

# Study on the Problems and Development of the Elderly-care in Rural Areas under the “Healthy China Initiative” Based on the Research of Smart Elderly-care in Rural Areas of Qingdao City

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**Abstract.** In recent years, population aging has become a global problem, and this problem is getting more serious in China. At present, home-based elderly-care is still prevalent in China's elderly-care system, which can not meet the growing needs of the elderly in our country. Therefore, the implementation of smart elderly-care in rural areas to meet the needs of the elderly has become an urgent task. Based on the implementation situation of smart elderly-care in Qingdao City, this paper adopts qualitative and quantitative methods to study the practical dilemma of smart elderly-care, and puts forward effective countermeasures and suggestions for its implementation so as to create a positive and diversified pattern of smart elderly-care services.

**Keywords:** Smart elderly-care; Population aging; Rural areas.

## 1. Background Information

At present, China has entered the rapid development stage of population aging, becoming the country with the largest aged population in the world. According to the seventh national census, China has two hundred and sixty-four million people aged sixty and above, accounting for eighteen point seven percent of the total. At the same time, the rural labor force is moving to more developed coastal areas, which has aggravated the “hollowing out” of rural population and lead to the intensification of rural elderly-care problems. In this way, the decrease of the phenomenon of inter-generational life has left the elderly facing a crisis of lack of both daily care and spiritual comfort [1-3]. Besides, the urban-rural structure has widened the gap in the equalization of basic public services for the elderly [4], and most of the rural population is not covered by the social security system, which have displayed that the security level of elderly-care varies greatly among different areas [5].

Currently, the mode and institutions of elderly-care cannot provide services according to the cognitive structure, sentiment motivation and actual needs of the elderly, which makes the elderly face difficulties in the integration of life care and rehabilitation nursing.

Therefore, making use of big data to ensure and improve people's livelihood, taking advantage of “Internet plus” technology to create a new mode of smart elderly-care services, and forming the treatment concept of “prevention before diseases, prevention of the deterioration of diseases, prevention of recurrence after recovery” to provide specific security for the elderly will become effective measures to deal with the problem of “silver hair wave” in China.

## 2. Study Design and Methodology

### 2.1 Data Sources

Inclusion criteria: Age  $\geq$  sixty, having residence registration. Exclusion criteria: Presence of hearing, cognitive or mental impairment; having serious diseases.

A total of one thousand two hundred and eighty-five questionnaires were distributed in eight communities and twelve villages, and one thousand two hundred and thirty valid questionnaires were collected with an effective recovery rate of ninety-five point eight seven percent. The stratified cluster

sampling was used to divide eight districts and two counties in Qingdao City into four layers, and two districts and one county were randomly selected from each layer, two streets or rural towns were selected from each district and county, and one rural community was selected from each street or rural town for questionnaire survey.

## 2.2 Variable Set

### 2.2.1 The Living Quality of the Elderly in Rural Areas

The World Health Organization (WHO) regards “living quality” as an extension of the concept of “health”. This paper uses this concept to evaluate the living conditions of the rural elderly under the background of smart elderly-care, and measures the living quality of the rural elderly by using a self-test survey adapted from the Short Form 36 Health Survey (SF-36). The SF-36 has been specifically tested for reliability and validity, and it is easy to be understood with a high responsiveness. The measurements of SF-36 are divided into eight dimensions: Physical Function (PF), Role Physical (RP), Body Pain (BP), General Health (GH), Vitality (VT), Social Function (SF), Role of Emotion (RE), and Mental Health (MH).

In this study, forty questions are set according to the eight dimensions of the SF-36, and the options are divided into “yes” and “no” with “1” and “0”, respectively. For example, the respondents are asked, “have you had any physical pain in the past six weeks?”, if their answers are “1”, they refer to “yes”, if their responds are “0”, they refer to “no”. By combining the scores of all questions, the total score of each sample in the revised SF-36 is adopted to study the living quality of the rural elderly.

### 2.2.2 Smart Elderly-care

Based on the classification of the dimensions of smart elderly-care in previous studies, this survey focuses on the development status and needs of smart elderly-care in rural areas. And the concept of smart elderly-care is divided into five aspects, which are the understanding and mastery of the rural elderly on smart elderly-care devices, the willingness and needs of the rural elderly to smart elderly-care projects, the use of health and safety monitoring devices for home-based elderly-care, the professional standard of the relevant service personnel in elderly-care service institutions, and the ways of comprehension of smart elderly-care services. Each aspect is a level-one variable with a level-two variable set below. The options for each question in level-two variable are divided into “yes” and “no” and assigned a value of “1” and “0”, respectively. According to the level-one variable, the scores of each level-two variable are combined to study the situation of the five aspects of the samples.

## 2.3 Methodology

In this paper, quantitative research is adopted to analyze the relationship between smart elderly-care and the living quality of the rural elderly, and SPSS20.0 is used to analyze the data. Through qualitative research and collection of relevant text information of rural elderly-care, questionnaires are issued to the rural elderly, and qualitative interviews are conducted with the personnel of rural elderly-care service institutions to understand and analyze the dilemma of the current situation of rural elderly-care.  $P < 0.05$  is considered as statistically significant difference.

## 3. Outcome Analysis

### 3.1 Basic Information of the Research Object

One thousand two hundred and twenty valid data are collected after removing the missing values of the core data. By analyzing the sample, it is found that the elderly aged sixty-one to seventy accounted for sixty-nine percent, and those aged seventy-one to eighty accounted for thirty-one percent. Besides, the sample generally has a low degree of education, with thirty-five percent having not been educated, and those with primary school education, junior high school education and high school education or above accounted for thirty-five percent, twenty percent and ten percent,

respectively. It can also be noticed that the left-behind phenomenon is serious in rural areas. The proportion of elderly couples who stay at home and their children working outside accounted for sixty-nine point five percent, and the proportion of elderly couples who are taken care of by one child at home accounted for only thirteen point five percent. The data are shown in table 1.

**Table 1.** Basic Information of the Research Object

| Variables | Number  | Mean Value | Standard Deviation |
|-----------|---|------------|--------------------|
| Age       | 61-70 = 0, 71 - 80 = 1  | 0.31       | 0.464              |
| Gender    | Male = 1, Female = 0  | 0.52       | 0.501              |
| Spouse    | Have a spouse = 0, Have no spouse = 1   | 0.34       | 0.323              |
| Education | Uneducated = 0, Primary school = 1, Junior high school = 2, Senior high school = 3, College degree or above = 4 | 1.08       | 1.048              |

### 3.2 Survey Data Analysis

#### 3.2.1 Basic Situation of the Smart Elderly-care in Rural Areas

Table 2 shows the situation of the smart elderly-care of the selected samples. Firstly, the elderly in rural areas are less known about of smart elderly-care, less than twenty percent of them are proficient in using communication software and computers, and only twenty-five point nine percent are proficient in using mobile phones. The elderly in rural areas are also not familiar with the concept of smart elderly-care, and more than thirty percent of the them resist safety monitoring devices and GPS. Secondly, less than fifty percent of employees have mastered professional psychological counseling skills in elderly-care service institutions, indicating a shortage of mental health professionals in rural areas. Besides, only about fifty percent of practitioners are capable of performing effective medical treatments, and about forty percent do not have a bachelor's degree or relevant qualification certificates. In this way, it can be seen that elderly-care service institutions, as important forms of manifestation of the implementation of smart elderly-care, have obvious shortcomings such as unprofessional employees with weak interdisciplinary ability, and uneven quality of grass-roots employees.

**Table 2.** Situation of Smart Elderly-care of the Selected Samples (N = 1,220)

| Level-one Variables  | Level-two Variable  | Yes (%) | No (%) |
|--|---|---------|--------|
| Understanding and Mastery of the Rural Elderly on Smart Elderly-care Devices | Being Proficient in Using Communication Software (WeChat, QQ)                             | 17.90   | 82.10  |
|  | Being Proficient in Using Mobile Phones   | 25.90   | 74.10  |
|  | Being Proficient in Using Computers   | 17.00   | 83.00  |
| Willingness and Needs of the Rural Elderly to Smart Elderly-care Projects    | Being Familiar with the Concepts of "Virtual Nursing Home" and "Smart City"               | 14.90   | 85.10  |
|  | Being Willing to Install Surveillance Cameras at Home                                     | 31.20   | 68.80  |
|  | Being Agreed that the Location is Shared to the Children through GPS in case of Accidents | 34.30   | 65.70  |
| Use of Health and Safety Monitoring Devices for Home-based Elderly-care      | Having Safety Detectors at Home (eg. Smart Sphygmomanometer)                              | 48.70   | 51.30  |
|  | Being Equipped with Emergency Call System at Home   | 11.70   | 88.30  |
|  | Being Capable of Using Smart Glucometer and Other Smart Devices                           | 39.60   | 60.40  |

| Level-one Variables  | Level-two Variable   | Yes (%) | No (%) |
|--|--|---------|--------|
| Professional Standard of the Relevant Service Personnel in Elderly-care Service Institutions | Having Mastered Professional Psychological Counseling Skills                 | 45.70   | 54.30  |
|  | Being Capable of Performing Effective Medical Treatments                     | 52.80   | 47.20  |
| Ways of Comprehension of Smart Elderly-care Services   | Having a Bachelor's Degree or above and Relevant Qualification Certificates  | 58.40   | 41.60  |
|  | Making Appointments for Community Elderly-care Services through the Internet | 14.20   | 85.80  |
|  | Ordering Housing Keeping Services through Smart Phones                       | 18.30   | 81.70  |
|  | Making Appointments for Property Maintenance through Apps                    | 27.40   | 72.60  |

### 3.2.2 The Influence of Smart Elderly-care on the Living Quality of the Rural Elderly

A multiple linear regression model is established in this study. The adjusted R<sup>2</sup> of the model is 0.995, and the explanatory power of the model is acceptable (check table 3). According to the multiple linear regression model, the understanding and mastery of the rural elderly on smart elderly-care devices (Beta = 0.246, P < 0.01) and the ways of comprehension of smart elderly services (Beta = 0.265, P < 0.01) have a significant and positive influence on the living quality of the elderly in rural areas, and these two aspects are the key to promote the development of smart elderly-care. In this way, it can be seen that the more proficient the rural elderly are in using the smart elderly-care devices, the more they can enjoy the efficient and high-quality elderly-care service brought by smart elderly-care, and the higher quality of life they can have. Moreover, the more perfect the community smart elderly-care service facilities are, the more the rural elderly can enjoy the corresponding smart elderly-care services, and the higher quality of life they can enjoy.

**Table 3.** Multiple Linear Regression Analysis of Influence of Different Variables on the Living Quality of the Elderly

| Level-one Variables  | B-value | SEB   | Beta  | Sig   |
|--|---------|-------|-------|-------|
| Understanding and Mastery of the Rural Elderly on Smart Elderly-care Devices                 | 0.568   | 0.054 | 0.246 | 0.000 |
| Ways of Comprehension of Smart Elderly-care Services   | 0.582   | 0.058 | 0.265 | 0.004 |
| Willingness and Needs of the Rural Elderly to Smart Elderly-care Projects                    | 0.040   | 0.017 | 0.053 | 0.023 |
| Use of Health and Safety Monitoring Devices for Home-based Elderly-care                      | 0.274   | 0.088 | 0.069 | 0.002 |
| Professional Standard of the Relevant Service Personnel in Elderly-care Service Institutions | 0.031   | 0.018 | 0.042 | 0.043 |

The use of health and safety monitoring devices for home-based elderly-care (Beta = 0.069, P < 0.01), the willingness and needs of the rural elderly to smart elderly-care projects (Beta = 0.053, P < 0.05), and the professional standard of the relevant service personnel in elderly-care service institutions (Beta = 0.042, P < 0.05) have a significant and positive influence on the living quality of the elderly, and have become important factors of the implementation of smart elderly-care. The subjective perception and needs of smart elderly-care of the elderly can reflect their acceptance to the smart elderly-care, which indicates that the more willing the rural elderly are to accept the convenient

services brought by the smart elderly-care, the higher quality of life they can have. Besides, the professional standard of the personnel in elderly-care service institutions can indirectly reflect the implementation of smart elderly-care. And the higher the professional standard of the personnel in elderly-care service institutions, the more the elderly in rural areas can enjoy professional smart elderly-care services, and the higher quality of life they can enjoy.

#### **4. Problems of Smart Elderly-care in Qingdao's Rural Areas**

##### **4.1 Poor Integration of New Mode of Smart Elderly-care with Traditional Elderly-care Concepts**

The smart elderly-care mode is an intelligent service system with typical characteristics of urban life that relies on information platform and works in the mode of "Internet plus". Although this system has been introduced in some rural areas in Qingdao, it still cannot integrate with the local in a short period of time due to the limitations of the local traditional rural lifestyle. The survey data show that the rural elderly generally have a low degree of education, and have a poor ability to master smart devices. Only seventeen point nine percent of them are proficient in using computers, twenty-five point nine percent are proficient in using mobile phones, and fourteen point two percent are willing to make appointments for community elderly-care services through the intelligent system.

In terms of elderly-care services, the elderly in rural areas have ambivalence of "willing to accept with distrust". They distrust the new mode of smart elderly-care, which often strengthens their attachment to traditional ways of elderly-care and their resistance to smart elderly-care. Thus, these two kinds of ambivalence make the elderly vacillating in "trying new stuff and being conservative". Although smart elderly-care can improve the living quality of the rural elderly, they are unable to enjoy the convenient services brought by smart elderly-care due to their backward concepts of elderly-care.

##### **4.2 Shortage of Professional Caring and Administrative Personnel**

In recent years, the loss of rural population has been aggravated, and the "hollowing out" of rural population has seriously affected the cultivation of professionals in the field of rural elderly-care. At present, many elderly-care service institutions in Qingdao's rural areas lack sufficient professional supports, which makes it difficult to implement the mode of smart elderly-care in a smooth way. The existing service personnel cannot meet the needs of daily care for the elderly, and part-time employees do not have administrative experience relevant to smart elderly-care services, which make it unable to achieve the desired results.

##### **4.3 Low Popularizing Rate and Poor Adaptability of Smart Devices**

The smart elderly-care is able to realize the combination of elderly-care resources and medical resources through the closed-loop implementation of smart devices, online service platform and offline service network. However, there are still problems in the implementation of smart elderly-care in Qingdao. For instance, the popularizing rate of the smart device is relatively low, mainly due its poor adaptability and accuracy, and the smart device has widespread problems such as functional complexity, and compound and unreasonable design. Besides, the design of these devices does not take the elderly into consideration, making it uneasy to meet their actual needs of elderly-care, and disconnecting the smart elderly-care from the direct beneficiaries. In this way, these problems may cause a series of problems of smart elderly-care, which can influence the experience of smart elderly-care of the elderly and make it difficult to effectively meet their needs for personalized elderly-care services.

## **5. Strategies for the Sound Development of Smart Elderly-care Services in Qingdao's Rural Areas**

The problem of smart elderly-care in Qingdao's rural areas originates from the urban-rural digital divide. The rural elderly generally have a low degree of education, with low Internet utilization rate and less of the use of smart elderly-care devices. At the same time, the "hollowing out" of rural population has also aggravated the loss of human resources in the aspect of rural smart elderly-care. Therefore, the implementation of the smart elderly-care needs multiple efforts to promote its further development in rural areas.

### **5.1 Strengthening the Talents Building, Making the Positions more Attractive**

The government should take the lead in establishing training and research bases for the smart elderly-care industry with colleges and elderly-care service companies to ensure the adequate supply of talents and to provide practice opportunities for these talents. In terms of elderly-care service companies, they should provide internship positions for college students and part-time degrees for outstanding employees. Besides, the government can implement the policy of "talents introduction" and "talents subsidy" to guarantee the college graduates to stay and work, establish a training mechanism for elderly-care service personnel, and formulate working standards for the elderly-care industry through relevant policies, in order to improve the quality of practitioners and their business capabilities.

### **5.2 Strengthening Publicity, Promoting the Development of Community Smart Elderly-care Services**

The government should guide the elderly to overcome their negative mindset, promote the active ideas of elderly-care, and change their backward concepts on elderly-care services, to make sure the elderly can directly talk to the elderly-care service providers to meet their new needs for life, health and culture.

Elderly-care service institutions can promote the development of smart elderly-care by combining online consultation with offline publicity. The online customer service will patiently answer the questions and requirements of the elderly about the smart elderly-care, while the offline service personnel will encourage the elderly to actively participate in the experience activities of smart elderly-care services carried out by the community, so as to improve their acceptance of community smart elderly-care and change their backward concepts of elderly-care services.

The community staff can interact with the elderly through educational lectures, publicity activities and experience activities to increase their awareness of the smart elderly-care services, enabling them to better accept intelligent information technology to promote the development of community smart elderly-care. At the same time, portable smart devices, such as smart bracelets, can also be introduced to the elderly to let them experience smart elderly-care services and break their prejudice, so as to fundamentally eliminate their sense of resistance and accept the modern information technology.

## **6. Conclusion**

The smart elderly-care is a new strategy for actively dealing with the long-term task of population aging, which can provide a new optimization idea for relieving the pressure of family elderly-care, meeting the diversified needs of the elderly, and realizing the goal of the elderly from "being healthy" to "being happiness". In order to promote the long-term development of smart elderly-care services, it is necessary to adapt to the development of the times, make effective use of information platform and intelligent technology and the diversification of government, market, social organizations, communities, families and individual advantages, clarify the rights and responsibilities of all parties, and create a positive and diversified pattern of smart elderly-care services. In this way, we should

respond to population aging with positive attitude and actions to ensure that the elderly are properly cared for, treated and able to enjoy a happiness time in their later years.

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