Analysis of Home Care Services for the Elderly with Disabilities in Changchun with Multiple Linear Regression Model Analysis and Potential Market Forecast

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Abstract: As China's aging situation intensifies, the Chinese government is vigorously promoting the implementation of elderly care policies. on December 24, 2021, Changchun City issued a home care policy for the disabled elderly, identifying Nanguan District and Erdao District as the first pilot area for medical insurance for the disabled in China. Researchers explored the prospects for the development of the home care services market for the disabled elderly in Changchun. The current of potential markets was analyzed and timely and targeted recommendations were made to promote the development of home care services for the disabled in Changchun.

1. Introduction

By 2021, the number of disabled elderly people in China will reach 40 million. By mid-century, the elderly population will exceed 480 million. In 2016, China's National 13th Five-Year Plan proposed to “explore the establishment of a long-term care insurance system and carry out long-term care insurance pilot projects. “On December 24, 2021, the launch ceremony of Changchun's medical insurance home care service was held, making it the first pilot city in China for medical insurance for people with disabilities. The Changchun Municipal Government identified Nanguan District and Erdao District as the pilot areas, and plans to address the issue of aging in place for more than 4,000 families with disabilities in the pilot areas.

The researchers worked to understand the current situation of the home care service market for the disabled elderly in the non-pilot areas of Changchun and the residents' willingness and demand for home care services for the disabled elderly, and to explore the development prospects of the home care service market for the disabled elderly in Changchun. The current situation of different types of potential markets is analyzed, and recommendations are made to promote better in-home elderly care services for the disabled in Changchun for earlier and more targeted implementation and promotion.

2. Literature Review

After reviewing much research literature, we found that the current research on home care services for the disabled elderly can be broadly divided into the following areas[1].

Ding Yi analyzed the development environment of home care service and proposed to promote the change of the concept of home care, optimize government resources and system supply mode[2].

Henkens Kanalyzed that the aging of the population is becoming more and more obvious, and advocated to study the nursing problems of older workers and the urgent pension problems of retired workers.[3].

Wang Boyan and Liu Shuxiang surveyed with a self-made questionnaire. The results show that 84% of the ordinary elderly need to provide for the aged at home[4] [5].

To sum up, the research on home-based services mostly starts from the current situation of the industry, market demand, existing problems, and so on. Fewer studies were analyzed from the

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policy perspective, and the researchers are somewhat subjective.

3. Thesis Innovation

3.1 The Theme is Novel and Timely

The theme is timely research, focusing on the new policy and the hot social topic of home care services for the disabled elderly[6].

3.2 Improve the Existing Research on the Disabled Elderly

This study analyzes from the policy perspective and effectively fills the gap of the existing research on the current situation and demand of the home care service market in Changchun[7].

3.3 Various Statistical Analysis Methods Are Used

logistic regression analysis, column analysis, cluster analysis, and multiple linear regression analysis. The data were objectively analyzed to reflect the respondents' awareness, consumption preferences, and the types of services they are willing to receive for the home care services for people with disabilities[8].

4. Investigation Scheme and Implementation

4.1 Survey Location and Respondents

The study sites were divided into pilot areas and non-pilot areas.

Pilot area: Families of seniors with disabilities who have received services and passersby in Nanguan District and Erdao District, Changchun City[9].

Non-pilot areas: Families of elderly with disabilities, and residents in Chaoyang District, Jiutai District, and Shuangyang District were surveyed based on the sampling results.

4.2 Sampling Method

According to the implementable conditions, questionnaires are distributed in the pilot areas (Nanguan District, Erdao District) and non-pilot areas respectively by using the methods of random sampling, stratified sampling, and unequal probability sampling[10].

4.2.1 Stratified Sampling and Sampling with Unequal Probability

Changchun City was divided into pilot and non-pilot districts according to the policy using stratified sampling, and then the selected sample was sampled in three stages using unequal probability sampling, and finally the families of the elderly with disabilities, relevant medical service institutions, and community street offices were selected from the sampled streets for interviewing and filling out electronic questionnaires[11].

4.3 Determination of Sample Size

The investigator set P to 0.5, after consulting the information, n was taken as 9066906. at 95% confidence level, calculated in accordance with the requirement that the sampling error should not exceed 5%, that is, the sample size should be taken.

$$n_0 = \frac{(Za_{/2})^2 NP(1-P)}{N\triangle_p^2 + (Za_{/2})^2 P(P-1)} = \frac{1.96^2 * 9066906 * 0.5(1-0.5)}{9066906 * 0.05^2 + 1.96^2 * 0.5 * (0.5-1)} \approx 384$$

The investigator collected 50 questionnaires, of which 45 were valid, with a recovery rate of 100% and an effective rate of 95%. Sample size = sample size / (recovery rate * effective rate), which gives a sample of 405. To make the data more efficient, the investigator decided to finally distribute 650 questionnaires. According to the proportion of the resident population in different regions to the total population in the survey area, the questionnaire of the corresponding proportion is distributed.

5. Home Care Market Overview and Analysis:Multiple Linear Regression

5.1 Current Status of Interviewees

5.1.1 Interviewee Analysis

In the income survey of respondents, the majority of the monthly salary income of 5,000-7,000 yuan, accounting for 46.9%, 3,000-5,000 yuan followed by 25.6%. The largest number of disabled seniors live with their spouses, accounting for 40%, followed by those living with their children, accounting for 34%, and those living in nursing homes and those living alone, accounting for 14% and 12% respectively.

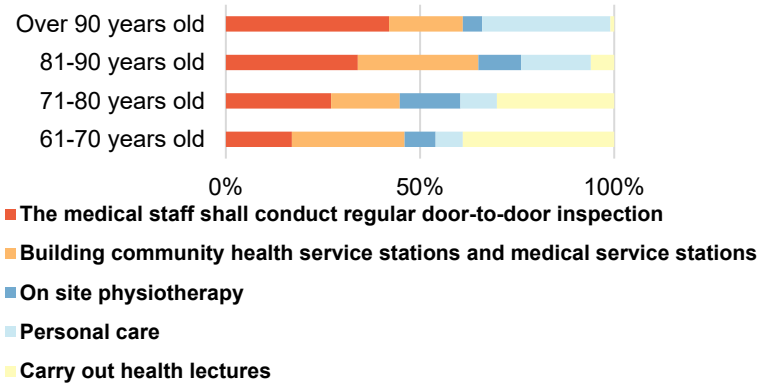

Fig.1 The Needs of Old People of Different Ages

5.1.2 Demands Analysis

Fig.1 shows the Needs of Old People of Different Ages, Most of the people aged 61-70 and 71-80 have a normal cognitive function and need regular health lectures in the community to help them prevent diseases, and medical staff regularly visit and take care of their lives. In conclusion, the more they call for health lectures, and the older the elderly, the more they need relevant home care services.

5.1.3 Current Market Prices in the Pilot Area

After visiting relevant medical institutions, the investigators found that the current market price of home-based pension services ranges from 300 yuan to 2000 yuan. 50-1500 yuan accounts for a large market share, accounting for 57.86%.

5.1.4 Channels for Understanding Home Care Services

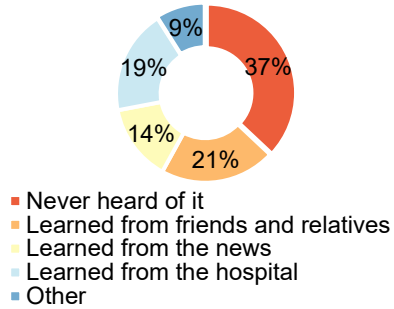

Fig.2 Channels Outside the Pilot Area

In the pilot districts, more than half of the respondents learned about senior services through family members checking community news and promptly told their elders who needed the services.

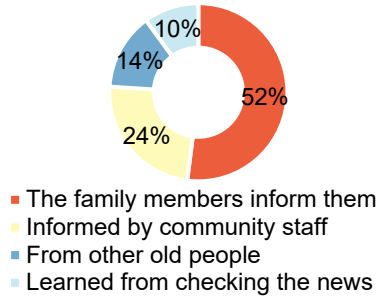

Fig.3 Channels in the Pilot Area

In the non-pilot district survey, nearly 37% of respondents said they had not heard of it, and 21% said they learned about it through friends and relatives in the pilot district.

5.1.5 Respondents' Preferences for Caregivers' Qualities

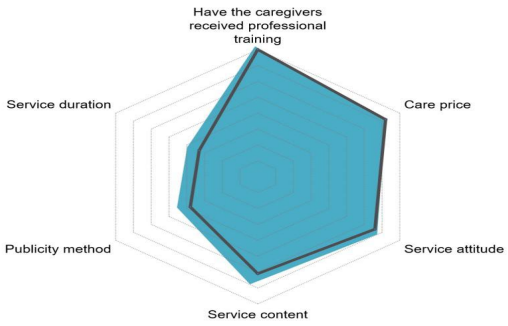

Fig.4 Respondents' Preference for Their Own Quality of Caregivers

People are more willing to choose professional caregivers with a good service attitude and reasonable care prices for the disabled elderly, and the promotion method and service years are not the main factors influencing respondents' choice. Therefore, the professionalism and quality of caregivers and reasonable care prices should be the key to the promotion of home care services.

5.1.6 Home Care Services Program Preference

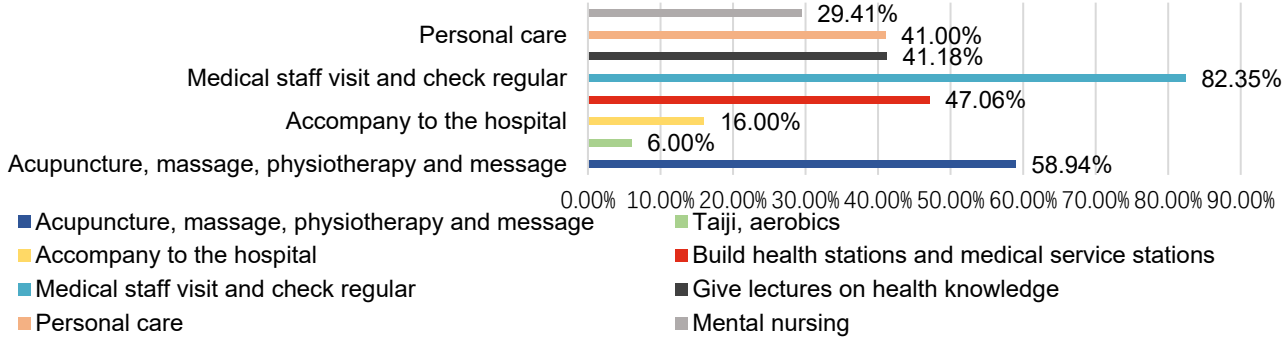

Fig.5 Home Care Service Mode Preference

The largest share of “Regular home visits by medical staff” was 82.35%. It can be seen that home care service is the most desired care mode. Meanwhile, respondents also preferred regular home checkups and acupuncture and massage by medical personnel, with a proportion of 82.35% and 58.94% respectively.

5.1.7 Respondents' Preference for the Length of Caregiver Visits

More than half of the interviewees want the caregivers to arrive home in less than three hours, indicating that caregivers only need to complete professional care measures for the disabled within a specified period of time. This is consistent with the service content mentioned in the opinions on

the implementation of Home Care Service of Medical Insurance for the disabled in Changchun.

5.2 Multiple Linear Regression Analysis of Preference for Home Care Services

5.2.1 Variable Determination

Dependent variable: Whether respondents receive home care services or not reflects the current market situation of home care services. The binary choice behavior of "whether to receive home care services" of the ith individual is represented as the dependent variable, and Y_i takes the value of 1 when "yes" is selected, and Y_i takes the value of 0.

Independent variables: "professional training", "service attitude", "service time", "service price", and "service content". In the questionnaire design, all six variables were given in the form of "yes" and "no". The investigator used a statistically standardized method to transform "professional training", "service attitude", "service hours", "service staff pricing", "service type" and "promotion method" into dummy variables. Based on the research objectives and the generalization of the questionnaire data, the variable names and variable designs of the model were obtained, as shown in Table 1.

Table 1 Multiple Linear Regression Variables

Variable name	Variable symbols	Variable definition
Accept home care services	Y	$Y=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Professional training	X_1	$X_1=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Service attitude	X_2	$X_2=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Service duration	X_3	$X_3=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Service personnel pricing	X_4	$X_4=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Service type	X_5	$X_5=\begin{cases}1 & YES\\ 0 & NO\end{cases}$
Publicity method	X_6	$X_6=\begin{cases}1 & YES\\ 0 & NO\end{cases}$

5.2.2 Modeling

Based on the above definitions of the independent and dependent variables, a multiple linear regression model was constructed as follows.

$Y=ß_0+ß_1X_1+ß_2X_2+\ldots+ß_kX_k+\mu$

Where Y is the dependent variable, X is the independent variable, and X_k corresponds to "professional training", "service attitude", "service duration", "service pricing", "service type", "promotion method".

Table 2 Results of Multiple Linear Regression Analysis

Linear regression analysis results, n=620						
	Nonstandard coefficient	Standardization coefficient	P	R^2	Adjusted R^2	F
	B	Beta				
Constant	2.0000000000000444	-	0.000***			
Service duration	0.0874874707234620	-0.018	0.000***			
Publicity method	0.7075646898600938	-0.092	0.003***			
Service attitude	0.2098241921505429	0.328	0.527	1	1	F=1.099 P=0
Professional training	0.7844806239940767	0.011	0.228			
Service content	0.1657341758564144	0.351	0.003***			
Caregiver pricing	0.3729416862696875	0.235	0.210			
Dependent variable: Receiving condition						

5.2.3 Model Results Analysis

According to Table 8 and the model, the multiple linear regression model constructed for the acceptance of home care services for the elderly with disabilities is:

$Y=0.784X_1+0.21X_2+0.087X_3+0.373X_4+0.166X_5+0.708X_6+2.0$

From the model, it can be obtained that

(1) Whether caregivers have received professional training or not has the greatest influence on respondents' acceptance of home services, with a coefficient of 0.784. professionally trained caregivers have professional knowledge and technical ability to take better care of the disabled elderly.

(2) The second most influential factor on the consumption of home care services is the way of publicity, with a coefficient of 0.708. Since children are busy with work and the elderly find it difficult to obtain policy information on their own, which hinders some of them from understanding and accepting care services, the notification and publicity by relevant care institutions and community workers are particularly important.

(3) The price of caregivers and the influence of caregivers are weak, with coefficients of 0.373 and 0.21, respectively. in addition to the ability of medical care, families of the disabled elderly also want more refined and patient services.

(4) Length of service has the weakest effect on acceptance of home care services, with a coefficient of 0.087. length of service is not a core factor affecting respondents' acceptance.

6. Potential Market Mining: K-Means Clustering

6.1 Selection of Clustering Factors

As the survey is a cluster analysis of potential users, the questionnaire gives priority to those respondents who are not willing to receive home care services for the disabled. Investigators used questionnaires to screen 188 potential users.

Therefore, the surveyor finally identified six factors that were closely related to potential users, namely: gender, age, monthly income, traditional family values, child rearing pressure, and concern for home care services[12].

6.2 Potential User Clustering

Using the cluster analysis method to classify potential customers, the following clustering results were obtained using SPSS software.

Table 3 Classification of Potential Users

Lead type	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ
Gender（S）	Male	Male	Female	Female	Female
Age（A）	25-50	Above 50	Below 25	25-50	25-50
Monthly income（I）	5000-7000	Below 5000	Below 5000	5000-7000	5000-7000
Concept（P）	Influence	No impact	Influence	Influence	Influence
Child pressure（J）	No impact	Great influence	No impact	Great influence	Great influence
Attention（H）	Very concerned	Follow	Commonly	Very concerned	Follow

6.3 Potential User Value Analysis

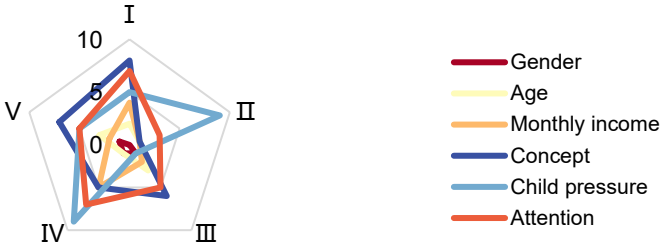

Fig.6 Distribution of User Characteristics

According to the clustering table of potential customer types and the feature analysis chart, it is clear that potential customers without using types have significantly different performance characteristics. Therefore, the investigator divided the prospects into four categories: important prospects, minor prospects, general prospects and low-value prospects. The characteristics of each of these prospect categories are as follows.

Important potential customers: These are the IV potential customers, mainly women who are very concerned about home care services for the disabled elderly, aged 25-50, with a monthly income of RMB 5,000-7,000, and are easily influenced by traditional family concepts and work pressure. They are most likely to choose home care services for the elderly with disabilities because they are more concerned about the professionalism of the service providers, the time and content of the home care services, and the completeness of the medical equipment of the relevant institutions. For this group, we need to focus on the quality of home care services for the elderly with disabilities and launch a targeted promotion program combined with the Internet platform.

Secondary Potential Customers: These customers are Category I and V potential customers, mainly men. These customers are concerned about the health and safety and psychological care of the elderly, and they also expect to conduct regular health knowledge seminars for the elderly group. For this group, relevant institutions can improve the existing equipment and service types appropriately for the characteristics of this group to stimulate their desire to choose.

General Potential Customers: These customers are the third category of potential customers, mainly women who are concerned about home care services for the disabled elderly, under the age of 25, with a monthly income of less than $5,000, and easily influenced by traditional family concepts. Service products and preferential policies can be introduced according to the above characteristics to attract their attention.

Low-value potential customers: This group of customers belongs to the second category of potential customers, mainly men who are concerned about home care services for the disabled elderly, aged over 50, with a monthly income of RMB 5,000-7,000, and easily influenced by traditional family concepts. Most of this group is retired, unwilling to put financial pressure on their children and not good at using smart devices, so community workers should strengthen door-to-door publicity work.

7. Conclusion

7.1 The Current Situation

In the pilot areas, the current publicity approach has not achieved good results, resulting in some elderly people living alone not being able to quickly access relevant policy information and enjoy the services. In addition, the existing service content is single and there is no combination package. The public expects a combination service with favorable prices and various contents.

In the non-pilot areas, through the trial implementation of existing policies in the pilot areas, it can be seen that the care services have strong adaptability to non-pilot areas as well. The non-pilot areas have a large elderly population and a wide market for policy promotion and services.

7.2 Classification of Service Influencing Factors

(1) The content of existing care services meets the needs of existing families with disabilities and is basically consistent with the content of services mentioned in the opinions on *The Implementation Of Medical Care Insurance Home Care Services For The Disabled* in Changchun. It has strong adaptability.

(2) The current market price, the proportion of household income spent on home care, the channels of understanding home care services, the respondents' preference for the quality of caregivers, and the service content of home care services are important factors influencing their choice, and people prefer more professional caregivers with a good service attitude.

7.3 Potential Market

For potential clients of home care services, the investigators explored the influence of age, gender, income, policy concern, and traditional perceptions, and confirmed that the important potential clients are women who are very concerned about home care services for the disabled elderly, the group aged between 25-50 years old and with a monthly income of between $5,000-7,000, and are more likely to be influenced by traditional family perceptions and work pressure.

8. Recommendation

8.1 Publicity

The investigators believe that the most effective way to promote the policy is through grassroots offices, such as street offices, which take a census of the number, age, physical condition, and household financial status of each elderly household, and visit them regularly, so that those who are in need and meet the policy requirements can be included in the scope of home care in a timely manner and provided with policy information.

8.2 Industry Standard Setting Aspect

According to the multivariate linear analysis, the family members of the disabled elderly are more concerned about the own quality of the home care service personnel, i.e., the experience, practice certificate, and service attitude of the caregivers. Therefore, the investigators believe that performance assessment should be conducted for designated medical service providers and practitioners, and the results should be publicized to reassure the public.

8.3 Nursing Care Programs

According to the survey results, most disabled families want a combination of services with favorable prices and diverse contents. Therefore, the relevant service organizations should expand new segments of customized care service programs for specific disabled elderly people, combine the personal physical condition and economic situation of the disabled elderly people, and judge the care methods, time, and frequency needed by the elderly people to form a personalized and diversified service system.

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