

Health-related Behavior, Medical Service Use, and HRQOL in Elderly Korean Living Alone and Elderly Korean Living with Family: Using the 2018 Third-Year KNHAES Data

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Abstract

Background/Objectives: This study was to identify health-related behavior, medical service use, and HRQOL in elderly Korean living alone and elderly Korean living with family.

Methods/Statistical analysis: We carry out a cross-sectional analysis using nationally representative data from the KNHANES, 2018. A total of 1,528 elders in 2018. Data analysis and complex sampling design were performed using SPSS 25.0.

Findings: The HRQOL of elderly Korean living alone was lower than elderly Korean living with family. Among the elderly Korean living alone, living in rural areas, aged 75 or above, elementary school graduation or lower education, unemployed, two comorbidities, drinkers, poor subjective health conditions, highly perceived their stress, and unmet medical needs showed low levels of HRQOL.

Improvements/Applications: In order to health promotion in elderly Korean, it is necessary to establish different strategies according to their residence type.

Keywords: Health-related behavior, Medical service, HRQoL, Elder, KNHANES

1. Introduction

According to data from the National Statistical Office, the proportion of South Korea's elderly population aged 65 or above ranked 51st (14.9%) in the world as of 2019 and is forecast to exceed that of Japan (36.7%), the world's most aged country, at 37.0% in 2045[1]. With rapid increases in the elderly population, elderly Korean living alone accounted for 34.2% of the total elderly households in 2019. At this fast rate, the number of elderly Korean living alone surged from 540,000 in 2000 to 1.51 million in 2019[2]. The current households comprised of elderly couples can also experience with time one partner's death and the other partner's solitary life[3], and the current increasing trend in the elderly Korean living alone is unlikely to improve.

In general, elderly Korean experience more frequent health problems with aging. These health problems, coupled with financial problems, affect their quality of life[4]. In other words, regarding the relationship between health and income, the low-income group's burden for medical expenses is reported to have a negative impact on the health issues of individuals in this group[5]. An examination of elderly Korean living alone, who reach up to one third of the total elderly population, showed certain features. First, this group included many individuals with low income or education levels, as well as more women than men due to women's longer life expectancy[6,7]. In addition, the prevalence of chronic diseases in the elderly Korean living alone was 93.5%, a higher level than that of the elderly living with family[8]. These economic difficulties and vulnerabilities including lack of a support system lead this elderly group to experience not only physical problems, but also feelings of helplessness, guilt, disappointment, and anger, which extend to psychological maladjustment[9,10, 16-19], thereby influencing their psychological health and HRQoL.

Because the depression or lonely deaths of elderly Korean who live alone are emerging as a social issue [11], social attention is required for them. Improving the health-related behavior of elderly Korean living alone is cost effective given that it can increase the prophylactic potential of the problems that they experience. This points to the need to identify their health-related behaviors such as drinking, smoking, and exercise, medical service use, and HRQoL.

Therefore, it is urgent to provide interventions and policy support that can improve the elderly's HRQoL by identifying the factors that influence HRQoL in the elderly Korean living alone and elderly living with family. In this regard, this study was conducted to provide basic data for nursing strategies to improve and promote the health of elderly Korean living alone, who

are emerging as a new target group for future nursing, by examining basic data on elderly Korean living alone and elderly Korean living with family.

The purpose of this paper is to identify health-related behavior, medical service use, and HRQoL in elderly Korean who live alone and live with family, and to confirm factors related to these variables. The study's specific objectives are as follows:

- Identify differences in general characteristics, health-related behavior, medical service use, and HRQoL between the elderly who live alone and the elderly who do not.
- Identify whether the subjects have differences in their HRQoL according to their general characteristics, health-related behaviors, and levels of medical service use.
- Identify factors that influence the subjects' HRQoL.

2. Materials and Methods

2.1. Research design

This is a secondary data analysis study that identifies health-related behavior, medical service use, HRQoL in elderly Korean living alone and elderly Korean living with family by employing the 7th Third-Year KNHAES conducted nationwide in 2018.

2.2. Subjects

The 2018 KNHAES involved 7,992 respondents in total. In the present study, 1,528 individuals without missing values were selected as final subjects from 1,653 elderly Korean aged 65 or above.

2.3. Instruments

2.3.1. Sociodemographic characteristics

As the subjects' general characteristics, gender, age, areas of residence, education levels, marital status, income levels, and occupations were used. Of these variables, areas of residence were divided into "urban" and "rural". The current marital status was reclassified into "having a spouse" and "living together", and occupations were also reclassified into "having" and "not having".

2.3.2. Health-related behavior

Health-related behaviors include the number of comorbidities, smoking, drinking, engaging in exercise or not, subjective health conditions, suicidal thoughts, and perceived stress. The number of comorbidities means the number of diseases from which one suffers after doctors' confirmation. For smoking, those who had smoked at least five packs in their lifetime and were currently smoking were classified as answering "yes". For drinking, those who had drunk at least one glass of alcohol over the past one year were classified as answering "yes." In addition, those who performed at least one of 1) strenuous physical activities that cause severe SOB, 2) moderate physical activities that cause moderate SOB, and 3) walking were classified as engaging in regular exercise. Subjective health conditions were reclassified into "good", "average", and "poor." For suicidal thoughts, the original survey's answers were used without change. In addition, perceived stress was reclassified into "high" and "low".

2.3.3. Use of medical services

For the study's data on medical service use, data on whether the following medical needs were met or not were extracted from the KNHAES's health survey results: 1) necessary medical services, 2) medical checkups, 3) cancer screening, 4) dental care, 5) oral examinations over the past one year. Unmet medical needs refer to cases in which an individual who needed services (examinations or treatments) from hospitals, clinics, or dental clinics could not receive them over the past one year. The answers to whether an individual used a specific medical service or not were classified into "yes" and "no".

2.3.4. HRQoL

For HRQoL, its values measured using the EuroQol-5 dimension (EQ-5D) were analyzed. The EQ-5D is a tool for measuring HRQoL. It comprises five multiple choice questions in five domains. Each sub-question is designed to be answered with one of three choices: "extreme problems", "some problems or moderate problems", and "no problems." The EQ-5D Index is obtained by applying weighted values to measured values for these five questions. These obtained values are interpreted in the range from 1 point, meaning the state of being healthy, to -1 point, meaning the state of being unhealthy. In this study, the values that KNHAES produced by applying a weighted scoring model were used as they were.

2.4. Data analysis methods

The study's data were analyzed using SPSS 25.0, and differences in general characteristics, health-related behavior, medical service use, and HRQoL between elderly Korean living alone and elderly Korean living with family were identified using descriptive statistics and t-tests. Differences in the subjects' HRQoL according to their general characteristics, health-related behavior, and medical service use were analyzed using the X²-test. To identify the factors that influence HRQoL in elderly Korean living alone and elderly Korean living with family, a multiple regression analysis was conducted using a concurrent input method by applying the significant variables resulting

from an univariable analysis as independent variables.

2.5. Ethical consideration

The KNHAES was conducted under approval by the Institutional Review Board (IRB) of KCDC (No. 2018-01-03-P-A). On April 5, 2020, the present study's researcher received approval for data use and downloaded them via the link on the KCDC's website, which releases and provides the KNHAES's raw data. In addition, this study underwent a review for an examination exemption (IRB No. SMU-EX-2020-05-001) at the IRB of the organization to which the research belongs.

3. Results and Discussion

3.1. Differences in HRQoL according to sociodemographic characteristics, health-related behavior, and medical service use

In the study, Elderly Korean living alone showed higher proportions of women ($\chi^2=77.60$, $p<.001$), those living in rural areas ($\chi^2=22.47$, $p<.001$), and those aged 75 or above ($\chi^2=57.80$, $p<.001$) than elderly Korean living with family. Moreover, elderly Korean living alone included higher proportions of those whose education level was elementary school graduation or lower ($\chi^2=39.30$, $p<.001$) and those who were divorced, bereaved, separated, or single ($\chi^2=698.93$, $p<.001$). In terms of income levels, elderly Korean living alone had lower incomes ($\chi^2=110.37$, $p<.001$) than elderly Korean living with family. In addition, more elderly Korean living with family than elderly Korean living alone had occupations ($\chi^2=6.21$, $p=.007$).

Regarding the variables of health-related behavior, elderly Korean living alone exhibited higher frequencies of smoking ($\chi^2=50.04$, $p<.001$), drinking, ($\chi^2=12.48$, $p<.001$), poor subjective health conditions, ($\chi^2=11.41$, $p=.003$), and no regular exercise ($\chi^2=21.82$, $p<.001$).

In terms of the variables related to medical service use, elderly Korean living alone showed higher frequencies of not being able to receive necessary medical services ($\chi^2=6.36$, $p=.009$), medical checkups, ($\chi^2=14.84$, $p<.001$), and cancer screening ($\chi^2=9.32$, $p=.002$) than elderly Korean living with family. Moreover, compared to elderly Korean living with family, elderly Korean living alone showed higher frequencies of not being able to receive dental care ($\chi^2=6.04$, $p=.008$) and oral examinations ($\chi^2=6.04$, $p=.008$). The HRQoL of elderly Korean living alone was lower than elderly Korean living with family ($t=24.48$, $p<.001$) as shown in table 1.

Table 1: Demographic Characteristics of Two Groups (N=1,528)

Variables	Categories	Elderly Korean living Alone(N=365)	Elderly Korean not living Alone(N=1,163)	χ^2 or t (p)
		N (%) or M \pm SD	N (%) or M \pm SD	
Gender	Male	82 (22.5)	565 (48.6)	77.60 (.000)**
	Female	283 (77.5)	598 (51.4)	
Living area	Urban	239 (65.5)	905 (77.8)	22.47 (.000)**
	Rural	126 (34.5)	258 (22.2)	
Age (years)	65–69	66 (18.1)	409 (35.2)	57.80 (.000)**
	70–74	89 (24.4)	331 (28.5)	
	≥ 75	210 (57.5)	432 (36.4)	
Education	\leq Elementary school	253 (70.3)	609 (52.6)	39.30 (.000)**
	Middle school	51 (14.2)	193 (16.7)	
	\geq High school	56 (15.6)	355 (30.7)	
Marital status	Divorced, Unmarried, widowed	32 (8.8)	187 (16.1)	698.93 (.000)**
	Married, living with spouse	333 (91.2)	976 (83.9)	
Income	Quartile 1	147 (40.4)	233 (20.2)	110.37 (.000)**
	Quartile 2	109 (29.9)	267 (23.1)	
	Quartile 3	80 (22.0)	302 (26.1)	
	Quartile 4	28 (7.7)	354 (30.6)	
Occupation	No	255 (71.0)	739 (63.9)	6.21 (.007)*
	Yes	104 (29.0)	418 (36.1)	

Number of comorbidities	None	249 (68.2)	730 (62.8)	4.89 (.179)
	1	77 (21.1)	305 (26.2)	
	2	27 (7.4)	97 (8.3)	
	≥3	12 (3.3)	31 (2.7)	
Smoking status	No	75 (20.5)	687 (59.1)	50.04 (.000)**
	Yes	290 (79.5)	476 (40.9)	
Alcohol drinking status	No	78 (21.4)	803 (69.0)	12.48 (.000)**
	Yes	287 (78.6)	360 (31.0)	
Subjective health status	Good	61 (16.7)	260 (22.4)	11.41 (.003)*
	Common	166 (45.5)	564 (48.5)	
	Poor	138 (37.8)	339 (29.1)	
Regular exercise	No	336 (92.1)	952 (81.9)	21.82 (.000)**
	Yes	29 (7.9)	211 (18.1)	
Suicidal ideation	No	347 (95.1)	1143 (98.3)	11.81 (.001)*
	Yes	18 (4.9)	20 (1.7)	
Perceived stress	Low	295 (81.3)	949 (81.7)	.041 (.447)
	High	68 (18.7)	212 (18.3)	
Medical service use				
Unmet medical needs	No	315 (86.3)	1057 (90.9)	6.36 (.009)*
	Yes	50 (13.7)	106 (9.1)	
Medical check-up	No	129 (35.3)	291 (25.0)	14.84 (.000)**
	Yes	236 (64.7)	872 (75.0)	
Cancer screening	No	135 (37.0)	332 (28.5)	9.32 (.002)*
	Yes	230 (63.0)	831 (71.5)	
Unmet dental needs	No	200 (54.8)	718 (61.7)	5.58 (.011)*
	Yes	165 (45.2)	445 (38.3)	
Dental check-up	No	285 (78.1)	832 (71.5)	6.04 (.008)*
	Yes	80 (21.9)	331 (28.5)	
EQ-5D index		0.85±0.18	0.89±0.14	24.48 (.000)**

3.2.HRQoL according to sociodemographic characteristics, health-related behavior, and medical service use

Among the elderly Korean living alone, those living in rural areas ($F=9.87$, $p=.002$), those aged 75 or above ($F=7.29$, $p=.001$), those with elementary school graduation or lower education ($F=6.20$, $p=.002$), those who were unemployed ($F=5.74$, $p=.017$), those with two comorbidities ($F=4.47$, $p=.004$), drinkers ($F=4.08$, $p=.044$), those with poor subjective health conditions ($F=92.04$, $p<.001$), those who highly perceived their stress ($F=20.75$, $p<.001$), and those with unmet medical needs ($F=33.23$, $p<.001$) showed low levels of HRQoL.

Among the elderly Korean living with family, women ($F=26.98$, $p<.001$), those living in rural areas ($F=18.69$, $p<.001$), those aged 75 or above ($F=23.38$, $p<.001$), those with elementary school graduation or lower education ($F=24.09$, $p<.001$), those who were unemployed ($F=22.29$, $p<.001$), those with at least three comorbidities ($F=3.62$, $p=.013$), smokers ($F=14.86$, $p<.001$), drinkers ($F=31.54$, $p<.001$), those with poor subjective health conditions ($F=161.50$, $p<.001$), those without regular exercise ($F=14.52$, $p<.001$), those with suicidal thoughts ($F=9.99$, $p=.002$), those who highly perceived their stress ($F=75.39$, $p<.001$), those with unmet medical needs ($F=37.84$, $p<.001$), those who did not take medical checkups ($F=10.12$, $p=.002$), those who did not take cancer screening ($F=11.49$, $p=.001$), those with unmet dental care needs ($F=5.75$, $p=.017$), and those

who did not take dental examinations ($F=18.46$, $p<.001$) exhibited low levels of HRQoL as shown in table 2.

Table 2: HRQoL(EQ-5D Index) Based on General Characteristics, Health-related Behavior, and Medical Service Use (N=1,528)

Variables	Categories	Elderly Korean living alone		Elderly Korean not living alone	
		M±SD	F (p)	M±SD	F (p)
Gender	Male	0.87±0.19	1.51 (.219)	0.92±0.13	26.98 (.000)**
	Female	0.84±0.18		0.87±0.15	
Living area	Urban	0.87±0.17	9.87 (.002)*	0.90±0.13	18.69 (.000)**
	Rural	0.81±0.19		0.86±0.15	
Age (years)	65–69	0.90±0.13	7.29 (.001)*	0.92±0.12	23.38 (.000)**
	70–74	0.88±0.15		0.90±0.13	
	≥75	0.82±0.20		0.86±0.16	
Education	≤Elementary school	0.83±0.19	6.20 (.002)*	0.87±0.15	24.09 (.000)**
	Middle school	0.89±0.14		0.91±0.12	
	≥High school	0.90±0.13		0.93±0.11	
Marital status	divorced, Unmarried, widowed	0.84±0.18	1.73 (.188)	0.85±0.17	24.98 (.000)**
	Married, living with spouse	0.89±0.14		0.90±0.13	
Income	Quartile 1	0.82±0.19	7.47 (.000)**	0.88±0.14	0.63 (.595)
	Quartile 2	0.81±0.19		0.89±0.14	
	Quartile 3	0.92±0.11		0.89±0.14	
	Quartile 4	0.89±0.17		0.90±0.14	
Occupation	No	0.83±0.18	5.74 (.017)*	0.88±0.15	22.29 (.000)**
	Yes	0.88±0.17		0.92±0.11	
Number of comorbidities	None	0.87±0.16	4.47 (.004)*	0.90±0.13	3.62 (.013)*
	1	0.82±0.20		0.87±0.16	
	2	0.74±0.23		0.89±0.13	
	≥3	0.82±0.23		0.87±0.16	
Smoking status	No	0.86±0.19	0.39 (.529)	0.91±0.13	14.86 (.000)**
	Yes	0.84±0.18		0.88±0.15	
Alcohol drinking status	No	0.88±0.15	4.08 (.044)*	0.93±0.10	31.54 (.000)**
	Yes	0.84±0.19		0.88±0.15	

Subjective health status	Good	0.96±0.07	92.04 (.000)**	0.96±0.07	161.50 (.000)**
	Common	0.82±0.10		0.92±0.11	
	Poor	0.71±0.20		0.79±0.17	
Regular exercise	No	0.84±0.18	0.24 (.623)	0.89±0.15	14.52 (.000)**
	Yes	0.86±0.19		0.93±0.10	
Suicidal ideation	No	0.85±0.18	2.65 (.104)	0.89±0.14	9.99 (.002)*
	Yes	0.78±0.23		0.79±0.27	
Perceived stress	Low	0.87±0.15	20.75 (.000)**	0.91±0.12	75.39 (.000)**
	High	0.76±0.25		0.82±0.19	
Medical service use					
Unmet medical needs	No	0.87±0.16	33.23 (.000)**	0.90±0.13	37.84 (.000)**
	Yes	0.71±0.23		0.81±0.18	
Medical check-up	No	0.82±0.20	3.73 (.054)	0.87±0.16	10.12 (.002)*
	Yes	0.86±0.16		0.90±0.13	
Cancer screening	No	0.82±0.20	3.82 (.051)	0.87±0.16	11.49 (.001)**
	Yes	0.86±0.16		0.90±0.13	
Unmet dental needs	No	0.85±0.18	0.12 (.728)	0.90±0.13	5.75 (.017)*
	Yes	0.84±0.18		0.88±0.15	

3.3. Factors influencing HRQoL

To identify the factors that influence HRQoL in elderly Korean living alone and elderly Korean living with family, a multiple regression analysis using a concurrent input method was performed by applying the statistically significant variables resulting from an univariable analysis as independent variables. For elderly Korean living alone, household incomes, subjective health conditions, perceived stress, and unmet medical needs were associated with HRQoL, and the model's explanatory power was 36.4%. In addition, those with lower income levels, poorer subjective health conditions, higher perceived stress, and unmet medical needs exhibited lower levels of HRQoL.

In elderly Korean living with family, age, marital status, occupations, subjective health conditions, regular exercise, perceived stress, and unmet medical needs were linked with HRQoL, and the model's explanatory power was 29.0%. Moreover, those who were older and with poorer subjective health conditions, no regular exercise, higher perceived stress, and unmet medical needs showed lower levels of HRQoL as shown in table 3.

Table 3: Factors Associated with HRQoL (N=1,528)

Model	Variables	Unstandardized coefficient		Standardized coefficient	t	p
		B	SE	β		
	(Constant)	1.01	.07			
	Living area	-.02	.01	-.07	-1.60	.110
	Age	-.02	.01	-.08	-1.86	.063
	Education (≥high school)	-.00	.01	-.03	-.69	.486

	Income (quartile 1)	.01	.00	.09	1.99	.047*
	Occupation (no)	-.01	.01	-.04	-.97	.332
	Number of comorbidities	-.01	.01	-.07	-1.65	.098
	Alcohol drinking status (no)	.02	.01	.05	1.24	.215
	Subjective health status (good)	-.10	.01	-.42	-9.08	< .001**
	Perceived stress (low)	-.06	.02	.13	-2.94	.003*
	Unmet medical needs	.08	.02	-.16	3.60	< .001**
R ² =.364, Adjusted R ² =.346, F=19.75, p < .001.						
	(Constant)	.94	.07			
	Gender	-.01	.01	-.03	-0.79	.048
	Living area	-.02	.00	-.07	-2.84	.005*
	Age	-.02	.00	-.12	-4.32	< .001**
	Education (≥high school)	.00	.00	.03	1.18	.238
	Marital status (unmarried)	-.02	.01	-.07	-2.74	.006*
	Occupation (no)	-.01	.00	-.06	-2.24	.023*
	Number of comorbidities	-.00	.00	-.00	-0.27	.787
	Smoking status (no)	-.00	.01	-.01	-0.46	.640
	Alcohol drinking status (no)	.01	.00	.04	1.65	.098
	Subjective health status (good)	-.07	.00	-.34	-12.89	< .001**
	Regular exercise (no)	.06	.03	.05	2.29	.022*
	Perceived stress (low)	-.05	.01	-.14	-5.48	< .001**
	Unmet medical needs	.05	.01	.10	3.93	< .001**
	Medical check-up	.01	.01	.04	0.90	.366
	Cancer screening	-.01	.01	-.04	-0.94	.344
	Unmet dental needs	.00	.00	.02	0.91	.359
	Dental check-up	.00	.00	.01	0.62	.530
R ² =.290, Adjusted R ² =.279, F=27.28, p < .001.–.03						

This study was conducted to identify factors influencing HRQoL in elderly Korean living alone and elderly Korean living with family by using the 7th Third-Year KNHAES conducted in 2018. As a result, compared to elderly Korean living with family,

elderly Korean living alone showed more frequent cases of smoking, drinking, and not engaging in regular exercise. When establishing drinking and smoking-related health care programs and policies, it will be necessary to consider these characteristics of the elderly Korean living alone. In the use of medical services, 13.7% of elderly Korean living alone and 9.1% of elderly Korean living with family experienced unmet medical needs. Moreover, in relation to this, 35.3% of elderly Korean living alone did not take medical checkups, compared to 28.5% of elderly Korean living with family. This result was also statistically significant. In the use of every medical service, elderly Korean living alone exhibited a higher ratio of non-recipients than those living with family. In a previous study on unmet medical services and HRQoL, elderly Korean with unmet medical needs showed lower levels of quality of life than elderly Korean without unmet medical needs[12]. Another previous research reported that the most influential factor related to unmet medical needs was household incomes, and a group with poorer subjective health conditions, lower household incomes, and lower education levels were most likely to experience unmet medical needs, and those with lower income and education levels engaged in fewer activities aimed at enhancing health, such as medical checkups[13]. In South Korea, the rate of experiencing unmet medical needs has continued to fall and is currently at a similar level to those of 27 countries in the European Union, but this rate is still shown higher in the country's high-income group than low-income group[14]. Therefore, when establishing policies to resolve unmet medical needs, a focus should be placed on low-income elderly Korean who live alone. In addition, detailed and practical support should be provided by identifying factors related to the unmet medical needs and cancer screening of elderly Korean living alone.

In the present study, elderly Korean living alone showed lower levels of HRQoL than elderly Korean living with family. These elderly Korean form a health-related vulnerable group that has relatively poor health conditions and lacks resources to respond to emergencies[15]. They also can have multiple health problems given their nature of being prone to irregular living habits and social isolation[13]. Accordingly, it is necessary to provide interventions and policy support to improve the HRQoL of the elderly Korean living alone by identifying factors influencing their HRQoL. This may be an urgent task considering the recent increasing trend in the number of elderly Korean living alone.

The factors influencing HRQoL in elderly Korean living alone included household incomes, subjective health conditions, perceived stress, and unmet medical needs. The equivalent factors in elderly Korean living with family included age, marital status, occupations, subjective health conditions, regular exercise, perceived stress, and unmet medical needs. According to a previous study[9], elderly Korean living alone who had poor subjective health conditions either complained of their sufferings or expressed sadness about their solitary lives with sickness. Because the subjects showed differences between those living alone and those living with family in the factors influencing their HRQoL, these differences should be incorporated into the establishment of health-related policies for the elderly. Moreover, in the case of subjective health conditions, perceived stress, and unmet medical needs, both groups showed the impact of these variables on their HRQoL. Accordingly, these characteristics should be factored into new health-related policies. Furthermore, the suggestion of realistic policies and continuous monitoring are required to prevent or reduce unmet medical needs through the detailed identification of the current state and causes of unmet medical needs.

4. Conclusion

The present study is a secondary analysis on data extracted from the 7th Third-Year KNHAES conducted by KCDC in 2018 in order to compare elderly Korean living alone and elderly Korean living with family in terms of their health-related behavior, medical service use, and HRQoL. The study results showed regarding their health-related behavior that elderly Korean living alone had higher frequencies of smoking, drinking, and no regular exercise than elderly Korean living with family.

In the use of medical services, elderly Korean living alone exhibited a higher ratio of non-recipients than elderly Korean living with family. In terms of HRQoL, elderly Korean living alone showed lower levels of HRQoL than those living with family. The factors influencing HRQoL were household incomes, subjective health conditions, perceived stress, and unmet medical needs among the elderly Korean living alone, and age, marital status, occupations, subjective health conditions, perceived stress, and unmet medical needs among the elderly Korean living with family. Consequently, the respective characteristics of elderly Korean who live alone and live with family in relation to their health-related behavior and medical service use should be reflected in the establishment of health-related policies. In addition, efficient and realistic tailored policies should be provided to both groups in consideration of the factors influencing their HRQoL.

Meanwhile, since the present study focused on identifying the subjects' health-related behaviors and whether they were using medical services as a secondary analysis study based on the raw data of the 2018 KNHAES, it has a limitation of failing to identify various categories of health-related behavior and medical service use. Therefore, future studies are recommended to further segment and identify the subjects' health-related behaviors and actual conditions of medical service use, and based on the results, understand the relationship between these variables and HRQoL.

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