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Health Care in China



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KEYWORDS

• China • Health care • Public health • Global health • Epidemiology

KEY POINTS

- China has recently emerged as an important global partner with its immense population and size are such that what happens has a worldwide impact.
- China's major role as health innovator is paralleled by its importance in the control and prevention of epidemic and endemic diseases.
- China has experienced dramatic demographic and epidemiologic changes in the past few decades, including striking decline in fertility and child mortality and increase in life expectancy at birth, prompting major reforms.
- Timely and accurate assessment of the provincial burden of disease is useful for evidence-based priority setting at the local level in China.
- The most common noncommunicable diseases, ischemic heart disease, stroke, chronic obstructive pulmonary disease, and cancers (liver, stomach, and lung), contributed much more to years of life lost in 2013 compared with 1990.

INTRODUCTION

The BRICS nations of Brazil, Russia, India, China, and South Africa, collectively, are useful comparisons because of their size, racial, ethnic, and geographic diversity and inherent problems of social inequality, making them more similar to the United States than its European contemporaries.

China has experienced a remarkable epidemiologic and demographic transition during the past 3 decades. Far less is known about this transition at the subnational level. Timely and accurate assessment of the provincial burden of disease is useful for evidence-based priority setting at the local level in China. This article examines the health care system and the global burden of diseases of China.

BACKGROUND

As one of the world's oldest cultures, China has recently emerged as an important global partner. Several reasons account for this evolutionary trend: first, China's

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immense population and size such that what happens has a worldwide impact; second, China's major role as health innovator; third, China's importance in the control and prevention of epidemic and endemic diseases; fourth, China's assumption of greater authority and global responsibility. However, like other developing nations, China has experienced dramatic demographic and epidemiologic changes in the past few decades, including a striking decline in fertility and child mortality and an increase in life expectancy at birth.

Population discontent with the health care system has led to major reforms. The Global Burden of Diseases, Injuries and Risk Factor Study 2010¹ demonstrated that age-standardized years of life lost (YLL) in China were lower in 2010 than all emerging economies in the G20 and only slight higher than those noted in the United States. With the lowest years lived with disability rate in the G20 in 2010, China ranked 10th for healthy life expectancy and 12th for life expectancy.² In spite of a mainly urbanized and aging population, and important health threats from infectious outbreaks, reproductive health problems, and health inequality, China has, nonetheless, been on track to reach the Millennium Development Goals 4 and 5 by 2015, respectively, in the reduction of child and maternal mortality rates.³

Several other factors characterize the distinctive nature of the Chinese health care system, including its unique history, vast infrastructure, the speed of health reform, and economic capacity to make important advances in health care.⁴ With incomplete insurance coverage for urban and rural dwellers, uneven access, mixed quality of health care, increasing costs, and risk of catastrophic health expenditures, China advanced the Healthy China 2020 initiative to encourage disease prevention, health promotion, health care service delivery, expand pharmaceuticals, and promote health care coverage.^{4,5} The *Chinese dream* is an extremely popular slogan that refers to the realization of a prosperous and strong country with rejuvenation, sustained well-being, and health care reform.

Dong and Phillips⁵ and Blumenthal and Hsiao⁶ summarized the evolution of the Chinese health care system as a progression through 5 historical phases, evolving from a socialistic and collectivistic society of the mid-twentieth century emphasizing social equality to a decentralized market-driven system fostering disparities in access to services and the well-being of urban and rural communities.

The first or Post-Liberation phase, from 1949 to 1965, commenced with the establishment of the People's Republic of China. With government ownership of the health care system, bold preventative measures were implemented to treat and prevent infectious diseases and integrate Western and traditional Chinese medicine while health services were provided in urban government-funded hospitals and village and township rural clinics. Communes that owned the land, organized and distributed its harvest, supplied social services, and provided health care by a cooperative medical system. Staffed by practitioners with basic training, so-called barefoot doctors met the basic needs of the rural populations.⁷ The second or Cultural Revolution phase, from 1966 to 1976, coincided with university and medical school closers for 5 years sending students and faculty to work in the countryside. The third or Early Reform phase, from 1977 to 1989, heralded a period of rapid economic expansion associated with decentralization of political and economic power and opening China to the global economy. There were many well-coordinated health initiatives, such as the control of vectors^{7,8} to diminish infectious diseases, prevention of infant mortality, and increased longevity, whereas chronic cardiac, cancer, cerebrovascular, and mental illness arose as major causes of death and disability. From 1952 to 1982, infant mortality decreased from 200 to 34 per 1000 live births and life expectancy increased from 35 to 68 years, reflecting major investments in public health through a centralized government modeled essentially after the Soviet Union system.⁹ Disturbing policies, such as one

child per family, along with the accelerated aging of the population and the movement of rural workers to urban areas led to a demographic shift that further exacerbated disparities between the wealthy and impoverished classes. Several decisions leading up to the dismantling of its apparently successful health care and public health system in the early 1980s preceded the fourth and final phase of Late Reform, from 1990 to 2002, associated with the reigning in of health care costs.

The first decision was the change in financing of health care reducing the government's investment that amounted to a spending decrease from 32% to 15% at the same time transferring the responsibility for funding of health care services to provincial and local entities through local taxation.¹⁰ A second factor was the imposition of price regulation and tight controls over the amount that publicly run clinics and hospitals could charge for visits, services and pharmaceuticals despite encouragement of profits through markup of 15% or more.¹¹ Physician salaries were tied to bonuses and revenue generated by their activities, especially in their use of profitable new drugs and high technologic services available in the West. This practice led to a rapid overall increase in health care prices and spending available only to the wealthy through out-of-pocket payments. A third factor was the sudden and complete dismantling of communes that privatized the Chinese agricultural economy separating rural citizen from their cooperative medical systems, removing nearly 900 million Chinese peasants from risk pools and a health safety net. Barefoot doctors, unemployed, switched to more lucrative activities. A final factor was the decentralization of the public health system, which, encumbered by reductions in public funding as a proportion of local public health revenues from 60% to 42%, completed the partial privatization of China's public health system.¹⁰

GEOGRAPHY

China is the third largest country in the world in terms of land area ([Fig. 1](#)). It is situated in Eastern Asia sharing borders with Mongolia and Russia to the north; Pakistan, India, Nepal, Bhutan, and Myanmar to the west; Laos and Vietnam to the south; and North Korea to the east. China borders the South China Sea, East China Sea, and Yellow Sea as well as the Gulf of Tonkin. The country is divided into 3 geographic regions, including mountains and plateaus to the west, deserts and basins in the northeast, and the low-lying valleys and plains in the east.

SOCIAL DEMOGRAPHY AND VITAL STATISTICS

The vital statistics for China are shown in [Table 1](#). The population pyramid is shown in [Fig. 2](#). China has the largest world population with more than 1.36 billion people, with a life expectancy at birth of 75.2 years. Women have a higher life expectancy than men, 77.4 and 73.1 years, respectively. The maternal mortality ratio in 2010 was 37 per 100,000 births, and the infant mortality ratio was 14.8 per 1000 live births. The literacy rate for men was 97.5% and 92.7% for women. With one of the largest and fastest growing work economies with a total gross domestic product (GDP) of \$13.4 trillion in 2013 and GDP per capita of \$9,800, 6% of the population was below the poverty line with a human development index and Gini coefficient at 0.699 and 42.1, respectively. Health expenditures compose about 5.2% of the GDP.

INFRASTRUCTURE

China's present health care infrastructure can be divided into primary health care and hospital care in primarily rural and urban communities. Although guided by a market



Fig. 1. Geography of China. (Data from Available at: <https://maps.google.com/maps/ms?msa=0&msid=200187709978753177644.0004cb2a594bbc55b1164&dg=featureFigure> 9. Accessed September 1, 2015.)

approach, the central government has responded to growing public criticism for affordable access to health care services with greater financial risk protection from out-of-pocket spending on health services. Funding for health care in China derives from several newly enacted governmental sources.¹² They include subsidies to rural and

Table 1	
Vital statistics	
Population	1.36 Billion (July 2014 est)
Life expectancy at birth	Total population: 75.2 y Male: 73.1 y Female: 77.4 y
Maternal mortality ratio	37 Deaths per 100,000 live births (2010)
Infant mortality ratio	14.8 Deaths per 1000 live births
Literacy rate	Total population: 95.1% Male: 97.5% Female: 92.7%
GDP	\$13.39 Trillion (2013 est)
GDP per capita	\$9800 (2013 est)
Population below poverty line	6.1%
Health expenditures	5.2% of GDP (2011)
Physician density	1.46 Physicians per 1000 population (2010)
Hospital bed density	3.8 Beds per 1000 population (2009)
HDI	0.699
Gini coefficient	42.1

Abbreviations: est, estimated; GDP, gross domestic product; HDI, human development index.

From The world factbook 2016–17. Washington, DC: Central Intelligence Agency; 2016. Available at: <https://www.cia.gov/library/publications/the-world-factbook/index.html>.

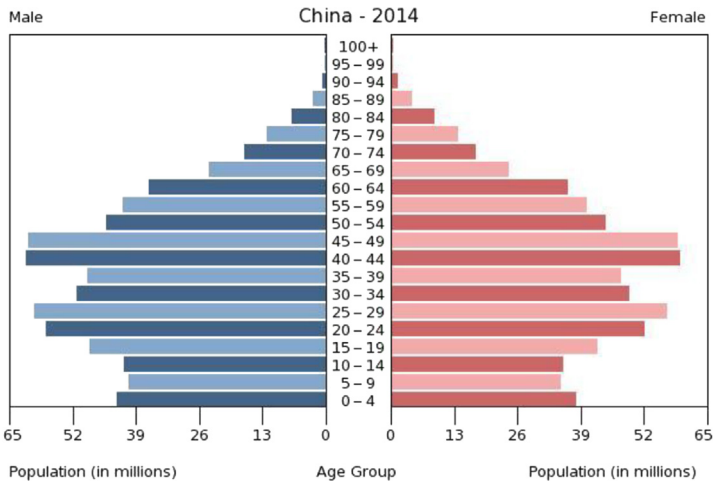


Fig. 2. Population pyramid of China. (From *The world factbook 2016–17*. Washington, DC: Central Intelligence Agency; 2016. Available at: <https://www.cia.gov/library/publications/the-world-factbook/index.html>.)

urban residents not covered by the Urban Employee Basic Medical Insurance (UEBMI) program through the New Cooperative Medical Scheme (NCMS) or the Urban Resident Basic Medical Insurance Program (URBMI), respectively. With a goal of increasing funding to cover at least 75% and 50% for hospital admissions and outpatient services, more than 96% of the population is covered together by NCMS, URBMI, and UEBMI. There has been a parallel increase in governmental health service coverage for hospital payments. Primary health care providers receive governmental funds to deliver a package of basic health services. Health care providers and government-appointed hospital officials, motivated by profits and behavior similar to other for-profit organizations, have been incentivized to prescribe excessive and high-tech diagnostic tests and to prescribe pharmaceuticals to earn profits for later distribution. In 2011, expenditures on drugs accounted for 43% of total health expenditures,¹² nearly triple the Organization for Economic Cooperation and Development's (OCED) average of 16%. With providers permitted to charge a 15% markup on pharmaceuticals, and public hospital profits tied to utilization of services, there is neither the motivation nor the incentive to find cost-effective approaches to health care service delivery focusing on aspects of disease prevention, health promotion, and disease management or a more functional coordination between primary, secondary, and tertiary health care providers.

Bhattacharyya and colleagues¹³ studied primary care in China over the past 2 decades noting that the current performance of community health facilities suffered from inadequacy of providers, increasing funding for community health services, unaffordability, and safety concerns regarding community health service providers. An important part of the Chinese Urban Health Reform System, community health centers (CHCs) were established throughout the country numbering in excess of 2406 CHC and 9700 service stations in autonomous regions and central government-ruled cities, such as Beijing, Shanghai, Chongqing, and Tianjin. Although regarded as basic networks for medical treatment and public health surveillance,¹⁴ CHCs are facing many problems in the deliverance of their 6 main services: disease prevention and control, health care services, health education, family planning, medical treatment service, and community rehabilitation. In competing with local hospitals for acute and chronic care

services, CHCs have had difficulty in winning the trust of local residents because of scarcity of medical resources, lack of funds, absence of newest medical technology, and few professional and qualified medical staff, especially in rural areas.

Among several factors that mitigate physician behavior, including, training, education, professional ethics, altruism, practice norms, regulatory oversight, and financial incentives, the incentive system of fee for service of the past 2 decades has slowly eroded primary care and hospital delivery of services in China. This system has led to artificially high price schedules, overpayment for pharmaceuticals, overuse of expensive high technologic testing, increase in health costs, and an erosion of professional ethics and practice norms.¹⁵ Ethical codes for medicine in China have been based on principles of autonomy, beneficence, and justice; however, in recent years the potential for conflicts of interest has undermined ethical relations between medical professionals, researchers, drug companies, and even regulatory agencies.¹⁶

The Chinese government has piloted new ways of dealing with misdirected provider financial incentives, including the change from fee for service to aggregated and prospective payments for performance and treatment protocols that assure improved quality and emphasize prevention and primary care of chronic disease in place of curative services more appropriate to infectious illness. In 2005, the Ministry of Health (MoH) piloted a new system of primary care funding of providers that separated revenue and charges¹⁷ and another payment reform pilot in 2005 in which CHCs were paid fees for service according to a government price schedule and distinct health bureaus that were given a yearly budget subject to end-year reassessment. Preliminary results showed that such pilots were associated with a reduction in per-visit outpatient expenditures. There are fewer pilot programs for provider payment methods in villages where health care workers are the main source of prevention and primary care for rural residents. However, their situation differs in that the motivation to dispense drug prescriptions, including antibiotics and intravenous injections, for simple health problems, is the return to their net income. Whereas inpatient services have typically been billed based on the utilization of services, so-called case-based systems of payment have been piloted based on payment rates for each disease in its *International Classification of Diseases* code, with expenditure caps or a prospective budget to reduce incentives for providers to increase volume or transfer expenditures to nonintervention cases.¹⁸

REFORM

With only 29% of Chinese people in possession of health insurance, out-of-pocket expenses accounted for 58% of health care spending in 2002 as compared with 20% in 1978.¹⁸ In a 2001 survey of residents from 3 Chinese provinces, one-half responded that they had given up health care in the previous 12 months because of its cost.¹⁹ With increasing health costs, annual per capita spending on personal health services increased in China by a factor of 40 from roughly \$1.35 to \$55.00 from 1978 to 2002, whereas national spending on health care increased from 3.0% to nearly 5.5% of the GDP.⁶ The decline in efficiency of the Chinese health care system has affected both urban and rural communities, however, more so in severely rural communities where only 3% of China's poorest rural western provinces have health insurance compared with 49% of urban Chinese. Notwithstanding, the quality of care in rural communities is generally inferior to that of its urban counterparts because of inadequately trained professionals, leading to relative underuse of rural services and overuse of urban ones. Such gaps in wealth, financial and physical access to care, and governmental and public health expenditures have had a differential effect on children less than 5 years of age and maternal mortality. In 2002 the former was comparatively worse in

rural than urban areas, respectively, at 39 versus 14 per 1000 for children less than 5 years of age, as was the latter, maternal mortality, at 72 versus 54 per 100,000, respectively.

Anand and colleagues²⁰ studied human resources of doctors and nurses using year-end data in China at the province level during 1990 to 2005 to assess levels of education, health-care-worker density, measures of inequality for density of health workers, and provider quality. The investigators noted that about two-thirds of doctors and nearly all nurses were educated up to junior college only despite a massive expansion of medical education countrywide. There was significant inequality in the distribution of both doctors and nurses within provinces that varied with respect to health outcomes, which in some cases showed that the density of health workers was linked to rates of infant and maternal mortality.

China's performance in health care delivery was studied nationally and regionally using indices of health system coverage and catastrophic medical spending,²¹ noting that provision of maternal and child health services was well addressed but poor in addressing noncommunicable diseases, notably hypertensive treatment. Those with low income received lower health system coverage than those with higher incomes but had an increased probability of either not seeking health care when ill or undergoing catastrophic medical spending. With mortality analysis showing a parallel transition in the major causes of death in the past 3 decades in China from communicable diseases and maternal and perinatal infectious conditions to noncommunicable chronic diseases, respectively accounting for 41% in 1973% and 74% of mortality in 2005, there was a staggering pace of increased age-standardized mortality of 10% from noncommunicable disease between 1991 and 2000.²² Modification and prevention of behavioral risk factors, diet, hypertension, obesity, tobacco use, and the response to chronic disease have, thus, claimed center stage in China. Xiao and Kohrman²³ suggested integrating medical anthropological solutions in conjunction with legislation banning smoking in public places, uniformly high cigarette prices, and tobacco advertising bans²⁴ in arriving at a solution to tobacco use in China citing that smoking has been encouraged in Chinese society among men as a means of development, both economic and personal.²⁵

Since 1978, after China adopted reform policies and opened up to the global community, the medical care system and health of residents have improved. Nevertheless, the main orientation of health care reform in the 1980s and 1990s was to render autonomy to government-owned public hospitals without contribution of public expenditures. With the emergence of for-profit privately owned hospitals, health care expenditures increased along with disparities between urban and rural areas and different provinces increased at the expense of health care coverage and access to services for most of its citizens, most of whom were the poorest. By absorbing and integrating experiences domestically and abroad, the new guidelines for China's health care reform have addressed core issues of equity and accessibility with strong public support.²⁶ According to Chen,²⁷ China's 2009 plan for health care reform marked the first phase toward achieving comprehensive health coverage by 2020. There are 5 essential components: first, systematic reform and affirming the government's role in wide medical research coverage for more than 90% of Chinese citizens; second, a national essential-drug system to meet the basic needs for treatment and prevention of diseases and to ensure safety, quality, and supply; third, improved grassroots-level medical care, with emphasis in rural areas on infrastructure and human resources in a 3-tier network at county, town, and village levels, and urban CMCs to alleviate overcrowding in city hospitals and foster a gatekeeper system led by family doctors and nurses; fourth, promotion of basic public health services; fifth,

pilot program reforms to direct substantial increases in public investment, restricting of hospital management, and correction of commercialization and skewed financial incentives.

Eggleston and colleagues²⁸ proposed that improvement in quality of care, responsiveness to patients, efficiency, cost escalation, and equity could be improved not simply by shifting ownership to the private sector or by encouraging providers both public and private to compete with one another for individual patients but by changing the way providers were paid, shifting away from fee for service and amending the distorted price schedule. Other elements of active purchasing might contribute to improved outcomes in health services in China. With most patients continuing to receive treatment in government-owned facilities, the private sector has grown more rapidly than the public sector, especially in rural areas because many village clinics have been sold or taken over by individuals. With at least one government-owned township health center and other private clinics in each village area, the government has called for policies on subsidies, taxation, and price setting for hospitals whether for profit or not or government or nongovernmentally owned. Basic medical insurance based on medical saving accounts combined with a social risk-pooling fund have been rolled out in urban communities, whereas the NCMS cooperative medical scheme, combining household contributions with central and local government subsidies, has been available since 2003. In 2013 a new health department, the national health and family planning commission (NHFPC), was established, merging with the MoH to improve medical and health care services and to deepen institutional reform in the medical care and public health sectors.²⁹

Tian and colleagues³⁰ conducted a cross-sectional survey in 2011 of 12 randomly sampled counties and 118 villages in China using indicators to assess coverage, equality, and effectiveness of rural public health services noting the most difficulties in noncommunicable disease management, especially in those with the lowest incomes. Implementation of health care reform to rectify access to public health services, which increased from 2008 to 2009, has still not corrected significant inter-regional and intraregional inequalities in health care access.

Yip and coworkers³¹ noted difficulties in transforming money and insurance coverage into cost-effective services when the delivery of health care was hindered by waste, inefficiencies, poor quality of services, scarcity, and maldistribution of qualified providers. There seemed to be the need for reforming incentive structures for providers, improved governance of public hospitals, and institution of stronger regulatory systems efforts of which have been slowed by opposition from stakeholders and lack of implementation capacity.

Yip and Hsiao¹² studied China's 2009 health care reform proposal noting that, although expansion of insurance coverage was accomplished, the goal of affordable and equitable access to quality health care for all of its citizens might not be obtained because of wasteful and inefficient health care service provision. The privatization of profit-driven public hospital sectors combined with a fragmented for-profit system would result in an escalation of health care expenditures with patients bearing increasing costs and poor population outcome due to an eventual 2-tier care system. Reformed for the public's interest, public and private collaboration might be further expanded after an objective assessment of its effect on China's health policy goals. This reform would include the following factors: recreation of exemplary models of public hospitals to provide equal, accessible, and quality universal health care; creation of a board to which public hospitals would be accountable; and reasonable salaries to physicians.

In spite of leading the way for world progress in alleviating extreme poverty over the last 2 decades, the Chinese have been charged with active suppression of health information at home, contributing to initial failures during the severe acute respiratory syndrome (SARS) epidemic; however, Hesketh and Xing³² argue that inadequacy of data collection systems and a target-driven culture were partly to blame. Health care reform for elderly Chinese citizens has included recommendations to accelerate development of community-based primary health care, educational programs to increase basic knowledge about health among the elderly and the promotion of healthy behaviors, as well as increasing the Social Security Fund of pension reserves, which is presently 2% of the GDP.³³

The reemergence of selected infectious diseases, such as gonorrhea and syphilis, has been associated with a large increase in migrant populations and in commercial sex, whereas others, such as AIDS, SARS, highly pathogenic avian influenza, *Streptococcus suis*, and the zoonoses, present new microbial threats notably because of the increasing size and density of populations that present opportunities for large epidemics and the need for swift national responses to prevent international spread.³⁴ To address these and other future microbial threats, the Chinese government has promised to commit substantial resources to the implementation of new strategies, including the development of real-time monitoring systems as part of its infectious disease surveillance.

With increasing worldwide needs on the biomedicine center stage, the development of biomedical research in China has become a massive and unique challenge.³⁵ While encouraging researcher-initiated projects by increasing the budget of the National Natural Science Foundation nearly 5-fold over the past decade, China has been able to launch key programs and establish major scientific facilities in genomics, proteomics, gene therapy, and stem-cell research. With the move toward scientific development, China has placed public health at the top of its agenda, with the aim of Health for All by 2020. China is poised to boost accessibility and equal provision of health services with cutting-edge technology in a serve-all approach combined with drug innovation and prevention and control of major emerging infectious diseases.

GLOBAL BURDEN OF DISEASE 2013: IMPLICATIONS FOR NEUROLOGY

Following the methods of the Global Burden of Disease Study 2013,³⁶ investigators systematically analyzed all available demographic and epidemiologic data sources for China at the provincial level and developed methods to aggregate county-level surveillance data to inform provincial-level analysis; the investigators used local data to develop specific garbage code redistribution procedures for China. They assessed levels of and trends in all-cause mortality, causes of death, and YLL in all 33 province-level administrative units in Mainland China, all of which were referred to as provinces, for the years between 1990 and 2013.

All provinces in Mainland China have made substantial strides to improve life expectancy at birth between 1990 and 2013. Increases ranged from 4.0 years in Hebei province to 14.2 years in Tibet. Improvements in female life expectancy exceeded those in male life expectancy in all provinces except Shanghai, Macao, and Hong Kong. There was a significant heterogeneity among provinces in life expectancy at birth and probability of death at 0 to 14, 15 to 49, and 50 to 74 years of age. Such heterogeneity was also present in cause of death structures between sexes and provinces. From 1990 to 2013, leading causes of YLLs changed substantially. In 1990, 16 of 33 provinces had lower respiratory infections or preterm birth complications as the leading causes of YLLs. Fifteen provinces had cerebrovascular disease and 2 (Hong Kong and Macao)

had ischemic heart disease. By 2013, 27 provinces had cerebrovascular disease as the leading cause, 5 had ischemic heart disease, and one had lung cancer (Hong Kong). Road injuries became a top 10 cause of death in all provinces in Mainland China. The most common noncommunicable diseases, including ischemic heart disease, stroke, chronic obstructive pulmonary disease, and cancers (liver, stomach, and lung), contributed much more to YLLs in 2013 compared with 1990.

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