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China's Healthcare System: Addressing Capacity Shortfalls before and after COVID-19

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Key Findings

- The novel coronavirus (COVID-19) pandemic has brought unprecedented attention to challenges in China's medical system. While healthcare in China has made considerable strides in the past decade, it remains ill-equipped to deal with the country's aging population and rising incidence of chronic disease.
- China's healthcare system is overly reliant on urban hospitals to provide even basic healthcare services. Hospitals account for just 3.5 percent of medical institutions in China, but they handle 45 percent of all outpatient visits.
- Per capita healthcare spending in China is increasing, but it remains low compared with other major economies largely due to underfunding by the Chinese government. Budget shortfalls in China's healthcare institutions are a major cause of widespread corruption in China's medical system.
- Chinese policymakers have prioritized the improvement of healthcare outcomes, most notably in the Healthy China 2030 Plan released in 2016. In line with the goals articulated in this plan, the Chinese government has sought to increase the capacity of its healthcare system through a variety of measures, including merging primary care facilities with hospitals and increasing the number of general practitioners in the country.
- As part of its broader efforts to gain soft power, the Chinese government has promoted traditional Chinese medicine (TCM) both domestically and abroad, despite a lack of evidence showing the efficacy of many TCM treatments. In the past several years, international organizations have begun incorporating TCM into medical standards amid China's push for greater recognition of TCM.

Introduction

The Chinese Communist Party (CCP) views the delivery of high-quality healthcare as an important aspect of its own political legitimacy. While China's government has made significant improvements to healthcare in the past decade, the healthcare system has not kept pace with many of the changing needs of China's population. As life expectancy has increased in China, so too has the burden of chronic diseases and the need for long-term and hospice care—problems the healthcare system remains underequipped to address. These problems are compounded by persistent budget shortfalls in many of China's healthcare institutions that contribute to a widespread corruption problem. Aware of the potential for these challenges to undermine political stability in China, Chinese policymakers have prioritized reform of the healthcare system.

This report reviews challenges in China's domestic healthcare system and examines the efforts of China's policymakers to address these challenges. It also examines Chinese policymakers' attempts to promote TCM both domestically and internationally. The report draws on the Commission's May 2020 hearing on "China's Evolving Healthcare Ecosystem: Challenges and Opportunities" and open source research. It expands on topics explored in Chapter 2, Section 3 of the Commission's 2020 Annual Report, "U.S.-China Links in Healthcare and Biotechnology."

Chronic Disease and Demographic Trends Strain China's Healthcare System

Over the past decade, China has made significant progress in reducing the burden of diseases and risks related to maternal, neonatal, and communicable conditions. For example, China's infant mortality rate fell from 13.1 per

thousand children born in 2010 to 5.6 per thousand in 2019.[*] [1] Over the same period, the maternal mortality rate fell from 30 deaths per 100 thousand to 17.8 deaths per 100 thousand.[2] Similarly, incidence of common communicable diseases such as viral hepatitis, measles, and malaria have all decreased significantly.[3] As people live longer, however, the burden of chronic disease has risen, becoming a significant focus of Chinese healthcare policy. As of 2018, 270 million people in China were estimated to suffer from hypertension, and 116.4 million lived with diabetes as of 2020.[†] [4] A variety of lifestyle and environmental factors, such as smoking and pollution, have also contributed to the rising incidence and lethality of chronic disease. As of 2017, high blood pressure, smoking, high-sodium diets, and particulate matter pollution were the four greatest health risk factors and leading causes of premature death in China.[‡] [5]

China's healthcare system is underequipped to handle the growing burden of chronic disease. It is over-reliant on urban hospitals to provide basic care, and the primary care system, which should play a significant role in chronic disease management, is underutilized. Beijing's healthcare policies have long tried to foster preventative and primary care as the most cost-effective way to provide healthcare services to China's large population.[6] However, primary care physicians, particularly those in rural areas, typically receive less training and are consequently less trusted by patients, who prefer to visit urban hospitals even for relatively minor conditions such as fevers and headaches. Moreover, the expansion of healthcare coverage has enabled more patients to self-refer to facilities with a higher quality of care, leading to overcrowding at urban hospitals.[7]

China's Medical Education System

China's medical education system is significantly less intensive than in the United States, where doctors must first earn a bachelor's degree, then attend medical school and complete a residency—a process taking ten or more years—before they are eligible to practice. Training pathways to becoming a practicing physician are also more diverse. Most doctors at China's urban hospitals received at least four years of post-secondary medical education, but the average education level of rural doctors is considerably lower.[8] As of 2014, only 11.9 percent of rural doctors had received a bachelor's degree. By contrast, 65.7 percent of doctors in urban hospitals had a bachelor's degree.[9]

To standardize medical education, in 2015 China's National Health Commission launched a so-called "5+3" model for both general practitioner candidates and those pursuing a master's degree in clinical medicine. In this revised system, doctors must complete five years of post-secondary medical education followed by a three-year residency.[10] However, a range of other potential pathways continues to exist, particularly for general practitioner candidates. For example, high school students from poor rural backgrounds can take advantage of a tuition-free, five-year medical degree program, after which they receive a license to practice in designated rural areas only. They must

[*] The lower infant mortality rates translate to a reduction from approximately 211,000 deaths in 2010 to approximately 82,000 deaths in 2019. Total births in China totaled 16.15 million in 2009 and 14.65 million in 2019 as China's birthrate fell to its lowest level since 1949. Amanda Lee, "China Population: Concerns Grow as Number of Registered Births in 2020 Plummet," *South China Morning Post*, February 9, 2021. *https://www.scmp.com/economy/china-economy/article/3121112/china-birth-rate-population-concerns-grow-number-registered*; *BBC*, "Chinese Birth Rate Falls to Lowest in Seven Decades," January 17, 2020. *https://www.bbc.com/news/world-asia-china-51145251*.

[†] China now has the world's largest population of diabetics, though in percentage terms the burden of the disease is still slightly less than in the United States—10.9 percent of adults in China compared to 13.3 percent in the United States as of 2020. International Diabetes Federation, "IDF Western Pacific Members: China," May 14, 2020. *https://idf.org/our-network/regions-members/western-pacific/members/101-china.html*; International Diabetes Federation, "IDF North American and Caribbean Members: United States," March 3, 2020. *https://idf.org/our-network/regions-members/north-america-and-caribbean/members/74-usa.html*; Hu Yiwei, "China's Diabetes Epidemic in Charts," *China Global Television Network*, November 14, 2019. *https://news.cgtn.com/news/2019-11-14/China-s-diabetes-epidemic-in-charts-LC60vrsOv6/index.html*.

[‡] According to a 2018 survey conducted by the Chinese Center for Disease Control and Prevention, smoking rates among males remain stubbornly high. Although the overall smoking rate among adults was 26.6 percent, down slightly from 27.7 percent three years earlier, the smoking rate among male adults was 50.5 percent, down from 52.1 percent in 2015. See Chinese Center for Disease Control and Prevention, *Results of the 2018 Survey of Chinese Adult Tobacco Usage—Smoking among Chinese Ages 15+ Is Decreasing* (2018年中国成人烟草调查结果发布—我国15岁及以上人群吸烟率呈下降趋势), May 30, 2019. Translation. *http://www.chinacdc.cn/yw_9324/201905/t20190530_202932.html*. *Xinhua*, "2015 China Adult Tobacco Survey Report: Chinese Smokers Smoke an Average of 15.2 Cigarettes per Day, and Second-Hand Smoke Exposure Has Improved" (2015中国成人烟草调查报告：我国吸烟者每天平均吸烟15.2支 二手烟暴露有所改善), December 28, 2015. Translation. *http://webcache.googleusercontent.com/search?q=cache:zrKuR7yzWbMJ:www.gov.cn/xinwen/2015-12/28/content_5028569.htm+&cd=3&hl=en&ct=clnk&gl=us*.

then serve six years at a rural health organization before being permitted to practice at an urban hospital.[11] There are also several ways for rural medical students to first become assistant general practitioners, with the possibility of becoming fully licensed general practitioners with additional job transfer training.[12]

Despite government efforts, China continues to experience an acute shortage of qualified doctors. The number of doctors has increased in recent years but still lags behind the growing volume of patient visits. Between 2009 and 2019, the number of practicing doctors increased 68.6 percent from 1.9 million to 3.2 million, but the number of inpatient hospital visits grew 100.6 percent from 132.6 million to 266 million over the same period.[13]

China's hospitals represent a small fraction of healthcare providers (3.5 percent as of 2019) but handle 45 percent of all outpatient visits (see Table 1).[14] Even among hospitals, Tier 3* hospitals (which generally have the highest quality of care) are disproportionately congested, handling 24 percent of China's 8.74 billion outpatient visits in 2019 despite accounting for just 0.3 percent of all healthcare institutions.[15]

Table 1: Chinese Outpatient Visits in 2019

Classification	Number of Institutions	Percentage of Total Providers	Number of Outpatient Visits (Billions)	Percentage of Total Outpatient Visits
Tier 3 Hospitals	2,749	0.3	2.06	24
Tier 2 Hospitals	9,687	1.0	1.34	15
Tier 1 Hospitals	11,264	1.1	0.23	3
Other Hospitals	10,654	1.1	0.21	3
Primary Care Centers	954,390	94.7	4.53	52
Specialty Healthcare Centers	15,924	1.6	n/a	n/a
Other Healthcare Centers	2,877	0.3	0.35	4
Total	**1,007,545**	**100**	**8.74**	**100**

Source: China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*.

As China's Population Ages, Demand for Long-Term and Hospice Care Grows

The UN forecasts nearly 450 million people in China will be aged 60 or older by 2045.[16] As China's 1.4-billion-person population ages, the healthcare system is severely underprepared to provide long-term care to hundreds of millions of elderly people. This is partly because of the increasing life expectancy in China, which has created new demand for long-term care services. China's life expectancy at birth has increased from 69.1 years in 1990 to 76.7 years in 2018, according to World Bank data.[17] According to State Council data, an average of 13 percent of Chinese over 65 require long-term care, a proportion that becomes progressively higher for each age group: 20 percent of people aged 75–80 years, 50 percent of people aged 80–90 years, and nearly 100 percent of people over 90 years old.[18] Other studies show that middle-aged Chinese may also require long-term care, with the percentage of people

* China's public hospitals are classified under a three-tier system. Tier 1 hospitals are typically rural hospitals with fewer than 100 beds, Tier 2 hospitals have 100–500 beds, and Tier 3 hospitals typically have more than 500 beds and generally offer the highest-quality care. Tier 3 hospitals are generally located in major cities. Caroline Lee et al., "Tech in China: The Future of Chinese Healthcare," *Collective Responsibility*, 2018, 4. *https://www.coresponsibility.com/wp-content/uploads/2018/09/Technology-China-Future-Chinese-Healthcare.pdf.pdf*.

aged 45 and older in need of daily care projected to reach 76.7 percent of the estimated total 110.5 million disabled people in China by 2050.[*]

Until recently, however, the government also did little to prepare the healthcare system to care for a large elderly population suffering from chronic conditions.[19] According to a national survey conducted in 2015 by China's National Committee on Aging, a government agency, approximately 80 percent of families seeking long-term care in China were unable to meet their needs.[20] China is only equipped with approximately 300,000 registered long-term care workers, though as of 2018 there are 167 million people over the age of 65.[21] Development of assisted living facilities in China is challenged by lack of funding, along with the preference of individuals in need of care to remain with their families.[22] The challenges of providing at-home elder care have been exacerbated by China's one-child policy as well as massive migration from rural to urban areas, both of which have reduced the number of people available to care for aging family members.[23]

Over the past decade, the Chinese government has announced several new policies that attempt to address long-term care needs of an aging population and the underlying policy framework around elder protection and related social services. In 2011, the State Council published the 12th Five-Year Plan of China on Ageing Undertaking Development (2011–2015) and the Social Care Service System Construction Plan (2011–2015), which set forth priorities in developing long-term care.[24] In 2016, the government launched long-term care insurance pilot programs in 15 cities that provide institutional and in most cases home care.[25] In 2019, the government issued a set of policies to improve care for elderly patients, including standardizing criteria for evaluating the needs of elderly patients and increasing the number of healthcare professionals to fill the need for nursing care.[26]

China's aging population is also driving the demand for hospice care. First established in China in the 1980s, hospice care facilities have struggled to meet growing needs and remain poorly integrated into mainstream healthcare.[27] Statistics on China's hospice care sector are often contradictory and unspecific, but even the highest estimate suggests that only 283,000 patients received hospice care in 2018.[28] This falls far short of demand since 2.3 million Chinese die from cancer alone each year, according to official statistics.[29] In 2017, the government launched a pilot hospice program in five cities, with plans announced in 2019 to expand the program to 71 cities across China.[30] Short of massive increases to investment in the healthcare system, however, the reality of caring for millions of terminally ill is likely to further strain China's already inadequate medical resources and increase social tensions within Chinese society.

Healthcare Capabilities Challenged by Funding Shortfalls

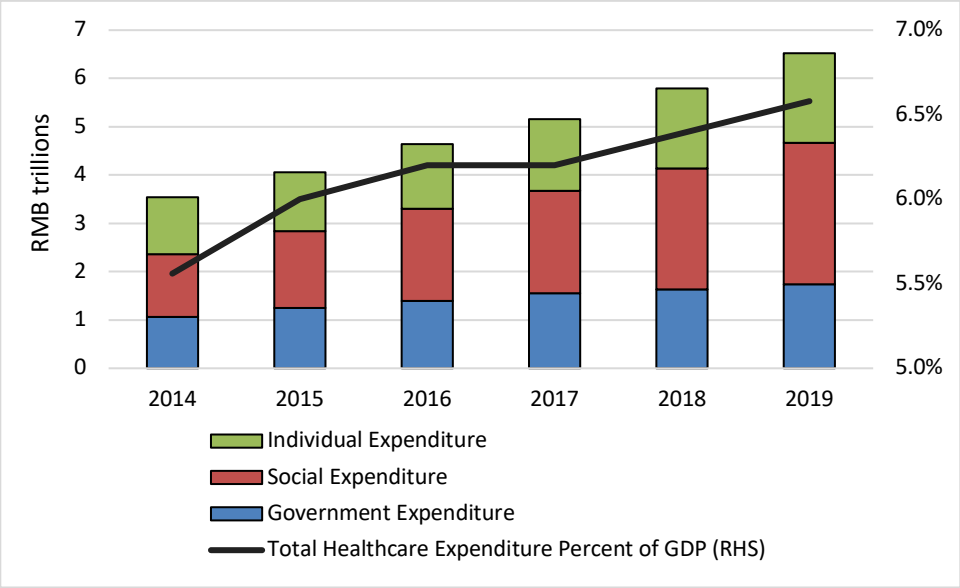
Despite substantial growth, China's healthcare spending remains low compared to other countries with similar per capita incomes.[† 31] Local governments have long shouldered the majority of healthcare expenditure responsibilities, though in 2018 the Ministry of Finance introduced a "sliding scale" for center-local healthcare cost sharing.[32] In this arrangement, the central government shoulders 80 percent of the cost burden for the poorest provinces and just 10 percent for the wealthiest, with several levels in between.[33] It is unclear whether this has significantly alleviated the burden on local budgets as Beijing already directed healthcare spending toward China's poorer regions, with

[*] The study noting this projection considered adults requiring long-term care as a subset of all disabled people in China. Chinese law defines a person with disabilities as someone "who has abnormalities of loss of a certain organ or function, psychologically or physiologically, or in anatomical structure and has lost wholly or in part the ability to perform an activity in the way considered normal." There is no uniform definition of "disability" for determining need for long-term care in China. Several long-term care pilot programs in China have used the Barthel Index, which measures a person's level of independence according to their ability to perform routine daily tasks such as bathing, feeding, and dressing. Law of the People's Republic of China on the Protection of Disabled Persons, 1990; Yumei Zhu and August Österle, "China's Policy Experimentation on Long-Term Care Insurance: Implications for Access," *International Journal of Health Planning and Management* 34 (July 25, 2019): 1661–1674. *https://onlinelibrary.wiley.com/doi/epdf/10.1002/hpm.2879*.

[†] In 2018, China's total health expenditure was 5.4 percent of its gross domestic product. The average for upper-middle-income countries, a group that includes China, was 5.7 percent. By contrast, out-of-pocket expenses paid by patients accounted for 35.8 percent of all health expenditures, versus 33.2 percent for upper-middle-income countries. World Bank, "World Bank Open Data." *https://data.worldbank.org/*.

central and western regions receiving 86.3 percent of the central government's healthcare-related fiscal transfers in 2017.* [34]

Figure 1: China's Healthcare Expenditure, 2014–2019



Note: China's National Bureau of Statistics defines social expenditure as all nongovernment healthcare spending other than individual out-of-pocket expenses. It primarily comprises expenditure by insurance providers but also includes healthcare philanthropy and private hospital spending.
Source: Various.[35]

Public Health Insurance Coverage Uneven between Rural and Urban Residents

Although the Chinese government claims to provide universal health insurance to its population, many Chinese people still struggle to afford quality healthcare. About 95 percent of the population receive some form of public health insurance, but the level of coverage varies significantly with geography and rural residents tend to receive less coverage than their urban compatriots.[36]

China's public health insurance system comprises two main types of coverage: Urban Employee Basic Medical Insurance (UEBMI) and Urban-Rural Residents Basic Medical Insurance (URRBMI). As the names suggest, the first is an insurance scheme for the urban workforce while the latter is for the rural population and urban residents outside the labor market.[37] Although the URRBMI resulted from a merger of urban and rural insurance schemes aimed at reducing geographic inequality, risk pooling remains localized and coverage levels vary widely.[38] Moreover, the differences in coverage levels between the UEBMI and the URRBMI are even starker. In 2019, annual per capita expenditure under the UEBMI was $507 (renminbi [RMB] 3,590), compared to $113 (RMB 793) under the URRBMI.† [39] In theory, healthcare is less expensive in rural areas, but since rural residents seeking higher-quality care travel to visit physicians at urban hospitals, the cost of treatment is disproportionately high for the rural population.

Even with near-universal public health insurance, out-of-pocket costs in China accounted for 28.3 percent of all healthcare expenditure in 2019 compared to 11 percent in the United States.[40] Meanwhile, average annual per capita

* Public health government expenditure in China is less than expenditure for other sectors such as infrastructure, education, and national defense. An analysis of Chinese government healthcare spending shows that total government public health expenditure has also fallen slightly as a proportion of total fiscal expenditure (from 5.70 percent in 2014 to 5.44 percent in 2018). The trends have not been consistent across all provinces, however, and many poorer provinces have seen growth in healthcare expenditure as a proportion of fiscal expenditure, in part due to increased transfer payments from the central government. Hui Jin and Xinyi Qian, "How the Chinese Government Has Done with Public Health from the Perspective of the Evaluation and Comparison about Public-Health Expenditure," *International Journal of Environmental Research and Public Health* (December 2020).

† Unless otherwise noted, this paper uses the following exchange rate throughout: $1 = RMB 7.08.

healthcare expenditure was $657 (RMB 4,657), constituting 6.4 percent of China's per capita gross domestic product (GDP)—$10,262 (RMB 75,229)—in 2019.[41] The financial burden for those with serious illnesses is considerably higher. For example, the average cost of a hospitalization in 2019 was $1,389 (RMB 9,848), or 12.6 percent of the average annual wage.[42] To fill the gap, Chinese insurance giants like Ping An and China Life offer commercial products that cover critical illness, medical reimbursement, disability income, and long-term care.[43] The rapid growth in demand for such products clearly demonstrates that public health insurance remains insufficient to meet China's healthcare needs: total premium revenue for commercial health insurance products grew from $33.7 billion (RMB 241.1 billion) in 2015 to $98.9 billion (RMB 706.6 billion) in 2019.[44]

Funding Shortfalls Fuel Systemic Corruption

Corruption among China's hospitals and doctors is a widely acknowledged problem that has contributed to a low level of public trust in the country's healthcare system and at times led to violence against Chinese doctors.[45] In many cases, doctors accept illicit payments, known as *hongbao*,[*] from patients in exchange for a higher quality of care. The practice of hongbao is widespread in China: in a 2013 survey of residents of Beijing, Shanghai, and Guangzhou, nearly one-third of respondents said they or a family member had given hongbao to physicians between 2000 and 2012.[46] In addition to accepting these payments from patients, doctors and hospital officials also receive kickbacks for purchasing certain types of medical equipment or pharmaceutical products, a practice that has been described as "endemic" in China.[47] In a 2010 survey of Chinese doctors, 78 percent of respondents said healthcare companies could not compete in China without paying bribes.[48]

In some cases, this corruption has involved foreign firms. In 2015, a Chinese court fined British pharmaceutical giant GlaxoSmithKline $490 million after the company was accused of paying bribes to public health officials and doctors.[49] A 2019 review of Chinese court records by the *New York Times* found over a dozen cases in which employees for firms such as General Electric, Philips, and Siemens bribed officials in public hospitals.[†] In March 2020, U.S. pharmaceutical company Cardinal Health agreed to pay more than $8 million to settle claims arising from alleged improper payments by employees of the firm's former Chinese subsidiary.[50] In November 2020, Pfizer announced in its quarterly securities filing that the Foreign Corrupt Practices Act divisions of the U.S. Department of Justice and U.S. Securities and Exchange Commission are investigating Pfizer's activities in China and Russia.[51]

Corruption in China's healthcare system is driven by persistent funding shortfalls that have created strong incentives for hospital systems and doctors to accept bribes. Low pay is a common complaint among doctors in China, and according to a 2017 white paper by the Chinese Medical Doctor Association, a national professional association of medical professionals in China, the average annual salary of junior doctors in China was approximately $8,150 (RMB 57,709).[52] This was only slightly higher than the average salary of approximately $6,780 (RMB 48,000) for all recent Chinese college graduates, despite heavy workloads for doctors that often include uncompensated overtime.[53] As a result, many physicians supplement their official income with hongbao payments.[54]

Hospitals in China have similarly struggled with resource shortfalls. In 2018, only 10 percent of funding for public hospitals came from government subsidies.[55] The majority of funding comes from service charges and drug sales; however, Chinese regulations place ceilings on the markups that may be charged on many medical treatments and drugs.[56] These price controls cut down on an important potential revenue stream and lead many hospitals to seek funds through illicit payments.[57]

The Chinese government has attempted to address corruption in its healthcare system through a variety of measures. For instance, in 2013 China's National Health and Family Planning Commission (NHFPC) issued a regulation banning nine types of behavior in the healthcare sector, including tying physicians' salaries to revenues from drug sales, paying or receiving commissions for drug prescriptions, and compiling for commercial purposes data on

[*] The term *hongbao* means "red envelope," referring to red envelopes containing money that are traditionally given as Lunar New Year gifts between friends and family. Carlos Tejada, "Bribes and Transparency on Chinese Holidays: A Primer," *Wall Street Journal*, January 23, 2009. *https://www.wsj.com/articles/BL-CJB-827*.

[†] In the cases reviewed by the *New York Times*, foreign companies were not accused of wrongdoing, as Chinese prosecutors focused on corruption by Chinese officials. Alexandra Stevenson and Sui-Lee Wee, "Bribes and Backdoor Deals Help Foreign Firms Sell to China's Hospitals," *New York Times*, June 14, 2019. *https://www.nytimes.com/2019/06/14/business/china-ge-siemens-bribery-medical-devices.html*.

physicians' purchasing patterns of drugs.[58] In 2014, the NHFPC instituted a provincial "blacklist" reporting scheme for medical corruption. Under the regulations, government-funded healthcare institutions within a province cannot purchase medicines, medical supplies, or medical equipment from a company on the blacklist for two years; if a company is on the blacklist twice or more within five years, the prohibition applies nationwide.[59] That same year, the NHFPC also issued a policy requiring physicians and patients to sign contracts not to exchange hongbao.[*]

Despite these efforts, bribery remains a persistent issue in China's healthcare system. In 2019, Yanzhong Huang, senior fellow for global health at the Council on Foreign Relations, described corruption in China's healthcare system as "endemic," citing low salaries as a major contributor.[60] High-profile corruption cases continue to occur. For instance, in 2019, Yang Xiangjun, then chief physician at the cardiovascular department of the First Affiliated Hospital of Soochow University in Suzhou, was investigated for accepting hongbao in order to perform medical procedures.[61] Dr. Yang was subsequently arrested and expelled from the CCP.[62] Corruption in medical procurement companies remains widespread as well. A 2019 analysis of the Chinese government's efforts to address corruption in pharmaceutical purchasing found that while anticorruption regulations have achieved some progress, considerable corruption challenges remain. The study pointed to inconsistent reporting and relatively low fines for violating anticorruption laws (in contrast to the United States) and concluded, "If the fine amounts are not significantly increased, it will remain profitable for drug companies to engage in corruption practices that undermine public health."[63] The study also recommended that the government "address the root of medical corruption" by focusing on improving financial incentives in the medical system.[64]

Beijing Seeks to Mitigate Healthcare Capacity Limitations

Beijing's aims for China's healthcare system are articulated in the "Healthy China 2030" plan, which was first outlined in a 2016 blueprint and subsequent 2019 action plan released by the State Council. Healthy China 2030 adopts a mixture of general guidelines and quantitative targets. First, the plan establishes five overarching goals: improving health levels and life expectancy, effectively controlling health risk factors, improving the healthcare system and delivery of healthcare services, building out the overall scale of the healthcare system, and improving the healthcare system's governance and oversight.[65] Second, it lays out a set of specific targets to be achieved by 2030, such as raising the average life expectancy to 79 years, reducing smoking to below 20 percent of adults, and reducing deaths from major chronic diseases by 30 percent from 2015 levels (see Appendix for a list of major targets).[66]

Overall, Healthy China 2030 emphasizes tackling environmental risk factors and promoting a healthy lifestyle.[67] This reflects the government's shift to focus more on preventing and combatting chronic disease. The plan also lays out a number of specific targets for reducing the incidence and severity of common chronic conditions. For example, Beijing aims to increase treatment and management of diabetes and plans to increase the percentage of diabetics whose condition is under control from 50 percent in 2015 to 60 percent by 2022 and 70 percent by 2030.[68] It also implicitly recognizes the burden of an aging population by calling for efforts to reduce the incidence of dementia and disability in those 65 and older, though the plan provides few details on how to accomplish this.[69]

Beijing Prioritizes Collection of Healthcare Data

One of the most promising recent developments in medical research has come from the aggregation and analysis of large amounts of healthcare data, which can lead to breakthroughs in medical treatment and offer significant commercial opportunities.[†] Recognizing the transformative potential of healthcare data, the Chinese government has sought to systematically collect healthcare data. In June 2016, the State Council issued the *Guiding Opinions on Promoting and Regulating the Development of the Application of Healthcare Big Data*, which stated that

[*] Doctors and patients at private medical centers and medical centers containing fewer than 100 beds were encouraged, but not specifically required, to follow this policy. Jeremy Blum, "No More Red Envelopes Allowed in Hospitals, China's National Health Commission Says," *South China Morning Post*, February 21, 2014. *https://www.scmp.com/news/china-insider/article/1432823/no-more-red-envelopes-allowed-hospitals-chinas-national-health*.

[†] For more on the CCP's efforts to collect healthcare data, see U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "U.S.-China Links in Healthcare and Biotechnology," in *2020 Annual Report to Congress*, December 2020, 293–327.

healthcare big data is a "fundamental, strategic national resource" and formulated plans to develop healthcare data.* In October 2020, China's Health Council published guidance on standardizing healthcare information in China, in part to improve the use of healthcare big data, according to Chinese state media.[70]

The Chinese government's efforts to collect healthcare data extend to the United States, whose healthcare data are particularly valuable due to the ethnic diversity of the U.S. population.[71] Chinese firms have invested significantly in U.S. healthcare firms, driven in part by government incentives such as government investment funds that target biotech firms.[72] These investments have given Chinese company ownership stakes in U.S. companies that have proprietary genetic sequencing technology and genomic databases.[73] Aside from investment, Chinese organizations are also frequently involved in other forms of partnerships, including research and development (R&D) partnerships, research incubators, and corporate partnerships.[74] In addition to obtaining U.S. healthcare data through legal means, Chinese entities and individuals have been implicated in intellectual property theft, hacking of U.S. companies, and other illicit activities.[75]

In the wake of the COVID-19 pandemic, Chinese firms have offered testing and other services to other countries, prompting concerns that any data collected from these services may be used for genetic research in China in an undisclosed manner. The most notable firm has been BGI (formerly Beijing Genomics Institute), the largest genomics company in the world.[76] In March, the U.S. Food and Drug Administration (FDA) granted emergency use authorization to BGI Americas, the U.S. subsidiary of BGI, for its test device to detect COVID-19.[77] By August 2020, BGI had sold more than 35 million COVID-19 test kits to 180 countries, including the United States.[78] Complementing market access for testing devices, BGI has gained access to global health data by establishing laboratories to support COVID-19 testing. As of August 2020, the company has established 58 such laboratories in 18 countries.[79] BGI has denied that it collects foreign genomic data from these tests for research purposes.[80]

The extent of BGI's activities, including research collaborations with China's government, remains poorly understood. Although BGI has referred to itself as a "private company," a Reuters investigation found BGI has conducted research with China's military on various topics, including testing for respiratory viruses.[81] A February 2021 regulatory filing by BGI also revealed that China's State Development and Investment Corporation, the country's largest state investment fund, had purchased a small ownership stake in the company.[82]

While Chinese firms aggressively pursue the collection of healthcare data abroad, the Chinese government places strict limitations on the sharing of Chinese healthcare data with foreign companies or researchers, in contrast to the open research environment of the United States. Some of the harshest provisions are found in China's human genetic resource regulations, which state that foreign parties cannot independently collect, store, use, transfer, or export human biospecimens obtained in China.[83] Instead, the foreign parties must enter into a collaboration with a Chinese partner, and the collaboration must be approved by the Office of Human Genetic Resources Administration, which is part of the Ministry of Science and Technology.[84] While many countries regulate access to citizens' medical data and genetic information, China's human genetic resource regulations are significantly more stringent and involve substantially greater procedural hurdles. International researchers have expressed concern that such hurdles risk slowing down scientific research.[85]

In line with the principles and goals established in Healthy China 2030, the government launched a number of reforms over the past five years to rationalize care and address the capacity challenges in China's healthcare system. In 2015, Beijing began experimenting with mergers of primary care providers and public hospitals into medical consortiums that share resources and information. Policymakers hope these consortiums will result in a tiered care system that will reduce hospital utilization and encourage more people to use the primary care system.[86] The consortiums are also aimed at allowing doctors—typically licensed to work only at a specific hospital—additional flexibility in where and how they provide treatment.[87] Beginning in 2017, the government expanded the use of

* The State Council publication does not define "big data"; however, in healthcare the term generally refers to the "aggregation of multiple aspects of healthcare-related information covering the full life-cycle of a large constituency of people, covering personal health, medical services, disease control and prevention, food safety, health preservation, among other things." *Hogan Lovells*, "China to Grow Big on E-Healthcare Data," August 2016. *https://www.hoganlovells.com/~/media/hogan-lovells/pdf/publication/2016/alert_china_to_grow_big_on_e-healthcare_data.pdf?la=en*.

medical consortiums and by the end of 2018 touted an 83 percent increase in referrals from hospitals back to general practitioners over the previous year.[88] However, as Karen Eggleston, Stanford University professor and authority on China's healthcare system, noted in testimony before the Commission, such medical consortiums create local monopolies, and without proper safeguards they may actually decrease the quality of care.[89]

Another government initiative is the establishment of a system of general practitioner contract services whereby patients can negotiate service contracts with a general practitioner through their primary care provider.[90] Under such contracts, general practitioners can provide basic health monitoring, management, and consultation services; priority appointment booking and referrals; prescription services; and preventative care.[91] This initiative was piloted in 2011 but has been substantially expanded since the launch of Healthy China 2030. So far, it appears to have achieved some positive results. A study of several counties in Zhejiang Province, which sought to assess local residents' awareness and usage of the contracting system in 2017, found that 71.6 percent of residents were aware of the program and 50.4 percent had contracted a general practitioner.[92] Those who were aware of the program but elected not to participate were predominantly young and had no history of chronic disease.[93]

To support the expansion of primary care capacity on which these reforms are predicated, the Chinese government is trying to increase the number of general practitioners. Although China has 2.8 doctors per 1,000 people, it has only 2.6 general practitioners per 10,000 people.[94] The Chinese government, therefore, aims to increase this number to five per 10,000 by 2030.[95] These efforts supplement the government's push to standardize medical education and improve the qualifications of doctors in China.

U.S. firms are well-positioned to complement the efforts of the Chinese government to improve patient outcomes by meeting growing Chinese demand for important healthcare services and products. For instance, medical devices are one of the fastest-growing markets in China, worth over $96 billion in 2019 and increasing by approximately 20 percent per year in recent years.[96] Many Chinese medical professionals consider U.S. medical devices to be the highest quality, providing a massive potential consumer base for U.S. firms.[97] U.S. companies are subject to numerous constraints in China's healthcare market, however, such as investment restrictions, burdensome approval requirements, and government procurement processes that favor domestic firms. These policies undermine the ability of U.S. firms to compete effectively in China.[*]

Beijing Promotes Traditional Chinese Medicine

While much of China's healthcare planning has focused on modern medicine, Beijing has also stepped up its promotion of traditional Chinese medicine (TCM), a form of healthcare that incorporates treatments such as acupuncture, tai chi, and herbal products.[98] One important contribution of TCM to modern medicine is artemisinin, an antimalarial medication extracted from the wormwood plant *Artemisia annua*.[99] The development of artemisinin was led by Youyou Tu, a pharmacologist at the China Academy of Traditional Chinese Medicine in Beijing, who became the first scientist based in China to receive a Nobel Prize in Physiology or Medicine.[100] Beyond this notable example, however, considerable uncertainty exists over the evidence-based efficacy of TCM treatments. According to the National Institutes of Health, "For most conditions there is not enough rigorous scientific evidence to know whether TCM methods work for the conditions for which they are used."[101] While acupuncture has been widely used as a therapeutic for pain management, in some cases TCM treatments have been linked with severe side effects such as urinary tract cancers and fatal kidney disease.[102] TCM also has been linked to the endangerment of certain animals.[†] For instance, pangolins, anteater-like creatures whose scales are used in some TCM treatments, have become the world's most highly trafficked nonhuman mammal.[103] In addition, reliance on TCM techniques and products has increased concerns among health experts that pathogens found in animals used in TCM treatments could transfer to humans.[104]

Under General Secretary of the CCP Xi Jinping, who often refers to TCM as a "national treasure," the Chinese government has heavily promoted TCM both domestically and internationally.[105] Since 2012, the Chinese

[*] For more on obstacles that U.S. firms face in China's healthcare market, see U.S.-China Economic and Security Review Commission, Chapter 2, Section 3, "U.S.-China Links in Healthcare and Biotechnology," in *2020 Annual Report to Congress*, December 2020, 293–327.

[†] For more on China's role in wildlife trafficking, see Suzanna Stephens and Matthew Southerland, "China's Role in Wildlife Trafficking and the Chinese Government's Response," *U.S.-China Economic and Security Review Commission*, December 6, 2018.

government has issued 13 plans focusing on promotion of TCM.[106] In 2016, the State Council published the *Outline of the Strategic Plan on the Development of Traditional Chinese Medicine*, which deemed TCM development a "national strategy."[107] Since then, the number of TCM clinics in China has skyrocketed from 195 in 2017 to 18,785 as of August 2020.[108] Also in 2016, the State Council Information Office issued a white paper on TCM that called for "equal attention to TCM and Western medicine" and discussed international cooperation in TCM.[109] Before the COVID-19 pandemic, the Chinese government's promotion of TCM was one of the most visible manifestations of China's "Health Silk Road" initiative, an extension of China's Belt and Road Initiative focused on promoting China's global health leadership.* [110]

Beijing's campaign to promote TCM globally achieved a significant victory in 2019, when the World Health Organization (WHO) included a chapter on TCM in its influential *International Classification of Diseases*, which guides how doctors around the world diagnose medical conditions.[111] Chinese media praised the WHO's decision, calling it "a major step for TCM's internationalization."[112] Other medical experts, however, expressed concern that the WHO was legitimizing a scientifically unproven form of medical treatment.[113] Domestically, China's efforts to legitimize TCM have also taken more coercive forms. In May 2020, Beijing's Municipal Health Commission issued draft regulations on TCM that call for criminal penalties for anyone who "slanders" TCM.[114] If passed, this would have been the first measure in China to criminalize criticism of TCM.[115] In December 2020, Beijing approved an updated version of the regulations that omitted the criminal penalties.[116]

Since the start of the COVID-19 pandemic, China's government and state-run media have publicized TCM's role in treating patients, despite the lack of any evidence proving TCM's effectiveness in treating COVID-19.[117] In June 2020, China's State Council Information Office released a white paper on fighting COVID-19 that claimed TCM medications were administered in 92 percent of confirmed COVID-19 cases.[118] In some cases, this treatment has been involuntary, with reports of Chinese authorities detaining residents in Xinjiang, home to millions of Uyghur Muslims, and forcing them to take TCM treatments for COVID-19.[119]

Conclusions and Considerations for Congress

Faced with capacity shortfalls and challenged by a rise in chronic disease, China's healthcare system struggles to deliver even basic healthcare to many of its citizens, particularly in China's rural and western regions. China's policymakers understand that for many, adequate and improving healthcare is a key component of the "social contract" that keeps the CCP in power. They are keenly aware of shortfalls and seek to address the threat that an overburdened healthcare system can pose to social stability. Over the past decade, Beijing has therefore attempted to address these problems through a series of policies to improve healthcare outcomes, including reducing reliance on the country's overburdened hospital system, shrinking urban-rural disparities in healthcare access, confronting widespread corruption, and modernizing medical education.

If successful, these efforts could significantly improve healthcare outcomes for millions of Chinese, ensuring a better, longer life. At the same time, it would bolster one of the CCP's key claims to legitimacy: that it can deliver ever-higher standards of living to China's population. These efforts could also help Beijing attain its goal of making China a global leader in healthcare, something that would not only commercially benefit Chinese healthcare firms but would also afford Beijing significant international influence. China's aggressive international promotion of TCM over the past several years illustrates the CCP's appreciation of the soft-power potential in healthcare leadership.

Success, however, is far from assured. While the CCP has repeatedly communicated its intentions to improve the quality of healthcare in China, it has largely left the task of financing to the health institutions themselves—even as stringent price controls prevent them from earning substantial revenues on many of the products and services they provide. Continued reliance on large urban hospitals and persistent corruption challenges are stark indicators of the consequences of budgetary shortfalls in medical institutions across China. If efforts to improve healthcare do not

* Since the beginning of the COVID-19 pandemic, the Chinese government has begun publicizing its COVID-19-related international medical assistance under the Health Silk Road banner. Elizabeth Chen, "China's Vaccine Diplomacy Revamps the Health Silk Road amid COVID-19," *Jamestown Foundation*, November 12, 2020. *https://jamestown.org/program/chinas-vaccine-diplomacy-revamps-the-health-silk-road-amid-covid-19/*.

succeed, the CCP runs the risk of an increasingly underserved and dissatisfied population questioning the legitimacy of CCP rule. Moreover, shortcomings in China's healthcare system can have effects outside of China, as the catastrophic worldwide health and economic consequences of the ongoing COVID-19 pandemic demonstrate.

China's efforts to improve its healthcare raise several issues that warrant congressional consideration:

- Can the United States reduce health risks in China and worldwide by cooperating with China to assist in improving China's healthcare system? Will the CCP allow open access and equitable cooperation to U.S. entities working to assist China? What is the appropriate role of U.S. engagement in improving China's healthcare system? What should be the focus and priorities of such engagement?
- What restrictions and nonmarket barriers impede U.S. access to China's healthcare markets? Given the rising demand and aging population, U.S. companies have the expertise, technology, and capacity to support healthcare services in China.
- What steps can the U.S. government take to ensure that the Chinese government cooperates with the U.S. government, other foreign governments, and international organizations in issues affecting global health, including promptly and fully disclosing data on potential outbreaks of infectious disease?
- What market opportunities for U.S. firms do the CCP's efforts to improve its healthcare system create? What can be done to ensure U.S. firms can fairly participate in China's healthcare system?
- How can the U.S. government ensure that collaborative medical research efforts with China include open and reciprocal sharing of healthcare data while ensuring the protection of U.S. citizens' privacy?
- How can the U.S. government ensure that the U.S. healthcare system remains the global leader in healthcare innovation? What steps can be taken to protect U.S. healthcare research and development from theft by or coerced transfer to Chinese entities?
- How can the U.S. government respond to the Chinese government's attempts to gain influence in international fora, including publicizing China's Health Silk Road initiative, promoting TCM, and providing medical supplies, vaccines, and assistance to countries in the wake of the COVID-19 pandemic?
- What steps can be taken to ensure that Chinese medical treatments and devices sold in the United States are safe and effective?
- What steps can the U.S. government take to ensure that Chinese entities' use of U.S. healthcare data for medical research does not infringe on the privacy or risk the safety of U.S. citizens?

Appendix: Healthy China 2030 Plan Major Targets

Campaign	2015 Baseline (if available)	2030 Target
Achieving longer average life expectancy	76.4 years	79.0 years
Popularizing health knowledge	Health literacy level is 10 percent.	Raise Chinese citizens' health literacy level to at least 30 percent.
Improving the healthcare system	1. 2.2 (assistant) doctors per 1,000 people. 2. Personal health expenditure accounts for 29.3 percent of total health expenditure.	1. 4.7 registered nurses per 1,000 people. 2. 3.0 (assistant) doctors per 1,000 people. 3. Personal health expenditure should account for about 25 percent of total health expenditure.
Implementing an innovative medical and health service supply model	N/A	Establish a "three-in-one" model for prevention and control that integrates professional health institutions, specialized hospitals, and primary-level medical and health institutions.
Expanding the healthcare industry	N/A	The size of the healthcare industry should reach 16 trillion RMB.
Strengthening innovation in medical technology	N/A	Bring quality standards for medicine and medical devices completely in line with international standards.
Promoting a healthy environment	1. 76.7 percent of days have acceptable air quality in cities at prefecture level and above. 2. 66 percent of surface water quality is at or better than Class III standards.	1. Continued improvement in the number of acceptable air quality days. 2. Continued improvement in drinking water quality and consumer product safety.
Strengthening comprehensive urban and rural health	N/A	1. All rural people will use sanitary toilets. 2. Increase the number of healthy/sanitary cities to 50 percent, with full coverage of provinces and autonomous regions.
Improving nutrition and diets	1. Incidence of adult obesity stunting among children five years old or under is 8.1 percent from 2002–2012. 2. Average daily salt intake is 10.5 grams. 3. Adult daily fat and oil intake is 42.1 grams. 4. Average daily intake of added sugar is 30 grams. 5. Average daily intake of fruits and vegetables is 296 grams.	1. Reduce the incidence of adult obesity stunting among children five years old or under to less than 5 percent. 2. Reduce average daily salt intake to less than 5 grams. 3. Reduce adult daily fat and oil intake to between 25 and 30 grams. 4. Reduce average daily intake of added sugar to less than 25 grams. 5. Increase average daily intake of fruits and vegetables to more than 500 grams.

Implementing nationwide fitness programs	1. 89.6 percent of the population meet national fitness standards. 2. The proportion of people who engage in regular exercise is 33.9 percent.	1. Increase the proportion of the population that meets national fitness standards to 92.17 percent. 2. Increase the proportion of people who engage in regular exercise to at least 40 percent.
Strengthening training for healthy skills	1. 1.6 sports instructors for every 1,000 people. 2. 88 percent of rural villages have sports facilities.	1. Have 2.3 sports instructors for every 1,000 people. 2. Build sports facilities in all remaining rural villages.
Improving the public fitness system	N/A	Build a three-tier system of public sports facilities with 2.3 square meters per capita and a 15-minute fitness circle in urban communities.
Implementing tobacco control	1. The proportion of the population protected by smoke-free regulations is about 10 percent. 2. Percentage of the population over age 15 that smokes is 27.7 percent.	1. Increase the proportion of the population protected by smoke-free regulations to 80 percent. 2. Gradually realize a ban on smoking in public places. 3. Reduce the percentage of smokers over age 15 to 20 percent.
Promoting mental health	1. Chinese citizens' mental health literacy rate is 12 percent. 2. Chinese citizens sleep an average of 6.5 hours per day. 3. China has 2.6 psychiatrists per 100,000 people.	1. Raise Chinese citizens' mental health literacy to 30 percent. 2. Increase the average hours Chinese citizens sleep per day to between 7 and 8. 3. Increase the number of psychiatrists to 4.5 per 100,000 people.
Improving women's and children's health	1. Infant mortality rate of 8.1 percent. 2. Maternal mortality rate of 20.1/100,000. 3. Anemia incidence among pregnant women is 17.2 percent. 4. The national prenatal screening rate is 61.1 percent.	1. Reduce the infant mortality rate to 5 percent or lower. 2. Reduce the maternal mortality rate to 12/100,000 or lower. 3. Provide pregnant women with free basic health services. 4. Reduce anemia incidence among pregnant women to under 10 percent. 5. Increase the national prenatal screening rate to more than 80 percent.
Improving family planning service management	Birth gender ratio of 113.5 males for every 100 females.	Achieve naturally balanced gender ratio at birth.
Reducing mortality of children under 5	Child mortality rate of 10.7 percent.	Achieve child mortality rate of 6.0 percent.

Improving health at elementary and middle schools	Proportion of students that meet national student health standards is 31.8 percent.	1. Increase the proportion of students that meet national student health standards to at least 60 percent. 2. More than 25 percent of students nationally are rated "excellent" by national student health standards. 3. Significantly reduce the incidence of new myopia. 4. Students should have at least one hour of sports activity daily. 5. Young people should master more than one sports skill. 6. Complete compliance of school sports facilities. 7. Students participate in sports activities at least three times a week.
Improving dental health	N/A	Fewer than 25 percent of 12-year-old children have cavities.
Improving elderly health	N/A	1. Reduce the incidence of dementia in those aged 65 and older. 2. Increase the percentage of Tier 2 hospitals with elderly medicine units to more than 90 percent. 3. Increase the percentage of Tier 3 hospitals with convalescence units to more than 90 percent.
Preventing early death from major chronic diseases	Major chronic diseases accounted for 19.1 percent of deaths in 2013.	Early deaths from major chronic diseases should be 30 percent below 2015 numbers.
Preventing cardiovascular disease	1. Mortality rate from cardiovascular and cerebrovascular disease of 238.4 per 100,000 people. 2. Blood lipid testing rate for people over 35 is 19.4 percent. 3. Knowledge of high blood pressure among those over 30 is 47 percent in 2012.	1. Reduce the mortality rate from cardiovascular and cerebrovascular disease to 190.7 per 100,000 or below. 2. Increase the standard management rate for people with high blood pressure to more than 70 percent. 3. Increase blood lipid testing rate for people over 35 to more than 35 percent. 4. Increase knowledge of high blood pressure among those over 30 to at least 65 percent.
Preventing and treating cancer	Overall five-year survival rate for cancer patients is 40.5 percent.	Increase the overall five-year survival rate for cancer patients to at least 46.6 percent.
Preventing chronic respiratory disease	Mortality rate from chronic respiratory diseases in those aged 70 and younger is 10.2 per 100,000.	Reduce the mortality rate from chronic respiratory diseases in those aged 70 and younger to 8.1 per 100,000.
Treating diabetes	1. Standard management rate for diabetes patients is 50 percent. 2. Diabetes knowledge among those over 18 is 36.1 percent.	1. Increase the standard management rate for diabetes patients to at least 70 percent. 2. Increase diabetes knowledge among those over 18 to more than 60 percent.

Preventing infectious disease	37,600 annual schistosomiasis cases.	1. Reduce incidence of Hepatitis B among children under age 5 to 0.5 percent. 2. Completely eliminate schistosomiasis.
Promoting road traffic safety	N/A	Reduce road-related deaths per 10,000 vehicles by 30 percent.

Note: Where baseline figures for 2015 are not available, they have been substituted with baseline data from the closest available year.
Source: Various.[120]

Endnotes

[1] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019 年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2010* (2010 年我国卫生事业发展统计公报), April 29, 2011. Translation. *http://www.nhc.gov.cn/mohwsbwstjxxzx/s7967/201104/51512.shtml*.

[2] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019 年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2010* (2010 年我国卫生事业发展统计公报), April 29, 2011. Translation. *http://www.nhc.gov.cn/mohwsbwstjxxzx/s7967/201104/51512.shtml*.

[3] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019 年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2010* (2010 年我国卫生事业发展统计公报), April 29, 2011. Translation. *http://www.nhc.gov.cn/mohwsbwstjxxzx/s7967/201104/51512.shtml*.

[4] International Diabetes Federation, "IDF Western Pacific Members: China," May 14, 2020. *https://idf.org/our-network/regions-members/western-pacific/members/101-china.html*; Hu Yiwei, "China's Diabetes Epidemic in Charts," *China Global Television Network*, November 14, 2019. *https://news.cgtn.com/news/2019-11-14/China-s-diabetes-epidemic-in-charts-LC60vrsOv6/index.html*; *Xinhua*, "There Are 270 Million Hypertension Patients in China, How Should We Stabilize Our Blood Pressure?" (我国高血压患者 2.7 亿 该如何稳住我们的血压?), October 24, 2019. Translation. *http://www.xinhuanet.com/politics/2019-10/24/c_1125147069.htm*.

[5] Maigeng Zhou et al., "Mortality, Morbidity, and Risk Factors in China and Its Provinces, 1990-2017: A Systematic Analysis for the Global Burden of Disease Study 2017," *Lancet*, June 24, 2019, 1151. *https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30427-1/fulltext.*

[6] Karen Eggleston, "Healing One-Fifth of Humanity: Progress and Challenges for China's Health System," *Milkin Institute Review*, October 28, 2019. *https://www.milkenreview.org/articles/healing-one-fifth-of-humanity.*

[7] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, written testimony of Karen Eggleston, May 7, 2020, 7–8; Sidney Leng, "China's Fragmented Health Care System under Increasing Pressure as Nation Rapidly Ages," *South China Morning Post*, June 11, 2019. *https://www.scmp.com/economy/china-economy/article/3013976/chinas-fragmented-health-care-system-under-increasing*; Sui-Lee Wee, "China's Health Care Crisis: Lines before Dawn, Violence, and 'No Trust,'" *New York Times*, September 30, 2018. *https://www.nytimes.com/2018/09/30/business/china-health-care-doctors.html*.

[8] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, written testimony of Karen Eggleston, May 7, 2020, 6; Karen Eggleston, "Healing One-Fifth of Humanity: Progress and Challenges for China's Health System," *Milken Institute Review*, October 28, 2019. *https://www.milkenreview.org/articles/healing-one-fifth-of-humanity.*

[9] Chee-Ruey Hsieh and Chengxiang Tang, "The Multi-Tiered Medical Education System and Its Influence on the Health Care Market—China's Flexner Report," *Human Resources for Health* 17 (2019). *https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-019-0382-4*.

[10] Shuang Wang et al., "General Practitioner Education Reform in China: Most Undergraduate Medical Students Do Not Choose General Practitioner as a Career under the 5+3 Model," *Health Professions Education*, 4:2 (June 2018) 127–132. *https://reader.elsevier.com/reader/sd/pii/S2452301116301237?token=84D3B9835B53E286A2027DBA5489FABCFDBC286A15ACC31AB5EF3E48A59175A3FDD06F1A0FA3BDBD18A2D6C317AD46E3*.

[11] Siqing Lian et al., "Training Pathways to Working as a General Practitioner in China," *Family Medicine* 51:3 (March 2019): 262–270. *https://journals.stfm.org/media/2178/fetters-2018-0101.pdf*.

[12] Siqing Lian et al., "Training Pathways to Working as a General Practitioner in China," *Family Medicine* 51:3 (March 2019): 262–270. *https://journals.stfm.org/media/2178/fetters-2018-0101.pdf*.

[13] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019 年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2010* (2010 年我国卫生事业发展统计公报), April 29, 2011. Translation. *http://www.nhc.gov.cn/mohwsbwstjxxzx/s7967/201104/51512.shtml.*

[14] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml.*

[15] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml.*

[16] United Nations Population Division, "World Population Prospects 2019." *https://population.un.org/wpp/DataQuery/*.

[17] World Bank, "Life Expectancy at Birth, Total (Years) – China." *https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN.*

[18] Wang Junping and Dong Rui, "Develop Nursing Insurance, Expand Service Provision"（发展护理保险 扩大服务供给）， *People's Daily*, November 22, 2019. Translation. *http://industry.people.com.cn/n1/2019/1122/c413883-31468826.html*.

[19] Yan Yan et al., "Current Awareness of Palliative Care in China," *Lancet*, March 1, 2020. *https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30006-1/fulltext*.

[20] Jiahui Zhang et al., "Long-Term Care Workforce Issues," in Elena Glinskaya and Zhanlian Feng, eds., "Options for Aged Care in China: Building an Efficient and Sustainable Aged Care System," *World Bank Group*, 2018, 285–298. *https://documents.worldbank.org/en/publication/documents-reports/documentdetail/171061542660777579/options-for-aged-care-in-china-building-an-efficient-and-sustainable-aged-care-system*.

[21] Zhanlian Feng et al., "Long-Term Care System for Older Adults in China: Policy Landscape, Challenges, and Future Prospects," *Lancet* 395 (October 24, 2020):1365. *https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32136-X/fulltext*; Qingjun Zeng et al., "Comparison of the Measurement of Long-Term Care Costs between China and Other Countries: A Systematic Review of the Last Decade," *Healthcare* 8:117 (April 1, 2020): 1.

[22] Fengyue Li and Junko Otani, "Financing Elderly People's Long-Term Care Needs: Evidence from China," *International Journal of Health Planning and Management* 33:2 (April–June 2018): 480–483. *https://onlinelibrary.wiley.com/doi/full/10.1002/hpm.2488*; Zhanlian Feng et al., "Long-Term Care System for Older Adults in China: Policy Landscape, Challenges, and Future Prospects," *Lancet* 395 (October 24, 2020).

[23] Zhang Wenli and Yu Yan, "How the One-Child Policy Heightens China's Aging Crisis," *Sixth Tone*, July 17, 2017. *https://www.sixthtone.com/news/1000528/how-the-one-child-policy-heightens-chinas-aging-crisis*; Jieyu Liu, "Ageing in Rural China: Migration and Care Circulation," *Journal of Chinese Sociology*, June 3, 2016. *https://journalofchinesesociology.springeropen.com/articles/10.1186/s40711-016-0030-5*.

[24] Du Peng, "Long-Term Care for Older Persons in China," *UN Economic and Social Commission for Asia and the Pacific Social Development Division Working Paper Series*, 2015. *https://www.unescap.org/sites/default/files/Long%20Term%20Care%20for%20older%20persons%20in%20China.pdf.*

[25] Yumei Zhu and August Österle, "China's Policy Experimentation on Long-Term Care Insurance: Implications for Access," *International Journal of Health Planning and Management* 34 (July 25, 2019): 1661–1674. *https://onlinelibrary.wiley.com/doi/epdf/10.1002/hpm.2879*.

[26] National Chinese Medical Administration Office, *Notice Regarding Strengthening Elder Care Services Work*（关于加强老年护理服务工作的通知）, December 2019. Translation. *http://www.gov.cn/xinwen/2019-12/26/content_5464161.htm*; Medical Administration and Hospital Authority, *Policy Explanation on "Notice on Implementing Elder Care Needs Assessment and Standardized Service Work" and "Notice on Strengthening Medical Care Worker Training and Standardized Management Work,"* August 26, 2019. *http://www.nhc.gov.cn/yzygj/s7652/201908/4deb17fd9a3c486c8dc6462288d29c19.shtml*.

[27] Yuhan Lu, Youhui Gu, and Wenhua Yu, "Hospice and Palliative Care in China: Development and Challenges," *Asia-Pacific Journal of Oncology Nursing* 5:1 (Jan–Mar 2018): 26–32. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5763435/*.

[28] *Xinhua*, "National Hospice Care Services Are Developing Rapidly, Last Year 283,000 Patients Received Care" (全国安宁疗护服务快速发展 去年已服务患者 28. 3 万人), June 3, 2019. Translation. *http://www.xinhuanet.com/2019-06/03/c_1124578776.htm*.

[29] *Xinhua*, "Every Year 3.8 Million New People Develop Cancer, What Else Can I Do to Prevent or Control It?" (每年新发癌症病例 380 万 防癌控癌我们还能做什么？）， August 26, 2019. Translation. *http://www.xinhuanet.com/local/2019-08/26/c_1124923004.htm*.

[30] Yan Yan et al., "Current Awareness of Palliative Care in China," *Lancet*, March 1, 2020. *https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30006-1/fulltext*; *Xinhua*, "National Hospice Care Services Are Developing Rapidly, Last Year 283,000 Patients Received Care"（全国安宁疗护服务快速发展 去年已服务患者 28. 3 万人）, June 3, 2019. Translation. *http://www.xinhuanet.com/2019-06/03/c_1124578776.htm*.

[31] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development and Family Planning in 2015* (2015年我国卫生健康事业发展统计公报), July 21, 2016. Translation. *http://www.gov.cn/xinwen/2016-07/21/content_5093411.htm*; *Health Affairs*, "National Health Spending Growth Increases in 2018 Driven by Private Insurance and Medicare Spending," December 5, 2019. *https://www.healthaffairs.org/do/10.1377/hblog20191205.472512/full/*; Organization for Economic Cooperation and Development, "Health Expenditure." *https://www.oecd.org/els/health-systems/health-expenditure.htm#:~:text=OECD%20spending%20on%20health%20as,2019%2C%20updated%20in%20November%202019.*

[32] Zhang Yuhui, "Zhang Yuhui: Public Health Should Be Guaranteed as a Fiscal Priority for Central and Local Governments" (张毓辉：应确保卫生投入在中央和地方财政中的优先地位), *Sina*, March 6, 2020. Translation. *https://finance.sina.com.cn/china/gncj/2020-03-06/doc-iimxxstf6984248.shtml*.

[33] State Council, *State Council General Office Notice on the Reform Plan for the Division of Fiscal Authority and Healthcare Expenditure Responsibilities* (国务院办公厅关于印发医疗卫生领域中央与地方财政事权和支出责任划分改革方案的通知), July 19, 2018. Translation. *http://www.gov.cn/zhengce/content/2018-08/13/content_5313489.htm.*

[34] Liu Kun, "State Council Report on the Distribution and Use of Healthcare and Public Health Funding" (国务院关于财政医疗卫生资金分配和使用情况的报告), *China National People's Congress*, December 24, 2018. Translation. *http://www.npc.gov.cn/npc/c10134/201812/70d2d6a4cc0d400a9aee8decd735c924.shtml*.

[35] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2018* (2018年我国卫生健康事业发展统计公报), May 22, 2019. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/201905/9b8d52727cf346049de8acce25ffcbd0.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development in 2017* (2017年我国卫生健康事业发展统计公报), June 12, 2018. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10743/201806/44e3cdfe11fa4c7f928c879d435b6a18.shtml*; China National Health Commission, *Statistical Report on China's Health Care Development and Family Planning in 2015* (2015年我国卫生健康事业发展统计公报), July 21, 2016. Translation. *http://www.gov.cn/xinwen/2016-07/21/content_5093411.htm*; China National Health Commission, *2014 Statistical Report on China's Health Care and Family Planning Development in 2014* (2014年我国卫生和计划生育事业发展统计公报), November 5, 2015. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10742/201511/191ab1d8c5f240e8b2f5c81524e80f19.shtml*; China National Bureau of Statistics, *Explanation of Important Statistics* (主要统计指标解释). Translation. *http://www.stats.gov.cn/tjsj/ndsj/2019/html/zb22.htm.*

[36] Center for Strategic and International Studies China Power Project, "Is China's Health Care Meeting the Needs of Its People?" *https://chinapower.csis.org/china-health-care-quality/.*

[37] China State Council, *State Council Opinions on the Integration of the Urban and Rural Basic Insurance Systems* (国务院关于整合城乡居民基本医疗保险制度的意见). January 12, 2016. Translation. *http://www.gov.cn/zhengce/content/2016-01/12/content_10582.htm*.

[38] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, written testimony of Karen Eggleston, May 7, 2020, 8; *Xinhua*, "Integration of Urban and Rural Residents Health Insurance Will Make the Guarantee System More Equal" (整合城乡居民医保，让保障制度更公平), July 27, 2018. Translation. *http://www.xinhuanet.com/2018-07/27/c_1123183690.htm*; China State Council, *State Council Opinions on the Integration of the Urban and Rural Basic Insurance Systems* (国务院关于整合城乡居民基本医疗保险制度的意见), January 12, 2016. Translation. *http://www.gov.cn/zhengce/content/2016-01/12/content_10582.htm*.

[39] China National Healthcare Security Administration, *Short Statistical Report on the Development of Medical Security Institutions in 2019* (2019年医疗保障事业发展统计快报), March 30, 2020. Translation. *http://www.nhsa.gov.cn/art/2020/3/30/art_7_2930.html*.

[40] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; Centers for Medicare and Medicaid Services, *National Health Expenditure Data 2018 Highlights*. *https://www.cms.gov/files/document/highlights.pdf*.

[41] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; World Bank, "GDP Per Capita."

[42] China National Health Commission, *Statistical Report on China's Health Care Development in 2019* (2019年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml.*

[43] Rong Yi and Sharon Huang, "China's Commercial Health Insurance Market," *Asian Insurance Review*, March 2019. *https://www.asiainsurancereview.com/Magazine/ReadMagazineArticle/aid/41884/SharedCode/0A5C27/China-s-commercial-health-insurance-market/1*; Gabriel Wildau, "Wealthy Chinese Spur Booming $78bn Health Insurance Industry," *Financial Times*, January 8, 2019. *https://www.ft.com/content/2e3e9af6-fd10-11e8-aebf-99e208d3e521*.

[44] China Banking and Insurance Regulatory Commission via CEIC database.

[45] Joseph D. Tucker et al., "Rebuilding Patient-Physician Trust in China," *Lancet* 388 (August 20, 2016): 755. *https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31362-9/fulltext*; Sui-Lee Wee, "China's Health Care Crisis: Lines before Dawn, Violence, and 'No Trust,'" *New York Times*, September 30, 2018. *https://www.nytimes.com/2018/09/30/business/china-health-care-doctors.html*.

[46] Cheris Shun-ching Chan and Zelin Yao, "A Market of Distrust: Toward a Cultural Sociology of Unofficial Exchanges between Patients and Doctors in China," *Theory and Society* 47 (2018): 737–772.

[47] Susan Rose-Ackerman and Yingqi Tan, "Corruption in the Procurement of Pharmaceuticals and Medical Equipment in China: The Incentives Facing Multinationals, Domestic Firms and Hospital Officials," *Pacific Basin Law Journal* 32:1 (2015):1–54; Yu Zeyuan, "Medical Corruption: A Tough Ailment to Treat," *ThinkChina*, January 6, 2020. *https://www.thinkchina.sg/medical-corruption-tough-ailment-treat*.

[48] Susan Rose-Ackerman and Yingqi Tan, "Corruption in the Procurement of Pharmaceuticals and Medical Equipment in China: The Incentives Facing Multinationals, Domestic Firms and Hospital Officials," *Pacific Basin Law Journal*, 32:1 (2015): 1–54; Yu Zeyuan, "Medical Corruption: A Tough Ailment to Treat," *ThinkChina*, January 6, 2020. *https://www.thinkchina.sg/medical-corruption-tough-ailment-treat*.

[49] Richard L. Cassin, "China Fines GSK $490 Million for Bribery," *FCPA Blog*, September 19, 2014. *https://fcpablog.com/2014/9/19/china-fines-gsk-490-million-for-bribery/*.

[50] U.S. Securities and Exchange Commission, *SEC Charges Cardinal Health with FCPA Violations*, February 28, 2020. *https://www.sec.gov/news/press-release/2020-48*.

[51] Pfizer Inc., *Form 10-Q*, November 16, 2020, 41. *https://investors.pfizer.com/financials/sec-filings/sec-filings-*

details/default.aspx?FilingId=14483915.

[52] Chinese Medical Doctor Association, "White Paper on the Professional Status of Chinese Physicians" (中国医师执业状况白皮书), December 2017, 25. Translation.

[53] Mandy Zuo, "China's New Graduates Earn US$588 a Month … Less than the Cost of an iPhone," *South China Morning Post*, June 14, 2017. *https://www.scmp.com/news/china/society/article/2098225/chinas-new-graduates-earn-us588-month-less-cost-iphone*; Ni Dandan, "Why China's Young Doctors Want Out of the System," *Sixth Tone*, January 11, 2019. *https://www.sixthtone.com/news/1003446/why-chinas-young-doctors-want-out-of-the-system*.

[54] Joseph D. Tucker et al., "Rebuilding Patient-Physician Trust in China," *Lancet* 388 (August 20, 2016): 755. *https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31362-9/fulltext.*

[55] *Xinhua*, "Chinese Public Hospitals Receive Increasing Government Funds," June 14, 2019. *http://www.chinadaily.com.cn/a/201906/14/WS5d03bfd8a3103dbf1432853d.html*.

[56] Jianwei Shi et al., "Moving towards a Better Path? A Mixed-Method Examination of China's Reforms to Remedy Medical Corruption from Pharmaceutical Firms," *BMJ*, BMJ Open 2018;8:e018513. doi: 10.1136/bmjopen-2017-018513; Jin Xu et al., "Reforming Public Hospital Financing in China: Progress and Challenges," *BMJ* 365 (2019): 14015.

[57] Jianwei Shi et al., "Moving towards a Better Path? A Mixed-Method Examination of China's Reforms to Remedy Medical Corruption from Pharmaceutical Firms," *BMJ*, BMJ Open 2018;8:e018513. doi: 10.1136/bmjopen-2017-018513.

[58] Benesch, "China Introduces New Health Care Sector Anti-Corruption Regulations," February 2014. *https://www.beneschlaw.com/resources/china-introduces-new-health-care-sector-anti-corruption-regulations.html*.

[59] China's National Health and Family Planning Commission, *Notice on Regulations on Establishing Bad Records of Commercial Bribery in the Field of Pharmaceutical Purchase and Sale* (国家卫生计生委印发《关于建立医药购销领域商业贿赂不良记录的规定》的通知), Article 7, 2013. Translation; Sherry Tao, "Anti-Bribery Battle in China's Healthcare Industry and the New Blacklisting Rules: A Treatment with Side Effects (China)," *ACC Docket*, March 1, 2015. *https://www.acc.com/resource-library/anti-bribery-battle-chinas-healthcare-industry-and-new-blacklisting-rules*.

[60] Alexandra Stevenson and Sui-Lee Wee, "Bribes and Backdoor Deals Help Foreign Firms Sell to China's Hospitals," *New York Times*, June 14, 2019. *https://www.nytimes.com/2019/06/14/business/china-ge-siemens-bribery-medical-devices.html*.

[61] Cang Wei, "Doctor Suspended, Under Investigation after Kickback Accusation," *China Daily*, May 21, 2019. *http://www.chinadaily.com.cn/a/201905/21/WS5ce3f51ca3104842260bcef1.html*.

[62] *Xinhua*, "Doctor at First Affiliated Hospital of Soochow University Reported for Accepting Bribes, Dismissed and Expelled from Party" (苏大附一院遭举报吃回扣医生违纪 被免职并开除党籍), July 6, 2019. Translation. *http://www.xinhuanet.com/legal/2019-07/06/c_1124718571.htm*.

[63] Jianwei Shi et al., "Moving towards a Better Path? A Mixed-Method Examination of China's Reforms to Remedy Medical Corruption from Pharmaceutical Firms," *BMJ*, BMJ Open 2018;8:e018513. doi: 10.1136/bmjopen-2017-018513.

[64] Jianwei Shi et al., "Moving towards a Better Path? A Mixed-Method Examination of China's Reforms to Remedy Medical Corruption from Pharmaceutical Firms," *BMJ*, BMJ Open 2018;8:e018513. doi: 10.1136/bmjopen-2017-018513.

[65] China State Council, *State Council Issues Outline of Healthy China 2030 Plan* (中共中央 国务院印发《"健康中国 2030"规划纲要》), October 25, 2016. *http://www.gov.cn/zhengce/2016-10/25/content_5124174.htm.*

[66] China State Council, *State Council Issues Outline of Healthy China 2030 Plan* (中共中央 国务院印发《"健康中国 2030"规划纲要》), October 25, 2016. *http://www.gov.cn/zhengce/2016-10/25/content_5124174.htm.*

[67] China State Council, *State Council Issues Outline of Healthy China 2030 Plan* (中共中央 国务院印发《"健康中国 2030"规划纲要》), October 25, 2016. *http://www.gov.cn/zhengce/2016-10/25/content_5124174.htm*; *China Global Television Network*, "China Issues New Documents on Implementing Healthy China Initiative," July 16, 2019. *https://news.cgtn.com/news/2019-07-16/China-issues-new-documents-to-implement-Healthy-China-initiative-ImIqjuksqA/index.html*; China State Council, *State Council Opinions on Healthy China Action Plan* (国务院关于实施健康中国行动的意见), June 24, 2019. Translation. *http://www.gov.cn/zhengce/content/2019-07/15/content_5409492.htm*.

[68] China State Council, *State Council Opinions on Healthy China Action Plan* (国务院关于实施健康中国行动的意见), June 24, 2019. Translation. *http://www.gov.cn/zhengce/content/2019-07/15/content_5409492.htm*.

[69] China State Council, *State Council Opinions on Healthy China Action Plan* (国务院关于实施健康中国行动的意见), June 24, 2019. Translation. *http://www.gov.cn/zhengce/content/2019-07/15/content_5409492.htm*.

[70] Chen Xiaoshu, "Standardization Needed for Use of Big Data in Health Care," *CGTN*, November 2, 2020. *https://news.cgtn.com/news/2020-11-02/Standardization-needed-for-use-of-big-data-in-health-care--V68snbX6WA/index.html*.

[71] Mark Kazmierczak et al., "China's Biotechnology Development: The Role of U.S. and Other Foreign Engagement," *Gryphon Scientific* and *Rhodium Group* (prepared for the U.S.-China Economic and Security Review Commission), February 14, 2019, 135.

[72] Mark Kazmierczak et al., "China's Biotechnology Development: The Role of U.S. and Other Foreign Engagement," *Gryphon Scientific* and *Rhodium Group* (prepared for the U.S.-China Economic and Security Review Commission), February 14, 2019, 78.

[73] Andrew Pollack, "U.S. Clears DNA Firm's Acquisition by Chinese," *New York Times*, December 30, 2012. *https://www.nytimes.com/2012/12/31/health/chinese-firm-is-cleared-to-buy-american-dna-sequencing-company.html*; BioSpace, "WuXi Healthcare Invests in U.S. Genomics Testmaker 23andMe," October 21, 2015. *https://www.biospace.com/article/releases/-b-wuxi-healthcare-b-invests-in-us-genomics-testmaker-23andme-/*.

[74] Mark Kazmierczak et al., "China's Biotechnology Development: The Role of U.S. and Other Foreign Engagement," *Gryphon Scientific* and *Rhodium Group* (prepared for the U.S.-China Economic and Security Review Commission), February 14, 2019, 103.

[75] U.S.-China Economic and Security Review Commission, *2020 Annual Report to Congress*, December 2020, 303.

[76] Kirsty Needham, "Exclusive: China Gene Firm Providing Worldwide COVID Tests Worked with Chinese Military," *Reuters*, January 30, 2021. *https://www.reuters.com/article/us-china-genomics-military-exclusive/exclusive-china-gene-firm-providing-worldwide-covid-tests-worked-with-chinese-military-idUSKBN29Z0HA*.

[77] Genome Web, "BGI Americas Gets U.S. Emergency Use Authorization for Coronavirus Test," March 27, 2020. *https://www.genomeweb.com/pcr/bgi-americas-gets-us-emergency-use-authorization-coronavirus-test*.

[78] Kirsty Needham, "Special Report: COVID Opens New Doors for China's Gene Giant," *Reuters*, August 5, 2020. *https://www.reuters.com/article/us-health-coronavirus-bgi-specialreport/special-report-covid-opens-new-doors-for-chinas-gene-giant-idUSKCN2511CE*; BGI Group, "BGI Group Helping over 80 Countries for Timely COVID-19 Detection and Intervention," *PR Newswire*, April 20, 2020. *https://www.prnewswire.com/news-releases/bgi-group-helping-over-80-countries-for-timely-covid-19-detection-and-intervention-301043895.html*.

[79] Kirsty Needham, "Special Report: COVID Opens New Doors for China's Gene Giant," *Reuters*, August 5, 2020. *https://www.reuters.com/article/us-health-coronavirus-bgi-specialreport/special-report-covid-opens-new-doors-for-chinas-gene-giant-idUSKCN2511CE*.

[80] Kirsty Needham, "Exclusive: China Gene Firm Providing Worldwide COVID Tests Worked with Chinese Military," *Reuters*, January 30, 2021. *https://www.reuters.com/article/us-china-genomics-military-exclusive/exclusive-china-gene-firm-providing-worldwide-covid-tests-worked-with-chinese-military-idUSKBN29Z0HA*.

[81] Jon Wertheim, "China's Push to Control Americans' Health Care Future," *60 Minutes*, January 31, 2021. *https://www.cbsnews.com/news/biodata-dna-china-collection-60-minutes-2021-01-31/*; Kirsty Needham, "Exclusive: China Gene Firm Providing Worldwide COVID Tests Worked with Chinese Military," *Reuters*, January 30, 2021. *https://www.reuters.com/article/us-china-genomics-military-exclusive/exclusive-china-gene-firm-providing-worldwide-covid-tests-worked-with-chinese-military-idUSKBN29Z0HA*.

[82] Kirsty Needham, "Chinese State Firm Invests in Gene Firm BGI," *Reuters*, February 21, 2021. *https://www.reuters.com/article/us-china-genomics-state/chinese-state-fund-invests-in-gene-firm-bgi-idUSKBN2AM0AT*.

[83] John Balzano, written testimony for U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, May 7, 2020, 6.

[84] Regulations of the People's Republic of China on the Management of Human Genetic Resources (中华人民共和国人类遗传资源管理条例), Article 21, 2019. Translation.

[85] David Cyranoski, "China's Crackdown on Genetics Breaches Could Deter Data Sharing," *Nature*, November 13, 2018. *https://www.nature.com/articles/d41586-018-07222-2*.

[86] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, written testimony of Karen Eggleston, May 7, 2020, 15–16; China State Council, *State Council Guiding Opinions on Advancing the Construction of a Tiered Care System* (国务院办公厅关于推进分级诊疗制度建设的指导意见), September 8, 2015. Translation. *http://www.gov.cn/zhengce/content/2015-09/11/content_10158.htm*.

[87] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, oral testimony of Karen Eggleston, May 7, 2020, 63–64.

[88] China State Council, *Comprehensive Opening of Medical Consortium Construction in China* (我国医联体建设全面推开), April 6, 2019. Translation. *http://www.gov.cn/guowuyuan/2019-04/06/content_5379969.htm*.

[89] U.S.-China Economic and Security Review Commission, *Hearing on China's Evolving Healthcare Ecosystem: Challenges and Opportunities*, written testimony of Karen Eggleston, May 7, 2020, 15–16.

[90] China State Council, *State Council General Office Notice on Key Tasks and Responsibilities of Deepening Reforms to the Medical Health System in 2017* (国务院办公厅关于印发深化医药卫生体制改革 2017 年重点工作任务的通知), May 5, 2017. Translation. *http://www.gov.cn/zhengce/content/2017-05/05/content_5191213.htm*; China State Council, *State Council Issues Outline of Healthy China 2030 Plan* (中共中央 国务院印发《"健康中国 2030"规划纲要》), October 25, 2016. *http://www.gov.cn/zhengce/2016-10/25/content_5124174.htm.*

[91] Sohu, "National Health Commission Issues a Document to Regulate Family Doctor Contracts! Don't Do Anything Not Mentioned" (卫健委发文，规范家庭医生签约！没有提到的都不要干！), October 10, 2018. Translation. *https://www.sohu.com/a/258700043_100213317*; China Ministry of Human Resources and Social Security, *Notice on Guiding Opinions on Advancing Family Doctor Contract Services* (关于印发推进家庭医生签约服务指导意见的通知), May 25, 2016. Translation. *http://www.mohrss.gov.cn/SYrlzyhshbzb/shehuibaozhang/zcwj/yiliao/201606/t20160615_241854.html*.

[92] Xiaopeng Shuang et al., "Residents' Awareness of Family Doctor Contract Services, Status of Contract with a Family Doctor, and Contract Service Needs in Zhejiang Province, China: A Cross-Sectional Study," *International Journal of Environmental Research and Public Health*, 16:8 (September 9, 2019). *https://pubmed.ncbi.nlm.nih.gov/31505783/*.

[93] Xiaopeng Shuang et al., "Residents' Awareness of Family Doctor Contract Services, Status of Contract with a Family Doctor, and Contract Service Needs in Zhejiang Province, China: A Cross-Sectional Study," *International Journal of Environmental Research and Public Health*, 16:8 (September 9, 2019). *https://pubmed.ncbi.nlm.nih.gov/31505783/*.

[94] China National Health Commission, *2019 Statistical Report on China's Health Care Development in 2018* (2018 年我国卫生健康事业发展统计公报), June 6, 2020. Translation. *http://www.nhc.gov.cn/guihuaxxs/s10748/202006/ebfe31f24cc145b198dd730603ec4442.shtml*; Graham Center, "The State of Primary Care in the United States: Chartbook of Facts and Statistics," January 2018, 8. *https://www.graham-center.org/content/dam/rgc/documents/publications-reports/reports/PrimaryCareChartbook.pdf*.

[95] *Xinhua*, "China to Train More General Practitioners," January 24, 2018. *http://english.www.gov.cn/policies/latest_releases/2018/01/24/content_281476024299962.htm.*

[96] Daniel Allen, "China's Medical Devices Market: A Must-Win Proposition," *EastWest Bank*, March 30, 2020. *https://www.eastwestbank.com/ReachFurther/en/News/Article/China-Medical-Market-A-Must-Win-Proposition*; U.S. International Trade Association, *China- Medical Devices*. *https://www.export.gov/apex/article2?id=China-Medical-Devices*.
[97] U.S. International Trade Association *Healthcare Resource Guide – China*, October 2019. *https://2016.export.gov/industry/health/healthcareresourceguide/eg_main_108574.asp*.
[98] Michael Eiginschink et al., "A Critical Examination of the Main Premises of Traditional Chinese Medicine," *Wiener Klinische Wochenschrift* 132:9-10 (May 2020): 260–273. *https://pubmed.ncbi.nlm.nih.gov/32198544/*; Johns Hopkins Medicine, "Chinese Medicine." *https://www.hopkinsmedicine.org/health/wellness-and-prevention/chinese-medicine*.
[99] Ewen Callaway and David Cyranoski, "Anti-Parasite Drugs Sweep Nobel Prize in Medicine 2015," *Nature*, October 5, 2015. *https://www.nature.com/news/anti-parasite-drugs-sweep-nobel-prize-in-medicine-2015-1.18507*.
[100] Ewen Callaway and David Cyranoski, "Anti-Parasite Drugs Sweep Nobel Prize in Medicine 2015," *Nature*, October 5, 2015. *https://www.nature.com/news/anti-parasite-drugs-sweep-nobel-prize-in-medicine-2015-1.18507*.
[101] National Center for Complementary and Integrative Health, *Traditional Chinese Medicine*, October 2013. *https://files.nccih.nih.gov/s3fs-public/Traditional_Chinese_Medicine_08-03-2015.pdf*.
[102] *Scientific American*, "The World Health Organization Gives the Nod to Traditional Chinese Medicine. Bad Idea," April 1, 2019. *https://www.scientificamerican.com/article/the-world-health-organization-gives-the-nod-to-traditional-chinese-medicine-bad-idea/*.
[103] Rachael Bale and Rachel Fobar, "Pangolin Scale Seizures at All-Time High in 2019, Showing Illegal Trade Still Booming," *National Geographic*, September 17, 2020. *https://www.nationalgeographic.com/animals/2020/09/pangolin-scale-seizures-all-time-high-2019/*.
[104] Michael Standaert, "China's New Animal Health Rules Alone Won't Stop Zoonotic Outbreaks, Experts Warn," *Guardian*, January 26, 2021. *https://www.theguardian.com/environment/2021/jan/26/chinas-new-animal-health-rules-alone-wont-stop-zoonotic-outbreaks-experts-warn*.
[105] Michael Collins, "Traditional Chinese Medicine: A Cure for China's Soft Power Woes?" *Council on Foreign Relations*, June 8, 2020. *https://www.cfr.org/blog/traditional-chinese-medicine-cure-chinas-soft-power-woes*.
[106] Wan-Ying Wang et al., "Current Policies and Measures on the Development of Traditional Chinese Medicine in China," *Pharmacological Research*, September 9, 2020. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7480280/*.
[107] China's State Council Information Office, *Traditional Medicine in China*, December 6, 2016. *http://webcache.googleusercontent.com/search?q=cache:hMDBIUn-MFUJ:english.www.gov.cn/archive/white_paper/2016/12/06/content_281475509333700.htm+&cd=1&hl=en&ct=clnk&gl=us*.
[108] China's State Council Information Office, *Traditional Chinese Medicine in China*, December 6, 2016. *http://webcache.googleusercontent.com/search?q=cache:hMDBIUn-MFUJ:english.www.gov.cn/archive/white_paper/2016/12/06/content_281475509333700.htm+&cd=1&hl=en&ct=clnk&gl=us*.
[109] China's State Council Information Office, *Traditional Chinese Medicine in China*, December 6, 2016.
[110] Andreea Brînză, "Some Say China's Belt and Road Helped Create This Pandemic. Can It Prevent the Next One?" *Diplomat*, April 2, 2020. *https://thediplomat.com/2020/04/some-say-chinas-belt-and-road-helped-create-this-pandemic-can-it-prevent-the-next-one/*.
[111] *Nature*, "The World Health Organization's Decision about Traditional Chinese Medicine Could Backfire," June 5, 2019. *https://www.nature.com/articles/d41586-019-01726-1*.
[112] *Xinhua*, "A Major Step for Traditional Chinese Medicine Going Global," May 26, 2019. *http://www.xinhuanet.com/english/2019-05/26/c_138091455.htm*.
[113] *Nature*, "The World Health Organization's Decision about Traditional Chinese Medicine Could Backfire," June 5, 2019. *https://www.nature.com/articles/d41586-019-01726-1*; *Scientific American*, "The World Health Organization Gives the Nod to Traditional Chinese Medicine. Bad Idea," April 1, 2019. *https://www.scientificamerican.com/article/the-world-health-organization-gives-the-nod-to-traditional-chinese-medicine-bad-idea/*.
[114] Beijing Municipal Health Commission, *Announcement on Public Consultation on Beijing Regulations on Traditional Chinese Medicine (Draft for Public Comment)* (关于对《北京市中医药条例（草案公开征求意见稿）》公开征求意见的公告), May 29, 2020. Translation. *http://wjw.beijing.gov.cn/hdjl_20203/myzj/202005/t20200530_1911882.html*.
[115] Michael Collins, "Traditional Chinese Medicine: A Cure for China's Soft Power Woes?" *Council on Foreign Relations*, June 8, 2020. *https://www.cfr.org/blog/traditional-chinese-medicine-cure-chinas-soft-power-woes*.
[116] Sun Liangzi and Ju Yiwen, "Beijing Drops Plan to Criminalize Criticism of Chinese Medicine," *Caixin*, December 2, 2020. *https://www.caixinglobal.com/2020-12-02/beijing-drops-plan-to-criminalize-criticism-of-chinese-medicine-101634925.html*.
[117] *China Daily*, "6 Effective TCM Recipes for COVID-19," March 24, 2020. *https://covid-19.chinadaily.com.cn/a/202003/24/WS5e795bb6a3101282172816c2.html*; David Cyranoski, "China Is Promoting Coronavirus Treatments Based on Unproven Traditional Medicines," *Nature*, May 6, 2020. *https://www.nature.com/articles/d41586-020-01284-x*.
[118] China's State Council Information Office, *Fighting COVID-19: China in Action*, June 7, 2020. *http://webcache.googleusercontent.com/search?q=cache:PHo9EN0Pm14J:english.scio.gov.cn/whitepapers/2020-06/07/content_76135269.htm+&cd=4&hl=en&ct=clnk&gl=us*.
[119] Dake Kang, "In China's Xinjiang, Forced Medication Accompanies Lockdown," *Associated Press*, August 31, 2020. *https://apnews.com/article/309c576c6026031769fd88f4d86fda89*.
[120] *China Global Television Network*, "China Issues New Documents on Implementing Healthy China Initiative," July 16, 2019; China State Council, *State Council Opinions on Implementing the Healthy China Action Plan* (国务院关于实施健康中国行动的意见) July 15, 2019. Translation. *http://webcache.googleusercontent.com/search?q=cache:p1uo0T8ljv8J:www.gov.cn/zhengce/content/2019-07/15/content_5409492.htm+&cd=1&hl=en&ct=clnk&gl=us*; China National Health Commission, *Healthy China Initiative* (健康中国行动), July 15, 2019. Translation. *http://www.nhc.gov.cn/guihuaxxs/s3585u/201907/e9275fb95d5b4295be8308415d4cd1b2.shtml*; China National Health Commission, *2019 Report on the Development of Children's and Women's Health in China* (中国妇幼健康事业发展报

告), May 27, 2019. Translation. *http://webcache.googleusercontent.com/search?q=cache:HTJVJMWiuMMJ:www.nhc.gov.cn/fys/s7901/201905/bbd8e2134a7e47958c5c9ef032e1dfa2.shtml+&cd=1&hl=en&ct=clnk&gl=us*; China State Council, *State Council Opinions on Healthy China Action Plan*（国务院关于实施健康中国行动的意见), June 24, 2019. Translation. *http://webcache.googleusercontent.com/search?q=cache:p1uo0T8ljv8J:www.gov.cn/zhengce/content/2019-07/15/content_5409492.htm+&cd=1&hl=en&ct=clnk&gl=us*; *Xinhua Daily Telegraph*, "China Birth Gender Ratio Decreases for Seventh Consecutive Year" (我出生人口性别比实现"七连降"), July 12, 2016. Translation. *http://webcache.googleusercontent.com/search?q=cache:1p_0K92-eDEJ:www.xinhuanet.com/mrdx/2016-07/12/c_135506174.htm+&cd=1&hl=en&ct=clnk&gl=us*; Chinese Center for Disease Control and Prevention, *Results of the 2018 Survey of Chinese Adult Tobacco Usage—Smoking among Chinese Ages 15+ Is Decreasing* (2018 年中国成人烟草调查结果发布--我国 15 岁及以上人群吸烟率呈下降趋势), May 30, 2019. Translation. *http://webcache.googleusercontent.com/search?q=cache:b-ev_vSkYIkJ:www.chinacdc.cn/yw_9324/201905/t20190530_202932.html+&cd=1&hl=en&ct=clnk&gl=us*; China State Council, *State Council Issues Outline of Healthy China 2030 Plan* (中共中央 国务院印发《"健康中国 2030"规划纲要》), October 25, 2016. *http://webcache.googleusercontent.com/search?q=cache:TUtaYww6t2cJ:www.gov.cn/zhengce/2016-10/25/content_5124174.htm+&cd=1&hl=en&ct=clnk&gl=us*.