



An Analysis of Aging and Healthcare Resource Allocation in Urban and Rural China: Insights from Population Consumption Levels

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Abstract. China's healthcare system continues to advance, ensuring better public health and improving physical well-being. However, with these improvements, the country faces the growing challenge of an aging population. This demographic shift has significant and lasting implications for economic and social development. In light of this, it becomes critical to examine how population aging affects the allocation of healthcare resources and to ensure that elderly individuals have access to adequate medical services. Ensuring health security for the aging population is a vital aspect of promoting social equity and enhancing the quality of life. This paper aims to analyze the specific impact of population aging on healthcare allocation in China, exploring how this demographic trend influences the distribution and utilization of medical resources. Understanding this relationship not only contributes to improving the well-being of the elderly but also helps reduce their dependence on families and society, easing the caregiving burden. Ultimately, addressing these challenges will support the harmonious development of society as a whole.

Keywords: Population aging, Healthcare resources, Urban-rural differences, Double difference models

1 Introduction

China's rapidly aging population presents significant challenges, particularly in the healthcare sector [1]. The growing number of elderly citizens not only increases the demand for healthcare services but also strains the existing healthcare system. Research underscores the need to systematically optimize healthcare resource allocation, enhance the health insurance system, innovate geriatric healthcare services, and implement effective public health strategies [2]. These approaches are vital not only for improving the quality of healthcare and life for the elderly but also for advancing social equity, shaping effective policies, and fostering sustainable economic and social development.

This paper aims to explore the disparities in healthcare consumption between urban and rural residents and their implications for the distribution of healthcare resources. By analyzing national data on consumption patterns and expenditures, this study seeks

to uncover how these differences influence the allocation of healthcare services. Through a comparative analysis of urban and rural healthcare usage, the paper offers insights into resource allocation disparities and provides evidence-based recommendations for formulating targeted policies to address the challenges posed by an aging population.

2 Analysis of the Current Situation

2.1 Analysis of the Share of Total Consumer Spending on Health Care of the Population

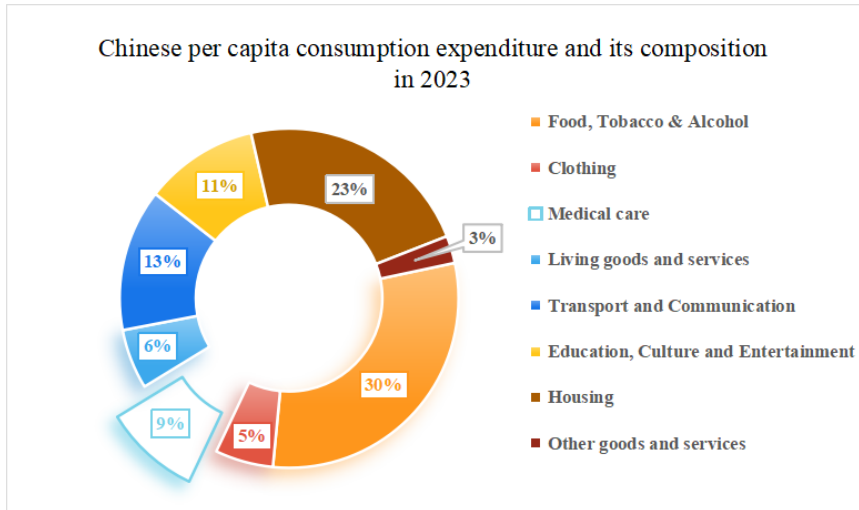


Fig. 1. Chinese per capita consumption expenditure and its composition in 2003.

According to Fig. 1, the data released by China's National Bureau of Statistics, residents' medical consumption expenditure accounts for a relatively small proportion of total household expenditure, and the reasons behind this cannot be separated from government support, which is analyzed as follows:

National policy support: China's government has invested heavily in healthcare and implemented an extensive medical insurance system [3]. Including urban workers' basic medical insurance, urban and rural residents' basic medical insurance, etc. These insurance schemes provide basic medical protection for the majority of residents and reduce the direct medical burden on individuals: the provision of public medical resources: China has a large public hospital system, and these public hospitals provide relatively inexpensive medical services with government subsidies so that residents do not need to pay for the necessary medical services when they get the high costs.

Cultural factors and the level of economic development also need to be taken into account. In the country's traditional culture, families and individuals may prefer

preventive measures and traditional medical methods to deal with health problems, which are usually less costly: although China's economy is growing rapidly, there is still a gap in the level of per capita income in comparison with Western countries. As a result, the structure of household expenditures is likely to focus more on the necessities of life, with medical expenditures receiving relatively low priority.

2.2 Analysis of Changes in Total Consumer Spending on Healthcare

The share of medical consumption expenditures in total household expenditures has been increasing year after year as a result of continuous economic development, rising incomes, and greater emphasis on health. Population aging is an even more important factor contributing to the increase in medical consumption expenditures, as the elderly usually need more medical services and health management.

This can be obtained by quantifying the differences in government investment in both urban and rural areas [4].

(1) Quality of healthcare services: urban areas usually have higher quality of healthcare services, better medical facilities, and more professional medical staff due to sufficient healthcare investment. On the contrary, the quality of healthcare services in rural areas may be limited due to insufficient funds and resources.

(2) Accessibility of healthcare services: Urban residents usually have easier access to healthcare services, while rural residents may need to travel long distances to reach healthcare facilities, resulting in significant differences in the accessibility of healthcare services.

(3) Residents' health status: the disparity in medical investment will further exacerbate the differences in the health status of urban and rural residents, and in rural areas, due to the lack of medical resources, residents may not be able to solve their health problems in a timely and effective manner.

2.3 The Distribution of Medical Resources Between Urban and Rural Areas in China is Markedly Uneven

Urban areas usually have more advanced and improved medical facilities, such as large hospitals, specialist centers, and high-end medical equipment, which are usually concentrated in large cities and provincial capitals. In contrast, healthcare facilities in rural areas are more outdated, with small health stations and township health centers often lacking the necessary medical equipment and infrastructure, and even in some remote areas, basic healthcare coverage is difficult to ensure.

Urban medical institutions have a larger number of medical personnel with higher levels of skill. The density and quality of medical professionals, such as doctors, nurses, and specialists, are much higher in cities than in villages. Rural areas face a shortage of medical personnel, especially senior medical personnel, which results in the quality and efficiency of medical services in rural areas usually being inferior to those in urban areas.

Urban residents generally have access to higher-quality healthcare services, including more advanced medical technologies and more diverse treatment options. Rural

residents have difficulty accessing the same quality of medical services, especially for emergency medical services and treatment of complex diseases, which often require traveling to more distant urban hospitals.

Although China has established a basic medical insurance system that covers both urban and rural areas, there are still differences in reimbursement rates and coverage. Medical insurance for urban residents usually has a higher reimbursement rate and more reimbursable medical items. Rural residents have relatively greater pressure on their medical expenditures, especially for the treatment of major diseases, which carry a heavy financial burden.

In recent years, the Chinese government has become aware of the problem of inequality in medical resources between urban and rural areas and has taken several measures to improve the situation, such as increasing investment in rural medical care, raising the level of medical insurance, and promoting telemedicine services.

Although the Government's efforts have achieved some success, it will take time and more systematic policy support to eliminate the disparities completely.

3 Hypotheses

3.1 Hypothesis 1: Differences in Consumption Levels Between Urban and Rural Elderly Populations Lead to Differences in the Demand for Healthcare Resources, and Thus to Differences in the Planning of Healthcare Resources

Analyzed from an economic perspective:

The first point is the principle of income effect, which in economics describes how changes in income affect consumers' purchasing behaviors. Urban seniors typically have higher incomes and pensions, which gives them greater financial ability to pay for healthcare services, thus increasing the demand for higher quality or a wider range of healthcare services. In contrast, rural older people's ability to consume healthcare is limited by their lower incomes, leading to lower demand for healthcare resources.

The second point is the difference in price elasticity. The price elasticity of demand for healthcare services describes the extent to which price changes affect the quantity demanded. As urban older people have a higher ability to pay, they may be less sensitive to the price of healthcare services, i.e. demand is more price inelastic. In contrast, rural older people are more price-sensitive, and their demand for high-priced health services may fall rapidly, exhibiting higher price elasticity.

The third point, the law of diminishing marginal utility, is that as consumption increases, the additional satisfaction (marginal utility) that consumers receive from each additional unit of consumption diminishes. In the area of healthcare consumption, urban elderly may reach a higher level of consumption since they can afford more healthcare services, in which the rate of diminishing marginal utility may be faster than that of rural elderly.

The fourth point is consumer choice theory, which discusses how consumers maximize their utility under budget constraints. Urban older people, with higher budgets, can choose from a wider portfolio of healthcare services to maximize their utility. Rural

older people, on the other hand, are subject to stricter budget constraints on their choices and may have to choose between necessary medical services and other necessities.

The fifth point is that there is too much variation in the allocation of resources, which in a market economy tend to be allocated to the use that yields the highest return [5]. Urban areas attract more investment in healthcare resources, such as hospitals, specialists and high-end medical equipment, due to the high demand and willingness to pay for healthcare services among the elderly population with high spending power. Rural areas, on the other hand, attract fewer medical resources due to their lower ability to pay, resulting in an inadequate supply of medical resources.

3.2 Hypothesis 2: Policy Implementation and Changes Have a Significant Impact on Individual or Household Healthcare Expenditures

Many aging support policies provide direct financial assistance or subsidies for medical expenses to older persons. This direct financial support can reduce the burden of medical expenses on individuals or families, especially when faced with high medical expenses. Alternatively, it can be provided through reforms of the health insurance system, such as increasing reimbursement rates, expanding insurance coverage, or lowering the threshold for insurance participation. These reforms can increase older persons' access to necessary medical services and reduce their out-of-pocket payments, thus directly reducing the medical expenses of their families. Furthermore, the supply of healthcare services should be strengthened to improve the quality and accessibility of services. For example, the Government may increase investment in geriatric facilities or provide specialized medical services for the elderly. This not only improves the quality of health care for older persons but may also reduce higher future health care costs through prevention and timely treatment. Finally, the introduction of tax incentives and aging support policies may include tax breaks for older persons or family members caring for older persons. These tax breaks can increase the disposable income of families, which can be partially used for healthcare expenditures, thus reducing the financial pressure on families [6]. By also focusing on education and preventive measures, older people can better manage their health and reduce the incidence of medical malpractice and chronic diseases, thereby reducing healthcare expenditure in the long term. This hypothesis will be further confirmed by empirical analyses.

3.3 Hypothesis 3: The Importance and Necessity of Studying the Impact of Ageing on Healthcare Resource Planning from the Perspective of the Consumption Level of the Resident Population

The consumption level of the population is an important indicator of its economic capacity, which directly affects the ability of individuals to pay for medical services. The consumption level of the elderly population can reflect their ability to spend on healthcare resources, which in turn affects their demand for high-quality healthcare services; regions or groups with higher consumption levels may be more inclined to choose higher-end healthcare services, which has direct impact on the allocation and optimization of healthcare resources; by analyzing the demand of the elderly for

healthcare resources in the context of different consumption levels, policymakers can more accurately carry out resource allocation, such as increasing investment in areas with fewer resources but higher demand; areas or groups with low consumption levels may have difficulties in obtaining necessary medical services, and studying these issues can help to solve the problem of inequality in medical services.

As the trend of population aging increases, the consumption patterns of the elderly will have a long-term impact on the demand for healthcare resources. Understanding this trend can help predict future medical needs, especially in an aging society; looking at consumption levels can help the government and relevant organizations to conduct long-term medical resource planning to ensure a rational allocation of resources to meet future needs.

Understanding healthcare demand at different levels of consumption can motivate healthcare providers to innovate their services, for example, by developing healthcare products and services targeted at specific groups; and its findings can support the formulation of healthcare policies that are more in line with actual needs, especially in the design of health insurance and support systems.

4 Empirical Analysis

$$Y_{it} = \alpha + \beta \cdot \text{treat} \cdot \text{post} + \gamma \cdot X_{it} + \mu_i + \nu_t + \epsilon_{it} \quad (1)$$

The model, in order to show the impact of the policy on the level of consumption, was selected as a double difference model, with the core explanatory variable being the healthcare policy dummy variable *Treat Post*, specifically defined as the province (11 pilot provinces for comprehensive healthcare reform, such as Jiangsu and Anhui, etc., were established), and the *Treat* variable was taken to be 1 if it was the area where the pilot policy was implemented or 0 otherwise; with 2016 being the year of implementation of the pilot policy, the *After 2016*, the variable *Post* is taken as 1, otherwise, it is taken as 0. Using the ratio of per capita medical expenditure to annual per capita disposable income as the dependent variable, in the model, in order to simply examine the policy effect of the policy, it is necessary to control for other variables related to the policy. Therefore, this paper refers to the research of other scholars, using the elderly dependency ratio, the number of elderly people over 65 years of age, the provincial annual GDP per capita, the number of health technicians per thousand population, and the number of beds in medical institutions per thousand population as the control variables [7]. From the model, whether β is significant or not determines whether the comprehensive policy plays a role in reducing the expenditure on patient visits.

The policy chosen is the new healthcare reform program announced by the state in 2009, which aims to solve the problems of "difficult to see a doctor" and "expensive to see a doctor" by changing the market-based healthcare service model, improving the healthcare insurance system, and accelerating the popularity of basic public health services. In 2015-2016, in order to implement the spirit of the relevant documents of the State Council, the State has established 11 pilot provinces for comprehensive healthcare reform, such as Jiangsu and Anhui, and used the pilot provinces as a benchmark for the popularization of healthcare reform policies in the future.

4.1 Benchmark Regression

Similar to the introduction of the new healthcare reform policy, which enables each pilot region to reduce medical costs and improve access to healthcare through supply-side structural reforms and optimized allocation of healthcare resources, this study seeks to evaluate whether the implementation of the proposed policies will yield comparable policy outcomes.

Table 1. Benchmark regression.

	post_1	post_2	post_3	_cons
T(Urban)	-2.66	-3.25	-3.56	0.62
p(Urban)	0.029	0.012	0.007	0.551
T(Rural)	-1.44	-2.07	-5.76	2.47
p(Rural)	0.210	0.093	0.002	0.057

As can be seen from Table 1, the p-value of the corresponding post-X for both urban and rural areas is less than 0.05, i.e., the result is significant, indicating whether the implementation of the policies proposed in the study has a corresponding policy effect. The coefficients are used to obtain the positive impact of the selected policy on the lives of the population.

Data sources are the China Health and Health Statistics Yearbook and China Statistical Yearbook. Policy-related information comes from the relevant policy documents issued by the General Office of the State Council. This proves that hypothesis two is valid.

4.2 Parallel Trend Test

The experimental and control groups satisfy the parallel trend assumption, a prerequisite that needs to be met for the double-difference approach to policy effects research. That is, in the absence of health care reform policy intervention, the dependent variable is not significantly different in the experimental and control groups.

The pilot areas of Fujian Province and Anhui Province were selected as the experimental group, and for a full comparison, Gansu Province, Guangxi Province, Henan Province, and Liaoning Province, which are provinces without the policy, were selected as the control group. Meanwhile, the overall data were divided into two parts: urban and rural. The elderly dependency ratio, the number of people over 65 years old, the annual per capita GDP of the province, the number of health technicians per 1,000 population, and the number of beds in medical institutions per 1,000 population were selected as control variables.

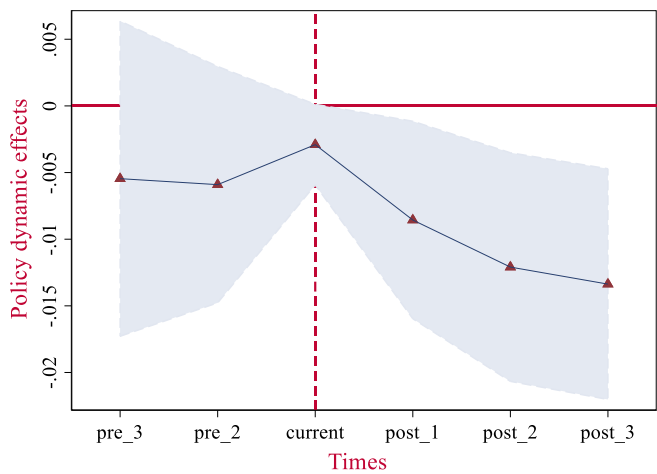


Fig. 2. Parallel trend test for urban residents.

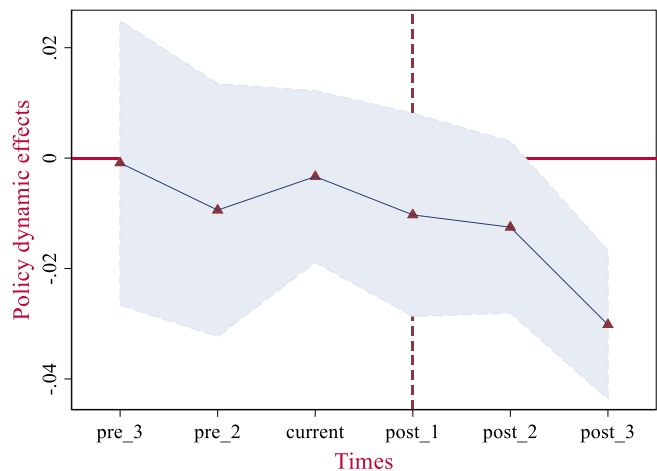


Fig. 3. Parallel trend test for rural residents.

Fig. 2 and Fig. 3 show the results of the parallel trend test, from which it can be seen that it is not significant before the implementation of the policy and significant after the implementation of the policy, which passes the parallel trend test.

5 Conclusion

The new healthcare reform program has improved the quality and efficiency of healthcare services and has played a positive role in solving the problems of "difficult" and "expensive" access to healthcare.

Differences in consumption levels among the elderly between urban and rural areas significantly influence the demand for healthcare services and the allocation of medical resources. In more economically developed urban regions, the elderly tend to have higher consumption levels, reflecting not only greater purchasing power but also a stronger demand for high-quality healthcare. Urban seniors are more likely to seek advanced medical examinations, expensive treatments, and more comfortable hospitalization options. This drives the development of urban healthcare systems toward specialized and high-end services.

Conversely, elderly populations in rural areas generally have lower consumption levels due to weaker economic conditions. This limits their access to expensive healthcare services, making them more dependent on basic healthcare and government medical assistance. As a result, rural healthcare needs lean toward basic and preventive services rather than advanced medical technology or specialized care.

These disparities in consumption patterns between urban and rural areas create imbalances in healthcare demand, affecting the planning and allocation of resources. In urban areas, healthcare planners must focus on introducing advanced medical equipment and specialized professionals to meet the demand for higher-quality services. In rural areas, however, the priority lies in improving access to basic healthcare facilities and strengthening primary care to ensure essential services are more readily available.

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