# Postprint of a Study on Public Health Service Utilization and Health Equity among Migrant Elderly in China

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## Abstract

Background The floating elderly population in China is continuously increasing. The dual vulnerabilities of "age" and "migration" lead to health vulnerability risks and low utilization of public health services. Currently, research on income-related public health services and health inequity among the floating elderly is relatively scarce. Objective To understand the utilization of public health services and health status of the floating elderly, evaluate the equity of their public health service utilization and health, and provide recommendations for reducing income-related health inequalities. Methods In April 2022, elderly migrants aged $\geq$ 60 years were selected from the 2018 China Migrants Dynamic Survey (CMDS 2018) database as study subjects (n=5,840). Public health service utilization was reflected by health education, health records, and family doctor service utilization; health status was reflected by self-rated health and illness in the past year; and sociodemographic, economic, and migration characteristics were collected as explanatory variables. The Erreygers index (EI) was used to measure the degree of income-related inequality in public health service utilization and health status, and decomposition analysis based on the logit model was used to quantify the contribution of each determinant to total inequity. Results The health education acceptance rate was 72.12% (4,212/5,840), EI=0.021 (P>0.05); the health record establishment rate was 30.99% (1,810/5,840), EI=-0.054 (P<0.05); the family doctor contract rate was 16.83% (983/5,840), EI=-0.057 (P<0.05). Those with good self-rated health accounted for 82.29% (4,806/5,840), EI=0.199 (P<0.05); those who were ill in the past year accounted for 29.02% (1,695/5,840), EI=0.123 (P<0.05). EI decomposition results showed: the factor contributing most to public health service utilization inequity was household per capita monthly income (contribution rates of 74.354% and 53.383% for health records and family doctor service utilization, respectively), followed by migration scope (contribution rates of 43.474% and 32.063% for health records and family doctor service utilization, respectively);

the factor contributing most to health status inequity was also household per capita monthly income (contribution rates of 59.561% and 66.641% for self-rated health and illness in the past year, respectively), followed by household registration' s effect on self-rated health (contribution rate of 36.347%), and migration scope' s effect on illness in the past year (contribution rate of 14.153%). Conclusion Both public health service utilization and adverse health outcomes among the floating elderly tend to be concentrated among low-income populations, and income is the main cause of public health service utilization and health inequity among the floating elderly. Relevant departments should strengthen publicity of public health services and focus on floating elderly populations with lower economic status.

## Full Text

# Public Health Service Utilization and Health Equity among Elderly Migrants in China

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### Abstract

**Background** The increasing scale of elderly migrants in China creates a dual vulnerability from both "age" and "migration status," leading to health fragility risks and low utilization of public health services. Currently, research on income-related public health service utilization and health inequities among this population remains limited.

**Objective** To understand the utilization of public health services and health status among elderly migrants, evaluate the equity of public health service utilization and health outcomes, and provide recommendations for reducing income-related health inequalities.

**Methods** In April 2022, elderly migrants aged $ $60 years (n=5,840) were selected from the 2018 China Migrants Dynamic Survey (CMDS 2018) database. Public health service utilization was measured through health education, health records, and family doctor services. Health status was assessed through self-rated health and illness in the past year. Socio-demographic, economic, and migration characteristics were collected as explanatory variables. The Erreygers-corrected concentration index (EI) measured income-related inequality in public

health service utilization and health status, while decomposition analysis based on logit models quantified each determinant' s contribution to total inequality.

**Results** Among elderly migrants, the health education acceptance rate was 72.12% (4,212/5,840) with EI=0.021 (P>0.05). The health record establishment rate was 30.99% (1,810/5,840) with EI=-0.054 (P<0.05). The family doctor contract rate was 16.83% (983/5,840) with EI=-0.057 (P<0.05). Those with good self-rated health accounted for 82.29% (4,806/5,840) with EI=0.199 (P<0.05), while 29.02% (1,695/5,840) had been ill in the past year with EI=0.123 (P<0.05). Decomposition results showed that per capita monthly household income contributed most to public health service utilization inequality (74.354% for health records, 53.383% for family doctor services), followed by migration range (43.474% for health records, 32.063% for family doctor services). Income also contributed most to health inequality (59.561% for self-rated health, 66.641% for past-year illness), followed by household registration' s effect on self-rated health (36.347%) and migration range' s effect on past-year illness (14.153%).

**Conclusion** Both low public health service utilization and poor health outcomes disproportionately affect low-income elderly migrants, with income being the primary driver of inequity. Relevant departments should strengthen publicity for public health services and prioritize economically disadvantaged elderly migrant populations.

**Keywords** Migrant elderly; Health equity; Health inequities; Public health services; Facilities and services utilization; Health status; Social determinants of health; Erreygers concentration index

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## Introduction

The seventh national population census revealed that China' s floating population reached 376 million. As migration continues expanding and the population ages rapidly, the scale and proportion of elderly migrants are growing. This large group' s health status poses significant challenges for destination cities' management and public health systems, representing a key issue in promoting equalization of basic public services. The "14th Five-Year New Urbanization Implementation Plan" proposes improving mechanisms for providing basic public health services and extending coverage to permanent residents without household registration. Meanwhile, the "Healthy China 2030" Blueprint and the National Medium- and Long-Term Plan for Actively Responding to Population Aging emphasize establishing and improving elderly health service systems including health education and preventive care.

Elderly migrants face health vulnerability risks due to the dual disadvantages of age and migration status, and their limited personal resources result in low public health service utilization. Preventive public health services can effectively reduce medical and caregiving burdens for older adults. However, current research on elderly migrants' public health services focuses primarily on utilization patterns and influencing factors, with relatively few studies examining income-related health service utilization and health equity within this population. This study uses 2018 China Migrants Dynamic Survey data (CMDS 2018) to analyze public health service utilization and health equity among elderly migrants in China, decomposing and exploring determinants of inequity to inform recommendations for reducing income-related inequalities.

## Data Source

This study was conducted in April 2022 using data from CMDS 2018. CMDS 2018 employed probability proportionate to size (PPS) sampling across urban areas in 31 provinces (autonomous regions, municipalities) and Xinjiang Production and Construction Corps. The survey targeted inflow populations aged $ $15 years who had resided locally for $ $1 month and held non-local household registration, with a sample of 152,000 covering approximately 480,000 migrants and their family members. This study selected 5,840 elderly migrants aged $ $60 years without missing variables as the study population.

## Research Methods

**Variable Selection** The dependent variables included public health service utilization and health status. Public health service utilization comprised three dimensions: health education, health records, and family doctor services. Health education was measured by asking whether respondents had received any health education in their current community/workplace in the past year (0=none, 1=one or more items). Health records were measured by asking whether respondents had established resident health records locally (1=established, 0=otherwise). Family doctor services were measured by asking whether respondents had contracted with a local family doctor (1=contracted, 0=otherwise).

Health status included subjective health (self-rated health) and objective health (illness in the past year). Self-rated health was assessed by asking "How is your health status?" with responses of "healthy" or "basically healthy" coded as 1 and other options (unhealthy but self-caring, unable to self-care) coded as 0. Objective health was measured by asking "Have you been ill (injured) or felt unwell in the past year?" (1=yes, 0=no).

Explanatory variables included: socio-demographic variables (gender, age, marital status, household registration type, family size), socioeconomic variables (per capita monthly household income, education level, medical insurance status), and migration characteristic variables (migration range, duration, and reason). Per capita monthly household income was divided into five groups from low to

high based on percentiles to analyze equity across income groups.

**Analysis of Public Health Service Utilization and Health Equity Concentration Index (CI)** CI is widely used to measure income-related inequality in health. The formula is: CI = 2cov(yi, Ri)/μ, where yi is the outcome variable for public health services or health, μ is the population mean, and Ri is the fractional rank of individual i in the income distribution. CI ranges from (-1,1), with CI>0 indicating pro-rich inequality, CI<0 indicating pro-poor inequality. Larger absolute CI values indicate greater sensitivity to income and higher inequity.

Since all outcome variables in this study are binary, we used the Erreygers-corrected concentration index (EI) to evaluate equity in public health service utilization and health status. The formula is: (ymax-ymin) × CI(y), where ymax and ymin are the maximum and minimum values of the public health service and health variables, and CI(y) is the CI of y.

**Decomposition of CI** CI decomposition can partition the CI of public health service utilization and health into contributions from each influencing factor, where each factor' s contribution equals the product of the outcome' s elasticity with respect to that factor and the factor' s income-related inequality. Decomposition further explores how each factor affects inequality in the dependent variable. Based on general regression analysis, the formula is: C = Σk ($\beta$k × xk / μ) × Ck + GC /μ, where C is the CI of the dependent variable, μ is the mean of public health service utilization or health status (y), $\beta$k is the logit regression coefficient, xk is the mean of variable k, Ck is the CI of xk, and GC is the generalized CI of the residual term. For binary outcomes, EI decomposition multiplies CI decomposition by 4μ.

**Statistical Methods** SPSS 25.0, Stata 16.0, and Excel 2019 were used for data screening, statistical analysis, and table preparation. Categorical data were expressed as relative frequencies, with inter-group comparisons using $^2$ tests and trend $^2$ tests. Measurement data were expressed as ($\bar{x}\pm s$). CI evaluated equity in public health service utilization and health status, while EI decomposition identified major contributing factors to inequity. P<0.05 indicated statistical significance.

## Results

### Basic Characteristics of Elderly Migrants

Among 5,840 elderly migrants, 3,364 (57.60%) were male; mean age was (65.5$±$5.2) years, with 4,764 (81.58%) aged 60-69; 4,924 (84.32%) were married; 3,521 (60.29%) held agricultural household registration; family size was predominantly $ $2 persons [3,492 (59.79%)]; median per capita monthly household income was 1,750 yuan, with 1,430 (24.49%) earning $ $3,000 yuan and 1,128 (19.32%) earning <1,000 yuan; 2,683 (45.94%) had primary

school education or below; 5,491 (94.02%) had medical insurance. Regarding migration characteristics, 2,646 (45.31%) migrated across provinces, 2,512 (43.01%) had migrated for $ $5 years, and primary migration reasons were work/business [2,111 (36.15%)] and family accompaniment [2,173 (37.21%)] .

### Public Health Service Utilization and Health Status of Elderly Migrants

For public health service utilization, 4,212 (72.12%) received health education, 1,810 (30.99%) established health records, and 983 (16.83%) contracted family doctor services. For health status, 4,806 (82.29%) reported good self-rated health, while 1,695 (29.02%) had been ill in the past year. Comparisons by characteristics are shown in .

Trend $^2$ tests showed: (1) Smaller migration range was associated with higher proportions receiving health education, establishing health records, and contracting family doctor services ( $^2$ trend = 0.077, 0.125, 0.119 respectively, P<0.001). Longer migration duration was associated with higher proportions establishing health records and contracting family doctor services ( $^2$ trend = 0.095, 0.059, P<0.001). (2) Older age was associated with poorer self-rated health ( $^2$ trend = -0.149, P<0.001). Higher education and higher per capita monthly household income were associated with better self-rated health ( $^2$ = 0.168, 0.234, P<0.001). Smaller migration range was associated with poorer self-rated health ( $^2$ trend = -0.092, P<0.01) and higher past-year illness rates ( $^2$ trend = 0.079, P<0.05). Longer migration duration was associated with poorer self-rated health ( $^2$ trend = -0.081, P<0.01) and higher past-year illness rates ( $^2$ trend = 0.079, P<0.01) .

### Equity Analysis of Public Health Service Utilization and Health Status

(1) For public health service utilization, the EI for health education was 0.021 (P>0.05), indicating relatively equitable utilization across income groups. The EI for health records (EI=-0.054, P<0.05) and family doctor services (EI=-0.057, P<0.05) were negative, indicating these services favored low-income elderly migrants. (2) For health status, the EI for self-rated health was 0.199 (P<0.05), indicating good self-rated health concentrated among high-income elderly migrants. The EI for past-year illness was negative (EI=-0.123, P<0.05), indicating illness concentrated among low-income elderly migrants.

### Decomposition of EI for Public Health Service Utilization and Health Status

EI decomposition using logit models was performed. Since no inequality existed in health education acceptance, decomposition was unnecessary. Results showed per capita monthly household income had an EI of 0.062, indicating

unequal income distribution among elderly migrants. Income contributed most to inequality in health record establishment, explaining 70.354% of the pro-poor inequality, followed by migration range (43.474%), with intra-city and inter-city migration within provinces explaining 23.936% and 19.538% respectively. Household registration type and self-rated health explained 22.173% and 20.756% respectively.

For family doctor service inequality, income again contributed most (53.383%), followed by migration range (32.063%) and household registration type (28.060%) .

For health status inequality decomposition, per capita monthly household income contributed most to self-rated health inequality (59.561%). Income' s positive elasticity coefficient indicates its positive effect on health. Household registration contributed 36.347% to self-rated health inequality. Gender, age, education, medical insurance, migration range, and public health service utilization all contributed to self-rated health inequality. Larger family size, longer migration duration, and migrating for family accompaniment or retirement reduced self-rated health inequality (negative contribution rates).

For past-year illness, income contributed most to inequality (66.641%), followed by intra-provincial migration (14.153%) and family accompaniment migration (10.970%). All migration-related variables had positive elasticity coefficients, indicating migration increases illness risk among elderly migrants. Older age, migration duration <15 years, and retirement migration reduced illness inequality, while other variables increased it .

## Discussion

### Public Health Service Utilization Among Elderly Migrants

The health education acceptance rate of 72.12% among elderly migrants is similar to that of young migrants and higher than the 59.56% reported among China' s elderly floating population in 2017. The non-significant EI for health education indicates no disparity across age and income groups, suggesting high equalization in health education programs. However, only 30.99% established health records and 16.83% contracted family doctor services, indicating considerable gaps compared with urban and rural residents. This may reflect: (1) the family doctor contract system initiated in 2016 still has coverage gaps; (2) low awareness of public health services among elderly migrants; (3) insufficient data on elderly migrants at primary healthcare institutions; and (4) the predominance of 60-69-year-olds with relatively good health and less apparent need for public health services.

Notably, migration characteristics affect service access. Compared with inter-provincial migrants, those migrating within provinces or within cities had higher utilization rates. Intra-city migrants face similar natural and socio-cultural environments to their origins, facilitating social integration and smoother informa-

tion access, thereby increasing likelihood of utilizing basic public health services. Elderly migrants from larger families and with longer residence duration also had higher participation rates, likely due to better knowledge of primary healthcare institutions and easier inclusion in service coverage.

### Health Status of Elderly Migrants

While 82.29% of elderly migrants reported good health—possibly due to the predominance of younger elderly—nearly half experienced illness within the past year, revealing a discrepancy between subjective and objective health. Lower health literacy may contribute to overestimation of health status. Older age correlated with poorer self-rated health and higher illness rates, with degenerative diseases posing potential health risks.

Regarding migration characteristics, intra-provincial migrants reported poorer self-rated health and higher illness rates than inter-provincial migrants, reflecting "healthy migrant selection" where those in poor health are less likely to migrate long distances. Longer migration duration correlated with poorer health, suggesting a "salmon bias effect" where migration itself poses health risks. Elderly migrants for work/business reported better subjective and objective health than those migrating for family accompaniment or retirement, as the latter represent passive migration with potentially older ages and more negative health reports.

### Equity and Decomposition of Public Health Service Utilization and Health Status

For public health service utilization, health records and family doctor services showed pro-poor inequality, possibly because higher-income elderly migrants prefer large general hospitals over primary healthcare institutions. Low-income elderly migrants benefit more from these services, promoting equity in access and reflecting basic public health services' role in protecting migrants' rights. Decomposition showed per capita monthly household income contributed most to pro-poor inequality in health records, followed by intra-provincial migration, non-agricultural household registration, good self-rated health, longer migration duration, female gender, and older age. Similarly, income, non-agricultural household registration, and intra-provincial migration significantly contributed to family doctor service inequality.

For health status, positive EI for self-rated health and negative EI for illness indicate income-related health inequalities. Good subjective and objective health both favored higher-income migrants, with income being the most important contributor—consistent with most research findings. Therefore, measures to reduce income gaps and financial support for low-income elderly migrants are needed. Non-agricultural household registration and higher education widened pro-rich inequality in self-rated health, confirming socioeconomic status impacts. Migration range contributed to health inequality, with intra-provincial migra-

tion increasing inequity. Health education positively affected both subjective and objective health. Most migration characteristics (except duration >15 years) negatively impacted health status, confirming migration as a health risk factor.

Authorities should strengthen data collection on elderly migrants, enable communities and primary healthcare institutions to track their information, and widely promote public health services to ensure full and equitable access to national basic public service equalization. Priority should focus on low-income and rural-registered elderly migrant populations to reduce health inequities among impoverished older adults.

**Limitations**: (1) Medical insurance types were not differentiated, preventing analysis of different insurance schemes' effects on equity; (2) Cross-sectional survey data limits causal inference; (3) Self-reported income and health status may deviate from actual values.

**Author Contributions**: MIN Shuhui and LI Bei conceived and designed the study; MIN Shuhui analyzed data and drafted the manuscript; HU Yi participated in data analysis; HU Yi, CHENG Xiaofen, and GUO Ruiqi revised the manuscript; LI Bei supervised quality control and overall responsibility.

**Conflict of Interest**: None declared.

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## References

[1] Seventh National Population Census [EB/OL]. (2021-05-11) [2022-04-06]. http://www.stats.gov.cn/ztjc/zdtjgz/zgrkpc/dqcrkpc/ggl/202105/t20210519_{1817700}.html.

[2] XIE J, ZHU Q, WANG X K. Study on influencing factors of health of elderly floating population in China[J]. Urban Development Studies, 2020, 27(11): 30-35.

[3] National Development and Reform Commission. "14th Five-Year"New Urbanization Implementation Plan [EB/OL]. [2023-03-08]. https://www.ndrc.gov.cn/fggz/fzzlgh/gjjzxgh/202207/t20

[4] CPC Central Committee and State Council. "Healthy China 2030" Blueprint [EB/OL]. (2016-12-25) [2022-04-06]. http://www.gov.cn/zhengce/2016-10/25/content_{5124174}.htm.

[5] CPC Central Committee and State Council. National Medium- and Long-Term Plan for Actively Responding to Population Aging [EB/OL]. (2019-11-21) [2022-04-06]. http://www.gov.cn/xinwen/2019-11/21/content_{5454347}.htm.

[6] CHEN N, SHI R B. Empirical research on health disparity of the floating old people[J]. Chongqing Social Sciences, 2017(7): 53-60. DOI: 10.19631/j.cnki.css.2017.07.008.

[7] HOU H L, LI C H. Identity, region and city size: inequality of basic public

health services for the elderly floating population[J]. Population and Development, 2019, 25(2): 31-38.

[8] DONNELL O O, van DOORSLAER E, WAGSTAFF A, et al. Analyzing health equity using household survey data: a guide to techniques and their implementation[M]. Washington, DC: 2008.

[9] KONINGS P, HARPER S, LYNCH J, et al. Analysis of socioeconomic health inequalities using the concentration index[J]. Int J Public Health, 2010, 55(1): 71-74. DOI: 10.1007/s00038-009-0078-y.

[10] WAGSTAFF A. The concentration index of a binary outcome revisited[J]. Health Econ, 2011, 20(10): 1155-1160. DOI: 10.1002/hec.1752.

[11] ERREYGERS G. Correcting the concentration index[J]. J Health Econ, 2009, 28(2): 504-515. DOI: 10.1016/j.jhealeco.2008.02.003.

[12] PAN B B. Evaluating health service utilization equity using corrected concentration index and its decomposition: a case study of elderly population in Jiangxi NCMS pilot counties[D]. Nanchang: Nanchang University, 2012.

[13] ZHU Z K. Public health services and migrant workers' willingness to settle in cities: evidence from China migrants dynamic survey[J]. Chinese Rural Economy, 2021, 37(10): 125-144.

[14] WANG X H, LI J B, YANG Y. Status and influencing factors of receiving health education and personal health record establishment among elderly migrant population in China[J]. Chinese Journal of Public Health, 2021, 37(2): 203-208. DOI: 10.11847/zgggws1128961.

[15] QIN J M. Progress in basic public health service projects in China[J]. Chinese Journal of Public Health, 2017, 33(9): 1289-1297. DOI: 10.11847/zgggws2017-33-09-01.

[16] PENG Y C, ZHOU J J, ZHANG Z Y, et al. Research on the performance and trust status parties in contract services of family doctors in the suburbs of Beijing[J]. 2020. DOI: 10.21203/rs.3.rs-131589/v1.

[17] TANG D, WANG F. Influencing factors of basic public health service utilization of the migrant elderly[J]. Chinese Journal of Health Policy, 2018, 11(2): 17-22. DOI: 10.3969/j.issn.1674-2982.2018.02.003.

[18] HAO A H, LI C C, PAN B. Guangdong residents' awareness and satisfaction with China' s national essential public health services: a telephone-based survey[J]. Chinese General Practice, 2019, 22(4): 407-412. DOI: 10.12114/j.issn.1007-9572.2019.04.008.

[19] SONG Q C, ZHANG Q. Research on health status of the elderly migrant population in China and its determinants[J]. Chinese Journal of Population Science, 2018(4): 81-92, 127.

[20] YUAN H B, DENG H L. The impact of basic public health services on the health of floating population: an empirical analysis based on CMDS2018 data[J]. Social Scientist, 2021, 38(8): 104-107, 112. DOI: 10.3969/j.issn.1002-3240.2021.08.017.

[21] LI Y T. Analysis on the characteristics and social integration of the elderly floating population in China[J]. Social Science Front, 2021, 44(3): 270-275.

[22] ZHANG H, YU Z J, LI X Y, et al. Research on equalization of basic public health services[J]. Chinese Journal of Health Statistics, 2018, 35(2): 269-271, 275.

[23] LU R Y, GAO J M, XU Y J, et al. Status and decomposition of health equity among the elderly in Fujian Province[J]. Chinese Journal of Public Health, 2016, 32(9): 1159-1163. DOI: 10.11847/zgggws2016-32-09-07.

[24] ZHAO T, QIAO H. Analyzing the health equity and its decomposition of rural elderly in Haiyuan County of Ningxia[J]. Chinese Journal of Health Statistics, 2020, 37(2): 196-198, 205.

[25] ZHOU Z, YIN J H, HAO S C, et al. Multi-dimensional health inequality and its decomposition among the elderly[J]. Chinese Journal of Health Statistics, 2018, 35(4): 500-503.

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