

Commentary

Transitions in Chronic Disease Mortality in China: Evidence and Implications

Binbin Su¹; Shuai Guo^{2,8}; Xiaoying Zheng^{2,3,#}

In China, there has been a significant transition in mortality trends, shifting from infectious diseases to non-communicable diseases (NCDs) over the last forty years. This shift has been primarily influenced by risk factors such as smoking, poor diet, and physical inactivity. Notably, cardiovascular diseases (CVD), cancers, chronic respiratory disorders (CRD), and diabetes have emerged as leading causes of death. Moreover, injuries, particularly road accidents and falls among older adults, also contribute significantly to the disease burden. Given the increasing aging population, there is a growing concern regarding age-related conditions and falls. To effectively address these challenges, China must prioritize chronic disease prevention throughout the lifespan and strengthen primary healthcare capabilities.

Over the past four decades, China has experienced significant changes in its mortality patterns, with a shift from infectious diseases to NCDs due to socio-economic growth and demographic shifts (1). This transition has been driven by the widespread presence of risk factors such as smoking, alcohol abuse, poor diet, and physical inactivity, leading to CVD, cancer, CRD, and diabetes becoming the leading causes of death in the country. Meanwhile, the burden from suicides, drownings, and other types of injuries has decreased, but there has been a rise in the burden from road injuries and falls. Therefore, it is crucial to reevaluate the relationship between socio-economic development and environmental risk factors. Analyzing the levels and trends of NCD mortality will help identify areas with high disease burden, inform evidence-based health policies, and allocate medical resources effectively.

CURRENT TRENDS IN CHRONIC DISEASE BURDEN

Major Chronic Diseases

China exhibits a higher prevalence of CVD, cancer, CRD, and diabetes compared to countries and regions

with similar social development levels. These NCDs account for 88.5% of total deaths and contribute to 84.9% of the disease burden [disability-adjusted life years (DALYs)] (2). From 1990 to 2017, there was an upward trend in the prevalence and incidence of major NCDs, except for CRD, which showed improvement. Of concern is the substantial increase in cancer incidence and prevalence, with age-standardized rates rising by 27.9% and 135.2% respectively. While overall NCD mortality has been controlled, the diabetes mortality rate remains around 0.08‰ with a slight increase (6.1%) (3). The leading causes of premature mortality, measured by years of life lost (YLLs), in 2017 were stroke, ischemic heart disease (IHD), lung cancer, chronic obstructive pulmonary disease (COPD), and liver cancer. Mortality rates for IHD and lung cancer increased significantly, contributing to an increase in YLLs (1). The rising prevalence of cancer poses a future challenge for China's healthcare system in the future — on one hand, since 2010, five out of the top 15 causes leading to YLLs were cancers (lung, liver, stomach, esophagus, and rectum), and this situation persisted until 2017 (4), and lung and liver cancers currently cause a significant disease burden, ranking 4th and 7th respectively in driving DALYs in 2017, with liver cancer's DALY rate being more than double the predicted value based on Social Development Index (SDI) in all provincial-level administrative divisions (1). Although the mortality rate of diabetes is low, its high prevalence combined with low treatment and control rates results in many patients living with the disease and disabilities, leading to a substantial disease burden. In 2018, the diabetes prevalence rate among Chinese adults was 11.9%, while the treatment and control rates were 34.1% and 33.1%, respectively (3).

Age-Dependent Diseases

The elderly population is growing due to declining birth and death rates, resulting in increased health issues and medical expenses related to age-dependent

diseases. Dementia, particularly Alzheimer's Disease (AD), is a major cause of disability in low- and middle-income countries (LMICs). Recent data from China (2015–2018) indicate that the prevalence of dementia among individuals aged 60 and above was 6.0%, with AD accounting for 3.9% of cases, consistent with global levels (5). Given China's rapid aging population, dementia has become the fastest-growing contributor to the disease burden in the country. YLLs due to AD and other types of dementia have risen in rank from 28th place in 1990 to 8th in 2017, with DALYs increasing by 157.0% over nearly three decades, moving from 29th place to 14th place (5). In 2010, 66% of the global disease burden from musculoskeletal disorders among the elderly originated from LMICs (6). Analysis of five major musculoskeletal diseases in China demonstrates that the burden increases with age, with the 40–80 age group contributing the most, accounting for 70.1%, 77.1%, and 74.3% of total incidence, prevalence, and DALYs, respectively (7). Therefore, population aging is the primary factor driving the increasing burden of musculoskeletal diseases in China. Sensory organ diseases, leading to vision and hearing loss, become more prevalent with age. China's elderly population has a higher rate of sensory decline compared to Western countries, with vision and hearing decline rates at 80.2% and 64.9% in 2013, respectively, and a dual sensory decline rate of 57.2%. In 2017, sensory organ diseases ranked as the third leading cause of Years Lived with Disability (YLDs) in China (1).

Road Injuries and Falls

In China, injuries, particularly road injuries and falls among the elderly population, are a substantial contributor to the country's disease burden. While road injuries consistently ranked among the top ten causes of disease burden from 1990 to 2017, the rates of disease burden declined over time, but their contribution to DALYs remained stable. On the other hand, drowning and self-harm, which ranked 8th and 9th in 1990, significantly dropped in rank by 2017 (1). YLLs from road injuries showed a declining trend, whereas YLDs increased by 32.1% from 1990 to 2017 (1), indicating the significant impact of road injuries on disability across all age groups. Falls, in particular, not only accounted for a high number of injury-related deaths among the elderly but also were the primary cause of traumatic fractures and injury-related medical visits (8). The incidence rate of falls among Chinese elderly individuals aged 60 and above was 3.8%.

Although the mortality rate from falls was low (0.39‰) and remained relatively stable from 1990–2019, the significant increase in incidence (79.2%) led to a rapid rise in disease burden from this cause, moving from 27th place in 1990 to 17th in 2017, with DALYs increasing by 51.9% (1).

ISSUES AND CHALLENGES

Increasing Complexity of Morbidity Risks

An individual's health is influenced by various factors that accumulate over time. Early life adverse factors in China, such as neonatal diseases and congenital malformations, have been effectively controlled, resulting in a decline in YLLs. However, chronic diseases are now primarily driven by health behaviors, lifestyles, and dietary habits during adolescence and later adulthood. The physical environment, including air quality and urban transportation infrastructure, further complicates morbidity risks and prevention efforts. Urbanization, while providing opportunities for improving health, also introduces health risks such as air pollution, occupational hazards, and poor dietary habits. In China, the leading risk factors for mortality and disease burden in 2017 were hypertension, smoking, high sodium diet, and environmental particulate pollution. Although survey results showed a gradual decline in smoking rates in China (27.3% in 2013 to 26.2% in 2018) (2), diseases associated with smoking, such as lung cancer and COPD, have not reduced, possibly due to environmental pollution from industrialization. Excessive sodium and red meat consumption, coupled with sedentary lifestyles due to reliance on public transportation, have led to increases in overweight, obesity, hypertension, and diabetes (9). Notably, children and adolescents aged 6–17 years have experienced the highest increase in overweight and obesity rates in recent years, and they will face a more complex risk factor environment in the future (9).

Aging Impact on Disease and Death Patterns

The aging population has led to an increased prevalence of age-dependent diseases and falls. With extended life expectancy and advancements in medical technology, the management of comorbidities and chronic disabilities requires more robust models and healthcare systems. A recent meta-analysis of mainland China residents from 1998 to 2019 showed a

significant upward trend in comorbidity rates. Prior to 2004, the rate was 14.5%, which increased to 35.2% from 2004 to 2014 and further accelerated to 40.4% after 2014 (10). According to GBD 2019 data, the proportion of YLDs in DALYs caused by chronic diseases and injuries among those aged 55 and above increased from 21.9% in 1990 to 31.2% in 2019, indicating a growing contribution of YLDs to the disease burden. Therefore, prioritizing the maintenance of physical function in individuals with one or more chronic diseases is crucial for healthy aging.

Socioeconomic Disparities in Disease Burden

The emergence of NCDs has led to heightened health disparities in terms of gender, urban-rural divide, and socio-economic status. Women, who generally have a lower socio-economic status but longer life expectancy, face elevated risks of chronic diseases, especially as they age. While urban areas with higher income levels, better access to medical resources, and higher education levels tend to have lower prevalence of chronic diseases, there is evidence suggesting that the urban-rural disparity in diseases such as obesity and hypertension is diminishing due to rapid urbanization and economic development. In contrast to high-income countries (HICs), China's high-income population is more susceptible to chronic diseases. Urbanization could exacerbate income inequalities in the risk of chronic diseases, with unhealthy dietary patterns and low levels of physical activity being significant contributing factors.

POLICY IMPLICATIONS

Disease Prevention and Control from a Life-Cycle Perspective

Evidence indicates that individual health is primarily influenced by lifestyle, health behaviors, and socio-economic factors, with clinical medicine playing a secondary role. Therefore, it is crucial to prioritize population health from a life-cycle perspective (11–12). In the case of children, efforts should be directed towards improving nutrition and providing health literacy education. For adolescents, there should be an intensified focus on health education, promoting healthy lifestyles, establishing sound dietary patterns, and implementing effective smoking control measures. Moreover, for adults, external environmental

modifications should be implemented to enhance their self-care ability, which is integral to maintaining cognitive and physical functionality.

Enhancing Primary Healthcare Service Capabilities and Accelerating the Construction of General Medicine

China's current healthcare system primarily emphasizes hospital-based and specialist treatment, which does not align well with the increasing burden of chronic diseases. Evidence suggests that effective management and post-disease care play a crucial role in reducing mortality rates, especially in conditions such as IHD, as demonstrated by many HICs. Therefore, it is crucial to strengthen the capabilities of primary healthcare institutions in order to mitigate the future disease burden, particularly in light of the rising incidence of CVD in China. Additionally, given the anticipated increase in comorbidity cases, the prompt establishment of a comprehensive general medicine service system is essential.

Strengthening the Construction of Talent Teams Related to Chronic Disability

The transition from chronic diseases to chronic disabilities in China necessitates a shift in the healthcare workforce. To address this, it is imperative for the government and society to allocate additional resources towards specialties such as rehabilitation medicine, geriatrics, rheumatology, audiology, and ophthalmology, as these fields offer high cost-effectiveness. Recognizing the significance of this undertaking, China has already taken steps to enhance the training of healthcare professionals in rehabilitation medicine and geriatrics.

Conflicts of interest: No conflicts of interest.

Funding: Supported by the Population and Aging Health Science Program (WH10022023035) and the National Key Research and Development Program (SQ2022YFC3600291).

doi: 10.46234/ccdcw2023.211

Corresponding author: Xiaoying Zheng, zhengxiaoying@sph.pumc.edu.cn.

¹ Department of Health Economics, School of Population Medicine and Public Health, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, China; ² Department of Population Health and Aging Sciences, School of Population Medicine and Public Health, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, China; ³ APEC Health Science Academy (HeSAY), Peking University, Beijing, China.

§ Joint first authors.

Submitted: November 12, 2023; Accepted: November 27, 2023

REFERENCES

1. Zhou MG, Wang HD, Zeng XY, Yin P, Zhu J, Chen WQ, 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* 2019;394(10204):1145 – 58. [http://dx.doi.org/10.1016/S0140-6736\(19\)30427-1](http://dx.doi.org/10.1016/S0140-6736(19)30427-1).
2. Chinese Center for Disease Control and Prevention, The National Center for Chronic and Noncommunicable Disease Control and Prevention. Report on chronic disease risk factor surveillance in China 2018. Beijing: People's Medical Publishing House. 2021. <http://product.dangdang.com/29356233.html>. (In Chinese)
3. Yin P, Qi JL, Liu YN, Liu JM, You JL, Wang LJ, et al. Incidence, prevalence, and mortality of four major chronic non-communicable diseases — China, 1990–2017. *China CDC Wkly* 2019;1(3):32 – 7. <http://dx.doi.org/10.46234/ccdcw2019.012>.
4. Yang GH, Wang Y, Zeng YX, Gao GF, Liang XF, Zhou MG, et al. Rapid health transition in China, 1990–2010: findings from the Global Burden of Disease Study 2010. *Lancet* 2013;381(9882):1987 – 2015. [http://dx.doi.org/10.1016/S0140-6736\(13\)61097-1](http://dx.doi.org/10.1016/S0140-6736(13)61097-1).
5. Jia LF, Du YF, Chu L, Zhang ZJ, Li FY, Lyu DY, et al. Prevalence, risk factors, and management of dementia and mild cognitive impairment in adults aged 60 years or older in China: a cross-sectional study. *Lancet Public Health* 2020;5(12):e661 – 71. [http://dx.doi.org/10.1016/S2468-2667\(20\)30185-7](http://dx.doi.org/10.1016/S2468-2667(20)30185-7).
6. Prince MJ, Wu F, Guo YF, Robledo LMG, O'Donnell M, Sullivan R, et al. The burden of disease in older people and implications for health policy and practice. *Lancet* 2015;385(9967):549 – 62. [http://dx.doi.org/10.1016/S0140-6736\(14\)61347-7](http://dx.doi.org/10.1016/S0140-6736(14)61347-7).
7. Wu DZ, Wong P, Guo C, Tam LS, Gu JR. Pattern and trend of five major musculoskeletal disorders in China from 1990 to 2017: findings from the Global Burden of Disease Study 2017. *BMC Med* 2021;19(1):34. <http://dx.doi.org/10.1186/s12916-021-01905-w>.
8. Yao Y, Yin PB, Liu XY. Falls prevention in China: time for action. *Lancet Public Health* 2021;6(12):e875 – 6. [http://dx.doi.org/10.1016/S2468-2667\(21\)00251-6](http://dx.doi.org/10.1016/S2468-2667(21)00251-6).
9. Wang Y, Wang L, Qu W. New national data show alarming increase in obesity and noncommunicable chronic diseases in China. *Eur J Clin Nutr* 2017;71(1):149 – 50. <http://dx.doi.org/10.1038/ejcn.2016.171>.
10. He L, Zhang YF, Shen XC, Sun Y, Zhao Y. Prevalence trends of multimorbidity among residents in mainland China: a meta-analysis. *Chin Gen Pract* 2023;26(29):3599 – 607. <http://dx.doi.org/10.12114/j.issn.1007-9572.2023.0217>. (In Chinese).
11. Zheng XY, Guo C. Strengthening systematic research on aging: reflections from an omics perspective. *China CDC Wkly* 2022;4(39):875 – 8. <http://dx.doi.org/10.46234/ccdcw2022.181>.
12. Zheng XY, Luo YN, Su BB, He P, Guo C, Tian YH, et al. Developmental gerontology and active population aging in China. *China CDC Wkly* 2023;5(8):184 – 7. <http://dx.doi.org/10.46234/ccdcw2023.033>.