SUPPLEMENTARY MATERIAL

Background Information

The numbers and proportions of oldest-old aged 80 years and over who most likely need care in daily life and health service will increase much faster than the overall elderly populations in China and worldwide. In addition to the continued and significant decline of mortality rates especially at oldest-old ages, the main reason why the number of oldest-old will climb so quickly especially after 2030 is that China's baby boomers, those who were born in the 1950s and the 1960s, will become the "oldest-old" after 2030. Clearly, the oldest-old population is growing much faster than the overall elderly population.

Data Source: The Chinese Longitudinal Healthy Longevity Study (CLHLS), 1998–2018

The first 8 waves of the Chinese Longitudinal Healthy Longevity Study (CLHLS) were conducted in 1998–2018. The 9th wave is being conducted in 2021 and has been expanded into the Chinese Longitudinal Healthy Longevity and Happy Family Study (CLHLS-HF) by adding several family-relevant questions based on CLHLS' initial questionnaire that contained about one-third of family-relevant questions. In this paper, we used the datasets of the CLHLS conducted in 1998–2018, which are summarized here.

The baseline survey of the CLHLS was conducted in 1998 and the follow-up surveys with new recruitments to replace dead participants were conducted in 2000, 2002, 2005, 2008–2009, 2011–2012, 2014, and 2017–2018. The CLHLS surveys were conducted in randomly selected roughly half of the counties and city districts of 23 out of 31 provincial level administrative divisions in China, including Liaoning, Jilin, Heilongjiang, Hebei, Beijing, Tianjin, Shanxi, Shaanxi, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan, Chongqing, and Hainan. The survey areas covered 985,000,000 persons in the baseline year 1998 and 1,156,000 persons in the most recent census year 2010, about 85% of the total population of China.

In the 8 waves of the CLHLS conducted in 1998–2018, we have conducted over face-to-face home-based 113,000 interviews, including 19,500 centenarians, 26,800 nonagenarians, 29,700 octogenarians, 25,500 younger elders aged 65–79, and 11,300 middle-aged adults aged 35–64. Data on death dates/age and relatively detailed information of health status, care needs/costs, etc., before dying for the 28,900 elders aged 65–118 who died between waves were collected in interviews with a close family member of the deceased. All of the interviews, basic health exams, and DNA samples were voluntarily collected with standard consensus forms reviewed/signed by the participants (or their direct family members).

All centenarians who voluntarily agreed to participate in the study in the randomly selected roughly half of the counties and city districts of the 23 provincial level administrative divisions were interviewed. For each centenarian, 1 nearby nonagenarian (aged 90–99), 1 nearby octogenarian (aged 80–89), and 1.5 nearby young-old aged 65–79 were interviewed. "Nearby" was loosely defined — it could be in the same village or street if the interviewees of pre-designated age and sex were available, or in the same town or in the same sampled county or city district if not available in the same village or street.

The pre-designated age and sex of the participants used to identify the approximately equal numbers of male and female nonagenarians, octogenarians, and young-old at each of the 5-year age groups from age 65 to 99 were randomly determined, based on the code numbers of the centenarians (1). The questionnaire data collected provides information on family structure, living arrangements and proximity to children, activities of daily living (ADL), the capacity of physical performance (picking up a book from the floor; standing up from a chair; and turning 360° without help), self-reported health, self-evaluation of life satisfaction, cognitive functioning and mental health, chronic disease prevalence, care needs and costs, participation in social activities, diet, smoking and drinking behaviors, psychological characteristics, economic resources, and care giving and family support among elderly respondents and their relatives. Information about the health status of the CLHLS participants who were interviewed in the previous wave but died before the current survey was collected by interviewing a close family member. Information provided consists of cause of death, chronic diseases, ADL before dying, frequency of hospitalization or instances of being bedridden from the last interview until death, whether bedridden before death,

length of disability, and suffering before death, etc.

The CLHLS has documented internationally established good data quality, including age reporting, assessments of mortality rates, proxy response, non-response rates, sample attrition, reliability and validity of major health measures, and rates of logically inconsistent answers (*2–5*). Relatively accurate age reporting of elderly including oldest-old among the Han Chinese (92% of total population of China) has been well-established and re-confirmed by a wide variety of international and domestic studies; this accuracy was due to the cultural traditions of memorizing one's exact date of birth to determine dates of important life events, such as dates of marriage and starting date to build a residential house (*6–7*).

Measurements of the Health Statuses

Activities of daily living (ADL)

Self-reported six ADL, including eating, dressing, transferring, using the toilet, bathing, and continence, were useful measurements of functional capacity and service needs, as verified in numerous previous studies; ADL was also a significant predictor of mortality (*8*). Following the widely adopted practice in the literature, if none of the six ADL activities was impaired, the elder was classified as "ADL active"; otherwise, the elder was classified as "ADL impaired".

Physical performance

Self-reported ADL status may not always be accurate in measuring actual capacity in physical performance of the oldest-old, mainly because ADLs were also affected by household facilities (*9*). Also, some of the oldest-old may feel ashamed to report difficulties in daily activities such as continence. Therefore, as in other international healthy aging surveys, we conducted objective examinations to measure oldest-old participants' physical performance. We present and discuss in this paper the 1998, 2008, 2017-2018 waves of CLHLS results of gender differentials in the physical performance of standing up from a chair and picking up a book from the floor.

The cognitive functional

The cognitive functional statuses of the Chinese elderly were screened by the Chinese version of the Mini-Mental State Examination (MMSE), which were translated into the Chinese language based on the widely used international standard of the MMSE questionnaire with careful considerations of Chinese cultural and social context, and empirically tested in pilot survey interviews (*9*). We used the same cutoffs as the MMSE international standard, defining a score of 24+ as "good" cognitive function and a score of <24 as impaired cognitive function (*11–12*).

Self-reported health and life satisfaction

Self-reported health and life satisfaction were significant and valuable predictors of the functioning and mortality of older adults, as demonstrated in many previous studies (*13*). In addition to self-reported health, the CLHLS also asked the elderly participants to report "How do you rate your life at the present?" The multiple responses to this question about life satisfaction were "very good; good; so-so; bad; very bad; and not able to answer." The category of self-reported "good life satisfaction" included those who provided an answer of "very good" or "good" to this question.

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