

# Study on the Influencing Factors of the Utilization Rate of Elderly Care Services in Beijing Tianjin Hebei Region

## -- Empirical Research Based on Provincial Panel Data from 2008 to 2017

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### Abstract

Pension beds are the core indicators of pension services. With the increasing number of pension beds per thousand people in China, a large number of pension beds are idle, and the contradiction between supply and demand is prominent. This paper takes Beijing Tianjin Hebei region as an example, selects the panel data from 2008 to 2017, and uses the random effect model (REM) to analyze the influencing factors of the utilization rate of pension beds. The results show that there is a significant gap in bed utilization rate among Beijing, Tianjin and Hebei, with the highest bed utilization rate reaching 80.65% and the lowest 34.89%. There is a positive correlation between the number of institutions owned by the elderly per 10000 people and the growth rate of social security expenditure and bed utilization rate. The higher the urbanization level, divorce rate and urban-rural income difference, the lower the bed utilization rate. Therefore, the development of pension services in Beijing Tianjin Hebei region needs to increase social security expenditure, coordinate the development of urban and rural areas, and adjust the structural problems of beds, so as to make full use of pension beds.

### Keywords

Regional pension service; Bed utilization rate; Influencing factors.

### 1. Introduction

According to statistics, the number of elderly people over 60 years old in Beijing, Tianjin and Hebei is 19460000, accounting for 17.3% of the total population. Beijing, Tianjin and Hebei, as an important economic area of regional development, are also the problems that Beijing, Tianjin and Hebei need to solve under the background of aging. In 2017, the implementation plan for coordinated development of Beijing Tianjin Hebei regional pension service pointed out that the coordinated development of three regions should be paid attention to and the pension level of the three regions should be improved as a whole. In the three areas of endowment planning, it is mentioned that the number of elderly people with the number of beds for the elderly should be increased. However, in reality, the supply of pension service is out of line with the demand. The double dilemma of the development of the beds with simple care function, the lack of nursing bed supply is double dilemma. The contradiction between the unbalanced and inadequate development of the elderly service is prominent. The use of the resources of the pension service is also used while improving the supply of the elderly care services The research of rate is very necessary.

At present, the domestic and foreign scholars mainly study the endowment service resources from the perspective of supply and demand. Laurence in the provision of pension services Malcolm (2007) pointed out that the developed countries are facing too many empty beds. In order to control the cost, New Zealand and other countries have been reducing the bed

utilization rate, which is consistent with the trend compared with the developed countries according to OECD statistics; Wan tao et al. (2018) taking Shanghai as an example, pointed out that the imperfect policy and insufficient capital investment often restrict the development of pension services.

In terms of the demand for elderly care services, Susan C (2001) shows that the spatial distribution of the community affects the access of services by tracking the housing construction and placement of the elderly care homes; vikrant Kanwar.etc (2014) from the perspective of nursing staff, the largest human resources of nursing staff as medical institutions is related to the bed utilization rate, so the utilization rate of elderly care service should consider the situation of nursing staff for the elderly; zhaodongxia et al. (2018) based on spatial autocorrelation analysis, taking the three provinces of Northeast China as an example, it is pointed out that there is obvious correlation between the spatial distribution of the elderly population and the endowment resources; Song Shan et al (2016) taking Shanghai as an example, it is found that the elderly 'preference for pension institutions is urban area > suburb > suburb; zhanghongfeng (2019) points out that family pension service resources will have extrusion effect on social pension service resources from two aspects: family pension service resources and social pension service resources by using Anderson medical service behavior model. In the survey of rural elderly in the three provinces, Yao Jun (2018) has significant differences in the demand for elderly care services in the survey of the elderly in the middle, East and west provinces.

After the combination of medical care and pension policy was put forward in 2013, the integration of medical care and pension gradually began. The diversification of pension demand makes the utilization of many basic public pension resources insufficient, and the price positioning of high-end pension institutions also makes most middle-income elderly people unable to afford. At present, most of the researches on pension service resources are focused on the supply and demand of pension services (Zhang Banghui, 2017; Wang Bo, 2016), and there are few researches on the influencing factors of the use of pension services. Therefore, based on the data of Beijing, Tianjin and Hebei from 2008 to 2017, this paper studies the influencing factors of the utilization rate of pension service, explores the structural adjustment of pension service resources by the utilization rate of pension service, and promotes the improvement of the level of pension service in Beijing, Tianjin and Hebei.

## 2. Research Design and Measurement Model

### 2.1. Data Sources

This paper selects panel data of Beijing, Tianjin and Hebei provinces from 2008 to 2017 for analysis. The data are from statistical yearbooks of Beijing, Tianjin and Hebei provinces and cities, without missing values. This paper makes a preliminary processing of the data, and finally uses Eviews software to analyze the data.

### 2.2. Index Selection and Description

By combing the existing literature, the utilization of pension services is related to the distance between pension institutions and residential areas. Generally speaking, the government's policy investment in pension services to a certain extent reflects that the government's policy support for pension services also needs to be included in the influencing factors. The spatial distribution of pension service construction is to protect the basic pension service needs of residents and reflect the government's promotion of fairness In addition, the higher the population density, the higher the proportion of the elderly population, the greater the demand for elderly care services; the urban-rural dual structure affects the utilization of elderly care services, and the marriage and economic level have a significant impact on the demand for

elderly care services, and the higher the economic level, the stronger the affordability; the elderly living in the weak marriage in Yan Zhiqiang (2018) survey Home in pension institutions, the demand will of the number of pension beds is strong, because of the emotional attachment of the elderly with spouses, the willingness of pension institutions is weak; some scholars point out that there is a close relationship between GDP and the level of urbanization, so this paper uses GDP as the main index to replace the urbanization rate. At present, the government encourages doctors to practice more. The staff of pension service institutions mainly include administrative management, medical staff, pension nurses and related technical personnel. Some scholars point out that the number of pension staff alone can not reflect the service quality of pension institutions, but the number of elderly people that each pension staff needs to care for can reflect the nursing situation of the elderly to a certain extent. The construction of pension beds is an important goal of pension service system in various regions. The number of pension beds is often the core index to measure the pension service resources in a certain region. Therefore, the utilization rate of pension service resources can be measured from the utilization rate of pension beds. Based on the theory of panchasky & Thomas, this paper defines the utilization rate of pension beds as the matching degree between pension resource services and the needs of the elderly, and selects indicators from three dimensions: geographical and time accessibility, content accessibility and economic accessibility. The utilization rate of beds for the aged is selected as the explained variable. The indexes of the explained variables are the number of institutions owned by each ten thousand elderly people (ratio), population density (logarithm), the number of elderly people taken care of by each elderly worker (ratio), divorce rate (‰), per capita GDP (logarithm) and per capita disposable income (logarithm). The specific definitions are shown in Table 1.

**Table 1.** Definition and description of relevant variables

Variable type	Variable Name	Variable Definition
The explained variable	ebr: utilization rate of beds for the aged	number of adoptions at the end of the year / number of beds in pension institutions
The explanatory variable	Pi: number of institutions owned by every ten thousand elderly people	number of pension institutions / number of elderly people over 65 years old
	Rkmd: population density	measures the density of population in a region
	Psep: the number of elderly people taken care of by each worker	reflects the care of the elderly
	dr: the divorce rate	reflects the attachment of the elderly
	Pdgp: per capita GDP	A measure of regional economic development
	Rpsr: per capita disposable income	as an indicator of the ability to pay of the elderly in urban and rural areas

### 2.3. Model Setting

According to the panel from 2008 to 2017, the paper analyzes the influencing factors of the use of Beijing Tianjin Hebei pension service, and estimates the mixed regression model, individual fixed effect model and individual random effect model considering the two dimensions of region and time. The following models are constructed:

$$EBR_{it} = \alpha + \sum_{k=1}^k \beta_k X_{kit} + \mu_{it} \quad (1)$$

$$EBR_{it} = \alpha_i + \sum_{k=1}^k \beta_k X_{kit} + \mu_{it} \tag{2}$$

$$EBR_{it} = \alpha_i + \sum_{k=1}^k \beta_k X_{kit} + \lambda_{it} + \omega_{it} \tag{3}$$

Among them, the parameters represent the constant term of the model, the coefficient vector of the explanatory variable vector, the factors that only change with individuals, the factors that only change with the passage of time, the factors that cannot be observed in the region, and the residual term.

### 3. Descriptive Statistics and Empirical Results

#### 3.1. Descriptive Statistical Analysis

The descriptive statistics of bed utilization rate and variables in Beijing Tianjin Hebei from 2008 to 2017 =shows that the bed utilization rate of Hebei Province and Tianjin is in a downward trend from 2008 to 2017. Since 2015, the bed utilization rate of Beijing has gradually increased. At present, generally speaking, the bed utilization rate is insufficient. The bed utilization rate of Beijing is higher than that of Tianjin and Hebei Province.

#### 3.2. Test of Stationarity and Cointegration

In order to avoid pseudo regression, this paper uses LLC, LPS, ADF Fisher and PP fisher to test the stationarity of variables, and then uses cointegration test to verify the cointegration relationship of data. In the unit root test of variables, there are unit roots in the number of institutions owned by each 10000 elderly people (PI) and the number of elderly people cared for by each employee (pdep), which means that the data is non-stationary. After the first-order difference, the data is stable at the significance level of 5%, as shown in Table 2.

**Table 2.** Stationarity test of each variable

Variable name		LLC	LPS	ADF-Fisher	PP-Fisher	Stationarity
ebr	Horizontal value	-2.24948**	-0.08831	10.6908*	24.4016***	stable
	First order difference	4.60930***	-1.87281**	24.5519***	24.5434***	stable
Pi	Horizontal value	-0.47407	-0.05085	5.74841	9.69227	Nonstationary
	First order difference	4.79195***	-1.92867**	15.2677**	22.6287***	stable
lnrkmd	Horizontal value	4.64202***	-2.24328**	17.4321***	36.6950***	stable
	First order difference	6.32887***	-2.51435***	32.4934***	16.5822**	stable
Pesp	Horizontal value	-0.38656	1.02340	4.39528	3.35528	Nonstationary
	First order difference	-1.66635**	0.20940	7.52089	23.5319***	stable
jlhr	Horizontal value	3.64234***	-1.54049*	24.6812***	16.2672**	stable
	First order difference	4.56210***	-3.60806***	28.2176***	50.1314***	stable
lnpgdp	Horizontal value	-2.02628**	-0.72938	8.20474	12.8350**	stable
	First order difference	5.79093***	-2.21912**	27.6360***	45.3220***	stable
lnrjsr	Horizontal value	-3.07605**	0.10443	4.56730	15.7327**	stable
	First order difference	-1.69678**	-0.03609	5.85268	10.6531*	stable

Note: \*\*\*, \* are significant at 0.01, 0.05 and 0.1 levels respectively

The use rate of nursing beds and its explanatory variables are first-order single integration, which meets the condition of cointegration test and reflects the long-term stable relationship among variables. Pedroni Engle Granger rejects the original hypothesis at the 0.1 significance level, and Kao Engle Granger rejects the original hypothesis at the 0.01 significance level, which indicates that there is a long-term stable relationship between the panel data.

### 3.3. Construction of Panel Data Model

For whether there is effect in panel data, the constrained F-test is used. In economic analysis, the F-statistic and Hausman test are used to select the specific panel data model. The formula  $F = 6.74 > 3.47$  rejects the original hypothesis that there is an effect in the panel data, and the effect model should be chosen. Compared with the original model, the random effect of hasun = 1.4126 is more reasonable.

### 3.4. Model Estimation and Result Analysis

Based on the above analysis, the research on the utilization rate of pension beds in Beijing, Tianjin and Hebei is not only affected by the differences between different regions, but also has a period effect. It is necessary to establish a random effect model

$$ebr_{it} = \alpha_0 + \beta_1 pi_{it} + \beta_2 cr_{it} + \beta_3 cbi_{it} + \beta_4 staff_{it} + \beta_5 jlhr_{it} + \beta_6 incxcj_{it} + \lambda_{it} + \omega_{it} \quad (4)$$

$\alpha_0$  is the intercept of Beijing Tianjin Hebei cross-section,  $\beta$  the influence coefficient of each explanatory variable,  $\lambda_{it}$  the cross-section error term,  $\omega_{it}$  all random error terms except the cross-section error term. Through Eviews software and least square regression, the F value is 13.87, the model fitting R2 is 0.78, and the adjusted R2 is 0.72. The results are shown in Table 3.

**Table 3.** Regression analysis results

Variable	regression coefficient	standard error	TStatistics
Pi	0.028058	0.026627	1.053739
lnrkmd	0.076117*	0.036845	2.065861
Pesp	0.045040***	0.010753	4.188753
Dr	-1.267916*	0.725022	-1.748795
lnpgdp	0.609002**	0.260538	2.337478
lnrjsr	-0.255462***	0.041522	-6.152480

Note: \*\*\*, \*\*, and \* are significant at 0.01, 0.05, and 0.1 levels

## 4. Conclusion and Discussion

### 4.1. Conclusion

The equation is significant on the whole. At the 0.01 significance level, the number of elderly people cared by each employee and the per capita disposable income have significant influence. At the 0.05 significance level, the per capita GDP has significant influence. At the 0.1 significance level, the population density and divorce rate have significant influence. The number of institutions owned by each 10000 elderly people has not passed the significance level, which may be due to the number of pension institutions in Beijing, Tianjin and Hebei The spatial

layout is mainly concentrated in the areas far away from the elderly residents. The elderly who need pension beds can not get pension beds nearby due to the distance. Therefore, the increase in the number of pension institutions has no impact on the use of pension beds.

## 4.2. Discussion

(1) Geographical and temporal accessibility The areas with high population density increase the use of pension beds in Beijing, Tianjin and Hebei. In the Beijing, Tianjin and Hebei areas with increasing aging degree, the higher the population density, the higher the demand for pension. Compared with rural areas, the urban population density is higher, so the government's allocation of pension beds is often concentrated in cities and towns, but in reality, the allocation of pension beds in rural areas is seriously inadequate Foot. The government should adjust the welfare resource allocation policy in favor of cities, vigorously improve the resource situation of rural elderly care services, and promote the new urbanization development of urban and rural integration.

(2) Content accessibility On the supply side, the increase in the number of elderly people taken care of by each employee promotes the use of beds for the elderly in Beijing, Tianjin and Hebei. With the continuous improvement of nursing training, the skills of nursing staff are constantly skilled, and the number of elderly people who can take care of is also more. In addition, the elderly also accept the services of skilled nursing staff, so it can promote the use of pension services. However, the number of elderly people taken care of by each employee in Beijing, Tianjin and Hebei shows a downward trend. While the government improves the training system of elderly care services, it also needs to increase the introduction of elderly care talents, increase the salary of elderly care talents, and retain elderly care talents. On the demand side, the government needs to strengthen the subsidies for bed expenses, constantly improve the reimbursement proportion and payment scope of long-term care insurance, and expand the long-term care insurance The pilot areas of nursing insurance enable the elderly to obtain pension medical services nearby and reduce the pressure of payment.

(3) Economic accessibility On the supply side, the improvement of per capita GDP promotes the use of pension beds in Beijing, Tianjin and Hebei. With the development of economy, the government's ability to guarantee pension services has been strengthened. At present, the coverage of pension insurance in Beijing, Tianjin and Hebei is expanding, and some cities of long-term care insurance in Beijing, Tianjin and Hebei are also in the pilot stage. Therefore, the government needs to improve the security level of the low-income elderly, and constantly promote the development of medical care and pension In terms of demand, the government needs to ensure the improvement of pension beds, coordinate the development between urban and rural areas, ensure the fairness between urban and rural areas, and tilt pension resources to rural areas, and constantly optimize pension beds To strengthen the investment in nursing beds.

## References

- [1] Hebei Bureau of statistics. Hebei Economic Yearbook [m]. Hebei: Hebei Statistical Press, 2018.
- [2] Liu Dongsheng. Supply side reform of public service for the aged: main short board and strategy selection [j]. Journal of Tianjin Administrative College, 2018,20 (03): 40-46.
- [3] Malcolm L . Trends in hospital bed utilisation in New Zealand 1989 to 2006: More or less beds in the future?[j]. The New Zealand medical journal,2007,120(1264):U2772.



- [4] Zhongyuxing, zhuqianru, Chen Hao, hujunjiang, fan Ma Yi, Guo Qing. Physical resource allocation and operation of pension institutions in the East and West China [j]. Chinese Journal of Gerontology, 2019 (10): 2514-2517.
- [5] Liu Chunmei. Regional difference analysis of rural endowment resources supply capacity [j]. Agricultural economy, 2015 (12): 67-69.
- [6] Li ZHAOYOU, zhengjiyou. Analysis of the collaborative supply of home-based elderly care services in rural communities in China [j]. Journal of Northeast University (SOCIAL SCIENCE EDITION), 2016,18 (06): 616-621.