BMJ Open

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults - A Nationwide Cross-Sectional Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-082548
Article Type:	Original research
Date Submitted by the Author:	28-Nov-2023
Complete List of Authors:	Zhu, Rui; Bengbu Medical College, Hou, Wenjie; Bengbu Medical College Wang, Lingmeng; Bengbu Medical College Zhang, Chenchen; Bengbu Medical College Guo, Xing; Bengbu Medical College Luo, Dan; Bengbu Medical College Wang, Fuzhi; Bengbu Medical College
Keywords:	GERIATRIC MEDICINE, Health Services for the Aged, Aged, Aging

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults - A Nationwide Cross-Sectional Study

Objectives: This study aimed to understand the willingness of Chinese older adults to purchase institutionalized elderly care services and the influencing factors and to provide a theoretical basis and decision-making support for the construction and improvement of China's institutionalized elderly care service system.

Methods: Research data from 4123 elderly people who met the requirements of this study were screened from the database of Psychology and Behaviour Investigation of Chinese Residents (PBICR) in 2022. Three multivariate logistic regression analysis models of the willingness of elderly people to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's willingness to purchase institutionalized elderly care services.

Results: Of the 4123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutionalized senior care services (1125, 27.3% vs. 1079, 26.2%, respectively) and 1919 (46.5%) had hesitant attitudes. The analysis of Model 1 found that medical insurance participation, the number of children and siblings, chronic disease, and per capita monthly household income had an influential effect on the willingness of elderly people to purchase institutional care. In Model 2, we found that factors such as per capita monthly household income and anxiety led to hesitancy among older adults to purchase institutionalized senior care services. In Model 3, we further found that social support and health literacy led to a shift from hesitation to willingness to purchase institutionalized elderly care services.

Conclusion: The number of children, number of siblings, per capita monthly income of the family, medical insurance participation, health status, health literacy, and social support were the main factors that influenced the purchase of institutionalized care by elderly individuals.

Strengths and limitations of this study

- This study participants from 148 cities in 22 provinces, 5 autonomous regions, and

4 municipalities.

- This study using stratified and quota sampling methods.
- This study was a cross-sectional study, which makes it difficult to explain the causal relationship between variables.
- The inclusion of all possible influences in this study was difficult to achieve.

1. Background

Population ageing has become a global issue. According to the World Health Organization, by 2030, one-sixth of the world's population will be older than 60, and the number of people older than 60 will increase from 1 billion to 1.4 billion from 2020 to 2030 [1]. China has one of the fastest-ageing populations in the world.[1] Data from the National Bureau of Statistics (NBS) show that by 2020, China's elderly population aged 60 and above will reach 260 million, accounting for 18.7% of the total population. [2] According to the National Population Development Plan (2016-2030), it is predicted that the proportion of elderly people over 60 years of age in China will be greater than 25% in 2030,[3] which means that one out of every four people will be over 60 years of age. As the proportion of China's elderly population continues to rise, the social burden of old age is gradually increasing.

Along with the increase in the proportion of the elderly population, the fertility rate of mainland China's population has shown a continuous downwards trend and the per capita life expectancy has shown an upwards trend, which will inevitably lead to an increase in the degree of population ageing and in the burden of old-age pension faced by society. At the same time, the demographic structure of Chinese families shows an inverted pyramid pattern in which a couple must take care of four elderly parents and one child.[4] This “4-2-1” family demographic structure makes “how to age” an important issue in society.

The results of previous studies show that in the Chinese conception of old age, family care has been the core means of support for old age in China.[5] Compared with Western countries, the Confucian idea of filial piety has led Chinese people to believe

for thousands of years that most elderly people who receive care from institutions are there because their children are ungrateful.[6] They believe that their children's unwillingness to take care of them makes them lose face, so most elderly people choose to age in the family. This suggests that intergenerational ties and obligations are generally stronger in Chinese families than in Western societies.[7] At the same time, in Chinese families, children's ability to care for elderly adults has been eroded by demographic changes and socioeconomic development.[8] The younger generation has had to move to cities to work, so family-centred forms of care for elderly individuals are gradually disappearing,[9] and there is an inevitable growing demand for institutional care. To cope with the growth of a rapidly ageing population, the Chinese government has released a blueprint for an emerging ageing service and support network that aims to establish a social ageing system of home-based ageing with community-based ageing as the necessary support and institutionalized ageing as a supplement.[10] In 2020, the Proposal of the Central Committee of the Communist Party of China on the Formulation of the Fourteenth Five-Year Plan for National Economic and Social Development and Vision for 2035 proposed the implementation of a national strategy of actively coping with the ageing of the population, promoting the synergistic development of old-age care and the old-age care industry, and constructing an old-age care system that combines medical care and recreation with old-age care and the goal of increasing the number of public institutions for old-age care in accordance with the 14th Five-Year Plan for Old-Age Care and Services Development.[11] The Chinese government is making great efforts to improve the quality of institutional care services and the training of specialized caregivers, gradually improve the old-age security system, promote the rapid development of institutional care services, actively respond to the ageing of the population, continue to satisfy the growing demand of elderly people for multilevel, high-quality, healthy old-age care and to provide the elderly population with tailored old-age care services.

Institutionalized elderly care generally refers to service institutions that provide comprehensive services for elderly individuals, such as food and living, cleaning and hygiene, life care, health management and cultural, sports and recreational activities.

Institutional care can reduce the burden of care on children, provide specialized care services and enrich the leisure activities of elderly individuals. However, the results of a cross-sectional survey of several regions suggest that many factors may influence the acceptance of institutionalized care among Chinese seniors. For example, the rapidly changing society is changing traditional family care for elderly individuals, resulting in a tendency for elderly Chinese people to choose institutionalized care as a way of ageing.[12] Negative news about elderly care institutions often leads to negative attitudes towards institutionalized care.[13] In addition, China is a vast country with enormous differences in economic and cultural conditions in different regions, which may affect the willingness of elderly individuals to purchase institutionalized elderly care services.[14] The above series of studies elaborated on the factors that influence the willingness of elderly people to purchase institutional care services.[15] However, the samples of these studies were limited to regional constraints and are not representative of the overall situation in mainland China.

Supported by the "2022 China Population Psychological and Behavioural Tracking Survey Project", we conducted a national cross-sectional survey in mainland China hoping to fully understand the willingness of elderly people to purchase institutionalized elderly care services and the factors that influence this willingness. This study can support the improvement of the level of institutionalized elderly care services in society and the enhancement of elderly people's sense of well-being and security.

2. Information and methodology

2.1 Data sources

The study data were obtained from the Psychology and Behaviour Investigation of Chinese Residents, 2022 (PBICR) database.[16] The China Population Psychological and Behavioural Survey (CPBS) aims to establish a database through a multicentre, large-sample cross-sectional survey to provide strong data support for the development of research in various fields and for a comprehensive and systematic understanding of the public's physical and mental health. The cross-sectional survey was initiated by the School of Public Health, Peking University, and was conducted

from June 20, 2022, to August 31, 2022, using stratified and quota sampling methods to select 148 cities, 202 districts and counties, 390 townships/streets, and 780 communities/villages in 23 provinces, 5 autonomous regions, and 4 municipalities directly under the central government where mainland China is located. The questionnaires were distributed to the public one-on-one and face-to-face by surveyors. After the respondents provided informed consent, they could click on the link to fill out the questionnaire.

The screening criteria for the sample of this study were as follows: (1) age ≥60 years or older; (2) nationality of the People's Republic of China; (3) resident population of China (annual time away from home ≤ 1 month); (4) voluntary participation in the study and the completion of the informed consent form; (5) completion of the network questionnaire survey independently or with the help of investigators; and (6) participants could understand the meaning of each item in the questionnaire. The sample exclusion criteria were as follows: (1) people with mental disturbances; (2) persons with cognitive impairment; (3) people who were participating in other research on similar topics; and (4) people who did not wish to collaborate.

The questionnaire was completed by 30,505 participants from 148 cities in 22 provinces, 5 autonomous regions, and 4 municipalities directly under the central government. Based on the sample selection criteria and exclusion criteria, research data from 4123 older adults were finally included in this study.

2.2 Research instrument

The visual analogue scale (VAS) was applied to assess the willingness of elderly people to purchase institutionalized elderly care services. The items were rated from 0 (unwillingness to purchase) to 100 (strong willingness to purchase). The higher the score, the stronger the willingness of elderly respondents to purchase institutionalized elderly services. The first 27% of the sample with VAS scores was considered to have a negative attitude towards institutionalized elderly services, the second 27% was considered to have a positive attitude towards institutionalized elderly services, and the remaining sample was considered to have a hesitant attitude towards institutionalized elderly services.[17]

The HLS-SF12 was applied to assess the health literacy level of the respondents. The HLS-SF12 was developed by Sun Xiaonan et al. [18] to assess respondents' ability to find, understand, evaluate, and apply health-related information. The options were rated on a Likert scale from “very difficult” (1 point) to “very easy” (4 points). The total score of the items ranged from 0 to 36, with the top 50% of the scores considered to have a high level of health literacy and the bottom 50% considered to have a low level of health literacy.[19] The Cronbach's coefficient for the HLS-SF12 in this study was 0.910.

The PSSS was applied to assess respondents' feelings about the social support they received. The PSSS evaluates the extent to which individuals feel supported by family, friends, and others in terms of three dimensions, family support, friend support, and support from others, with the total score reflecting the degree of total social support felt by the individual. A Likert scale was used that ranged from “strongly disagree” (1 point) to “strongly agree” (7 points). The total score was 21, with a higher total score indicating a higher level of social support for the individual.[20] Respondents with the top 50% of the score were considered to have a higher level of social support, and respondents in the bottom 50% were considered to have a lower level of individual social support. Cronbach's coefficient for the PSSS in this study was 0.928.

The GAD-7 was applied to measure the respondents’ anxiety. Each entry on the GAD-7 is rated from 0 to 3, and the total score ranges from 0 to 21. The seven items are summed to produce a final rating that indicates the frequency of anxiety symptoms. A score of 0-4 indicates no anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and 15 or more indicates severe anxiety.[21] The Cronbach's coefficient for the GAD-7 in this study was 0.927.

The PHQ-9 was applied to measure the depressive state of the respondents. Options were rated on a Likert scale ranging from “never” (0 points) to “nearly every day” (4 points). The nine items were summed to give a total score from 0 to 36 indicating the frequency of depressive symptoms. Scores of 0-4 were categorized as no depression, 5-9 as mild depression, 10-14 as moderate depression, and 15-27 as severe depression.[22] Cronbach's coefficient for the PHQ-9 in this study was 0.916.

2.3 Statistical methods

Descriptive statistics were applied to analyse the percentages of sociodemographic information, social structure, economy, and other factors for different samples. The chi-square test was applied to analyse the differences in the willingness of elderly respondents to purchase institutional care in different sociological contexts. Three multivariate logistic regression analysis models of elderly people's willingness to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's purchase of institutionalized elderly care services. Data organization was completed using Excel 2019 (Microsoft Inc., Washington DC, USA), and data analysis was completed using IBM SPSS Statistics (Ver. 26, IBM Inc., New York, USA) and R language (Ver. 4.2.3).

3. Results

3.1 Sample distribution

The 4123 study samples came from 780 residential communities in 22 provinces, 5 autonomous regions, and 4 municipalities in mainland China. Overall, the willingness of elderly people to purchase institutionalized elderly care services was generally high in central and eastern China, while the willingness of elderly people to purchase institutionalized elderly care services was generally low in northwestern and northeastern China. The distribution of elderly people purchasing institutional care services in different provinces in mainland China is shown in Figure 1, and the scores of elderly people purchasing institutional care services in different provinces in mainland China are shown in Figure 2.

3.2 Current Situation of Elderly People's Willingness to Purchase Institutional Care Services

The basic characteristics of the 4123 respondents are shown in Table 1. Of the 4123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutional care (1125, 27.3% vs. 1079, 26.2%, respectively), and 1,919 (46.5%) had hesitant attitudes. The results of the one-way analysis of the purchase of institutionalized elderly care services by elderly people show that in the "unwillingness-

willingness" model, there were significant differences in the willingness to participate in institutionalized elderly care services among elderly people with different places of residence, highest educational level, marital status, age, number of children and siblings, occupation, per capita monthly household income, indebtedness, medical insurance participation, property, health status and health literacy factors, as shown in Figure 3(Supplemental Figure). Further analysis of the results in the "reluctance-hesitation" and "hesitation-willingness" models found that other factors also affected the willingness of elderly people to purchase institutionalized elderly care services and that there were significant differences in the willingness to purchase institutionalized elderly care services among elderly people with different levels of social support and anxiety factors, as shown in Table 2.

Table 1. Basic characteristics of respondents

Variate		n(%)	Variate		n(%)
Gender	Male	2079(50.40)	Number of house properties	0	365(8.90)
	Female	2044(49.60)		1	2958(71.70)
Highest educational level[a]	Uneducated	867(21.00)		≥2	800(19.40)
	Primary	1941(47.10)	Have subsidies[b]	No	2781(0.68)
	Intermediate	738(17.90)		Yes	1342(0.33)
	High class	577(14.00)	Have debts	No	3378(0.82)
Place of residence	Urban	2300(55.80)		Yes	745(0.18)
	Rural	1823(44.20)	Have health insurance	No	236(0.06)
Marital status	Spinsterhood	110(2.70)		Yes	3887(0.94)
	Married	3437(83.40)	Number of chronic disease (kind)	0	1749(42.40)
	Divorced	99(2.40)		1	1233(29.90)
	Widowed	477(11.60)		≥2	1141(27.70)
Age group	60-70	2529(61.30)	HLS-SF12	Low	2205(0.54)
	71-80	1401(34.00)		High	1918(0.47)
	> 80	193(4.70)	PSSS	Low	2382(0.58)
Number of children*	0	318(7.70)		High	1741(0.42)
	1	1337(32.50)	Anxiety	No anxiety	2299(0.56)
	≥2	2465(59.80)		Mild anxiety	1338(0.33)
Number of brothers and sisters	0	764(18.50)		Moderate anxiety	416(0.10)
	1	662(16.10)		Severe anxiety	70(0.02)
	≥2	2697(65.40)	Depressed	No depressed	4074(98.80)
Occupation type*	Professionals	216(7.60)		Mild depressed	1(0.00)
	Business services personnel	257(9.00)		Moderate depressed	10(0.20)
	Agricultural, forestry and	560(19.60)		Severe depressed	38(0.90)

	fisheries producers	
	Soldier	48(1.70)
	Other staff	1779(62.60)
Monthly household income	<2000	1008(24.40)
	2000-4000	1571(38.10)
(CNY)	>4000	1544(37.40)

Notes:*: (missing data) **a:** Primary (primary and junior high school); intermediate (secondary vocational education or senior high school); and senior (college, bachelor's degree and above). **b:** Includes subsidies for renting, employment, living, purchasing a home, job seeking and starting a business.

Table 2. One-way (chi-square test) analysis of elderly people's willingness to purchase institutionalized elderly care services

Variate	Unwillingness-Hesitate		Hesitate-Willingness	
	χ2	P	χ2	P
Gender	1.211	0.271	0.610	0.435
Highest educational level	22.923	<0.001	8.578	0.035
Place of residence	11.805	0.001	0.271	0.603
Marital status	33.66	<0.001	0.399	0.706
Age group	3.064	0.216	3.930	0.140
Number of children	38.886	<0.001	6.256	0.044
Number of brothers and sisters	47.38	<0.001	12.646	0.002
Occupation type	14.631	0.006	6.159	0.188
Monthly household income (CNY)	49.243	<0.001	6.529	0.038
Number of properties	1.378	0.502	8.875	0.012
Have subsidies	4.640	0.031	2.242	0.134
Have debts	21.572	<0.001	1.477	0.224
Have health insurance	0.241	0.623	20.388	<0.001
Number of chronic diseases (kind)	20.156	<0.001	40.899	<0.001
HLS-SF12	16.537	<0.001	20.588	<0.001
PSSS	28.296	<0.001	52.654	<0.001
Depressed	2.325	0.508	0.923	0.820
Anxiety	15.260	0.002	17.111	0.001

3.3 Influential factors related to the willingness of elderly people to purchase institutional care services

Variables with significant differences in the univariate analysis were further substituted into the three multivariate logistic regression models of older adults' willingness to purchase institutionalized senior care services.

The results of the analysis of Model 1 (reluctance-willingness) found that the

sociodemographic factors of medical participation (β=-0.555), 1 child (β=-0.771) or more than 2 children (β=-0.854), 2 or more siblings (β=-0.323), suffering from 1 (β=-0.517) or 2 or more chronic diseases (β=-0.845) were related to elderly people's unwillingness to purchase institutional care services. Willingness to purchase institutionalized elderly care services was higher among elderly individuals whose per capita monthly household income was 2,000-4,000 yuan (β=0.349) or 4,000 yuan or more (β=0.554) than among those whose per capita monthly household income was <2,000 yuan, as shown in Figure 4(Supplemental Figure).

The results of the analysis of Model 2 (reluctance-hesitation) showed that elderly people who had one child (β=-0.522), two or more siblings (β=-0.526), two or more chronic diseases (β=-0.343), and a higher level of social support (β=-0.452) were reluctant to purchase institutionalized elderly care services. In contrast, older adults with a per capita monthly household income of 2,000-4,000 yuan (β=0.296) or more than 4,000 yuan (β=0.357), a high level of health literacy (β=0.464), and mild anxiety (β=0.238) had a hesitant attitude towards purchasing institutionalized senior care services, as shown in Figure 5(Supplemental Figure).

The results of the analysis of Model 3 (hesitation-willingness) showed that older adults who were medically insured (β=-0.517), had one sibling (β=-0.309), and suffered from one (β=-0.397) or two or more chronic illnesses (β=-0.505) were hesitant to purchase institutionalized senior care. In contrast, willingness to purchase institutional care services was generally higher among older adults with higher levels of health literacy (β=0.189) and higher levels of social support (β=0.482), as shown in Figure 6(Supplemental Figure).

4. Discussion

This study discussed the willingness of older Chinese adults to purchase institutionalized elderly care services and the factors that influence this willingness. Our study found that 26.2% of mainland Chinese older adults were willing to choose institutionalized elderly care services, 46.5% were hesitant to do so, and 27.3% were clearly unwilling to choose institutionalized elderly care services. Various factors may influence the purchase of institutional care services by elderly individuals.

In Model 1, we analysed the factors that influence the reluctance/willingness of elderly people to participate in elderly services. The first factor that influences the willingness of elderly people to purchase institutionalized care was their health care participation. Our study found that the willingness of older adults without health insurance to purchase institutionalized senior care services was generally higher, which was inconsistent with the findings of Chen Na and other scholars.[23] A possible explanation is that medically insured older people are relieved of the financial burden of access to health care, while intergenerational conflicts caused by the sharing of health care costs between older people and their children can be avoided in favour of family old age on the basis of intergenerational exchanges.[24] Second, our study found that the number of children was a key factor that influenced the willingness of elderly people to purchase institutional care. The willingness to purchase institutional care services was weaker among older adults with a larger number of children, which was consistent with the results of previous studies.[25, 26] In mainland China, children are an important resource for elderly people in their old age, and taking turns taking care of elderly adults is still the mainstream concept of old age in society. However, with the development of society and economy, the young generation is currently facing the double pressure of career and family,[27] and whether the traditional concept of old age can succeed requires further research. Third, the willingness of older people with siblings to participate in institutionalized care was generally lower, suggesting that siblings can care for older siblings and accompany each other in their lives. Finally, our study also found that economic conditions had a major influence on the willingness of elderly people to purchase institutional care. The better their economic conditions are, the stronger the willingness of elderly people to participate in institutionalized elderly care. This indicates that economically affluent elderly individuals lay the material foundation for purchasing institutionalized elderly care services, which is consistent with the results of previous studies.[28, 29]

In Model 2, we analysed the factors that influence older people's reluctance/hesitation to purchase institutional care services. We found that factors such as per capita monthly household income and anxiety lead to elder individuals' hesitancy

in purchasing institutionalized elderly care services. Combined with the results of the analysis of Model I, we found that the primary reasons for elderly people to purchase institutional care services may be economic factors and, more importantly, elderly people's living habits and ideological concepts.[30] Anxiety factors are mainly geriatric anxiety disorders, which are mainly characterized in the field of psychology by the lack of self-confidence and security of elderly people in their later years of life, which is usually manifested in symptoms such as insomnia and restlessness.[31] Often, older persons with anxiety disorders are insecure, fearful of being separated from their families, and have difficulty adapting to a new living environment in an institutionalized setting, which leads to hesitancy to participate in institutionalized care services.

In Model 3, we further found that social support and health literacy lead to a shift in attitudes from hesitation to willingness to purchase institutional care. Older adults with higher levels of social support generally have a stronger willingness to purchase institutional care services, consistent with the findings of Feng Tieyin and other scholars.[32] This suggests that in mainland China, stronger social support helps to increase the willingness of older people to purchase institutionalized care. Previous research has demonstrated that older adults with higher health literacy have higher utilization of health services.[33] In this study, we found that health literacy also plays a key role in changing the willingness of older adults to purchase institutional care. This indicates the need to strengthen the health literacy of elderly people through health education to increase their willingness to participate in institutionalized elderly services.

In addition, this study found that the choice of institutionalized elderly services by elderly people in mainland China is influenced by their health status. Our research suggests that older people in poorer health generally have a lower willingness to purchase institutionalized elderly care services. One possible reason for this is that based on the rates charged by institutionalized elderly care services, the poorer the health of an older person is, the higher the corresponding level of care and the higher the fee.[34] The high cost of expenses has led to a significant reduction in the willingness of elderly people to purchase institutional care services.

5. Limitations

There are some limitations to this study. First, the factors that influence the purchase of institutional care services by elderly people are varied, and the inclusion of all possible influences in this study was difficult to achieve. Second, this study was a cross-sectional study, which makes it difficult to explain the causal relationship between variables. Third, China is a multiethnic country with Han Chinese as the main ethnic group, and the vast majority of the research samples in this study came from areas inhabited by Han Chinese. Further in-depth research is needed to examine the situation and factors that influence the purchase of institutionalized elderly care by elderly people in areas inhabited by ethnic minorities.

6. Conclusions

The number of children, number of siblings, per capita monthly household income, medical insurance participation, health status, health literacy, and social support were the main factors that influenced the purchase of institutionalized care by elderly individuals. China's social institutions for elderly people need to continue to improve their capacity and quality of service and to provide diversified, multilevel institutional care for elderly people to respond more actively and effectively to the problem of population ageing in Chinese society.

Contributors RZ, WH, LW, CZ, XG and DL designed the study. RZ, WH conducted data analysis. RZ wrote the manuscript. RZ, WH, LW, CZ, XG, DL and FW proofed the final manuscript.

Funding This study was supported by funding This study was supported by funding from the Anhui Province Philosophy and Social Science Planning Project (Grant no. AHSKY2021D24).

Competing interests The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics approval This study was approved by the Ethics Research Committee of the Shaanxi Institute of International Trade and Commerce (JKWH-2022-02). Informed consent was obtained from all subjects who participated in the study. All data were

collected anonymously and kept confidential.

Data sharing statement Dataset available on request. Please contact the corresponding authors.

References

[1] Aging and health [EB/OL]. https://www.who.int/zh/news-room/fact-sheets/detail/ageing-and-health. [2022-10-01] [2023-10-05].

[2] National Bureau of Statistics of China [EB/OL]. http://www.stats.gov.cn/english/. [2023-07-04].

[3] Circular of the State Council on the Issuance of the National Population Development Plan (2016-2030) Population and Family Planning China.gov.cn[EB/OL]. https://www.gov.cn/zhengce/content/2017-01/25/content_5163309.htm. [2017-01-25] [2023-09-03]

[4] Song Jian. Old-age ability and old-age risk of "four-two-one" structure families--An overview of family security and the construction of a harmonious society. *Journal of Renmin University of China* 2013,27(05): 94-102.

[5] Liu Xiao, Pan Yu. Concepts that need to be changed and concepts that cannot be touched in China's aging process. *Northern Economy and Trade* 2015(09): 36-37.

[6] LI Y, ZHANG J, LUO H, et al. The Role of Contextual Factors in Shaping Urban Older Adults' Intention of Institutional Care in China: A Mixed-Methods Study. *International Journal of Environmental Research and Public Health* 2023,20(6): 4731.

[7] LU J, ZHANG L, ZHANG K. Care Preferences Among Chinese Older Adults with Daily Care Needs: Individual and Community Factors. *Res Aging* 2021,43(3-4): 166-176.

[8] FENG Z, GLINSKAYA E, CHEN H, et al. Long-term care system for older adults in China: policy landscape, challenges, and future prospects. *Lancet* 2020,396(10259): 1362-1372.

[9] YANG G, WAN L, DONG H, et al. Utilisation willingness for institutional care by the disabled elderly and its influencing factors based on Andersen's model: a cross-sectional survey of Henan, China. *BMJ Open* 2022,12(12): e64949.

[10] Law of the People's Republic of China on the Protection of the Rights and Interests of the Elderly__China.gov.cn [EB/OL]. https://www.gov.cn/guoqing/2021-10/29/content_5647622.htm.

[2021-10-29] [2023-09-07].

[11] State Council Issues "14th Five-Year Plan for the Development of the National Aging Career and Old-Age Service System"_Scrolling News_China.gov.cn [EB/OL]. https://www.gov.cn/xinwen/2022-02/21/content_5674877.htm[2022-02-21] [2023-07-06].

[12] ZHOU J, WALKER A. The impact of community care services on the preference for ageing in place in urban China. *Health Soc Care Community* 2021,29(4): 1041-1050.

[13] LUM T Y, LOU V W, CHEN Y, et al. Neighborhood Support and Aging-in-Place Preference Among Low-Income Elderly Chinese City-Dwellers. *J Gerontol B Psychol Sci Soc Sci* 2016,71(1): 98-105.

[14] ZHANG S, WANG Q, ZHAO D, et al. Association of Sensory Impairment With Institutional Care Willingness Among Older Adults in Urban and Rural China: An Observational Study. *Innovation in Aging* 2023,7(3).

[15] WANG Z, XING Y, YAN W, et al. Effects of individual, family and community factors on the willingness of institutional elder care: a cross-sectional survey of the elderly in China. *BMJ Open* 2020,10(2): e32478.

[16] WANG Y, KAIERDEBIEKE A, FAN S, et al. Study protocol: A cross-sectional study on psychology and behavior investigation of Chinese residents, PBICR. *Psychosomatic Medicine Research* 2022,4(3): 19.

[17] Qiang Luo, Feifei Yu. The impact of students' academic burden on academic achievement - Based on the results of monitoring the academic quality of compulsory education in S city. *Educational Measurement and Evaluation* 2021(07): 30-37.

[18] SUN X, LV K, WANG F, et al. Validity and reliability of the Chinese version of the Health Literacy Scale Short-Form in the Chinese population. *BMC Public Health* 2023,23(1).

[19] DUONG T V, ARINGAZINA A, KAYUPOVA G, et al. Development and Validation of a New Short-Form Health Literacy Instrument (HLS-SF12) for the General Public in Six Asian Countries. *Health Lit Res Pract* 2019,3(2): e91-e102.

[20] Yang Liangqin, Li Xi, Ju Mei, et al. Migratory stress and its influencing factors among the elderly in nursing homes. *Guangxi Medicine* 2022,44(19): 2273-2277.

[21] ROBERT L. SPITZER M, KURT KROENKE M, JANET B. W. WILLIAMS D, et al. A Brief Measure for Assessing Generalized Anxiety Disorder. Arch Intern Med, 2006,166(10): 1092-1097.

[22] Li ZH, Xiao A, Xie Z, et al. Application of the Patient Health Questionnaire Depression Scale (PHQ-9) in an elderly population in a rural community. *Chinese Journal of Clinical Psychology* 2011,19(02): 171-174.

[23] Chen Na, Deng Min. Analysis of the willingness and influencing factors of institutional care for the disabled elderly in China based on Anderson's model. *China Health Statistics* 2021,38(01): 96-99.

[24] Yu Changyong, Dai Zhiming, Ma Ruili. Reality and expectation:An empirical analysis of the weakening of rural family pension. *China Rural Observation* 2017(02): 54-67.

[25] Leng Zhiwei, Guo Qing, Liu Liyun, et al. A study on the willingness and influencing factors of institutionalized elderly in Zhejiang Province. *Preventive Medicine* 2019,31(6): 545-548.

[26] Wang Yan, An Wenzhong, Yang Jiaqi, et al. Analysis on the willingness and influencing factors of the urban elderly population in Beijing-Tianjin-Hebei to institutionalized elderly care. *Modern Preventive Medicine* 2020,47(9): 1625-1628.

[27] Lin Mei. Pressure and anxiety of young people in contemporary China. *People's Forum* 2019(33): 78-80.

[28] LIU Z, YU Y, FANG L, et al. Willingness to receive institutional and community-based eldercare among the rural elderly in China. *PLOS ONE* 2019,14(11): e225314.

[29] SHI C, HU B. Preferences for Formal Social Care in Rural and Urban China: Evidence from a National Survey. *J Gerontol Soc Work* 2020,63(1-2): 19-40.

[30] Lv Xuefeng, Yu Changyong, You Xinbei. Analysis of rural elderly people's willingness to institutionalize and their influencing factors - Based on survey data of 1,218 rural elderly people in 36 counties of 12 provinces across China. *China Rural Observation* 2018(04): 102-116.

[31] Wan Chunping. Clinical efficacy observation of compound diazepam tablets in the treatment of anxiety disorder in old age. *Journal of Qiqihar Medical College* 2016,37(8): 1055-1056.

[32] Feng Tieyin, Cao Li. An empirical study on social support, health self-assessment and elderly service utilization of elderly people in nursing institutions. *Journal of Xi'an Jiaotong University (Social Science Edition)* 2018.

[33] Liu YB, Liang J, Yao DW, et al. A study on the relationship between health literacy and health status and health service utilization among elderly people in nursing institutions. *Chinese Family Medicine* 2014,17(4): 449-452.

[34] Ma Xiaowen, Xie Hong. The current situation and insights of pricing models for senior care services. *Chinese Journal of Gerontology* 2018,38(2): 479-482.

Figure 1. Distribution of older adults purchasing institutional care services in different provinces in mainland China

135x67mm (96 x 96 DPI)

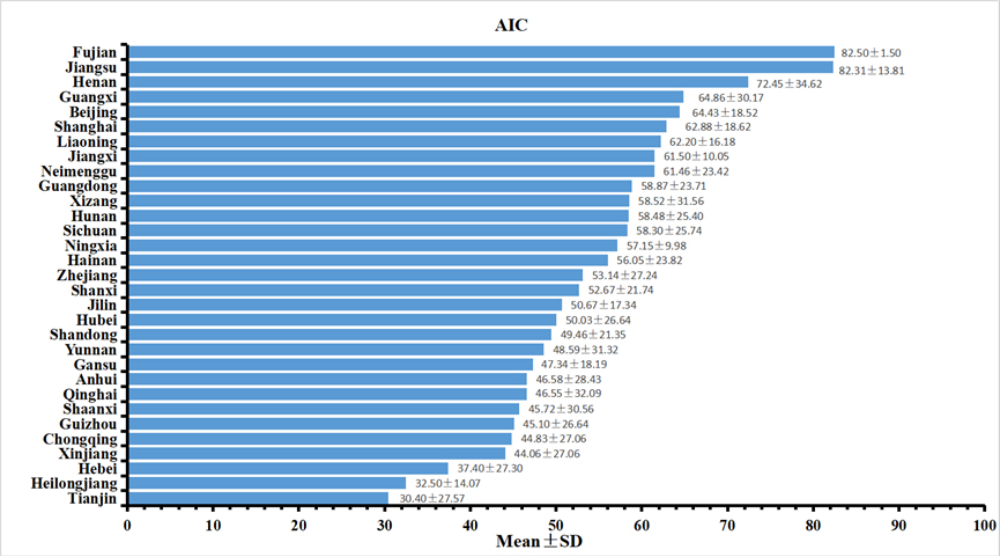


Figure 2. Purchase of institutional care services by the older adults in different provinces in mainland China

372x207mm (59 x 59 DPI)

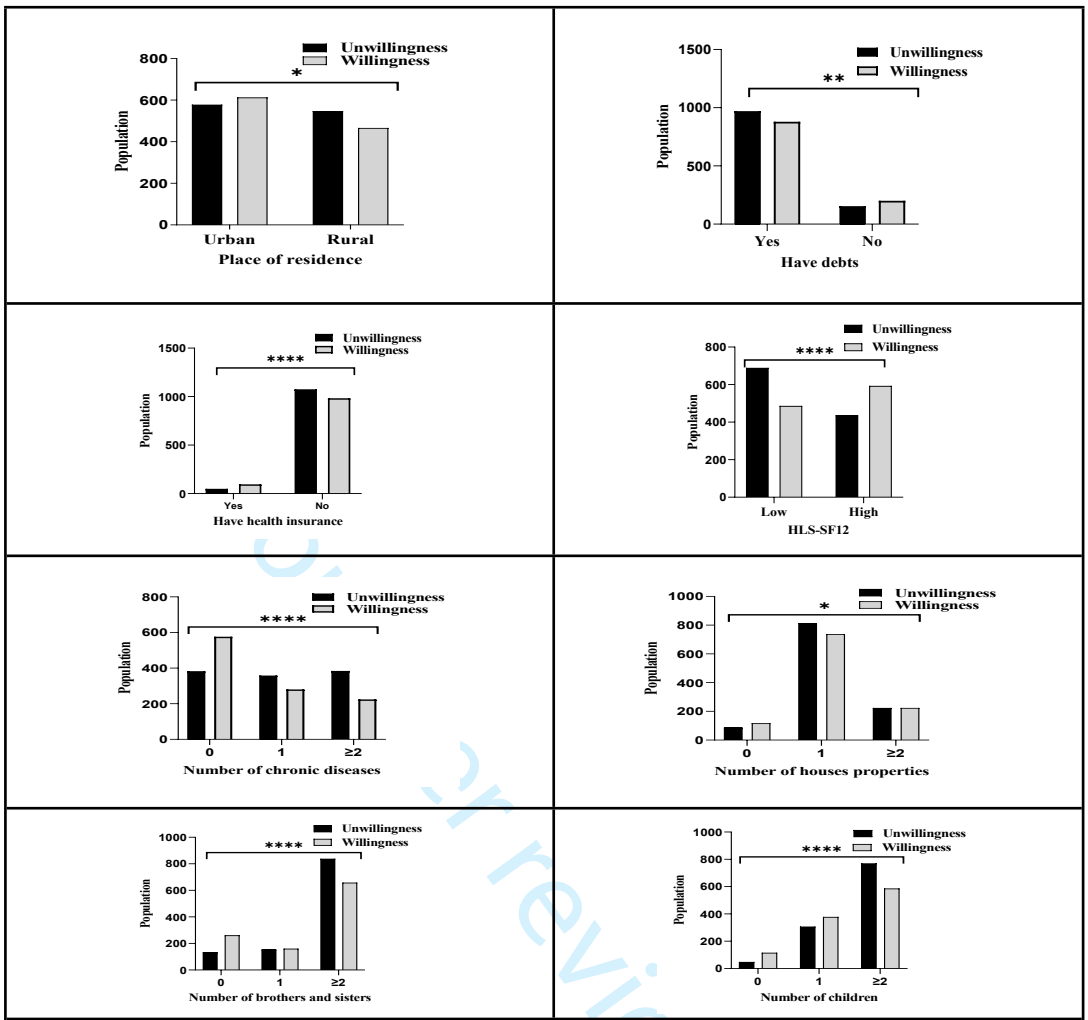


Figure 3. Univariate (chi-square) analysis of the "reluctance-reluctance" attitude of elderly people towards purchasing institutionalized elderly care services (****P<0.0001, ***P<0.001, **p<0.01, *p<0.05)

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.555	0.045	0.574	0.333	0.988
Residence					
Rural	0.051	0.682	1.052	0.825	1.342
Marital status					
Married	0.086	0.838	1.090	0.475	2.500
Divorced	-0.211	0.688	0.810	0.289	2.272
Widowed	-0.318	0.487	0.728	0.297	1.783
Have debts					
Yes	0.144	0.357	1.155	0.850	1.571
Highest education level					
Primary	-0.310	0.061	0.733	0.530	1.014
Intermediate	-0.123	0.537	0.884	0.599	1.306
Advanced	0.101	0.642	1.106	0.723	1.692
Number of children					
1	-0.771	0.004	0.462	0.275	0.778
≥2	-0.854	0.001	0.426	0.252	0.718
Number of brothers and sisters					
1	-0.395	0.050	0.674	0.454	1.000
≥2	-0.323	0.048	0.724	0.526	0.997
Monthly household income					
2000-4000	0.349	0.032	1.417	1.031	1.949
>4000	0.554	0.001	1.740	1.248	2.425
Occupation type					
Business services personnel	-0.202	0.348	0.817	0.535	1.247
Agriculture，forestry，husbandry and fishing	-0.264	0.102	0.768	0.559	1.054
Soldier	0.422	0.338	1.525	0.644	3.613
Other staffs	-0.070	0.645	0.932	0.692	1.256
Number of houses properties					
1	0.013	0.951	1.013	0.677	1.516
>2	-0.016	0.943	0.984	0.630	1.536
Number of chronic diseases					
1	-0.517	<0.001	0.596	0.460	0.773
≥2	-0.845	<0.001	0.430	0.328	0.563

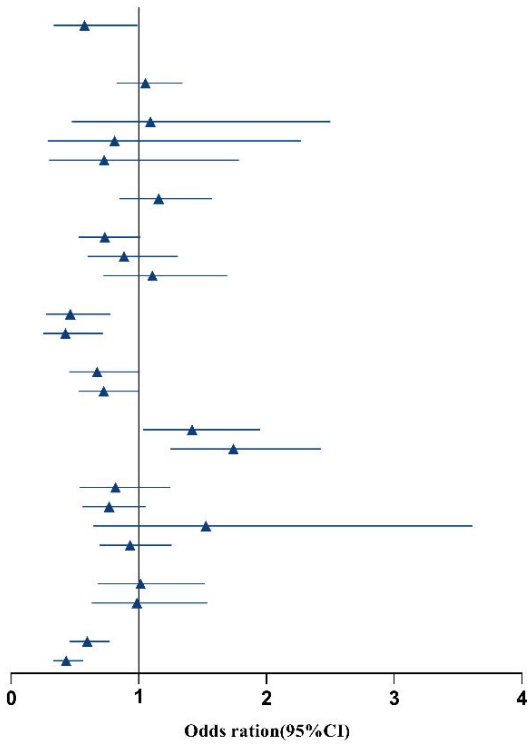


Figure 4. Results of regression analysis of "reluctance – willingness" of elderly people to purchase institutional care services

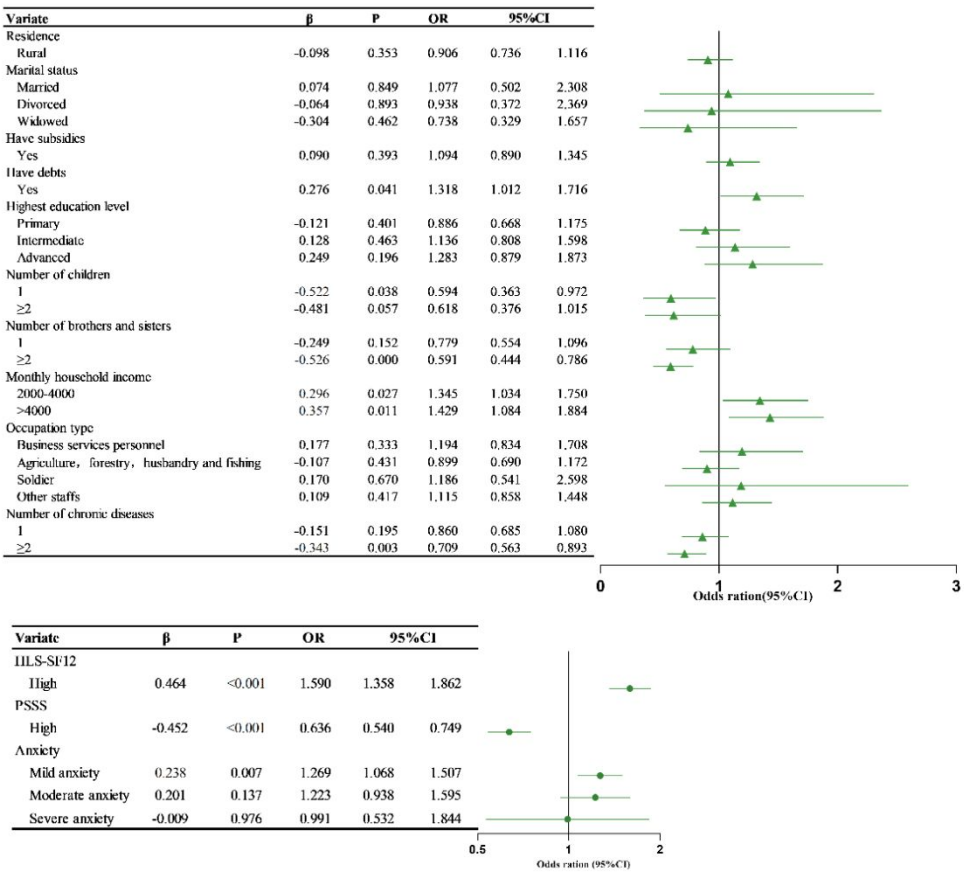
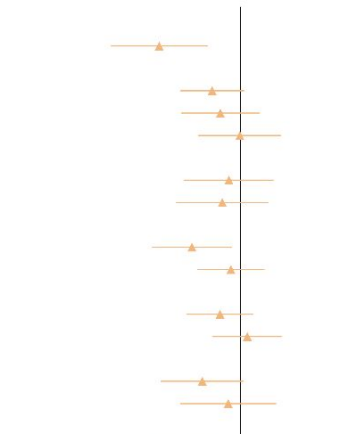


Figure 5. Results of regression analysis of the "reluctance-hesitation" attitude of elderly people in purchasing institutionalized elderly care services

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.517	0.001	0.596	0.437	0.813
Highest education level					
Primary	-0.18	0.084	0.835	0.681	1.024
Intermediate	-0.128	0.32	0.88	0.684	1.132
Advanced	-0.004	0.974	0.996	0.765	1.296
Number of children					
1	-0.074	0.616	0.929	0.697	1.239
≥2	-0.115	0.442	0.891	0.664	1.195
Number of brothers and sisters					
1	-0.309	0.017	0.734	0.569	0.947
>2	-0.061	0.577	0.941	0.759	1.166
Monthly household income					
2000-4000	-0.131	0.233	0.878	0.708	1.087
>4000	0.044	0.698	1.045	0.837	1.304
Number of houses properties					
1	-0.243	0.071	0.784	0.602	1.021
≥2	-0.078	0.616	0.925	0.681	1.256
Number of chronic diseases					
1	-0.397	<0.001	0.673	0.561	0.806
>2	-0.505	<0.001	0.603	0.498	0.731



Variate	β	P	OR	95%CI	
HLS-SF12					
High	0.189	0.019	1.208	1.031	1.416
PSSS					
High	0.482	<0.001	1.619	1.368	1.917
Anxiety					
Mild anxiety	-0.081	0.376	0.922	0.770	1.104
Moderate anxiety	0.032	0.811	1.033	0.793	1.346
Severe anxiety	0.473	0.094	1.604	0.923	2.789

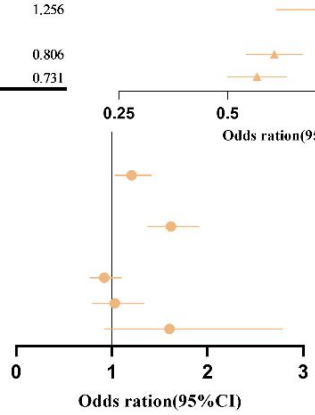


Figure 6. Results of regression analysis of "hesitant-willing" attitude of elderly people towards purchasing institutionalized elderly care services

BMJ Open

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults—A Nationwide Cross-Sectional Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-082548.R1
Article Type:	Original research
Date Submitted by the Author:	14-Feb-2024
Complete List of Authors:	Zhu, Rui; Bengbu Medical College, Hou, Wenjie; Bengbu Medical College Wang, Lingmeng; Bengbu Medical College Zhang, Chenchen; Bengbu Medical College Guo, Xing; Bengbu Medical College Luo, Dan; Bengbu Medical College Wang, Fuzhi; Bengbu Medical College
Primary Subject Heading:	Sociology
Secondary Subject Heading:	Health services research, Geriatric medicine, Nursing
Keywords:	GERIATRIC MEDICINE, Health Services for the Aged, Aged, Aging

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults—A Nationwide Cross-Sectional Study

Objectives: In view of the serious ageing of China's population and the low desire of elderly people to purchase institutionalized elderly care services, we explored the willingness of Chinese elderly people to purchase institutionalized elderly care services and its influencing factors.

Design: This was a cross-sectional study. Three multivariate logistic regression analysis models of the willingness of elderly people to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's willingness to purchase institutionalized elderly care services.

Setting: This study was based on the 2022 Psychology and Behaviour Investigation of Chinese Residents (PBICR) database.

Participants: Research data from 4123 older adults who met the requirements of this study were screened from the database.

Results: Of the 4123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutionalized senior care services (1125, 27.3% vs. 1079, 26.2%, respectively), and 1919 (46.5%) had hesitant attitudes. The analysis of Model 1 showed that medical insurance participation, the number of children and siblings, chronic diseases, and per capita monthly household income had an influential effect on the willingness of elderly people to purchase institutional care. In Model 2, we found that factors such as per capita monthly household income and anxiety led to hesitancy among older adults to purchase institutionalized senior care services. In Model 3, we further found that social support and health literacy led to a shift from hesitation to willingness to purchase institutionalized elderly care services.

Conclusion: The number of children, number of siblings, per capita monthly income of the family, medical insurance participation, health status, health literacy, and social support were found to be the main factors influencing the purchase of institutionalized care by elderly individuals.

Strengths and limitations of this study

- The participants were from 148 cities in 22 provinces, 5 autonomous regions, and 4 municipalities.
- This study used stratified and quota sampling methods.
- The factors that influence the purchase of institutional care services by elderly people are varied; thus, it was difficult to include all the possible influences in this study.
- This was a cross-sectional study in which only the phenomenon was analysed; an in-depth explanation of the reasons behind the phenomenon requires the design of a rigorous mixed qualitative and quantitative study.

1. Background

Population ageing has become a global issue. According to the World Health Organization, by 2030, one-sixth of the world's population will be older than 60 years, and the number of people older than 60 will increase from 1 billion to 1.4 billion from 2020 to 2030 [1]. China has one of the fastest-ageing populations in the world [1]. It is expected that by 2025, China's elderly population aged 60 years and older will reach 300 million, accounting for more than 20% of the total population [2]. According to the National Population Development Plan (2016-2030), it is predicted that the proportion of elderly people older than 60 years in China will be greater than 25% in 2030 [3], which means that one out of every four people will be older than 60 years. As the proportion of China's elderly population continues to increase, the social burden of old age is gradually increasing.

Along with the increase in the proportion of the elderly population, the fertility rate of mainland China's population has shown a continuous downwards trend, while the per capita life expectancy has shown an upwards trend; these trends will inevitably lead to an increase in the degree of population ageing and in the burden of old-age

pensions faced by society. Moreover, the demographic structure of Chinese families shows an inverted pyramid pattern in which a couple must take care of four elderly parents and one child [4]. This "4-2-1" family demographic structure makes "how to age" an important issue in society.

Previous studies have shown that in the Chinese context of old age, family care has long been the core means of supporting older people [5]. Compared with Western countries, the Confucian idea of filial piety has led Chinese people to believe for thousands of years that most elderly people who receive care from institutions are there because their children are ungrateful [6]. They believe that their children's unwillingness to take care of them makes them lose face; thus, most elderly people choose to age in their families. This finding suggests that intergenerational ties and obligations are generally stronger in Chinese families than in Western societies [7]. However, in Chinese families, children's ability to care for elderly adults has been eroded by demographic changes and socioeconomic development [8]. The younger generation has had to move to cities to work, which means that family-centred forms of care for elderly individuals are gradually disappearing [9]; thus, there is an inevitable growing demand for institutional care. To cope with the growth of a rapidly ageing population, the Chinese government has released a blueprint for an emerging ageing service and support network that aims to establish a social ageing system of home-based ageing with community-based ageing as the necessary support and institutionalized ageing as a supplement [10]. In 2020, the Proposal of the Central Committee of the Communist Party of China on the Formulation of the Fourteenth Five-Year Plan for National Economic and Social Development and Vision for 2035 proposed the implementation of a national strategy of actively coping with the ageing of the population, promoting the synergistic development of old-age care and the old-age care industry, and constructing an old-age care system that combines medical care and recreation with old-age care and the goal of increasing the number of public institutions for old-age care in accordance with the 14th Five-Year Plan for Old-Age Care and Services Development [11]. The Chinese government is making great efforts to improve the quality of institutional care services and the training of specialized

caregivers. This will promote the rapid development of institutional care services to continue to satisfy the growing demand of elderly people for multilevel, high-quality, healthy old-age care.

Institutionalized elderly care generally refers to service institutions that provide comprehensive services for elderly individuals, such as food and living, cleaning and hygiene, life care, health management and cultural, sports and recreational activities. Institutional care can reduce the burden of care on children, provide specialized care services and enrich the leisure activities of elderly individuals. However, the results of a cross-sectional survey of several regions suggest that many factors may influence the acceptance of institutionalized care among Chinese seniors. For example, a rapidly changing society is changing traditional family care for elderly individuals, resulting in a tendency for elderly Chinese people to choose institutionalized care as a way of ageing [12]. Negative news about elderly care institutions often leads to negative attitudes towards institutionalized care [13]. In addition, China is a vast country with enormous differences in economic and cultural conditions in different regions, which may affect the willingness of elderly individuals to purchase institutionalized elderly care services [14]. The above mentioned studies have elaborated on the factors that influence the willingness of elderly people to purchase institutional care services [15]. However, the samples of these studies were limited by regional constraints and are thus not representative of the overall situation in mainland China.

Supported by the "2022 China Population Psychological and Behavioural Tracking Survey Project", we conducted a national cross-sectional survey in mainland China to fully understand the willingness of elderly people to purchase institutionalized elderly care services and the factors that influence this willingness. This study can support the improvement of the level of institutionalized elderly care services in society and the enhancement of elderly people's sense of well-being and security.

2. Information and methodology

2.1 Data sources

The study data were obtained from the Psychology and Behaviour Investigation of Chinese Residents, 2022 (PBICR) database [16]. The China Population

Psychological and Behavioural Survey (CPBS) aims to establish a database through a multicentre, large-sample cross-sectional survey to provide strong data support for the development of research in various fields and for a comprehensive and systematic understanding of the public's physical and mental health. The cross-sectional survey was initiated by the School of Public Health, Peking University and conducted from June 20, 2022, to August 31, 2022, using stratified and quota sampling methods to select 148 cities, 202 districts and counties, 390 townships/streets, and 780 communities/villages in 23 provinces, 5 autonomous regions, and 4 municipalities directly under the central government of mainland China. The questionnaires were distributed to the public one-on-one and face-to-face by surveyors. After the respondents provided informed consent, they could click on a link to complete the questionnaire.

The screening criteria for the sample of this study were as follows: (1) ≥60 years of age or older, (2) nationality of the People's Republic of China, (3) resident of China (annual time away from home ≤ 1 month), (4) voluntary participation in the study and completion of the informed consent form, (5) completion of the network questionnaire survey independently or with the help of investigators, and (6) understanding of the meaning of each item in the questionnaire. The sample exclusion criteria were as follows: (1) had a mental disturbance, (2) had a cognitive impairment, (3) were participating in other research on similar topics, and (4) did not wish to collaborate.

The questionnaire was completed by 30,505 participants from 148 cities in 22 provinces, 5 autonomous regions, and 4 municipalities directly under the central government of mainland China. Based on the sample selection criteria and exclusion criteria, research data from 4,123 older adults were ultimately included in this study.

2.2 Research instrument

The visual analogue scale (VAS) was used to assess the willingness of elderly people to purchase institutionalized elderly care services. The items were rated from 0 (unwillingness to purchase) to 100 (strong willingness to purchase). The higher the score is, the greater the willingness of elderly respondents to purchase institutionalized elderly services is. The first 27% of the participants with VAS scores were considered

to have a negative attitude towards institutionalized elderly services, the last 27% were considered to have a positive attitude towards institutionalized elderly services, and the remaining sample was considered to have a hesitant attitude towards institutionalized elderly services [17].

The short-form Health Literacy Survey (HLS-SF12) was used to assess the health literacy level of the respondents. The HLS-SF12 was developed by Sun Xiaonan et al. [18] to assess respondents' ability to find, understand, evaluate, and apply health-related information. The options are rated on a Likert scale ranging from “very difficult” (1 point) to “very easy” (4 points). The total score of the items range from 0 to 36, with the top 50% of the scores considered to indicate a high level of health literacy and the bottom 50% considered to indicate a low level of health literacy [19]. The Cronbach's coefficient for the HLS-SF12 in this study was 0.910.

The Perceived Social Support Scale (PSSS) was applied to assess respondents' feelings about the social support they received. The PSSS evaluates the extent to which individuals feel supported by family, friends, and others in terms of three dimensions, namely, family support, friend support, and support from others, with the total score reflecting the degree of total social support felt by the individual. A Likert scale is used that ranges from “strongly disagree” (1 point) to “strongly agree” (7 points). The total possible score is 21, with a higher total score indicating a higher level of social support for the individual [20]. Respondents with scores in the top 50% are considered to have a higher level of social support, and respondents with scores in the bottom 50% are considered to have a lower level of individual social support. Cronbach's coefficient for the PSSS in this study was 0.928.

The General Anxiety Disorder-7 (GAD-7) scale was used to measure the respondents’ anxiety. Each entry on the GAD-7 scale is rated from 0 to 3, and the total score ranges from 0 to 21. The seven items are summed to produce a final rating that indicates the frequency of anxiety symptoms. A score of 0-4 indicates no anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and 15 or more indicates severe anxiety [21]. The Cronbach's coefficient for the GAD-7 scale in this study was 0.927.

The Patient Health Questionnaire-9 (PHQ-9) was used to measure the depressive state of the respondents. Options are rated on a Likert scale ranging from "never" (0 points) to "nearly every day" (4 points). The nine items are summed to give a total score ranging from 0 to 36, indicating the frequency of depressive symptoms. A score of 0-4 is categorized as no depression, 5-9 is categorized as mild depression, 10-14 is categorized as moderate depression, and 15-27 is categorized as severe depression [22]. The Cronbach's coefficient for the PHQ-9 in this study was 0.916.

2.3 Statistical methods

Descriptive statistics were applied to analyse the percentages of patients' sociodemographic information, social structure, economic status, and other factors for different samples. A chi-square test was applied to analyse the differences in the willingness of elderly respondents to purchase institutional care in different sociological contexts. Three multivariate logistic regression analysis models of elderly people's willingness to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's purchase of institutionalized elderly care services. The data were organized using Excel 2019 (Microsoft, Inc., Washington, DC, USA), and the data were analysed using IBM SPSS Statistics (Ver. 26, IBM, Inc., New York, USA) and R language (Ver. 4.2.3).

2.4 Patient and Public Involvement

No patients were involved in setting the research question or the outcome measures, nor were they involved in developing plans for design or implementation of the study.

3. Results

3.1 Sample distribution

The 4,123 study samples came from 780 residential communities in 22 provinces, 5 autonomous regions, and 4 municipalities in mainland China. Overall, the willingness of elderly people to purchase institutionalized elderly care services was generally high in central and eastern China, while the willingness of elderly people to purchase institutionalized elderly care services was generally low in northwestern and

northeastern China. The distribution of elderly people purchasing institutional care services in different provinces in mainland China is shown in Figure 1, and the scores of elderly people purchasing institutional care services in different provinces in mainland China are shown in Figure 2.

3.2 Current Situation of Elderly People's Willingness to Purchase Institutional Care Services

The basic characteristics of the 4,123 respondents are shown in Table 1. Of the 4,123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutional care (1125, 27.3% vs. 1079, 26.2%, respectively), and 1,919 (46.5%) had hesitant attitudes. The results of the one-way analysis of the purchase of institutionalized elderly care services by elderly people showed that in the "unwillingness-willingness" model, there were significant differences in the willingness to participate in institutionalized elderly care services among elderly people with different places of residence, highest educational level, marital status, age, number of children and siblings, occupation, per capita monthly household income, indebtedness, medical insurance participation, property, health status and health literacy factors, as shown in Figure 3 (Supplemental Figure 1). Further analysis of the results of the "reluctance-hesitation" and "hesitation-willingness" models revealed that other factors also affected the willingness of elderly people to purchase institutionalized elderly care services and that there were significant differences in the willingness to purchase institutionalized elderly care services among elderly people with different levels of social support and anxiety, as shown in Table 2.

Table 1. Basic characteristics of the respondents

Variate		N (%)	Variate		N (%)
Gender	Male	2,079 (50.40)	Number of house properties	0	365 (8.90)
	Female	2,044 (49.60)		1	2,958 (71.70)
Highest educational level[a]	Uneducated	867 (21.00)		≥2	800 (19.40)
	Primary	1,941(47.10)	Have subsidies[b]	No	2,781 (0.68)
	Intermediate	738 (17.90)		Yes	1,342 (0.33)
	High class	577 (14.00)	Have debts	No	3,378 (0.82)
Place of residence	Urban	2,300 (55.80)		Yes	745 (0.18)
	Rural	1,823 (44.20)	Have health insurance	No	236 (0.06)
Marital status	Spinsterhood	110 (2.70)		Yes	3,887 (0.94)

	Married	3,437 (83.40)	Number of chronic diseases (kind)	0	1,749 (42.40)
	Divorced	99 (2.40)		1	1,233 (29.90)
	Widowed	477 (11.60)		≥2	1,141 (27.70)
Age group	60-70	2,529 (61.30)	HLS-SF12	Low	2,205 (0.54)
	71-80	1,401 (34.00)		High	1,918 (0.47)
	> 80	193 (4.70)	PSSS	Low	2,382 (0.58)
Number of children*	0	318 (7.70)		High	1,741 (0.42)
	1	1,337 (32.50)	Anxiety	No anxiety	2,299 (0.56)
	≥2	2,465 (59.80)		Mild anxiety	1,338 (0.33)
Number of brothers and sisters	0	764 (18.50)		Moderate anxiety	416 (0.10)
	1	662 (16.10)		Severe anxiety	70 (0.02)
	≥2	2,697 (65.40)	Depression	No depression	4,074 (98.80)
Occupation type*	Professionals	216 (7.60)		Mild depression	1 (0.00)
	Business services personnel	257 (9.00)		Moderate depression	10 (0.20)
	Agricultural, forestry and fisheries producers	560 (19.60)		Severe depression	38(0.90)
	Soldier	48 (1.70)			
	Other staff	1,779 (62.60)			
Monthly household income (CNY)	<2000	1,008 (24.40)			
	2000-4000	1,571 (38.10)			
	>4000	1,544 (37.40)			

Notes:*: (missing data) **a:** Primary (primary and junior high school); intermediate (secondary vocational education or senior high school); and senior (college, bachelor's degree and above). **b:** Includes subsidies for renting, employment, living, purchasing a home, job seeking and starting a business.

Table 2. One-way (chi-square test) analysis of elderly people's willingness to purchase institutionalized elderly care services

Variate	Unwillingness-Hesitate		Hesitate-Willingness	
	χ2	P	χ2	P
Gender	1.211	0.271	0.610	0.435
Highest educational level	22.923	<0.001	8.578	0.035
Place of residence	11.805	0.001	0.271	0.603
Marital status	33.66	<0.001	0.399	0.706
Age group	3.064	0.216	3.930	0.140
Number of children	38.886	<0.001	6.256	0.044
Number of brothers and sisters	47.38	<0.001	12.646	0.002
Occupation type	14.631	0.006	6.159	0.188
Monthly household income (CNY)	49.243	<0.001	6.529	0.038
Number of properties	1.378	0.502	8.875	0.012
Have subsidies	4.640	0.031	2.242	0.134
Have debts	21.572	<0.001	1.477	0.224

Have health insurance	0.241	0.623	20.388	<0.001
Number of chronic diseases (kind)	20.156	<0.001	40.899	<0.001
HLS-SF12	16.537	<0.001	20.588	<0.001
PSSS	28.296	<0.001	52.654	<0.001
Depression	2.325	0.508	0.923	0.820
Anxiety	15.260	0.002	17.111	0.001

3.3 Influential factors related to the willingness of elderly people to purchase institutional care services

Variables with significant differences in the univariate analysis were further substituted into the three multivariate logistic regression models of older adults' willingness to purchase institutionalized senior care services.

The results of the analysis of Model 1 (reluctance-willingness) showed that the sociodemographic factors of medical participation (β=-0.555), 1 child (β=-0.771) or more than 2 children (β=-0.854), 2 or more siblings (β=-0.323), and 1 (β=-0.517) or 2 or more chronic diseases (β=-0.845) were related to elderly people's unwillingness to purchase institutional care services. The willingness to purchase institutionalized elderly care services was greater among elderly individuals whose per capita monthly household income was 2,000-4,000 yuan (β=0.349) or 4,000 yuan or more (β=0.554) than among those whose per capita monthly household income was <2,000 yuan, as shown in Figure 4 (Supplemental Figure 2).

The results of the analysis of Model 2 (reluctance-hesitation) showed that elderly people who had one child (β=-0.522), two or more siblings (β=-0.526), two or more chronic diseases (β=-0.343), or a higher level of social support (β=-0.452) were reluctant to purchase institutionalized elderly care services. In contrast, older adults with a per capita monthly household income of 2,000-4,000 yuan (β=0.296) or more than 4,000 yuan (β=0.357), a high level of health literacy (β=0.464), or mild anxiety (β=0.238) had a hesitant attitude towards purchasing institutionalized senior care services, as shown in Figure 5 (Supplemental Figure 3).

The results of the analysis of Model 3 (hesitation-willingness) showed that older adults who were medically insured (β=-0.517), had one sibling (β=-0.309), and suffered

from one (β=-0.397) or two or more chronic illnesses (β=-0.505) were hesitant to purchase institutionalized senior care. In contrast, willingness to purchase institutional care services was generally greater among older adults with higher levels of health literacy (β=0.189) and higher levels of social support (β=0.482), as shown in Figure 6 (Supplemental Figure 4).

4. Discussion

This study examined the willingness of older Chinese adults to purchase institutionalized elderly care services and the factors that influence this willingness. Our study revealed that 26.2% of mainland Chinese older adults were willing to choose institutionalized elderly care services, 46.5% were hesitant to do so, and 27.3% were clearly unwilling to choose institutionalized elderly care services. Various factors may influence the purchase of institutional care services by elderly individuals.

In Model 1, we analysed the factors that influence the reluctance/willingness of elderly people to participate in elderly services. The first factor that was found to influence the willingness of elderly people to purchase institutionalized care is their health care participation. Our investigative study showed that older adults without health insurance were generally more willing to purchase institutionalized senior care services than were younger adults without health insurance, which is consistent with the findings of Chengcheng Gao and other scholars [23]. A possible explanation is that because this group of older persons is not covered by health insurance, they would consider purchasing institutionalized elderly care services as security for their old age. Another possible reason is that as China's per capita GDP increases annually [24], the disposable income of elderly people has also greatly increased, which may lead to an increase in the willingness of elderly people to purchase institutionalized elderly care services. In addition, there may be other reasons for the effect of health insurance participation on the willingness of elderly people to purchase institutionalized senior care services, which need to be further explored in future studies. Second, our study showed that the number of children was a key factor influencing the willingness of elderly people to purchase institutional care. The willingness to purchase institutional care services was weaker among older adults with more children. Similar phenomena

have been reported in studies conducted in countries such as China and Turkey [25-27]. This finding suggests that children are an important resource for elderly people in their old age and that taking turns taking care of elderly adults is still the mainstream concept of old age in society. However, with the development of society and economy, the young generation is currently facing the double pressure of career and family [28]; thus, whether the traditional concept of old age can succeed requires further research. Third, the willingness of older people with siblings to participate in institutionalized care was generally lower, suggesting that siblings can care for older siblings and accompany each other in their lives. Finally, our study revealed that economic conditions had a major influence on the willingness of elderly people to purchase institutional care. In China, the better the economic conditions of elderly people are, the greater their willingness to participate in institutionalized elderly care is. This indicates that economically affluent elderly individuals lay the material foundation for purchasing institutionalized elderly care services. However, in Japan, which is also in the Asian Cultural Circle, the results of related research are the opposite; i.e., an increase in income of elderly Japanese people improves their ability to perform daily life activities, which reduces their willingness to purchase institutionalized elderly care services [29]. Therefore, the influence of economic conditions on the willingness of elderly people to purchase institutionalized elderly care services should be further analysed in depth with respect to sociocultural factors.

In Model 2, we analysed the factors that influence older people's reluctance/hesitation to purchase institutional care services. Combined with the results of the analysis in Model 1, our investigation revealed that economic factors not only affected the willingness of elderly people to purchase institutionalized elderly care services but were also related to anxiety. Similar issues have been found in related studies conducted in Australia [30]. The transition of older adults from home care to institutional care is a stressful life experience that is prone to anxiety. Our study agrees with the view that elderly people are prone to insecurity, fear of separation from their families, and greater difficulty in adapting to changes in their living environment, which leads to hesitancy to participate in institutionalized aged care services.

In Model 3, we further found that social support and health literacy led to a shift in attitudes from hesitation to willingness to purchase institutional care. Older adults with higher levels of social support generally had a greater willingness to purchase institutional care services. Similar ideas have been validated in a series of studies conducted in East Asian countries [31-32]. Previous research has demonstrated that older adults with higher health literacy have a greater utilization of health services [33]. In conjunction with the results of this study, we found that health literacy also played a key role in changing the willingness of older adults to purchase institutional care. This indicates the need to strengthen the health literacy of elderly people through health education to increase their willingness to participate in institutionalized elderly services.

In addition, the role of health status in the purchase of institutional care by elderly people is an issue that should be explored in depth. Our research suggests that older people in poorer health generally have a lower willingness to purchase institutionalized elderly care services. This may be because, based on the rates charged by institutionalized elderly care services, the poorer the health of an older person is, the greater the corresponding level of care is and the greater the related fees are [34]. The high cost of expenses has may have led to a significant reduction in the willingness of elderly people to purchase institutional care services. In addition, when older adults are in poor health, they prefer their relatives to be by their side [27], which further reduces their willingness to purchase institutionalized elderly care services.

5. Limitations

This study has several limitations. First, the factors that influence the purchase of institutional care services by elderly people are varied; thus, it was difficult to include all the possible influences in this study. Second, this was a cross-sectional study in which only the phenomenon was analysed; an in-depth explanation of the reasons behind the phenomenon requires the design of a rigorous mixed qualitative and quantitative study. Third, China is a multiethnic country with Han Chinese individuals as the main ethnic group, and the vast majority of the research samples in this study came from areas inhabited by Han Chinese individuals. However, further in-depth research is needed to determine the factors that influence the purchase of

institutionalized elderly care by elderly people in areas inhabited by ethnic minorities.

6. Conclusions

The number of children, number of siblings, per capita monthly household income, medical insurance participation, health status, health literacy status, and social support were found to be the main factors influencing the purchase of institutionalized care by elderly individuals. China's social institutions for elderly people need to not only continue to improve their capacity and quality of service but also provide diversified, multilevel institutional care for elderly people to respond more actively and effectively to the problem of population ageing in Chinese society.

Contributors RZ, WH, LW, CZ, XG and DL designed the study. RZ and WH conducted the data analysis. RZ wrote the manuscript. RZ, WH, LW, CZ, XG, DL and FW proofed the final manuscript.

Funding This study was supported by funding. This study was supported by funding from the Anhui Province Philosophy and Social Science Planning Project (Grant no. AHSKY2021D24).

Competing interests The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics approval This study was approved by the Ethics Research Committee of the Shaanxi Institute of International Trade and Commerce (JKWH-2022-02). Informed consent was obtained from all the subjects who participated in the study. All the data were collected anonymously and kept confidential.

Data sharing statement The dataset is available upon request. Please contact the corresponding author.

References

[1] Aging and health [EB/OL]. https://www.who.int/zh/news-room/fact-sheets/detail/ageing-and-health. [2022-10-01] [2023-10-05].

[2] In the next five years, "the old will be cared for" [EB/OL]. https://www.gov.cn/xinwen/2021-03/21/content_5594235.htm. [2021-03-21] [2024-01-20].

[3] Circular of the State Council on the Issuance of the National Population Development Plan (2016-2030) Population and Family Planning China.gov.cn [EB/OL]. https://www.gov.cn/zhengce/content/2017-01/25/content_5163309.htm. [2017-01-25] [2023-09-03].

[4] Song Jian. Old-age ability and old-age risk of "four-two-one" structure families--An overview of family security and the construction of a harmonious society. *Journal of Renmin University of China* 2013,27(05): 94-102.

[5] Liu Xiao, Pan Yu. Concepts that need to be changed and concepts that cannot be touched in China's aging process. *Northern Economy and Trade* 2015(09): 36-37.

[6] LI Y, ZHANG J, LUO H, et al. The Role of Contextual Factors in Shaping Urban Older Adults' Intention of Institutional Care in China: A Mixed-Methods Study. *International Journal of Environmental Research and Public Health* 2023,20(6): 4731.

[7] LU J, ZHANG L, ZHANG K. Care Preferences Among Chinese Older Adults with Daily Care Needs: Individual and Community Factors. *Res Aging* 2021,43(3-4): 166-176.

[8] FENG Z, GLINSKAYA E, CHEN H, et al. Long-term care system for older adults in China: policy landscape, challenges, and future prospects. *Lancet* 2020,396(10259): 1362-1372.

[9] YANG G, WAN L, DONG H, et al. Utilisation willingness for institutional care by the disabled elderly and its influencing factors based on Andersen's model: a cross-sectional survey of Henan, China. *BMJ Open* 2022,12(12): e64949.

[10] Law of the People's Republic of China on the Protection of the Rights and Interests of the Elderly__China.gov.cn [EB/OL]. https://www.gov.cn/guoqing/2021-10/29/content_5647622.htm. [2021-10-29] [2023-09-07].

[11] State Council Issues "14th Five-Year Plan for the Development of the National Aging Career and Old-Age Service System"_Scrolling News_China.gov.cn [EB/OL]. https://www.gov.cn/xinwen/2022-02/21/content_5674877.htm[2022-02-21] [2023-07-06].

[12] ZHOU J, WALKER A. The impact of community care services on the preference for ageing in place in urban China. *Health Soc Care Community* 2021,29(4): 1041-1050.

[13] LUM T Y, LOU V W, CHEN Y, et al. Neighborhood Support and Aging-in-Place Preference Among Low-Income Elderly Chinese City-Dwellers. *J Gerontol B Psychol Sci Soc Sci* 2016,71(1): 98-105.

[14] ZHANG S, WANG Q, ZHAO D, et al. Association of Sensory Impairment With Institutional

Care Willingness Among Older Adults in Urban and Rural China: An Observational Study. *Innovation in Aging* 2023,7(3).

[15] WANG Z, XING Y, YAN W, et al. Effects of individual, family and community factors on the willingness of institutional elder care: a cross-sectional survey of the elderly in China. *BMJ Open* 2020,10(2): e32478.

[16] WANG Y, KAIERDEBIEKE A, FAN S, et al. Study protocol: A cross-sectional study on psychology and behavior investigation of Chinese residents, PBICR. *Psychosomatic Medicine Research* 2022,4(3): 19.

[17] Qiang Luo, Feifei Yu. The impact of students' academic burden on academic achievement - Based on the results of monitoring the academic quality of compulsory education in S city. *Educational Measurement and Evaluation* 2021(07): 30-37.

[18] SUN X, LV K, WANG F, et al. Validity and reliability of the Chinese version of the Health Literacy Scale Short-Form in the Chinese population. *BMC Public Health* 2023,23(1).

[19] DUONG T V, ARINGAZINA A, KAYUPOVA G, et al. Development and Validation of a New Short-Form Health Literacy Instrument (HLS-SF12) for the General Public in Six Asian Countries. *Health Lit Res Pract* 2019,3(2): e91-e102.

[20] Yang Liangqin, Li Xi, Ju Mei, et al. Migratory stress and its influencing factors among the elderly in nursing homes. *Guangxi Medicine* 2022,44(19): 2273-2277.

[21] ROBERT L. SPITZER M, KURT KROENKE M, JANET B. W. WILLIAMS D, et al. A Brief Measure for Assessing Generalized Anxiety Disorder. Arch Intern Med, 2006,166(10): 1092-1097.

[22] Li ZH, Xiao A, Xie Z, et al. Application of the Patient Health Questionnaire Depression Scale (PHQ-9) in an elderly population in a rural community. *Chinese Journal of Clinical Psychology* 2011,19(02): 171-174.

[23] Gao Chengcheng. Analysis of elderly people's willingness to institutional care and influencing factors[J]. China Collective Economy, 2018(34): 144-145.

[24] GDP doubles in 10 years, China's economic strength makes historic leap__China.gov.cn [EB/OL]. https://www.gov.cn/govweb/yaowen/liebiao/202312/content_6920375.htm [2023-12-15] [2024-01-25].

[25] Leng Zhiwei, Guo Qing, Liu Liyun, et al. A study on the willingness and influencing factors of institutionalized elderly in Zhejiang Province. *Preventive Medicine* 2019,31(6): 545-548.

[26] Wang Yan, An Wenzhong, Yang Jiaqi, et al. Analysis on the willingness and influencing factors of the urban elderly population in Beijing-Tianjin-Hebei to institutionalized elderly care. *Modern Preventive Medicine* 2020,47(9): 1625-1628.

[27] GUDUK O, ANKARA H G. Factors Affecting Long-Term Care Preferences in Turke y*[J]. Ann Geriatr Med Res,* 2022,26(4): 330-339.

[28] Lin Mei. Pressure and anxiety of young people in contemporary China. *People's Forum* 2019(33): 78-80.

[29] YANG S, HOSHI T, NAKAYAMA N, et al. The effects of socio-economic status and physical health on the long-term care needs of Japanese urban elderly: a chronological study*[J]. Environ Health Prev Med,* 2013,18(1): 33-39.

[30] POLACSEK M, WOOLFORD M. Strategies to support older adults' mental health during the transition into residential aged care: a qualitative study of multiple stakeholder perspectives*[J]. BMC geriatrics*, 2022,22(1): 151.

[31] Feng Tieyin, Cao Li. An empirical study on social support, health self-assessment and elderly service utilization of elderly people in nursing institutions. *Journal of Xi'an Jiaotong University (Social Science Edition)* 2018.

[32] KIM H, CHOI W. Willingness to Use Formal Long-Term Care Services by Korean Elders and Their Primary Caregivers*[J]. Journal of Aging & Social Policy*, 2008,20(4): 474-492.

[33] Liu YB, Liang J, Yao DW, et al. A study on the relationship between health literacy and health status and health service utilization among elderly people in nursing institutions. *Chinese Family Medicine* 2014,17(4): 449-452.

[34] Ma Xiaowen, Xie Hong. The current situation and insights of pricing models for senior care services. *Chinese Journal of Gerontology* 2018,38(2): 479-482.

Figure 1. Distribution of older adults purchasing institutional care services in different provinces in mainland China

135x67mm (96 x 96 DPI)

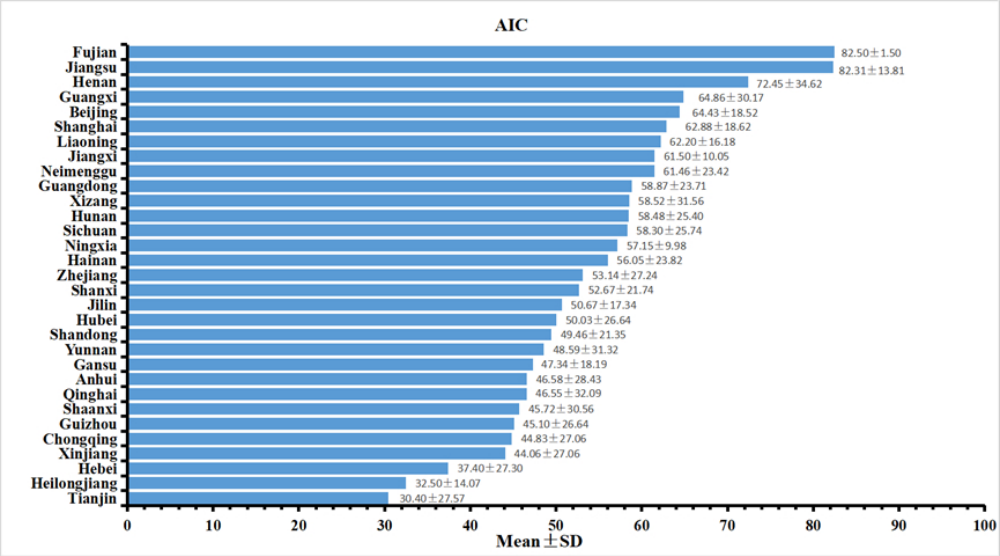
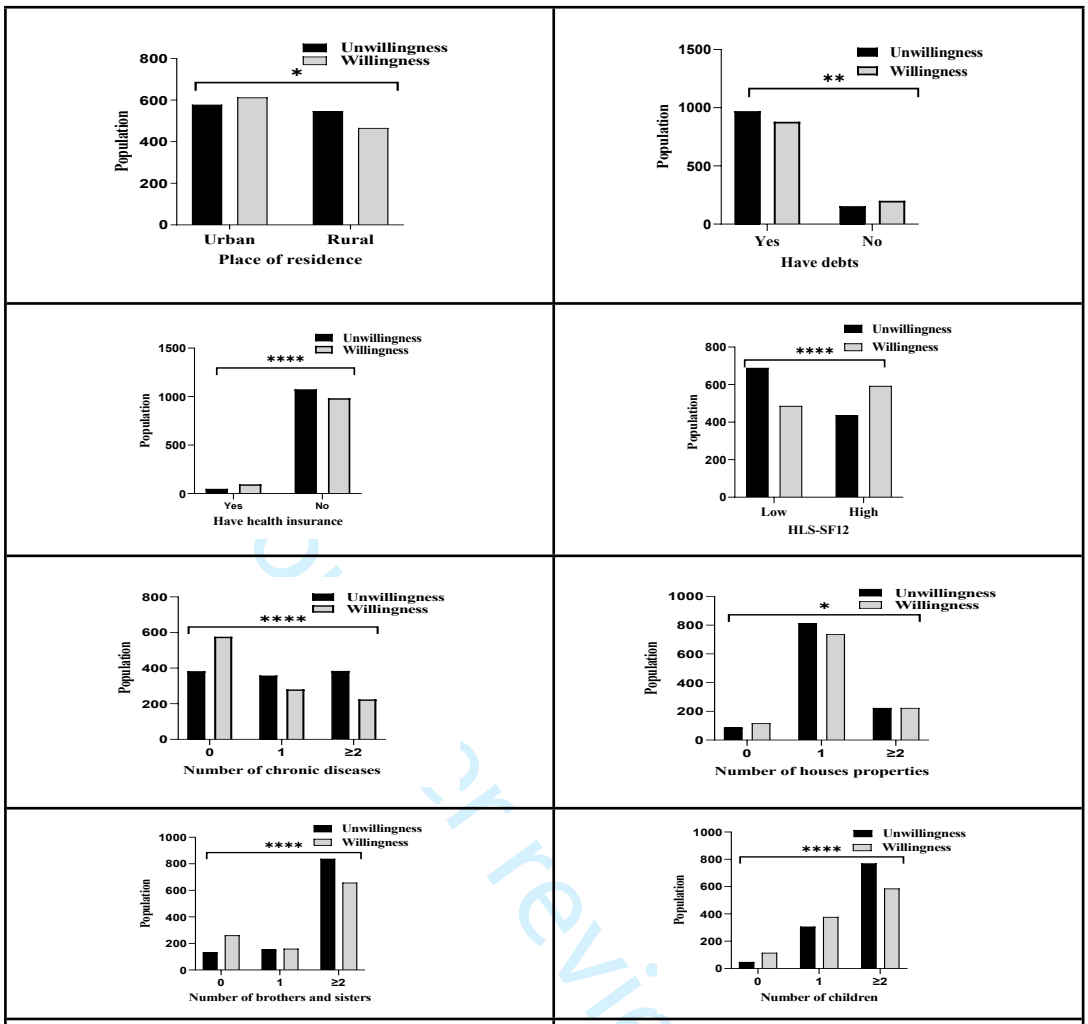


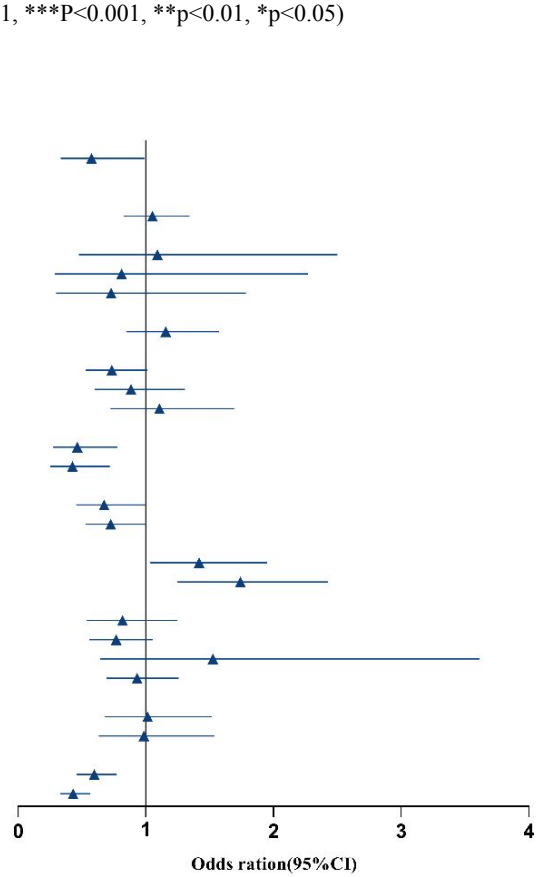
Figure 2. Purchase of institutional care services by the older adults in different provinces in mainland China

372x207mm (59 x 59 DPI)



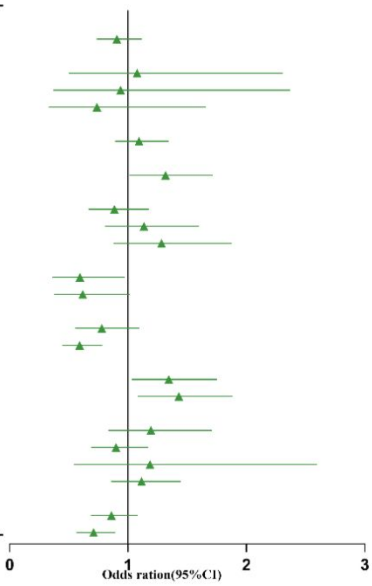
supplementary figure 1. Univariate (chi-square) analysis of the "reluctance-reluctance" attitude of older adults towards purchasing institutionalized elderly care services (****P<0.0001, ***P<0.001, **p<0.01, *p<0.05)

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.555	0.045	0.574	0.333	0.988
Residence					
Rural	0.051	0.682	1.052	0.825	1.342
Marital status					
Married	0.086	0.838	1.090	0.475	2.500
Divorced	-0.211	0.688	0.810	0.289	2.272
Widowed	-0.318	0.487	0.728	0.297	1.783
Have debts					
Yes	0.144	0.357	1.155	0.850	1.571
Highest education level					
Primary	-0.310	0.061	0.733	0.530	1.014
Intermediate	-0.123	0.537	0.884	0.599	1.306
Advanced	0.101	0.642	1.106	0.723	1.692
Number of children					
1	-0.771	0.004	0.462	0.275	0.778
≥2	-0.854	0.001	0.426	0.252	0.718
Number of brothers and sisters					
1	-0.395	0.050	0.674	0.454	1.000
≥2	-0.323	0.048	0.724	0.526	0.997
Monthly household income					
2000-4000	0.349	0.032	1.417	1.031	1.949
>4000	0.554	0.001	1.740	1.248	2.425
Occupation type					
Business services personnel	-0.202	0.348	0.817	0.535	1.247
Agriculture，forestry，husbandry and fishing	-0.264	0.102	0.768	0.559	1.054
Soldier	0.422	0.338	1.525	0.644	3.613
Other staffs	-0.070	0.645	0.932	0.692	1.256
Number of houses properties					
1	0.013	0.951	1.013	0.677	1.516
>2	-0.016	0.943	0.984	0.630	1.536
Number of chronic diseases					
1	-0.517	<0.001	0.596	0.460	0.773
≥2	-0.845	<0.001	0.430	0.328	0.563

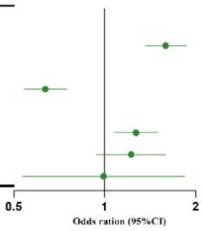


supplementary figure 2. Results of regression analysis of "reluctance – willingness" of older adults to purchase institutional care services

Variate	β	P	OR	95%CI	
Residence					
Rural	-0.098	0.353	0.906	0.736	1.116
Marital status					
Married	0.074	0.849	1.077	0.502	2.308
Divorced	-0.064	0.893	0.938	0.372	2.369
Widowed	-0.304	0.462	0.738	0.329	1.657
Have subsidies					
Yes	0.090	0.393	1.094	0.890	1.345
Have debts					
Yes	0.276	0.041	1.318	1.012	1.716
Highest education level					
Primary	-0.121	0.401	0.886	0.668	1.175
Intermediate	0.128	0.463	1.136	0.808	1.598
Advanced	0.249	0.196	1.283	0.879	1.873
Number of children					
1	-0.522	0.038	0.594	0.363	0.972
≥2	-0.481	0.057	0.618	0.376	1.015
Number of brothers and sisters					
1	-0.249	0.152	0.779	0.554	1.096
≥2	-0.526	0.000	0.591	0.444	0.786
Monthly household income					
2000-4000	0.296	0.027	1.345	1.034	1.750
>4000	0.357	0.011	1.429	1.084	1.884
Occupation type					
Business services personnel	0.177	0.333	1.194	0.834	1.708
Agriculture，forestry，husbandry and fishing	-0.107	0.431	0.899	0.690	1.172
Soldier	0.170	0.670	1.186	0.541	2.598
Other staffs	0.109	0.417	1.115	0.858	1.448
Number of chronic diseases					
1	-0.151	0.195	0.860	0.685	1.080
≥2	-0.343	0.003	0.709	0.563	0.893

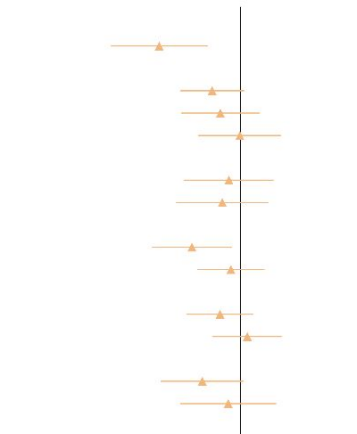


Variate	β	P	OR	95%CI	
HLS-SF12					
High	0.464	<0.001	1.590	1.358	1.862
PSSS					
High	-0.452	<0.001	0.636	0.540	0.749
Anxiety					
Mild anxiety	0.238	0.007	1.269	1.068	1.507
Moderate anxiety	0.201	0.137	1.223	0.938	1.595
Severe anxiety	-0.009	0.976	0.991	0.532	1.844

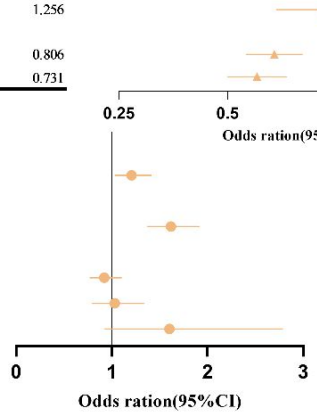


supplementary figure 3. Results of regression analysis of the “reluctance-hesitation” attitude of older adults in purchasing institutionalized elderly care services

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.517	0.001	0.596	0.437	0.813
Highest education level					
Primary	-0.18	0.084	0.835	0.681	1.024
Intermediate	-0.128	0.32	0.88	0.684	1.132
Advanced	-0.004	0.974	0.996	0.765	1.296
Number of children					
1	-0.074	0.616	0.929	0.697	1.239
≥2	-0.115	0.442	0.891	0.664	1.195
Number of brothers and sisters					
1	-0.309	0.017	0.734	0.569	0.947
>2	-0.061	0.577	0.941	0.759	1.166
Monthly household income					
2000-4000	-0.131	0.233	0.878	0.708	1.087
>4000	0.044	0.698	1.045	0.837	1.304
Number of houses properties					
1	-0.243	0.071	0.784	0.602	1.021
≥2	-0.078	0.616	0.925	0.681	1.256
Number of chronic diseases					
1	-0.397	<0.001	0.673	0.561	0.806
>2	-0.505	<0.001	0.603	0.498	0.731



Variate	β	P	OR	95%CI	
HLS-SF12					
High	0.189	0.019	1.208	1.031	1.416
PSSS					
High	0.482	<0.001	1.619	1.368	1.917
Anxiety					
Mild anxiety	-0.081	0.376	0.922	0.770	1.104
Moderate anxiety	0.032	0.811	1.033	0.793	1.346
Severe anxiety	0.473	0.094	1.604	0.923	2.789



supplementary figure 4. Results of regression analysis of "hesitant-willing" attitude of older adults towards purchasing institutionalized elderly care services

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any prespecified hypotheses	
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page6-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 8
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 9

		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	Page 11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults—A Nationwide Cross-Sectional Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-082548.R2
Article Type:	Original research
Date Submitted by the Author:	27-Feb-2024
Complete List of Authors:	Zhu, Rui; Bengbu Medical College, Hou, Wenjie; Bengbu Medical College Wang, Lingmeng; Bengbu Medical College Zhang, Chenchen; Bengbu Medical College Guo, Xing; Bengbu Medical College Luo, Dan; Bengbu Medical College Wang, Fuzhi; Bengbu Medical College
Primary Subject Heading:	Sociology
Secondary Subject Heading:	Health services research, Geriatric medicine, Nursing
Keywords:	GERIATRIC MEDICINE, Health Services for the Aged, Aged, Aging

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Willingness to Purchase Institutionalized Elderly Services and Influencing Factors among Chinese Older Adults—A Nationwide Cross-Sectional Study

Objectives: In view of the serious ageing of China's population and the low desire of elderly people to purchase institutionalized elderly care services, we explored the willingness of Chinese elderly people to purchase institutionalized elderly care services and its influencing factors.

Design: This was a cross-sectional study. Three multivariate logistic regression analysis models of the willingness of elderly people to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's willingness to purchase institutionalized elderly care services.

Setting: This study was based on the 2022 Psychology and Behaviour Investigation of Chinese Residents (PBICR) database.

Participants: Research data from 4123 older adults who met the requirements of this study were screened from the database.

Results: Of the 4123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutionalized senior care services (1125, 27.3% vs. 1079, 26.2%, respectively), and 1919 (46.5%) had hesitant attitudes. The analysis of Model 1 showed that medical insurance participation, the number of children and siblings, chronic diseases, and per capita monthly household income had an influential effect on the willingness of elderly people to purchase institutional care. In Model 2, we found that factors such as per capita monthly household income and anxiety led to hesitancy among older adults to purchase institutionalized senior care services. In Model 3, we further found that social support and health literacy led to a shift from hesitation to willingness to purchase institutionalized elderly care services.

Conclusion: The number of children, number of siblings, per capita monthly income of the family, medical insurance participation, health status, health literacy, and social support were found to be the main factors influencing the purchase of institutionalized care by elderly individuals.

Strengths and limitations of this study

- The participants were from 148 cities in 22 provinces, 5 autonomous regions, and 4 municipalities.
- This study used stratified and quota sampling methods.
- The factors that influence the purchase of institutional care services by elderly people are varied; thus, it was difficult to include all the possible influences in this study.
- This was a cross-sectional study in which only the phenomenon was analysed; an in-depth explanation of the reasons behind the phenomenon requires the design of a rigorous mixed qualitative and quantitative study.

1. Background

Population ageing has become a global issue. According to the World Health Organization, by 2030, one-sixth of the world's population will be older than 60 years, and the number of people older than 60 will increase from 1 billion to 1.4 billion from 2020 to 2030 [1]. China has one of the fastest-ageing populations in the world [1]. It is expected that by 2025, China's elderly population aged 60 years and older will reach 300 million, accounting for more than 20% of the total population [2]. According to the National Population Development Plan (2016-2030), it is predicted that the proportion of elderly people older than 60 years in China will be greater than 25% in 2030 [3], which means that one out of every four people will be older than 60 years. As the proportion of China's elderly population continues to increase, the social burden of old age is gradually increasing.

Along with the increase in the proportion of the elderly population, the fertility rate of mainland China's population has shown a continuous downwards trend, while the per capita life expectancy has shown an upwards trend; these trends will inevitably lead to an increase in the degree of population ageing and in the burden of old-age

pensions faced by society. Moreover, the demographic structure of Chinese families shows an inverted pyramid pattern in which a couple must take care of four elderly parents and one child [4]. This "4-2-1" family demographic structure makes "how to age" an important issue in society.

Previous studies have shown that in the Chinese context of old age, family care has long been the core means of supporting older people [5]. Compared with Western countries, the Confucian idea of filial piety has led Chinese people to believe for thousands of years that most elderly people who receive care from institutions are there because their children are ungrateful [6]. They believe that their children's unwillingness to take care of them makes them lose face; thus, most elderly people choose to age in their families. This finding suggests that intergenerational ties and obligations are generally stronger in Chinese families than in Western societies [7]. However, in Chinese families, children's ability to care for elderly adults has been eroded by demographic changes and socioeconomic development [8]. The younger generation has had to move to cities to work, which means that family-centred forms of care for elderly individuals are gradually disappearing [9]; thus, there is an inevitable growing demand for institutional care. To cope with the growth of a rapidly ageing population, the Chinese government has released a blueprint for an emerging ageing service and support network that aims to establish a social ageing system of home-based ageing with community-based ageing as the necessary support and institutionalized ageing as a supplement [10]. In 2020, the Proposal of the Central Committee of the Communist Party of China on the Formulation of the Fourteenth Five-Year Plan for National Economic and Social Development and Vision for 2035 proposed the implementation of a national strategy of actively coping with the ageing of the population, promoting the synergistic development of old-age care and the old-age care industry, and constructing an old-age care system that combines medical care and recreation with old-age care and the goal of increasing the number of public institutions for old-age care in accordance with the 14th Five-Year Plan for Old-Age Care and Services Development [11]. The Chinese government is making great efforts to improve the quality of institutional care services and the training of specialized

caregivers. This will promote the rapid development of institutional care services to continue to satisfy the growing demand of elderly people for multilevel, high-quality, healthy old-age care.

Institutionalized elderly care generally refers to service institutions that provide comprehensive services for elderly individuals, such as food and living, cleaning and hygiene, life care, health management and cultural, sports and recreational activities. Institutional care can reduce the burden of care on children, provide specialized care services and enrich the leisure activities of elderly individuals. However, the results of a cross-sectional survey of several regions suggest that many factors may influence the acceptance of institutionalized care among Chinese seniors. For example, a rapidly changing society is changing traditional family care for elderly individuals, resulting in a tendency for elderly Chinese people to choose institutionalized care as a way of ageing [12]. Negative news about elderly care institutions often leads to negative attitudes towards institutionalized care [13]. In addition, China is a vast country with enormous differences in economic and cultural conditions in different regions, which may affect the willingness of elderly individuals to purchase institutionalized elderly care services [14]. The above mentioned studies have elaborated on the factors that influence the willingness of elderly people to purchase institutional care services [15]. However, the samples of these studies were limited by regional constraints and are thus not representative of the overall situation in mainland China.

Supported by the "2022 China Population Psychological and Behavioural Tracking Survey Project", we conducted a national cross-sectional survey in mainland China to fully understand the willingness of elderly people to purchase institutionalized elderly care services and the factors that influence this willingness. This study can support the improvement of the level of institutionalized elderly care services in society and the enhancement of elderly people's sense of well-being and security.

2. Information and methodology

2.1 Data sources

The study data were obtained from the Psychology and Behaviour Investigation of Chinese Residents, 2022 (PBICR) database [16]. The China Population

Psychological and Behavioural Survey (CPBS) aims to establish a database through a multicentre, large-sample cross-sectional survey to provide strong data support for the development of research in various fields and for a comprehensive and systematic understanding of the public's physical and mental health. The cross-sectional survey was initiated by the School of Public Health, Peking University and conducted from June 20, 2022, to August 31, 2022, using stratified and quota sampling methods to select 148 cities, 202 districts and counties, 390 townships/streets, and 780 communities/villages in 23 provinces, 5 autonomous regions, and 4 municipalities directly under the central government of mainland China. The questionnaires were distributed to the public one-on-one and face-to-face by surveyors. After the respondents provided informed consent, they could click on a link to complete the questionnaire.

The screening criteria for the sample of this study were as follows: (1) ≥60 years of age or older, (2) nationality of the People's Republic of China, (3) resident of China (annual time away from home ≤ 1 month), (4) voluntary participation in the study and completion of the informed consent form, (5) completion of the network questionnaire survey independently or with the help of investigators, and (6) understanding of the meaning of each item in the questionnaire. The sample exclusion criteria were as follows: (1) had a mental disturbance, (2) had a cognitive impairment, (3) were participating in other research on similar topics, and (4) did not wish to collaborate.

The questionnaire was completed by 30,505 participants from 148 cities in 22 provinces, 5 autonomous regions, and 4 municipalities directly under the central government of mainland China. Based on the sample selection criteria and exclusion criteria, research data from 4,123 older adults were ultimately included in this study.

2.2 Research instrument

The visual analogue scale (VAS) was used to assess the willingness of elderly people to purchase institutionalized elderly care services. The items were rated from 0 (unwillingness to purchase) to 100 (strong willingness to purchase). The higher the score is, the greater the willingness of elderly respondents to purchase institutionalized elderly services is. The first 27% of the participants with VAS scores were considered

to have a negative attitude towards institutionalized elderly services, the last 27% were considered to have a positive attitude towards institutionalized elderly services, and the remaining sample was considered to have a hesitant attitude towards institutionalized elderly services [17].

The short-form Health Literacy Survey (HLS-SF12) was used to assess the health literacy level of the respondents. The HLS-SF12 was developed by Sun Xiaonan et al. [18] to assess respondents' ability to find, understand, evaluate, and apply health-related information. The options are rated on a Likert scale ranging from “very difficult” (1 point) to “very easy” (4 points). The total score of the items range from 0 to 36, with the top 50% of the scores considered to indicate a high level of health literacy and the bottom 50% considered to indicate a low level of health literacy [19]. The Cronbach's coefficient for the HLS-SF12 in this study was 0.910.

The Perceived Social Support Scale (PSSS) was applied to assess respondents' feelings about the social support they received. The PSSS evaluates the extent to which individuals feel supported by family, friends, and others in terms of three dimensions, namely, family support, friend support, and support from others, with the total score reflecting the degree of total social support felt by the individual. A Likert scale is used that ranges from “strongly disagree” (1 point) to “strongly agree” (7 points). The total possible score is 21, with a higher total score indicating a higher level of social support for the individual [20]. Respondents with scores in the top 50% are considered to have a higher level of social support, and respondents with scores in the bottom 50% are considered to have a lower level of individual social support. Cronbach's coefficient for the PSSS in this study was 0.928.

The General Anxiety Disorder-7 (GAD-7) scale was used to measure the respondents’ anxiety. Each entry on the GAD-7 scale is rated from 0 to 3, and the total score ranges from 0 to 21. The seven items are summed to produce a final rating that indicates the frequency of anxiety symptoms. A score of 0-4 indicates no anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and 15 or more indicates severe anxiety [21]. The Cronbach's coefficient for the GAD-7 scale in this study was 0.927.

The Patient Health Questionnaire-9 (PHQ-9) was used to measure the depressive state of the respondents. Options are rated on a Likert scale ranging from "never" (0 points) to "nearly every day" (4 points). The nine items are summed to give a total score ranging from 0 to 36, indicating the frequency of depressive symptoms. A score of 0-4 is categorized as no depression, 5-9 is categorized as mild depression, 10-14 is categorized as moderate depression, and 15-27 is categorized as severe depression [22]. The Cronbach's coefficient for the PHQ-9 in this study was 0.916.

2.3 Statistical methods

Descriptive statistics were applied to analyse the percentages of patients' sociodemographic information, social structure, economic status, and other factors for different samples. A chi-square test was applied to analyse the differences in the willingness of elderly respondents to purchase institutional care in different sociological contexts. Three multivariate logistic regression analysis models of elderly people's willingness to purchase institutionalized elderly care services were established (Model 1: "reluctance – willingness"; Model 2: "reluctance – hesitation"; and Model 3: "hesitation – willingness") to explore the factors that influence elderly people's purchase of institutionalized elderly care services. The data were organized using Excel 2019 (Microsoft, Inc., Washington, DC, USA), and the data were analysed using IBM SPSS Statistics (Ver. 26, IBM, Inc., New York, USA) and R language (Ver. 4.2.3).

2.4 Patient and Public Involvement

No patients were involved in setting the research question or the outcome measures, nor were they involved in developing plans for design or implementation of the study.

3. Results

3.1 Sample distribution

The 4,123 study samples came from 780 residential communities in 22 provinces, 5 autonomous regions, and 4 municipalities in mainland China. Overall, the willingness of elderly people to purchase institutionalized elderly care services was generally high in central and eastern China, while the willingness of elderly people to purchase institutionalized elderly care services was generally low in northwestern and

northeastern China. The distribution of elderly people purchasing institutional care services in different provinces in mainland China is shown in Figure 1, and the scores of elderly people purchasing institutional care services in different provinces in mainland China are shown in Figure 2.

3.2 Current Situation of Elderly People's Willingness to Purchase Institutional Care Services

The basic characteristics of the 4,123 respondents are shown in Table 1. Of the 4,123 respondents, roughly equal numbers had negative and positive attitudes towards purchasing institutional care (1125, 27.3% vs. 1079, 26.2%, respectively), and 1,919 (46.5%) had hesitant attitudes. The results of the one-way analysis of the purchase of institutionalized elderly care services by elderly people showed that in the "unwillingness-willingness" model, there were significant differences in the willingness to participate in institutionalized elderly care services among elderly people with different places of residence, highest educational level, marital status, age, number of children and siblings, occupation, per capita monthly household income, indebtedness, medical insurance participation, property, health status and health literacy factors, as shown in Figure 3 (Supplemental Figure 1). Further analysis of the results of the "reluctance-hesitation" and "hesitation-willingness" models revealed that other factors also affected the willingness of elderly people to purchase institutionalized elderly care services and that there were significant differences in the willingness to purchase institutionalized elderly care services among elderly people with different levels of social support and anxiety, as shown in Table 2.

Table 1. Basic characteristics of the respondents

Variate		N (%)	Variate		N (%)
Gender	Male	2,079 (50.40)	Number of house properties	0	365 (8.90)
	Female	2,044 (49.60)		1	2,958 (71.70)
Highest educational level[a]	Uneducated	867 (21.00)		≥2	800 (19.40)
	Primary	1,941(47.10)	Have subsidies[b]	No	2,781 (0.68)
	Intermediate	738 (17.90)		Yes	1,342 (0.33)
	High class	577 (14.00)	Have debts	No	3,378 (0.82)
Place of residence	Urban	2,300 (55.80)		Yes	745 (0.18)
	Rural	1,823 (44.20)	Have health insurance	No	236 (0.06)
Marital status	Spinsterhood	110 (2.70)		Yes	3,887 (0.94)

	Married	3,437 (83.40)	Number of chronic diseases (kind)	0	1,749 (42.40)
	Divorced	99 (2.40)		1	1,233 (29.90)
	Widowed	477 (11.60)		≥2	1,141 (27.70)
Age group	60-70	2,529 (61.30)	HLS-SF12	Low	2,205 (0.54)
	71-80	1,401 (34.00)		High	1,918 (0.47)
	> 80	193 (4.70)	PSSS	Low	2,382 (0.58)
Number of children*	0	318 (7.70)		High	1,741 (0.42)
	1	1,337 (32.50)	Anxiety	No anxiety	2,299 (0.56)
	≥2	2,465 (59.80)		Mild anxiety	1,338 (0.33)
Number of brothers and sisters	0	764 (18.50)		Moderate anxiety	416 (0.10)
	1	662 (16.10)		Severe anxiety	70 (0.02)
	≥2	2,697 (65.40)	Depression	No depression	4,074 (98.80)
Occupation type*	Professionals	216 (7.60)		Mild depression	1 (0.00)
	Business services personnel	257 (9.00)		Moderate depression	10 (0.20)
	Agricultural, forestry and fisheries producers	560 (19.60)		Severe depression	38(0.90)
	Soldier	48 (1.70)			
	Other staff	1,779 (62.60)			
Monthly household income (CNY)	<2000	1,008 (24.40)			
	2000-4000	1,571 (38.10)			
	>4000	1,544 (37.40)			

Notes:*: (missing data) **a:** Primary (primary and junior high school); intermediate (secondary vocational education or senior high school); and senior (college, bachelor's degree and above). **b:** Includes subsidies for renting, employment, living, purchasing a home, job seeking and starting a business.

Table 2. One-way (chi-square test) analysis of elderly people's willingness to purchase institutionalized elderly care services

Variate	Unwillingness-Hesitate		Hesitate-Willingness	
	χ2	P	χ2	P
Gender	1.211	0.271	0.610	0.435
Highest educational level	22.923	<0.001	8.578	0.035
Place of residence	11.805	0.001	0.271	0.603
Marital status	33.66	<0.001	0.399	0.706
Age group	3.064	0.216	3.930	0.140
Number of children	38.886	<0.001	6.256	0.044
Number of brothers and sisters	47.38	<0.001	12.646	0.002
Occupation type	14.631	0.006	6.159	0.188
Monthly household income (CNY)	49.243	<0.001	6.529	0.038
Number of properties	1.378	0.502	8.875	0.012
Have subsidies	4.640	0.031	2.242	0.134
Have debts	21.572	<0.001	1.477	0.224

Have health insurance	0.241	0.623	20.388	<0.001
Number of chronic diseases (kind)	20.156	<0.001	40.899	<0.001
HLS-SF12	16.537	<0.001	20.588	<0.001
PSSS	28.296	<0.001	52.654	<0.001
Depression	2.325	0.508	0.923	0.820
Anxiety	15.260	0.002	17.111	0.001

3.3 Influential factors related to the willingness of elderly people to purchase institutional care services

Variables with significant differences in the univariate analysis were further substituted into the three multivariate logistic regression models of older adults' willingness to purchase institutionalized senior care services.

The results of the analysis of Model 1 (reluctance-willingness) showed that the sociodemographic factors of medical participation (β=-0.555), 1 child (β=-0.771) or more than 2 children (β=-0.854), 2 or more siblings (β=-0.323), and 1 (β=-0.517) or 2 or more chronic diseases (β=-0.845) were related to elderly people's unwillingness to purchase institutional care services. The willingness to purchase institutionalized elderly care services was greater among elderly individuals whose per capita monthly household income was 2,000-4,000 yuan (β=0.349) or 4,000 yuan or more (β=0.554) than among those whose per capita monthly household income was <2,000 yuan, as shown in Figure 4 (Supplemental Figure 2).

The results of the analysis of Model 2 (reluctance-hesitation) showed that elderly people who had one child (β=-0.522), two or more siblings (β=-0.526), two or more chronic diseases (β=-0.343), or a higher level of social support (β=-0.452) were reluctant to purchase institutionalized elderly care services. In contrast, older adults with a per capita monthly household income of 2,000-4,000 yuan (β=0.296) or more than 4,000 yuan (β=0.357), a high level of health literacy (β=0.464), or mild anxiety (β=0.238) had a hesitant attitude towards purchasing institutionalized senior care services, as shown in Figure 5 (Supplemental Figure 3).

The results of the analysis of Model 3 (hesitation-willingness) showed that older adults who were medically insured (β=-0.517), had one sibling (β=-0.309), and suffered

from one (β=-0.397) or two or more chronic illnesses (β=-0.505) were hesitant to purchase institutionalized senior care. In contrast, willingness to purchase institutional care services was generally greater among older adults with higher levels of health literacy (β=0.189) and higher levels of social support (β=0.482), as shown in Figure 6 (Supplemental Figure 4).

4. Discussion

This study examined the willingness of older Chinese adults to purchase institutionalized elderly care services and the factors that influence this willingness. Our study revealed that 26.2% of mainland Chinese older adults were willing to choose institutionalized elderly care services, 46.5% were hesitant to do so, and 27.3% were clearly unwilling to choose institutionalized elderly care services. Various factors may influence the purchase of institutional care services by elderly individuals.

In Model 1, we analysed the factors that influence the reluctance/willingness of elderly people to participate in elderly services. The first factor that was found to influence the willingness of elderly people to purchase institutionalized care is their health care participation. Our investigative study showed that older adults without health insurance were generally more willing to purchase institutionalized senior care services than were younger adults without health insurance, which is consistent with the findings of Chengcheng Gao and other scholars [23]. A possible explanation is that because this group of older persons is not covered by health insurance, they would consider purchasing institutionalized elderly care services as security for their old age. Another possible reason is that as China's per capita GDP increases annually [24], the disposable income of elderly people has also greatly increased, which may lead to an increase in the willingness of elderly people to purchase institutionalized elderly care services. In addition, there may be other reasons for the effect of health insurance participation on the willingness of elderly people to purchase institutionalized senior care services, which need to be further explored in future studies. Second, our study showed that the number of children was a key factor influencing the willingness of elderly people to purchase institutional care. The willingness to purchase institutional care services was weaker among older adults with more children. Similar phenomena

have been reported in studies conducted in countries such as China and Turkey [25-27]. This finding suggests that children are an important resource for elderly people in their old age and that taking turns taking care of elderly adults is still the mainstream concept of old age in society. However, with the development of society and economy, the young generation is currently facing the double pressure of career and family [28]; thus, whether the traditional concept of old age can succeed requires further research. Third, the willingness of older people with siblings to participate in institutionalized care was generally lower, suggesting that siblings can care for older siblings and accompany each other in their lives. Finally, our study revealed that economic conditions had a major influence on the willingness of elderly people to purchase institutional care. In China, the better the economic conditions of elderly people are, the greater their willingness to participate in institutionalized elderly care is. This indicates that economically affluent elderly individuals lay the material foundation for purchasing institutionalized elderly care services. However, in Japan, which is also in the Asian Cultural Circle, the results of related research are the opposite; i.e., an increase in income of elderly Japanese people improves their ability to perform daily life activities, which reduces their willingness to purchase institutionalized elderly care services [29]. Therefore, the influence of economic conditions on the willingness of elderly people to purchase institutionalized elderly care services should be further analysed in depth with respect to sociocultural factors.

In Model 2, we analysed the factors that influence older people's reluctance/hesitation to purchase institutional care services. Combined with the results of the analysis in Model 1, our investigation revealed that economic factors not only affected the willingness of elderly people to purchase institutionalized elderly care services but were also related to anxiety. Similar issues have been found in related studies conducted in Australia [30]. The transition of older adults from home care to institutional care is a stressful life experience that is prone to anxiety. Our study agrees with the view that elderly people are prone to insecurity, fear of separation from their families, and greater difficulty in adapting to changes in their living environment, which leads to hesitancy to participate in institutionalized aged care services.

In Model 3, we further found that social support and health literacy led to a shift in attitudes from hesitation to willingness to purchase institutional care. Older adults with higher levels of social support generally had a greater willingness to purchase institutional care services. Similar ideas have been validated in a series of studies conducted in East Asian countries [31-32]. Previous research has demonstrated that older adults with higher health literacy have a greater utilization of health services [33]. In conjunction with the results of this study, we found that health literacy also played a key role in changing the willingness of older adults to purchase institutional care. This indicates the need to strengthen the health literacy of elderly people through health education to increase their willingness to participate in institutionalized elderly services.

In addition, the role of health status in the purchase of institutional care by elderly people is an issue that should be explored in depth. Our research suggests that older people in poorer health generally have a lower willingness to purchase institutionalized elderly care services. This may be because, based on the rates charged by institutionalized elderly care services, the poorer the health of an older person is, the greater the corresponding level of care is and the greater the related fees are [34]. The high cost of expenses has may have led to a significant reduction in the willingness of elderly people to purchase institutional care services. In addition, when older adults are in poor health, they prefer their relatives to be by their side [27], which further reduces their willingness to purchase institutionalized elderly care services.

5. Limitations

This study has several limitations. First, the factors that influence the purchase of institutional care services by elderly people are varied; thus, it was difficult to include all the possible influences in this study. Second, this was a cross-sectional study in which only the phenomenon was analysed; an in-depth explanation of the reasons behind the phenomenon requires the design of a rigorous mixed qualitative and quantitative study. Third, China is a multiethnic country with Han Chinese individuals as the main ethnic group, and the vast majority of the research samples in this study came from areas inhabited by Han Chinese individuals. However, further in-depth research is needed to determine the factors that influence the purchase of

institutionalized elderly care by elderly people in areas inhabited by ethnic minorities.

6. Conclusions

The number of children, number of siblings, per capita monthly household income, medical insurance participation, health status, health literacy status, and social support were found to be the main factors influencing the purchase of institutionalized care by elderly individuals. China's social institutions for elderly people need to not only continue to improve their capacity and quality of service but also provide diversified, multilevel institutional care for elderly people to respond more actively and effectively to the problem of population ageing in Chinese society.

Contributors RZ, WH, LW, CZ, XG and DL designed the study. RZ and WH conducted the data analysis. RZ wrote the manuscript. RZ, WH, LW, CZ, XG, DL and FW proofed the final manuscript.

Funding This study was supported by funding. This study was supported by funding from the Anhui Province Philosophy and Social Science Planning Project (Grant no. AHSKY2021D24).

Competing interests The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics approval This study was approved by the Ethics Research Committee of the Shaanxi Institute of International Trade and Commerce (JKWH-2022-02). Informed consent was obtained from all the subjects who participated in the study. All the data were collected anonymously and kept confidential.

Data sharing statement The dataset is available upon request. Please contact the corresponding author.

References

[1] Aging and health [EB/OL]. https://www.who.int/zh/news-room/fact-sheets/detail/ageing-and-health. [2022-10-01] [2023-10-05].

[2] In the next five years, "the old will be cared for" [EB/OL]. https://www.gov.cn/xinwen/2021-03/21/content_5594235.htm. [2021-03-21] [2024-01-20].

[3] Circular of the State Council on the Issuance of the National Population Development Plan (2016-2030) Population and Family Planning China.gov.cn [EB/OL]. https://www.gov.cn/zhengce/content/2017-01/25/content_5163309.htm. [2017-01-25] [2023-09-03].

[4] Song Jian. Old-age ability and old-age risk of "four-two-one" structure families--An overview of family security and the construction of a harmonious society. *Journal of Renmin University of China* 2013,27(05): 94-102.

[5] Liu Xiao, Pan Yu. Concepts that need to be changed and concepts that cannot be touched in China's aging process. *Northern Economy and Trade* 2015(09): 36-37.

[6] LI Y, ZHANG J, LUO H, et al. The Role of Contextual Factors in Shaping Urban Older Adults' Intention of Institutional Care in China: A Mixed-Methods Study. *International Journal of Environmental Research and Public Health* 2023,20(6): 4731.

[7] LU J, ZHANG L, ZHANG K. Care Preferences Among Chinese Older Adults with Daily Care Needs: Individual and Community Factors. *Res Aging* 2021,43(3-4): 166-176.

[8] FENG Z, GLINSKAYA E, CHEN H, et al. Long-term care system for older adults in China: policy landscape, challenges, and future prospects. *Lancet* 2020,396(10259): 1362-1372.

[9] YANG G, WAN L, DONG H, et al. Utilisation willingness for institutional care by the disabled elderly and its influencing factors based on Andersen's model: a cross-sectional survey of Henan, China. *BMJ Open* 2022,12(12): e64949.

[10] Law of the People's Republic of China on the Protection of the Rights and Interests of the Elderly__China.gov.cn [EB/OL]. https://www.gov.cn/guoqing/2021-10/29/content_5647622.htm. [2021-10-29] [2023-09-07].

[11] State Council Issues "14th Five-Year Plan for the Development of the National Aging Career and Old-Age Service System"_Scrolling News_China.gov.cn [EB/OL]. https://www.gov.cn/xinwen/2022-02/21/content_5674877.htm[2022-02-21] [2023-07-06].

[12] ZHOU J, WALKER A. The impact of community care services on the preference for ageing in place in urban China. *Health Soc Care Community* 2021,29(4): 1041-1050.

[13] LUM T Y, LOU V W, CHEN Y, et al. Neighborhood Support and Aging-in-Place Preference Among Low-Income Elderly Chinese City-Dwellers. *J Gerontol B Psychol Sci Soc Sci* 2016,71(1): 98-105.

[14] ZHANG S, WANG Q, ZHAO D, et al. Association of Sensory Impairment With Institutional

Care Willingness Among Older Adults in Urban and Rural China: An Observational Study. *Innovation in Aging* 2023,7(3).

[15] WANG Z, XING Y, YAN W, et al. Effects of individual, family and community factors on the willingness of institutional elder care: a cross-sectional survey of the elderly in China. *BMJ Open* 2020,10(2): e32478.

[16] WANG Y, KAIERDEBIEKE A, FAN S, et al. Study protocol: A cross-sectional study on psychology and behavior investigation of Chinese residents, PBICR. *Psychosomatic Medicine Research* 2022,4(3): 19.

[17] Qiang Luo, Feifei Yu. The impact of students' academic burden on academic achievement - Based on the results of monitoring the academic quality of compulsory education in S city. *Educational Measurement and Evaluation* 2021(07): 30-37.

[18] SUN X, LV K, WANG F, et al. Validity and reliability of the Chinese version of the Health Literacy Scale Short-Form in the Chinese population. *BMC Public Health* 2023,23(1).

[19] DUONG T V, ARINGAZINA A, KAYUPOVA G, et al. Development and Validation of a New Short-Form Health Literacy Instrument (HLS-SF12) for the General Public in Six Asian Countries. *Health Lit Res Pract* 2019,3(2): e91-e102.

[20] Yang Liangqin, Li Xi, Ju Mei, et al. Migratory stress and its influencing factors among the elderly in nursing homes. *Guangxi Medicine* 2022,44(19): 2273-2277.

[21] ROBERT L. SPITZER M, KURT KROENKE M, JANET B. W. WILLIAMS D, et al. A Brief Measure for Assessing Generalized Anxiety Disorder. Arch Intern Med, 2006,166(10): 1092-1097.

[22] Li ZH, Xiao A, Xie Z, et al. Application of the Patient Health Questionnaire Depression Scale (PHQ-9) in an elderly population in a rural community. *Chinese Journal of Clinical Psychology* 2011,19(02): 171-174.

[23] Gao Chengcheng. Analysis of elderly people's willingness to institutional care and influencing factors[J]. China Collective Economy, 2018(34): 144-145.

[24] GDP doubles in 10 years, China's economic strength makes historic leap__China.gov.cn [EB/OL]. https://www.gov.cn/govweb/yaowen/liebiao/202312/content_6920375.htm [2023-12-15] [2024-01-25].

[25] Leng Zhiwei, Guo Qing, Liu Liyun, et al. A study on the willingness and influencing factors of institutionalized elderly in Zhejiang Province. *Preventive Medicine* 2019,31(6): 545-548.

[26] Wang Yan, An Wenzhong, Yang Jiaqi, et al. Analysis on the willingness and influencing factors of the urban elderly population in Beijing-Tianjin-Hebei to institutionalized elderly care. *Modern Preventive Medicine* 2020,47(9): 1625-1628.

[27] GUDUK O, ANKARA H G. Factors Affecting Long-Term Care Preferences in Turke y*[J]. Ann Geriatr Med Res,* 2022,26(4): 330-339.

[28] Lin Mei. Pressure and anxiety of young people in contemporary China. *People's Forum* 2019(33): 78-80.

[29] YANG S, HOSHI T, NAKAYAMA N, et al. The effects of socio-economic status and physical health on the long-term care needs of Japanese urban elderly: a chronological study*[J]. Environ Health Prev Med,* 2013,18(1): 33-39.

[30] POLACSEK M, WOOLFORD M. Strategies to support older adults' mental health during the transition into residential aged care: a qualitative study of multiple stakeholder perspectives*[J]. BMC geriatrics*, 2022,22(1): 151.

[31] Feng Tieyin, Cao Li. An empirical study on social support, health self-assessment and elderly service utilization of elderly people in nursing institutions. *Journal of Xi'an Jiaotong University (Social Science Edition)* 2018.

[32] KIM H, CHOI W. Willingness to Use Formal Long-Term Care Services by Korean Elders and Their Primary Caregivers*[J]. Journal of Aging & Social Policy*, 2008,20(4): 474-492.

[33] Liu YB, Liang J, Yao DW, et al. A study on the relationship between health literacy and health status and health service utilization among elderly people in nursing institutions. *Chinese Family Medicine* 2014,17(4): 449-452.

[34] Ma Xiaowen, Xie Hong. The current situation and insights of pricing models for senior care services. *Chinese Journal of Gerontology* 2018,38(2): 479-482.

Figure 1. Distribution of older adults purchasing institutional care services in different provinces in mainland China

Figure 2. Purchase of institutional care services by the older adults in different provinces in mainland China

supplementary figure 1. Univariate (chi-square) analysis of the "reluctance-reluctance" attitude of older adults towards purchasing institutionalized elderly care services (****P<0.0001, ***P<0.001, **p<0.01, *p<0.05)

supplementary figure 2. Results of regression analysis of "reluctance – willingness" of older adults to purchase institutional care services

supplementary figure 3. Results of regression analysis of the "reluctance-hesitation" attitude of older adults in purchasing institutionalized elderly care services

supplementary figure 4. Results of regression analysis of "hesitant-willing" attitude of older adults towards purchasing institutionalized elderly care services

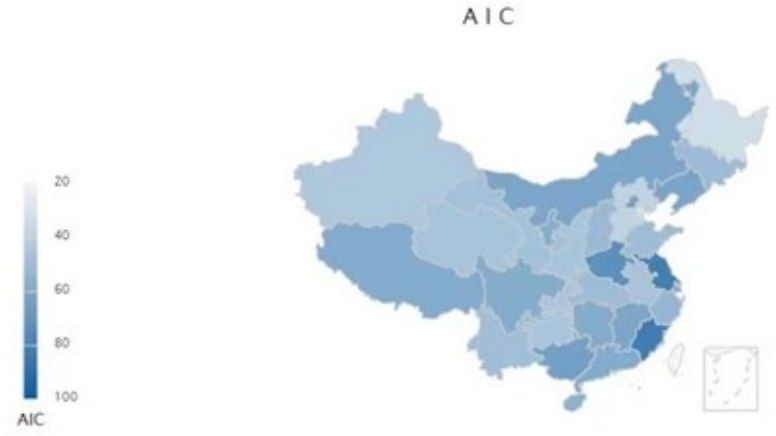


Figure 1. Distribution of older adults purchasing institutional care services in different provinces in mainland China

135x67mm (96 x 96 DPI)

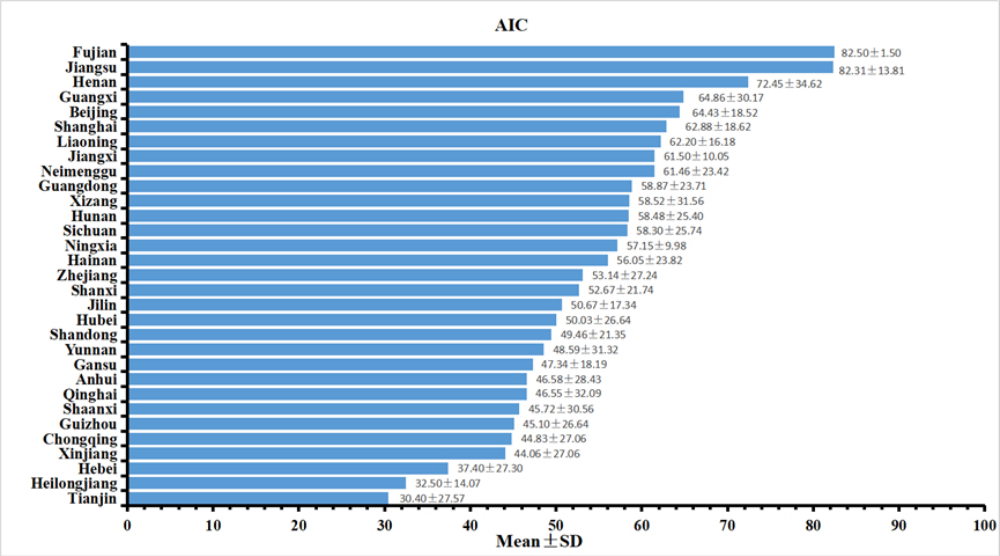
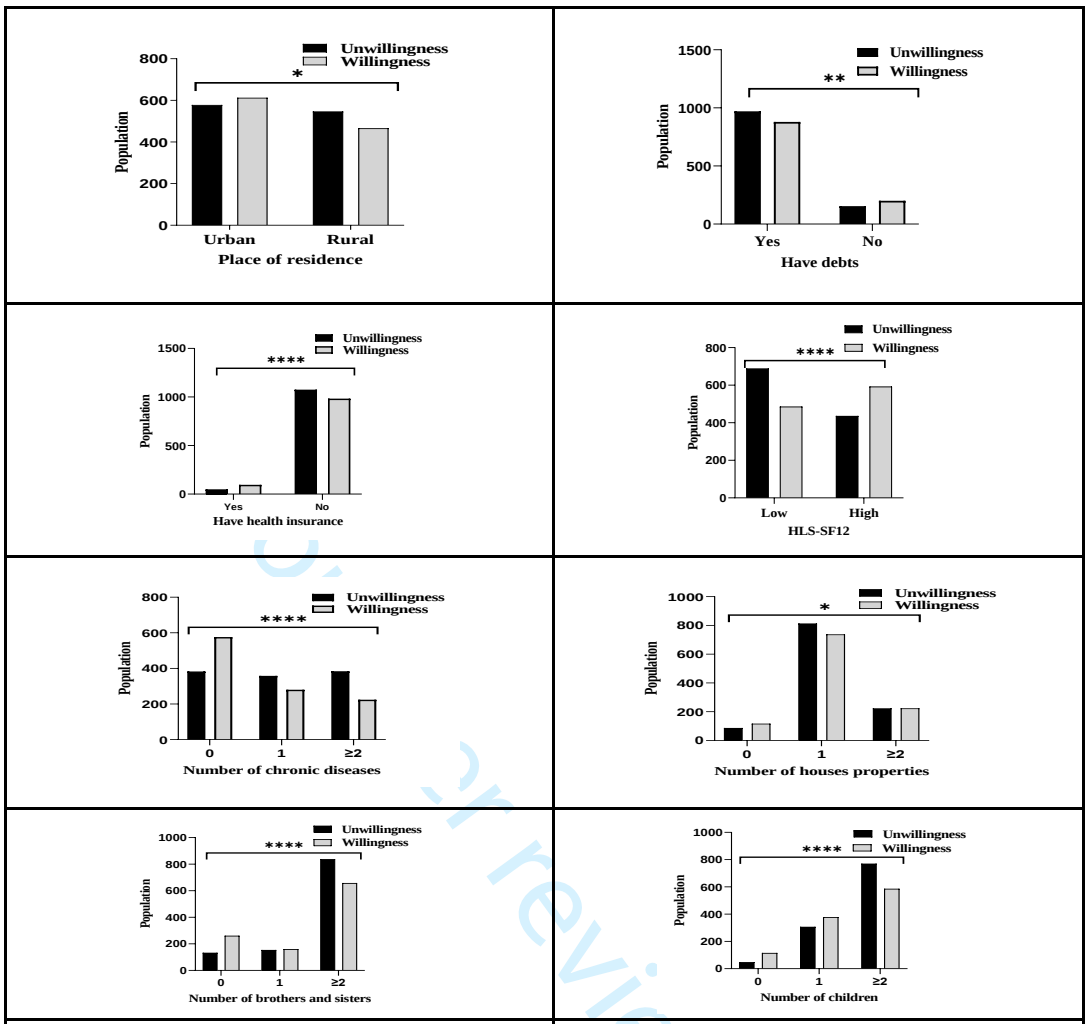


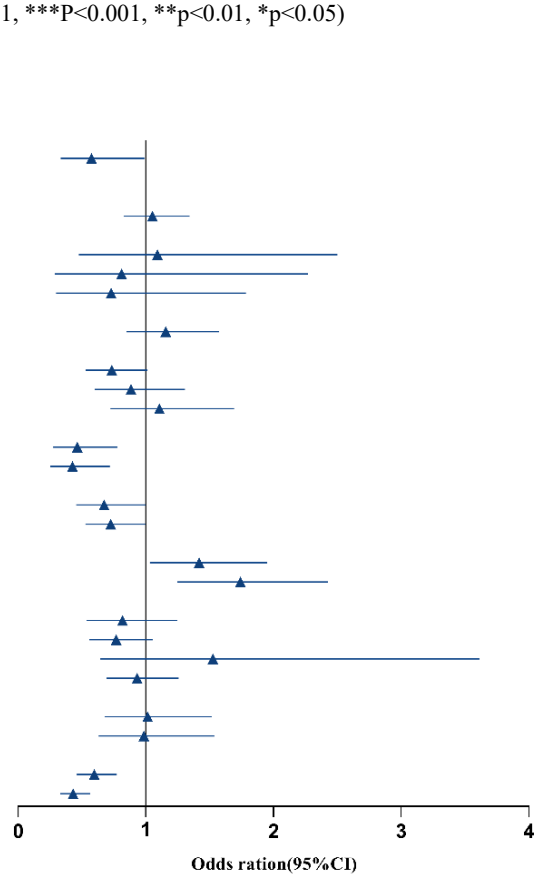
Figure 2. Purchase of institutional care services by the older adults in different provinces in mainland China

372x207mm (59 x 59 DPI)



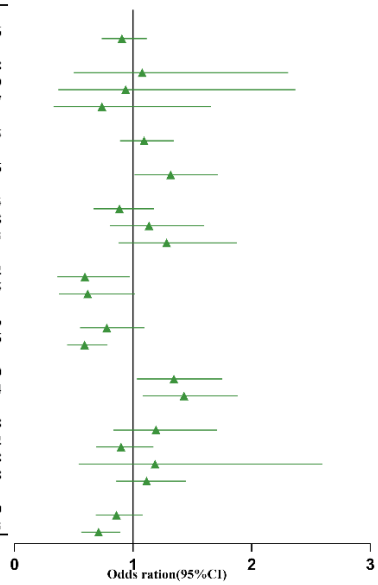
supplementary figure 1. Univariate (chi-square) analysis of the "reluctance-reluctance" attitude of older adults towards purchasing institutionalized elderly care services (****P<0.0001, ***P<0.001, **p<0.01, *p<0.05)

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.555	0.045	0.574	0.333	0.988
Residence					
Rural	0.051	0.682	1.052	0.825	1.342
Marital status					
Married	0.086	0.838	1.090	0.475	2.500
Divorced	-0.211	0.688	0.810	0.289	2.272
Widowed	-0.318	0.487	0.728	0.297	1.783
Have debts					
Yes	0.144	0.357	1.155	0.850	1.571
Highest education level					
Primary	-0.310	0.061	0.733	0.530	1.014
Intermediate	-0.123	0.537	0.884	0.599	1.306
Advanced	0.101	0.642	1.106	0.723	1.692
Number of children					
1	-0.771	0.004	0.462	0.275	0.778
≥2	-0.854	0.001	0.426	0.252	0.718
Number of brothers and sisters					
1	-0.395	0.050	0.674	0.454	1.000
≥2	-0.323	0.048	0.724	0.526	0.997
Monthly household income					
2000-4000	0.349	0.032	1.417	1.031	1.949
>4000	0.554	0.001	1.740	1.248	2.425
Occupation type					
Business services personnel	-0.202	0.348	0.817	0.535	1.247
Agriculture，forestry，husbandry and fishing	-0.264	0.102	0.768	0.559	1.054
Soldier	0.422	0.338	1.525	0.644	3.613
Other staffs	-0.070	0.645	0.932	0.692	1.256
Number of houses properties					
1	0.013	0.951	1.013	0.677	1.516
>2	-0.016	0.943	0.984	0.630	1.536
Number of chronic diseases					
1	-0.517	<0.001	0.596	0.460	0.773
≥2	-0.845	<0.001	0.430	0.328	0.563

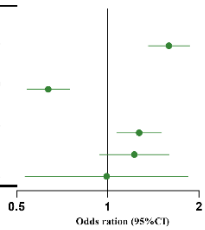


supplementary figure 2. Results of regression analysis of "reluctance – willingness" of older adults to purchase institutional care services

Variate	β	P	OR	95%CI	
Residence					
Rural	-0.098	0.353	0.906	0.736	1.116
Marital status					
Married	0.074	0.849	1.077	0.502	2.308
Divorced	-0.064	0.893	0.938	0.372	2.369
Widowed	-0.304	0.462	0.738	0.329	1.657
Have subsidies					
Yes	0.090	0.393	1.094	0.890	1.345
Have debts					
Yes	0.276	0.041	1.318	1.012	1.716
Highest education level					
Primary	-0.121	0.401	0.886	0.668	1.175
Intermediate	0.128	0.463	1.136	0.808	1.598
Advanced	0.249	0.196	1.283	0.879	1.873
Number of children					
1	-0.522	0.038	0.594	0.363	0.972
≥2	-0.481	0.057	0.618	0.376	1.015
Number of brothers and sisters					
1	-0.249	0.152	0.779	0.554	1.096
≥2	-0.526	0.000	0.591	0.444	0.786
Monthly household income					
2000-4000	0.296	0.027	1.345	1.034	1.750
>4000	0.357	0.011	1.429	1.084	1.884
Occupation type					
Business services personnel	0.177	0.333	1.194	0.834	1.708
Agriculture, forestry, husbandry and fishing	-0.107	0.431	0.899	0.690	1.172
Soldier	0.170	0.670	1.186	0.541	2.598
Other staffs	0.109	0.417	1.115	0.858	1.448
Number of chronic diseases					
1	-0.151	0.195	0.860	0.685	1.080
≥2	-0.343	0.003	0.709	0.563	0.893

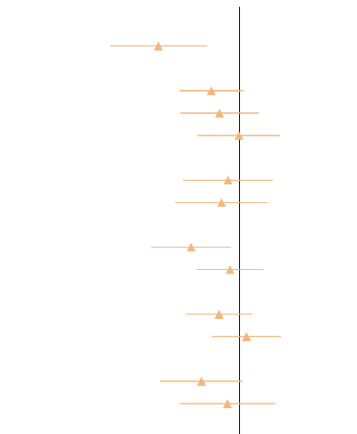


Variate	β	P	OR	95%CI	
IILS-SF12					
High	0.464	<0.001	1.590	1.358	1.862
PSSS					
High	-0.452	<0.001	0.636	0.540	0.749
Anxiety					
Mild anxiety	0.238	0.007	1.269	1.068	1.507
Moderate anxiety	0.201	0.137	1.223	0.938	1.595
Severe anxiety	-0.009	0.976	0.991	0.532	1.844

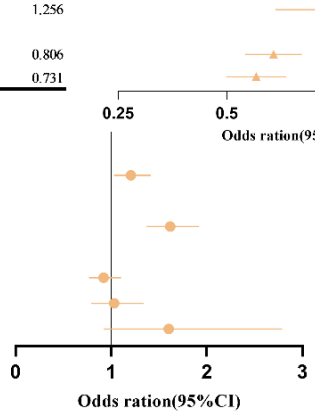


supplementary figure 3. Results of regression analysis of the "reluctance-hesitation" attitude of older adults in purchasing institutionalized elderly care services

Variate	β	P	OR	95%CI	
Have health insurance					
Yes	-0.517	0.001	0.596	0.437	0.813
Highest education level					
Primary	-0.18	0.084	0.835	0.681	1.024
Intermediate	-0.128	0.32	0.88	0.684	1.132
Advanced	-0.004	0.974	0.996	0.765	1.296
Number of children					
1	-0.074	0.616	0.929	0.697	1.239
≥2	-0.115	0.442	0.891	0.664	1.195
Number of brothers and sisters					
1	-0.309	0.017	0.734	0.569	0.947
>2	-0.061	0.577	0.941	0.759	1.166
Monthly household income					
2000-4000	-0.131	0.233	0.878	0.708	1.087
>4000	0.044	0.698	1.045	0.837	1.304
Number of houses properties					
1	-0.243	0.071	0.784	0.602	1.021
≥2	-0.078	0.616	0.925	0.681	1.256
Number of chronic diseases					
1	-0.397	<0.001	0.673	0.561	0.806
>2	-0.505	<0.001	0.603	0.498	0.731



Variate	β	P	OR	95%CI	
HLS-SF12					
High	0.189	0.019	1.208	1.031	1.416
PSSS					
High	0.482	<0.001	1.619	1.368	1.917
Anxiety					
Mild anxiety	-0.081	0.376	0.922	0.770	1.104
Moderate anxiety	0.032	0.811	1.033	0.793	1.346
Severe anxiety	0.473	0.094	1.604	0.923	2.789



supplementary figure 4. Results of regression analysis of "hesitant-willing" attitude of older adults towards purchasing institutionalized elderly care services

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	N/A
Methods			
Study design	4	Present key elements of study design early in the paper	N/A
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Page 5-6
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N/A
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6-8
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	Page 8
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	N/A
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	page 5-6
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	N/A
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	Report numbers of outcome events or summary measures over time	N/A

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Page11-12 N/A N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14-15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 15

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.