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The influencing factors of health status among low-income individuals living alone in Wuxi, China

Shiming Li, Yue Wu, Queping Yang, Ying Jiang✉ & Haohao Zhu✉

This study aimed to understand the health status of low-income individuals living alone and to identify influencing factors. Using systematic random sampling methods, low-income individuals living alone were randomly selected. Via telephone interviews, we gathered information about their general health status. A logistic regression model was used to analyze relevant factors about the physical health of this population. The study included 1583 low-income individuals living alone. The prevalence rate of all kinds of diseases in low-income living alone in this survey was 88.63%. The multifactorial logistic regression analysis revealed that the risk factors for illness in this population were age ≥ 60 (OR 1.842, 95% CI 1.135–2.926, *P* = 0.006), self-rated poor mental health (OR 2.538, 95% CI 1.128–3.828, *P* = 0.005), and self-rated poor hearing status (OR 2.781, 95% CI 1.586–3.647, *P* = 0.001). Being female (OR 0.469, 95% CI 0.178–0.821, *P* = 0.033) was identified as a protective factor. Low-income individuals living alone are a unique group who lack familial care and economic and social support, and are thus in a disadvantaged social position. Therefore, this population requires increased attention, especially regarding their physical health. Implementing targeted assistance policies to improve their health status and enhance their quality of life is essential.

Keywords Low-income population, Living alone, Health status, Influencing factors, China

Low-income populations globally are vulnerable due to their lack of economic support, often resulting in physical illnesses, mental health issues, and social discrimination. Despite China's ongoing poverty alleviation efforts, which have gradually reduced poverty and improved living standards, the health challenges faced by low-income and living alone individuals cannot be ignored[1]. The individuals lack familial care and social attention, and lives in an unfavorable social environment. Poor nutrition over a long period can exacerbate health issues[2]. Mental stress and communicable diseases also affect the individuals, impacting their health status[3]. Based on relevant reports, the proportion of single-person households in China has been increasing annually, rising from 6% in 1990 to 16.69% in 2018. In 2018, there were approximately 77 million adults living alone in China[4]. Studies have confirmed that living alone may be causally linked to a range of diseases, including cardiovascular diseases, diabetes, and dementia[5–7], and can also increase the risk of death[8]. Currently, both domestic and international research on the psychological and physical health of individuals living alone has focused primarily on the elderly. There is relatively little research on the health status and related factors of low-income adults living alone. The impact of living alone on the health of this low-income population deserves further study to identify relevant factors. This study was conducted to gain a comprehensive understanding of the physical health status of low-income individuals living alone in China and identify its associated factors. The findings can provide a scientific basis for the Chinese government's implementation of aid policies and health promotion activities for the individuals.

Subjects and methods

Subjects

Low-income individuals refer to those who are recipients of subsistence allowances, extremely impoverished individuals, borderline families for subsistence allowances, and families in financial distress due to heavy expenditure, all of whom are registered within the Wuxi civil affairs system (https://mzj.wuxi.gov.cn/?eqid=a83cf9030005d84f000000046476b501). Living alone is defined as living alone due to reasons such as divorce, widowhood,

Wuxi Central Rehabilitation Hospital, The Affiliated Mental Health Center of Jiangnan University, Wuxi 214151, Jiangsu, China. ✉email: jiangying1010@jiangnan.edu.cn; zhuhh@jiangnan.edu.cn

being unmarried, and not living with children[4,9]. From September to October 2022, systematic random sampling was used for this study. Based on the total number of registered low-income individuals living alone, which was 8100, each individual was assigned a number according to their registration order. Using a random number table, the selection number from 1 to 5 was determined, and then, following the principle of equal intervals of 5, a total of 1590 individuals were randomly selected for this study. Data on personal basic information and health conditions were collected through survey questionnaires. Inclusion criteria for the study subjects were: (1) Age ≥ 18 years old; (2) Living alone in the past 6 months; (3) Agreement to participate in the study. After excluding questionnaires with significant missing basic information, a total of 1583 valid questionnaires were collected, resulting in an effective rate of 99.56%.

Methods and relevant definitions

A cross-sectional study method was used. A self-made basic information survey form was used to collect information on the study subjects, including gender, age, educational level, marital status, smoking, drinking, physical and mental health status, Frailty (due to advanced age, not illness-induced frailty), Self-rated hearing status (due to age-related hearing decline, not illness-induced), height, weight, blood pressure, and other living conditions. BMI is calculated as weight (KG)/height $(m)^2$. Pulse pressure difference is the average of systolic blood pressure minus diastolic blood pressure under resting state measured three times[10]. Health conditions refer to chronic diseases (such as hypertension, diabetes, tumors, etc.), infectious diseases (AIDS, tuberculosis, hepatitis B, etc.), and other mental disorders (anxiety, depression, substance dependence, etc.) that have been definitively diagnosed by medical institutions. All of the above-mentioned diseases were clearly diagnosed by secondary or higher medical institutions.

Statistical analysis

SPSS 19.0 statistical software was used for data analysis. Count data were expressed as rates or proportions. Intergroup comparison was conducted using the χ^2 test. Variables with differences between groups were included in the multi-factor logistic regression analysis. Through regression analysis, the relevant influencing factors of disease conditions in low-income individuals living alone were compared. Variable assignment was shown in Table 1. *P* value < 0.05 was considered statistically significant in the χ^2 test and logistic regression analysis.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Wuxi Mental Health Centre, with the grant number of WXMHCIRB2010LLky053, and the written informed consent was obtained from all subjects. All methods were carried out in accordance with relevant guidelines and regulations.

Results

Basic information

A total of 1583 low-income individuals living alone were included in this study, among whom 1076 were males (67.97%), with an age range of 18–98 years and an average of (42.23 ± 12.25). The majority had a middle school education (52.75%). The highest proportion in marital status was divorce (43.59%). There were 1403 individuals with health conditions, and the rate of different types of chronic diseases was 88.63%. See Table 2.

Single factor comparative analysis results

The rate of health conditions in low-income males living alone was higher than in females, and the rate in the ≥ 60 years age group was higher than in the < 60 years age group. The rate in the non-drinking group was higher than in the drinking group, and the rate in those with poor mental health was higher than in those with good mental health. The rate in those with poor hearing was higher than in those with normal hearing. The differences within each group were statistically significant (P < 0.05). See Table 2.

Variables	Assignment
Health status	0 = No disease, 1 = Having diseases
Gender	0 = Male, 1 = Female
Age	0 ≤ 60, 1 ≥ 60
Education level	0 = Elementary or below, 1 = Middle school, 2 = High school or above
Marital status	0 = Unmarried, 1 = Married, 2 = Divorced, 3 = Other
Smoking	0 = Yes, 1 = No
Frailty	0 = Yes, 1 = No
Self-rated mental health status	0 = Good, 1 = Poor
Drinking	0 = Yes, 1 = No
Self-rated hearing status	0 = Normal, 1 = Poor
BMI	0 ≤ 18.5, 1 = 18.5–23.9, 2 = 24–27.9, 3 ≥ 28
Pulse pressure difference	0 ≤ 60, 1 ≥ 60

Table 1. Assignment of variables.

Factors	Total number	Patients (%)	Non patients (%)	χ^2	*P*
Gender				13.125	0.001
Male	1076 (67.97%)	975 (90.61%)	101 (9.39%)		
Female	507 (32.03%)	428 (84.42%)	79 (15.58%)		
Age				10.231	0.001
< 60	1011 (63.83%)	874 (86.45%)	137 (13.55%)		
≥ 60	573 (36.17%)	529 (92.32%)	44 (7.68%)		
Education level				2.741	0.254
Elementary or below	361 (23.32%)	315 (87.26%)	46 (12.74%)		
Middle school	835 (53.94%)	735 (88.02%)	100 (11.98%)		
High school or above	352 (22.74%)	320 (90.91%)	32 (9.09%)		
Marital status				0.250	0.969
Unmarried	746 (48.41%)	662 (88.74%)	84 (11.26%)		
Married	94 (6.10%)	82 (87.23%)	12 (12.77%)		
Divorced	690 (44.78%)	612 (88.70%)	78 (11.29%)		
Other	11 (0.71%)	10 (90.91%)	1 (9.09%)		
Drinking				4.357	0.036
Yes	337 (21.48%)	288 (85.46%)	49 (14.54%)		
No	1232 (78.52%)	1103 (89.53%)	129 (10.47%)		
Smoking				0.369	0.544
Yes	731 (46.47%)	644 (88.10%)	87 (11.89%)		
No	842 (53.53%)	750 (89.07%)	92 (10.93%)		
BMI				0.851	0.837
< 18.5	54 (6.56%)	48 (88.89%)	6 (11.11%)		
18.5–23.9	454 (55.16%)	401 (88.33%)	53 (11.67%)		
24–27.9	222 (26.97%)	199 (89.64%)	23 (10.36%)		
≥ 28	93 (11.30%)	85 (91.40%)	8 (8.59%)		
Self-rated mental health status				4.84	0.028
Good	1088 (68.69%)	915 (84.10%)	173 (15.90%)		
Poor	496 (31.31%)	438 (88.31%)	58 (11.69%)		
Frailty				0.151	0.698
Yes	1386 (87.50%)	1226 (88.46%)	160 (11.54%)		
No	198 (12.50%)	177 (89.39%)	21 (10.61%)		
Pulse pressure difference				0.046	0.830
< 60	1518 (95.83%)	1344 (88.54%)	174 (11.46%)		
≥ 60	66 (4.17%)	59 (89.40%)	7 (10.59%)		
Self-rated hearing status				11.980	0.001
Normal	1201 (75.82%)	1045 (87.01%)	156 (12.99%)		
Poor	383 (24.18%)	358 (93.47%)	25 (6.53%)		

Table 2. Univariate analysis of health conditions in low-income individuals living alone.

Multivariate logistic regression analysis and statistical analysis results

The variables with statistical significance in the univariate analysis were included in the multivariate logistic regression model. The results suggest that the risk of health conditions in low-income individuals living alone aged ≥ 60 years was higher that of the < 60 years group. The risk of health conditions in low-income individuals living alone with a poorer self-rated mental health was higher that with good mental health group. The risk of health conditions in low-income individuals living alone with poorer hearing was higher that with normal hearing. The risk of health conditions in male low-income individuals living alone was higher than females. See Table 3.

Discussion

Through this study, it was found that in the Wuxi, 88.63% of low-income individuals living alone suffer from various types of diseases. Currently, there are few domestic studies on the health conditions of people living alone. Some scholars have conducted surveys on the health conditions of the poor population and found that the prevalence of chronic diseases in the poor population is 28.57%[11] and 35.50%[12]. Our study focuses on low-income individuals living alone, whose disease prevalence is at a relatively high level. Living alone, without family support and financial backing, makes one more susceptible to chronic diseases[13,14]. Common chronic diseases such as hypertension, diabetes, and tumors bring a heavy economic burden to individuals and society[15,16]. They not

Factors	β	Wald χ^2	P	OR	95% CI	
					Lower	Upper
Gender						
Male				1.000		
Female	− 0.213	3.892	0.033	0.469	0.178	0.821
Age						
< 60				1.000		
≥ 60	0.875	6.328	0.006	1.842	1.135	2.926
Self-rated mental health status						
Good				1.000		
Poor	0.758	8.259	0.005	2.538	1.128	3.828
Drinking						
No				1.000		
Yes	0.183	1.292	0.125	0.526	0.216	0.896
Self-rated hearing status						
Normal				1.000		
Poor	0.852	8.128	0.001	2.781	1.586	3.647

Table 3. Multivariate logistic regression analysis of influencing factors of health conditions in low-income individuals living alone.

only cause huge economic losses, but also lead to long-term poverty due to loss of labor capacity. Therefore, the health conditions of low-income individuals living alone have gradually received attention from governments at all levels in our country. This study aims to describe the health level of this population and find factors affecting their health. By finding effective interventions, we can improve the health level and quality of life of this population. This study found that the level of illness among low-income women living alone is lower than that of men. Men living alone often do not maintain a healthy diet, reducing their intake of fruits and vegetables, and their eating patterns are irregular, often accompanied by smoking or heavy drinking[17,18]. Men living alone also have fewer social networks compared to women, which can lead to feelings of loneliness and depression[19]. Combined with economic poverty, these factors make men more prone to health problems. A meta-analysis found that the overall mortality risk for adult men living alone is higher than for women[20].

We also found that as age increases, the risk of various chronic diseases in the elderly also gradually increases[21]. This may be due to the decline in physical skills with age, exacerbated by economic poverty, nutrition level, and social environment, which accelerates the progression of diseases. Therefore, the elderly are more prone to various chronic or infectious diseases[22]. The subjects of this study evaluated their own mental health, and it was found that those with poor evaluation results had a higher probability of chronic diseases[23]. This could be due to poor mental health leading to depression and anxiety[24], or physical illness causing patients to have negative emotions[25,26]. The mental health of special groups should be given the same attention as physical health. Among the subjects included in the study, we also surveyed their hearing conditions and found that those with poorer hearing are more prone to diseases. Hearing impairment may be caused by lesions in the brain, nerves, or mental system, and some studies have found that chronic diseases can affect the circulation in the inner ear and lipid metabolism, leading to hearing loss[27].

The strength of this study is the large sample cross-sectional survey. Through large sample data, we investigated the health level and its influencing factors of low-income individuals living alone. The limitations of this study, in addition to the inherent limitations of cross-sectional studies, are that we did not conduct an in-depth survey and understanding of the living conditions of individuals living alone, which has some impact on the results of this article. At the same time, we used self-evaluation for mental health status, without using standardized uniform measurement tables, which introduces some bias. In future research, targeted studies should be conducted on this special population to understand their true health conditions.

Conclusion

In summary, the health level of low-income individuals living alone in this region is relatively low, with the majority suffering from chronic or infectious diseases, often in comorbid states. Therefore, with the development of our country's economy and continuous progress in social governance, there should be an increased focus on this population. Their living standards should be improved to avoid poverty due to illness. Therefore, appropriate health education should be conducted in this region and effective health service policies should be developed[28]. This will enhance the quality of life for low-income individuals living alone, and reduce the prevalence of diseases.

Data availability

The dataset generated during and analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

Shiming Li and Haohao Zhu conceived the study; Yue Wu, Queping Yang and Ying Jiang collected the report; Shiming Li and Haohao Zhu wrote the manuscript and edited the manuscript. All authors have approved publishment of the manuscript. The informed consent was obtained from all subjects.

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Competing interests

The authors declare no competing interests.

Additional information

Correspondence and requests for materials should be addressed to Y.J. or H.Z.