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Original Article

Factors influencing quality of life among older adults in Korea: Korea National Health and Nutrition Examination Survey 6th–9th (2016–2024)

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ABSTRACT

Objectives: We analyzed factors impacting health-related quality of life (HRQoL) among Korean older adults, as measured by the EuroQol 5 Dimensions (EQ-5D), and compared trends over time. **Methods:** Data were obtained from the Korea National Health and Nutrition Examination Survey (KNHANES). Using data collected every four years from 2016 to 2024, we examined factors associated with older adults' quality of life during each survey period. Participants were aged 65 years or older, with a sample size of 1,578 in 2016, 1,681 in 2020, and 1,951 in 2024. Complex sample logistic regression was used for statistical analyses. **Results:** Spanning the survey periods, sex and activity limitations consistently emerged as significant determinants of HRQoL. In 2016 and 2024, economic activity, stress, and unmet dental care were also significant factors, whereas in 2020, smoking and chewing discomfort were significant. **Conclusions:** HRQoL in older adults is influenced by interactions between structural factors (sex and activity limitations) and environmental and behavioral factors (economic activity, mental health, and oral health). Issues related to dental care access, such as unmet dental treatment needs, exert long-term impacts on quality of life, underscoring the need for integrated elderly health policies and early interventions to support health management.

Keywords: Aged, Dental care, Nutrition survey, Oral health, Quality of life

Introduction

Health-related quality of life (HRQoL) refers to the aspects of quality of life that are directly associated with an individual's physical, mental, and social health status [1]. It extends beyond the mere presence or absence of disease, comprehensively reflecting an individual's perceived overall health and functional capacity in daily life. HRQoL is considered an important indicator for assessing health status in older adults [2]. In later life, the prevalence of chronic diseases and declines in physical function tend to significantly reduce HRQoL, highlighting the need for a systematic analysis of its determinants [3,4].

Oral health enables a balanced diet and adequate nutritional intake by maintaining proper masticatory and swallowing functions. This contributes to the preservation of immune function and physical capacity, thereby playing a crucial role in promoting healthy aging [5]. In contrast, deterioration in oral function can reduce the enjoyment of eating and limit opportunities for social interaction, potentially leading to psychological issues such as depression and social isolation. From this perspective, oral health is regarded as an important determinant of overall quality of life in older adults, extending beyond a mere component of physical health [6,7].

In addition, unmet dental care needs have been reported as a major factor contributing to a decline in oral health–related quality of life, particularly by significantly increasing psychological discomfort and social limitations [8,9]. Older adults with unmet dental

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care needs tend to have lower HRQoL scores, resulting in an overall reduction in quality of life [8]. These findings indicate that timely and adequate dental care plays a crucial role not only in maintaining oral function but also in supporting daily activities and overall psychosocial well-being [10].

In Korea, HRQoL is commonly assessed using the EQ-5D instrument, following the standardized guidelines provided by the Korea Disease Control and Prevention Agency [11]. The EQ-5D evaluates five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Its simple yet comprehensive structure facilitates large-scale epidemiological assessments and the evaluation of healthcare policies. Additionally, the use of country-specific value weights enables comparisons of health status across different time periods and population groups [12].

Previous studies have reported that higher oral health-related quality of life (OHRQoL) is significantly associated with higher HRQoL, indicating a strong link between oral health and overall health perception [13,14]. Conversely, oral health problems, such as tooth loss or reduced masticatory function can contribute to the deterioration of general health and lower HRQoL. Declining oral function is also associated with reduced happiness and increased psychological distress or depressive symptoms [6,7,15]. Moreover, various socioeconomic factors, including smoking, stress, economic activity, and activity limitations, have been shown to influence HRQoL. These findings indicate that health-related quality of life in older adults is shaped by a complex interplay of oral health status and broader social and economic determinants.

However, most previous domestic studies have been cross-sectional or have focused on specific time points or populations, limiting the ability to comprehensively examine temporal changes in HRQoL and its associated factors [5,16]. In particular, studies that consistently use the same indicators for periodic comparisons are relatively scarce.

This study utilizes data from the nationally representative Korea National Health and Nutrition Examination Survey (KNHANES), collected at four-year intervals from 2016 to 2024. The aim of the study is to analyze the key factors influencing HRQoL, measured by the EQ-5D among older adults at each survey period, and to compare the results across years at a descriptive level. Through this approach, the study seeks to systematically identify the primary determinants of quality of life in older adults and to provide foundational evidence to support the development of healthcare policies aimed at improving oral health and overall HRQoL in the elderly population.

Methods

1. Study population and design

This study utilized data from the health survey component of the Korea National Health and Nutrition Examination Survey (KNHANES) to analyze factors associated with the health-related quality of life (HRQoL) of older adults. Data were drawn from the first year of the 7th survey cycle (2016), the second year of the 8th cycle (2020), and the third year of the 9th cycle (2024). These years were selected because key health variables, including the EQ-5D, were consistently measured, allowing reliable comparisons across survey cycles. In addition, the samples from these years provide adequate representation of the older population, enabling stable estimation of oral health and HRQoL outcomes. The total number of survey participants was 8,150 in 2016, 7,359 in 2020, and 6,997 in 2024, among whom adults aged 65 years and older were included in the analysis, comprising 1,578, 1,681, and 1,951 participants in 2016, 2020, and 2024, respectively.

2. Study instruments

The dependent variable was the EQ-5D index, a standardized instrument developed to assess overall health status. The EQ-5D consists of five dimensions: self-care, mobility, usual activities, pain/discomfort, and anxiety/depression, each rated on a three-level

scale (1=no problems, 2=moderate problems, 3=severe problems). EQ-5D was converted into an index score using the Time Trade-Off (TTO) value set. According to the measurement criteria for the EQ-5D for Koreans presented by the Korea Disease Control and Prevention Agency, when all five dimensions have a response of "1", it is considered a full health state, and the EQ-5D value at that time is 1. If there is a response of "2" or "3", EQ-5D=1−h, and h is calculated using the following weighted formula. Here, M2 represents the response "2" , and M3 represents the response "3", and the remaining terms are defined in the same way. Finally, N3 indicates that there is a response of "3". For example, when the worst health state occurs and all five dimensions are "3", EQ-5D=−0.171, and the value ranges from −0.171 to 1, meaning that the worse the health status, the smaller the value [17].

$$h = 0.05 + 0.096(M2) + 0.418(M3) + 0.046(SC2) + 0.136(SC3) + 0.051(UA2) + 0.208(UA3) + 0.037(PD2) + 0.151(PD3) + 0.043(AD2) + 0.158(AD3) + 0.05(N3).$$

The outcome variable, the EQ-5D index, was dichotomized into a "high" group (EQ-5D index=1) and a "low" group (EQ-5D index<1). This dichotomization facilitated interpretation of the results and identification of key factors associated with HRQoL among older adults [18].

The explanatory variables included sociodemographic characteristics, health-related psychological and behavioral factors, and oral health-related factors. Sociodemographic characteristics comprised sex (male, female), region (urban, rural), co-habitation(yes, no), income level (high, upper-middle, lower-middle, low), education level (below elementary, middle school, high school, college or higher), and economic activity status (yes, no).

Health-related psychological and behavioral factors included alcohol consumption, smoking experience, stress perception, aerobic physical activity, and activity limitations. Alcohol consumption was categorized as drinking at least once per month or lifelong non-drinker, and smoking experience as yes or no. Stress Perception was originally measured on a four-point scale (very much, much, a little, almost none) and dichotomized into 'low' and 'high' stress. Aerobic physical activity was classified as 'high' if participants met the recommended weekly thresholds (≥150 minutes of moderate-intensity activity, ≥75 minutes of vigorous-intensity activity, or a combination of moderate and vigorous activity, with 1 minute of vigorous activity counted as 2 minutes of moderate activity), and 'low' if not. Activity limitations were coded as yes or no.

Oral health-related factors included chewing discomfort, speech difficulty, and unmet dental care needs within the past year. Chewing discomfort was measured on a five-point scale (from very uncomfortable to not uncomfortable at all) and categorized as present if participants reported 'very uncomfortable' or 'uncomfortable' speech difficulty and unmet dental care were coded as yes or no.

3. Data Analysis

Statistical analyses were conducted using IBM SPSS Statistics (ver 26.0; IBM Corp., Armonk, NY, USA) with complex sample procedures. The complex sample design was specified by defining stratification (variance estimation stratum: Kstrata), clustering (primary sampling units: PSU), and applying the combined health interview and examination survey weights (Wt_itvex). Variables were categorized into three groups: sociodemographic characteristics, health-related factors, and oral health-related factors. Frequency analyses, descriptive statistics, and cross-tabulations were performed for each survey year. In addition, complex sample logistic regression analyses were performed for each survey year to identify significant factors associated with quality of life among older adults. However, formal analyses of year-to-year differences using year × independent variable interaction terms were not conducted, and comparisons across years were interpreted descriptively. Statistical significance was defined as $p<0.05$.

Results

1. General characteristics

The characteristics of respondents by survey year are presented in <Table 1>. Among sociodemographic factors, the proportion of women was higher in 2016 (57.8%), 2020 (56.8%), 2024 (55.9%). A majority of respondents resided in urban areas (2016: 76.3%, 2020: 77.3%, 2024: 73.7%). Most participants lived with others (2016: 79.9%, 2020: 78.5%, 2024: 73.6%). Regarding family income, the largest group fell into the low-income category, though this proportion decreased over time (2016: 49.5%, 2020: 41.8%, 2024: 38.4%), and the majority had an education level of elementary school or below, with a declining trend (2016: 59.6%, 2020: 49.5%, 2024: 44.2%). Most respondents were not engaged in economic activities, with percentages decreasing (2016: 68.7%, 2020: 63.2%, 2024: 59.9%).

Among health-related psychological and behavioral factors, most respondents reported consuming less than one alcoholic drink per month (2016: 66.1%, 2020: 70.2%, 2024: 65.3%), were past smokers or non-smokers (2016: 90.3%, 2020: 90.8%, 2024: 90.3%), perceived low levels of stress (2016: 81.5%, 2020: 85.5%, 2024: 85.3%), engaged in low levels of aerobic physical activity (2016: 65.6%, 2020: 66.8%, 2024: 67.3%), and reported no activity limitations (2016: 80.4%, 2020: 85.4%, 2024: 77.1%).

Regarding oral health-related factors, respondents reported chewing discomfort (2016: 44.1%, 2020: 33.1%, 2024: 22.6%), speech difficulty (2016: 21.2%, 2020: 13.7%, 2024: 9.8%), and unmet dental care (2016: 35.8%, 2020: 34.0%, 2024: 28.3%). The mean health-related quality of life (EQ-5D) gradually increased over time, with values of 0.479 in 2016, 0.531 in 2020, and 0.550 in 2024.

2. EQ-5D scores according to respondent characteristics

The changes in health-related quality of life (EQ-5D) according to respondent characteristics by survey year are presented in <Table 2>.

In 2016, statistically significant differences in EQ-5D scores were observed according to sex, region, co-habitation, income, education level, economic activity status, smoking, stress, aerobic physical activity, activity limitations, chewing discomfort, speech difficulty, and unmet dental care (p<0.05). Among sociodemographic factors, men had significantly higher scores than women (p<0.001), and urban residents scored higher than rural residents (p<0.05). Participants living with others had higher scores (p<0.001), and higher income and education levels were associated with increased scores (p<0.001). Individuals engaged in economic activities also demonstrated higher EQ-5D scores (p<0.001).

Regarding health-related behaviors in 2016, non-drinkers scored significantly higher (p<0.001), non-smokers scored significantly higher (p<0.001), participants with low scored levels had higher scores (p<0.001), individuals engaging in aerobic physical activity scored higher (p<0.001), and those without activity limitations scored higher (p<0.001). In terms of oral health, respondents without chewing discomfort (p<0.001), without speech difficulty (p<0.01), and without unmet dental care (p<0.001) had significantly higher EQ-5D scores.

In 2020, EQ-5D scores differed significantly base on sex, region, co-habitation, income, education level, economic activity status, alcohol consumption, smoking, aerobic physical activity, activity limitations, chewing discomfort, speech difficulty, and unmet dental care (p<0.05). Among sociodemographic factors, men had significantly higher scores than women (p<0.001), and urban residents scored higher than rural residents (p<0.05). Participants living with others had higher scores (p<0.01), and higher income and education levels were associated with higher scores (income:p<0.001; education: p<0.001). Those engaged in economic activities also had higher scores (p<0.01).

Regarding health-related behaviors in 2020, non-drinkers scored higher (p<0.01), non-smokers scored higher (p<0.001), participants with low stress scored higher (p <0.001), those engaging in aerobic physical activity scored higher (p<0.001), and those without

activity limitations had higher scores (p<0.001). For oral health, respondents without chewing discomfort (p<0.001), without speech difficulty (p<0.01), and without unmet dental care (p<0.001) had significantly higher scores.

In 2024, statistically significant differences in EQ-5D scores were observed base on sex, co-habitation, income, education level, Economic activity status, alcohol consumption, smoking, stress, aerobic physical activity, activity limitations, chewing discomfort, speech difficulty, and unmet dental care (p<0.05). Among sociodemographic factors, men had significantly higher EQ-5D scores than women (p<0.001), and participants living with others had significantly higher scores than those living alone (p<0.05). Higher income and education levels were associated with significantly higher scores (income: p<0.01; education: p<0.001), and individuals engaged in economic activities also had higher scores (p<0.001).

In terms of health-related behaviors, non-drinkers had significantly higher EQ-5D scores (p<0.001), whereas past or non-smokers had significantly lower EQ-5D scores (p<0.001). Participants reporting low stress levels had higher scores (p<0.001), those engaging in aerobic physical activity scored higher (p<0.05), and individuals

without activity limitations had significantly higher scores (p<0.001). Regarding oral health, respondents without chewing discomfort (p<0.001), without speech difficulty (p<0.05), and without unmet dental care (p<0.001) demonstrated significantly higher EQ-5D scores.

3. Factors affecting health-related quality of life

The factors influencing health-related quality of life (HRQoL) were analyzed using complex-sample multiple logistic regression. The results are presented in <Table 3>.

In 2016, the factors significantly associated with HRQoL were sex, economic activity status, Stress perception, activity limitations, speech difficulty, and unmet dental care. Men had 2.439(1.772–3.356, p<0.001)times higher odds of better HRQoL than women, and participants engaged in economic activities had 1.605(1.171–2.201, p<0.01)times higher odds. Individuals experiencing low stress had 1.997(1.372–2.908, p<0.001)times higher odds, while those without activity limitations had 5.354(3.588–7.987, p<0.001)times higher odds. Participants without speech difficulty had 2.050(1.309–3.208, p<0.01)times higher odds, and those without unmet dental care had 1.834(1.277–2.634, p<0.01)times higher odds of better HRQoL.

In 2020, the significant predictors of HRQoL were sex, smoking status, activity limitations, and chewing discomfort. Men had 1.516(1.071–2.147, p<0.05)times higher odds of better HRQoL than women, and non-smokers had 2.090(1.127–3.877, p<0.05)times higher odds compared to smokers. Participants without activity limitations had 8.831(5.525–14.115, p<0.001)times higher odds, and those without chewing discomfort had 1.726(1.191–2.502, p<0.01)times higher odds of better HRQoL.

In 2024, the factors significantly associated with HRQoL among older adults were sex, economic activity status, stress perception, activity limitations, and unmet dental care. Compared to women, men had 1.762(1.303–2.383, p<0.001)times higher odds of better HRQoL, and participants engaged in economic activities had 1.770(1.312–2.388, p<0.001)times higher odds. Individuals reporting low stress had 2.617(1.688–4.057, p<0.001)times higher odds, those without activity limitations had 3.341(2.339–4.773, p<0.001)times higher odds, and participants without unmet dental care had 1.716(1.248–2.359, p<0.01)times higher odds of better HRQoL .

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Table 1. General characteristics [n(%)]

		2016	2020	2024
Characteristic socio-demographic factors				
Sex	Male	695(42.2)	724(43.2)	812(44.1)
	Female	883(57.8)	957(56.8)	1139(55.9)
Region	Urban	1145(76.3)	1197(77.3)	1361(73.7)
	Rural	433(23.7)	484(22.7)	590(26.3)
Co-habitation	No	361(20.1)	421(21.5)	527(26.4)
	Yes	1217(79.9)	1260(78.5)	1424(73.6)
Income level	Low	776(49.5)	732(41.8)	808(38.4)
	Lower-middle	430(25.9)	488(29.0)	566(30.5)
	Upper-middle	211(14.3)	278(18.2)	373(20.3)
	High	149(10.4)	165(11.1)	188(10.8)
Education level	Below elementary	894(59.6)	704(49.5)	839(44.2)
	Middle school	214(14.4)	243(18.1)	367(20.1)
	High school	233(15.7)	278(21.4)	411(23.3)
	College or higher	140(10.4)	149(11.0)	207(12.3)
Economic activity status	Yes	481(31.3)	512(36.8)	694(40.1)
	No	1002(68.7)	862(63.2)	1035(59.9)
Health-related psychological & behavioral factors				
Alcohol consumption	Drinks	1008(66.1)	1139(70.0)	1222(65.3)
	Abstinent (less than 1 drink per month)	519(33.9)	505(30.0)	606(34.7)
Smoking experience	Past smoker/non-smoker	1380(90.3)	1493(90.8)	1684(91.8)
	Smoker	146(9.7)	148(9.2)	144(8.2)
Stress perception	Low	1233(81.5)	1363(83.9)	1561(86.3)
	High	289(18.5)	275(16.1)	265(13.7)
Aerobic physical activity	Low	975(65.6)	916(66.8)	1201(67.3)
	High	506(34.4)	454(33.2)	527(32.7)
Activity limitations	Yes	303(19.6)	202(14.6)	437(22.9)
	No	1201(80.4)	1185(85.4)	1386(77.1)
Oral health-related factors				
Chewing discomfort	No	842(55.9)	1100(66.9)	1335(73.4)
	Yes	682(44.1)	541(33.1)	493(26.6)
speech difficulty	No	1201(78.8)	1407(86.3)	1638(90.2)
	Yes	323(21.2)	234(13.7)	190(9.8)
Unmet dental care	Yes	418(35.8)	427(34.0)	415(28.3)
	No	802(64.2)	826(66.0)	1015(71.7)
Health-related quality of life (EQ-5D)				
EQ5D	Low	769(52.1)	660(46.8)	1153(62.1)
	High	695(47.9)	723(53.2)	671(37.9)
	Mean±SD	0.479 ± 0.017	0.531 ± 0.017	0.550 ± 0.007

SD: standard deviation
by complex sample frequency analysis & descriptive statistics, proportion (%): weight.

Table 2. EQ-5D by respondents' characteristics [n(%)]

			2016년			2020			2024		
			Low	High	p^*	Low	High	p^*	Low	High	p^*
Characteristic socio-demographic factors	Sex	Male	261(37.7)	396(62.3)	<0.001	240(36.6)	375(63.4)	<0.001	390(49.7)	377(50.3)	<0.001
		Female	535(62.5)	299(37.5)		420(55.0)	348(45.0)		763(72.2)	294(27.8)	
	Region	Urban	554(50.0)	533(50.0)	0.016	457(45.1)	543(54.9)	0.023	806(61.1)	481(38.9)	0.210
		Rural	242(59.2)	162(40.8)		203(53.0)	180(47.0)		347(64.9)	190(35.1)	
	Co-habitation	No	207(61.7)	130(38.3)	<0.001	183(55.6)	143(44.4)	0.001	323(66.5)	153(33.5)	0.044
		Yes	589(49.7)	565(50.3)		477(44.5)	580(55.5)		830(60.6)	518(39.4)	
	Income level	Low	433(58.7)	296(41.3)	<0.001	325(56.9)	244(43.1)	<0.001	491(66.6)	230(33.4)	0.003
		Lower-middle	204(49.3)	199(50.7)		182(43.8)	228(56.2)		347(64.0)	202(36.0)	
		Upper-middle	90(42.5)	114(57.5)		98(38.8)	148(61.2)		203(55.2)	162(44.8)	
		High	65(42.6)	81(57.4)		49(31.9)	99(68.1)		110(55.6)	76(44.4)	
	Education level	Below elementary	543(60.2)	345(39.8)	<0.001	398(56.9)	306(43.1)	<0.001	583(69.5)	256(30.5)	<0.001
		Middle school	97(42.6)	117(57.4)		111(43.9)	132(56.1)		234(62.6)	133(37.4)	
		High school	87(37.5)	144(62.5)		100(34.8)	178(65.2)		226(54.2)	185(45.8)	
		College or higher	55(37.4)	85(62.6)		47(30.1)	102(69.9)		110(50.1)	97(49.9)	
	Economic activity status	Yes	204(41.8)	277(58.2)	<0.001	213(39.9)	299(60.1)	0.002	385(54.0)	301(46.0)	<0.001
		No	580(56.4)	414(43.6)		443(50.9)	419(49.1)		680(68.0)	320(32.0)	
Health-related psychological & behavioral factors	Alcohol consumption	Drinks	556(57.0)	409(43.0)	0.855	490(51.9)	458(48.1)	<0.001	820(66.9)	398(33.1)	<0.001
		Abstinent	226(41.8)	280(58.2)		170(35.4)	264(64.6)		333(53.2)	273(46.8)	
	Smoking experience	Past/non-smoker	713(51.9)	621(48.1)	<0.001	594(46.3)	663(53.7)	0.327	1082(63.7)	598(36.3)	<0.001
		Smoker	70(51.0)	67(49.0)		66(52.0)	59(48.0)		71(44.2)	73(55.8)	
	Stress perception	Low	569(46.7)	621(53.3)	<0.001	514(43.7)	643(56.3)	<0.001	927(58.7)	630(41.3)	<0.001
		High	211(74.6)	66(25.4)		145(64.1)	79(35.9)		225(83.5)	40(16.5)	
	Aerobic physical activity	Low	563(56.5)	407(43.5)	<0.001	476(51.9)	440(48.1)	<0.001	759(64.3)	410(35.7)	0.029
		High	225(43.9)	280(56.1)		176(35.7)	278(64.3)		304(58.1)	211(41.9)	
	Activity limitations	Yes	255(85.1)	44(14.9)	<0.001	169(85.0)	31(15.0)	<0.001	374(84.3)	63(15.7)	<0.001
		No	541(44.1)	650(55.9)		491(40.4)	692(59.6)		778(55.5)	608(44.5)	
Oral health-related factors	Chewing discomfort	No	369(43.7)	446(56.3)	<0.001	389(40.8)	540(59.2)	<0.001	784(58.0)	549(42.0)	<0.001
		Yes	414(62.3)	241(37.7)		271(59.1)	182(40.9)		369(73.6)	122(26.4)	
	Speech difficulty	No	570(47.4)	591(52.6)	<0.001	544(45.0)	644(55.0)	0.003	1013(61.0)	623(39.0)	0.013
		Yes	213(68.8)	96(31.2)		116(58.7)	78(41.3)		140(72.5)	48(27.5)	
	Unmet dental care	Yes	264(66.1)	141(33.9)	<0.001	207(54.7)	156(45.3)	<0.001	314(73.7)	100(26.3)	<0.001
		No	361(44.4)	408(55.6)		308(43.3)	401(56.7)		611(59.1)	403(40.9)	

*by complex sample chi-square test, proportion (%): weight.

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Table 3. Factors affecting quality of life [OR(95% CI)]

			2016		2020		2024	
			OR(95% CI)	p^*	OR(95% CI)	p^*	OR(95% CI)	p^*
Characteristic Socio-demographic Factors	Sex	Male	2.439(1.772-3.356)	0.000	1.516(1.071-2.147)	0.019	1.762(1.303-2.383)	0.000
		Female						
	Region	Urban	1.452(0.970-2.171)	0.070	1.371(0.962-1.952)	0.080	1.219(0.884-1.682)	0.226
		Rural						
	Co-habitation	No	0.919(0.624-1.355)	0.669	0.864(0.555-1.344)	0.515	0.885(0.630-1.243)	0.480
		Yes						
	Income level	Low	1.021(0.599-1.741)	0.939	0.623(0.343-1.130)	0.119	1.309(0.776-2.209)	0.312
		Lower-middle	1.049(0.600-1.833)	0.866	0.751(0.414-1.363)	0.346	1.127(0.694-1.832)	0.628
		Upper-middle	1.070(0.592-1.934)	0.823	0.646(0.382-1.092)	0.103	1.310(0.794-2.159)	0.289
		High						
	Education level	Below elementary	0.923(0.589-1.447)	0.727	0.664(0.371-1.188)	0.167	0.631(0.395-1.008)	0.054
		Middle school	1.493(0.849-2.627)	0.164	0.797(0.425-1.494)	0.478	0.629(0.382-1.034)	0.067
		High school	1.280(0.730-2.244)	0.389	1.251(0.663-2.360)	0.489	0.751(0.486-1.161)	0.197
		College or higher						
	Economic activity status	Yes	1.605(1.171-2.201)	0.003	1.333(0.984-1.807)	0.064	1.770(1.312-2.388)	0.000
		No						
Health-related psychological & behavioral factors	Alcohol consumption	Drinks	0.951(0.667-1.356)	0.779	0.788(0.541-1.146)	0.212	0.936(0.691-1.269)	0.671
		Abstinent						
	Smoking experience	Past/non-smoker	1.063(0.620-1.824)	0.823	2.090(1.127-3.877)	0.020	0.736(0.482-1.123)	0.154
		Smoker						
	Stress perception	Low	1.997(1.372-2.908)	0.000	1.490(0.951-2.337)	0.082	2.617(1.688-4.057)	0.000
		High						
	Aerobic physical activity	Low	0.764(0.552-1.056)	0.103	0.737(0.520-1.043)	0.085	0.792(0.597-1.052)	0.107
		High						
	Activity limitations	Yes	5.354(3.588-7.987)	0.000	8.831(5.525-14.115)	0.000	3.341(2.339-4.773)	0.000
		No						
Oral health-related factors	Chewing discomfort	No	1.047(0.728-1.505)	0.805	1.726(1.191-2.502)	0.004	1.333(0.950-1.869)	0.096
		Yes						
	speech difficulty	No	2.050(1.309-3.208)	0.002	0.758(0.469-1.226)	0.258	0.754(0.438-1.299)	0.309
		Yes						
	Unmet dental care	Yes	1.834(1.277-2.634)	0.001	1.025(0.729-1.440)	0.888	1.716(1.248-2.359)	0.001
		No						

OR: odds ratio; CI: confidence interval
*by complex sample logistic regression

Discussion

This study used data from the 7th (2016) to the 9th (2024) Korea National Health and Nutrition Examination Survey to explore factors associated with quality of life among older adults and to descriptively compare their associations across survey periods.

Sex was significantly associated with quality of life in all survey periods, with men reporting relatively higher quality of life than women. This finding is consistent with previous studies [19–21], which have suggested that older women are more likely to experience a higher burden of chronic conditions, economic vulnerability, and reduced social roles in later life [22,23]. In the present study, major potential confounders such as age, education level, and household income were included in the multivariable logistic regression models, and the association between sex and quality of life remained statistically significant after adjustment.

Activity limitation consistently demonstrated a negative impact on QoL across all survey periods, aligning with previous research [24–26]. Reduced physical function associated with activity limitations can lead to decreased social participation and increased depressive symptoms, thereby broadly affecting overall QoL. These findings underscore the importance of community-based support and healthcare services aimed at maintaining physical function and promoting independent daily living.

In 2016, economic activity, stress perception, speech difficulty, and unmet dental care were found to significantly affect quality of life among older adults, consistent with findings from previous studies [5,11,27]. However, in the 2020 survey, the effects of these factors decreased or were no longer statistically significant, while smoking and chewing discomfort emerged as newly significant variables. This change can be interpreted in the context of the COVID-19 pandemic, which coincided with the survey period and resulted in restrictions on external activities and reduced utilization of healthcare services, thereby influencing older adults' daily lives and health behaviors.

According to statistics from the Ministry of Health and Welfare and the Health Insurance Review and Assessment Service, outpatient visits and dental visits among older adults declined during the pandemic, limiting opportunities for regular preventive and therapeutic oral care [28,29]. Social distancing and reduced face-to-face interactions may have lowered the perceived impact of communication difficulties, such as speech problems, while the shift toward home-centered meals may have relatively increased the importance of masticatory function.

In 2024, similar to 2016, economic activity, stress, and unmet dental care were significant predictors of QoL, consistent with prior studies [9,11,27]. Notably, unmet dental care remained significant both before and after the pandemic, underscoring the persistent structural impact of oral healthcare accessibility on QoL in older adults.

Overall, the quality of life among older adults is influenced not by a single factor, but by the complex interaction of various factors that change according to social environments and health conditions over time. Accordingly, public health policies for the elderly should focus on persistent factors such as sex and physical functional limitations, while also developing timely and context-specific strategies to address variable factors, including economic activity, mental health, and oral health. Specifically, to reduce unmet dental care in the elderly, approaches such as mobile dental clinics, home-visit oral care services, reduction of out-of-pocket costs, and provision of vouchers for vulnerable populations are warranted. From a functional maintenance perspective, programs that combine community-based physical exercise with oral exercises, as well as integration with rehabilitation services, can help prevent declines in both physical and oral function. Furthermore, to enhance mental health and stress management, integrated screening at primary care facilities or public health centers should be implemented, and linking these efforts with programs that support economic activity and social participation—combining work, community engagement, and health management services—can contribute to improving the overall quality of life for older adults.

Several limitations of this study should be considered. First, this study employed a repeated cross-sectional design using data from the Korea National Health and Nutrition Examination Survey, which limits the ability to infer causal relationships between quality of life and its associated factors. Because analyses were conducted separately for each survey year, direct statistical comparisons of effect sizes across years or assessments of within-individual changes over time were not possible. Also, differences in sample

characteristics across survey years, as well as broader social and environmental changes—such as those related to the COVID-19 pandemic—may have influenced health behaviors, healthcare utilization, and response patterns, thereby affecting the observed associations. In addition, the proportion of older adults with a high EQ-5D score decreased in 2024, and further research is needed to determine whether this decline is temporary or driven by other factors.

Despite these limitations, this study has important strengths, including the use of nationally representative data over an extended time period to examine factors related to quality of life among older adults. Future research should employ longitudinal designs to better clarify temporal relationships between oral health and quality of life and consider pooled modeling approaches with interaction terms or causal inference methods to more rigorously assess variations in associations across time.

Conclusion

This study analyzed factors related to the quality of life measured by EQ-5D among older adults using data from the Korea National Health and Nutrition Examination Survey (KNHANES) spanning from 2016 (7th wave) to 2024 (9th wave), collected at four-year intervals. The results are as follows.

1. In 2016, sex, economic activity status, stress perception, activity limitations, speech difficulty, and unmet dental care significantly affected quality of life ($p<0.05$).

2. In 2020, sex, smoking, activity limitations, and Chewing discomfort were significantly associated with quality of life ($p<0.05$).

3. In 2024, sex, economic activity status, stress perception, activity limitations, and unmet dental care significantly influenced quality of life ($p<0.05$).

4. Across all survey periods, sex($p<0.05$) and activity limitations($p<0.05$) were consistently associated with quality of life among older adults.

These findings suggest that the quality of life in older adults is influenced by an interaction of structural factors, such as sex and physical functional limitations, with environmental and behavioral factors, including economic activity, mental health, and oral health. In particular, issues related to access to dental care-such as unmet dental needs-have a long-term impact on quality of life. This study emphasizes that integrated public health policies and early interventions are essential for supporting comprehensive health management for older adults, including oral health.

Notes

Author Contributions

The author fully participated in the work performed and documented truthfully.

Conflicts of Interest

The author declared no conflict of interest.

Funding

None.

Ethical Statement

This study was approved by the Institutional Review Board (IRB) of Korea Disease Control and Prevention Agency (KDCA)

Research Ethics Committee (IRB No. 2013-07CON-03-4C, 2018-01-03-C-A, 2018-01-03-4C-A).

Data Availability

In the case of KNHANES 6th(2016)-9th(2024) Data can be obtained from National Health and Nutrition Examination Survey website (https://knhanes.kdca.go.kr) repository source.

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한국 노인의 삶의 질 변화와 영향 요인: 국민건강영양조사 6th(2016)–9th(2024)

초록

연구목적: 건강 관련 삶의 질은 노년기 건강 수준을 평가하는 중요한 지표이다. 본 연구는 2016년부터 2024년까지 국민건강영양조사(KNHANES) 자료를 활용하여, 노인의 건강 관련 삶의 질(EQ-5D)에 영향을 미치는 요인을 시기별로 분석하고 변화 추이를 비교하고자 하였다. **연구방법**: 국민건강영양조사(KNHANES) 자료를 활용하여 제7기 1차 연도(2016)부터 제9기 3차 연도(2024)까지 매 4년을 주기로 조사 시기별 노인의 삶의 질 관련 요인을 파악하였다. 연구대상자는 65세 이상 노인 1,578명(제7기), 681명(제8기), 1,951명(제9기)을 선정하여 분석하였다. 통계분석은 복합표본 로지스틱 회귀분석을 통해 실시하였다. **연구결과**: 모든 조사 시점에서 성별과 활동제한은 노인의 삶의 질에 지속적으로 유의한 영향을 미치는 주요 요인으로 나타났다. 2016년과 2024년에는 경제활동, 스트레스, 치과 진료 미치료가, 2020년에는 흡연과 저작불편이 추가로 삶의 질에 유의한 영향을 미쳤다. **결론**: 노인의 HRQoL은 구조적 요인(성별, 활동 제한)과 환경적·행태적 요인(경제활동, 정신건강, 구강건강)이 상호작용하여 영향을 받는다. 특히 미충족 치과 진료와 같은 치과 의료 접근성 문제는 삶의 질에 장기적인 영향을 미치는 것으로 나타나, 노인 건강관리를 지원하기 위한 통합적 보건 정책과 조기 개입의 필요성이 강조된다.

주요어: 구강건강, 노인, 삶의 질, 영양 조사, 치과 진료