

Advancing Healthy Life Expectancy for Sustainable Urban Development: A Multisectoral Approach to Counter Demographic Challenges

Jun-Yan Xi^{1,2,3}, Xiao Lin^{1,2,3}, Jing Gu^{1,2,3*}, Yuan-Tao Hao^{4,5,6*}

¹ Department of Medical Statistics, School of Public Health, Sun Yat-sen University, Guangzhou 510080, Guangdong, China.

² Sun Yat-sen Global Health Institute, Sun Yat-sen University, Guangzhou 510080, Guangdong, China.

³ Center for Health Information Research, Sun Yat-sen University, Guangzhou 510080, Guangdong, China.

⁴ Peking University Center for Public Health and Epidemic Preparedness & Response, Beijing 100191, China.

⁵ Department of Epidemiology & Biostatistics, School of Public Health, Peking University, Beijing 100191, China.

⁶ Key Laboratory of Epidemiology of Major Diseases, Peking University, Ministry of Education, Beijing 100191, China.

***Corresponding author**

Professor Yuan-Tao Hao; Email: haoyt@bjmu.edu.cn

Professor Jing Gu; Email: gujing5@mail.sysu.edu.cn

Abstract

Improving healthy life expectancy is fundamental to achieving sustainable urban development and resilient cities globally. Identifying its social determinants is thus critical. Following the WHO Dahlgren-Whitehead model, our series of studies examined the impact of multilevel factors on HLE, from macro societal trends to individual circumstances. Population aging, alongside increasing size and shifting age structures, drives spatiotemporal disease burden evolution, directly impacting HLE. We project that by 2030, globally, age-structure changes may cause HLE losses of 0.76 years (premature mortality burden) and 0.89 years (disability burden). Similarly, population growth may incur losses of 1.21 years (premature mortality burden) and

1.17 years (disability burden). Critically, these demographic shifts will amplify HLE losses from chronic diseases, significantly exceeding the combined adverse impact of communicable, maternal, neonatal, and nutritional diseases.

As demographic trends are largely immutable macro-factors, mitigating their negative effects necessitates modifying alterable determinants. Achieving Sustainable Development Goal target 3.4 (Reducing premature mortality from the major chronic diseases between the ages of 30 and 70 years by a third from 2015 levels by 2030) through health investment could gain 3.13 years in HLE, effectively offsetting demographic-driven HLE loss. Further eliminating disability from the major chronic diseases could yield an additional gain of up to 4.53 years. Attaining this requires multidimensional investments. For instance, comprehensive environmental management targeting climate change, air quality, and heavy metal pollution (measured by Environmental Performance Index increases) significantly reduces HLE loss associated with mental disorders—a major disability cause—by 31.84, 281.23, and 331.59 person-years per 100,000 population, respectively. However, single-dimensional interventions yield limited gains, underscoring the imperative for multisectoral collaboration.

Simultaneously, macro-level policies can enhance HLE by influencing individual behaviors and vulnerabilities. For example, in China, middle-aged and older adults providing care for elderly parents see their risk of chronic multimorbidity substantially increased by the heavy caregiving burden. Compared to non-caregivers, their HLE is reduced by 3.63 years. Strengthening social eldercare services could alleviate this burden, narrowing the HLE gap between these groups and promoting health equity.

In conclusion, advancing HLE requires concerted societal effort, directly contributing to sustainable urban development and resilient cities. Integrating health considerations into all policies emerges as the pivotal strategy for achieving these interconnected goals.

Keywords: Chronic Disease Burden; Demographic Change; Healthy Life Expectancy; Sustainable Development; Urban Resilience