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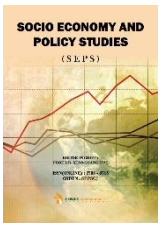

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REVIEW ARTICLE

MEASUREMENT OF MULTI-DIMENSIONAL POVERTY OF THE ELDERLY IN CHINA

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ABSTRACT

Based on CLHLS data, this paper uses the A-F method to measure multidimensional poverty among the elderly in China. In analyzing the dimensions of elderly poverty, the study emphasizes the inter-generational effects of education and economic support on poverty alleviation among the elderly. Empirical studies show that the poverty incidence rate of most indicators is decreasing, but the incidence rate of elderly psychological health poverty shows a slight rise. Inter-generational support alleviates poverty for the elderly who are in relatively higher levels of multidimensional poverty, but exacerbates the incidence of poverty in vulnerable elderly populations. Therefore, as China continues to age, attention should be given to the psychological well-being of the relatively impoverished elderly, establishing reasonable income supplement mechanisms for them, and implementing targeted social security policies.

KEYWORDS

Relative poverty; Multidimensional poverty among the elderly; Measurement; CLHLS data.

1. INTRODUCTION

By the end of 2021, China's population aged 65 and above had reached 255 million, accounting for 18.1% of the total population. According to United Nations predictions, by 2050, the population aged 65 and above in China will reach 477 million, accounting for 34.9% of the total population. This indicates that China has entered an aging society, and the pace of aging is rapid. Accelerated aging has gradually brought the problem of poverty among the elderly to light, and they have become a rapidly growing group among the new poor. As older people exit the labor market, their ability to earn income is partially or completely lost, increasing the risk of falling into poverty. Data from the 2013 "China Health and Retirement Longitudinal Study" by the National School of Development at Peking University show that among people aged 60 and above, 22.9% (42.4 million) have consumption levels below the poverty line. Considering multi-dimensional poverty issues such as health and mental poverty among the elderly, their welfare situation may be even worse (Zhang et al., 2019).

Following the complete eradication of absolute poverty after 2020, future poverty reduction will need to focus more on the poverty situation of special groups such as women, children, and the elderly (Nath and Modak, 2022). Therefore, how to evaluate the poverty situation of special groups and accurately identify poverty among the elderly will become a focus of poverty reduction efforts. Accordingly, this study will answer the following two questions: First, what is the multi-dimensional poverty situation of the elderly? In which dimensions is it more prominent? Second, what is the impact of inter-generational factors on multi-dimensional poverty? Differing from previous studies, this research constructs a multi-dimensional poverty index based on feasible capabilities and subjective well-being, shifting the research perspective from the "family level" to the "individual level," and attempts to measure and evaluate the multi-dimensional poverty of the elderly at the individual level.

2. METHODS, INDICATORS, AND DATA

2.1 Methods

This study uses the A-F method to assign values to each dimension and indicator. This method determines whether each sample is impoverished based on the weighted sum of the deprivations experienced by individuals. It is characterized by its strong intuitiveness and is particularly suitable for policy analysis. Weighted Poverty Threshold (C_i): The computation of the weighted poverty threshold typically involves multiplying the proportion of the impoverished population in each dimension by the degree to which that dimension contributes to the overall poverty index, yielding the weighted poverty threshold for that dimension.

This value represents the proportion of the population that is impoverished in that dimension. Hence, x_{ij} denotes the deprivation score of the i-th individual on the j-th indicator. When x_{ij} is in a state of deprivation, it is assigned a value of 1; otherwise, it is assigned 0. $\omega_j (j = 1,2,\dots,d)$ represents the weight of each indicator. The formula for calculating the threshold is: $C_i = \sum_{i=1}^{d} \omega_j x_{ij}$. The poverty rate (H) refers to the proportion of the impoverished population q to the total population n, i.e., $H = \frac{q}{n}$.

Average Deprivation Intensity (A): This refers to the average proportion of poverty experienced by the impoverished population. It is obtained by dividing the total deprivation scores by the number of impoverished individuals, i.e., $A = \frac{1}{q}\sum_{i=1}^{q} C_i$.

Multi-dimensional Poverty Index (M): It is the product of the poverty incidence rate (H) and the average deprivation intensity (A), i.e., $M = \frac{1}{n}\sum_{i=1}^{q} C_i = H * A$. This represents the share of poverty experienced by the impoverished population when they are deprived in various aspects of poverty.

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2.2 Selection of Dimensions and Indicators

During the multidimensional poverty measurement process, special emphasis is placed on the inter-generational factors influencing the multidimensional poverty of the elderly. Therefore, this study establishes five dimensions: education, social security, income, material life, and mental health. The selection rationale and specific indicators for each dimension are as follows:

2.2.1 Education

Education is one of the crucial factors affecting the multidimensional poverty of the elderly. It directly reflects the human capital of the family, the family's social network, employment structure, and is an important dimension to measure capability poverty. Moreover, the education of the previous generation and the next generation are also critical factors influencing the changes in elderly poverty (Xiao, 2012). Given the varying societal contexts across time and the enhancement in educational levels with economic development, the education threshold for the parents of the respondents (elderly) is set at both having never received education. The threshold for the respondent's own educational duration is 6 years, and the threshold for their children's education is set at 9 years.

2.2.2 Social Security

Social security can provide basic life support for the elderly, including pensions and medical insurance. These measures can fulfill certain fundamental life necessities and alleviate the medical expense burdens for the ill elderly (Shinohara, 2022).

2.2.3 Income

This study sets relative poverty standards for urban and rural areas at 50% and 60% of the median per capita family income, respectively (Zhong and Lin, 2020). This determines whether a family is in a state of poverty. For the elderly with a singular income structure or unstable income sources, financial support from their children is a significant source of income.

2.2.4 Material Life

Material life objectively reflects the quality of life of the elderly and is a vital indicator of the extent of elderly poverty. It encompasses multiple areas such as living conditions, diet quality, and sanitation facilities. However, objective conditions alone cannot accurately grasp the living quality of the elderly in areas with different economic development levels. Therefore, subjective evaluations where the elderly compare their poverty conditions to their peers are considered.

2.2.5 Mental Health

Mental health is a significant component of elderly poverty. Many elderly individuals, due to long-term illnesses, chronic pain, dementia, and disabilities, are prone to psychological issues such as loneliness, depression, and anxiety. These issues can hinder their active participation in societal activities and access to economic resources, leading them into poverty. In recent years, the psychological problems of the elderly, notably loneliness and depression, have become increasingly evident, yet they haven't garnered adequate attention from society (Knezevic, 2014).

This study employs an equal-weight method to measure multidimensional poverty among the elderly. The equal-weight method for multidimensional poverty sets the sum of dimensions to 1, and calculates based on the deprivation status of the elderly, producing the weighted poverty threshold (C_i). It is then compared to the multidimensional poverty deprivation value to reflect the degree of multidimensional poverty of the elderly. Generally, samples with a weighted poverty threshold less than 1/3 are classified as vulnerable households, those equal to or greater than 1/3 are defined as multi-dimensional impoverished households. Those between 1/3 and 2/3 are generally multidimensional impoverished, and those equal to or greater than 2/3 are extremely multidimensional impoverished (Zeng and Yang, 2019). The selection of each dimension and the setting of indicator weights are shown in Table 1.

Table 1: Dimensions, Indicators, and Deprivation Threshold Values for Elderly Multidimensional Poverty in China

Dimensions	Indicators	Deprivation Threshold and Assignment	Weight
Education (1/5)	Respondent's education years	Below 6 years assigned as 1, otherwise 0	1/15
	Children's education years	Below 9 years assigned as 1, otherwise 0	1/15
	Parents' education years	Both parents never attended school assigned as 1, otherwise 0	1/15
Social Security (1/5)	Basic medical insurance	Rural residents without New Rural Cooperative Medical Scheme assigned as 1, otherwise 0; Urban residents without Urban Resident Basic Medical Insurance assigned as 1, otherwise 0	1/10
	Social pension insurance	No social pension insurance assigned as 1, otherwise 0	1/10
Income (1/5)	Per capita family income	Rural areas below 2400 yuan (2011)/3000 yuan (2014)/3600 yuan (2018) assigned as 1, otherwise 0; Urban areas below 3750 yuan (2011)/5000 yuan (2014)/7500 yuan (2018) assigned as 1, otherwise 0	1/10
	Financial support from children	None assigned as 1, otherwise 0	1/10
Material Life (1/5)	Cooking fuel	Using firewood assigned as 1, otherwise 0	1/25
	Housing material	Water pipe burst or roof leak in the past year assigned as 1, otherwise 0	1/25
	Meat consumption frequency	Eating fish or meat less than once a month assigned as 1, otherwise 0	1/25
	Drinking water source	Non-tap water assigned as 1, otherwise 0	1/25
	Relative living standard	Respondent's life is worse or the same as local peers assigned as 1, otherwise 0	1/25
Mental Health (1/5)	Feeling anxious	Frequency being often/always assigned as 1, otherwise 0	1/10
	Feeling lonely	Frequency being often/always assigned as 1, otherwise 0	1/10

2.3 Data Source

The data selected for this article comes from the Chinese Longitudinal Healthy Longevity Survey (CLHLS). The survey covers 23 provinces, cities, and autonomous regions across the country. The subjects of the survey include the elderly aged 65 and above and adult children aged 35-64. Through periodic follow-up surveys, researchers can dynamically track and analyze the health status, lifestyle, and socioeconomic conditions of the elderly, and discover the influencing factors and trends of elderly poverty. However, due to the inability of some indicators in the initial data to accurately reflect the current state of poverty, data from the years 2011, 2014, and 2018 were chosen for the analysis. Based on research needs, this article uses SPSS26.0 to organize data from 2011-2018, selecting family samples that meet the research requirements. There were 4043 households in 2011, 2968 in 2014, and 6089 in 2018, covering a total of 23 provinces.

3. Measurement of Elderly Multidimensional Poverty

3.1 Poverty Incidence of the Elderly in China

With the implementation of China's poverty alleviation policies, the living standards of the elderly have gradually improved, and the poverty incidence has shown a downward trend. This indicates that China has achieved significant results in the field of poverty alleviation, and the quality of life of the elderly has been significantly improved. Detailed results are shown in Table 2.

Table 2: Poverty Incidence of the Elderly in China in 2011, 2014, and 2018 (Unit: %)				
Dimensions	**Indicators**	**2011**	**2014**	**2018**
Education	Respondent's education years	83.70	82.40	66.90
	Children's education years	75.56	77.56	74.40
	Parents' education years	81.81	80.00	77.43
Social Security	Basic medical insurance	47.52	44.02	40.19
	Social pension insurance	81.24	69.16	65.85
Income	Per capita family income	27.64	23.76	33.44
	Financial support from children	23.06	20.65	21.85
Material Life	Cooking fuel	41.56	33.46	22.52
	Housing material	24.83	17.74	15.73
	Meat consumption frequency	19.30	14.53	17.06
	Drinking water source	36.91	24.63	23.53
	Relative living standard	12.88	10.76	9.32
Mental Health	Feeling anxious	3.73	3.33	3.54
	Feeling lonely	5.25	5.67	5.27

Education and social security are the two main dimensions that affect elderly poverty. From 2011 to 2018, the poverty incidence of the three indicators within the education dimension showed a general downward trend. However, the poverty incidence rate remains high, all exceeding 66%. The historically low national education coverage has affected the educational levels of the elderly and their parents, thus taking up a significant proportion of the elderly poverty incidence (Paul, 2019). The indicator of children's years of education also has a high poverty incidence rate within the education dimension. Moreover, the poverty incidence rate of the social pension insurance indicator has been decreasing year by year, but still accounted for 65.85% in 2018. The poverty incidence rate of having New Rural Cooperative Medical Scheme/Urban Residents Basic Medical Insurance is also 40.19%, indicating that there is still a significant room for development in the poverty alleviation work for the elderly with the recent medical reforms.

From 2011 to 2014, the trend of declining household per capita income indicators based on the relative poverty line was evident, indicating that the income poverty gap of elderly impoverished families was gradually narrowing. However, from 2014 to 2018, the poverty incidence rate of the household per capita income indicator showed an upward trend, suggesting that a large number of relatively low-income elderly groups in China have incomes that are below the social average, still possessing strong economic vulnerability. Additionally, the financial support from children indicator shows a general downward trend. With the acquisition of social security and the gradual improvement of the national pension system, elderly people with retirement and pension income sources will rely less on their children's financial subsidies (Miller et al., 2021; Marion and Petra, 2022). In the material life dimension, the five indicators basically show a downward trend, indicating that the living conditions of the elderly, such as hygiene and diet, are gradually improving. The steady improvement of living conditions can help impoverished elderly reduce the probability of illness and provide important protection for elderly disease prevention. In terms of mental health, the poverty rate of elderly people's sense of loneliness has slightly risen without signs of decreasing. Individual characteristics, family, and social participation may all become factors affecting the mental health of the elderly. Combined with the fast pace of life which means many children have no time to care for the psychological changes of the elderly, they are very prone to psychological problems (Knezevic, 2014).

3.2 Results of China's Multidimensional Elderly Poverty Measurement Considering Inter-generational Factors

In terms of the multidimensional poverty index, considering that inter-generational education and economy will affect the living conditions of the elderly, indicators with inter-generational connections such as children's years of education, parents' years of education, and financial support from children were excluded as a control group (M, H, A). Compared with the indicators of children's years of education, parents' years of education, and financial support from children when considering inter-generational factors (M', H', A'), the elderly multidimensional poverty was measured. The detailed measurement results are shown in Table 3. From the measurement results of Table 3, it can be found that inter-generational support promotes the poverty incidence of vulnerable elderly poverty groups and alleviates the multidimensional poverty of elderly with high poverty levels.

Table 3: Comparison of China's Multidimensional Elderly Poverty Index when Excluding and Considering Inter-generational Factors							
Total deprivation score		**0.2**	**1/3**	**0.4**	**0.5**	**0.6**	**2/3**
2011	M	0.40	0.36	0.28	0.17	0.11	0.05
	M'	0.40	0.34	0.27	0.14	0.05	0.02
	H	0.94	0.73	0.54	0.28	0.16	0.07
	H'	0.96	0.73	0.53	0.24	0.08	0.03
	A	0.43	0.49	0.51	0.62	0.67	0.73
	A'	0.42	0.46	0.50	0.58	0.67	0.73
2014	M	0.33	0.29	0.17	0.13	0.07	0.03
	M'	0.35	0.28	0.21	0.09	0.03	0.01
	H	0.89	0.62	0.34	0.21	0.11	0.04
	H'	0.93	0.63	0.43	0.16	0.04	0.01
	A	0.37	0.47	0.49	0.60	0.66	0.71
	A'	0.38	0.44	0.49	0.57	0.65	0.72
2018	M	0.34	0.26	0.22	0.13	0.07	0.03
	M'	0.33	0.26	0.19	0.10	0.03	0.01
	H	0.84	0.54	0.42	0.22	0.11	0.04
	H'	0.88	0.57	0.39	0.17	0.05	0.01
	A	0.40	0.48	0.52	0.60	0.66	0.73
	A'	0.38	0.45	0.49	0.57	0.66	0.73

4. Conclusion and Recommendations

This paper measures the degree of deprivation in the multidimensional poverty of the elderly in China from the perspective of relative poverty. Empirical results show that the incidence rate of elderly poverty in most indicators is declining. However, the incidence of psychological poverty among the elderly is slightly rising. Inter-generational support has a mitigating effect on elderly groups with a relatively high degree of multidimensional poverty and promotes the incidence of poverty among vulnerable elderly groups. Based on the above conclusions, this paper puts forward the following recommendations.

Firstly, strengthen elderly vocational education to gradually narrow the educational gap in relatively impoverished areas. First, expand the supply of elderly educational resources. Encourage and support the primary workforce in relatively impoverished elderly families to receive vocational skills training, enhancing the production or entrepreneurial abilities of the labor force in impoverished elderly families, thereby achieving the effect

of intellectual poverty alleviation. Secondly, strengthen elderly educational support services. Use channels like the internet and digital television to enhance the reach of high-quality elderly learning resources to rural, remote, poor, and ethnic areas.

Secondly, establish and improve the social security system, setting up a reasonable income supplementation mechanism for relatively impoverished elderly, and strengthen the economic support for families that bear the responsibility of elderly care. Encourage all sectors of society to participate in the care and support of the elderly, offering help through forms like volunteer services and mutual aid organizations. Encourage employment among the elderly, providing more job opportunities and positions for them. Establish an income supplementation mechanism to provide income support for impoverished elderly, aiding them in escaping poverty.

Thirdly, pay attention to the mental health of the relatively impoverished elderly and provide appropriate psychological interventions. Firstly, children and younger generations should value emotional support, allowing the elderly to feel the joy of family togetherness. Secondly, advocate for a diversified understanding of elderly value, harness the proactive nature of the elderly, and guide the relatively impoverished elderly to actively participate in building their psychological understanding of aging, fundamentally addressing their psychological issues. Lastly, professional psychological counseling is essential. Relevant psychological professionals can face various life or mental problems together with the elderly, providing appropriate psychological intervention and therapies.

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