Preface

Preface to the Special Collection on Interdisciplinary Research on Healthy Aging

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Invited by the guest editors, I briefly outline in this preface the demographic trends of population aging and the academic and public health needs for interdisciplinary research on healthy aging, which is the general theme of this special collection of *Demographic Research*. Note that the concept of healthy aging used throughout this collection not only means surviving to old ages in good physical/mental health and with active social participation (individual life processes) but also refers to how societies can age healthily (societal processes) with sound policy and intervention program supports.

This special collection of *Demographic Research* includes selected and peer-reviewed papers presented at the international conference on Advances in Methodology and Applications: Biodemography and Multistate Event History Analysis on Healthy Aging held from October 15 to 18, 2012, in Beijing and Hangzhou, China. The conference was jointly organized by the Center for Healthy Aging and Development Studies (CHADS), the National School of Development at Peking University, the China Population and Development Research Center (CPDRC), and the Zhejiang University Institute of Population and Development (ZUIPD) in collaboration with the Max Planck Institute for Demographic Research, the Netherlands Interdisciplinary Demographic Institute, Duke University's Population Research Institute, and the Center for Study of Aging and Human Development. The conference was well attended by 75 scholars from China, the United States, Germany, Canada, the Netherlands, Australia, and Singapore, with 65 abstracts (and some full papers) submitted. As the three-day conference could not accommodate all (or even most) submitted papers, we also held poster sessions, and five papers were selected to receive poster paper awards based on evaluations by a committee consisting of four professors.

Populations worldwide are aging rapidly, with an extraordinary increase of the oldest-old. For example, in the United States (the largest developed country), the number of people aged 65+ will climb to 89 million by 2050, which is more than

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double the number in 2010. The most significant growth will be among the oldest-old (those aged 80+). The share of the American oldest-old among the total population will hit 7.0% in 2050, almost tripling that of 2008 (US Census Bureau 2008). The population of China, which is the largest developing country, making up about one-fifth of the world's total population, is aging rapidly due to rapid declines in both fertility and mortality in recent decades. Under the medium- or low-mortality assumptions, the total number of elderly aged 65+ in China is estimated to increase dramatically from 111 million in 2010 (8.2% of the total population) to 337–400 million in 2050 (23.9%–26.9% of the total population). The number of oldest-old aged 80+ who most likely need daily life assistance was about 20 million in 2010, but it will climb to about 107–150 million in 2050 (Zeng and George 2010). Because the Chinese baby boomers, who were born in the 1950s and 1960s, will fall into the category of the oldest-old after 2030, the average annual rate of increase of the oldest-old from 2000 to 2050 is about 4.4%–5.1% in China, more than twice that of the United States and other industrialized countries (UN 2011). The much more dramatic increase of the oldest-old in both developed and developing countries deserves serious attention because the oldest-old consume services and medical care at a much higher rate than the young-old (Torrey 1992).

Population aging worldwide accompanied by the rapid growth of the oldest-old is unavoidable. Such trends raise fundamental research questions about whether the rapid population aging will be accompanied by disability expansion (Gruenberg 1977), morbidity compression (Fries 1980), or dynamic equilibrium (Manton 1982). Why do some people survive to advanced ages with good health while others suffer severe disability and diseases? How to keep the aging societies healthy? More specifically, what are the factors that may affect old adults' health status and the process of healthy population aging? What kind of policy reactions and program interventions need to be taken to respond to the serious challenges of population aging? Adequately addressing these questions will improve the quality of life not only for the elderly but for all members of society, but so far there are relatively few answers to these important questions.

Numerous studies have shown that few diseases or health conditions are caused purely by biomedical-genetic factors; most diseases are the result of interactions among social, behavioral, and biomedical-genetic factors (Hernandez, Blazer, and IOM 2006; Guo, Roettger, and Cai 2008). For example, using the phenotypic and genotypic data from the Chinese Longitudinal Healthy Longevity Survey and adjusted for various confounders including health status in last interview, Zeng et al. (2010) found that interactions between regular exercise and carrying the genotype FOXO1A-209 significantly reduce mortality at very advanced ages by 31% to 32%. The positive effects of regular exercise among FOXO1A-209 carriers are substantially higher than

that in noncarriers. Another example is that we also found the associations between tea drinking and reduced mortality are much stronger among carriers of the FOXO1A-209 genotype compared to noncarriers, and drinking tea is associated with a reversal of the negative effects of carrying FOXO1A-209 minor alleles, that is, from a substantially increased mortality risk to a substantially reduced mortality risk at advanced ages (Zeng et al. 2016). If these findings would be further reconfirmed by laboratory tests and clinical trials, societies may need to pay particular attention to promoting regular exercise and drinking tea among those who carry the FOXO1A-209 genotype. Clearly, research on the effects of interactions between social/behavioral and biomedical-genetic factors is potentially useful for increasing the efficiency of healthy aging intervention programs. However, research on this crucially important interdisciplinary research topic is very much underdeveloped (Hernandez, Blazer, and IOM 2006). There is an urgent public health need for interdisciplinary research to investigate the effects of the social, behavioral, and biomedical-genetic factors and their interactions on healthy aging (Hernandez, Blazer, and IOM 2006).

As Vaupel (2010) pointed out, linked with both the social sciences and the biological sciences, biodemography of aging, based on a mathematical foundation and benefiting from extensive data analysis, will play a major role in deepening our understanding of healthy aging, which is in the interest of scholars, policymakers, and the public. This is exactly why the present Special Collection of *Demographic Research* and its associated international conference chose the theme of interdisciplinary research on healthy aging, including biodemographic and multistate analysis.

Why did we promote and include both biodemographic and multistate analysis on healthy aging in our international conference? On one hand, one of the most important items on the biodemographic research agenda is to integrate analyses of biomedical and genotypic data with analyses of longitudinal data pertaining to social and behavioral factors related to healthy aging. On the other hand, multistate demographic models elucidate individuals' and cohorts' life courses (including past, current, and future trends) in terms of status transition events affected by social, behavioral, and biomedical-genetic factors. Previously, the biomedical-genetic factors and many other nonmeasurable factors were all mixed up and classified as 'unobserved heterogeneity' without reasonably accurate estimates in the multistate event history analysis because of a lack in biomarker and genotypic data. Nowadays, biomedical-genotypic data gradually (and in some fields rapidly) becomes more widely available. Consequently, it is scientifically important to integrate the biodemographic and multistate demographic analysis in interdisciplinary studies on healthy aging. Note that the integration of biomedical-genetic data analysis and multistate modeling is already rather popular in biostatistics, epidemiology, and public health, but it has received less attention in demography so far. Thus, promoting biodemographic and multistate interdisciplinary

analyses on healthy aging is one of the main motivations for our international conference and special collection of *Demographic Research*.

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