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Revista de Cercetare si Interventie Sociala

ISSN: 1583-3410 (print), ISSN: 1584-5397 (electronic)

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Revista de cercetare și intervenție socială, 2020, vol. 68, pp. 53-63

<https://doi.org/10.33788/rcis.68.4>

Published by:
Expert Projects Publishing House



On behalf of:
„Alexandru Ioan Cuza” University,
Department of Sociology and Social Work
and
HoltIS Association

REVISTA DE CERCETARE SI INTERVENTIE SOCIALA
is indexed by Clarivate Analytics (Social Sciences Citation Index),
SCOPUS and CROSSREF

Applying Big Data Analysis to Discuss the Elderly Social Welfare Service Use Condition and the Relevant Factors

Zhi-Ping HOU¹, Zhi-Fei CHEN², Yu-Zhou LUO³

Abstract

The advance of medical technology and the change in living environment gradually prolong the life expectancy of humans to constantly increase the elderly population in the world. Relevant demands and problems derived from aging are therefore getting emphasized. To cope with the elderly needs, the government sequentially promotes welfare service. Nevertheless, it is still discovered that the welfare service use rate of the elderly is rather low, not achieving the estimated demand. Aiming at the elderly in Guilin, the data in this study are collected and analyzed from social welfare related open information platforms and the analyses and research, publications, or database of government agencies. The relevant data are integrated, analyzed, discussed, and applied to understand the effects of indicators and further activate the utilization of data. The research results show remarkable correlations between redisposing factors and service use condition, enabling factors and service use condition, and demand factors and service use condition. According to the results, suggestions are proposed, expecting to comprehensively understand the elderly social welfare service use conditions and identify the factors in the elderly service use so as to examine the match of the elderly welfare service with the elderly needs to develop the maximal function of social welfare service.

Keywords: big data analysis, the elderly, social welfare, service condition, social services.

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Introduction

The advance of medical technology and the improvement of living environment in the past decade gradually prolong the life expectancy of humans to result in increasing elderly population in the world. A lot of advanced countries also encounter the change in population structure that relevant demand and problems derived from aging are gradually emphasized. The increase in the elderly population mainly because of advanced medical technology releasing individual acute diseases; similarly, it also results in most elders suffering from chronic diseases in the later-year life. Apparently, many elders, even though the life is prolonged, are limited the daily life functions in the rest of life; even the functions would be gradually degraded with increasing age. In addition to the elderly daily life requiring different assistance and care from others, the extension of life expectancy also results in another important issue, i.e. how to arrange seniors' later-year life in 10-20 years. Most elders are lack of social support network beyond family members, and the activity is restricted in neighborhood and communities. When the family members have to work and go to schools, they could hardly accompany and care the seniors. In this case, elders would easily feel lonely and lack external stimulation. The quality and safety of the later-year life are worth of special concerns.

To cope with the elderly needs, the government sequentially promotes welfare service. The content of service measures in various areas might not be the same; however, the series of welfare measures could be classified into health care maintenance, economic security, education and leisure, residential support, psychological and social adaptation, and personal safety. Furthermore, the emergence of community oriented care concept changes the principle of the elderly welfare service no longer focusing on large institutional support, but stressing on satisfying community elders' needs through local service provision. That is, even though family members could not provide proper care for the elderly who needs technical care intervention, the social climate of local aging still advocates keeping the elderly in small institutions in the communities, aiming to have the people with requirement for welfare acquire the service in the familiar communities. Accordingly, the government indeed provides several welfare measures and reinforces the accessibility of service as much as possible. Nonetheless, service for community elders being fully cared has been emphasized in past years, but the elderly welfare service use rate, according to literatures and research data, is still low, not achieving the estimated demand (Banu *et al.*, 2016). Although data reveal low welfare service use rate of the elderly, regardless the service property or the service provided for healthy elders or the elderly with limited functions, it should be considered whether the governmental service really responds to the elderly, aiming at the inconsistency between estimated conditions and actual conditions. Moreover, whether service measures, which are considered necessary but appear low use rate of the elderly, are hidden service use obstacles or unknown in the elderly life experience should be discussed. Big data is therefore applied in this

study to analyze the elderly social welfare eservice use condition and the relevant factors, expecting to comprehensively understand the elderly social welfare service use conditions and identify the factors in the elderly service use. It aims to examine whether the elderly welfare service could match the elderly needs and develop the maximal function of social welfare service

Literature review

Chen (2018) stated that, along with the approach of accountability time, people stressed more on the effectiveness of the resource re-distribution for social welfare service and concerned the relationship between resource provision and use as well as the obstacle to service delivery. Hana *et al.* (2019) mentioned that Andersen's Behavior Model, with multiple perspectives, discussed the relevance between users and service use and further understood the patterns of service delivery channels and the quality of service delivery and service provision. Andersen's Behavior Model divided factors in people's medical service use into redisposing factors, enabling factors, and demand factors: (1) *Redisposing factors*: Referring to an individual with the characteristics of population and social structure and health belief tending to use medical resources. It reveals that Andersen model presents the functions of prediction and explanation; (2) *Enabling factors*: referring to certain potential factors in individual ability of service use. In other words, an individual with more enabling factors would enhance the possibility of service use. The enabling factors mentioned by Andersen are divided into family and society layers. The former contains income, health insurance, and fixed source of care; and, the latter includes living location to show the accessibility of resources, the proportion of medical professionals and equipment prices to present the quantity of community medical resources, and the prices of health care service, medical time, and waiting time. (3) *Demand factors*: referring to an individual starting to seek for service when perceiving the demand. Demand could be divided into subjective demand and objective demand. The former covers self-report physical function disorder, self-report diseases, and self-evaluation of health; and, the latter contains health care workers aiming at clinical symptoms and diagnoses of individuals.

In the research on the elderly service use, Chan *et al.* (2018) indicated that age, current illness history, education attainment, health belief, and attitude were regarded as redisposing factors. Rangamiztousi & Ismail (2016) indicated that a lot of research revealed the effect of redisposing factors in the elderly with limited functions on the demand and social welfare service use patterns. In the research on community elders' welfare service use, Hensel *et al.* (2016) revealed the significant difference in service between age and health care use and leisure education. Lethbridge & Muldoon (2018) indicated that elder people with higher home service use would show higher use of medical and financial assistance. Accordingly, the following hypothesis is established in this study.

H1: Redisposing factors present significant correlations with service use condition.

Chang and Chang Tzeng (2017) revealed that enabling factors presented the best explanation on the welfare service use of the elderly with limited functions. Zafar *et al.* (2018) mentioned that the elderly with more number of family members and family resources appeared lower need satisfaction. Other research also revealed that the elderly with limited functions could hardly use service measures alone; most of them required family members' company and assistance. For this reason, number of family members would affect service use of the elderly with limited functions. Feucht & Holmgren (2018) pointed out economic condition as an important factor in the elderly service use. Shrestha *et al.* (2017) showed the correlations between monthly service use hours with the elderly living alone and family income. Low family income would affect the elderly demand for care and increase the welfare service use. Penha *et al.* (2018) further indicated that the location of dwelling communities might affect the social welfare service use of the elderly with limited functions. Melo *et al.* (2017) stated that the elderly living in urban and rural areas appeared notable effects on economic subsidies and home service. The following hypothesis is therefore established in this study.

H2: Enabling factors show remarkable correlations with service use condition.

In regard to demand factors, He *et al.* (2017) indicated that the elderly demand covered economic security, health care maintenance, living care, psychological and social adaptation, education, leisure and social participation, and elderly protection. Cmar, McDonnall, & Crudden (2018) mentioned that those with worse health condition and serious limited functions used more diverse variety of welfare service, with higher use rate. Camadan *et al.* (2018) revealed that individual health condition and degree of limited functions would affect the service cognition and service use of the elderly with limited functions. As a result, the following hypothesis is established in this study.

H3: Demand factors reveal notable correlations with service use condition.

Methodology

Definition of research dimension

(1) Redisposing factors

Referring to Lin & Lin (2019), redisposing factors in this study is measured with

1. Age: the actual age of the sampled elderly.
2. Care system: external environmental factors of nature, politics, and economy as the primary information to understand and affect health care service use.

(2) Enabling factors

Referring to Lin & Lin (2019), enabling factors in this study are measured with

1. Income: monthly disposable amount of the sampled elderly
2. Number of family members: number of population currently living with the sampled elderly.

(3) Demand factors

Referring to Lin & Lin (2019), demand factors in this study are measured with

1. Symptom: objective disease symptoms.
2. Diagnosis: experts evaluated health state.

(4) Service use condition

Referring to Kim & Kim (2018), service use condition in this study is measured with

1. Service style: Whether the sampled elderly accepts various elderly social welfare measures currently practiced.
2. Time interval: Mainly to understand the social welfare service use frequency of the sampled elderly.

Research object

Aiming at the elderly in Guilin, the data collected and analyzed in this study are acquired from social welfare related open information platforms and the analyses and research, publications, or database of government agencies. Relevant data are integrated, analyzed, discussed, and applied to understand the effects of various indicators and further activate the utilization of the data.

Analysis method

Regression analysis is applied to understand the relations between redisposing factors, enabling factors and service use condition.

Findings and Discussion

Correlation analysis of redisposing factors and service use condition

Regression analysis is used for testing the hypothesis and the theoretical structure. The first regression analysis result is shown in Table 1, where the regression equation achieves the significance ($F=36.533$, $p<0.001$). Redisposing factors present significant effects on service style, where “age” and “care system” in redisposing factors show remarkably positive effects on service style in service

use condition, with significance ($\beta=2.211, p<0.01$; $\beta=2.044, p<0.01$). The second regression analysis result, *Table 1*, reveals the regression equation reaching the significance ($F=47.186, p<0.001$). Redispersing factors appear notable effects on time interval, where “age” and “care system” in redispersing factors present significantly positive effects on time interval in service use condition, with significance ($\beta=2.315, p<0.01$; $\beta=2.138, p<0.01$). Apparently, H1 is supported.

Table 1: Regression analysis of redispersing factors to service use condition

dependent variable→	service use condition			
independent variable↓	service style		time interval	
redispersing factors	β	ρ	β	ρ
age	2.211**	0.000	2.315**	0.000
care system	2.044**	0.002	2.138**	0.000
F	36.533		47.186	
P	0.000***		0.000***	
R2	0.355		0.423	
adjusted R2	0.327		0.404	

Note: * stands for $p<0.05$, ** for $p<0.01$.

Correlation analysis of enabling factors and service use condition

Using regression analysis for testing the hypothesis and the theoretical structure in this study, the first regression analysis result is shown in *Table 2*, in which the regression equation achieves the significance ($F=56.218, p<0.001$). Enabling factors shows notable effects on service style, where “income” and “number of family members” in enabling factors reveal remarkable effects on service style in service use condition, with significance ($\beta=2.126, p<0.01$; $\beta=-2.241, p<0.01$). The second regression analysis, *Table 2*, appears the regression equation reaching the significance ($F=73.625, p<0.001$). Enabling factors present significant effects on time interval, where “income” and “number of family members” in enabling factors show remarkable effects on time interval in service use condition, with significance ($\beta=2.423, p<0.01$; $\beta=-2.362, p<0.01$). H2 is therefore supported.

Table 2: Regression analysis of enabling factors to service use condition

dependent variable→	service use condition			
independent variable↓	service style		time interval	
enabling factors	β	ρ	β	ρ
income	2.126**	0.000	2.423**	0.000
number of family members	-2.241**	0.002	-2.362**	0.000
F	56.218		73.625	
P	0.000***		0.000***	
R2	0.297		0.344	
adjusted R2	0.276		0.319	

Note: * stands for $p < 0.05$, ** for $p < 0.01$.

Correlation analysis of demand factors and service use condition

Testing the hypothesis and the theoretical structure with regression analysis in this study, the first regression analysis results, *Table 3*, appear the regression equation achieving the significance ($F=22.615$, $p < 0.001$). Demand factors show notable effects on service style, where “symptom” and “diagnosis” in demand factors reveal significantly positive effects on service style in service use condition, with significance ($\beta=2.375$, $p < 0.01$; $\beta=2.296$, $p < 0.01$). The second regression analysis result, *Table 3*, reveals the regression equation reaching the significance ($F=31.743$, $p < 0.001$). Demand factors reveal significant effects on time interval, where “symptom” and “diagnosis” in demand factors appear remarkably positive effects on time interval in service use condition, with the significance ($\beta=2.488$, $p < 0.01$; $\beta=2.327$, $p < 0.01$). Consequently, H3 is supported.

Table 3: Regression analysis of demand factors to service use condition

dependent variable→ independent variable↓	service use condition			
	service style		time interval	
demand factors	β	ρ	β	ρ
symptom	2.375**	0.000	2.488**	0.000
diagnosis	2.296**	0.002	2.327**	0.000
F	22.615		31.743	
P	0.000***		0.000***	
R2	0.347		0.388	
adjusted R2	0.323		0.364	

Note: * stands for $p < 0.05$, ** for $p < 0.01$.

Conclusion

The research results, regarding predisposing factors, show remarkable correlations between age and social welfare service use, and the elderly with high age knows better about social welfare service use. In terms of enabling factors, the elderly income, number of family members, and community reveal correlations with social welfare service use, where the elderly using social welfare service mostly with formal economic sources (including pension and governmental subsidies) for the living expenses. Nevertheless, the elderly making a living privately seldom uses social welfare service. The elderly being supported the living by family members, relatives & friends, or neighbors mostly does not use social welfare service, while those being assisted by formal service personnel show higher social welfare service use rate. Apparently, the elderly being supported the daily life by governmental personnel, institutional manpower, or volunteers would more possibly use social welfare service. In regard to demand factors, the elderly with more difficulty in daily life activity appear more social welfare service use, while those with less difficulty in daily life activity seldom use social welfare service.

Recommendations

Aiming at social welfare service, the following suggestions are proposed in this study.

- 1) The promotion of distinct elderly social welfare service is a key point to provide service for the elderly. In this case, it is suggested to regard the elderly family members or the easily contacted people, affairs, and objects as the promotion channels, such as home service workers with frequent contact with the elderly, TV advertisement, and radio stations.
- 2) Social welfare service institutions should understand that one-time explanation of service content, service fee, and service limits does not mean that the elderly totally understand and accept the information. Social welfare service institutions should promote the service programs for several times to avoid the elderly misunderstanding and appearing negative emotion on the institutions when using social welfare service.
- 3) The government and civil units should reinforce the education of the elderly with low education standard and low income to engage in social participation and social welfare service use so as to avoid the service merely for the rich and those with high knowledge standards but excluding ones with worse economic and knowledge standards in the social welfare service design.
- 4) In the service provision process, social welfare service institutions should train and evaluate the skills of service providers or home care workers as well as consider the service value and attitude. What is more, service providers should have sufficient manpower to enhance the service quality and efficiency.

Acknowledgments

This work is supported by the National Natural Science Foundation of China (Grant No. 71962005): The effects of knowledge is contained in in online review on product performance: A perspective of semantic association and the Guangxi Zhuang Autonomous Region: 100 Plan on the Introduction of High-level Overseas Talents for Colleges and Universities in Guangxi.

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