Impact of Household Income Levels on Successful Aging in Older Adults: Postprint

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Abstract

Background Successful aging helps alleviate the aging process, but may be influenced by household income. Objective To explore the impact of different household income levels on successful aging among older adults, and to provide baseline data for improving health equity among Chinese older adults. Methods Data from the 2018 China Health and Retirement Longitudinal Study (CHARLS) were selected for older adults aged 60 years and above. Based on provincial household annual income levels, the older adult population was divided into high-income group ($ 33.33 $66.67%). Successful aging levels were measured according to the Rowe and Kahn model, and multivariate Logistic regression models were used to analyze the impact of different household income levels on successful aging. Results A total of 7,741 subjects were finally included in the study, comprising 2,192 low-income older adults (28.32%), 2,680 middle-income older adults (34.62%), and 2,869 high-income older adults (37.06%). The successful aging rate among Chinese older adults in 2018 was 15.55% (1,204/7,741). The successful aging rate for low-income older adults was 10.77% (236/2,192), which was lower than that of middle-income (13.62%, 365/2,680) and high-income groups (21.02%, 603/2,869) (P<0.05). Low-income older adults performed worse than middle-income and high-income groups in terms of absence of functional impairment, normal cognitive function, absence of depression, and active participation in social activities (P<0.05). However, there was no statistically significant difference in the prevalence of major chronic diseases among different income groups (P>0.05). Multivariate Logistic regression analysis showed that after controlling for sociodemographic characteristics (age, gender, ethnicity, education level, and residential area), the successful aging levels of middle-income and high-income groups were 1.226 times (OR=1.226, 95%CI=1.028~1.463) and 1.721 times (OR=1.721, 95%CI=1.450~2.044) that of the low-income group, respectively; after further controlling for health status and behavioral factors (nighttime sleep duration, accidental falls, hospitaliza-

tion in the past year, hearing, and chewing function), the successful aging level of high-income older adults was 1.559 times that of low-income older adults (OR=1.559, 95%CI=1.028~1.463); after simultaneously controlling for household living environment (bathing facilities and household hygiene), the successful aging level of high-income older adults was 1.461 times that of low-income older adults (OR=1.461, 95%CI=1.207~1.770). Conclusion The successful aging rate among Chinese older adults is relatively low, and household income level is an independent influencing factor of successful aging in older adults. Focusing on the physical and mental health and functional improvement of older adults from low-income families, and enhancing their social participation are important measures for advancing the Healthy China Initiative and actively responding to population aging.

Full Text

Impact of Household Income Levels on Successful Aging of the Elderly

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Abstract

Background Successful aging can help alleviate the aging process, but may be affected by household income.

Objective To explore the impact of different household income levels on successful aging among the elderly and provide fundamental data for improving health equity for older adults in China.

Methods Data from the 2018 China Health and Retirement Longitudinal Study (CHARLS) were used to select participants aged 60 and above. Based on provincial household annual income levels, older adults were categorized into high-income ($ 33.33 $66.67%) groups. Successful aging was measured according to the Rowe and Kahn model. Multivariate Logistic regression analysis was conducted to examine the effects of different household income levels on successful aging.

Results A total of 7,741 subjects were included, comprising 2,192 (28.32%) low-income, 2,680 (34.62%) middle-income, and 2,869 (37.06%) high-income older adults. The prevalence of successful aging among Chinese older adults in 2018 was 15.55% (1,204/7,741). The rate was 10.77% (236/2,192) in the low-income group, significantly lower than the middle-income (13.62%, 365/2,680) and high-income groups (21.02%, 603/2,869) (P<0.05). Low-income older adults

performed worse than their middle- and high-income counterparts in terms of functional independence, normal cognitive function, absence of depression, and active social participation (P<0.05). However, no statistically significant difference was observed in the prevalence of major chronic diseases across income groups (P>0.05). Multivariate Logistic regression analysis showed that after controlling for demographic characteristics (age, gender, ethnicity, education, and region of residence), the odds of successful aging in middle- and high-income groups were 1.226 times (OR=1.226, 95%CI=1.028-1.463) and 1.721 times (OR=1.721, 95%CI=1.450-2.044) those of the low-income group, respectively. After further controlling for health status and behavioral factors (night sleep duration, accidental falls, hospitalization in the past year, hearing, and masticatory function), the odds for the high-income group remained 1.559 times higher than the low-income group (OR=1.559, 95%CI=1.028-1.463). Additionally controlling for household living environment (bathing facilities, home hygiene), the high-income group still showed 1.461 times higher odds of successful aging (OR=1.461, 95%CI=1.207-1.770).

Conclusion The prevalence of successful aging in China is relatively low, and household income level is an independent influencing factor. Focusing on improving physical and mental health, functional status, and social participation among low-income older adults represents a crucial measure for advancing Healthy China initiatives and actively responding to population aging.

Key words Successful aging; Healthy ageing; Income; Aged; China; Root cause analysis

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Introduction

The seventh national population census in 2020 revealed that China had 264.02 million people aged 60 and above, accounting for 18.70% of the total population [1]—an increase of 5.44% from the sixth census, indicating significantly accelerated population aging. Successful aging refers to a state in which older adults simultaneously meet five criteria: absence of major chronic disease, no functional loss, normal cognitive function, no depression, and active social participation [2]. This concept helps slow the aging process and maintains a critical balance between individual development and social integration in later life.

Previous studies have identified barriers to successful aging, including advanced age, living alone, low income, low education, accidental falls, and rural residence [3-5]. However, most of these studies focused on single regions or controlled only for individual-level confounders [6-8]. This study analyzes national data from the 2018 China Health and Retirement Longitudinal Study (CHARLS) while applying the social determinants of health theoretical framework. By controlling for demographic characteristics, health status and behaviors, and household living environment factors, we assessed the independent effect of household income level on successful aging to inform future support strategies for low-income

elderly populations.

Methods

1.1 Data Source

This study utilized data from the 2018 CHARLS, which conducted face-to-face household interviews covering health status and functioning, healthcare and insurance, work and retirement, income and expenditures, and housing across 30 provinces in China. The inclusion criteria were: (1) age $ $60 years; (2) availability of household annual income data; and (3) ability to determine successful aging status. Based on these criteria, the final sample comprised 7,741 older adults.

1.2 Measurement Indicators

To account for regional economic disparities, participants were stratified by province according to household annual income. Those in the top 33.33% within each province were classified as high-income, those between 33.34%-66.66% as middle-income, and those $ $66.67% as low-income. Household annual income comprised five components: household wage income, individual transfer income, household agricultural income, self-employment income, and government transfer payments.

Based on the Rowe and Kahn model [9], successful aging was defined as simultaneously meeting all five conditions: (1) **No major chronic disease**: absence of any of five conditions (cancer, chronic lung disease, diabetes, heart disease, stroke); (2) **No functional loss**: assessed using the Activities of Daily Living (ADL) scale—no difficulty in any of six activities (bathing, dressing, eating, getting out of bed, toileting, continence); (3) **Normal cognitive function**: evaluated using the brief Community Screening Instrument for Dementia (CSI-D), with total scores of 0-9 (0-4 indicating dementia, 5-6 possible dementia, 7-9 normal). Possible dementia cases were further verified using an informant questionnaire (0-6 scale, 0-1 dementia, 2-6 normal); (4) **No depression**: measured by the 10-item Center for Epidemiological Studies Depression Scale (CES-D 10) , with total scores of 0-30 (10-30 indicating depression, 0-9 no depression); and (5) **Active social participation**: defined as participation in one or more of 11 social activities surveyed by CHARLS in the past month.

1.3 Statistical Analysis

Data were processed and analyzed using Stata 15.1. Categorical data were presented as [n (%)], with differences examined using chi-square tests and pairwise comparisons among groups performed using Bonferroni correction. Given that CHARLS covers 30 provinces, 150 districts/counties, and 450 villages, we first examined whether hierarchical structures existed at city or county levels using multilevel Logistic regression. With intraclass correlation coefficient

(ICC) approaching zero, indicating no hierarchical structure, we employed single-level Logistic regression models with successful aging as the dependent variable. Based on social determinants of health theory, we sequentially controlled for demographic characteristics, health status and behaviors, and household living environment to obtain adjusted odds ratios (OR) and 95% confidence intervals (CI). The significance level was set at α=0.05 for two-sided tests and α=0.017 for pairwise comparisons.

Results

2.1 Basic Characteristics of Study Participants

Among the 7,741 participants, 2,192 (28.32%) were low-income, 2,680 (34.62%) middle-income, and 2,869 (37.06%) high-income older adults. Significant differences existed across income groups in age, gender, education, and region of residence (P<0.05), but not in ethnicity (P>0.05) .

2.2 Successful Aging Prevalence and Component Analysis

The overall prevalence of successful aging among Chinese older adults in 2018 was 15.55% (1,204/7,741), with significant differences across income groups (P<0.05). The rate was 10.77% in low-income, 13.62% in middle-income, and 21.02% in high-income older adults. Significant differences were also observed across income groups in functional independence, normal cognitive function, absence of depression, and active social participation (P<0.05), though no difference was found in major chronic disease prevalence (P>0.05) .

Pairwise comparisons revealed that low-income older adults had significantly lower successful aging rates (10.77%) compared to middle-income (13.62%, ^{2}=9.076, P<0.017) and high-income groups (21.02%, ^{2}=94.426, P<0.017). Functional loss affected 21.82% (1,689/7,741) of all participants, with significantly higher rates in the low-income group (28.10%) than in middle-income (23.28%, ^{2}=14.756, P<0.017) and high-income groups (15.65%, ^{2}=115.963, P<0.017). Cognitive impairment affected 14.52% (1,124/7,741) overall, with a significantly higher rate in low-income older adults (19.30%) than in the high-income group (8.64%, ^{2}=122.628, P<0.017). Depression prevalence was 37.64% (2,914/7,741) overall, with significantly higher rates in low-income (45.26%) versus middle-income (40.86%, ^{2}=9.521, P<0.017) and high-income groups (28.83%, ^{2}=145.694, P<0.017). Inactive social participation affected 48.42% (3,748/7,741) overall, with significantly higher rates in low-income (54.56%) versus high-income groups (40.96%, ^{2}=92.395, P<0.017).

2.3 Multivariate Logistic Regression Analysis of Income Effects on Successful Aging

Multilevel Logistic regression showed the intraclass correlation coefficient (ICC) approached zero, indicating no hierarchical structure at city or county levels.

Therefore, single-level Logistic regression was employed. The unadjusted model showed that compared to low-income older adults, high-income individuals had 1.307 times higher odds (OR=1.307, 95%CI=1.098-1.556) and middle-income individuals had 2.206 times higher odds (OR=2.206, 95%CI=1.875-2.594) of successful aging. After controlling for demographic characteristics (age, gender, ethnicity, education, region), the odds were 1.226 times (OR=1.226, 95%CI=1.028-1.463) for middle-income and 1.721 times (OR=1.721, 95%CI=1.450-2.044) for high-income groups. After additionally controlling for health status and behavioral factors (night sleep duration, accidental falls, hospitalization in past year, hearing, masticatory function), high-income older adults showed 1.559 times higher odds (OR=1.559, 95%CI=1.028-1.463). Finally, after controlling for household living environment (bathing facilities, home hygiene), high-income older adults maintained 1.461 times higher odds (OR=1.461, 95%CI=1.207-1.770) .

Discussion

This study found that the prevalence of successful aging among Chinese older adults in 2018 was 15.55% (1,204/7,741), higher than the 14.41% reported in 2015 [5] but lower than rates in Japan (29.2%) and Singapore (28.6%) [10-11], possibly reflecting differences in economic development and healthcare systems. Low-income older adults were more likely to be aged $ $75 years, illiterate, and rural residents—factors that may limit health education access and healthcare utilization due to insufficient economic resources [5], while age-related physiological decline further impedes successful aging. After systematically controlling for demographic, health behavior, and household environment factors based on social determinants of health theory, household income remained an independent predictor, with low-income older adults significantly less likely to achieve successful aging—consistent with previous findings [6,8].

Notably, major chronic disease prevalence did not differ significantly across income groups (all $ $47%), representing a substantial barrier to successful aging at the population level. While China has implemented chronic disease self-management, community-based health management, and information monitoring systems with some success [13], limitations in prevention workforce, health literacy, and government funding have constrained effectiveness [14]. Future efforts should enhance health literacy, strengthen prevention infrastructure, and increase financial investment.

Functional loss prevalence was highest among low-income older adults (28.10%). Research indicates functional loss associates with chronic disease [15], which features long duration, high disability rates, and complications. Low-income elderly, predominantly rural, may avoid seeking care or rehabilitation due to financial constraints and poor healthcare accessibility when complications arise, or may discontinue treatment due to prolonged duration and economic burden—exacerbating functional decline and reducing successful aging likelihood. Strengthening chronic disease complication management and rehabilitation ser-

vices for older adults is therefore essential.

Cognitive function also differed by income, with only 80.70% of low-income versus 91.36% of high-income older adults showing normal cognition [16], likely because higher-income individuals can afford healthier lifestyles and better healthcare, delaying cognitive decline.

Depression prevalence (45.26%) and inactive social participation (54.56%) were highest among low-income older adults [17-18], with research confirming their interrelationship [19]. Persistent economic hardship and life pressures increase emotional dysregulation, while age-related negative events (spousal loss, serious illness) [20-21] elevate hopelessness and anxiety [22] without timely psychological support [23-24]. Low-income older adults also face social support deficits and economic barriers to participation, creating a vicious cycle of depression and social isolation [25] that impedes successful aging.

This study has limitations. First, unreasonable dietary patterns and congenital genetic history may affect successful aging, but CHARLS lacks this information. Second, the cross-sectional design relies on self-reported data from the past year, including household income components (wages, transfers, agricultural income, self-employment, government transfers), which may introduce recall bias.

In conclusion, successful aging prevalence in China is low, particularly in rural areas, with household income serving as an independent influencing factor. To break the disease-poverty cycle among low-income rural populations, China has promoted basic public health service equalization [26] and implemented health poverty alleviation strategies since 2017 [27], enhancing health literacy and service utilization through insurance policy incentives. However, services for functional maintenance, mental health, home-based medical care, long-term care, and multimorbidity management require further expansion and quality improvement. Prioritizing physical and mental health, functional improvement, and social participation among low-income older adults remains critical for Healthy China construction and active responses to population aging.

Author Contributions: ZHANG Yafang and HUANG Yuan designed the study, conducted analyses, interpreted results, and drafted/revised the manuscript, taking responsibility for the article; WEN Xuan and YANG Zhongting managed data and performed statistical analyses; DU Xingmei, DENG Chunyan, YE Qingyun, and DENG Rui contributed to data management and statistical processing. All authors approved the final manuscript.

Conflicts of Interest: None declared.

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Note: Figure translations are in progress. See original paper for figures.