Factors Influencing Health-Related Quality of Life of People who Eat Alone

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Factors Influencing Health-Related Quality of Life of People who Eat Alone

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Abstract

Background: The Andersen model was utilized to identify differences in the predictors of quality of life (QOL) between people who eat alone and those who do not.
Methods: Data of 5,432 adults who responded to a question about having company for meals from the 2016 KNHANES were analyzed. Using the Andersen model, the parameters were classified into predisposing factors, enabling factors, need factors, and health behaviors; differences in the influences of each parameter category on QOL, depending on company during meals, were analyzed using logistic regression.
Results: Individuals who ate alone included higher percentages of older women living alone, people with no medical aid or private insurance membership, low education and income, more chronic diseases, poorer perceived health, activity restrictions and unmet health care needs, and smoking and drinking, and lower health examination rates. Differences in the predictors of each domain of health-related QOL (HRQOL) were analyzed according to the absence of company during meals. Perceived health status was a predictor of all domains of HRQOL regardless of eating alone or not; age, activity restrictions, sex, and number of chronic diseases predicted two to four domains of QOL. Factors predicting QOL only among individuals who ate alone were sex (mobility, self-care, and usual activities), number of chronic diseases and health examination (pain/discomfort), and private insurance membership (anxiety/depression).
Conclusion: The results verify the potential of using the Andersen model for measuring HRQOL. These findings highlight the need for tailored welfare services, social policies, and programs for people who eat without company.

Keywords: eating alone, eating together, health-related quality of life, Andersen model

1. Background

The number of single-person households in South Korea has risen from 5.20 million in 2015 (27.2%) to 6.15 million in 2019 (30.2%), with three out of every ten households being single-person households [1]. Owing to such a dramatic increase in single-person households and a transition to an individual-centered social structure, the number of people who eat alone is growing. [2,3]. Moreover, the social distancing mandates amid the coronavirus disease 2019 (COVID-19) pandemic have further increased the practice of eating alone.

Researchers have actively studied eating alone in South Korea since 2018, but most studies have focused on the motives for eating alone and the relevant marketing implications [4]. Additionally, past studies on the health-related implications of eating alone have focused on obesity [5], metabolic syndrome [6], depression [2,7,8], and quality of life (QOL) [2,8], predominantly examining people who eat alone [2,5,6,7] or the differences between eating alone and eating with other people for a particular group of people [8].

QOL is a health index influenced not only by one's general wellbeing but also by the severity of disease that encompasses physical, psychological, social, and mental health as well as perceived health status and health behaviors, and it is widely utilized as a health indicator worldwide [9]. While the lifespan in Korea has increased, owing to dramatic social, economic, and medical advances, Koreans' healthy life expectancy—the number of years an individual is expected to live disease-free—is approximately 20 years less than the life expectancy [10]. As QOL is being increasingly valued, as opposed to simply living longer, the need for health-related QOL (HRQOL) is anticipated to rise [11]. HRQOL is an indicator of the health status of a population and represents multidimensional, subjectively-rated health status, spanning physical, mental, and social health [12]. Since 2005, the Korea National Health and Nutrition Examination Survey (KNHANES) has assessed HRQOL using the Euro Quality of Life–five dimensions (EQ-5D).

This study aimed to examine the differences in the predictors of QOL according to eating alone using the Andersen model of health services utilization as the analytical framework. Andersen's behavioral model was developed to analyze the predictors of individuals' health care utilization; it has been validated for factor classification in many studies, and it comprehensively describes internal and external factors, rendering it appropriate for behavioral prediction [13]. In the present study, the Andersen model informed the analysis of the associations among predisposing factors, enabling factors, need factors, and health behaviors to clarify the differences in the predictors of QOL according to eating alone, ultimately to present foundational data for developing measures to systematically manage and improve HRQOL.

2. Materials and Methods

2.1 Design

A cross-sectional design was used, employing the Andersen model as the analytical framework, to investigate the differences in the predictors of QOL according to eating alone.

2.2 Study Population

We used the 2016 data from the most recent KNHANES (7th; 2016–2018), which is an annual rolling sample survey conducted on Korean nationals aged 1 year or above to examine their health status, health behaviors, and food and nutritional intake. The survey generates data for the formulation of health policies, such as setting and assessing goals for the Health Plan and developing health-promoting programs (Korea Disease Control and Prevention Agency, 2016).

The 7th KNHANES (2016) enrolled 8,150 participants. Of these, 5,432 adults who answered the question about having company for lunch and dinner were included in this study. 2,284 of the participants reported that they generally eat alone at least once a day during lunch or dinner, and 3,148 said that they generally eat both lunch and dinner with someone.

This study was approved by the Institutional Review Board of Inje University (no. 2019-09-007).

2.3 Measures

The dependent variable (HRQOL) was measured using the EQ-5D-3L, which comprises five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each item is rated on a three-point scale, with response

options of “no problem,” “some problems,” and “extreme problem.” In this study, we used QOL as a binomial qualitative variable with “no problem” and “problem” as the possible responses; 1 was set as the maximum score, with a lower score indicating poorer QOL.

Based on the available data, the factors to be included in the analysis were classified into predisposing factors, enabling factors, need factors, and health behaviors using the Andersen model. Predisposing factors included sex, age (≤ 65 years, > 65 years), education level (≤ high school, ≥ college), and marital status (presence of spouse); enabling factors included history of National Basic Livelihood Security (NBLS) benefits, type of health insurance (health insurance, medical aid), private insurance membership, household income (ten thousand KRW), cohabiting family members, and activity restrictions; need factors included the number of chronic diseases, perceived health status (not bad, bad), and unmet health care needs; and health behaviors included smoking status (smoker if smoked at least one cigarette in the past year), drinking status (drinker if had at least one drink in the past year), physical activity engagement (moderate intensity activity in leisure time), and health examination history. The following 13 chronic diseases out of the 27 surveyed by the KNHANES were included based on the World Health Organization (WHO) definition of chronic diseases: hypertension, stroke, myocardial infarction, angina, diabetes mellitus, gastric cancer, liver cancer, colorectal cancer, breast cancer, cervical cancer, lung cancer, thyroid cancer, and other types of cancer.

People who reported generally eating lunch or dinner alone were defined as people who eat alone, and those who reported generally eating both lunch and dinner with someone were defined as people who eat with others.

2.4 Statistical Analysis

Differences in the predictors of QOL according to the absence of company during meals, using the Andersen model, were analyzed using SAS (version 9.4). Each factor was analyzed using frequency and descriptive statistics to examine the general characteristics. All four factors were added to the logistic regression model in the order specified in existing studies, to compare their effects on HRQOL according to eating alone using the Andersen model. The data used in this study are nationally representative, and we used stratification, clusters, and weights for our analyses.

3. Results

3.1 General Characteristics of the Multimorbidity

We analyzed sex, age, education level, and marital status as predisposing factors. The eat-alone group comprised 36.4% men and 63.6% women, and the eat-with-others group comprised 55.1% men and 44.9% women. In terms of age, 80.4% of people in the eat-alone group were aged 65 years or below and 19.6% were aged 66 years or above; the eat with-others group comprised 87.1% of people aged 65 years or below and 12.9% aged 66 years or above, showing that the percentage of older adults (>65 years) was higher among those who ate alone compared to those who ate with others. Regarding education level, the eat-alone group had a higher percentage of people with a high school diploma or lower (64.0%; 36.0% had bachelor’s degree or higher) compared to the eat-with-others group (57.6% had high school diploma or lower, 42.5% had bachelor’s degree or higher). In terms of marital status, the eat-alone group comprised a higher percentage of people without a spouse (57.7% with spouse, 42.4% without spouse) than the eat-with-others group (72.9% with spouse, 27.1% without spouse).

The history of NBLS benefits, type of health insurance, private insurance membership, household income, cohabiting family members, and activity restrictions were examined as enabling factors. There were no statistically significant differences in the history of NBLS benefits according to the presence of company during meals; the percentages of people who had and had not received NBLS benefits in the past were 92.7% and 7.3%, respectively, in the eat-alone group and 94.4% and 5.6%, respectively, in the eat-with-others group. Regarding the type of health insurance, there was a higher percentage of people receiving medical aid in the eat-alone group (95.5% health insurance, 4.5% medical aid) than in the eat-with-others group (97.4% health insurance, 2.6% medical aid). Additionally, a lower percentage of people owned a private insurance policy in the eat-alone group (77.0% yes, 23.0% no) than in the eat-with others group (83.5% yes, 16.5% no). In terms of household income, the eat-alone group had a lower household income (3.927 million KRW)

than the eat-with-others group (4.519 million KRW). A higher percentage of people in the eat-alone group lived without family (81.7% live with family, 18.3% live without family) than in the eat-with-others group (96.5% live with family, 3.5% without family). The percentage of people with restricted activities was also higher in the eat-alone group (90.6% no activity restriction, 9.4% activity restriction) than in the eat-with-others group (94.1% no activity restriction, 5.9% activity restriction).

As need factors, we analyzed the number of chronic diseases, perceived health status, and unmet health care needs. The mean number of chronic diseases was 0.4 in the eat-alone group (20.5% had 1 disease, 7.6% had 2 diseases, 1.8% had ≥3 diseases) and 0.3 in the eat-with-others group (17.5 had 1 disease, 5.8% had 2 diseases, 1.0% had ≥3 diseases). Regarding perceived health, a higher percentage of people perceived themselves as having poor health in the eat-alone group (77.4% not bad, 22.6% bad) than in the eat-with-others group (84.8% not bad, 15.2% bad). Furthermore, there was a higher percentage of people with unmet health care needs in the eat-alone group (90.3% had no unmet health care needs, 9.7% had unmet health care needs) than the eat-with-others group (92.2% had no unmet health care needs, 7.8% had unmet health care needs).

As health behaviors, we examined smoking status, drinking status, physical activity engagement, and health examinations. The eat-alone group had lower smoking and drinking rates (81.2% non-smokers, 18.8% smokers; 30.7% no drinking, 69.3% drinking) than the eat-with-others group (74.9% non-smokers, 25.1% smokers; 20.0% no drinking, 80.0% drinking). There was no statistically significant difference in physical activity engagement (moderate-intensity leisure activity) between the eat-alone group (23.2% yes, 76.8% no) and the eat-with-others group (24.8% yes, 75.2% no). A lower percentage of people received regular physical examination in the eat-alone group (60.2% yes, 39.8% no) than in the eat-with-others group (68.8% yes, 31.2% no).

Regarding the dependent variable, measured using EQ-5D, for each domain, the percentage of people with a problem was generally higher in the eat-alone group than in the eat-with-others group (mobility: 14.1% and 9.8%, respectively; self-care: 3.8% and 2.7%, respectively; usual activities: 8.7% and 4.9%, respectively; pain/discomfort: 23.5% and 17.5%, respectively; anxiety/depression: 12.2% and 7.7%, respectively). The mean EQ-5D score was 0.9 in the eat-alone group and 1.0 in the eat-with-others group, showing that people who eat-alone have a lower QOL(Table 1).

3.2 Factors Affecting HRQOL

We analyzed the predictors of the mobility domain of QOL among people who ate alone. In Model 1 (predisposing factors), women, people aged >65 years, people with a high school diploma or lower, and people without a spouse had more problems with mobility. In Model 2 (predisposing factors+enabling factors), women, people aged >65 years, people with a high school diploma or lower, medial aid recipients, people without a private insurance policy, and people with activity restrictions had more problems with mobility. In Model 3 (predisposing factors+enabling factors+need factors), women, people aged >65 years, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, and people with poor perceived health had more problems with mobility. In Model 4 (predisposing factors+enabling factors+need factors+health behaviors), women, people aged >65 years, people with activity restrictions, people with more chronic diseases, and people with poor perceived health had more problems with mobility.

Analysis of the predictors of mobility among people who ate with others showed that in Model 1, women, people aged >65 years, and those with a high school diploma or lower had more problems with mobility. In Model 2, women, people aged >65 years, people with a high school diploma or lower, people with a spouse, people without a private insurance policy, people with a lower household income, and people with activity restrictions had more problems with mobility. In Model 3, people aged >65 years, people with a spouse, people without private insurance policy, people with activity restrictions, people with more chronic diseases, people with poor perceived health, and people with unmet health care needs had more problems with mobility. In Model 4, people aged >65 years, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, people with poor perceived health, and people with unmet health care needs had more problems with mobility.

Further, the predictors of mobility were compared between the two groups. In Model 1, marital status predicted mobility only in the eat-alone group. In Model 2, the type of health insurance was a predictor only in the eat-alone group, while marital status and household income were predictors only in the eat-with-others group. In Model 3, sex was a predictor only in the eat-alone group, while marital status and unmet health care needs were predictors only in the eat-with-others group. In Model 4, sex was a predictor only in the eat-alone group, while private health insurance membership and unmet health care needs were predictors only in the eat-with-others group(Table 2).

We analyzed the predictors of the self-care domain of QOL among people who ate alone. In Model 1, people aged >65 years and those with a high school diploma or lower had more problems with self-care. In Model 2, people aged >65 years and those with activity restrictions had more problems with self-care. In Models 3 and 4, people aged >65 years, people with activity restrictions, people with more chronic diseases, and those with poor perceived health had more problems with self-care.

The predictors of self-care were analyzed among people who ate with others. In Model 1, people aged >65 years and those with a high school diploma or lower had more problems with self-care. In Model 2, people aged >65 years, those without a private insurance policy, and those with activity restrictions had more problems with self-care. In Models 3 and 4, people aged >65 years, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, and people with poor perceived health had more problems with self-care.

We compared the predictors of the self-care domain of QOL between the two groups. In Model 1, there were no differences between the eat-alone and eat-with-others groups; however, in Models 2, 3, and 4, private insurance membership influenced the self-care dimension only in people who ate with others(Table 3).

We analyzed the predictors of the usual activities domain of QOL among people who ate alone. In Model 1, people aged >65 years and those without a spouse had more problems with usual activities. In Model 2, women, people aged >65 years, people who had received NBLS benefits, people without a private insurance policy, and people with activity restrictions had more problems with usual activities. In Models 3 and 4, women, people aged >65 years, people who had received NBLS benefits, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, and people with poor perceived health had more problems with usual activities.

For the predictors of usual activities among people who ate with others, in Model 1, people aged >65 years had more problems with their usual activities. In Model 2, people aged >65 years, people without a private insurance policy, people with lower household income, and people with activity restrictions had more problems with usual activities. In Models 3 and 4, people aged >65 years, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, and people with poor perceived health had more problems with usual activities.

A comparison of the predictors of the usual activities domain of QOL between the two groups showed that marital status in Model 1 and sex and NBLS in Models 2, 3, and 4 were predictors only among people who ate alone, while household income in Model 2 was a predictor only among people who ate with others(Table 4).

We analyzed the predictors of the pain/discomfort domain of QOL among people who ate alone. In Model 1, women, people aged >65 years, people with a high school diploma or lower, and people without a spouse had more problems with pain/discomfort. In Model 2, women, people aged >65 years, people with a high school diploma or lower, and people with activity restrictions had more problems with pain/discomfort. In Model 3, women, people with activity restrictions, people with more chronic diseases, people with poor perceived health, and people with unmet health care needs had more problems with pain/discomfort. In Model 4, women, people with activity restrictions, people with more chronic diseases, people with poor perceived health, people with unmet health care needs, and people who received health examinations had more problems with pain/discomfort.

Analysis of the predictors of the pain/discomfort domain of QOL among people who ate with others showed that in Model 1, women, people aged >65 years, people with a high school diploma or lower, and people with a spouse had more problems with pain/discomfort. In Model 2, women, people aged >65 years, people with a spouse, people with lower household income, and people with activity restrictions had more problems with pain/discomfort. In Models 3

and 4, women, people aged >65 years, people with a spouse, people with activity restrictions, people with poor perceived health, and people with unmet health care needs had more problems with pain/discomfort.

We compared the predictors of the pain/discomfort domain of QOL between the two groups. There were no differences in the predictors between the two groups in Model 1. In Model 2, education level was a predictor only in the eat-alone group, while marital status and household income were predictors only in the eat-with-others group. In Model 3, the number of chronic diseases was a predictor only in the eat-alone group, while age and marital status were predictors only in the eat-with-others group. In Model 4, the number of chronic diseases and health examination were predictors only in the eat-alone group, while age and marital status were predictors only in the eat-with-others group(Table 5).

Analysis of the predictors of the anxiety/depression domain of QOL among people who ate alone showed that in Model 1, women and people without a spouse had more problems with anxiety and depression. In Model 2, women, people without a private insurance policy, and people with activity restrictions had more problems with anxiety/depression. In Model 3, women aged ≤65 years, people without a private insurance policy, people with activity restrictions, people with poor perceived health, and people with unmet health care needs had more problems with anxiety/depression. In Model 4, women, people without a private insurance policy, people with activity restrictions, people with poor perceived health, and people with unmet health care needs had more problems with anxiety/depression.

In terms of the predictors of the anxiety/depression domain of QOL among people who ate with others, in Model 1, women, people aged >65 years, and people without a spouse had more problems with anxiety/depression. In Model 2, women, people without a spouse, people with lower household income, and people with activity restrictions had more problems with anxiety/depression. In Model 3, women, people without a spouse, people with activity restrictions, people with poor perceived health, and people with unmet health care needs had more problems with anxiety/depression. In Model 4, women, people without a spouse, people with activity restrictions, people with poor perceived health, people with unmet health care needs, and smokers had more problems with anxiety/depression.

A comparison of the predictors of the anxiety/depression domain of QOL between the two groups showed that in Model 1, age was a predictor only in the eat-with-others group. In Model 2, private insurance membership was a predictor only in the eat-alone group, while marital status and household income were predictors only in the eat-with-others group. In Model 3, age and private insurance membership were predictors only in the eat-alone group, while marital status was a predictor only in the eat-with-others group. In Model 4, private insurance membership was a predictor only in the eat-alone group, and marital status and smoking status were predictors only in the eat-alone group(Table 6).

We analyzed the predictors of the EQ-5D index among people who ate alone. In Model 1, women, people aged >65 years, people with a high school diploma or lower, and people without a spouse had a lower QOL. In Model 2, women, people aged >65 years, people with a high school diploma or lower, people without a spouse, medical aid recipients, people without a private insurance policy, and people with activity restrictions had a lower QOL. In Models 3 and 4, women, people aged >65 years, people without a spouse, medical aid recipients, people without a private insurance policy, people with activity restrictions, people with more chronic diseases, people with poor perceived health, and people with unmet health care needs had a lower QOL.

Analysis of the predictors of the EQ-5D index among people who ate with others showed that in Model 1, women, people aged >65 years, and people with a high school diploma or lower had a lower QOL. In Model 2, women, people aged >65 years, people without a private insurance policy, people with lower household income, and people with activity restrictions had a lower QOL. In Models 3 and 4, women, people aged >65 years, people without a private insurance policy, people with lower household income, people with activity restrictions, people with poor perceived health, and people with unmet health care needs had a lower QOL.

We compared the predictors of the QOL score between the two groups. In Model 1, marital status was a predictor only in people who ate alone. In Model 2, education level, marital status, and type of health insurance were predictors only in people who ate alone, while household income was a predictor only in people who ate with others. In Models 3

and 4, marital status, type of health insurance, and number of chronic diseases were predictors only in people who ate alone, while household income was a predictor only in people who ate with others(Table 7).

4. Discussion

This study aimed to investigate the differences in the predictors of QOL between Korean adults who eat alone and those who eat with others, employing the Andersen model on the 2016 data from the 7th KNHANES.

Regarding the predisposing factors, the percentages of women, older adults (>65 years), people with a high school diploma or lower, and people without a spouse were higher among those who ate alone compared to those who ate with others. This is consistent with previous results reporting that people who eat at least two meals alone per day comprise a higher percentage of women, with the mean age increasing and education level decreasing with increasing number of meals eaten alone [2] and that people who eat dinner alone are generally older, without a spouse, and less educated [6]. Regarding the enabling factors, the percentages of medical aid recipients, people without a private insurance policy, people not living with family members, and people with activity restrictions were higher among those who ate alone compared to those who ate with others, while the average monthly household income was lower among people who ate alone compared to those who ate with others. These results are consistent with previous findings that income level decreases with increasing number of meals eaten alone [2], that people who eat dinner alone have a lower income [6], and that the rate of private health insurance membership is lower among the low-income class [14]. Regarding the need factors, the number of chronic diseases, rate of poor perceived health status, and percentage of people with unmet health care needs were higher among people who ate alone compared to those who ate with others. These results are in line with previous findings that the higher-income class demonstrates greater understanding of disease and receives higher quality health care services compared to the lower-income class, and that the low-income class exhibits poor perceived health [14]. Regarding health behaviors, the smoking and drinking rates were lower among people who ate alone compared to those who eat with others, while the health examination rate was lower among people who ate alone compared to those who ate with others. These results are similar to previous findings that smoking is influenced by social factors, such as income and education level [6], people who engage in physical activities demonstrate a high HRQOL [14], and low income class shows a low health examination rate [15].

The increased average life expectancy has led to an increase in the number of older adults living alone, number of chronic diseases, and rate of activity restrictions, which in turn cause diminished social involvement, reduced income, and a higher rate of medical aid recipients among older adults [1,2,6,11,15]. Such reduction in income results in more low-income individuals who lack the financial resources to purchase private health insurance policies. Hence, these individuals receive health care services through the medical aid system but cannot access more costly health care services or preventive health care services, such as health examinations [16]. From this perspective, among people eating alone, older women in the low-income class with multiple chronic diseases are a more socially vulnerable group. Thus, tailored welfare services should be provided to this group, in addition to devising social policies and programs that address their needs.

We examined the predictors of QOL by each domain of QOL and EQ-5D scores between people who eat alone and those who eat with others. The predictors of the mobility domain of QOL were age, activity restriction, number of chronic diseases, and perceived health status, regardless of eating alone. Sex only predicted mobility among people who ate alone, while private insurance membership and unmet health care needs only predicted mobility among people who ate with others. The predictors of the self-care domain of QOL were age, activity restriction, number of chronic diseases, and perceived health status, regardless of eating alone, while private health insurance membership only predicted selfcare among people who ate with others. The predictors of the usual activities domain of QOL were age, private insurance membership, activity restriction, number of chronic diseases, and perceived health status, regardless of eating alone, but sex and NBLS only predicted usual activities among people who ate alone. The predictors of the pain/discomfort domain of QOL were sex, activity restriction, perceived health status, and unmet health care needs, regardless of eating alone. However, the number of chronic diseases and health examinations only predicted

pain/discomfort among people who ate alone, and age and marital status only predicted pain/discomfort among people who ate with others. The predictors of the anxiety/depression domain of QOL were sex, activity restriction, perceived health status, and unmet health care needs, regardless of eating alone, whereas private insurance membership only predicted anxiety/depression among people who ate alone, and smoking status and marital status only predicted anxiety/depression among people who ate with others.

Among the predictors of QOL, perceived health status affected all domains of QOL, regardless of eating alone, and age, activity restriction, sex, and number of chronic diseases affected two to four domains of QOL, regardless of eating alone. In addition, sex, age, activity restriction, and perceived health status influenced the EQ-5D score, regardless of eating alone. These results are in line with previous reports that perceived health status is an important factor in improving QOL [9]. A study analyzing the factors associated with HRQOL by age group [16] reported that sex, perceived health status, stress, and various disease-related factors influence HRQOL and that there were marked differences in QOL according to sex and perceived health status among older adults. Therefore, amid the growing older adult population, it is important to develop programs that maintain and promote health to prevent an increase in the prevalence of chronic diseases and programs that promote activity and enhance perceived health status among the older adult population, regardless of company during meals.

Sex was a predictor of the mobility, self-care, and usual activities domains of QOL only among people who ate alone, presumably due to the higher percentage of women in this group compared to those who ate with company. For the pain/discomfort domain of QOL, the number of chronic diseases and health examination were significant predictors only among people who ate alone, which can be attributed to the higher number of chronic diseases and lower rate of health examination in this group compared to those who ate with company; thus, having many chronic diseases increases pain/discomfort and such individuals seek health care, as opposed to getting regular health examinations. For the anxiety/depression domain of QOL, having private insurance was identified as a predictor only among people who ate alone. We can speculate that the relatively low income among those who ate alone and a low private insurance membership rate among the low-income class may have influenced the anxiety/depression domain. Marital status, type of health insurance, and number of chronic diseases predicted the EQ-5D score only among people who ate alone, presumably because many older adults who live alone eat alone, the higher percentage of medical aid recipients in this group due to the lower income level, and the greater number of chronic diseases suffered by people in this group compared to those who ate with others.

This study has some limitations. As it is a cross-sectional study, the present results cannot establish causality between QOL and eating alone. Furthermore, we did not consider the context or reasons for eating alone. As the context or reasons for eating alone may vary widely, subsequent studies should also examine the differences in QOL depending on the voluntariness of eating alone. Despite these limitations, this study comprehensively examined individuals' internal and external factors in analyzing the differences in the predictors of QOL according to the absence of company during meals by applying the Andersen model as the theoretical framework, and it verified the potential of using the Andersen model for assessing HRQOL, which is the key factor differentiating this study from past research that examined HRQOL based only on a QOL score.

5. Conclusions

This study aimed to investigate the differences in the predictors of QOL between people who eat alone and those who eat with others using the Andersen model. The results showed that the percentages of women, older adults, people with a high school diploma or lower, people without a spouse, medical aid recipients, people without a private health insurance, people who do not live with family, and people with activity restrictions were higher among people who ate alone compared to those who ate with others, and the monthly household income was lower among the former. In addition, the eat-alone group showed higher percentages of people with more chronic diseases, poor perceived health, unmet health care needs, and higher smoking and drinking rates, but a lower health examination rate than the eat-with-others group. Regarding the specific domains of QOL, perceived health status influenced all domains of QOL regardless of eating alone, while age, activity restriction, sex, and number of chronic diseases influenced two to four domains of

QOL, regardless of eating alone. Some factors were identified to predict QOL only among people who eat alone, namely sex for the mobility, self-care, and usual activities domains; number of chronic diseases and health examination for the pain/discomfort domain; and private health insurance membership for the anxiety/depression domain. Therefore, based on our findings, we recommend developing mental health and welfare services, social policies, and programs tailored to people eating alone.

Declarations

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Conflicts of interest

The authors declare no conflicts of interest that are relevant to the content of this article.

Availability of data and material

[The 2016 data from the most recent KNHANES (7th; 2016–2018)],
[https://knhanes.kdca.go.kr/knhanes/sub03/sub03_02_05.do]

Authors' contributions

Eunmi Lee: study conception and design, data analysis, drafting of manuscript, critical revisions, and final approval of the version to be submitted; Kuem Sun Han: drafting of manuscript; Jeonghyun Cho: drafting of manuscript; Taeyoun Kim: drafting of manuscript, critical revisions, and final approval of the version to be submitted.

Ethics approval

The study was approved by the Institutional Review Board of Inje University (no. 2019-09-007). Ethical issues regarding plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been addressed by the authors.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

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Table 1. General characteristics of eating alone and eating with company

		Class	Eating alone		Eating with company	
			%	mean±SD	%	mean±SD
Predisposing factors	Sex	Male	36.4%		55.1%	
		Female	63.6%		44.9%	
	Age	≤ 65 years	80.4%		87.1%	
		> 65 years	19.6%		12.9%	
	Education level	Below high school graduate	64.0%		57.6%	
		Above high school graduate	36.0%		42.5%	
	Marital status	Spouse	57.7%		72.9%	
		No spouse	42.4%		27.1%	
Enabling factors	NBLS	No	92.7%		94.4%	
		Yes	7.3%		5.6%	
	Type of health insurance	Health insurance	95.5%		97.4%	
		Medical aid	4.5%		2.6%	
	Private insurance membership	Yes	77.0%		83.5%	
		No	23.0%		16.5%	
	Household income *quantity: ten thousand KRW	Low	21.7%	392.7±305.7	13.9%	451.9±313.3
		Middle-low	23.8%		23.1%	
		Middle-high	25.8%		29.9%	
		High	28.7%		33.2%	
	Cohabiting family	Yes	81.7%		96.5%	
		No	18.3%		3.5%	
	Activity restriction	No	90.6%		94.1%	
		Yes	9.4%		5.9%	
Need factors	Number of chronic diseases	0	70.1%	0.4±0.8	75.8%	0.3±0.7
		1	20.5%		17.5%	
		2	7.6%		5.8%	
		3	1.6%		0.8%	
		4	0.2%		0.2%	
	Perceived health status	Not bad	77.4%		84.8%	
		Bad	22.6%		15.2%	
	Unmet health care needs	No	90.3%		92.2%	
		Yes	9.7%		7.8%	
Health behaviors	Smoking status	No-smoker	81.2%		74.9%	
		Smoker	18.8%		25.1%	
	Drinking status	No drinking	30.7%		20.0%	
		Drinking	69.3%		80.0%	
	Physical activity	Yes	23.2%		24.8%	
		No	76.8%		75.2%	

	Health examination	Yes	60.2%	68.8%
		No	39.8%	31.2%
Dependent variables	Mobility	No problem	85.9%	90.3%
		Problem	14.1%	9.8%
	Self-care	No problem	96.2%	97.3%
		Problem	3.8%	2.7%
	Usual activities	No problem	91.3%	95.1%
		Problem	8.7%	4.9%
	Pain/discomfort	No problem	76.5%	82.5%
		Problem	23.5%	17.5%
	Anxiety/depression	No problem	87.8%	92.3%
		Problem	12.2%	7.7%
	EQ-5D index		0.9±0.1	1.0±0.1

Note: NBLS, National Basic Livelihood Security; EQ-5D, Euro Quality of Life–five dimensions.

Table 2. Factors affecting the mobility dimension of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)
Predisposing factors	Sex(ref=Male)	1.49 (0.023)	1.59 (0.010)	1.67 (0.008)	1.85 (0.004)	1.39 (0.032)	1.43 (0.025)	1.33 (0.101)	1.28 (0.217)
	Age (ref=≤ 65 years)	6.67 (<0.001)	5.26 (<0.001)	3.70 (<0.001)	3.85 (<0.001)	7.69 (<0.001)	3.57 (<0.001)	3.33 (<0.001)	3.23 (<0.001)
	Education level (ref=≤ high school diploma)	0.51 (0.003)	0.60 (0.021)	0.69 (0.094)	0.72 (0.147)	0.42 (<0.001)	0.58 (0.007)	0.70 (0.087)	0.73 (0.134)
	Marital status(ref=Spouse)	1.59 (0.004)	1.04 (0.809)	1.05 (0.795)	1.00 (0.995)	0.75 (0.144)	0.60 (0.017)	0.65 (0.044)	0.66 (0.072)
Enabling factors	NBLS(ref=No)		1.45 (0.378)	1.56 (0.387)	1.61 (0.344)		1.14 (0.682)	1.18 (0.657)	1.14 (0.736)
	Type of health insurance (ref=Health insurance)		2.86 (0.032)	2.04 (0.181)	1.92 (0.230)		1.39 (0.373)	1.22 (0.617)	1.18 (0.695)
	Private insurance membership(ref=Yes)		1.69 (0.007)	1.67 (0.017)	1.54 (0.056)		2.13 (<0.001)	2.13 (<0.001)	2.00 (<0.001)
	Household income (monthly average)		1.00 (0.930)	1.00 (0.860)	1.00 (0.738)		1.00 (0.011)	1.00 (0.120)	1.00 (0.199)
	Cohabiting family (ref=Yes)		1.32 (0.177)	1.27 (0.278)	1.30 (0.233)		1.75 (0.116)	1.69 (0.151)	1.82 (0.092)
	Activity restriction (ref=No)		5.56 (<0.001)	2.94 (<0.001)	2.94 (<0.001)		5.88 (<0.001)	3.33 (<0.001)	3.23 (<0.001)
Need factors	Number of chronic diseases			1.62 (<0.001)	1.64 (<0.001)			1.35 (0.004)	1.38 (0.003)
	Perceived health status (ref=Not bad)			4.00 (<0.001)	3.85 (<0.001)			4.00 (<0.001)	3.85 (<0.001)
	Unmet health care needs (ref=No)			1.52 (0.105)	1.49 (0.131)			2.22 (0.001)	2.22 (0.001)
Health behaviors	Smoking status (ref=non-smoker)				1.43 (0.098)				1.16 (0.520)
	Drinking status (ref=no drinking)				0.88 (0.447)				0.78 (0.191)
	Physical activity (ref=Yes)				1.33 (0.256)				1.69 (0.025)
	Health examination (ref=Yes)				1.20 (0.237)				0.98 (0.927)
	Wald (p)	57.48 (<0.001)	29.81 (<0.001)	32.63 (<0.001)	25.59 (<0.001)	66.43 (<0.001)	35.15 (<0.001)	26.01 (<0.001)	19.28 (<0.001)
	Cox and Snell's R^2	0.131	0.196	0.237	0.239	0.101	0.142	0.174	0.175
	Nagelkerke's R^2	0.238	0.355	0.431	0.435	0.214	0.299	0.366	0.369

Note: NBLS, National Basic Livelihood Security.

Table 3. Factors affecting the self-care dimension of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)
Predisposing factors	Sex(ref=Male)	0.89 (0.656)	0.83 (0.508)	0.87 (0.636)	1.03 (0.934)	0.83 (0.429)	0.85 (0.560)	0.76 (0.343)	0.64 (0.159)
	Age (ref=≤ 65 years)	7.69 (<0.001)	3.70 (0.001)	2.56 (0.030)	3.03 (0.018)	10.00 (<0.001)	2.86 (0.003)	2.32 (0.018)	2.22 (0.020)
	Education level (ref=≤ high school diploma)	0.28 (0.018)	0.38 (0.081)	0.41 (0.086)	0.40 (0.082)	0.30 (0.003)	0.53 (0.144)	0.68 (0.407)	0.67 (0.365)
	Marital status (ref=Spouse)	1.47 (0.121)	0.92 (0.815)	0.97 (0.934)	0.97 (0.942)	1.75 (0.104)	1.35 (0.363)	1.54 (0.238)	1.52 (0.255)
Enabling factors	NBLS (ref=No)		1.96 (0.198)	2.04 (0.211)	2.13 (0.198)		1.75 (0.313)	1.69 (0.339)	1.72 (0.302)
	Type of health insurance (ref=Health insurance)		0.69 (0.579)	0.45 (0.253)	0.45 (0.267)		1.59 (0.484)	1.54 (0.498)	1.72 (0.395)
	Private insurance membership (ref=Yes)		1.89 (0.080)	1.79 (0.151)	1.72 (0.193)		2.63 (0.002)	2.63 (0.002)	2.50 (0.002)
	Household income (monthly average)		1.00 (0.212)	1.00 (0.242)	1.00 (0.34)		1.00 (0.125)	1.00 (0.282)	1.00 (0.248)
	Cohabiting family (ref=Yes)		1.04 (0.912)	1.01 (0.984)	1.08 (0.831)		1.43 (0.399)	1.23 (0.664)	1.27 (0.616)
	Activity restriction (ref=No)		5.88 (<0.001)	3.70 (0.002)	4.17 (0.001)		11.11 (<0.001)	6.25 (<0.001)	6.25 (<0.001)
Need factors	Number of chronic diseases			1.69 (0.001)	1.75 (<0.001)			1.48 (0.022)	1.43 (0.035)
	Perceived health status (ref=Not bad)			2.50 (0.013)	2.70 (0.008)			5.88 (<0.001)	5.88 (<0.001)
	Unmet health care needs (ref=No)			1.00 (0.992)	0.97 (0.950)			1.14 (0.748)	1.20 (0.626)
Health behaviors	Smoking status (ref=non-smoker)				1.18 (0.666)				0.61 (0.263)
	Drinking status (ref=no drinking)				1.85 (0.078)				1.76 (0.354)
	Physical activity (ref=Yes)				1.11 (0.825)				1.79 (0.570)
	Health examination (ref=Yes)				1.47 (0.173)				1.43 (0.167)
	Wald (p)	28.37 (<0.001)	35.65 (<0.001)	27.64 (<0.001)	19.59 (<0.001)	26.50 (<0.001)	28.00 (<0.001)	20.36 (<0.001)	15.41 (<0.001)
	Cox and Snell's R^2	0.051	0.076	0.087	0.089	0.040	0.079	0.095	0.097
	Nagelkerke's R^2	0.191	0.292	0.335	0.349	0.182	0.357	0.428	0.436

Note: NBLS, National Basic Livelihood Security.

Table 4. Factors affecting the usual activity dimension of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)
Predisposing factors	Sex (ref=Male)	1.54 (0.051)	1.64 (0.027)	1.85 (0.012)	1.89 (0.020)	1.30 (0.178)	1.41 (0.107)	1.28 (0.253)	1.18 (0.508)
	Age (ref=≤ 65 years)	5.56 (<0.001)	3.45 (<0.001)	2.04 (0.010)	2.00 (0.015)	9.09 (<0.001)	3.23 (<0.001)	2.78 (<0.001)	2.63 (0.001)
	Education level (ref=≤ high school diploma)	0.68 (0.174)	0.88 (0.673)	1.12 (0.683)	1.16 (0.600)	0.40 (0.002)	0.63 (0.139)	0.79 (0.475)	0.81 (0.536)
	Marital status (ref=Spouse)	1.75 (0.004)	1.18 (0.512)	1.27 (0.383)	1.28 (0.360)	1.14 (0.641)	0.93 (0.775)	1.02 (0.944)	1.04 (0.892)
Enabling factors	NBLS (ref=No)		2.08 (0.044)	2.63 (0.035)	2.56 (0.039)		1.33 (0.624)	1.33 (0.656)	1.32 (0.660)
	Type of health insurance (ref=Health insurance)		1.69 (0.236)	0.91 (0.849)	0.91 (0.854)		1.56 (0.458)	1.52 (0.510)	1.49 (0.515)
	Private insurance membership (ref=Yes)		1.89 (0.006)	1.89 (0.024)	1.89 (0.025)		2.38 (0.001)	2.44 (<0.001)	2.23 (0.001)
	Household income (monthly average)		1.00 (0.438)	1.00 (0.671)	1.00 (0.728)		1.00 (0.027)	1.00 (0.191)	1.00 (0.227)
	Cohabiting family (ref=Yes)		1.02 (0.937)	0.94 (0.826)	0.97 (0.905)		1.27 (0.571)	1.14 (0.771)	1.20 (0.660)
	Activity restriction (ref=No)		7.14 (<0.001)	3.45 (<0.001)	3.45 (<0.001)		10.00 (<0.001)	5.88 (<0.001)	5.56 (<0.001)
Need factors	Number of chronic diseases			2.00 (<0.001)	2.02 (<0.001)			1.37 (0.031)	1.36 (0.034)
	Perceived health status (ref=Not bad)			6.67 (<0.001)	6.67 (<0.001)			4.76 (<0.001)	4.76 (<0.001)
	Unmet health care needs (ref=No)			1.05 (0.853)	1.06 (0.815)			1.27 (0.498)	1.28 (0.476)
Health behaviors	Smoking status (ref=non-smoker)				0.93 (0.816)				0.88 (0.697)
	Drinking status (ref=no drinking)				1.19 (0.432)				0.75 (0.202)
	Physical activity (ref=Yes)				1.37 (0.471)				1.18 (0.623)
	Health examination (ref=Yes)				1.00 (0.994)				1.08 (0.737)
	Wald (p)	35.07 (<0.001)	22.88 (<0.001)	26.33 (<0.001)	21.54 (<0.001)	42.84 (<0.001)	38.00 (<0.001)	28.69 (<0.001)	21.24 (<0.001)
	Cox and Snell's R^2	0.076	0.141	0.196	0.197	0.064	0.111	0.132	0.132
	Nagelkerke's R^2	0.172	0.322	0.448	0.451	0.196	0.339	0.403	0.405

Note: NBLS, National Basic Livelihood Security.

Table 5. Factors affecting the pain/discomfort dimension of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)
Predisposing factors	Sex (ref=Male)	1.69 (<0.001)	1.75 (<0.001)	1.85 (<0.001)	1.82 (0.001)	1.82 (<0.001)	1.92 (<0.001)	1.82 (<0.001)	1.89 (<0.001)
	Age (ref=≤ 65 years)	2.13 (<0.001)	1.82 (0.001)	1.32 (0.162)	1.19 (0.386)	2.56 (<0.001)	1.59 (0.008)	1.52 (0.031)	1.49 (0.045)
	Education level (ref=≤ high school diploma)	0.67 (0.004)	0.75 (0.048)	0.82 (0.173)	0.82 (0.192)	0.68 (0.001)	0.80 (0.061)	0.89 (0.399)	0.88 (0.360)
	Marital status (ref=Spouse)	1.32 (0.025)	1.10 (0.508)	1.12 (0.457)	1.25 (0.180)	0.70 (0.021)	0.63 (0.004)	0.65 (0.011)	0.67 (0.021)
Enabling factors	NBLS (ref=No)		1.18 (0.544)	1.27 (0.471)	1.32 (0.411)		1.39 (0.318)	1.43 (0.322)	1.39 (0.353)
	Type of health insurance (ref=Health insurance)		1.92 (0.062)	1.30 (0.479)	1.27 (0.529)		0.76 (0.558)	0.68 (0.422)	0.71 (0.472)
	Private insurance membership (ref=Yes)		1.12 (0.473)	1.11 (0.563)	1.14 (0.484)		1.19 (0.269)	1.12 (0.430)	1.12 (0.443)
	Household income (monthly average)		1.00 (0.570)	1.00 (0.993)	1.00 (0.860)		1.00 (0.044)	1.00 (0.259)	1.00 (0.196)
	Cohabiting family (ref=Yes)		0.99 (0.959)	0.92 (0.677)	0.83 (0.396)		1.39 (0.282)	1.33 (0.429)	1.32 (0.457)
	Activity restriction (ref=No)		5.26 (<0.001)	2.70 (<0.001)	2.70 (<0.001)		5.26 (<0.001)	3.33 (<0.001)	3.33 (<0.001)
Need factors	Number of chronic diseases			1.32 (0.004)	1.32 (0.004)			1.12 (0.270)	1.12 (0.273)
	Perceived health status (ref=Not bad)			4.76 (<0.001)	5.00 (<0.001)			3.45 (<0.001)	3.57 (<0.001)
	Unmet health care needs (ref=No)			2.44 (<0.001)	2.56 (<0.001)			2.04 (0.001)	2.04 (0.002)
Health behaviors	Smoking status (ref=non-smoker)				1.09 (0.677)				1.12 (0.526)
	Drinking status (ref=no drinking)				0.82 (0.160)				0.85 (0.282)
	Physical activity (ref=Yes)				0.83 (0.252)				0.79 (0.130)
	Health examination (ref=Yes)				0.69 (0.009)				0.89 (0.451)
	Wald (p)	25.7 (<0.001)	17.75 (<0.001)	25.07 (<0.001)	18.06 (<0.001)	31.05 (<0.001)	20.87 (<0.001)	20.70 (<0.001)	15.44 (<0.001)
	Cox and Snell's R^2	0.049	0.111	0.196	0.201	0.046	0.083	0.122	0.123
	Nagelkerke's R^2	0.075	0.167	0.297	0.304	0.076	0.136	0.202	0.203

Note: NBLS, National Basic Livelihood Security.

Table 6. Factors affecting the anxiety/depression dimension of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)	OR (p)
Predisposing factors	Sex (ref=Male)	1.52 (0.015)	1.56 (0.014)	1.61 (0.014)	2.04 (0.002)	1.96 (<0.001)	1.96 (<0.001)	1.75 (0.001)	2.17 (<0.001)
	Age (ref=≤ 65 years)	1.41 (0.076)	0.85 (0.483)	0.58 (0.043)	0.69 (0.202)	2.86 (<0.001)	1.52 (0.092)	1.56 (0.103)	1.69 (0.056)
	Education level (ref=≤ high school diploma)	0.79 (0.235)	0.96 (0.828)	1.03 (0.881)	1.03 (0.896)	0.96 (0.852)	1.27 (0.257)	1.43 (0.101)	1.45 (0.087)
	Marital status (ref=Spouse)	1.59 (0.006)	1.41 (0.061)	1.45 (0.062)	1.35 (0.147)	1.89 (0.001)	1.82 (0.005)	1.92 (0.003)	1.92 (0.004)
Enabling factors	NBLS (ref=No)		1.54 (0.249)	1.61 (0.271)	1.72 (0.214)		1.05 (0.880)	0.99 (0.982)	0.96 (0.904)
	Type of health insurance (ref=Health insurance)		1.47 (0.376)	1.05 (0.913)	1.11 (0.836)		1.32 (0.617)	1.32 (0.609)	1.20 (0.721)
	Private insurance membership (ref=Yes)		1.67 (0.024)	1.75 (0.019)	1.72 (0.029)		1.20 (0.405)	1.19 (0.418)	1.19 (0.437)
	Household income (monthly average)		1.00 (0.160)	1.00 (0.286)	1.00 (0.359)		1.00 (0.030)	1.00 (0.148)	1.00 (0.127)
	Cohabiting family (ref=Yes)		0.70 (0.117)	0.63 (0.069)	0.63 (0.065)		0.57 (0.195)	0.51 (0.144)	0.50 (0.130)
	Activity restriction (ref=No)		4.17 (<0.001)	2.17 (0.001)	2.27 (0.001)		5.88 (<0.001)	3.70 (<0.001)	3.85 (<0.001)
Need factors	Number of chronic diseases			2.00 (0.106)	2.02 (0.073)			1.37 (0.659)	1.02 (0.850)
	Perceived health status (ref=Not bad)			4.35 (<0.001)	4.35 (<0.001)			3.85 (<0.001)	3.70 (<0.001)
	Unmet health care needs (ref=No)			1.64 (0.022)	1.59 (0.039)			2.00 (0.002)	1.89 (0.006)
Health behaviors	Smoking status (ref=non-smoker)				1.59 (0.106)				1.79 (0.020)
	Drinking status (ref=no drinking)				1.43 (0.074)				1.08 (0.703)
	Physical activity (ref=Yes)				0.76 (0.290)				1.22 (0.361)
	Health examination (ref=Yes)				1.16 (0.400)				0.85 (0.442)
	Wald (p)	9.13 (<0.001)	16.34 (<0.001)	18.83 (<0.001)	14.07 (<0.001)	12.75 (<0.001)	14.77 (<0.001)	14.58 (<0.001)	13.57 (<0.001)
	Cox and Snell's R^2	0.017	0.067	0.114	0.121	0.023	0.053	0.078	0.082
	Nagelkerke's R^2	0.032	0.128	0.217	0.231	0.055	0.127	0.186	0.194

Note: NBLS, National Basic Livelihood Security.

Table 7. Factors affecting the EQ-5D index of health-related quality of life in eating alone and eating with company according to Andersen's model

	Variables	Eating alone				Eating with company			
		Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
		B (p)	B (p)	B (p)	B (p)	B (p)	B (p)	B (p)	B (p)
Predisposing factors	Sex (ref=Male)	-0.02 (<0.001)	-0.02 (<0.001)	-0.02 (<0.001)	-0.02 (<0.001)	-0.02 (<0.001)	-0.01 (<0.001)	-0.01 (<0.001)	-0.01 (<0.001)
	Age (ref=≤ 65 years)	-0.08 (<0.001)	-0.06 (<0.001)	-0.04 (<0.001)	-0.04 (<0.001)	-0.09 (<0.001)	-0.05 (<0.001)	-0.04 (<0.001)	-0.04 (<0.001)
	Education level (ref=≤ high school diploma)	0.02 (<0.001)	0.01 (0.048)	0.00 (0.478)	0.00 (0.537)	0.01 (<0.001)	0.01 (0.064)	0.00 (0.908)	0.00 (0.914)
	Marital status (ref=Spouse)	-0.02 (<0.001)	-0.01 (0.086)	-0.01 (0.018)	-0.01 (0.033)	0.00 (0.861)	0.01 (0.111)	0.00 (0.412)	0.00 (0.505)
Enabling factors	NBLS (ref=No)		-0.02 (0.131)	-0.03 (0.104)	-0.03 (0.081)		-0.01 (0.513)	-0.01 (0.451)	-0.01 (0.530)
	Type of health insurance (ref=Health insurance)		-0.06 (0.006)	-0.04 (0.036)	-0.04 (0.042)		-0.04 (0.082)	-0.03 (0.087)	-0.03 (0.091)
	Private insurance membership (ref=Yes)		-0.02 (0.002)	-0.02 (0.008)	-0.02 (0.024)		-0.03 (0.001)	-0.02 (<0.001)	-0.02 (0.001)
	Household income (monthly average)		0.00 (0.324)	0.00 (0.603)	0.00 (0.658)		0.00 (<0.001)	0.00 (0.024)	0.00 (0.034)
	Cohabiting family (ref=Yes)		0.00 (0.879)	0.00 (0.749)	0.00 (0.527)		-0.01 (0.157)	-0.01 (0.246)	-0.01 (0.250)
	Activity restriction (ref=No)		-0.11 (<0.001)	-0.08 (<0.001)	-0.08 (<0.001)		-0.13 (<0.001)	-0.10 (<0.001)	-0.1 (<0.001)
Need factors	Number of chronic diseases			-0.02 (<0.001)	-0.02 (<0.001)			-0.01 (0.067)	-0.01 (0.051)
	Perceived health status (ref=Not bad)			-0.07 (<0.001)	-0.07 (<0.001)			-0.06 (<0.001)	-0.06 (<0.001)
	Unmet health care needs (ref=No)			-0.02 (0.007)	-0.02 (0.007)			-0.02 (0.006)	-0.02 (0.008)
Health behaviors	Smoking status (ref=non-smoker)				-0.01 (0.222)				-0.01 (0.078)
	Drinking status (ref=no drinking)				0.00 (0.912)				0.01 (0.134)
	Physical activity (ref=Yes)				0.00 (0.371)				0.00 (0.262)
	Health examination (ref=Yes)				0.00 (0.342)				0.00 (0.717)
	F (p)	42.71 (<0.001)	36.60 (<0.001)	44.51 (<0.001)	34.60 (<0.001)	53.80 (<0.001)	35.45 (<0.001)	32.67 (<0.001)	25.94 (<0.001)
	R^2	0.142	0.291	0.379	0.392	0.118	0.251	0.319	0.320
	Adjusted R^2	0.141	0.288	0.376	0.387	0.117	0.249	0.316	0.316

Note: NBLS, National Basic Livelihood Security.