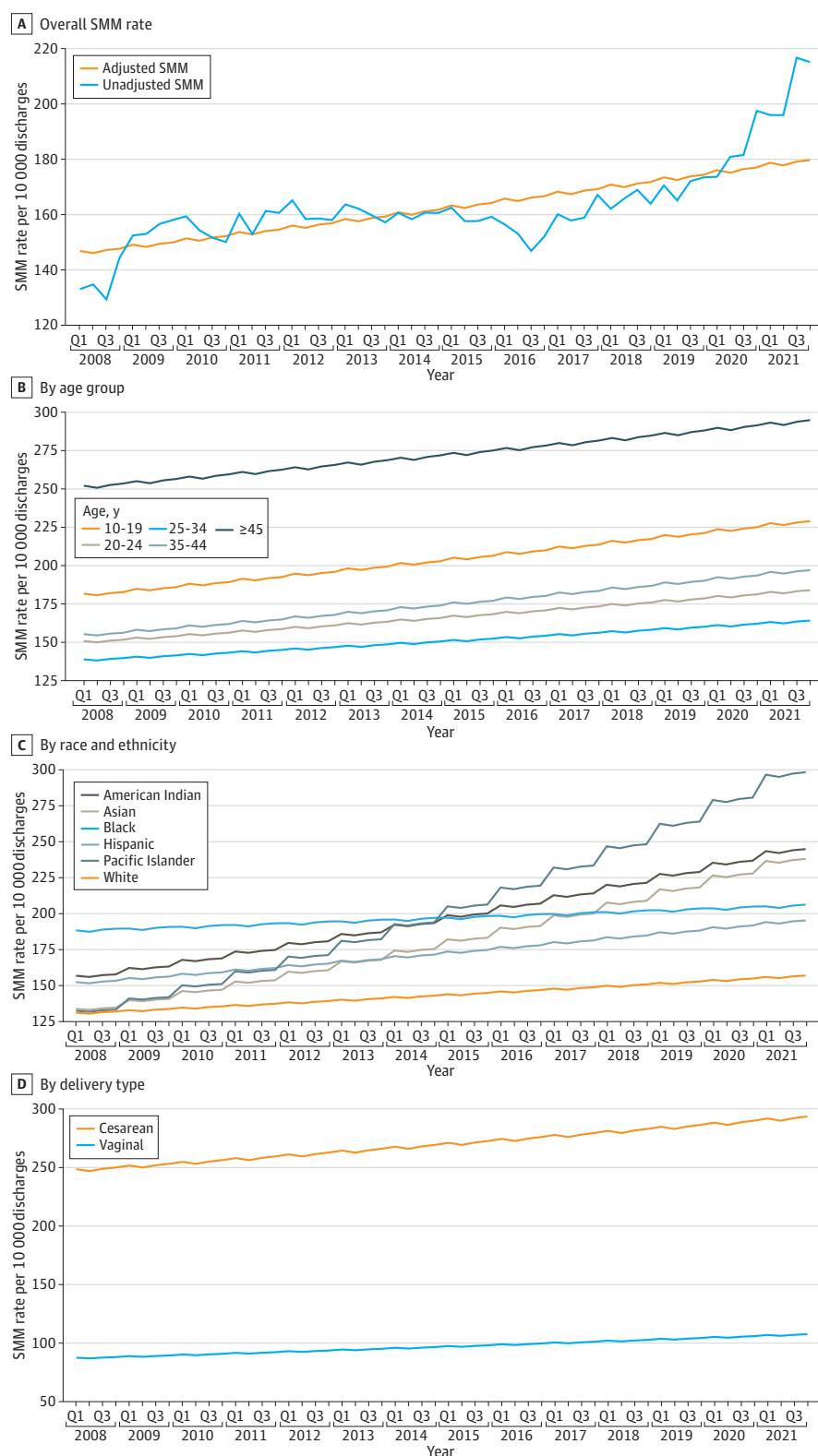
Characteristic	Overall (2008-2021) (N = 11 628 438)	2008 (n = 545 297)	2014 (n = 959 874)	2016 (n = 947 865)	2019 (n = 895 086)	2020 (n = 816 259)	2021 (n = 737 241)
Mild preeclampsia or unspecified preeclampsia	329 904 (28.4)	14 760 (27.1)	28 488 (29.7)	22 786 (24.0)	26 110 (29.2)	24 839 (30.4)	23 182 (31.4)
Severe preeclampsia	342 672 (29.5)	9888 (18.1)	23 600 (24.6)	27 187 (28.7)	36 222 (40.5)	35 129 (43)	35 278 (47.9)
Chronic kidney disease	23 557 (2.0)	1293 (2.4)	2815 (2.9)	1101 (1.2)	1113 (1.2)	1101 (1.3)	1031 (1.4)
Preexisting hypertension	310 054 (26.7)	10 242 (18.8)	23 948 (24.9)	27 794 (29.3)	26 953 (30.1)	27 114 (33.2)	27 119 (36.8)
Congenital heart disease	10 250 (0.9)	395 (0.7)	875 (0.9)	728 (0.8)	837 (0.9)	846 (1.0)	852 (1.2)
Systemic lupus erythematosus	15 092 (1.3)	498 (0.9)	1283 (1.3)	1172 (1.2)	1228 (1.4)	1292 (1.6)	1213 (1.6)
HIV	9612 (0.8)	487 (0.9)	695 (0.7)	762 (0.8)	667 (0.7)	687 (0.8)	584 (0.8)
Multiple gestation	214 087 (18.4)	10 360 (19.0)	18 208 (19.0)	17 476 (18.4)	15 604 (17.4)	13 606 (16.7)	12 751 (17.3)
Drug abuse	250 039 (21.5)	6353 (11.7)	18 887 (19.7)	21 921 (23.1)	25 035 (28.0)	25 489 (31.2)	24 114 (32.7)
Alcohol abuse	10 591 (0.9)	501 (0.9)	1066 (1.1)	731 (0.8)	649 (0.7)	622 (0.8)	634 (0.9)
Tobacco use	676 360 (58.2)	31 371 (57.5)	61 885 (64.5)	52 893 (55.8)	49 195 (55.0)	43 355 (53.1)	36 879 (50.0)
Cardiac valvular disease	24 109 (2.1)	2697 (4.9)	1974 (2.1)	1336 (1.4)	1167 (1.3)	1129 (1.4)	1060 (1.4)
Chronic congestive heart failure	10 250 (0.9)	395 (0.7)	875 (0.9)	728 (0.8)	837 (0.9)	846 (1)	852 (1.2)
Asthma	532 746 (45.8)	17 054 (31.3)	41 758 (43.5)	44 603 (47.1)	49 168 (54.9)	49 847 (61.1)	48 420 (65.7)
Preexisting diabetes	116 122 (10.0)	4688 (8.6)	10 306 (10.7)	9512 (10.0)	8702 (9.7)	8650 (10.6)	7241 (9.8)
Gestational diabetes	864 546 (74.3)	29 409 (53.9)	66 520 (69.3)	71 338 (75.3)	77 422 (86.5)	80 041 (98.1)	76 955 (104.4)
Obesity	1 057 844 (91.0)	18 550 (34.0)	76 178 (79.4)	91 702 (96.7)	116 107 (129.7)	122 908 (150.6)	121 771 (165.2)
Cystic fibrosis	959 (0.1)	36 (0.1)	55 (0.1)	92 (0.1)	54 (0.1)	130 (0.2)	126 (0.2)
Previous cesarean delivery	2 027 278 (174.3)	86 087 (157.9)	170 848 (178.0)	168 750 (178.0)	160 945 (179.8)	145 359 (178.1)	131 693 (178.6)
Other clinical conditions							
Hemorrhage	551 647 (47.4)	18 108 (33.2)	38 522 (40.1)	50 010 (52.8)	52 302 (58.4)	50 408 (61.8)	49 398 (67.0)
Severe maternal morbidities, No. (rate per 10 000 discharges)							
Acute myocardial infarction	370 (0.3)	7 (0.1)	18 (0.2)	24 (0.3)	40 (0.4)	54 (0.7)	40 (0.5)
Acute kidney failure	11 304 (9.7)	262 (4.8)	702 (7.3)	905 (9.5)	1275 (14.2)	1350 (16.5)	1426 (19.3)
Acute respiratory distress syndrome	11 430 (9.8)	245 (4.5)	820 (8.5)	899 (9.5)	994 (11.1)	1272 (15.6)	1695 (23.0)
Amniotic fluid embolism	571 (0.5)	25 (0.5)	36 (0.4)	51 (0.5)	55 (0.6)	44 (0.5)	37 (0.5)
Aneurysm	289 (0.2)	5 (0.1)	20 (0.2)	30 (0.3)	30 (0.3)	31 (0.4)	21 (0.3)
Cardiac arrest or ventricular fibrillation	1065 (0.9)	38 (0.7)	87 (0.9)	102 (1.1)	70 (0.8)	86 (1.1)	137 (1.9)
Cardioversion	1040 (0.9)	35 (0.6)	73 (0.8)	78 (0.8)	85 (0.9)	94 (1.2)	103 (1.4)
Disseminated intravascular coagulation	28 722 (24.7)	1418 (26.0)	2709 (28.2)	1848 (19.5)	1789 (20)	1594 (19.5)	1614 (21.9)
Eclampsia	8367 (7.2)	448 (8.2)	571 (5.9)	969 (10.2)	602 (6.7)	562 (6.9)	530 (7.2)
Heart failure or arrest during procedure	677 (0.6)	84 (1.5)	72 (0.8)	7 (0.1)	13 (0.1)	7 (0.1)	12 (0.2)
Puerperal cerebrovascular disorders	3492 (3.0)	186 (3.4)	260 (2.7)	287 (3.0)	274 (3.1)	268 (3.3)	291 (3.9)
Acute heart failure or pulmonary edema	6567 (5.6)	264 (4.8)	426 (4.4)	575 (6.1)	601 (6.7)	580 (7.1)	576 (7.8)
Severe anesthesia complications	1111 (1.0)	103 (1.9)	107 (1.1)	71 (0.7)	59 (0.7)	40 (0.5)	42 (0.6)
Sepsis	8594 (7.4)	249 (4.6)	606 (6.3)	760 (8.0)	858 (9.6)	871 (10.7)	973 (13.2)
Shock	7112 (6.1)	161 (3.0)	488 (5.1)	633 (6.7)	745 (8.3)	726 (8.9)	784 (10.6)
Sickle cell anemia with crisis	1131 (1.0)	56 (1.0)	82 (0.9)	86 (0.9)	99 (1.1)	88 (1.1)	68 (0.9)

(continued)

Table 1. Demographic and Clinical Characteristics of Hospital Inpatient Discharges for Newborn Delivery From 2008 to 2021 (continued)

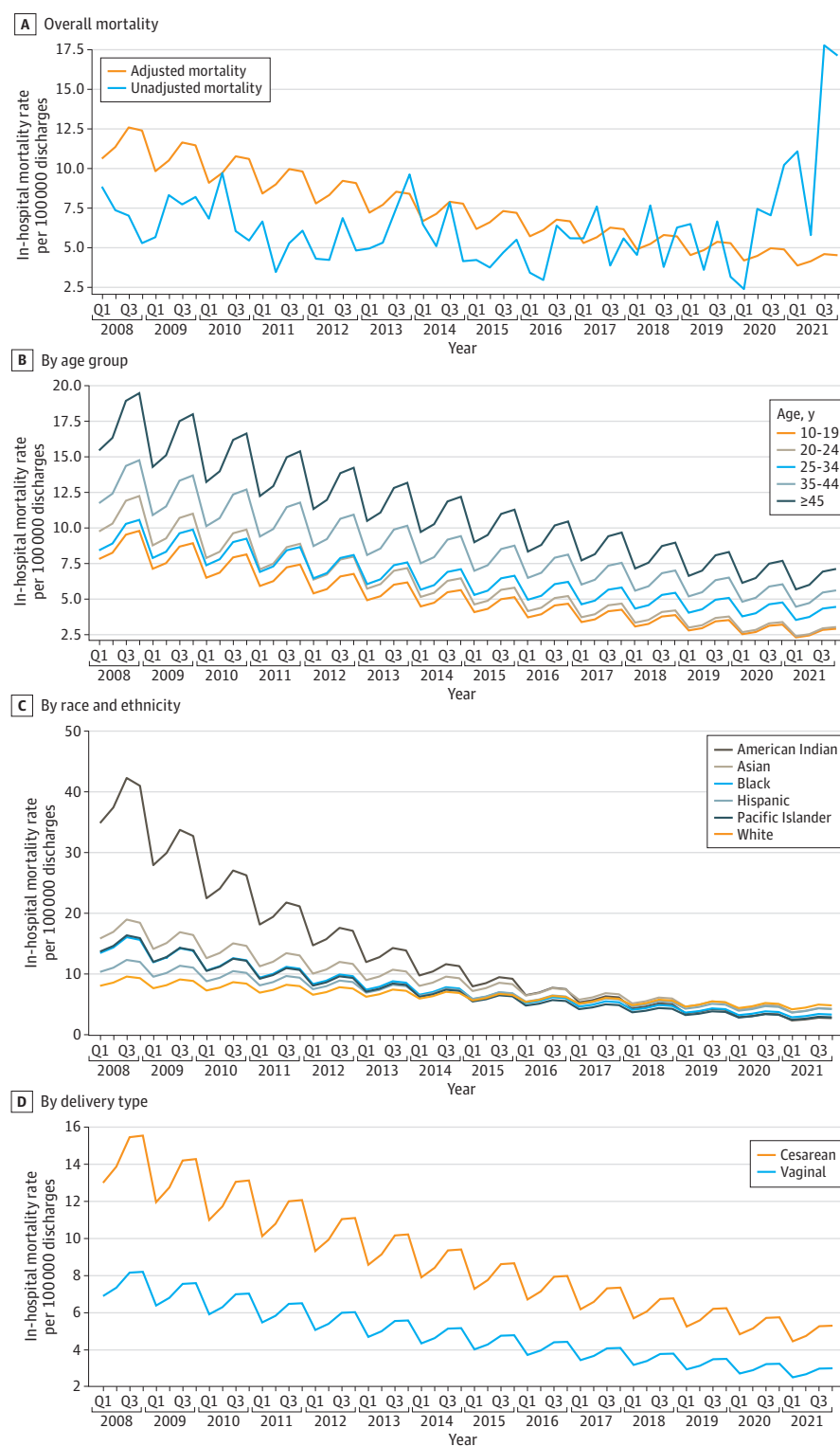
Characteristic	Overall (2008-2021) (N = 11 628 438)	2008 (n = 545 297)	2014 (n = 959 874)	2016 (n = 947 865)	2019 (n = 895 086)	2020 (n = 816 259)	2021 (n = 737 241)
Air and thrombotic embolism	2877 (2.5)	90 (1.7)	179 (1.9)	271 (2.9)	291 (3.3)	258 (3.2)	300 (4.1)
Blood transfusion	125 999 (108.4)	4746 (87.0)	10 498 (109.4)	9347 (98.6)	9971 (111.4)	9704 (118.9)	9727 (131.9)
Hysterectomy	12 738 (11.0)	476 (8.7)	977 (10.2)	1033 (10.9)	1121 (12.5)	1134 (13.9)	944 (12.8)
Temporary tracheostomy	324 (0.3)	14 (0.3)	26 (0.3)	15 (0.2)	17 (0.2)	27 (0.3)	57 (0.8)
Ventilation	4154 (3.6)	39 (0.7)	128 (1.3)	524 (5.5)	506 (5.7)	519 (6.4)	675 (9.2)
Any severe maternal morbidity	189 908 (163.3)	7374 (135.2)	15 366 (160.1)	14 410 (152)	15 250 (170.4)	14 961 (183.3)	15 192 (206.1)

Figure 1. Trend of Unadjusted and Regression-Adjusted Severe Maternal Morbidity (SMM) Rates Among Hospital Inpatient Discharges for Newborn Delivery, 2008 to 2021, Overall and by Age Group, Race and Ethnicity, and Delivery Type



Q indicates quarter.

Figure 2. Trend of Unadjusted and Regression-Adjusted In-Hospital Mortality Among Hospital Inpatient Discharges for Newborn Delivery, 2008 to 2021, Overall and by Age Group, Race and Ethnicity, and Delivery Type



Q indicates quarter.

Table 2. Estimates From the Multivariable Logistic Regression of In-Hospital Mortality and Any SMM Among Hospital Inpatient Discharges for Newborn Delivery, 2008 to 2021

Variable	Adjusted OR (95% CI)		
	In-hospital mortality ^a	In-hospital mortality sensitivity analysis ^b	Any SMM ^c
Age group, y			
10-19	0.74 (0.48-1.14)	0.61 (0.42-0.89)	1.39 (1.36-1.42)
20-24	0.90 (0.70-1.15)	0.70 (0.56-0.86)	1.10 (1.08-1.11)
25-34	1 [Reference]	1 [Reference]	1 [Reference]
35-44	1.49 (1.22-1.84)	2.16 (1.83-2.54)	1.17 (1.16-1.19)
≥45	1.95 (0.83-4.55)	6.01 (3.16-11.41)	1.76 (1.65-1.88)
Year	0.89 (0.87-0.92)	0.95 (0.93-0.97)	1.02 (1.01-1.02)
Diagnosis code version (ICD-10-CM vs ICD-9-CM)	NE	NE	0.92 (0.90-0.94)
Race			
White	1 [Reference]	1 [Reference]	1 [Reference]
American Indian	1.86 (0.95-3.64)	1.93 (1.10-3.39)	1.41 (1.35-1.48)
Asian	1.37 (0.88-2.14)	1.61 (1.11-2.34)	1.33 (1.30-1.36)
Black	1.09 (0.86-1.37)	1.78 (1.47-2.15)	1.39 (1.38-1.41)
Hispanic	1.06 (0.81-1.39)	1.04 (0.83-1.31)	1.22 (1.20-1.24)
Other or unknown	1.02 (0.77-1.35)	1.19 (0.94-1.51)	1.21 (1.19-1.22)
Pacific Islander	0.89 (0.29-2.76)	1.25 (0.48-3.26)	1.53 (1.45-1.61)
Quarter			
First	0.80 (0.62-1.04)	0.91 (0.74-1.13)	0.99 (0.98-1.01)
Second	0.88 (0.68-1.14)	0.91 (0.74-1.13)	0.99 (0.98-1.00)
Third	1.02 (0.80-1.31)	1.03 (0.85-1.26)	1.00 (0.98-1.01)
Fourth	1 [Reference]	1 [Reference]	1 [Reference]
Urbanicity of hospital population served (rural vs urban)	NE	NE	0.88 (0.87-0.90)
Primary payer			
Commercial	1 [Reference]	1 [Reference]	1 [Reference]
Charity or indigent	1.51 (0.27-8.53)	2.36 (0.78-7.09)	1.57 (1.42-1.73)
Medicaid	1.73 (1.41-2.13)	1.66 (1.4-1.97)	1.22 (1.20-1.23)
Other	1.72 (1.25-2.36)	1.69 (1.31-2.20)	1.23 (1.21-1.25)
Teaching hospital (vs nonteaching)	NE	NE	1.18 (1.17-1.20)
Hospital region			
South Atlantic	1 [Reference]	1 [Reference]	1 [Reference]
East North Central	0.91 (0.67-1.24)	0.87 (0.68-1.11)	0.94 (0.93-0.95)
East South Central	1.42 (1.00-2.02)	1.29 (0.96-1.72)	0.90 (0.88-0.92)
Middle Atlantic	0.93 (0.68-1.27)	0.91 (0.70-1.18)	1.15 (1.13-1.16)
Mountain	1.04 (0.70-1.54)	1.31 (0.95-1.79)	0.87 (0.85-0.89)
New England	0.73 (0.35-1.53)	0.62 (0.32-1.18)	1.09 (1.06-1.12)
Pacific	0.66 (0.48-0.92)	0.66 (0.50-0.88)	0.84 (0.83-0.86)
West North Central	1.36 (0.90-2.07)	1.28 (0.91-1.80)	0.88 (0.86-0.90)
West South Central	1.07 (0.80-1.45)	1.11 (0.88-1.42)	1.09 (1.08-1.11)
Admission type			
Elective	1 [Reference]	1 [Reference]	1 [Reference]
Emergent	3.17 (2.48-4.04)	5.17 (4.26-6.26)	1.50 (1.48-1.52)
Urgent	1.20 (0.96-1.49)	1.55 (1.29-1.87)	1.08 (1.06-1.09)
Trauma center	16.65 (9.89-28.04)	16.21 (10.36-25.35)	1.40 (1.31-1.50)
Other or unknown	1.46 (0.90-2.36)	1.43 (0.96-2.15)	1.28 (1.25-1.31)
Delivery type			
Vaginal	1 [Reference]	1 [Reference]	1 [Reference]
Cesarean	2.28 (1.87-2.79)	3.94 (3.34-4.64)	3.00 (2.97-3.03)
Comorbidities (yes vs no)			
COVID-19 diagnosis	13.31 (8.95-19.79)	41.63 (31.7-54.67)	4.44 (4.23-4.66)

(continued)

Table 2. Estimates From the Multivariable Logistic Regression of In-Hospital Mortality and Any SMM Among Hospital Inpatient Discharges for Newborn Delivery, 2008 to 2021 (continued)

Variable	Adjusted OR (95% CI)		
	In-hospital mortality ^a	In-hospital mortality sensitivity analysis ^b	Any SMM ^c
Placenta previa	NE	NE	6.32 (6.17-6.47)
Sickle cell disease	NE	NE	2.93 (2.82-3.05)
Gestational hypertension	NE	NE	1.29 (1.26-1.31)
Mild or unspecified preeclampsia	NE	NE	1.93 (1.89-1.97)
Severe preeclampsia	NE	NE	4.55 (4.48-4.62)
Chronic kidney disease	NE	NE	5.21 (4.99-5.44)
Preexisting hypertension	NE	NE	1.54 (1.50-1.57)
Chronic ischemic heart disease	NE	NE	3.92 (3.50-4.39)
Congenital heart disease	0.07 (0.01-0.34)	1.8 (0.46-7.08)	2.43 (2.23-2.66)
Systemic lupus erythematosus	3.68 (1.70-7.97)	7.63 (4.28-13.62)	1.95 (1.81-2.10)
HIV	3.94 (1.30-11.92)	3.03 (1.29-7.13)	1.47 (1.33-1.63)
Multiple gestation	NE	NE	2.20 (2.16-2.24)
Substance use disorder	1.38 (1.00-1.91)	3.44 (2.67-4.43)	1.71 (1.67-1.75)
Alcohol abuse	NE	NE	1.68 (1.52-1.85)
Cardiac valvular disease	0.19 (0.10-0.33)	6.73 (4.07-11.14)	3.50 (3.32-3.69)
Asthma	NE	NE	1.26 (1.24-1.28)
Preexisting diabetes	1.70 (1.20-2.42)	3.69 (2.81-4.86)	1.22 (1.18-1.25)
Gestational diabetes	NE	NE	0.96 (0.95-0.98)
Cystic fibrosis	40.17 (7.22-223.56)	35.97 (9.32-138.81)	1.76 (1.22-2.52)
Previous cesarean delivery	NE	NE	0.88 (0.87-0.89)
SMM (yes vs no)			
Acute kidney failure	1.30 (1.01-1.67)	Not included	Not included
Amniotic fluid embolism	7.67 (5.28-11.14)	Not included	Not included
Aneurysm	25.07 (7.40-84.91)	Not included	Not included
Disseminated intravascular coagulation	2.21 (1.69-2.88)	Not included	Not included
Puerperal cerebrovascular disorder	9.09 (6.11-13.51)	Not included	Not included
Sepsis	1.90 (1.45-2.51)	Not included	Not included
Shock	3.81 (2.96-4.91)	Not included	Not included
Air and thrombotic embolism	2.63 (1.79-3.86)	Not included	Not included
Sickle cell anemia with crisis	4.96 (2.17-11.33)	Not included	Not included
Bleeding complications (hemorrhage with no blood transfusion vs no bleeding)	2.73 (2.06-3.61)	Not included	Not included
Bleeding complications (blood transfusion vs no bleeding)	3.87 (3.05-4.91)	Not included	Not included
Hysterectomy	1.69 (1.24-2.318)	Not included	Not included
Respiratory complications ^d	5.92 (4.56-7.69)	Not included	Not included
Cardiovascular complications ^e	111.11 (86.69-142.42)	Not included	Not included

Abbreviations: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM, International Statistical Classification of Diseases, Tenth Revision, Clinical Modification; NE, not entered in final model; OR, odds ratio; SMM, severe maternal morbidity.

^a Overall, 728 deaths among 11 628 380 inpatient hospitalizations were included in the analysis; 58 patients reported by hospitals with in-hospital mortality followed by readmission were excluded from the regression of mortality. Additional covariates included in the regression of mortality are described in the Statistical Analysis section.

^b A logistic regression of mortality without SMMs as covariates was performed as a sensitivity analysis.

^c A total of 189 908 discharges with SMM (of 11 628 438 inpatient hospitalizations) were included in the analysis. Additional covariates included in the regression of severe maternal morbidity are described in the Statistical Analysis section.

^d Respiratory complications included acute respiratory distress syndrome, temporary tracheostomy and ventilation as defined by the US Centers for Disease Control and Prevention.

^e Cardiovascular complications included any of the following severe maternal morbidities: acute myocardial infarction, cardiac arrest or ventricular fibrillation, conversion of cardiac rhythm, heart failure or arrest during surgery or procedure, and pulmonary edema or acute heart failure as defined by the US Centers for Disease Control and Prevention.

aged 45 years or older (Figure 2B). A decreasing trend for in-hospital mortality was observed in all racial and ethnic groups. In particular, the greatest decrease in adjusted mortality was observed for American Indian patients: from 34.8 per 100 000 discharges in Q1 of 2008 to 2.7 per 100 000 discharges in Q4 of 2021 (Figure 2C; the 95% CI for mortality among American Indian patients is

provided in eTable 4 in Supplement 1). In-hospital mortality consistently decreased during the study period for patients with cesarean delivery (from 12.6 per 100 000 discharges in Q1 of 2008 to 5.2 per 100 000 discharges in Q4 of 2021) and also for patients with vaginal delivery (from 6.6 per 100 000 discharges in Q1 of 2008 to 3.0 per 100 000 discharges in Q4 of 2021) (Figure 2D).

Risk Factors for In-Hospital Mortality and SMM

Compared with patients aged 25 to 34 years, those between 35 and 44 years had higher odds of dying during the index hospitalization (aOR, 1.49; 95% CI, 1.22-1.84). Although the association between race and mortality was not statistically significant in the regression in which SMMs were included as covariates, a sensitivity analysis showed that American Indian (aOR, 1.93, 95% CI, 1.10-3.39), Black (aOR, 1.78; 95% CI, 1.47-2.15), and Asian patients (aOR, 1.61, 95% CI, 1.11-2.34) had increased risk of death compared with White patients, suggesting that the racial disparity was partly attributable to the difference in the SMM rates across racial and ethnic groups. The mortality of Pacific Islander patients and Hispanic patients was not statistically significantly different from White patients in the sensitivity analysis. Patients with cesarean delivery had 2-fold higher odds of death than those with vaginal delivery (aOR, 2.28; 95% CI, 1.87-2.79). Patients with a COVID-19 diagnosis had a 13-fold increased odds of mortality compared with those without COVID-19 (aOR, 13.31; 95% CI, 8.95-19.79). Among comorbidity and acute complications assessed, cardiac complications, cystic fibrosis, aneurysm, trauma, and puerperal cerebrovascular disorder were among the risk factors associated with death during delivery-related hospitalization (Table 2).

As seen in Table 2, after adjusting for other risk factors and compared with patients aged 25 to 34 years, both patients younger than 24 years (eg, age 10-19 years: aOR, 1.39; 95% CI, 1.36-1.42) and older than 35 years (eg, age ≥ 45 years: aOR, 1.76; 95% CI, 1.65-1.88) had increased odds of SMM. All minority racial and ethnic groups were associated with increased odds of experiencing any SMM (Pacific Islander: aOR, 1.53; 95% CI, 1.45-1.61; American Indian: aOR, 1.41; 95% CI, 1.35-1.48; Black: aOR, 1.39; 95% CI, 1.38-1.41; Asian: aOR, 1.33; 95% CI, 1.30-1.36; Hispanic: aOR, 1.22; 95% CI, 1.20-1.24). Cesarean delivery (aOR, 3.00; 95% CI, 2.97-3.03) and COVID-19 diagnosis (aOR, 4.44; 95% CI, 4.23-4.66) were also associated with substantially higher adjusted odds of SMM. Among all the chronic comorbidities assessed, placenta previa (aOR, 6.32; 95% CI, 6.17-6.47), chronic kidney disease (aOR, 5.21; 95% CI, 4.99-5.44), severe preeclampsia (aOR, 4.55; 95% CI, 4.48-4.62), cardiac valvular disease (aOR, 3.50; 95% CI, 3.32-3.69), chronic ischemic heart disease (aOR, 3.92; 95% CI, 3.50-4.39), and sickle cell disease (aOR, 2.93; 95% CI, 2.82-3.05) were associated with the highest odds of experiencing SMM (Table 2).

Discussion

This cross-sectional study examined rates of delivery-related in-hospital maternal mortality and SMM in a large national inpatient database. In this sample encompassing more than 11 million inpatient discharges, delivery-related in-hospital mortality was found to decrease significantly over a period of 14 years. The adjusted mortality per 100 000 discharges decreased by more than 50% from Q1 of 2008 to Q4 of 2021, likely demonstrating the impact of national strategies focused on improving the maternal quality of care provided by the hospitals during delivery-related hospitalizations. In contrast, the rates of overall SMM increased over time for the overall population, which may be attributable to preexisting conditions and the increasing trend in the age of delivering patients in the past decade. The increasing trend of adjusted SMM rates was seen in all racial and ethnic minority groups and was most prominent in Asian, American Indian, and Pacific Islander patients. The fact that many of the comorbid conditions are risk factors for mortality and SMM indicates that it is essential to consider comorbid conditions when assessing SMM and mortality and that better management of patients' comorbid conditions during pregnancy may help reduce SMM occurrence and ultimately decrease mortality risk. Further improvement in patient outcomes could be achieved if patients with known risk factors could access improved care during pregnancy and during hospital delivery.

Delivery-related in-hospital maternal mortality in this study was lower than that reported in PMSS data, which defined pregnancy-related death as death during pregnancy or within 1 year of the end of pregnancy, from a cause related to pregnancy or its management.³ PMSS data showed an increasing trend in pregnancy-related mortality during 1987 to 2017, which differs from our findings. A plausible explanation for these differences is that the timeframe for assessing mortality was substantially different between our study and the PMSS. Our study focused on mortality during delivery-related hospitalizations, which was associated with the change in quality of care for all patients in a hospital setting. In contrast, the PMSS estimates cover the entire pregnancy and postpartum period, which are associated with the overall burden of deaths among pregnant patients. Because a proportion of pregnancy-related deaths occur during delivery hospitalization, the differences between our findings and the PMSS estimates reinforced the importance of examining mortality separately for different stages of pregnancy and postpartum.

The study found that mortality risk was associated with several factors, including advanced maternal age, Medicaid as primary insurance, cesarean delivery, comorbid conditions, and severe complications during delivery. Similarly, a maternal age younger than 19 years or older than 35 years; being Asian, American Indian, Black, Hispanic, Pacific Islander; cesarean delivery; Medicaid enrollment; and maternal comorbid conditions were associated with higher risk of developing SMM during delivery. The racial and ethnic differences observed in delivery-related maternal mortality seem to be at least partly attributable to the racial and ethnic variation observed in SMM based on the main and sensitivity analyses of this study. Therefore, further research and understanding on the causes of both mortality and SMM, including the impact of comorbidities on maternal outcomes, is needed. Additionally, developing a national hospital measure to more clearly identify and reduce SMMs will likely have a beneficial impact on improving national quality strategies aimed at improving maternal health outcomes in the United States.

Limitations

The study has limitations. The PHD is a hospital administrative database and does not include as much clinical details as electronic health records. Identifying clinical conditions and procedures relied on the accuracy of hospital-reported diagnosis and procedure codes. Coding errors may lead to misclassification of variables. The definition of mortality was based on in-hospital death during the visit for delivery, without accounting for death before delivery admission or after discharge.

Maternal comorbid conditions were defined based on diagnosis during the visit for delivery. Conditions occurring before admission may not have been captured. Since the study spanned 14 years, there were changes in how hospitals collected and reported race and ethnicity. Hispanic was reported as a race category before 2011, while ethnicity was listed as a separate field in the patient admission form in later years. Hispanic race or ethnicity as defined in this study included patients who reported Hispanic as their race before 2011 and those who reported Hispanic as their ethnicity in 2012 and later, regardless of their reported race.

Conclusions

This large national study found a decreasing trend of in-hospital delivery-related maternal mortality during 2008 to 2021, regardless of racial or ethnic group, age, or mode of delivery, likely demonstrating the impact of national and local strategies focused on improving the maternal quality of care provided by hospitals during delivery-related hospitalizations. Risk factors for in-hospital delivery-related mortality included cesarean delivery, COVID-19 diagnosis, and comorbidities and acute complications. Analysis indicated that American Indian, Black, and Asian patients had a statistically significant increased risk of death compared with White patients only when not controlling for SMMs, suggesting that the racial difference in mortality could be at least partly attributable to the differences in SMM rates across racial groups (analysis of Pacific Islander and Hispanic patients were not statistically significant).

From 2008 to 2021, there was an increasing trend of SMM rates, and chronic comorbid conditions were associated with higher rates. SMMs are known risk factors of maternal deaths and impose substantial social and economic burdens. Notably, disparities in both mortality and SMM remained across age, delivery mode, and racial and ethnic groups. These characteristics should be considered when designing maternal care quality improvement programs. As current national strategies increasingly focus on improving delivery-related maternal outcomes among high-risk groups, including racial and ethnic minority groups, it will become important to evaluate the effectiveness of these strategies in reducing occurrences of maternal mortality and SMM.

ARTICLE INFORMATION

Accepted for Publication: April 12, 2023.

Published: June 22, 2023. doi:10.1001/jamanetworkopen.2023.17641

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Author Contributions: Messers Lipkin and Perigard had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Obtained funding: Kilday, Marshall.

Administrative, technical, or material support: Kilday, Larson, Smith, Marshall, Finke, Deirmenjian, Rosenthal.

Supervision: Kilday, Smith, Marshall, Deirmenjian, Rosenthal.

Conflict of Interest Disclosures: Ms Kilday, Dr Cao, Ms Larson, Mr Lipkin, Mr Perigard, Ms Finke, Mr Tatum, Ms Deirmenjian, and Dr Rosenthal reported having a contract with the Department of Health and Human Services Maternal Morbidity and Mortality Data and Analysis Project during the conduct of the study and outside the submitted work. No other disclosures were reported.

Funding/Support: This project was supported by the US Department of Health & Human Services Office on Women's Health (contract No. 75PO0120C00066).

Role of the Funder/Sponsor: Under the leadership of the HHS Office on Women's Health team, this study was designed and conducted; data were collected, managed, analyzed, and interpreted; the manuscript was prepared, reviewed, and approved; and decision to submit the manuscript for publication was made.

Disclaimer: The opinions expressed in this article are the authors' own and do not reflect the view of the Department of Health and Human Services.

Data Sharing Statement: See [Supplement 2](#).

Additional Contributions: Margaret Snyder, MALD, and Alain Moluh, MSc (Department of Health and Human Services); and Amy Karon, DVM, MPH, MA, and Cate Polacek, MLIS (Premier, Inc), assisted with manuscript editing. Alex Kartashov, PhD, MS, Ben Davis, MS, Antony Vibin, BS, Himanshu Jayswal, MS (Premier, Inc), assisted with conducting statistical analyses and generating descriptive tables. Ashley Wilkes, BS (Premier Inc), assisted with project management, manuscript revision, and analysis and technology support.

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SUPPLEMENT 1.

eTable 1. ICD-9-CM and ICD-10-CM Diagnosis and Procedure Codes Used for Patient Inclusion and Exclusion

eTable 2. ICD-9-CM and ICD-10-CM Diagnosis and Procedure Codes Used to Identify Severe Maternal Morbidities

eTable 3. ICD-9-CM and ICD-10-CM Diagnosis Codes Used to Identify Maternal Comorbidities

eTable 4. Rates of Adjusted Mortality for American Indian Patients with 95% Poisson CIs

SUPPLEMENT 2.

Data Sharing Statement

WHEN DOES HUMAN LIFE BEGIN? THE SCIENTIFIC EVIDENCE AND TERMINOLOGY REVISITED

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The question of when human life begins continues to be a source of ethical and political controversy. In this debate, the language used by many medical textbooks fosters significant misinterpretation of the scientific facts. In particular, terminology that refers to the product of sperm-egg fusion as a “penetrated oocyte” and claims that the zygote does not form until syngamy (approximately twenty-four hours after sperm-egg fusion) have resulted in the erroneous belief that a human embryo does not exist during the period prior to this point (i.e. the “pre-zygote error”). Yet an objective view of the modern scientific evidence supports only a single definition of the term “zygote”: a one-cell human *organism* (i.e. a human being) that forms *immediately* upon sperm-egg fusion (not after twenty-four hours of development has elapsed). Therefore, the life of a new human being commences at a scientifically well-defined event; the fusion of the plasma membranes of sperm and egg. This conclusion is not a matter of religious belief or societal convention; it is a matter of objective, scientific observation. In light of the evidence, alternative views of when human life begins and when a developing human is the subject of rights (at viability or when the fetus is capable of conscious awareness) are both scientifically unsound and have significant negative implications for the ethical treatment of all human persons.

INTRODUCTION

A wide range of issues that are important for both science and society center on the biological and moral status of human prenatal life, including

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abortion, assisted reproduction technologies and human embryonic stem cell research. The debate over these issues often reflects deeply divided opinions. In the spring of 2013, scientists reported the successful generation of cloned human embryos that survived to the blastocyst stage before being destroyed to obtain embryonic stem cells.¹ The result was met by significant ethical objections from some commentators² and unqualified praise from others,³ reflecting the widely differing views of both when human life begins and the value of human life at early embryonic stages. Similarly, a proposed amendment to the Mississippi Constitution in 2011 that would grant the rights of personhood to human embryos from the one-cell stage onward, raised considerable alarm in the media⁴ and was ultimately defeated after achieving the support of a substantial number of the state's voters (42%). Similar personhood efforts in Nevada, Oklahoma, Virginia and Florida also obtained significant public support while facing strong opposition from scientists⁵ and others,⁶ indicating that the diversity of opinions on when human life begins noted five years ago⁷ have not been resolved.

Yet even at much later stages of human prenatal development, there is no consensus on when a human embryo or fetus is a human person with basic human rights. The ambivalent public opinions surrounding the conviction of Dr. Kermit Gosnell for murder of three infants, who were killed after delivery in late-term abortions,⁸ illustrates the lack of consensus in our society regarding the moral and ethical status of human prenatal life. Different religions, philosophies and cultures have come to very different

1. Masahito Tachibana et al., *Human Embryonic Stem Cells Derived by Somatic Cell Nuclear Transfer*, 153 CELL 1228, 1228–38 (2013).

2. Cardinal O'Malley: *Human Cloning Inconsistent with Human Dignity, Treats People as Products*, U.S. CONF. OF CATH. BISHOPS (May 13, 2013), <http://www.usccb.org/news/2013/13-094.cfm>.

3. David Cyranoski, *Human Stem Cells Created by Cloning*, 497 NATURE 295, 295–96 (2013).

4. For example, in a critical essay the New York Times stated that, if passed, the amendment “would define the term “person” in the State Constitution to include fertilized human eggs and grant to fertilized eggs the legal rights and protections that apply to people.” Editorial, *The ‘Personhood’ Initiative*, N.Y. TIMES, Oct. 28, 2011, at A30.

5. Lee Rubin Collins & Susan L. Crokin, *Fighting ‘Personhood’ Initiatives in the United States*, 24 REPROD. BIOMED. ONLINE 689, 689–91 (2012); Susan Young, *Mississippi to Vote on ‘Personhood’*, 479 NATURE 13, 13–14 (2011).

6. E.g., Kathy Hawken, *North Dakota's Fetal Personhood Amendment: Why I Voted Against It*, THE DAILY BEAST.COM (Mar. 24, 2013), <http://www.thedailybeast.com/articles/2013/03/24/north-dakota-s-fetal-personhood-amendment-why-i-voted-against-it.html>.

7. Maureen L. Condit, *When Does Human Life Begin? A Scientific Perspective*, 1 WESTCHESTER INST. WHITE PAPER 1, 1–32 (2008), reprinted in 9 NAT'L CATH. BIOETHICS Q. 127, 127–208 (2009).

8. See e.g., Trip Gabriel & Jon Hurdle, *Philadelphia Abortion Doctor Guilty of Murder in Late-Term Procedures*, N.Y. TIMES, May 14, 2013, at A12.

conclusions on the question of when human life begins and when that life has value, leading many to conclude the question cannot be objectively resolved. Yet ample scientific evidence points to a clear resolution to this question based entirely on an objective, factual analysis of human embryonic development.

HOW DOES SCIENCE DETERMINE A NEW CELL TYPE HAS BEEN FORMED?

To address the question of when life begins from a scientific perspective, we must first consider when a new cell that is distinct from sperm and egg is formed. As previously discussed,⁹ scientists determine when a new cell is formed based on two simple criteria: cell composition and cell behavior. These two criteria are used universally in the field of biology to distinguish when new cell types are produced, either in the laboratory or during embryonic development. These two factors often interact, with differences in cell composition resulting in differences in cell behavior. For example, brain cells have characteristic electrical activity required for information processing and this activity is produced by specific molecules (voltage-gated membrane channels) that are present in brain cells, but not in skin cells.

Based on both composition and behavior, it is entirely clear that a new cell type forms immediately upon sperm and egg plasma membrane fusion (Figure 1), which is a rapid event that takes less than a second to complete.¹⁰ At this point, a single cell is generated that contains all the components of both gametes and therefore has a unique molecular composition. Moreover, the cell produced by sperm-egg fusion rapidly enters into a new pattern of cell behavior that is also distinct from either gamete (initiating cell division, for example). Thus, based on the two criteria noted above, a new cell is formed at a well-defined moment: the instant of sperm-egg plasma-membrane fusion.

9. MAUREEN L. CONDIE ET AL., *IS THIS CELL A HUMAN BEING? EXPLORING THE STATUS OF EMBRYOS, STEM CELLS AND HUMAN-ANIMAL HYBRIDS* 27 (Joachim Huarte & Antoine Suarez eds., 2011); Condie, *supra* note 7.

10. Due to the singularity of the sperm-egg fusion event (which occurs only one time in one place for each oocyte) and the difficulty of obtaining oocytes (only five to ten human eggs can be harvested at a time, compared to approximately 250 million sperm in human ejaculate) the mechanisms of sperm-egg plasma membrane fusion are not well studied. However, both acrosome-reacted sperm, C.N. Tomes, *Molecular Mechanisms of Membrane Fusion During Acrosomal Exocytosis*, 65 SOC'Y REPROD. FERTILITY SUPP. 275, 275-91 (2007), and mature oocytes, Min Liu, *The Biology and Dynamics of Mammalian Cortical Granules*, 9 REPROD. BIOLOGY ENDOCRINOLOGY 149, 149 (2011), express well studied SNARE and SNAP proteins on their surfaces that are likely to mediate rapid membrane fusion (~0.25 seconds) once sperm-egg binding occurs.

DEVELOPMENT REFLECTS THE ACTIVITY OF AN ORGANISM AND IS NOT
CONTROLLED BY THE OOCYTE

Knowing that a new cell is formed at gamete fusion does not fully answer the question of when human life begins. We must still ask what kind of a cell has been produced—a new human being or simply a new human cell?

The medical dictionary administered by the National Institutes of Health defines the product of fertilization as a “zygote,” or “a cell formed by the union of two gametes; *broadly* the developing individual produced from such a cell.”¹¹ The term “zygote” derives from the Greek *zygōtós* or “yoked,” a variant of *zygōûn*, or “to join together.” Thus, “zygote” is another name for a one-cell embryo that is formed by the union of sperm and egg and that undergoes the process of development to generate a mature individual.

However, there is still inherent ambiguity regarding precisely *when* the zygote forms; either at sperm-egg fusion or at fusion of the male and female pronuclei, approximately twenty-four hours later. Historically, medical texts define the formation of the zygote and the beginning human life as *syngamy*; i.e. the “fusion”¹² of the two pronuclei in preparation for the first cell division of the embryo.¹³ Consequently, the new cell formed by sperm-egg fusion is often characterized as nothing more than a modified gamete (i.e. a “fertilized egg” or a “penetrated oocyte”). However, based on the ample scientific evidence¹⁴ that is reviewed and updated here, this conclusion is clearly false. A modern understanding of human embryology indicates that syngamy does not meet either of the two criteria for the formation of a new cell. Rather, the zygote is formed in the instant of sperm-egg plasma membrane fusion, with all subsequent events of the first day of life being acts *of* the zygote, not acts that *form* the zygote (Figure 1).

The view that the zygote is simply a modified human oocyte in part reflects the difference in size and complexity between the male and female gametes. Human sperm, excluding the tail, measure roughly five microns by three microns with a volume of approximately 150 cubic microns,

11. *Zygote Definition*, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/medline/plus/zygote>, April 1, 2014.

12. Although syngamy is commonly described as pronuclear “fusion,” this is highly inaccurate and dangerously misleading. Condic, *supra* note 9.

13. For example, “Fertilization is a complex sequence of coordinated events that begins with contact between a sperm and an oocyte. . . and ends with the intermingling of maternal and paternal chromosomes at metaphase of the first mitotic division of the zygote.” KEITH L. MOORE & T.V.N. PERSAUD, *THE DEVELOPING HUMAN* 31 (7th ed. 2003); “At this point, [syngamy] the process of fertilization can be said to be complete and the fertilized egg is called a zygote.” BRUCE M. CARLSON, *HUMAN EMBRYOLOGY AND DEVELOPMENTAL BIOLOGY* 36 (3rd ed. 2004).

14. Condic, *supra* note 9.

making them one of the smallest human cell types. In contrast, a human egg is roughly 100-150 microns in diameter, having a volume of over 1.5 million cubic microns (more than ten thousand fold larger than a sperm). Consequently, the oocyte contributes the vast majority of cellular material to the zygote. This discrepancy in size, combined with the observation that an unfertilized egg can undergo many of the early steps of development when electrically stimulated and the fact that egg cytoplasm is sufficient to reprogram a mature somatic nucleus in cloning experiments, has led some to erroneously conclude that all of the factors required for early development are derived from the oocyte.

Modern evidence shows this is clearly not the case, but rather that components derived from both sperm and egg interact extensively following sperm-egg fusion to promote the ongoing development of the zygote as a whole. Based on a unique molecular composition that is distinct from an oocyte, the zygote functions immediately to direct its *own* development. Importantly, the zygote does not act like a human gamete, a human cell or even a collection of human cells, but rather like an *organism* that is undergoing a self-directed process of maturation.

An organism is distinct from a cell because all parts of an organism act together in a coordinated manner to preserve the life, health and *continued development* of the organism as a whole.¹⁵ While human cells have complex behavior that sustains cellular life, they do not show any higher level of organization beyond that of a single cell. In contrast, human organisms exhibit globally coordinated functions that promote the health and survival of the individual as a whole. The zygote clearly exhibits such coordinated, organismal behavior from the moment of sperm-egg fusion onward. As will be illustrated by the evidence below, the activities initiated at sperm-egg fusion are not merely directed towards promoting the life of the zygote as a single cell, but rather they are directed towards *development*; i.e. production of interacting groups of cells, tissues and structures in a specific spatial and temporal sequence.

UPDATING THE EVIDENCE FOR ORGANISMAL FUNCTION OF THE EARLY HUMAN EMBRYO

The following is a summary of the events of the first five days of human life that demonstrate the organismal nature of the embryo from the moment of sperm-egg fusion onward. Some of these events (those in italics

15. An organism is defined as: "An individual constituted to carry on the activities of life by means of organs separate in function but mutually dependent: a living being." *Organism Definition*, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/medlineplus/organism>, April 1, 2014.

below) have been discussed in previous works,¹⁶ and will be mentioned only briefly here, except where new information is available. This data provides ample evidence that 1) development requires the coordinated interaction of components derived from *both* the sperm and the egg (i.e. that development is not controlled by oocyte-derived factors alone) and 2) the events of the pre-implantation period only make sense as part of an ongoing, developmental process (i.e. as activities of an organism). A summary of the scientific references for the numbered points discussed below is given in Table 1.

At Sperm-Egg Fusion

1. **Sperm-egg binding:** The molecular mechanism of sperm-egg binding is still not well understood. However, a large body of work has revealed critical roles in fertilization for a sperm protein (IZUMO) and an egg protein (CD9), as well as many other contributing molecules.¹⁷ A recent study examined sperm-egg fusion in real time and showed that following sperm-egg membrane fusion, the process of incorporation of the sperm nucleus into the zygote, is very rapid with the sperm genetic material being fully engulfed by five minutes post sperm-egg fusion.¹⁸ This demonstrates that the zygote acts rapidly to incorporate the molecular components required for its continued development.

Binding of sperm and egg also results in a rapid but poorly understood alteration of the zygote known as the “membrane block” to polyspermy, which prevents fusion of additional sperm.¹⁹ This alteration is distinct from the cortical reaction (see point 3 below) and requires sperm-egg membrane fusion (i.e. it is not seen in cases of intracytoplasmic sperm injection or parthenogenesis²⁰). Although this block is believed to develop over the first thirty minutes of life, recent evidence suggests that it may have effects as

16. Condic, *supra* note 9; Maureen L. Condic, *Totipotency: What It Is and What It Isn't*, STEM CELLS AND DEVELOPMENT (forthcoming 2014).

17. Janice P. Evans, *Sperm-egg Interaction*, 74 ANN REV. PHYSIOLOGY 477, 477–502 (2012).

18. Masahito Ikawa, Naokazu Inoue, Masaru Okabe & Yuhkoh Satouh, *Visualization of the Moment of Mouse Sperm-Egg Fusion and Dynamic Localization of IZUMO1*, 125 J. CELL SCI. 4985, 4985–90 (2012).

19. See Janice P. Evans & Allison J. Gardner, *Mammalian Membrane Block to Polyspermy: New Insights Into How Mammalian Eggs Prevent Fertilisation by Multiple Sperm*, 18 REPROD. FERTILITY DEV. 53, 53–61 (2006).

20. Janice P. Evans, Rafael A. Fissore, Manabu Kurokawa & Genevieve B. Wortzman-Show, *Calcium and Sperm Components in the Establishment of the Membrane Block to Polyspermy: Studies of ICSI and Activation with Sperm Factor*, 13 MOLECULAR HUM. REPROD. 557, 557–65 (2007); Michiharu Horikawa et al., *Requirement of Sperm-Oocyte Plasma Membrane Fusion for Establishment of the Plasma Membrane Block to Polyspermy in Human Pronuclear Oocytes*, 52 MOLECULAR REPROD. DEV. 183, 183–88 (1999).

early as ten seconds after sperm-egg fusion.²¹ The rapid initiation of cellular modifications that prevent sperm from binding to the zygote clearly opposes the function of the gametes (whose primary purpose is to bind to each other). Moreover, blocking polyspermy is not required for the health of the zygote as a single cell, yet it is critical for embryonic development.²² Consequently, this modification cannot be understood except as the first step of a new, *developmental* trajectory that is *immediately* initiated by the zygote to promote the health and survival of the organism as a whole.

2. Sperm entry point: Several studies²³ have pointed to the sperm entry point as a significant factor in determining the first cleavage plane of the zygote, which in turn affects how the primary body axes of the embryo are established. This conclusion has been contested by some,²⁴ but, if correct, it indicates that the very earliest interaction of the sperm and egg influences an event that does not occur for another twenty-four to thirty hours and supports the conclusion that sperm-egg fusion initiates a *developmental* sequence that ultimately produces the structural organization of the body as well as all the cells that the body contains.

In the first 1-5 minutes

3. Sperm-derived phospholipase-C-zeta (PLC ζ): Sperm derived PLC ζ is critical for the initiation of calcium oscillations that begin within the first minute following sperm-egg fusion. These oscillations will induce two important developmental events: 1) the cortical reaction that releases maternally-derived enzymes into the space surrounding the zygote to chemically modify both the zona pellucida and the cell surface so that additional sperm are unable to bind and 2) the completion of meiosis II in the oocyte-derived nucleus²⁵ (Figure 1). Both of these events illustrate the

21. Yumiko Iba et al., *Possible Mechanism of Polyspermy Block in Human Oocytes Observed by Time-Lapse Cinematography*, 29 J. ASSIST. REPROD. GENET. 951, 951–56 (2012).

22. Polyploid human cells (i.e. cells having more than the normal two sets of genetic information) are common and this condition typically does not impair cellular function. In contrast, polyploidy is incompatible with embryonic development and almost always results in the early death of the embryo.

23. Karolina Piotrowska & Magdalena Zernicka-Goetz, *Role for Sperm in Spatial Patterning of the Early Mouse Embryo*, 40 NATURE 517, 517–21 (2002); Karolina Piotrowska et al., *Sperm Entry Position Provides a Surface Marker for the First Cleavage Plane of the Mouse Zygote*, 32 GENESIS 193, 193–98 (2002); Dionne Gray et al., *First Cleavage of the Mouse Embryo Responds to Change in Egg Shape at Fertilization*, 14 CURRENT BIOLOGY 397, 397–405 (2004).

24. T. J. Davies & R. L. Gardner, *The Plane of First Cleavage is not Related to the Distribution of Sperm Components in the Mouse*, 17 HUMAN REPROD. 2368 (2002); Nami Motosugi et al., *Polarity of the Mouse Embryo is Established at Blastocyst and is not Prepatterned*, 19 GENES & DEV. 1081 (2005); Sophie Louvet-Vallée et al., *Mitotic Spindles and Cleavage Planes are Oriented Randomly in the Two-Mouse Embryo*, 15 CURRENT BIOLOGY 464 (2005).

25. Sook-Young Yoon et. al., *Recombinant Human Phospholipase C Zeta 1 Induces Intracellular Calcium Oscillations and Oocyte Activation in Mouse and Human Oocytes*, 27

coordination of maternally and paternally derived factors, and only make sense as part of an ongoing developmental process that ensures the zygote will have an appropriate amount of DNA for continued, healthy maturation (i.e. these events are not required for the health of the zygote as a human cell).

4. Sperm-dependent activation of protein tyrosine kinases: Protein tyrosine kinases (PTKs) are a family of enzymes that have broad ranging effects on many cellular systems and play important roles in completion of meiosis II following fertilization.²⁶ Recent data has shown that sperm-egg fusion initiates a rapid localization of PTKs and an alteration of structural elements in the cortical region of the zygote beneath the sperm-entry point.²⁷ Although the precise role of this PTK localization and cortical modification has not yet been directly determined, an independent study indicates that removal of the sperm-associated cortical cytoplasm perturbs cell division and normal patterning of the embryo many hours later,²⁸ again demonstrating that sperm-egg fusion sets off a cascade of molecular events that are part of an ongoing developmental sequence.

5. Early redox state affects development: Within the first five minutes following sperm-egg fusion, calcium oscillations initiated by sperm-derived PLC ζ alter the chemical oxidation-reduction (i.e. redox) reactions involved in energy metabolism of the zygote. Recent work in mice has shown that perturbing the normal sperm-induced redox state for only a few hours, beginning within the first five minutes of development, significantly alters prenatal growth, affecting the ultimate weight at birth (twenty days later) and beyond.²⁹ This indicates that events initiated by the zygote within minutes of sperm-egg fusion have profound and lasting effects on subsequent long-term growth and development.

In the first 30 minutes

6. Completion of meiosis: Meiosis II of the oocyte-derived nucleus is completed by thirty minutes, establishing the final diploid genome of the

HUMAN REPROD. 1768, 1768–80 (2012); Michail Nomikos et al., *Starting a New Life: Sperm PLC-Zeta Mobilizes the Ca²⁺ Signal that Induces Egg Activation and Embryo Development: an Essential Phospholipase C with Implications for Male Infertility*, 34 BIOESSAYS 126 (2012).

26. Lynda K. McGinnis et al., *Localized Activation of Src-Family Protein Kinases in the Mouse Egg*, 306 DEV. BIOLOGY 241, 241–54 (2007).

27. Lynda K. McGinnis et al., *Protein Tyrosine Kinase Signaling in the Mouse Oocyte Cortex During Sperm-Egg Interactions and Anaphase Resumption*, 80 MOLECULAR REPROD. & DEV. 260, 260–72 (2013).

28. Karolina Piotrowska & Magdalena Zernicka-Goetz, *Early Patterning of the Mouse Embryo - Contributions of Sperm and Egg*, 129 DEV. 5803, 5803–13 (2002).

29. Bernadette Banzhez et al., *Adult Body Weight is Programmed by a Redox-Regulated and Energy-Dependent Process During the Pronuclear Stage in Mouse*, 6 PLOS ONE (Dec. 28, 2011), <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0029388>.

zygote. Although a third of the original triploid zygotic genome is eliminated in meiosis II, this information is nonetheless an important component of the zygote's biological state and makes significant contributions to subsequent development. The importance of this quickly eliminated DNA, and how it contributes to the development of the zygote, is illustrated by a class of genes known as "maternal effect" genes. As the name indicates, these are genes contributed by the mother that have important developmental effects even when they are absent from the final diploid genome of the zygote due to elimination at either the first or second round of meiosis.³⁰ These "absent" genes contribute RNA or protein to the zygote, which subsequently alters zygotic development. Often these genes have no effect at all on the normal function of the mother. This illustrates that all of the components contributed to the zygote by the oocyte and the sperm must be seen as components of the zygote itself that interact to generate a pattern of development that is unique to the specific human individual formed at sperm-egg fusion.

7. Histone H3.3 localization: Beginning within the first thirty minutes following sperm-egg fusion, protamine in the paternally derived nucleus is replaced with maternally supplied histone H3. Recent data has shown that a particular variant of this protein, histone H3.3, is preferentially localized to paternally derived DNA, while many of the unique paternal epigenetic modifications of this half of the zygotic genome are preserved.³¹ The differential incorporation of histone H3.3 into the paternally derived nucleus anticipates the differential transcriptional activation of the two halves of the genome that will occur several hours later (see 12 below). Further, it demonstrates that the two halves of the zygotic genome are intimately communicating³² well before syngamy (see point 15 below).

30. Nicholas K. Priest & Michael J. Wade, *Maternal-Zygotic Epistasis and the Evolution of Genetic Diseases*, J. OF BIOMEDICINE AND BIOTECHNOLOGY (2010), <http://dx.doi.org/10.1155/2010/478732>; Ze-Xu Jiao & Theresa K. Woodruff, *Detection and Quantification of Maternal-Effect Gene Transcripts in Mouse Second Polar Bodies: Potential Markers of Embryo Developmental Competence*, 99 FERTILITY & STERILITY 2055, 2055–61 (2013); Lie Li, Ping Zheng & Jurrien Dean, *Maternal Control of Early Mouse Development*, 137 DEV. 859 (2010).

31. G. W. van der Heijden et al., *Asymmetry in Histone H3 Variants and Lysine Methylation Between Paternal and Maternal Chromatin of the Early Mouse Zygote*, 122 MECHANISMS OF DEV. 1008, 1008–22 (2005).

32. In all living cells, different parts of the genome communicate to generate coordinated patterns of cell behavior and/or development. And in all cases, this communication occurs exclusively through *indirect* mechanisms that do not require all of the cell's DNA to be physically present in the same location. The main mechanism of communication involves protein. Specific genes will be transcribed into RNA, which moves out of the nucleus into the cytoplasm, where it is translated into protein. This protein then returns to the nucleus, where it interacts with specific regions of the genome to regulate gene function. In the case of histone H3.3, a histone gene that is present in the maternally-derived half of the genome communicates with large regions of the paternally derived DNA through exactly this mechanism (i.e. the protein doesn't know or care that the paternally and maternally derived halves of the genome are in separate pronuclear

8. DNA remodeling: In addition to histone replacement, both the paternally derived and maternally derived pronuclei undergo extensive remodeling, beginning in the first thirty minutes following sperm-egg fusion. Specifically, the paternal DNA is rapidly and extensively demethylated, while the maternally derived DNA is largely protected from demethylation.³³ Recent work has implicated specific methylases³⁴ and other maternal factors³⁵ in this DNA remodeling, again indicating extensive interaction between maternal and paternal components of the zygotic genome from the earliest stages. Moreover, this remodeling (in particular, alterations in epigenetic histone marks)³⁶ plays an important role in the subsequent differences in transcription seen between the two pronuclei³⁷ (see 12 below).

In hours 1-10

9. DNA licensing as early as four hours: Cells use a molecular process known as “DNA licensing” to ensure that every chromosome is only copied once during each cell division.³⁸ In the zygote, the oocyte-derived nucleus localizes licensing complexes during meiosis II, but the paternally derived nucleus does not, allowing the two nuclei to have distinct patterns of DNA replication, despite existing in the same cell. This differential DNA licensing is required for nuclear division to proceed in a manner that is quite different from standard mitosis (and even from meiosis I), but entirely appropriate to the unique state of the zygote.³⁹

10. DNA replication depends on sperm: Following completion of meiosis II, approximately eight to ten hours post sperm-egg fusion, both halves of the zygotic genome are replicated in anticipation of the first

compartments). So long as the entire genome is present in a single cell (as it is in the zygote), the interactive communication between various elements of that genome proceeds in exactly this manner at all stages of life.

33. Toshinobu Nakamura et al., *PGC7/Stella Protects Against DNA Demethylation in Early Embryogenesis*, 9 NATURE CELL BIOLOGY 64, 64–71 (2007).

34. Tian-Peng Gu et al., *The Role of Tet3 DNA Dioxygenase in Epigenetic Reprogramming by Oocytes*, 477 NATURE 606, 606-10 (2011).

35. Yuki Hatanaka et al., *GSE is a Maternal Factor Involved in Active DNA Demethylation in Zygotes*, 8 PLOS ONE (Apr. 1, 2013), <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0060205>.

36. Seungeum Yeo et al., *Methylation Changes of lysine 9 of Histone H3 During Preimplantation Mouse Development*, 20 MOLECULAR CELL 423, 423–28 (2005); Fátima Santos et al., *Dynamic Chromatin Modifications Characterise the First Cell Cycle in Mouse Embryos*, 280 DEV. BIOLOGY 225, 225–36 (2005).

37. Olga Østrup, Ingrid S. Anderson & Phillippe Collas, *Chromatin-Linked Determinants of Zygotic Genome Activation*, 70 CELLULAR AND MOLECULAR LIFE SCI. 1425, 1425–37 (2013).

38. Hideo Nishitani & Zoi Lygerou, *Control of DNA replication licensing in a cell cycle*, 7 GENES TO CELLS 523, 523–34 (2002).

39. Michael A. Ortega et al., *Unique Pattern of ORC2 and MCM7 Localization During DNA Replication Licensing in the Mouse Zygote*, 87 BIOLOGY OF REPROD. 1 (2012).

division of the zygote that will not occur for another fifteen hours. The onset of DNA replication is critical for normal development and is initiated by factors derived from sperm.⁴⁰ Damage to paternally derived DNA can significantly alter the timing of DNA replication,⁴¹ indicating that coordination between maternally and paternally derived DNA controls the development of the zygote as a whole.

11. Minor wave of zygotic activation: Utilization of zygotic genes (i.e. zygotic gene transcription) is initiated in the first ten hours following sperm-egg fusion in mouse⁴² and human⁴³ embryos, indicating that the zygote (not the mother) is controlling its own developmental progress.

12. Differential paternal-maternal transcription: The sperm-derived nucleus begins transcription earlier than the maternal nucleus⁴⁴ and is four to five fold more transcriptionally active⁴⁵ due to repression of maternal

40. P. Comizzoli et al., *Onset of the First S-Phase is Determined by a Paternal Effect During the G1-Phase in Bovine Zygotes*, 62 BIOLOGY OF REPROD. 1677, 1677–84 (2002); L.N. Eid, S.P. Lorton & J.J. Parrish, *Paternal Influence on S-Phase in the First Cell Cycle of the Bovine Embryo*, 51 BIOLOGY OF REPROD. 1232, 1232–37 (1994); J. Schabronath & K. Gärtner, *Paternal Influence on Timing of Pronuclear DNA Synthesis in Naturally Ovulated and Fertilized Mouse Eggs*, 38 BIOLOGY OF REPROD. 744, 744–49 (1988).

41. Joanne E. Gawecka et al., *Mouse Zygotes Respond to Severe Sperm DNA Damage by Delaying Paternal DNA Replication and Embryonic Development*, 8 PLOS ONE (Feb. 19, 2013), <http://www.plosone.org/>; Yasushiro Yamauchi et al., *Paternal Pronuclear DNA Degradation is Functionally Linked to DNA Replication in Mouse Oocytes*, 77 BIOLOGY OF REPROD. 407, 407–15 (2007).

42. Luke Martin-Maffrey et al., *RGS14 is a Mitotic Spindle Protein Essential from the First Division of the Mammalian Zygote*, 7 DEV. CELL 763, 763–69 (2004); Christine Bouniol et al., *Endogenous Transcription Occurs at the 1-Cell Stage in the Mouse Embryo*, 218 EXPERIMENTAL CELL RESEARCH 57, 57–62 (1995); Fugaku Aoki et al., *Regulation of Transcriptional Activity During the First and Second Cell Cycles in the Preimplantation Mouse Embryo*, 181 DEV. BIOLOGY 296, 296–307 (1997); Fanyi Zeng & Richard M. Schultz, *RNA Transcript Profiling During Zygotic Gene Activation in the Preimplantation Mouse Embryo*, 283 Dev. Biology 40, 40–57 (2005).

43. Asangla Ao et al., *Transcription of Paternal Y-Linked Genes in the Human Zygote as Early as the Pronucleate Stage*, 2 ZYGOTE 281, 281–87 (1994); R. Daniels et al., *XIST Expression in Human Oocytes and Preimplantation Embryos*, 61 AM. J. HUMAN GENETICS 33, 33–39 (1997); Anthony T. Dobson et al., *The Unique Transcriptome through day 3 of Human Preimplantation Development*, 13 HUMAN MOLECULAR GENETICS 1461, 1461–70 (2004); R. Daniels et al., *Expression of the Myotonin Protein Kinase Gene in Preimplantation Human Embryos*, 4 HUMAN MOLECULAR GENETICS 389, 389–93 (1995); Morris Fiddler et al., *Expression of SRY Transcripts in Preimplantation Human Embryos*, 55 AM. J. OF MED. GENETICS 80, 80–84 (1995); R. Daniels et al., *Transcription of Tissue-Specific Genes in Human Preimplantation Embryos*, 12 HUMAN REPROD. 2251, 2251–56 (1997); Zhigang Xue et al., *Genetic Programs in Human and Mouse Early Embryos Revealed by Single-Cell RNA Sequencing*, 500 NATURE 593, 593–97 (2013).

44. Hong-Thuy Bui et al., *Essential Role of Paternal Chromatin in the Regulation of Transcriptional Activity During Mouse Preimplantation Development*, 141 REPROD. 67, 67–77 (2011); Bouniol et al., *supra* note 42; Ao et al., *supra* note 43.

45. Aoki et al., *supra* note 42; Maria Wieokowski et al., *Requirements for Promoter Activity in Mouse Oocytes and Embryos Distinguish Paternal Pronuclei from Maternal and Zygotic Nuclei*, 159 DEV. BIOLOGY 366, 366–78 (1993); Pierre G. Adenot et al., *Differential H4 Acetylation of Paternal and Maternal Chromatin Precedes DNA Replication and Differential Transcriptional Activity in Pronuclei of 1-cell Mouse Embryos*, 124 DEV. 4615, 4615–25 (1997).

transcription by sperm-derived factors.⁴⁶ Somewhat later in development, paternal genes are preferentially (although not exclusively) expressed in the placenta,⁴⁷ the earliest vital organ of the embryo. While it is clear that paternally expressed genes enhance the growth of both the placenta and the fetus,⁴⁸ it is not known whether early activation of paternal genes at the one-cell stage contributes to placenta formation. However, differential utilization of paternal and maternal genes again indicates that coordinated function of the genome begins immediately, well prior to syngamy.

In hours 10-25

13. Changes in zygote shape influence the first cleavage plane: Sperm entry establishes a specialized region of cortex in the zygote (see 2 above). Shortly after sperm-egg fusion, the zygote changes shape from a sphere to a flattened oval (Figure 2), with the site of sperm entry lying along the short axis. The first cleavage plane of the embryo aligns with this short axis and, in most cases, passes close to the site of sperm entry and the site of meiosis II (the “animal pole” of the embryo).⁴⁹ This demonstrates the earliest events of sperm-egg fusion and events that occur much later are part of an ongoing developmental sequence that has pronounced effects on the subsequent maturation of the embryo (see 16 below).

14. Position of pronuclei influences the first cleavage plane: The first cleavage plane is also influenced by the trajectory taken by the maternally and paternally derived pronuclei, and the plane they come to occupy at the center of the zygote (Figure 2), with cell division typically passing through this plane, so that the zygote is divided along what was the meridional axis of the embryo.⁵⁰ The path taken by the pronuclei is determined by the sperm

46. Bui et al., *supra* note 44.

47. S. J. Tunster et al., *Imprinted Genes in Mouse Placental Development and the Regulation of Fetal Energy Stores*, 145 REPROD. 117, 117–37 (2013); Xu Wang et al., *Paternally Expressed Genes Predominate in the Placenta*, 110 PROCEEDINGS OF THE NAT’L ACAD. OF SCI. 10705, 10705–10 (2013).

48. A. L. Fowden et al., *Imprinted Genes and the Epigenetic Regulation of Placental Phenotype*, 106 PROGRESS IN BIOPHYSICS AND MOLECULAR BIOLOGY 281, 281–88 (2011).

49. Karolina Piotrowska & Magdalena Zernicka-Goetz, *Role for Sperm in Spatial Patterning of the Early Mouse Embryo*, 409 NATURE 517, 517–21 (2011); Berenika Plusa & Karolina Piotrowska, *Sperm Entry Position Provides a Surface Marker for the First Cleavage Plane of the Mouse Zygote*, 32 GENESIS 193, 193–98 (2002); Dionne Gray et al., *First Cleavage of the Mouse Embryo Responds to Change in Egg Shape at Fertilization*, 14 CURRENT BIOLOGY 397, 397–405 (2004); R. L. Gardner, *Specification of Embryonic Axes Begins Before Cleavage in Normal Mouse Development*, 128 DEV. 839, 839–47 (2001); R. L. Gardner & T. J. Davies, *An Investigation of the Origin and Significance of Bilateral Symmetry of the Pronuclear Zygote in the Mouse*, 21 HUMAN REPROD. 492, 492–502 (2005).

50. Jing-gao Zheng et al., *Understanding Three-Dimensional Spatial Relationship Between the Mouse Second Polar Body and First Cleavage Plane with Full-Field Optical Coherence Tomography*, 18 J. BIOMEDICAL OPTICS 10503 (2013); Takashi Hiiragi & Davor Solter, *First Cleavage Plane of the Mouse Egg is not Predetermined but Defined by the Topology of the Two*

entry point and the microtubule aster produced by the sperm centrosome.⁵¹ Zygote-specific mechanisms that involve molecules derived from both sperm and egg prevent the sperm aster from interfering with the completion of meiosis II⁵² and coordinate the movement of the pronuclei to the center of the zygote once meiosis II is complete, with both events being critical for subsequent normal development of the embryo.

15. Syngamy is not the beginning of human life: As has been discussed in detail elsewhere,⁵³ there is no evidence for a new cell forming at syngamy; the material composition of the zygote does not change and there is no substantive change in cell behavior. All of the preparations for cell division (DNA replication, assembly of the mitotic spindle, chromatin condensation) are clearly underway hours earlier, indicating syngamy is merely another step in an already ongoing developmental process. Despite inaccurate assertions to the contrary,⁵⁴ syngamy does not form the mature genome of the zygote; the full genome of the zygote is present at sperm-egg fusion and the definitive, diploid genome is formed at the completion of meiosis II. Syngamy also does not produce a “fused” nucleus; due to nuclear membrane breakdown at syngamy (an event that occurs during every cell division at all stages of life), there is no nucleus at all. Finally, as illustrated above, the two halves of the zygotic genome do not need to be enclosed in a single nuclear membrane to interact; the zygotic genome has been functioning in a coordinated, “unified” manner since sperm-egg fusion. While syngamy is the last unique event of the first day of human life and provides further evidence for the ongoing organismal function of the embryo, it is not a “zygote-forming” event, but rather it is part of an ongoing developmental sequence that is produced by the zygote.

At the 2-3 cell stage (day two of development)

16. The overall pattern of cell division predicts cell fate: Between twenty-four and thirty hours post sperm-egg fusion, the zygote divides to produce the two-cell embryo (Figure 1E, 2C). As discussed above, in most cases the zygote divides in a manner that bisects the embryo along the animal-vegetal axis (i.e. from the position of the polar body to the position of the sperm entry point, passing through the plane of opposition of the two pronuclei; see Figure 2A, 2B). This plane of cleavage predicts the

Opposing Pronuclei, 430 NATURE 360, 360–64 (2004).

51. Gianpiero D. Palermo et al., *The Human Sperm Centrosome is Responsible for Normal Syngamy and Early Embryonic Development*, 2 REV. REPROD. 19, 19–27 (1997).

52. Karen McNally et al., *Kinesin-1 Prevents Capture of the Oocyte Meiotic Spindle by the Sperm Aster*, 22 DEV. CELL 788 (2012); Phuong Nguyen et al., *Pronuclear Migration: No Attachment? No Union, but a Futile Cycle*, 22 CURRENT BIOLOGY R409, R409–11 (2012).

53. Condit, *supra* note 7.

54. See, e.g., Jan Tesarik & Ermanno Greco, *A Zygote is not an Embryo: Ethical and Legal Considerations*, 9 MOLECULAR ASSISTED REP. AND GENETICS 13, 13–16 (2004).

orientation of the embryonic-abembryonic axis of the embryo and the location of the inner cell mass at the blastocyst stage (Figure 2F), demonstrating that cell cleavage is part of an ongoing developmental sequence where early events influence subsequent events to produce the more mature structures of the embryo. Although the specific pattern of the second round of cell cleavage is variable (Figure 2C-2E), it strongly influences the structures each cell will produce,⁵⁵ indicating that the body plan emerges as part of an orderly developmental sequence, not as a random event.

17. The major wave of zygotic transcription is initiated at the two-cell stage: Utilization of zygotic genes increases significantly at the two-cell stage in mouse⁵⁶ and development beyond this stage requires zygotic transcription.⁵⁷ In humans, older studies suggested that the zygotic genome was not active until the four to eight cell stage,⁵⁸ yet more recent work indicates that zygotic transcription begins much earlier, with many genes being expressed at the one-cell stage (see point 11 above) and the major peak of gene activation occurring in two-cell embryos.⁵⁹ This demonstrates

55. R. L. Gardner, *Specification of Embryonic Axes Begins Before Cleavage in Normal Mouse Development*, 128 DEV. 839 (2001); Toshihiko Fujimori et al., *Analysis of Cell Lineage in Two- and Four-Cell Mouse Embryos*, 130 DEV. 5113 (2003); Karolina Piotrowska et al., *Blastomeres Arising from the First Cleavage Division have Distinguishable Fates in Normal Mouse Development*, 128 DEV. 3739 (2001); Karolina Piotrowska-Nitsche et al., *Four-Cell Stage Mouse Blastomeres have Different Developmental Properties*, 132 DEV. 479 (2005); Shawn L. Chavez et al., *Dynamic Blastomere Behaviour Reflects Human Embryo Ploidy by the Four-Cell Stage*, 3 NATURE COMMUN 1251 (2012).

56. Christine Bell et al., *Genomic RNA Profiling and the Programme Controlling Preimplantation Mammalian Development*, 14 MOLECULAR HUMAN REPROD. 691 (2008); Q. Tian Wang et al., *A Genome-Wide Study of Gene Activity Reveals Developmental Signaling Pathways in the Preimplantation Mouse Embryo*, 6 DEV. CELL 133 (2004); Shiho Kageyama et al., *Analysis of Transcription Factor Expression During Oogenesis and Preimplantation Development in Mice*, 15 ZYGOTE 117 (2007); Toshino Hamatani et al., *Dynamics of Global Gene Expression Changes During Mouse Preimplantation Development*, 6 DEV. CELL 117 (2004).

57. Lakshmi Rambhatla & Keith E. Latham, *Strain-Specific Progression of Alpha-Amanitin-Treated Mouse Embryos Beyond the Two-Cell Stage*, 41 MOLECULAR REPROD. & DEV. 16 (1995); P.R. Braude, *Time-Dependent Effects of Alpha-Amanitin on Blastocyst Formation in the Mouse*, 52 J. EMBRYOLOGY & EXPERIMENTAL MORPHOLOGY 193 (1979); G. M. Kidder & J. R. McLachlin, *Timing of Transcription and Protein Synthesis Underlying Morphogenesis in Preimplantation Mouse Embryos*, 112 DEV. BIOLOGY 265 (1985).

58. P. Braude et al., *Human Gene Expression First Occurs Between the Four- and Eight-Cell Stages of Preimplantation Development*, 332 NATURE 459 (1988); Jan Tesarik et al., *Early Morphological Signs of Embryonic Genome Expression in Human Preimplantation Development as Revealed by Quantitative Electron Microscopy*, 128 DEV. BIOLOGY 15 (1988).

59. Rita Vassena et al., *Waves of Early Transcriptional Activation and Pluripotency Program Initiation During Human Preimplantation Development*, 138 DEV. 3699 (2011); D. M. Taylor et al., *Paternal Transcripts for Glucose-6-Phosphate Dehydrogenase and Adenosine Deaminase are First Detectable in the Human Preimplantation Embryo at the Three- to Four-Cell Stage*, 48 MOLECULAR REPROD. & DEV. 442 (1997); Anthony Dobson et al., *The Unique Transcriptome Through Day 3 of Human Preimplantation Development*, 13 HUMAN MOLECULAR

that in both mice and humans, the zygote utilizes its own genome to direct development from the two-cell stage onward.

18. The first two blastomeres have different timing of cell division: Multiple studies have demonstrated that the first two-cells of the embryo have a bias towards different developmental fates.⁶⁰ One cell of the two-cell embryo typically divides earlier than its sister blastomere (Figure 2C) and this “leading” cell preferentially contributes to the inner cell mass, while the “lagging” cell contributes predominantly to the mural trophectoderm (Figure 2F).⁶¹ This indicates that differences in biologic properties are present at the two-cell stage, and that these differences are part of a predictable developmental sequence that results in the non-random production of specific cell types.

19. The first two blastomeres may have different patterns of gene expression: Determining the earliest point at which blastomeres show consistent differences in gene expression is complicated by the variable patterns of cell division that are observed (see 16 and 18 above).⁶² Some studies have detected no consistent differences in gene expression between the first two blastomeres,⁶³ while others have seen variable differences in expression of genes that regulate cell cycle kinetics⁶⁴ and still others have

GENETICS 1461 (2004); Said Assou et al., *Dynamic Changes in Gene Expression During Human Early Embryo Development: From Fundamental Aspects to Clinical Applications*, 17 HUMAN REPROD. UPATE 272 (2011).

60. Gardner, *supra* note 55; Karolina Piotrowska et al., *Blastomeres Arising from the First Cleavage Division have Distinguishable Fates in Normal Mouse Development*, 128 DEV. 3739 (2001); Fujimori et al., *supra* note 55.

61. C.F. Graham & Z. A. Deussen, *Features of Cell Lineage in Preimplantation Mouse Development*, J. EMBRYOLOGY & EXPERIMENTAL MORPHOLOGY 53 (1978); Akiko Spindle, *Cell Allocation in Preimplantation Mouse Chimeras*, 219 J. EXPERIMENTAL ZOOLOGY 361 (1982); M. A. Surani & S.C. Barton, *Spatial Distribution of Blastomeres is Dependent on Cell Division Order and Interactions in Mouse Morulae*, 102 DEV. BIOLOGY 335 (1984); C. Louise Garbutt et al., *When and How Does Cell Division Order Influence Cell Allocation to the Inner Cell Mass of the Mouse Blastocyst?*, 100 DEV. 325 (1987).

62. For example, if the leading blastomere has a meridional division and the lagging blastomere an equatorial division (as depicted in Figure 2C), predictable cell types will be produced by each blastomere. This specific biological trajectory is likely to be associated with a specific pattern of gene activation in each cell at the two-cell stage. However, if both the leading and lagging blastomeres divide equatorially, a different developmental pattern is produced. (for review see: Cleavage pattern and emerging asymmetry of the mouse embryo, and this distinct developmental trajectory is likely to be associated with a different pattern of gene expression at the two-cell stage. See Magdalena Zernicka-Goetz, *Cleavage Pattern and Emerging Asymmetry of the Mouse Embryo*, 6 NAT. REV. MOLECULAR CELL BIOLOGY 919 (2005).) In both cases, unique genes may be expressed in each of the first two blastomeres, but since there is no way to prospectively determine what developmental trajectory the embryo will follow, these differences may not be detected in a pool of embryos at the two-cell stage that will ultimately show a variety of future developmental trajectories.

63. Matthew D. VerMilyea et al., *Transcriptome Asymmetry Within Mouse Zygotes but not between Early Embryonic Sister Blastomeres*, 4 EMBO J. 1841 (2011).

64. R. Michael Roberts et al., *Transcript Profiling of Individual Twin Blastomeres Derived by Splitting Two-Cell Stage Murine Embryos*, 84 BIOLOGY OF REPROD. 487 (2011).

observed consistent differences in several genes important for cell signaling and cell division.⁶⁵ Thus, in addition to the distinct developmental fates noted above, it is possible that blastomeres have different molecular composition as early as the two-cell stage.

At the 4-cell stage (day 2-3 of development)

20. Differential gene expression at the four-cell stage: There is clear evidence from multiple laboratories that by the four-cell stage, blastomeres have unique patterns of gene expression that become more pronounced by the 8-cell stage.⁶⁶ This demonstrates that although cells of the embryo remain “plastic,” or able to change their developmental path until the sixteen-cell stage, cells are already specialized on a molecular level by the four-cell stage.

21. Differential cell function at the four-cell stage: Associated with differences in molecular composition at the four-cell stage, there are also differences in cellular function. For example, each cell of a four-cell embryo shows a different level of transcription of zygotic genes (i.e. a difference in cell function), indicating that the contributions of the cells to subsequent development are quantitatively, and perhaps qualitatively, distinct.⁶⁷

22. Differential developmental capability at the four-cell stage: Recombining specific blastomeres derived from four-cell embryos results in a range of developmental outcomes, from normal development to death,⁶⁸ indicating that the molecular and functional differences observed between cells at this stage also have significant developmental consequences (see Figure 2E). Importantly, these differences arise in an orderly, non-random fashion. A cell inheriting primarily vegetal cytoplasm at the second round of cell division (e.g. the cell labeled “V” in Figure 2D) subsequently shows low levels of histone modification (H3R26me2a and H3R17me2a) at the

65. Jian Hong Sun et al., *Differential Expression of Axin1, Cdc25c and Cdkn2d mRNA in 2-Cell Stage Mouse Blastomeres*, 20 ZYGOTE 305 (2012).

66. Michael Antczak & Jonathan Van Blerkom, *Oocyte Influences on Early Development: the Regulatory Proteins Leptin and STAT3 are Polarized in Mouse and Human Oocytes and Differentially Distributed within the Cells of the Preimplantation Stage Embryo*, 3 MOLECULAR HUMAN REPROD. 106 (1997); Chris Hansis et al., *Candidate Lineage Marker Genes in Human Preimplantation Embryos*, 8 REPROD. BIOMEDICINE ONLINE 577 (2004); Agnieszka Jedrusik et al., *Role of Cdx2 and Cell Polarity in Cell Allocation and Specification of Trophoblast and Inner Cell Mass in the Mouse Embryo*, 22 GENES & DEV. 2692 (2008); Maria-Elena Torres-Padilla et al., *Histone Arginine Methylation Regulates Pluripotency in the Early Mouse Embryo*, 445 NATURE 214 (2007); Sun, *supra* note 65; Nicolas Plachta et al., *Oct4 Kinetics Predict Cell Lineage Patterning in the Early Mammalian Embryo*, 13 NATURE CELL BIOLOGY 117 (2011).

67. Maria-Elena Torres-Padilla et al., *Histone Arginine Methylation Regulates Pluripotency in the Early Mouse Embryo*, 445 NATURE 214 (2007).

68. Karolina Piotrowska-Nitsche et al., *Four-Cell Stage Mouse Blastomeres have Different Developmental Properties*, 132 DEV. 479 (2005).

four-cell stage,⁶⁹ with the progeny of these “V” cells showing high levels of Cdx2 expression at the eight-cell stage and contributing primarily to the TE lineage at the blastocyst stage.⁷⁰

At the 8-16 cell stage (day 3-4 of development)

23. Compaction reflects a coordinated change in cell behavior: Beginning around the eight-cell stage, embryos undergo a process of compaction, where cells become polarized and adhere more tightly. As a consequence, cells located on the outside of the embryo will give rise to placenta, while inner cells will produce most of the structures of the postnatal body (Figure 2). Recent work has identified components of the molecular signaling pathway responsible for initiating this important event.⁷¹ Surprisingly, many of the molecular players are present at earlier stages, but their function is regulated by cell-cell contacts, with inner cells being inhibited from assuming a polarized state. Independent studies showing that early cell cleavage patterns predict the segregation of cells into these two lineages (see 16 above; Figure 2) indicate that the cell-cell interactions and cell positioning at the eight-cell stage that are critical for embryo compaction are part of an ongoing developmental sequence.

24. Segregation of TE/ICM: Shortly after compaction, between the sixteen-cell and the 32-cell stage, outer and inner cells become committed to either the TE or the ICM lineage and are no longer “plastic” (i.e. able to re-specify their identities if challenged with a new set of developmental signals).⁷² This indicates that by three days, the embryo has made distinct

69. Torres-Padilla, *supra* note 67.

70. Agnieszka Jedrusik et al., *Role of Cdx2 and Cell Polarity in Cell Allocation and Specification of Trophectoderm and Inner Cell Mass in the Mouse Embryo*, 22 GENES & DEV. 2692 (2008).

71. Robert Odell Stephenson et al., *Disorganized Epithelial Polarity and Excess Trophectoderm Cell Fate in Preimplantation Embryos Lacking E-cadherin*, 137 DEV. 3383 (2010); Hiroshi Sasaki et al., *The Hippo Signaling Pathway Components Lats and Yap Pattern Tead4 Activity to Distinguish Mouse Trophectoderm from Inner Cell Mass*, 16 DEV. CELL 398 (2009); Noriyuki Nishioka et al., *Tead4 is Required for Specification of Trophectoderm in Pre-Implantation Mouse Embryos*, 125 MECHANISMS OF DEV. 270 (2008); Rieko Yagi et al., *Transcription Factor TEAD4 Specifies the Trophectoderm Lineage at the Beginning of Mammalian Development*, 134 DEV. 3827 (2007); Yoshikazu Hirate et al., *Polarity-Dependent Distribution of Angiomotin Localizes Hippo Signaling in Preimplantation Embryos*, 23 CURRENT BIOLOGY 1181 (2013); Hongjie Liu et al., *Atypical PKC, Regulated by Rho GTPases and Mek/Erk, Phosphorylates Ezrin During Eight-Cell Embryo Compaction*, 375 DEV. BIOLOGY 13 (2013).

72. Aneta Suwinska et al., *Blastomeres of the Mouse Embryo Lose Totipotency after the Fifth Cleavage Division: Expression of Cdx2 and Oct4 and Developmental Potential of Inner and Outer Blastomeres of 16- and 32-Cell Embryos*, 322 DEV. BIOLOGY 133 (2008); C. De Paepe et al., *Human Trophectoderm Cells are not Yet Committed*, 28 HUMAN REPROD. 740 (2013); R. D. Schramm & A. M. Paprocki, *In vitro Development and Cell Allocation Following Aggregation of Split Embryos with Tetraploid or Developmentally Asynchronous Blastomeres in Rhesus Monkeys*, 6 CLONING AND STEM CELLS 302 (2004); T. Shinozawa et al., *Development of Rat Tetraploid and*

cell types that will continue to interact to produce the increasingly complex tissues and structures of the maturing body.

In days 4-6

25. Coordination of hatching and implantation: In preparation for implantation, embryos must escape from the zona pellucida in a process known as hatching. TE cells are largely responsible for interacting with the uterine endometrium and therefore they must be exposed for implantation to occur. At the time of hatching, cells of the mural trophoctoderm generate projections that interact with the zona pellucida.⁷³ Mural TE cells also secrete proteases that both digest the zona pellucida⁷⁴ and contribute to implantation.⁷⁵ The specialized function of mural TE and the coordinated changes in cell behavior associated with hatching/implantation again provide evidence for the organismal function of the early embryo.

26. Interaction of TE and ICM are critical for ongoing development: TE and ICM cannot be seen as two separate cell types that just so happen to coexist in the same place. Unlike cells of a tumor, these tissues are coordinately generated in a spatial arrangement that is appropriate to their ultimate functions. When ICM does not form or is defective, TE cells do not produce a placenta, but a tumor instead.⁷⁶ Similarly, when TE does not form or is defective, ICM cells either die⁷⁷ or do not implant.⁷⁸ This mutual dependence illustrates the organismal nature of the early embryo.

Chimeric Embryos Aggregated with Diploid Cells, 14 ZYGOTE 287 (2006); Andrezej K. Tarkowski et al., *Mouse Singletons and Twins Developed from Isolated Diploid Blastomeres Supported with Tetraploid Blastomeres*, 45 INT. J. DEV. BIOLOGY 591 (2001); Andrezej K. Tarkowski et al., *Identical Triplets and Twins Developed from Isolated Blastomeres of 8- and 16-cell Mouse Embryos Supported with Tetraploid Blastomeres*, 49 INT. J. DEV. BIOLOGY 825 (2005); Andrezej K. Tarkowski et al., *Individual Blastomeres of 16- and 32-cell Mouse Embryos are able to Develop into Foetuses and Mice*, 348 DEV. BIOLOGY 190 (2010).

73. P. B. Sesagiri et al., *Cellular and Molecular Regulation of Mammalian Blastocyst Hatching*, 83 J. REPROD. IMMUNOLOGY 79 (2009); Y. P. Cheon et al., *Role of Actin Filaments in the Hatching Process of Mouse Blastocyst*, 7 ZYGOTE 123 (1999); S. Niimura et al., *Time-lapse Videomicrographic Observations of Blastocyst Hatching in Cattle*, 56 J. REPROD. DEV. 649 (2010).

74. Rosario M. Perona & Paul W. Wasserman, *Mouse Blastocysts Hatch in Vitro by Using a Trypsin-Like Proteinase Associated with Cells of Mural Trophoctoderm*, 114 DEV. BIOLOGY 42 (1986); G. V. Sireesha et al., *Role of Cathepsins in Blastocyst Hatching in the Golden Hamster*, 14 MOLECULAR HUMAN REPROD. 337 (2008).

75. N. Sharma et al., *Implantation Serine Proteinases Heterodimerize and are Critical in Hatching and Implantation*, 11 BMC DEV. BIOLOGY 61 (2006).

76. See Erik E. Hauzman & Zoltán Papp, *Conception without the Development of a Human Being* 36 J. OF PERINATAL MEDICINE 175 (2008); Elizabeth Garner et al., *Gestational Trophoblastic Disease*, 50 CLINICAL OBSTETRICS AND GYNECOLOGY 112 (2007).

77. K. Chawengsaksohak et al., *Homeosis and Intestinal Tumours in Cdx2 Mutant Mice*, 386 NATURE 84 (1997).

78. Alexander Meissner & Rudolf Jaenisch, *Generation of Nuclear Transfer-Derived Pluripotent ES Cells from Cloned Cdx2-deficient Blastocysts*, 439 NATURE 212 (2006).

Table 1: Scientific papers documenting the organismal functions of human embryos from the one-cell stage onward.

No.	Time	Developmental Event	Citations
1	At fusion	Sperm-egg binding	•Annu Rev Physiol. 2012;74:477-502. •J Cell Sci. 2012;125(Pt 21):4985-90. •Reprod Fertil Dev. 2006;18(1-2):53-61. •Mol Hum Reprod. 2007;13(8):557-65. •Mol Reprod Dev. 1999;52(2):183-8. •J Assist Reprod Genet. 2012;29(9):951-6.
2	At fusion	Sperm entry point	•Nature. 2001;409(6819):517-21. •Genesis. 2002;32(3):193-8. •Curr Biol. 2004;14(5):397-405.
3	1-3 minutes	Sperm PLC ζ	•Hum Reprod. 2012;27(6):1768-80. •Bioessays. 2012;34(2):126-34.
4	1-3 minutes	PTK activation	•Dev Biol. 2007;306(1):241-54. •Mol Reprod Dev. 2013;80(4):260-72. •Development. 2002;129(24):5803-13.
5	1-3 minutes	Redox state	•PLoS One. 2011;6(12):e29388.
6	First 30 minutes	Meiosis II	•J Biomed Biotechnol. 2010;2010:478732. •Fertil Steril. 2013;99(7):2055-61. •Development.

			2010;137(6):859-70.
7	First 30 minutes	Histone H3.3	•Mech Dev. 2005;122(9):1008-22.
8	First 30 minutes	Paternal DNA remodeling	•Nat Cell Biol. 2007; 9: 64–71. •Nature. 2011;477(7366):606-10. •PLoS One. 2013;8(4):e60205. •Mol. Cell. 2005;20:423–428. •Dev. Biol. 2005; 280; 225–236. •Cell Mol Life Sci. 2013;70(8):1425-37.
9	1-10 hours	DNA licensing	•Biol Reprod. 2012;87(3):62.
10	1-10 hours	DNA replication; sperm factors	•Biol Reprod. 2000;62(6):1677-84. •Biol Reprod. 1994;51(6):1232-7. •Biol Reprod. 1988;38(4):744-9. •PLoS One. 2013;8(2):e56385. •Biol Reprod. 2007;77(3):407-15.
11	1-10 hours	Minor zygotic gene activation	•Dev Cell. 2004;7(5):763-9. •Exp Cell Res. 1995;218(1):57-62. •Dev Biol. 1997;181(2):296-307. •Dev Biol. 2005;283(1):40-57. •Zygote. 1994;2(4):281-7. •Am J Hum Genet. 1997;61(1):33-9. •Hum Mol Genet. 2004;13(14):1461-70. •Hum Mol Genet.

			1995;4(3):389-93. •Am J Med Genet. 1995;55(1):80-4. •Hum Reprod. 1997;12(10):2251-6. •Nature. 2013;500(7464):593-7.
12	1-10 hours	Differential DNA utilization	•Reproduction. 2011;141(1):67-77. •Exp Cell Res. 1995;218(1):57-62. •Zygote. 1994;2(4):281-7. •Dev Biol. 1997;181(2): 296-307. •Dev Biol. 1993;159(1): 366-78 •Development. 1009;124(22): 4615-25. •Reproduction. 2013;145(5):R117-37. •Proc Natl Acad Sci 2013; 25;110(26):10705-10. •Prog Biophys Mol Biol. 2011;106(1):281-8.
13	10-25 hours	Cell shape influences cleavage plane	•Nature. 2001;409(6819):517-21. •Genesis. 2002;32(3):193-8. •Curr Biol. 2004;14(5):397-405. •Development. 2001;128(6):839-47. •Hum Reprod. 2006 ;21(2):492-502.
14	10-25 hours	Pronuclei influence cleavage plane	•Biomed Opt. 2013;18(1):10503. •Nature. 2004 Jul;430(6997):360-4. •Rev Reprod. 1997; 2(1):19-27.

			•Dev Cell. 2012;22(4):788-98. •Curr Biol. 2012;22(10):R409-11.
15	10-25 hours	Syngamy	•See citation in: Natl Cathol Bioeth Quart. 2009; 9(1):127-208.
16	10-25 hours	Cell division	•Development. 2001;128: 839. •Development. 2003;130: 5113. •Development. 2001;128: 3739. •Development. 2005;132: 479. •Nat Commun. 2012;3:1251.
17	Day 2-3	Major zygotic gene activation	•Mol Hum Reprod. 2008;14(12):691-701. •Dev Cell. 2004;6(1):133-44. •Zygote. 2007;15(2):117-28. •Dev Cell. 2004;6(1):117-31. •Development. 2011;138(17):3699-709. •Mol Reprod Dev. 1997;48(4):442-8. •Hum Mol Genet. 2004;13(14):1461-70. •Hum Reprod Update. 2011;17(2):272-90.
18	Day 2-3	Leading and lagging blastomeres	•Development. 2001;128: 839-847. •Development. 2001;128:3739-3748. •Development. 2003;21:5113-5122. •J. Embryol. Exp. Morphol.

			1978;48:53-72. •J. Exp. Zool. 1982;219:361-367. •Dev. Biol. 1984;102:335-343. •Development. 1987;100:325-332.
19	Day 2-3	Differential gene expression; two-cell	•Biol Reprod. 2011;84(3):487-94. •Zygote. 2012;20(3):305-10.
20	Day 2-3	Differential gene expression; four-cell	•Mol human reproduction. 1997; 3:1067-86. •Reprod biomedicine online. 2004; 8:577-83. •Genes & development. 2008; 22:2692-706. •Nature. 2007; 445:214-8. •Zygote. 2012; 20:305-10. •Nature cell biology. 2011; 13:117-23.
21	Day 2-3	Differential cell function; four-cell	•Nature. 2007; 445:214-8.
22	Day 2-3	Differential developmental capabilities; four-cell	•Development. 2005; 132:479-90. •Nature 2007; 445:214-8. •Genes Dev. 2008;22:2692-2706.
23	Day 3-4	Compaction	•Development. 2010;137(20):3383-91. •Dev Cell. 2009;16(3):398-410. •Mech Dev. 2008;125(3-4):270-83. •Development. 2007;134(21):3827-36. •Curr Biol. 2013;23(13):1181-94. •Dev Biol. 2013;375(1):13-22.
24	Day 3-4	Commitment of	•Dev Biol. 2008; 322:133-

		TE/ICM	44. •Human reproduction. 2013; 28:740-9. •Cloning and stem cells. 2004; 6:302-14. •Zygote. 2006; 14:287-97. •Int J Dev Biol. 2001; 45:591-6. •Int J Dev Biol. 2005; 49:825-32. •Dev Biol. 2010; 348:190-8.
25	Day 4-6	Hatching and implantation	•J Reprod Immunol. 2009;83(1-2):79-84. •Zygote. 1999;7(2):123-9. •J Reprod Dev. 2010;56(6):649-54. •Dev Biol. 1986;114(1):42-52. •Mol Hum Reprod. 2008;14(6):337-46. •BMC Dev Biol. 2006;6:61.
26	Day 4-6	TE/ICM interactions	•J Perinat Med. 2008;36(2):175. •Clinical Obs Gyn. 2007;50(1): 112. •Nature. 1997;386: 84. •Nature. 2006;439(7073):212.

USE OF THE TERM "ZYGOTE" IN SCIENTIFIC AND MEDICAL LITERATURE

Based on the evidence discussed above, it is clear that the zygote, or one-cell human embryo, forms immediately upon sperm-egg fusion. The development of the zygote is not driven by the oocyte, but rather requires the coordinated interaction of elements derived from *both* sperm and egg. Moreover, the embryo does not function as a mere human cell or group of human cells, it functions as an *organism*; a complete human being at an immature stage of development.

In light of the clear evidence, why do so many medical texts incorrectly

identify syngamy as the beginning of human life? The erroneous conclusion that the zygote does not form until twenty-four hours post-sperm egg fusion in part reflects the definition of the term “zygote” promoted by the “Carnegie stages,” a developmental staging system based on the Carnegie collection of human embryos. This system was originally published in a 1973 monograph by Ronan O’Rahilly.⁷⁹ It was revised and expanded by O’Rahilly and Müller in 1987⁸⁰ and again in 2010.⁸¹ While O’Rahilly and Müller did not *originate* the view that the zygote is present only after syngamy,⁸² their promotion of this definition has led to serious errors in how the embryo is viewed in medical literature and elsewhere.

Clearly, if a zygote is a one-cell human embryo and if one accepts the claim that the zygote does not form until approximately one day after sperm-egg fusion, it is simply a matter of logic to (erroneously) conclude that the cell existing *prior* to this point is *not* a human embryo. For example, Germany, a strongly prolife country that forbids the use of human embryos in medical research, nonetheless permits the use of “pre-zygotes” formed from fusion of sperm and egg prior to syngamy. The reason Germany allows this practice is, in agreement with the terminology of the Carnegie Stages, the human embryo is defined as “the human egg cell, fertilized and capable of development, from the time of fusion of the nuclei.”⁸³

The false conclusion that the human embryo does not form until twenty-four hours after sperm-egg fusion is only accentuated by the misleading Carnegie terms for stages *prior* to the formation of the zygote: the “penetrated oocyte” (at stage 1A, approximately the first thirty minutes of development) and the “ootid” (at stage 1B, approximately the first twenty-four hours prior to syngamy). Both of these terms erroneously suggest the embryo is nothing more than a modified female gamete for the

79. RONAN O’RAHILLY, *Part A: Embryos of the First Three Weeks (Stages 1 to 9)*, in DEVELOPMENTAL STAGES IN HUMAN EMBRYOS, INCLUDING A SURVEY OF THE CARNEGIE (Carnegie Inst. of Washington, 1973).

80. RONAN O’RAHILLY & FABIOLA MÜLLER, DEVELOPMENTAL STATES IN HUMAN EMBRYOS, INCLUDING A REVISION OF STREETER’S “HORIZONS” AND A SURVEY OF THE CARNEGIE COLLECTION, (Carnegie Inst. of Washington, 1987).

81. Ronan O’Rahilly & Fabiola Müller, *Developmental Stages in Human Embryos: Revised and New Measurements*, 192 CELLS TISSUES ORGANS 73 (2010).

82. The term “zygote” has been used for over 100 years and there has been a long-standing emphasis on fusion of the pronuclei as a significant event in zygote formation. See Adam Sedgwick, *Variation and some Phenomena Connected with Reproduction and Sex*, 11 SCI. 881, 886 (1900) (“This fusion of the protoplasm of the two gametes gives us a uninucleated organism—for the fusion of the nuclei of the two gametes seems to be an essential part of the process—in which the potencies of the two gametes are blended. The *zygote*, as the mass formed of the fused gametes is called, is formed by the combination of two individualities, and is therefore essentially a new individuality, the characters of which will be different from the characters of both of the parents.”).

83. Federal Embryo Protection Law, 1 Bundesgesetzblatt 2746–48 (Dec. 19, 1990).

first day of life.

Despite the misleading nature of the Carnegie terminology, it is widely used in medical texts⁸⁴ and is considered by many to be “definitive.” For those who hold this view, the decision not to employ the Carnegie terminology in this analysis may appear to reflect confusion or outright ignorance. Yet this decision has been consciously made, both to avoid the false implications of O’Rahilly and Müller’s definition of the zygote and to use the terminology that is, in fact, *standard* in the scientific literature.

PubMed, a service maintained by the National Institutes of Health, is the world’s largest database of scientific publications, indexing more than twenty-two million research papers. A recent search of PubMed for the Carnegie term “penetrated oocyte”⁸⁵ returned only seventy-six publications out of the more than *nineteen million* publications added to the database since O’Rahilly published his original monograph in 1973 (Figure 3). Similarly, the term “ootid” has been used only six times. In contrast, searching for “zygote” (a term that has been in common usage since the 1900s⁸⁶) returned 11,210 citations. Similarly, the term “pronuclear” (an alternative, modern name for Carnegie Stage 1B) has been used 1,868 times. A conservative search for the alternative modern terminology applied to the entire period of Carnegie stage 1 (“one-cell embryo” and variations⁸⁷) returned 2,232 citations (Figure 3).

Searches of large databases can sometimes be misleading, generating “false negatives” where the term is actually used in the publication but does not appear in the searchable database fields. However, errors of this type are relatively unbiased for similar types of terminology (e.g. the term “pronuclear” and the term “ootid” are equally likely to be missing from the searchable database fields of a scientific publication if this stage of development is not a critical aspect of the work). Therefore, it is legitimate to compare two different terms for the same developmental stage to each other. Based on this comparison, scientists have clearly *not* adopted the terminology associated with the Carnegie Stages and, consequently, using it would be confusing to both scientific and non-scientific readers.

84. A recent, non-scientific search returned over a thousand (primarily medical) texts and over forty thousand web pages containing the term “Carnegie stage.” https://books.google.com/ngrams/graph?content=Carnegie+stage&year_start=1800&year_end=2000&corpus=15&smoothing=3&share=&direct_url=t1%3B%2CCarnegie%20stage%3B%2Cc0#t1%3B%2CCarnegie%20stage%3B%2Cc1.

85. All searches reported in this text were conducted on June 17, 2013 and are on file with the author.

86. Sedgwick, *supra* note 82.

87. A search of PubMed for (one-cell or “one-cell stage” or “one cell” or “one cell stage” or 1-cell or “1 cell”) AND (embryo or embryos or embryonic). This search does not include the many variations on the general term “one-cell embryo” that are sometimes used in the literature (e.g. 1C, “single cell,” unicellular, etc.).

Terminology matters in science. In discussing the topic of human embryology with non-scientists, clarity is often compromised by unnecessary precision and arcane terminology. Whenever possible, it is preferable to use terms that have clear common-sense meanings in addition to being accepted scientific terms.⁸⁸ Yet in contrast to mere lack of clarity that can be introduced by esoteric or obscure terminology, *dangerous* confusion is introduced by misleading or mistaken terminology. The Carnegie terminology, that has promoted the “pre-zygote error” by falsely suggesting an embryo does not exist for the first day of life, is a clear example of dangerously misleading terminology.

WHY DOES IT MATTER?

The scientific evidence clearly indicates that a one-cell human organism, the zygote, forms immediately at fusion of sperm and egg. From a scientific perspective, this single cell is inarguably a complete and living organism; *i.e.* a member of the human species at the earliest stage of natural development. Despite the clarity of the scientific evidence many people (including many scientists) find this conclusion difficult to accept; it seems *absurd* to call a single cell a “human being,” and, consequently, many simply reject the evidence as irrelevant, and instead ask a different question: when does human life become *valuable*?

Many who question the value of the human embryo accept that human life begins at sperm-egg fusion and that human embryos are organisms, yet insist that these scientific conclusions are irrelevant to any of the important social issues that turn on the question of when life begins. What is relevant, proponents of this view assert, is the question of when the embryo acquires “rights” or “value” or “personhood,” and these more nuanced and less scientifically quantifiable traits are believed to accrue gradually over developmental time.

There are two common forms of the argument that human rights/value/personhood are achieved at some point significantly later than sperm-egg fusion: the “structure/function” and the “social convention” forms. The logical implications of each argument have been considered in some detail elsewhere⁸⁹ and will be briefly discussed here.

88. For example, the word “egg” (used in 108,147 scientific publications indexed in PubMed to refer to a non-avian female gamete) or the word “ovum” (used in 82,986 publications) are both easily understood by the public as well as being scientifically accurate terms.

89. MAUREEN L. CONDIE, *Pre-implantation Stages of Human Development: the Biological and Moral Status of Early Embryos*, in *IS THIS CELL A HUMAN BEING?: EXPLORING THE STATUS OF EMBRYOS, STEM CELLS AND HUMAN-ANIMAL HYBRIDS* 25, 25–44 (Antoine Suarez & Joachim Huarte eds., 2011).

Structure/Function Form: Human Rights Depend on Specific Structural and/or Functional Features

As development proceeds, a human embryo gradually acquires a familiar human form and characteristic human function. Rather than linking human rights/value to status as a human organism (a status that is clearly achieved at sperm-egg fusion), many attempt to use a specific biological structure or function as the basis for human rights, with “viability” or the development of brain structures capable of supporting “consciousness” (including the conscious perception of pain) being the most commonly invoked characteristics.

Yet both viability and higher neural function are fundamentally arbitrary. While the age of a fetus clearly affects the ability to survive following preterm birth,⁹⁰ survival also depends on a large number of factors that have nothing to do with the fetus itself, including the sophistication, proximity and affordability of neonatal intensive care facilities.⁹¹ Consequently, linking human rights to “viability” provides an almost purely technological definition of who is and who is not the subject of basic human rights. Moreover, this definition fundamentally discriminates against those members of the human species who happen to be born in rural areas or in families without generous medical insurance policies.⁹² While it is unfortunate that all infants do not have equal access to sophisticated medical care, this can hardly be the basis for determining who is a human person and who is not.

Although the attainment of “consciousness” is a less technological definition of when a developing human being has rights, the point at which the nervous system is considered to be sufficiently mature for this definition to pertain is also entirely arbitrary. The earliest neurons are born at approximately four weeks,⁹³ with neural activity beginning at

90. In most studies, survival at 20 weeks fetal age is approximately 10%, increasing to over 50% by 22 weeks. See generally Barbara J. Stoll et al., *Neonatal Outcomes of Extremely Preterm Infants from the NICHD Neonatal Research Network*, 126 PEDIATRICS 443 (2010).

91. See Brandon W. Alleman et al., *Individual and Center-Level Factors Affecting Morality Among Extremely Low Birth Weight Infants*, 132 PEDIATRICS 175 (2013) (indicating that in-hospital mortality rates for fetuses delivered at less than 23 weeks of fetal age varied from 28% to 90%, depending on the facility).

92. Gwieneverea D. Brandon et al., *Are Outcomes and Care Processes for Preterm Neonates Influenced by Health Insurance Status?*, 124 PEDIATRICS 122 (2009) (“In addition to the known impact of insurance status on well-being at birth, Medicaid managed care is independently associated with adverse neonatal outcomes in preterm infants.”).

93. Irina Bystron et al., *Tangential Networks of Precocious Neurons and Early Axonal Outgrowth in the Embryonic Human Forebrain*, 25 J. NEUROSCIENCE 2781 (2005); LIN Cheng et al., *ApoER2 and VLDLR in the Developing Human Telencephalon*, 15 EUR. J. PAEDIATR. NEUROL. 361 (2011); Irina Bystron et al., *The First Neurons of the Human Cerebral Cortex*, 9 NATURE NEUROSCIENCE 2781 (2005); Irina Bystron et al., *Development of the Human Cerebral Cortex: Boulder Committee revisited*, 9 NATURE NEUROSCIENCE 110 (2008).

approximately seven weeks and connections forming between the spinal cord and lower brain centers at approximately eighteen weeks.⁹⁴ Circuitry capable of supporting “higher” functions, such as consciousness, develops between twenty-two to twenty-four weeks.⁹⁵ Throughout this entire period, brain development is a continuous process,⁹⁶ with no clear landmarks defining when “consciousness” arises. Indeed, some have argued the brain function observed at birth is insufficient to consider a newborn infant a person.⁹⁷

In addition to the continuous nature of brain development, it is difficult (if not impossible) to determine the qualitative mental experience of a fetus. In the debate over fetal pain legislation, for example, both sides essentially agree on the scientific fact that developing humans react to painful stimuli from approximately eight weeks of development, yet disagree on the issue of whether a fetus “perceives” pain in the same, self-reflective manner as an adult human would.⁹⁸ Consequently, those opposed to fetal pain legislation simply ignore the ample biological evidence that a fetus experiences pain in some capacity, and assert that until the fetus achieves an ill-defined level of neural sophistication that is sufficient for “awareness” of pain, this biological reaction to pain is irrelevant. Indeed, it has been argued that from a purely psychological perspective, a newborn baby does not have sufficient “life experience” to have a meaningful perception of pain until nine months after birth.⁹⁹

The problems inherent in using any aspect of brain function as the definition of human “personhood” can be illustrated by asking just two disturbing questions. First, if we assign rights based on brain function, how do we view the wide range of variation in brain function that exists among postnatal humans? Are we comfortable assigning human rights proportionate to brain function, with the intelligent enjoying greater freedom and privilege than the less intelligent? Most of us find this idea intuitively repugnant, and yet it is entirely consistent with the logic of subordinating the rights of a fetus relative to the mother, based on

94. N. Zecevic, *Synaptogenesis in Layer I of the Human Cerebral Cortex in the First Half of Gestation*, 8 CEREBRAL CORTEX 245 (1998).

95. M.G. Gatti et al., *Functional Maturation of Neocortex: a Base of Viability*, 25(1) J. Maternal-Fetal and Neonatal Med. 101 (2012); J. Corbett-Detig et al., *3D Global and Regional Patterns of Human Fetal Subplate Growth Determined in Utero*, 215 J. BRAIN STRUCTURE & FUNCTION 255 (2011).

96. See *Developmental Biology of Pain Perception: Hearing on H.R. 1797 Before the Subcomm. On the Constitution and Civil Justice*, 113th Cong. 1 (2013) (statement of Maureen L. Condic), available at <http://www.gpo.gov/fdsys/pkg/CRPT-113hrpt109/pdf/CRPT-113hrpt109-pt1.pdf>.

97. HELGA KUHSE & PETER SINGER, *SHOULD THE BABY LIVE?: THE PROBLEM WITH HANDICAPPED INFANTS* (Oxford Univ. Press, 1988).

98. H.R. 1797, 113th Cong. 1 (2013).

99. Stuart W.G. Derbyshire, *Can Fetuses Feel Pain?*, 332 BMJ 909 (2006).

differences in brain function.

Second, if we reject a “scaled” concept of rights, how would we identify a minimal level of brain function that qualifies an individual for human rights? While there are uniquely human neurological networks,¹⁰⁰ the neurological structures seen in a fetus or a newborn are very similar to other animal species.¹⁰¹ Therefore it is impossible to justify assigning rights to a human infant based on distinctively human cognitive function without assigning identical rights to many animals. Indeed, because the human brain continues to develop for a very long time after birth and does not achieve mature human structure or function until between twenty and twenty-five years of age,¹⁰² assigning rights to humans at *any* stage prior to adulthood cannot be justified based on an argument that human rights depend on the acquisition of *mature* human cognitive abilities.

Assuming it somehow proves possible to set a level of brain function or cortical connectivity that excludes human fetuses and non-human animals as holders of basic human rights while including human infants and children, there would still be significant problems with this definition. What is the status of those individuals who are initially above the bar, but subsequently fall below it as a consequence of injury, disease or old age? What about those who are born with a genetic or developmental defect that prevents them from *ever* achieving the minimum requirements? Are such individuals to be considered sub-human animals? Can they be consumed as food, used as sexual objects, exploited as sources of organs, bought and sold as property or destroyed as scientific research animals? And if not, why?

Clearly, adopting arbitrary criteria for who is the subject of rights undermines basic principles of human justice. Further if arbitrary criteria such as brain function and “viability” are insufficient to confer human rights, all other criteria based on structural or functional maturation are also similarly arbitrary and insufficient.

100. Dante Mantini et al., *Evolutionarily Novel Functional Networks in the Human Brain?*, 33 J. NEUROSCIENCE 3259 (2013).

101. Jason Hill et al., *Similar Patterns of Cortical Expansion During Human Development and Evolution*, 107 PROCEEDINGS OF NAT’L ACAD. SCI. 13135 (2010); Tomok Sakai, *Developmental Patterns of Chimpanzee Cerebral Tissues Provide Important Clues for Understanding the Remarkable Enlargement of the Human Brain*, 280 PROCEEDINGS OF BIOLOGICAL SCI. 1753 (2012).

102. Nitin Gogtay et al., *Dynamic Mapping of Human Cortical Development During Childhood through Early Adulthood*, 101 PROCEEDINGS OF NAT’L ACAD. OF SCI. 8174 (2004); Elizabeth R. Sowell et al., *Mapping Cortical Change Across the Human Life Span*, 6 NATURE NEUROSCIENCE 309 (2003).

Social Convention Form: Rights are Assigned Based on Collective Social Judgment or Negotiation

The second common form of the argument that human rights are not intrinsically tied to status as a human being abandons the idea that rights are linked to any specific human feature, and instead argues that rights are assigned purely on the basis of pragmatic social concerns.¹⁰³ This view does not deny that an embryo or fetus is a human being, but rather asserts that society has the power to decide whether human beings have rights or not, including the right to continue living. And in many cases, the decisions of society are based on arbitrary or ill-defined criteria that nonetheless reflect social consensus.

For example, while there are real and significant differences between an adolescent and a child, the transition is gradual, with no universal landmarks defining "adolescence" for all individuals. Nonetheless, we are comfortable restricting the driving privileges of a child, while allowing adolescents to drive, based on an ill-defined and arbitrary (age-based) distinction between these two stages of human development. Similarly, it is argued, the rights of an embryo or fetus can also be restricted until some arbitrary point in maturation is achieved, even though the precise point may be impossible to objectively justify. In many cases, those arguing that rights are conferred by social convention will point to events such as viability or "consciousness" as the relevant criteria, while acknowledging there is no real change in the status of the fetus associated with these events.

Inherent to the "social convention" view is the idea that "inalienable" rights (such as the right to life, liberty and the pursuit of happiness) do not exist at all, but rather are only a matter of social accord or contract. Those who have sufficient power to impose their views or sufficient influence over public opinion to effectively promote them are free to define human "rights" in any manner they choose. Consequently, this view fatally undermines both the concept of human rights and the concept of personhood. If all rights are conferred merely by social convention, why should anyone have any rights at all beyond those they are able to acquire by persuasion, by purchase or by power? And if rights are exclusively acquired in this manner, it is inevitable that the clever, the rich and the strong will enjoy more rights than the inept, the poor and the weak. Moreover, if those with sufficient power or persuasive ability choose to *deny* rights to individuals of a particular race, religion, gender or economic class, on what basis could proponents of the 'social convention' view possibly object?

Arguments that human rights accrue gradually over developmental

103. See Jed Rubenfeld, *On the Legal Status of the Proposition that 'Life Begins at Conception'*, 43 STAN. L. REV. 599 (1991).

time, based either on structural/functional maturation or on social convention, are both scientifically and logically flawed. Moreover, they defy our basic concepts of justice. Therefore, criteria such as viability and consciousness should not be used as a basis for deciding when a human embryo or fetus is the subject of human rights.

In contrast, asserting that basic human rights, such as the right to life, are inherent to all human beings, regardless of their age or ability, is consistent with logic, with the facts, with our current standards of justice and with the vast majority of jurisprudence in this country. While science cannot dictate the moral and ethical status of human embryos, scientific evidence can rightly determine who is and who is not a human being and therefore who is the subject of human rights.¹⁰⁴ And, based on the evidence presented here, prenatal humans are clearly human beings who are entitled to basic human rights.

CONCLUSION

Modern scientific evidence demonstrates that the one-cell human embryo, or zygote, is formed at the instant of sperm-egg plasma membrane fusion. The zygote has unique material composition that is distinct from either gamete. It immediately initiates a series of cellular and biochemical events that ultimately generate the cells, tissues and structures of the mature body in an orderly temporal and spatial sequence. The capacity to undergo development is a defining characteristic of a human organism at the beginning of life. The scientific evidence presented here refutes the long-standing “pre-zygote error” promoted by the Carnegie stages that the zygote is not formed until syngamy, and therefore, that the cell produced by fusion of the gametes is nothing more than a “penetrated oocyte.” Ethical positions that deny the personhood of human being at all stages of life are logically inconsistent and scientifically unsound, in addition to having significant, negative implications for the ethical treatment of all human persons.

104. Maureen L. Condic, *Science and the Politics of Personhood*, THE WITHERSPOON INSTITUTE (2012) available at <http://www.thepublicdiscourse.com/2012/12/7300/>.

GLOSSARY¹⁰⁵

blastocyst: the modified blastula of a placental mammal; an early metazoan embryo typically having the form of a hollow fluid-filled rounded cavity bounded by a single layer of cells.

diploid: having the basic (haploid) chromosome number doubled. Diploid is the normal state for somatic (i.e. body) cells.

DNA: any of various nucleic acids that are usually the molecular basis of heredity, that are constructed of a double helix held together by hydrogen bonds between purine and pyrimidine bases, which project inward from two chains containing alternate links of deoxyribose and phosphate, and that in eukaryotes are localized chiefly in cell nuclei— also called deoxyribonucleic acid.

embryo: an animal in the early stages of growth and differentiation that is characterized by cleavage, the laying down of fundamental tissues, and the formation of primitive organs and organ systems; especially the developing human individual from the time of fertilization to the end of the eighth week after conception (*cleavage commences immediately after fertilization to produce the two-cell embryo*).

epigenetic: relating to, being, or involving a modification in gene expression that is independent of the DNA sequence of a gene.

fate: the expected result of normal development (i.e. what tissues or structures a cell will contribute to if left undisturbed in the embryo).

fertilization: the process of union of two gametes whereby the somatic chromosome number is restored and the development of a new individual is initiated.

gamete: a mature male or female germ cell (*sperm or egg*) usually possessing a haploid chromosome set and capable of initiating formation of a new diploid individual by fusion with a gamete of the opposite sex— also called sex cell.

gene: a specific sequence of nucleotides in DNA that is located usually on a chromosome and that is the functional unit of inheritance controlling the transmission and expression of one or more traits by specifying the structure of a particular polypeptide and especially a protein or controlling the function of other genetic material – also called determinant, determiner, factor.

genome: one haploid set of chromosomes with the genes they contain.

haploid: having the gametic number of chromosomes or half the number characteristic of somatic cells.

105. All definitions are taken from the NIH-administered medical dictionary with minor modifications for clarity, as indicated by italics. Available at <http://www.nlm.nih.gov/medlineplus/plusdictionary.htm>.

histone: any of various simple water-soluble proteins that are rich in the basic amino acids lysine and arginine and are complexed with DNA.

inner cell mass: (*ICM*) the portion of the blastocyst of a mammalian embryo that is destined to become the *structures of the postnatal body*.

implantation: in placental mammals: the process of attachment of the embryo to the maternal uterine wall—called also nidation.

membrane: a semipermeable limiting layer of cell protoplasm consisting of a fluid phospholipid bilayer with intercalated proteins—called also cell membrane, plasmalemma.

meiosis: the cellular process that results in the number of chromosomes in gamete-producing cells being reduced to one half and that involves a reduction division in which one of each pair of homologous chromosomes passes to each daughter cell and a mitotic division.

mitosis: a process that takes place in the nucleus of a dividing cell, involves typically a series of steps consisting of prophase, metaphase, anaphase, and telophase, and results in the formation of two new nuclei each having the same number of chromosomes as the parent nucleus.

morula: a globular solid mass of blastomeres formed by cleavage of a zygote that typically precedes the blastocyst.

nucleus: a cellular organelle of eukaryotes that is essential to cell functions (as reproduction and protein synthesis), is composed of nuclear sap and a nucleoprotein-rich network from which chromosomes and nucleoli arise, and is enclosed in a definite membrane.

organism: an individual constituted to carry on the activities of life by means of organs separate in function but mutually dependent: a living being.

ovum (oocyte, egg): a female gamete—especially a mature egg that has undergone reduction, is ready for fertilization, and takes the form of a relatively large inactive gamete providing a comparatively great amount of reserve material and contributing most of the cytoplasm of the zygote.

placenta: the vascular organ in mammals that unites the fetus to the maternal uterus and mediates its metabolic exchanges through a more or less intimate association of uterine mucosal with chorionic and usually allantoic tissues permitting exchange of material by diffusion between the maternal and fetal vascular systems but without direct contact between maternal and fetal blood and typically involving the interlocking of fingerlike vascular chorionic villi with corresponding modified areas of the uterine mucosa.

pronucleus: the haploid nucleus of a male or female gamete (as an egg or sperm) up to the time of fusion with that of another gamete in fertilization.

protamine: any of various strongly basic proteins of relatively low

molecular weight that are rich in arginine and are found, associated especially with DNA, in place of histone in the sperm of various animals.

reprogramming: altering the epigenetic state of a nucleus such that it enters into a new developmental state; e.g. during cloning, a body cell nucleus is reprogrammed by factors within an oocyte to enter into a state similar to that of a zygotic nucleus, and capable of supporting a normal pattern of embryonic development.

RNA: any of various nucleic acids that contain ribose and uracil as structural components and are associated with the control of cellular chemical activities—called also ribonucleic acid. Messenger RNA is an RNA produced by transcription that carries the code for a particular protein from the nuclear DNA to a ribosome in the cytoplasm and acts as a template for the formation of that protein—also called mRNA.

SCNT/Cloning: Somatic cell nuclear transfer (SCNT): transplanting nuclei from body (*i.e.*, *somatic*) cells to enucleated eggs.

sperm (spermatozoa): a *sperm cell*. A motile male gamete of an animal usually with rounded or elongated head and a long posterior flagellum.

somatic: Of, relating to, or affecting the body especially as distinguished from the germ plasm or psyche.

syngamy: sexual reproduction by union of gametes. Commonly used to refer to the breakdown of nuclear membranes of the pronuclei approximately 24 hours after sperm-egg fusion.

transcription: the process of constructing a messenger RNA molecule using a DNA molecule as a template with resulting transfer of genetic information to the messenger RNA.

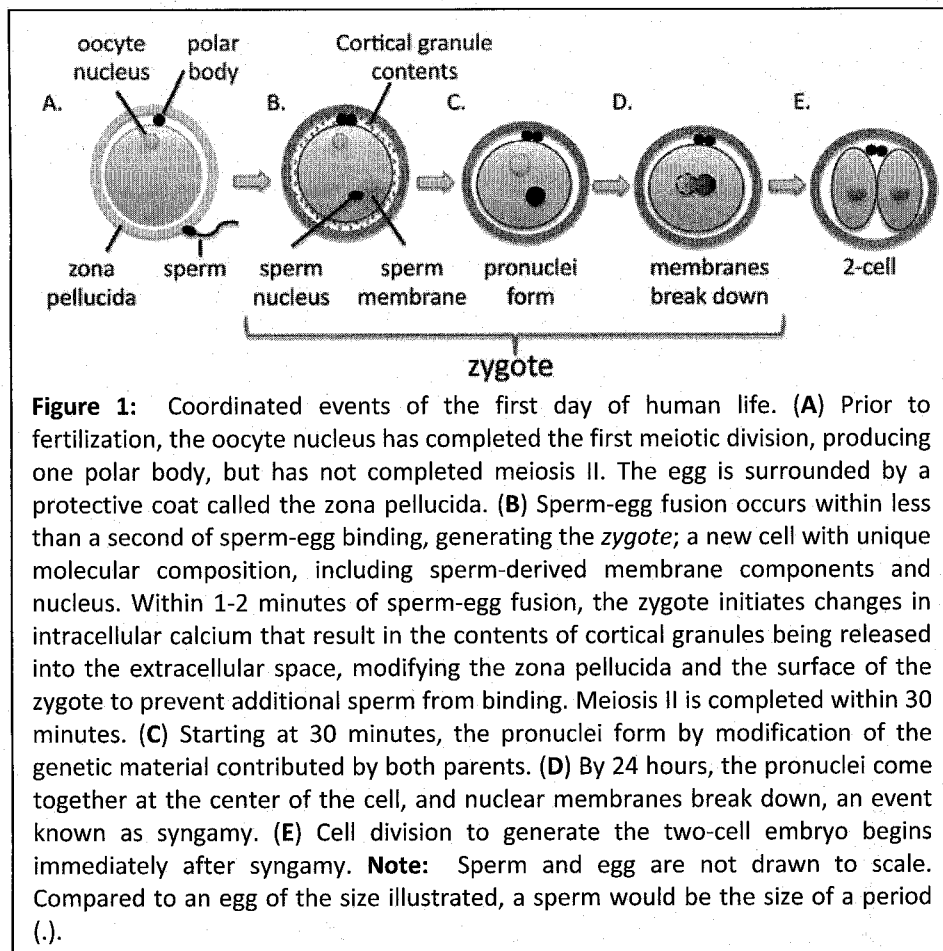
translation: the process of forming a protein molecule at a ribosomal site of protein synthesis from information contained in messenger RNA.

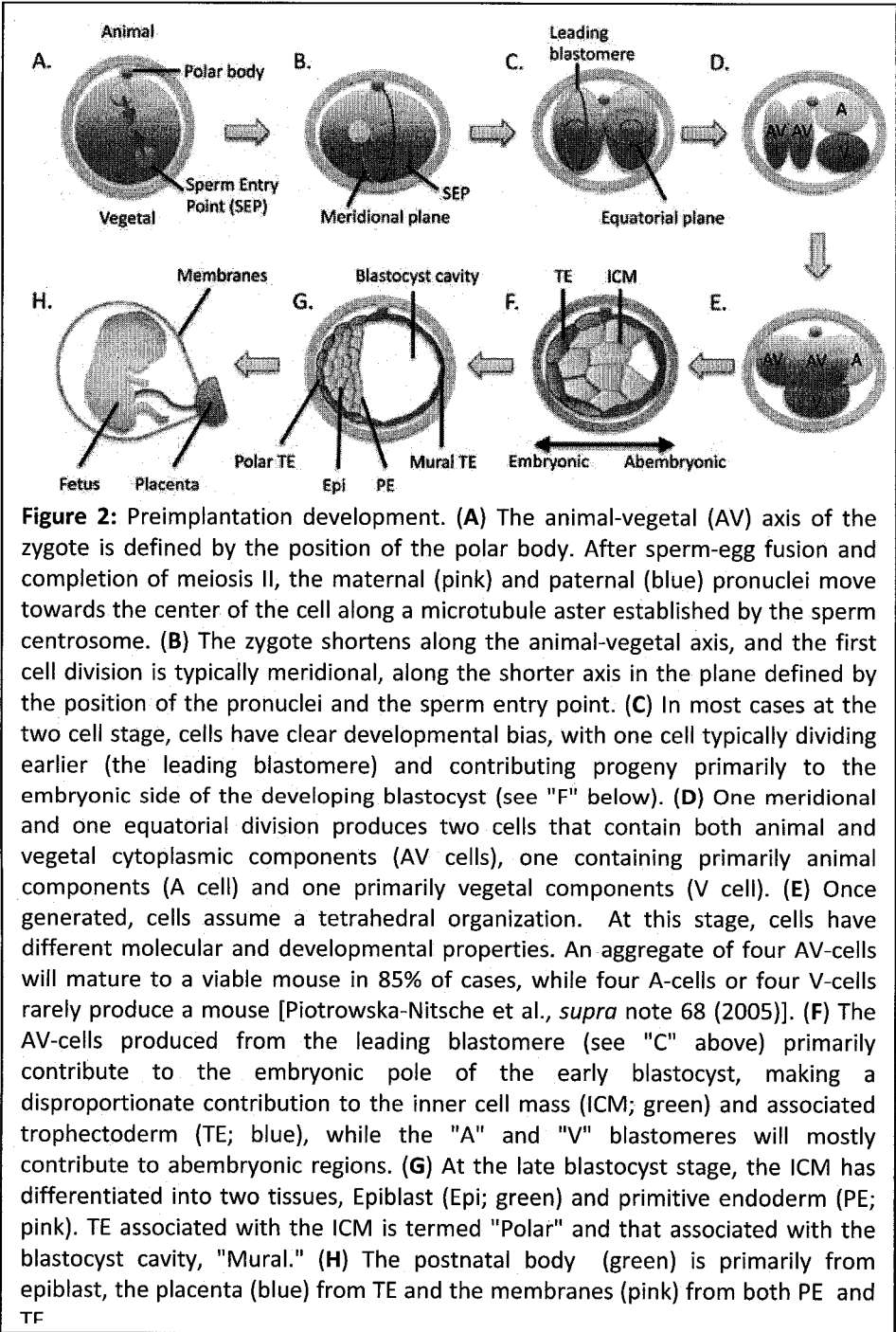
trophectoderm: (*TE*) the outer layer of the mammalian blastocyst after differentiation of the ectoderm, mesoderm, and endoderm when the outer layer is continuous with the ectoderm of the embryo. *Trophectoderm gives rise predominantly to the placenta.*

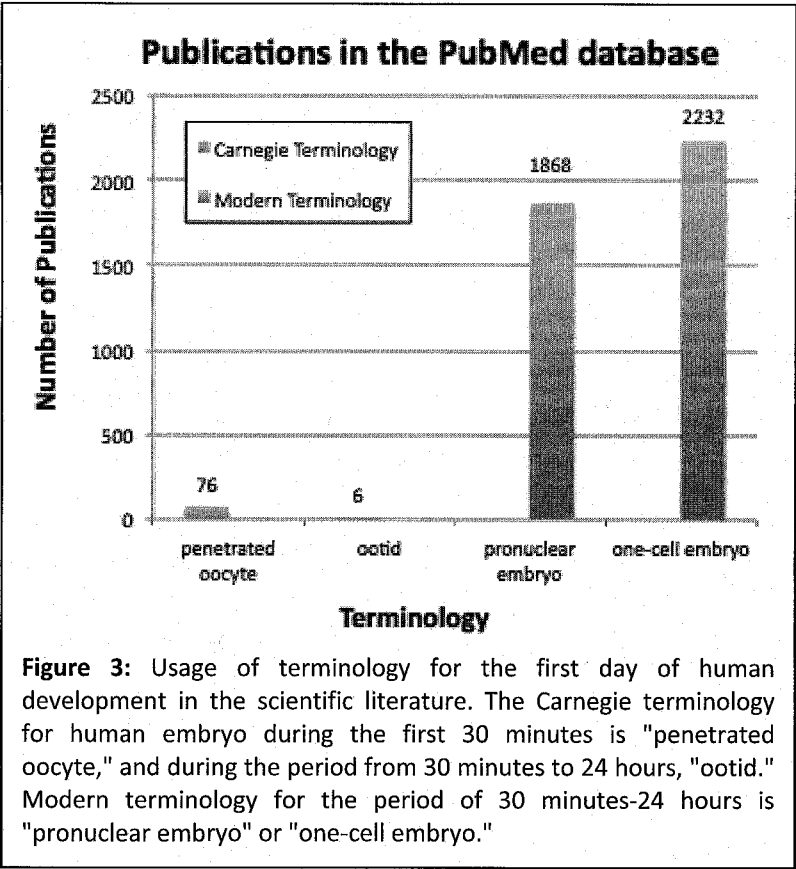
zona pellucida: the transparent more or less elastic noncellular glycoprotein outer layer or envelope of a mammalian ovum.

zygote: a cell formed by the union of two gametes; broadly the developing individual produced from such a cell.

Figures and Legends







Why We Need Federal Limits on Late Abortion to Protect Both Mother and Child

Ingrid Skop, M.D., F.A.C.O.G.



Issue 97 | October 2023

Previous Reports

Mary E. Harned, J.D., *Abortion "Shield Laws": Pro-Abortion States Seek to Force Abortion on Life-Affirming States*, On Point Series 96
Michael J. New, Ph.D., *Hyde @ 40: Analyzing the Impact of the Hyde Amendment with July 2020 and June 2023 Addenda*, On Point Series 95
Richard M. Doerflinger, M.A., *The Women's Health Protection Act of 2023: Attacking the Health and Freedom of Women*, On Point Series 94
Mary E. Harned, J.D., *Pro-Abortion States Accelerate Their Race to the Bottom*, On Point Series 93
Richard M. Doerflinger, M.A., *Lethal Non-Compliance with Washington's "Death with Dignity Act,"* On Point Series 92
Richard M. Doerflinger, M.A., *The Effort to Reinterpret EMTALA to Mandate Abortions*, On Point Series 91
Michael New, Ph.D., *Texas' Gain: The Lifesaving Impact of the Texas Heartbeat Act*, On Point Series 90
Richard M. Doerflinger, M.A., *Politifact and Fiction on Abortion*, On Point Series 89
Mia Steupert, M.A., *A Primer on the Standing with Moms Act*, On Point Series 88
Matt Connell, Maria Donovan, *Adoption Tax Credits: Utilization, State Expansions, and Taxpayer Savings (2022)*, On Point Series 87
Ingrid Skop, M.D., Mary E. Harned, J.D., *Pro-Life Laws Protect Mom and Baby: Pregnant Women's Lives are Protected in All States*, On Point Series 86
Moira Gaul, M.P.H., Jeanneane Maxon, J.D., *Lives Saved Impact at U.S. Pregnancy Help Centers*, On Point Series 83

The full text of this publication can be found at: <https://lozierinstitute.org/why-we-need-federal-limits-on-late-term-abortion-to-protect-both-mother-and-child/>

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Most on the left vehemently oppose any legislative limits on abortion, and some on the right, even if they identify as pro-life, are of the opinion that a federal limit on late abortions would fail to find consensus and so could not be passed. Neither position is tenable in light of the evidence that limits on late abortion are needed for both women and their unborn children, and that popular support exists for such limits.¹

Is it true that federal limits on late abortion could not find consensus?

Polls document that 72% of Americans agree with limiting abortion to no later than 15 weeks, so there appears to be broad public consensus supporting limits. Only 10% agree with the radical position of abortion on demand for any reason at any time in pregnancy.² The U.S. is in the minority with its hyper-permissive abortion policy: we are one of very few countries allowing elective abortion in the second half of pregnancy, in the same camp as North Korea and China.³ This is surprising, given how extensively the humanity of unborn children has been documented. At 15 weeks' gestation they have all their major organs, a beating heart, and suck their thumb (even demonstrating whether they are right- or left-handed based on their preference visualized on ultrasound). At this same stage, they respond to touch, taste, and pain, and some have been successfully operated upon in utero to correct defects.⁴

How often do late abortions occur?

Over the past 10 years, the CDC reports that between 7.5 and 9.2% of abortions performed annually were after 13 weeks' gestation, and approximately 1% were performed after 21 weeks' gestation, when the child can often survive if separated from his or her mother.⁵ However, CDC data is limited by voluntary state reporting. Some of the states that perform large numbers of late abortions, such as California and Maryland, refuse to provide data to the CDC. The Guttmacher Institute, which receives its information directly from abortion providers, consistently reports a significantly higher national abortion total, with nearly a million abortions performed in the U.S. each year; this suggests that around 10,000 abortions at 21 weeks of gestation or later are performed annually.⁶

What are the reasons for late abortions?

¹ Although no standard medical definition exists for "late abortion," this discussion will consider "late abortions" to be those performed after the first trimester and "extremely late abortions" to be those performed after viability (late second trimester and third trimester).

² "Polling," Susan B. Anthony Pro-Life America, accessed September 19, 2023, <https://sbapro-life.org/polling>.

³ Angelina Baglini, "Gestational Limits on Abortion in the United States Compared to International Norms," *Lozier Institute*, February 1, 2018, <https://lozierinstitute.org/internationalabortionnorms/>.

⁴ Katrina Furth, "15 Facts at 15 weeks," *Lozier Institute*, September 9, 2021, <https://lozierinstitute.org/15-facts-at-15-weeks/>.

⁵ Katherine Kortsmits et al., "Abortion Surveillance — United States, 2020," *Morbidity and Mortality Weekly Report* 71, no. 10 (November 25, 2022): 1–27, <https://doi.org/10.15585/mmwr.mm7110a1>.

⁶ Guttmacher Institute, "Induced Abortion in the United States," *Guttmacher*, September 2019, <https://www.guttmacher.org/fact-sheet/induced-abortion-united-states>.

Most Americans assume that late abortions are performed for tragic reasons, such as threats to the life of the mother or severe fetal abnormalities. In reality, however, most late abortions are performed for the very same elective reasons that earlier abortions are obtained, and are often influenced by partner abandonment, coercion, and indecision. In one study, reasons given for late abortions included “not knowing about the pregnancy,” “trouble deciding about the abortion,” and “disagreeing about the abortion with the man involved.”⁷ The same study, citing previous research, concluded that “data suggest that most women seeking later terminations are not doing so for reasons of fetal anomaly or life endangerment.” An additional study found that 50% of women having second-trimester abortions delayed the procedure due to indecision, 36% due to lack of awareness of whether they were pregnant or how far along they were, and 33% due to the difficulty of the decision.⁸ Unasked by the researchers, but consistent with the frequently noted indecision and relationship difficulties, is the possibility that pressure toward abortion by the baby’s father may also motivate some of these late abortions. Nine months is a long time for a woman who desires her child to continue saying “no” to a coercive partner. We could protect many women from unwanted abortions if we prohibited late, elective abortions.

What about the “hard cases”?

Although few states document the reasons (though all should) for abortions reported, Florida and Utah do report this data. In 2021, Florida reported that only 12% of second trimester abortions were obtained to protect the life and health of the mother, address life-limiting fetal conditions, or intervene after rape and incest. Utah reported in 2021 that, of 254 abortions performed on resident women in the state in the second trimester or later, zero were due to rape or life endangerment and only 12 were due to fetal malformation. The vast majority of late abortions in these states—95% in Utah, and 88% in Florida—were either elective or performed for social, financial, other, or unstated reasons.⁹ In fact, it is extremely rare for an obstetrician to perform an abortion to save a mother’s life. Life-threatening events usually occur in the second half of pregnancy, when the child can be separated from his or her mother by induction or cesarean section in an attempt to save both lives.¹⁰ If an abortion is needed, however, every current state law protecting unborn human life allows an exception so that a physician may intervene in a life-threatening emergency. Undoubtedly, a federal limit would also include this exception.¹¹

⁷ Diana Greene Foster and Katrina Kimport, “Who Seeks Abortions at or after 20 Weeks?,” *Perspectives on Sexual and Reproductive Health* 45, no. 4 (November 4, 2013): 210–18, <https://doi.org/10.1363/4521013>.

⁸ Lawrence B. Finer et al., “Timing of Steps and Reasons for Delays in Obtaining Abortions in the United States,” *Contraception* 74, no. 4 (October 1, 2006): 334–44, <https://doi.org/10.1016/j.contraception.2006.04.010>.

⁹ “Agency for Health Care Administration: Reported Induced Terminations of Pregnancy (ITOP) by Reason, by Trimester, 2021 --- Year to Date,” accessed September 25, 2023, https://ahca.myflorida.com/content/download/7207/file/TrimesterByReason_2021.pdf; “Utah Vital Statistics: Abortions 2021,” accessed September 25, 2023, <https://vitalrecords.utah.gov/wp-content/uploads/Abortion-Report-2021.pdf>.

¹⁰ Ingrid Skop, “Fact Sheet: Medical Indications for Separating a Mother and Her Unborn Child,” *Lozier Institute*, May 17, 2022, <https://lozierinstitute.org/fact-sheet-medical-indications-for-separating-a-mother-and-her-unborn-child/>.

¹¹ Ingrid Skop, “Abortion Policy Allows Physicians to Intervene to Protect a Mother’s Life,” *Lozier Institute*, May 16, 2023, <https://lozierinstitute.org/abortion-policy-allows-physicians-to-intervene-to-protect-a-mothers-life/>; Mary Harned and Ingrid Skop, “Pro-Life Laws Protect Mom and Baby: Pregnant Women’s Lives are Protected in All States,” *Lozier Institute*, September 11, 2023, <https://lozierinstitute.org/pro-life-laws-protect-mom-and-baby-pregnant-womens-lives-are-protected-in-all-states/>.

Do extremely late abortions really occur?

Doe v. Bolton, the companion case to *Roe v. Wade*, allowed abortion at any time in pregnancy if it would benefit the “health” of a woman, defined as any factor contributing to her “well-being,” encompassing physical, mental, emotional, familial, age, and social factors.¹² This allowed abortion to be justified at any time in pregnancy. CLI estimates, based on information collected and analyzed from ineedana.com, that there are 285 clinics, across 30 U.S. states, offering abortion at 15 weeks’ gestation or later. This includes 137 clinics that perform abortions through 20 weeks’ gestation, 120 through 24 weeks’ gestation, 23 through 28 weeks’ gestation, and five through 29 weeks’ gestation and later. Notorious Boulder, Colorado abortionist Warren Hern, in an interview with *The Atlantic*, confirmed that more than half of the dozen late abortions he performs weekly occur in healthy women with healthy babies.¹³ Although 25 states have passed abortion restrictions in the year since the Supreme Court’s *Dobbs v. Jackson Women’s Health* decision, the remaining states have not implemented any restrictions, allowing extremely late abortions to continue up to the point of birth, for any reason.¹⁴

Can late abortions result in physical complications and death?

Late abortions are associated with a higher incidence of complications compared to earlier abortions,¹⁵ due to the anatomical and physiologic changes that occur as the pregnancy advances. The increased amount of fetal and placental tissue requires a greater degree of cervical dilation, the increased blood flow predisposes to hemorrhage, and the relaxed uterine musculature is more subject to mechanical perforation. Moreover, due to the calcification of fetal bones after the first trimester, a dilation and evacuation (D&E) abortion requires stretching open a strong muscular cervix and dismembering the fetus by multiple passages of the surgeon’s instruments into the uterus, which could easily result in physical damage to a woman, even in experienced hands. The CDC has documented that the risk of maternal death from abortion increases by 38% for each additional week beyond eight weeks’ gestation, rising to a 76-fold higher risk of mortality in the late second trimester.¹⁶ Women’s safety will benefit from limiting later, more dangerous abortions.

Can late abortions result in mental health complications?

Mental health complications have been documented to occur in many women following abortion, specifically resulting in higher risks of depression, anxiety, substance and alcohol abuse, and self-harm.¹⁷ These mental health issues may then lead to “deaths of despair”: suicide, homicide, substance

¹² *Doe v. Bolton*, 410 U.S. 179 (1973)

¹³ Elaine Godfrey, “The Abortion Absolutist,” *The Atlantic*, May 12, 2023, <https://www.theatlantic.com/politics/archive/2023/05/dr-warren-hern-abortion-post-roe/674000/>.

¹⁴ “Life-Saving Laws,” Susan B. Anthony Pro-Life America, accessed September 19, 2023, <https://sbapro-life.org/lifesavinglaws>.

¹⁵ Monique Wubbenhorst, “Midtrimester Abortion Epidemiology, Indications and Mortality,” *Lozier Institute*, October 28, 2021, <https://lozierinstitute.org/midtrimester-abortion-epidemiology-indications-and-mortality/>.

¹⁶ Linda Bartlett et al., “Risk Factors for Legal Induced Abortion–Related Mortality in the United States,” *Obstetrics & Gynecology* 103, no. 4 (April 1, 2004): 729–37, <https://doi.org/10.1097/01.aog.0000116260.81570.60>.

¹⁷ Charlotte Lozier Institute, “Fact Sheet: Abortion and Mental Health,” *Lozier Institute*, September 13, 2023, <https://lozierinstitute.org/fact-sheet-abortion-and-mental-health/>.

overdoses, and accidental deaths from high-risk-taking behavior. Such mental health deaths have been documented to occur six times as often in the year following abortion than following childbirth in European records-linkage studies. The U.S. abortion-related maternal mortality data, however, is known to be dramatically incomplete because the CDC relies primarily on death certificates, which often do not report a preceding abortion. Some subgroups of women are at particularly high risk of mental health complications, including those who obtain a coerced or unwanted abortion.¹⁸ Sometimes abortion advocates argue that these women suffered from more mental health disorders prior to pregnancy and any subsequent mental health disorders were unrelated to the abortion. This argument has been undermined, however, by a recent records-linkage study documenting significantly greater increases in outpatient mental health visits, inpatient mental health hospitalizations, and longer inpatient mental health stays, following abortion than compared to childbirth. This was the case even though pre-pregnancy mental health diagnoses were more common in the childbirth cohort compared to the abortion cohort.¹⁹

Are infants ever born alive after a failed late abortion?

As the fetus grows, D&E becomes harder to perform due to the difficulty in eviscerating and disarticulating a larger fetus, so the abortionist will often perform an induction abortion late in pregnancy. To prevent a fetus from being born alive (which European studies have documented occurs more than half of the time in labor induction abortions²⁰), the abortionist kills the fetus before labor induction. This is usually done with intraamniotic or intracardiac potassium chloride or digoxin injection, but entails additional risks to a woman if these potent cardiotoxic medications enter her bloodstream.²¹ A recent survey of late abortion providers, however, documented that almost 70% do not routinely kill the fetus first,²² so it is likely that many babies survive induction abortion and are actively or passively euthanized in unsupervised clinics. Additionally, compelling fetal neurologic research documents that pain perception begins as early as 12-15 weeks' gestation, so these babies likely experience excruciating pain as they are killed.²³

Conclusion

Despite the resistance of many who support abortion to any federal restrictions that would limit late, elective abortion procedures, most Americans support such limits. Many late abortions occur in the U.S.

¹⁸ David C. Reardon and Tessa Longbons, "Effects of Pressure to Abort on Women's Emotional Responses and Mental Health," *Cureus*, January 31, 2023, <https://doi.org/10.7759/cureus.34456>

¹⁹ James Studnicki et al., "A Cohort Study of Mental Health Services Utilization Following a First Pregnancy Abortion or Birth," *International Journal of Women's Health* Volume 15 (June 1, 2023): 955–63, <https://doi.org/10.2147/ijwh.s410798>.

²⁰ Stephanie Springer et al., "Fetal Survival in Second-Trimester Termination of Pregnancy without Feticide," *Obstetrics & Gynecology* 131, no. 3 (March 1, 2018): 575–79, <https://doi.org/10.1097/aog.0000000000002503>.

²¹ Michael Molaei et al., "Effectiveness and Safety of Digoxin to Induce Fetal Demise Prior to Second-Trimester Abortion," *Contraception* 77, no. 3 (March 1, 2008): 223–25, <https://doi.org/10.1016/j.contraception.2007.10.011>.

²² Katharine O. White et al., "Second-Trimester Surgical Abortion Practices in the United States," *Contraception* 98, no. 2 (August 1, 2018): 95–99, <https://doi.org/10.1016/j.contraception.2018.04.004>.

²³ Charlotte Lozier Institute, "Fact Sheet: Science of Fetal Pain," *Lozier Institute*, September 13, 2022, <https://lozierinstitute.org/fact-sheet-science-of-fetal-pain/>.

and almost all are obtained for elective financial or social reasons. Additionally, it has been documented that many of these abortions are obtained following coercion or indecision. Late abortions are more dangerous than early abortions and are associated with far higher rates of maternal mortality. Mental health complications are also documented more frequently following late abortions. Further, there are reasons to believe that infanticide does occur after failed late induction abortions, although due to lax oversight of abortion clinics these deaths usually remain unreported. Fetal neuroscience documents that pain does occur in fetuses killed in late abortions, and we should all consider this of added moral significance. Our country's commitment to "choice" has led us to avert our attention from the scourge of late abortions, capable of causing physical complications, mental health harm, and death to women, causing painful deaths to members of our own species, and occasionally permitting infanticide. As a caring and just society, surely, we can reach a consensus to prevent these egregious ethical violations.

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Worldwide decline of IVF birth rates and its probable causes

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Submitted on January 14, 2019; resubmitted on May 20, 2019; editorial decision on June 3, 2019

ABSTRACT: With steadily improving pregnancy and live birth rates, IVF over approximately the first two and a half decades evolved into a highly successful treatment for female and male infertility, reaching peak live birth rates by 2001–2002. Plateauing rates, thereafter, actually started declining in most regions of the world. We here report worldwide IVF live birth rates between 2004 and 2016, defined as live births per fresh IVF/ICSI cycle started, and how the introduction of certain practice add-ons in timing was associated with changes in these live birth rates. We also attempted to define how rapid worldwide ‘industrialization’ (transition from a private practice model to an investor-driven industry) and ‘commodification’ in IVF practice (primary competitive emphasis on revenue rather than IVF outcomes) affected IVF outcomes. The data presented here are based on published regional registry data from governments and/or specialty societies, covering the USA, Canada, the UK, Australia/New Zealand (combined), Latin America (as a block) and Japan. Changes in live birth rates were associated with introduction of new IVF practices, including mild stimulation, elective single embryo transfer (eSET), PGS (now renamed preimplantation genetic testing for aneuploidy), all-freeze cycles and embryo banking. Profound negative associations were observed with mild stimulation, extended embryo culture to blastocyst and eSET in Japan, Australia/New Zealand and Canada but to milder degrees also elsewhere. Effects of ‘industrialization’ suggested rising utilization of add-ons (‘commodification’), increased IVF costs, reduced live birth rates and poorer patient satisfaction. Over the past decade and a half, IVF, therefore, has increasingly disappointed outcome expectations. Remarkably, neither the profession nor the public have paid attention to this development which, therefore, also has gone unexplained. It now urgently calls for evidence-based explanations.

Key words: IVF / live birth rate / elective single embryo transfer / PGS / preimplantation genetic testing for aneuploidy / embryo banking / blastocyst-stage embryo transfer / all-freeze cycles

Introduction

US live birth rates, defined as live birth rates per fresh cycle of IVF or ICSI started, almost steadily improved until 2001–2002, declined between 2003 and 2007, reached a new high in 2008, plateaued till 2010 and have since been steadily declining, especially profoundly between 2013 and 2016 (Fig. 1). Similar trends have also been observed in other regions of the globe, including Canada, Australia/New Zealand (reporting combined) and especially Japan (for detailed figures and analyses the reader is referred to Kushnir *et al.*, 2017a). Quite surprisingly, these developments have, however, neither attracted attention from the medical profession nor public, even though live birth rates in the USA by 2016 had fallen to levels not seen since 1998 (Centers for Disease Control and Prevention, 2016).

The declines in IVF live birth rates pointed out here represent a long-term reversal in a previously consistent trend of outcome improvements. They, therefore, also are a formal rebuttal of what patients’ primary desires are in IVF cycles, reported as timely conception and delivery (Scotland *et al.*, 2007; Schaller *et al.*, 2016). Exploring why these declines are happening, therefore, appears overdue. In presenting here the first results of such an investigation, we attempted to associate changes in IVF practice in different regions of the world with observed declines in live birth rates.

Background

On 25 July 2018, the world celebrated the 40th anniversary of the 1978 birth of the first ‘test-tube baby’ (Steptoe and Edwards, 1978).

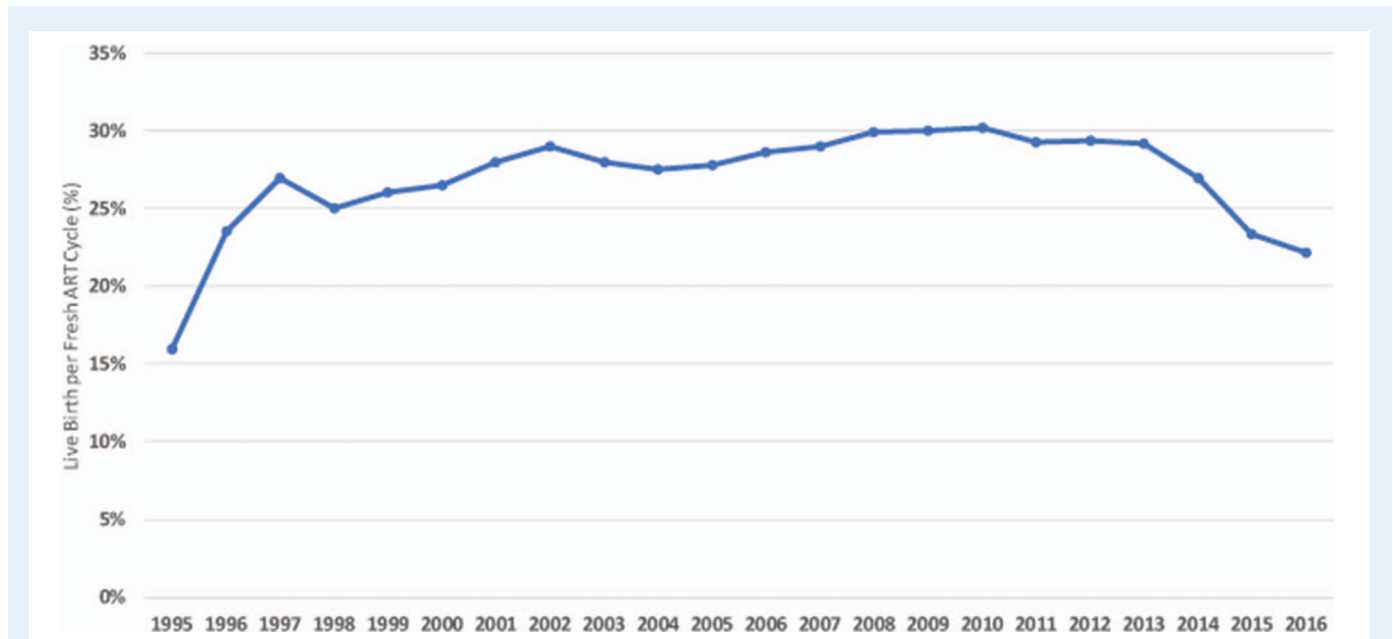


Figure 1 US annual live birth rates following fresh autologous IVF cycles from 1995 to 2016. The data for this figure are derived from annual CDC ART Success Rate Reports (www.cdc.gov/art/artdata/), accessed 10 August 2018 and again 7 March 2019. Live birth rates demonstrate almost steady improvements until 2002, a decline between 2003 and 2007, reaching a new peak similar to that in 2002 between 2008 and 2010, only to again decline by 2016 to rates not seen since 1998.

Initially an experimental procedure with very limited outcomes, IVF quickly developed into a clinically and economically highly successful medical sub-specialty area. In the USA, IVF primarily evolved in private practice settings outside of academia because the procedure was by Congress implicitly excluded from most government-funded research. Economic competition between centers based on pregnancy and live birth outcomes, therefore, became a principal reason for quick outcome improvements. Except for a short plateau in live birth rates in the mid-1990s, IVF outcomes, therefore, steadily improved until approximately 2001–2002 (Fig. 1).

By the mid-1990s, some US states (MA, IL, VA, CA) had mandated varying levels of IVF insurance coverage for IVF. Insurance carriers in those states, therefore, started contracting with preferred medical providers—in the process creating a first generation of mega-IVF centers. Controlling large local market shares, these IVF centers were largely relieved from outcome-driven competition but now faced significant cost-based competition. As Fig. 1 demonstrates, this led to first ever observed evidence that ‘industrialization’ of IVF may lead to negative outcome consequences, as national live birth data between 1997 and 1999 for the first time ever flattened. On an interesting side note, US live birth rates in 2016, the last year of available national data, fell to exactly the same low levels as seen during those 2 years (see also later discussion).

Outcome improvements, however, resumed, reaching a new peak around 2001–2002. As Fig. 1 further demonstrates, US live birth rates then again dipped between 2002 and 2008, recovered between 2008 and 2010 and have, ever since, fallen precipitously to the lowest levels since 1998. Especially after 2010, rates truly plummeted, strongly suggesting that significant changes in national US IVF practice must have occurred to cause such significant changes in national live birth rates.

Fresh autologous IVF cycles in the USA, nevertheless, continued to outperform other regions of the world (Kushnir et al., 2017a), with greater outcome-dependent competition between US centers, possibly, a contributing factor. US society apparently values individual pregnancy success very highly, while, for example, many European countries favor more a social construct of national health care priorities (Gleicher et al., 2007).

Looking at the world over decades, consistency of observed geographic variations in fresh autologous IVF cycle outcomes between regions is, indeed, remarkable (Kushnir et al., 2017a). One, therefore, must assume that observed differences in macro-health are caused by how local health care systems provide services. When, despite such varying health care systems, however, similar declines in live birth rates are observed at approximately similar time periods, it is reasonable to assume that those declines must be associated with new practice changes that affected IVF worldwide. We, therefore, attempted to identify practice changes that may be causally associated with universally observed declines in live birth rates in different regions of the world.

Methods

The here-discussed autologous IVF outcome data, mostly representing live birth rates for the 12 years between 2004 and 2016 and defined as live births per fresh IVF/ICSI cycle start, reflect distinctively different racial and ethnic patient populations in the USA, Canada, the UK, Australia/New Zealand (combined), Latin America (as a block) and Japan, either based on national data sets or outcome data reported by regional fertility societies. Data sources used were retrieved from publicly available local registries of either government agencies and/or

regional professional societies (Kushnir *et al.*, 2017a) and, where applicable, are referenced. Though the original intent was also to include annual data sets published by ESHRE, those data, ultimately, had to be removed since the year-to-year variations in reporting countries varied too much to allow for reliable conclusions.

Add-ons to IVF practice that were investigated included extended embryo culture to blastocyst stage (BSC), other BSC-dependent new procedures, including mild stimulation, elective single embryo transfer (eSET), PGS (preimplantation genetic testing for aneuploidy: PGT-A), all-freeze cycles and embryo banking. We, furthermore, investigated time associations between IVF results and 'industrialization', defined as transition from a private practice model into an investor-driven industry, and for 'commoditization', defined as primary emphasis on revenue rather than IVF outcomes. Effects of 'industrialization' and 'commoditization' were in detail only investigated in Australia/New Zealand, where these developments have been most advanced, with only three companies controlling a lion share of the national IVF market. Since the medical literature until very recently did not comment on this subject, our sources for these associations were primarily media reports, and they are referenced.

Time associations are hypothesis generating and not proof of causation. Persistently observed associations with identical treatment changes in different regions of the world, however, do suggest potential causality. They, however, still require independent verification to prove cause and effect.

Results

Why IVF outcomes, likely, have declined

Kushnir *et al.* (2017a) recently reported live birth rates for various regions till 2014, including the USA, Canada, the UK, Latin America, Australia and New Zealand (combined) and Japan. We here, when available, added the years 2015–2016 for some regions (the USA, Japan and Australia/New Zealand). European data, other than the UK's, were not included. Kushnir and colleagues reported impressive gains in Canadian live birth rates until 2009–2010. In subsequent years, the Canadian live birth rate, however, remarkably declined. US rates by 2016, indeed, fell to levels not seen since 1998 (Fig. 1).

BSC and eSET

Looking for associated events that could explain Canada's sudden drop in birth rates, Canada's most populous province, Québec, in 2010 introduced legislation that initiated funding of IVF, while restricting the number of embryos that could be transferred, strongly promoting the use of eSET. By 2011, the programme was hailed as a success for significantly reducing twin pregnancy rates (Bissonnette *et al.*, 2011), while others noted that pregnancy rates had precipitously dropped and that 33.1% fewer IVF infants had been born following a directed practice change to greater utilization of eSET (Gleicher, 2011).

Kushnir *et al.* (2017a) also explored eSET utilization around the world and demonstrated uniform increases in eSET utilization during the study period. Australia/New Zealand and Japan were the two world regions demonstrating the largest increases in eSET utilization, while, starting in 2007, Japan, the UK and Canada demonstrated the most rapid increases.

Recently extensively reviewed (Adashi and Gleicher, 2017), we here do not intend to address controversies surrounding eSET. That eSET, in comparison to double embryo transfer, reduces clinical pregnancy rates is well established (McLernon *et al.*, 2010). Observed associations between declining live birth rates and compensatory increases in IVF cycles started also support a likely association between growing eSET utilization and declines in live birth rates (Kushnir *et al.*, 2017a).

Evidence of such an association is nowhere more obvious than in Japan. Already in 2004 demonstrating the lowest fresh cycle live birth rates in the world, the country's rates further plummeted between 2004 and 2008, only to experience further small declines in 2009–2016, reaching and maintaining over these years an astonishing live birth rate with reference to cycles started of only ~5.0%. Japan, over the here presented study period, thus lost two-thirds of its already very low 2004 live birth rate (Kushnir *et al.*, 2017a). This decline coincided with introduction of the so-called 'Kato protocol', first published in 2007 (Teramoto and Kato, 2007) but widely known, and copied in the Japanese IVF community since 2002–2003. The protocol was defined by mild ovarian stimulation, BSC and eSET and quickly became the dominant IVF protocol in all of Japan.

Demonstrating a likely association between declining live birth rates and increasing IVF cycle starts remarkably well, Japan compensated for the loss of two-thirds of her live births between 2004 and 2013 (from ca. 15% to ca. 5%), by tripling the cycles started (Kushnir *et al.*, 2017a).

A quantitatively less radical but similar association is offered by Australia/New Zealand. These two countries doubled their utilization of BSC and eSET between 2004 and 2013 to a world-leading 80% of fresh IVF cycles (only Japan reached similar eSET utilization). Only outperformed by Japan, Australia/New Zealand since 2004 also persistently demonstrated the second lowest IVF live birth rates among regions of the world here investigated. Australia/New Zealand also demonstrated the same mirror image between falling live birth rates and increasing cycle starts (Kushnir *et al.*, 2017a).

Proponents of eSET argue that lower live birth rates after eSET are largely compensated by improving outcomes with, and increasing birth rates of, frozen-thawed second cycles (Pandian *et al.*, 2013). This argument is based on two reported observations: cumulative pregnancy and live birth rates from fresh plus one thaw cycle match, or even slightly exceed, rates from only a fresh IVF cycle (Pandian *et al.*, 2013) and elective transfers of frozen embryos in a later cycle produce improved pregnancy and live birth rates in comparison to fresh transfers in stimulated cycles (Wei *et al.*, 2019).

Both arguments are, however, incorrect: first, no patient can ever be guaranteed an opportunity for a subsequent frozen-thawed cycle. Moreover, second cycles increase cost and length to conception; second, arguments that pregnancy and live birth rates are improved by avoiding fresh transfers in stimulated cycles and delaying them into subsequent frozen-thawed cycles are based on inappropriate patient selection and, therefore, at best, only apply to good prognosis patients. This was recently well demonstrated by two mega-studies from China, where one reported improved IVF outcomes with frozen transfers (Wei *et al.*, 2019) and the other demonstrated absolutely no outcome differences (Shi *et al.*, 2018). Both studies were multi-center studies, conducted in China on a predominantly Han population. The only difference was that the first study compared blastocyst-stage transfers, where the study design excluded poorer prognosis patients whose embryos cannot reach blastocyst-stage in culture, while the

second study performed transfers at cleavage stage. In unselected patient populations, deferred embryo transfer after embryo freezing, therefore, does 'not' improve IVF outcomes. Indeed, it is reasonable to assume that this practice in poor prognosis patients, whose embryos survive freezing and thawing poorly, may actually adversely affect IVF outcomes. In addition, here too, a second cycle is needed, increasing costs and potentially delaying time to pregnancy.

Being pioneering countries in basic reproductive biology research, the poor clinical performance of clinical IVF in countries like Japan, Australia/New Zealand and Canada is puzzling but emblematic of how difficult it can be to convert excellent basic science research into equally excellent clinical practice. That these clinical data were produced in scientifically highly developed countries, however, allows for the conclusion that the observed relatively poor IVF outcomes were not a consequence of technical weaknesses in local laboratories. These outcomes, therefore, with great likelihood must be the consequence of specific changes in clinical practice patterns. Interestingly, in the USA extended routine BSC and eSETs also started to increase in popularity around 2010 (Kushnir et al., 2017a), exactly when live birth rates initiated their precipitous decline (Fig. 1).

Other methods of embryo selection

BSC is also an essential component of other embryo selection methods, such as PGS/PGT-A, closed embryo incubation with time lapse imaging, embryo banking and all-freeze protocols. They all represent relatively new add-ons to IVF, characterized by questionable clinical utility (Harper et al., 2017). They also all share potentially negative effects on IVF outcomes.

Adverse effects will be even more obvious if add-ons are used indiscriminately and, especially, if they are used on patients of advanced age and/or with low functional ovarian reserve. This is, however, exactly what has been happening. As there is no evidence that BSC improves cumulative pregnancy rates (De Vos et al., 2016; Glujovsky et al., 2016) or improves implantation rates in first transfers in any patient population but good prognosis patients, BSC, developed as an embryo selection method in good prognosis patients, for no obvious reasons evolved in many IVF laboratories into a routine embryo culture practice for almost everybody. In the USA, 2016 Centers for Disease Control and Prevention (CDC) data demonstrate that approximately two-thirds of fresh autologous IVF cycles utilized BSC (Centers for Disease Control and Prevention, 2016). Routine BSC was recently also questioned based on biological concerns (Maheshwari et al., 2016).

The most controversial embryo selection method is currently, however, PGS/PGT-A. After version 1.0 was found ineffective (Practice Committee of the ASRM, 2008), currently used versions, 2.0 and 3.0, result in high numbers of false-positive diagnoses (Paulson, 2017). PGS/PGT-A was recently also, once again, declared ineffective in improving IVF outcomes in a combined statement from the Practice Committees of the American Society for Reproductive Medicine and Society for Assisted Reproductive Technology (2018). Because of the high false-positivity rate, a large number of perfectly normal embryos are now routinely discarded which, if transferred, in surprisingly high percentages still would result in normal births (Gleicher et al., 2015, 2016a; Greco et al., 2015; Morales et al., 2016; Munné et al., 2017; Victor et al., 2019). Especially in poorer prognosis patients, PGS/PGT-A affects IVF pregnancy chances negatively. Recent national US

outcome data also suggest that in unselected patient populations, PGS/PGT-A actually reduces live birth rates (Kushnir et al., 2016a).

Mild ovarian stimulation

This IVF modification was already addressed within the context of the 'Kato protocol', which by design produces greatly reduced egg numbers in comparison to standard ovarian stimulations (Kushnir et al., 2016b, 2017a). After a woman's age, transferrable embryo numbers are, however, the best predictors of IVF success (Gleicher et al., 2016b). Mild stimulations, therefore, appears counterintuitive, even if used separate from the 'Kato protocol' and eSET.

IVF cycle interruptions: embryo banking

The hypothesis of embryo banking is that, especially in poor prognosis patients (who usually produce few oocytes and embryos), sequential freeze-all cycles offer clinical and/or financial benefits by delaying embryo transfer or PGS/PGT-A until sufficient eggs/embryos have been accumulated. In the USA, embryo banking has led to major distortions in national outcome reporting (Kushnir et al., 2016b). A recent study of 10 outlier centers with especially high percentages of embryo banking cycles demonstrated corrected live birth rates for this group of centers that were below the median of all other remaining US centers (Kushnir et al., 2016b, 2017b).

Embryo banking has grown exponentially since 2007 but the fastest in the 2010–2011 period (Kushnir et al., 2017a,b), corresponding to first declines in US live birth rates (Fig. 1). Since the CDC registry did not consider cycles that did not reach embryo transfer, declines in US live births after 2010 are, therefore, likely actually underreported, even further increasing already highly disturbing declines in US live birth rates in recent years (Kushnir et al., 2017a and Fig. 1).

Industrialization and commoditization of IVF

The investment community has over the past 10–15 years come to view infertility, and especially the practice of IVF, as a potential growth industry. The sector, therefore, has been attracting significant outside equity, with IVF centers, and companies serving those centers, being bought up by corporate interests at an increasingly rapid pace—a process we here describe as the 'industrialization' of IVF.

Such attempts started in the USA in the 1990s, when the first mega-IVF centers were established, and Wall Street promoted as market leaders in medical specialty areas the concept of so-called physician practice management companies. Disappointing earnings, however, ended quickly what later by economists was called the 'physician practice management bubble' (<https://www.beckershospitalreview.com/hospital-physician-relationships/physician-practice-management-a-new-chapter.html>, 10 January 2019, date last accessed) and a large majority of so-created companies in many different medical specialties, including infertility and IVF, disappeared as quickly as they had initially appeared on the scene.

Aggregations of fertility centers into large provider networks started again in Australia and Europe and regained popularity in the USA only more recently. Over the past 5–6 years, investor-driven companies and entrepreneurs, however, invested in the USA hundreds of millions of dollars into the sector. The women's health care unit of CooperSurgical (Trumbull, CT, USA), alone, spent close to \$500 million, building during

2015–2016 an IVF-driven laboratory and supply conglomerate, by purchasing leading national PGS laboratories (and their offspring in the UK), the Danish company K-System Kivex Biotech A/S (Denmark), the world’s dominant equipment supplier to IVF clinics for closed incubation systems with time lapse imaging, and Wallace (Denmark), the IVF segment of Smith Medical, a major supply company for IVF laboratories.

Consolidation is, however, most advanced in the Australia/New Zealand market, where only three IVF companies control 80% of IVF cycles (IBIS World, 2015). Increasing complaints about rising IVF costs evoked media scrutiny, by 2013 suggesting ‘the new business model, driven largely by profit targets, could undermine the integrity of fertility medicine’ (Medew and Baker, 2013). The industry’s defense that rising costs for research and outcome improvements mandated those increases was contradicted by disappointingly low live birth rates of only ca. 15% in those two countries (Kushnir et al., 2017a). Australia’s IVF industry recently also found itself severely admonished by the ‘Australian Competition and Consumer Commission’ over misleading success rate claims by some of the country’s major IVF clinics (Morris, 2016).

In Australia and New Zealand private equity investments started flowing in 2006–2007, leading to quick consolidation and ‘industrialization’. From that point on, Australia/New Zealand’s fresh live birth rates have been steadily declining (Kushnir et al., 2017a). This region’s developments, therefore, likely offer the best example of what a future of consolidation and ‘industrialization’ may look like in the IVF field. Especially considering Australia’s and New Zealand’s longstanding reputations as early cradles of successful IVF research, rising cycle costs, declining live birth rates and increasing ethical concerns do not suggest an evolution that warrants copying.

‘Industrialization’ in the UK, Spain, Germany/Austria and, of course, the USA is speeding up as well: in the USA, a leading private IVF center recently merged with Spain’s ‘Instituto Valenciano de Infertilidad’, likely the world’s largest IVF company, which also owns centers in other European countries, Latin America, the Middle East and India. Via this merger, the company became the first foreign company to obtain a major foothold in the US IVF market. Its goal is continuous US expansion (IVI Press Release, 2017). Since then, a number of mainland Chinese and Korean financial interests have also entered the US IVF market.

As ‘Forbes’ reported (Helft, 2016), serial entrepreneur Martin Varsavsky, with a \$200 million budget, launched ‘Prelude’, described as a ‘comprehensive fertility company focused on proactive fertility care to improve people’s chances of having healthy babies when they’re ready’ in a four-step process: fertility preservation through freezing of eggs and sperm at peak fertility (ages 20s to early 30s); embryo creation in the laboratory when clients are ready to start a family (in other words, what is proposed is the end of conception via intercourse), and eggs and sperm are unfrozen and embryos are created; genetic screening, where embryos are tested for chromosomal abnormalities and genetic mutations before transfer; and eSET.

Prelude is, thus, a remarkable accumulation of recent add-ons to IVF which, in this communication and elsewhere (Harper et al., 2017), have been described as ineffective and, likely, in selected patients even as detrimental to outcomes of IVF cycles. To offer these invasive and costly treatments to perfectly healthy young women and men, therefore, raises serious ethical questions since none of these individual

Table 1 Newly introduced additions that may have adversely affected IVF outcomes.

Newly identified additions

Embryo selection

- Extended embryo culture to blastocyst
- Elective single embryo transfer
- Closed embryo incubation systems with time lapse imaging
- PGS*

Mild ovarian stimulations

- ‘Mini-IVF’
- Natural cycle IVF
- Patient-friendly IVF

Cycle interruptions

- All-freeze cycles with frozen-thawed cycle to follow
- Embryo banking with combined frozen-thawed cycle to follow

*Now also called PGT-A (preimplantation genetic testing for aneuploidy).

steps has so far been validated as clinically effective and/or cost-effective. Currently available outcome data on social oocyte cryopreservation are, indeed, still considered inadequate (Hammarberg et al., 2017). Yet, ‘Prelude’ has become the largest accumulator of fertility clinics in the USA and, therefore, offers yet another example of why rapid ‘industrialization’ and ‘commodification’ of IVF must be viewed with serious concern.

Concerns like this do not only exist in the IVF arena. Similar expressions of concern have, indeed, recently also come up with entry of private equity investments into dermatology (Konda et al., 2018) and for US clinical medicine in general (Gondi and Song, 2019).

Discussion

The here presented time associations between changes in practice patterns and outcome changes in multiple different regions of the world appear surprisingly robust. They, therefore, are convincing in suggesting that ineffective and/or even harmful additions to IVF practice have been added in recent years. Add-ons qualifying for such consideration are summarized in Table 1. Additional potential causes for declining live birth rates, not named here, are likely. For example, ages of infertile women in IVF centers have been rapidly increasing (Gleicher et al., 2016c), suggesting that the proportion of good prognosis patients may be declining, while poor prognosis patients are increasing. Aging trends, however, only further emphasizes the importance of the here-reported associations, since the here-proposed causes for worldwide declining live birth rates are especially harmful for poorer prognosis patients, which includes older women.

Our study also offers a warning about ‘industrialization’ and ‘commodification’ of medical services for other economically successful private practice areas in medicine. ‘The New York Times’, for example, recently reported that the rapid ‘industrialization’ of dermatology practices in the USA, apparently, also has resulted in significant ‘commodification’ in that respective practice arena (Hafner, 2018). As previously noted, the dermatology literature has also taken notice of this fact (Konda et al., 2018). As especially Australia’s experience

suggests, such developments may lead to higher prices, poorer clinical outcomes and decreasing patient satisfaction. During current national discussions to rebuild the US health care system, these observations deserve special consideration.

Limitations and strength of the study

This study has a number of limitations, the most obvious being that associations do not establish causations. Another limitation is the absence of European data except for UK data. Finally, here-reported associations with 'industrialization' and 'commoditization' are limited to one world region, Australia/New Zealand, though some here discussed more peripheral developments in the USA also suggest adverse outcomes on practice from commercial developments. With practically complete absence of scientific investigations in the medical literature on these subjects, this analysis had to largely rely on data from the lay media. Two very recent publications, however, demonstrate awakening interest in the medical community regarding this subject (Konda et al., 2018; Gondi and Song, 2019). This manuscript, hopefully, will provide an incentive to conduct follow-up studies in the IVF arena.

The obvious primary strength of this study is the parallel observation of IVF outcomes in many regions of the world, thereby eliminating potential genetic/ethnic contributions to possible observations.

Key recommendations

Recommendations from this study include a need to:

- (i) more carefully consider changes to routine IVF practice before clinical implementation;
- (ii) conduct prospectively randomized studies of the effects of recent add-ons to IVF practice on IVF cycle outcomes in order to confirm or refute the observed associations in the present study; and
- (iii) urgently investigate the effects of 'industrialization' and 'commoditization' on IVF outcomes, as both are rapidly accelerating in most regions of the world.

Authors' roles

This manuscript was conceived by N.G. who also wrote the first manuscript draft. Some regional fresh cycle live birth rates discussed in this manuscript were previously published by Kushnir et al. (2014) and modified with permission for this manuscript by S.K.D. and V.A.K. All authors contributed significant revisions to later versions of the manuscript and approved the final version before submission.

Funding

Center for Human Reproduction; Foundation for Reproductive Medicine.

Conflict of interest

N.G., D.H.B. and V.A.K. are listed as co-owners of a number of already awarded and still pending US patents, none related to the

topic of this manuscript. N.G. is a shareholder in Fertility Nutraceuticals, LLC and owner of the CHR. N.G. and D.H.B. receive patent royalties from Fertility Nutraceuticals, LLC. N.G., D.F.A. and D.H.B. received research support, travel funding and lecture fees from various Pharma and medical device companies, none, in any way related to this manuscript. This study was funded by intramural funds from the Center for Human Reproduction (CHR) and by grants from the Foundation for Reproductive Medicine. V.A.K. previously served as a consultant to the Centers for Disease Control and Prevention (CDC). The CHR annually routinely reports IVF outcome data to CDC and Society for Assisted Reproductive Technology.

Data availability statement

The referenced source data are available from the referenced data sources in this manuscript and from our center's research data bank by contacting Ms Jolanta Tapper (jtapper@thechr.com).

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**Amendment to Written Testimony of Dr. Monique Chireau Wubbenhorst, M.D.,
M.P.H., FACOG, FAHA**

Hearing before the

Senate Committee on the Judiciary

“The Continued Assault on Reproductive Freedoms in a Post-Dobbs America”

Wednesday, March 20, 2024

Dirksen Senate Office Building, Room G50

2:30 p.m.

Many points were raised during the hearing that deserve consideration and comment, including the following.

Abortion is not healthcare. Abortion is defined by CDC as “an intervention...that is intended to terminate a suspected or known ongoing intrauterine pregnancy and that does not result in a live birth.” The goal of any abortion is therefore to kill the embryo or fetus. The embryo or fetus—the unborn child—is a human being. That is, he or she is a member of the human family, a unique living being with human DNA distinct from his or her parent. He or she is not a “clump of cells” or a “potential child” but an unborn child, a child assuming the human form. Since the goal of an abortion is to cause the death of the unborn child, and the unborn child is a human being, abortion causes the death of a human being. Pregnancy is not a disease. Abortion neither prevents, treats, or palliates any disease. Instead, it has as its goal the death of a human being. Abortion is therefore not health care, for either the mother or her unborn child.

In addition, abortion is not healthcare, and is specifically not essential health care, because very few OB/GYNs perform it. Research shows that the majority of OB/GYNs do not perform abortions. Not only that, but the percentage that do is declining and has been for decades. For example, in 1985, 40% of OB/GYNs surveyed performed abortions (Margaret Terry Orr and Jacqueline Darroch Forrest. The Availability of Reproductive Health Services from U.S. Private Physicians. Family Planning Perspectives, Mar. - Apr., 1985, Vol. 17, No. 2, pp. 63-69).

In 1986, 46.5% of OB/GYNs surveyed performed abortions (Weisman C., Nathanson C, Martha Ann Teitelbaum, Gary A. Chase and Theodore M. King. Abortion Attitudes and Performance

Among Male and Female Obstetrician-Gynecologists. *Family Planning Perspectives*, Mar. - Apr., 1986, Vol. 18, No. 2 (Mar. - Apr., 1986), pp. 67-73).

In 2008, 22% of OB/GYNs surveyed performed abortions (Steinauer J, Landy U, Filippone H, Laube D, Darney P, Jackson RA. Predictors of abortion provision among practicing obstetrician-gynecologists: A national survey. *Am J Obstet Gynecol* 2008;198:39.e1-39.e6).

In 2011, 14% of OB/GYNs surveyed performed abortions (Debra B. Stulberg, Annie M. Dude, Irma Dahlquist, Farr A. Curlin. Abortion Provision Among Practicing Obstetrician–Gynecologists. *Obstet Gynecol*. 2011 September; 118(3): 609–614. doi:10.1097).

In a 2018 survey, 7% of OB/GYNs in private practice settings performed abortions (Sheila Desai, Rachel K. Jones, Kate Castle. Estimating abortion provision and abortion referrals among United States obstetrician-gynecologists in private practice. *Contraception* 97 (2018) 297–302).

In a 2019 survey of OB/GYNs, 23.8% of OB/GYNs performed abortions. However, among a subset of study participants who provided more detailed information, 33% performed a median of 6 abortions per year, and 48% performed a median of 8 abortions per year (Grossman D, MD, Grindlay K, Altshuler A, Schulkin J. Induced Abortion Provision Among a National Sample of Obstetrician–Gynecologists. *Obstet Gynecol* 2019;133:477–83).

Given that a small and decreasing percentage of OB/GYNs perform abortions, it is clear that abortion is neither healthcare, nor essential healthcare. If it were, more OB/GYNs would be performing abortions.

There is no objective evidence that physicians or trainees are avoiding practicing in pro-life states. A 2023 study by Bernstein et al on this topic used survey data based on social media accounts to come to this conclusion. This cannot be considered objective data. The study also was not a representative sample of physicians and trainees.

Another study examining senior medical student applications to residency by the AAMC (<https://www.aamcresearchinstitute.org/our-work/data-snapshot/training-location-preferences-us-medical-school-graduates-post-dobbs-v-jackson-women-s-health>) showed:

- A 2 % decline in applications for residency slots overall, for all specialties (36,277 slots);
- A 3% decline in applications to states with abortion restrictions

- A 1.9% decline in applications to states with no restrictions.
- A 21.4% decline in applications for emergency medicine slots to states with abortion restrictions
- A 5.2% drop in applications for OB/GYN slots to states with abortion restrictions (73 residents), the total number of OB/GYN slots nationally is 1288. This means that 5.7% of the total number of residents applying to OB/GYN programs decided to apply to other states, for any reason.
- A 0.7% increase in slots for internal medicine residents
- The reason for the 1% difference between applications to states with or without abortion restrictions (the statistical significance of which is unclear) cannot be attributed with any certainty to the effect of abortion restrictions.
- States with abortion restrictions filled all of their residency slots and likely had to turn away applicants.

Finally, the AAMC study states that “Given the small scale of changes in the number of applicants year to year, there was only a small effect observed in abortion-ban states from 2021-2022 to 2022-2023...Because these results are of limited use in understanding exactly what may be motivating U.S. MD seniors to disproportionately avoid states with more restrictions on the practice of medicine, it will be critical for future research to explore this relationship further (e.g., looking at change among in- and out-of-state applicants) and for residency and fellowship programs (and state medical boards) to collect information from current and future program graduates about what state they choose to practice in and the reasons for their choice”. In other words, the study’s results do not prove that trainees are avoiding states with abortion restrictions.

Abortion does not reduce maternal mortality. No study using patient level data demonstrates that abortion reduces maternal mortality, because abortion does not address the major causes of maternal mortality, which are hemorrhage, infection, stroke and cardiovascular complications. Abortion, that is, intentional feticide, is associated with harms to women and always kills a developing human being. An embryo is not a “fertilized egg”. The latter term is inaccurate. A zygote is stated to have formed once the sperm and egg unite.

The study cited during the hearing regarding “criminalization of pregnancy” focuses mainly on the mother who used drugs in pregnancy. The study by Paltrow and Flavin was misrepresented to imply that women were prosecuted mostly because they self-managed

miscarriage or abortion, when in fact . In fact, the article states that most prosecutions were for child abuse and neglect or drug use or sale. “Because pregnancy is a necessary element of each case included in the study, the term pregnant woman is used to denote any woman whose case fits the rubric, regardless of whether she was pregnant, had experienced a pregnancy loss, or had already delivered at the time she was subject to the arrest, detention, or intervention”. Thus the connection to pregnancy can be unclear. The study is highly susceptible to bias, because of the methods for ascertaining cases (at the time, the authors state that at the time, there were no databases on prosecution of pregnant women). The methodology used was to identify cases “through repeated and systematic searches of legal, medical, news, and other periodical databases. We also identified cases as a result of our direct involvement in cases and through periodic, informal inquiries to public defenders and other legal advocates, judges, and health care providers across the country. *Once we identified a case that seemed to fit our rubric,* our team gathered information from public records, including police and court documents as well as media accounts [emphasis added]”. Also, the highest numbers of cases per year were seen in 1989, 1990 and 1991 – long before widespread discussion of fetal personhood. Despite the repeated allusions to personhood laws, no state has passed such a law, though such laws are under consideration.

Laws related to drug use in pregnancy, and fetal homicide laws exist because states have a compelling interest in protecting unborn children from the many effects of drug use in pregnancy. In fact, the article quotes an astonishing statement that “...cocaine is no more harmful to a fetus than nicotine use...”, and that in another case of a mother addicted to opioids, that “addiction posed no significant risk to the health of the fetus”. The study relies on a 2001 article on substance abuse in pregnancy, which is outdated. In the current context, where the adverse effects of methamphetamine, cannabis, cocaine and opioids, as well as the behaviors associated with addiction, wreak havoc in the lives of pregnant women and their children, such statements beggar belief, especially to those of us who care for pregnant women with addictions.

Abortion is very destructive to African American women and African American communities. Abortion had, and continues to have, destructive negative effects on black women and black communities. If anything, abortion has been an attack on women of color, especially black women, and the black community. Black women are more likely to undergo second trimester abortion. Black women are more likely to be injured by or die from abortion than any other ethnicity. Per CDC data, for every 3 African American children that are born, 2

are aborted, and this is reflected in declining birth rates and dwindling numbers of African American children. More than 17 million African American lives have been destroyed through abortion since *Roe*. There are substantial racial disparities in abortion rates, abortion mortality and non-abortion related maternal mortality between black women and white women. Nationally black women have the highest percentage of abortions, the highest abortion rate and the highest abortion ratio of any racial ethnic group in the United States. The abortion ratio and abortion rate for black women are 4 times higher than for white women. This is true even though African Americans (population 42,000,000) comprise only 12-14% of the total U.S. population. Black women also have the highest rates of poverty and maternal mortality, suggesting that the purported benefits of abortion not only do not accrue to them, but that abortion has negative effects on black individuals and communities.

Pregnancy is not a disease. Pregnancy is not a disease. It is not a medical condition. It is a developmental stage in the continuum of human life that includes two closely intertwined human beings. We are all the product of pregnancy, so it is impossible that we are the product of a pathological state. pregnancy changes noted by Plaintiffs' expert (Caldwell Dec, as noted) are largely adaptive, for example, the increase in clotting factors in pregnancy helps reduce the risk of hemorrhage at delivery. Moreover, women who have given birth enjoy better health later in life compared with those who have not (Green A, Beral V, Moser K. Mortality in women in relation to their childbearing history. *BMJ* Volume 297 6 August 1988; Jaffe D. Eisenbach Z, Manor O. The Effect of Parity on Cause-Specific Mortality Among Married Men and Women *Matern Child Health J* (2011) 15:376–385; L. S. Hurt, C. Ronsmans & S. L. Thomas (2006) The effect of number of births on women's mortality: Systematic review of the evidence for women who have completed their childbearing, *Population Studies* 2007, 60:1, 55-71).

The idea that pregnancy is pathologic in large part stems from an article written by Warren Hern in 1971. This article presents pregnancy as a disease, which states that "Under current conditions of phenomenal human population growth, 'normal' (unlimited) reproduction, if anything, endangers survival of the species", and that pregnancy "may be defined as an illness requiring medical supervision through (a) cultural traditions, functional or explicit, (b) circumstantial self-definition of illness or (c) individual illness behavior; may be treated by evacuation of the uterine contents; may be tolerated...". This is the same Warren Hern who performs abortion in Boulder, CO, who famously said "man is a malignant ecotumor", and who also said to a patient "I'm sorry, I don't kill babies. I aspirate gestational sacs. You kill your baby", and also – disrespecting any woman who's agonized through a miscarriage, abortion or

ectopic pregnancy – that women “are not mums until they have a baby” ([The last abortionist | Abortion | The Guardian](#)). The Boulder clinic does not specify any gestational age limits, and Hern states that he’s done abortions up to 36 weeks. The protocol used for third trimester abortions (performed after 28 weeks) is as follows

“First day: preoperative care. Fetal demise is induced [by stopping the fetal heart].
 Second day: fetal demise is confirmed, and a single laminaria is placed in the cervix.
 Third day: The laminaria is removed, and multiple laminaria are placed in the dilated cervix under local anesthesia.
 Fourth day: procedure.

Three things are very clear from this information. The first is that the clinic is aborting fetuses well past viability (currently 22-23 weeks). At 28 weeks, the survival rate for premature newborns is 80-90%. Therefore, children who could survive delivery are being killed. The second is that not only is abortion (intentional feticide) being carried out, these unborn children are being killed by injection of drugs into the heart prior to the procedure. The third is that there is no “labor and delivery” procedure, as prospective patients are told “they do not need to push”. For these dead fetuses, the skull is crushed and emptied before delivery of the body.

In vitro fertilization (IVF) need not result in the destruction of human life. Endorsement of IVF is not contrary to a pro-life position. Legislation that limits the number of embryos created and implanted, prohibiting embryonic research and genetic testing, as Germany has done, along with the broad use of embryo donation, would prevent the destruction of embryonic human life.

Cesarean delivery is not more dangerous than abortion. The comparison is inaccurate and inappropriate, because cesarean deliveries are done near term, when the risk of mortality from abortion far surpasses that of either cesarean delivery or vaginal delivery, especially for abortions performed using hysterotomy (an incision into the uterus). Given that the risk for mortality increases exponentially by 38% for each week of gestation, it is clear that abortion at the same gestational ages when cesarean delivery is performed is far more dangerous than either cesarean delivery or vaginal delivery.