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A Study on the Regional Gap Analysis and Management of the Elderly Health in an Aging Society

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Abstract

Korea is ranked as the world's No. 1 country in its aging rate. While the interest and demand for health is rapidly increasing, the health status of the elderly is in the lowest among OECD members. Increased chronic diseases, the burden of medical costs and digital/untact changes of societies after COVID-19 have caused the direction of healthcare to be changed from treatment oriented to health care and prevention oriented, along with increased income levels and a desire for a healthy life. Amid this paradigm of change, the gap in health standards and health inequality for the elderly according to local structure and social conditions affects not only socio-economic but also the quality of life for individual senior citizen. Utilizing prior data of Aging Research Panel Survey, this study aims to compare and analyze health conditions and regional gaps which are significant influences on the satisfaction of the life of the elderly, and to suggest direction of studies for health care to provide solutions for health inequalities. The findings are intended to be a basic data for researching models of the New Normal Smart Healthcare System that bridge the health gap between the elderly and enhance life satisfaction with health care models suitable for regional characteristics in aging society.

Keywords: *Aging Society, Health of the Elderly, Regional Disparaties/Gap, Life Satisfaction, Smart Health Care System*

1. Introduction

The senior citizens over the age of 65 are 16.5% (out of total population), the index of aging (per 100 youth) is 138.3% (Statistics Korea, 2021) in Korea. Under these conditions, Korea is ranked as the world's No. 1 country in its aging rate. While the interests and demands for health is suddenly increasing, the subjective health status of the elderly is in the lowest among OECD members.The life expectancy of the elderly and medical assistance are rapidly increasing as the level of income and the desire for healthy life are increasing. However, the gap in health standards and health inequality for the elderly according to local structure and social conditions are persisting and affects the quality of life for individual senior citizen.

Also, digital untact changes of societies after COVID-19 have caused the direction of healthcare to be

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changed from treatment oriented to health care and prevention oriented, toward systemized healthcare by using smart devices based on ICT.

Through the 6th Aging Research Panel Survey (2016) and the analysis of the prior research data, this study aims to classify and analyze interregional gaps into urban and rural areas with priority given to senior health which is the major influence among all other influences on the satisfaction of senior citizens' lives and also aim to present health care and future research directions for the elderly. The findings of the research are intended to be a basic data for researching models of the New Normal Smart Healthcare System (NNSHS) that resolves health inequality and enhance life satisfaction among the senior citizens in an aging society.

2. Theoretical background

2.1 The definition of Senior Health

Good health for the elderly can mean 'Healthy Aging' which is living long life under healthy condition. Being healthy is defined not by absolute criteria, but by relative multidimensional concepts such as personal perception, sociocultural interaction and so on. [1]

The health of the elderly is accumulated by the benefits and difficulties of the life process and class inequality in old age can be intensified. [2]

There are two hypotheses for this. The first one is Convergence Hypothesis which is believed as the gap in health conditions continued until middle age is moderated by aging. The second one is called as Divergence Hypothesis which is believed as the gap in health conditions stands out under different social conditions. [3]

Divergence Hypothesis has a perspective for that the phenomena of the gap in health conditions is not accumulated throughout their entire lives but only in their old age. Another perspective is that the gaps in health conditions under previous social conditions are accumulated as time goes by and the gaps are maximized in old age. [4]

2.2 Satisfaction and Theoretical Review in the Life of the Elderly

The concept of quality of life, which collectively refers to factors that understand how satisfactory an individual's life, is used in similar meanings such as well-being, happiness, satisfaction, and welfare. Such satisfaction in life is used in a similar sense to satisfaction in quality of life or satisfaction in living. [5]

A representative theory of life satisfaction is activity theory that correlates with participation in social activities, the separation theory that older people and society want to be separated because they are more likely to face health problems and death, the exchange theory that senior life satisfaction is affected by family, neighborhood, community relationships and interactions, the social environment theory that affected by the environment and the environment of opportunity to show and ability of psychological stability and the satisfaction in living of the elderly. [6]

The prior studies of determinants that affect life satisfaction appear in various ways, depending on which variables they are analyzed. According to the survey of aging panels of Korea Labor Institute's (2006), Sung-ho Heo (2011) verified that physical, mental and social factors of the elderly have a significant impact on life satisfaction factors. [7]

2.3 Health Disparities for the Elderly and the Prior Studies

The Health Gap (Health Inequality)

The Factors of Social Class

The health gap is a concept that individual health conditions are considered not only biological factors, but also results in differentiated quality of life and experience by the social class. One view in this regard includes

artificial composition that artificially calculated measurement errors make little connection between social classes and health conditions, and practical theory that views social classes as powerful factors.

On the other hand, according to the study on the health gap between social classes, the health gap between social classes is wider in the early stages of old age than the late age and the health gap is reduced toward the end. This report is very significant in the early years of old age when biological function declines. [8]

Selective Theory and Causal Theory

The selective theory is an alternative hypothesis in the causal relationship between social class and health. While the selective theory sees health as an independent variable and the social class as a dependent variable, the causal theory presents the social class as an independent variable and considers the conditions of the social class to affect health. Rather than this cross-sectional study, long-term research is required to determine the causal relationship and health inequality between social classes and health. The panel studies of House *et al.* (2005), Multau and Scholler (2002) have verified the causal relationship between socioeconomic factors and health, and the causal effect on health is much greater than the selective effect of falling classes, according to the analysis.

Other health disparities and social class studies also show greater health effects than educational level, income, and occupation among socioeconomic status indicators. When conceptualizing social classes, individual indicators on education, occupation and income need to be independently verified.

Psychosocial Resources and Risk Factors

Psychosocial resources refer to factors that promote or positively affect personal health, and risk factors refer to factors that negatively affect health. It includes personal tendencies like pride, self-esteem, sense of control and exercise, health promotion behavior, social support and networking, medical care, insurance system, etc. Risk factors include health-threatening behaviors such as smoking and drinking, daily events, chronic stress, and harmful environments. In order to understand the health gap between the elderly and the social classes, an integrated study of psychosocial resources and risk factors is needed

Most of these prior studies correlate life satisfaction with various influential variables in the practice of older people or compare urban and rural areas. This study aims to verify the factors that most influential on the health of the elderly through prior analysis and to suggest the direction of the ICT-based health care system as a health management model to resolve regional disparities.

3. Research Method

3.1. Analysis data

The main data was analyzed using raw materials from the Korea Employment Information Service during the 6th Survey on the Aging Research Panel (2016). Except for Jeju Island, 10,000 middle and high-aged people aged 45 or older in the rest of the country are subject to the probability sample. In this study, 4,552 senior citizens aged 65 or older were selected and re-analyzed based on the data analyzed according to the standards of senior citizens [9].

3.2. Analysis Model

Depending on general characteristics, the comparison of elderly health is verified by a T-test and the following analytical models are utilized to measure the factors and size of the satisfaction impact of the elderly.

$$SWB_i = \beta 0 + \beta 1 \mathrm{Region} i + X\theta + \epsilon i$$

i in *SWB* indicates satisfaction in life. It was used as a dependent variable as the mean of the sum of metrics (health, economy, quality of life) for the subjective life satisfaction.

Region i was classified into urban and rural areas as residential areas, and significant variable factors were selected among the factors affecting life satisfaction and regression analysis was performed.

4. Analysis Fidings

4.1 Findings of the analysis of major influencing factors of satisfaction in the lives of the elderly

As a result of the analysis, the value of $\mathrm{adj}-R^2$was about 0.436, which showed high explanatory power considering the use of cross-sectional analysis. $F-\mathrm{value}$ which represents conformity, has statistical significance with a confidence of 99.9%. Analysis of multicollinearity using the VIF index determined that the severity of the multicollinearity problem was very low, with a maximum value of about 3.0.

Under the assumption that structural different conditions, such as gender and age, are the same, life satisfaction is higher in rural areas than in cities, and statistical significance levels are significant at 0.01 levels (see <Table> 1).

Table 1. Analysis of major factors of life satisfaction in the elderly

Sortation	Non-standardization coeffcients		Standardization	t-value	F-value
	B	Standrd error	β		
Eudcation	.131	.074	.025	1.766	
Age	.094	.032	.041	2.913**	
Spouse	4.407	.508	.122	8.674***	
Religion	1.619	.400	.048	4.044***	
Area	1.641	.444	.045	3.697***	
subjective health	7.787	.265	.397	29.330***	
IADL	-.404	.133	-.059	-3.031**	
Labor status	1.076	.498	.027	2.161*	
Income	.000	.000	.046	3.581***	
Property	4.798E-05	.000	.093	7.260***	165.852***
Social gathering	.342	.078	.058	4.392***	
Descendant relationship	.062	.006	.131	10.518***	
Traval & culture	.204	.068	.037	3.007**	
Constant	11.615	2.864		4.055***	
R^2			0.436		

, **, * Significant statistical levels , IADL(Instrumental Activities of Daily Living)*

As a result of analyzing the major influencing factors on the satisfaction of older people's lives, the variables of age, religion, and spouse were statistically significantly analyzed. This is the solitude or reduce the physical and mental stress from the elderly, it dropped to improve awareness and positive variable show that a major impact. In addition, the subjective health of older adults has been identified as the most important factor in life satisfaction. Other than that, labor conditions, income, assets, etc. were all analyzed as significant relationships due to economic factors. Social relationships were significantly analyzed for the factors like the number of encounters with close people and with one person, and the relationship with their own children.

4.2. Life Satisfaction Variables and Results of Comparison between Urban and Rural Areas.

An analysis of the life satisfaction and key influencing factor relationships of senior citizens between urban and rural areas showed somewhat different results between urban and rural samples (see <Table 2>, <Table 3>).

In the case of cities, subjective health conditions, meeting with close friends, close relationship with their own children, and etc. are meaningful affecting factors on the life satisfaction rate of the elderly. On the other hand, life satisfaction has a negative impact when the dependency on others increases due to low daily living ability in the case of rural areas. Subjective health status, meeting with close friends, close relationship with their own children and such deliver significant result to the life satisfaction rate of the elderly.

In addition, for the case of rural areas decrease when their means of daily living ability (IADL) decreases, and life satisfaction rate increases by the amount of labor activities, and income is minimal but has a positive impact. As a result, integrated care services and elderly care system research are needed in cities because anxiety about alienation from family, neighborhood, and social relationships and difficulties of daily activities negatively. Support on traveling and cultural events is required more in cities, and rural areas are required to implement policies to support economic activities by expanding and supplying jobs tailored to the elderly.

Table 2. Verification of Differences between Urban and Rural Communities for Key Variables.

Sortation	Cuty (n=3,197)	Rural (n=1,355)	t(χ^2) test value	Reference
Satisfaction in life(SWB)	55.61	55.75	-.262	
Eudcation	8.76	7.38	15.414***	*,**,***
Age	75.37	76.64	-5.447***	Significant statistical levels
Spouse	2,163(67.7)	926(68.3)	0.203	
Religion	1,474(46.1)	469(34.6)	51.504	
subjective health	2.74	2.68	1.922	
IADL	0.90	0.99	-1.072	
Labor status	621(19.4)	466(34.4)	117.3	
Income	2,216.71	1,566.89	12.521***	
Property	26,982.13	20,279.17	6.570***	
Social gathering	7.00	8.11	-13.139***	
Descendant relationship	40.94	43.76	-2.449*	
Traval & culture	1.47	1.10	4.460***	

Table 3. Interregional Satisfaction Impact Variant Results

Sortation	City Estimation coefficient	t-value	Rural Estimation coefficient	t-value
Eudcation	0.708	0.673	1.484	0.843
Age	0.288	0.626	0.004	0.006
Spouse	14.591	1.829	8.948	0.961
Religion	7.515	1.191	2.307	0.307
subjective health	26.721	6.707***	35.973	8.745***
IADL	-0.869	-0.409	-2.617	-1.163
Labor status	-10.167	-1.285	0.076	0.011

Income	0.000	0.185	0.003	1.103
Property	0.000	0.583	0.001	2.082*
Social gathering	2.997	2.455*	3.450	2.060*
Descendant relationship	0.207	2.419*	0.189	2.086*
Traval & culture	2.039	1.688	1.496	0.643
Constant	103.168	2.530*	64.756	1.200
R^2(adj R^2)	0.428(0.377)		0.559(0.509)	

5. Conclusion

In the "6th Aging Research Panel" (2016) data, this study classified regions as urban and rural areas and measured the main factors and sizes of senior life satisfaction on the premise that different conditions were the same. There are two security points of the analysis results. First, attention is needed in interpretation due to the measure of the impact factors of satisfaction in the lives of the elderly. With the limitation of data collection, some measures of low information volume are used on a high scale, leaving room for under- or over-estimation of the estimated coefficients. Second, it is an omission problem for descriptive variables of regional characteristics. There is a need for the improvements by supplementing it with major influencing factors and data with universal validity.The health gap is applicable not only to the cities and rural areas but across the entire regions where welfare budgets, health care facilities, manpower and resources are concentrated mainly in cities.

The unequal distribution shows that urban areas have higher health levels than rural areas due to differences in treatable mortality rates and chronic disease management (Community Health Survey, 2019, Aging Demographics, 2020). In order to bridge this gap in health and health care, the government's political solution is needed at a macro level.

This study confirmed that subjective health status is the most significant influence factor through a comparative analysis between the health of the elderly and the region, which is a hot topic in an aging society. This shows that the quality of life on the elderly can be improved if the subjective health of the elderly is improved.

Therefore, from the microscopic viewpoint, research is needed on smart care systems, a health care model that can be easily available in existing mobile environments, by satisfying the desire for a healthy life and enhancing subjective health conditions.

Smart healthcare system suitable for regional characteristics is changed to health care and prevention, not medical level, and ICT-based healthcare integrated management is proposed, which is linked to self-diagnosis care services at the individual level. The analysis of this study aims to provide feasibility for the study of the New Normal Smart Healthcare System model, which can easily use medical information and services in a digital society and integrated management of self-health care, prevention, and emergency response

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