J Korean Soc Dent Hyg 2025;25(2):113-23
https://doi.org/10.13065/jksdh.2025.25.2.3

JKSDH

pISSN : 2287-1705
eISSN : 2288-2294

Original Article

Changes in factors affecting dental care use among older adults in Korea: KNHANES 2013-2022

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ABSTRACT

Objectives: Unmet dental care needs are a major cause of oral health deterioration among older adults. This study aimed to explore ways to improve access to dental care by comparing trends in unmet dental care needs over several years. **Methods:** Using data from the Korea National Health and Nutrition Examination Survey (KNHANES), we identified factors related to unmet dental care at each survey point from the 2013-2022, with a four-year interval. The study participants for the sixth, seventh, eighth, and ninth waves were 1,375, 1,632, 1,735, and 1,666 older adults, respectively. **Results:** From 2013–2022, unmet dental care showed statistically significant differences according to sex (p<0.05), health checkups (p<0.05), and chewing discomfort (p<0.05). Multiple logistic regression analysis showed that chewing discomfort was a statistically significant (p<0.001) factor influencing unmet dental care needs over the past decade. **Conclusions:** The study findings indicated that chewing discomfort has consistently influenced unmet dental care, and comprehensive measures to improve access to dental care for the older population are needed.

Key Words: Chewing discomfort, KNHANES, Older adults, Oral health, Unmet dental care

Introduction

As global aging accelerates, it is projected that by 2050, the population of individuals aged 65 and older will reach approximately 16% of the total population [1]. This demographic shift is causing various social changes in the healthcare and public health sectors [2], and there is a growing need for social foundations and institutional measures to support healthy aging.

Despite the improvement in economic levels and advances in medical technology in South Korea, the population continues to suffer from oral diseases [3]. In response, the government has been gradually expanding dental care services, such as dental sealants, dentures for the elderly, and implants, to improve oral health [4]. However, despite these efforts, unmet healthcare needs due to socio-economic factors have been reported in several studies [5,6], with particular concern about the high rate of unmet dental care among older adults [7]. According to the 2018 National Health and Nutrition Examination Survey (KNHANES), the annual untreated medical care rate was 8.8% in the medical field, while it was 31.9% in the dental field, indicating a relatively high rate of unmet dental care [8]. This unmet dental care ultimately increases the prevalence of oral diseases and is considered a major cause of oral health deterioration [9]. Moreover, unmet dental care has been reported to negatively impact various aspects beyond oral health, including systemic health, nutritional status, mental health, quality of life, and economic burden [10].

Unmet medical care refers to situations in which individuals do not receive healthcare services that they either desire or that healthcare professionals consider necessary. This includes not only disease treatment but also disease prevention and health

Received February 04, 2025 **Revised** March 06, 2025 **Accepted** March 12, 2025

promotion [11]. When examining the main factors of unmet dental care, studies abroad have mainly identified income and insurance status as key factors [12]. In South Korea, the main factors contributing to unmet dental care include high out-of-pocket costs and a lack of awareness about the importance of early treatment for oral diseases, leading to delayed treatment. It has been reported that the rate of unmet dental care is particularly high among socio-economically vulnerable groups [13,14].

However, most domestic studies to date have focused on single-year or specific group-based analyses, with few studies comparing trends over specific periods. Therefore, this study aims to identify significant factors associated with unmet dental care at each survey period from 2013 to 2022, using the representative data from the National Health and Nutrition Examination Survey (KNHANES), and to explore ways to improve access to dental care by comparing these trends.

Methods

1. Study participants and methods

The Korean National Health and Nutrition Examination Survey (KNHANES) is a nationwide cross-sectional survey conducted annually by the Korea Disease Control and Prevention Agency. This study used data from the 1st year of the 6th (2013), 7th (2016), 8th (2019), and 9th (2022) surveys. This study obtained approval from the Institutional Review Board (IRB), considering the collection of human-derived materials and the provision of raw data to third parties. However, the 7th cycle, 1st year was conducted without IRB approval based on the opinion of the Institutional Review Board of the Korea Disease Control and Prevention Agency (According to Article 2, Paragraph 1 of the Bioethics and Safety Act and Article 2, Paragraph 2, Subparagraph 1 of its Enforcement Rules, this study was classified as government-led research for public welfare, which does not require IRB). The study participants included 1,375 older adults aged 65 and older from the 6th wave, 1,632 from the 7th, 1,735 from the 8th, and 1,666 from the 9th wave, all of whom were selected for analysis.

2. Research tools

This study utilized the health survey data from the KNHANES to identify factors associated with unmet dental care at each survey point from the 1st year of the 6th (2013) to the 1st year of the 9th (2022) survey, with a 4-year interval.

The dependent variable was 'unmet dental care,' defined as responses of 'Yes' to the question about whether dental care was received or not. The independent variables were selected based on socio-demographic characteristics (gender, cohabitation status, income level, education level, national health insurance, economic activity), health-related psychological and behavioral factors (alcohol consumption, smoking, stress, aerobic physical activity, health checkups), and oral health-related factors (use of oral hygiene products, chewing discomfort, and oral checkups). The socio-demographic variables were analyzed based on gender (male, female), cohabitation status (living with, not living with), income level (high, upper middle, lower middle, low), education level (elementary, middle school, high school, college or above), national health insurance coverage (local, workplace, medical aid), and economic activity status (yes, no).

Health-related psychological and behavioral factors were analyzed in terms of alcohol consumption (yes, no), smoking history (has smoked, has not smoked), stress level (low, high), and level of aerobic physical activity (low, high).

Oral health-related factors were analyzed by the use of oral hygiene products (yes, no), presence of chewing discomfort (yes, no), and oral checkups (yes, no).

3. Data analysis

This study conducted complex sample statistical analysis using the SPSS Program (ver. 22.0; IBM Corp., Armonk, NY, USA)

statistical program. Prior to analysis, stratification, clustering, and weights were applied according to the guidelines for statistical analysis of the National Health and Nutrition Examination Survey data.

The characteristics of socio-demographic, health-related psychological and behavioral factors, and oral health related factors were analyzed using frequency and chi-square test. Logistic regression analysis was performed to identify the factors influencing unmet dental care. The statistical significance level was set at 0.05.

Results

1. General characteristics

The characteristics of the respondents are shown in <Table 1>. Regarding socio-demographic characteristics, the percentage of females was higher (2022: 56.3%, 2019: 57.1%, 2016: 57.8%, 2013: 58.6%). The percentage of respondents living with others was high (2022: 79.1%, 2019: 79.3%, 2016: 79.9%, 2013: 78.4%), and family income was predominantly low (2022: 41.9%, 2019: 46.1%, 2016: 49.5%, 2013: 52.6%). The education level was mainly at or below elementary school (2022: 46.6%, 2019: 53.1%, 2016: 59.6%, 2013: 67.8%), and the majority had workplace-based health insurance (2022: 59.8%, 2019: 61.0%, 2016: 60.0%, 2013: 59.3%). The percentage of respondents not engaging in economic activity was high (2022: 63.7%, 2019: 64.8%, 2016: 68.7%, 2013: 70.8%).

Regarding health-related psychological and behavioral factors, most respondents drank less than one drink per month (2022: 66.9%, 2019: 63.3%, 2016: 66.1%, 2013: 67.0%), had a history of smoking or had never smoked (2022: 90.5%, 2019: 89.7%, 2016: 90.3%, 2013: 88.9%), reported low stress levels (2022: 85.3%, 2019: 85.5%, 2016: 81.5%, 2013: 78.0%), and participated less in aerobic physical activity (2022: 66.9%, 2019: 67.0%, 2016: 65.6%, 2013: 95.5%). The percentage of those receiving health checkups was relatively high (2022: 74.3%, 2019: 72.8%, 2016: 66.5%, 2013: 64.5%).

Regarding oral health-related factors, the percentage of respondents not using oral hygiene products (such as interdental brushes) was high (2022: 70.5%, 2019: 79.6%, 2016: 92.5%, 2013: 87.8%), those reporting chewing discomfort was significant (2022: 33.7%, 2019: 36.9%, 2016: 44.1%, 2013: 49.2%), the percentage of respondents who had received an oral checkup in the past year was relatively low (2022: 36.6%, 2019: 28.8%, 2016: 21.2%, 2013: 18.9%), and the rate of unmet dental care was high (2022: 30.9%, 2019: 24.5%, 2016: 35.8%, 2013: 31.9%).

2. Unmet dental care according to characteristics

The characteristics of unmet dental care are shown in <Table 2>. In 2022, significant differences were observed in gender, cohabitation status, income, health checkup participation, alcohol consumption, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the past year) ($p<0.05$). Among socio-demographic characteristics, males showed statistically significantly higher rates ($p=0.003$), and those living with others had higher rates ($p<0.001$). Higher income groups also had significantly higher rates ($p=0.001$). Regarding health management, those who had received a health checkup showed significantly higher rates ($p<0.001$), and those who did not consume alcohol also showed higher rates ($p=0.048$). In terms of oral health-related factors, those using oral hygiene products (interdental brushes) had significantly higher rates ($p=0.018$), those with no chewing discomfort had higher rates ($p<0.001$), and those who had received an oral checkup in the past year had significantly higher rates ($p<0.001$).

In 2019, significant differences were observed in gender, income, education level, health checkup participation, alcohol consumption, stress, aerobic physical activity, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the past year) ($p<0.05$). Males showed significantly higher rates ($p=0.029$), and those with higher income had significantly higher rates compared to the lower income group ($p=0.015$). Higher education levels were also significantly associated

Table 1. General characteristics Unit: N(%)

Characteristics	Division	2022	2019	2016	2013
Socio-demographic characteristics					
Gender	Male	745(43.7)	723(42.9)	695(42.2)	558(41.4)
	Female	921(56.3)	967(57.1)	883(57.8)	771(58.6)
Co-habitation	No	393(20.9)	407(20.7)	361(20.1)	305(21.6)
	Yes	1,273(79.1)	1,283(79.3)	1,217(79.9)	1,019(78.4)
Income	Low	756(41.9)	800(46.1)	776(49.5)	690(52.6)
	Lower-middle	497(29.6)	490(28.6)	430(25.9)	347(25.6)
	Upper-middle	249(17.3)	251(16.5)	211(14.3)	164(12.9)
	High	158(11.1)	138(8.8)	149(10.4)	112(9.0)
Education level	Below elementary	748(46.6)	839(53.1)	894(59.6)	804(67.8)
	Middle school	239(15.5)	250(16.5)	214(14.4)	159(13.1)
	High school	321(22.6)	288(19.7)	233(15.7)	178(13.6)
	College or higher	192(15.3)	150(10.7)	140(10.4)	74(5.5)
Health insurance	Regional	580(34.8)	503(30.4)	517(33.8)	420(32.5)
	Workplace	980(59.8)	1,039(61.0)	925(60.0)	764(59.3)
	Medical assistance	106(5.4)	147(8.5)	97(6.2)	103(8.2)
Economic activity status	Yes	593(36.3)	532(35.2)	481(31.3)	355(29.2)
	No	899(63.7)	998(64.8)	1,002(68.7)	860(70.8)
Health-related psychological & behavioral factors					
Alcohol consumption	Drinks	1,089(66.9)	1,061(63.3)	1,008(66.1)	815(67.0)
	Abstinent (less than 1 drink per month)	540(33.1)	596(36.7)	519(33.9)	392(33.0)
Smoking	Past smoker / non-smoker	1,461(90.5)	1,492(89.7)	1,380(90.3)	1,064(88.9)
	Smoker	165(9.5)	161(10.3)	146(9.7)	137(11.1)
Stress perception	Low	1,394(85.3)	1,358(82.5)	1,233(81.5)	946(78.0)
	High	231(14.7)	294(17.5)	289(18.5)	254(22.0)
Aerobic physical activity	Low	1,013(66.9)	1,027(67.0)	975(65.6)	1,144(95.5)
	High	470(33.1)	498(33.0)	506(34.4)	52(4.5)
Regular medical check-up	Yes	1,113(74.3)	1,109(72.8)	1,024(66.5)	800(64.5)
	No	384(25.7)	422(27.2)	480(33.5)	410(35.5)
Oral health-related factors					
Oral hygiene product use (interdental brushes)	No	1,165(70.5)	1,328(79.6)	1,406(92.5)	1,046(87.8)
	Yes	461(29.5)	325(20.4)	120(7.5)	152(12.2)
Chewing discomfort	No	1,067(66.3)	1,031(63.1)	842(55.9)	621(50.8)
	Yes	557(33.7)	621(36.9)	682(44.1)	575(49.2)
Oral checkup (within past year)	No	1,062(63.4)	1,192(71.2)	1,192(78.8)	964(81.1)
	Yes	563(36.6)	458(28.8)	332(21.2)	232(18.9)
Unmet dental care	Tes	400(30.9)	403(24.5)	418(35.8)	374(31.9)
	No	852(69.1)	1,246(75.6)	802(64.2)	822(68.1)

with higher rates compared to the lower education group (p<0.001). Regarding health management, those who had received a health checkup showed significantly higher rates (p=0.001), those with low stress had higher rates (p<0.001), and those who engaged in aerobic physical activity had significantly higher rates (p=0.006). In terms of oral health-related factors, those using oral hygiene products (interdental brushes) had significantly higher rates (p<0.001), those with no chewing discomfort had higher rates (p<0.001), and those who had received an oral checkup in the past year had significantly higher rates (p<0.001).

In 2016, significant differences were observed in gender, education level, health checkup participation, stress, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the past year) (p<0.05). Males had significantly higher rates (p=0.002), and those with higher education had significantly higher rates compared to the lower education group (p=0.014). In terms of health management, those who had received a health checkup had significantly higher rates (p=0.004), and those with lower stress had higher rates (p<0.001). Regarding oral health-related factors, those using oral hygiene products (interdental brushes) had significantly higher rates (p<0.001), those with no chewing discomfort had higher rates (p<0.001), and those who had received an oral checkup in the past year had significantly higher rates (p<0.001).

In 2013, significant differences were observed in gender, income, health checkup participation, stress, and chewing discomfort (p<0.05). Males showed significantly higher rates (p=0.009), and those with higher income had significantly higher rates compared to the lower income group (p=0.024). Regarding health management, those who had received a health checkup showed significantly higher rates (p=0.019), and those with lower stress had higher rates (p=0.001). In terms of oral health-related factors, those without chewing discomfort had significantly higher rates (p<0.001).

3. Factors affecting unmet dental care

The results of the complex sample multiple logistic regression analysis of factors affecting unmet dental care are shown in <Table 3>.

In 2022, the factors influencing dental treatment were health checkup participation, chewing discomfort, and oral checkups (within the past year). Those who had received a health checkup were 1.737 times more likely to receive dental treatment compared to those who had not (p=0.006), those without chewing discomfort were 2.440 times more likely (p<0.001), and those who had received an oral checkup in the past year were 3.352 times more likely (p<0.001), with these differences being statistically significant.

In 2019, the factors influencing dental treatment were the use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the past year). Those using oral hygiene products (interdental brushes) were 1.737 times more likely to receive dental treatment (p=0.006), those without chewing discomfort were 2.303 times more likely (p<0.001), and those who had received an oral checkup in the past year were 3.163 times more likely (p<0.001), with these differences being statistically significant.

In 2016, the factors influencing dental treatment were gender, stress, chewing discomfort, and oral checkups (within the past year). Males were 1.576 times more likely to receive dental treatment (p=0.012), those with low stress were 1.744 times more likely (p=0.003), those without chewing discomfort were 2.976 times more likely (p<0.001), and those who had received an oral checkup in the past year were 3.497 times more likely (p<0.001), with these differences being statistically significant.

In 2013, the factors influencing dental treatment were income, health checkup participation, stress, and chewing discomfort. Those in the high-income group were 2.324 times more likely to receive dental treatment compared to those in the low-income group (p=0.031), those who had received a health checkup were 1.439 times more likely (p=0.042), those with low stress were 1.474 times more likely (p=0.032), and those without chewing discomfort were 2.440 times more likely (p<0.001), with these differences being statistically significant.

https://doi.org/10.13065/jksdh.2025.25.2.3

Table 2. Unmet dental care according to characteristics

Unit: N(%)

Characteristics	Division	2022			2019			2016			2013		
		Yes	No	p^*	Yes	No	p^*	Yes	No	p^*	Yes	No	p^*
Socio-demographic characteristics													
Gender	Male	159(27.6)	417(72.4)	0.003	152(27.1)	408(72.9)	0.029	155(28.8)	384(71.2)	0.002	132(26.4)	368(73.6)	0.009
	Female	241(35.7)	435(64.3)		251(34.1)	484(65.9)		263(38.6)	418(61.4)		242(34.8)	454(65.2)	
Co-habitation	No	117(40.6)	171(59.4)	<0.001	110(35.3)	202(64.7)	0.165	105(38.6)	167(61.4)	0.176	100(35.8)	179(64.2)	0.160
	Yes	283(29.4)	681(70.6)		293(29.8)	690(70.2)		313(33.0)	635(67.0)		274(29.9)	643(70.1)	
Income	Low	213(40.2)	317(59.8)	0.001	220(36.7)	380(63.3)	0.015	207(35.1)	382(64.9)	0.215	215(34.5)	409(65.5)	0.024
	Lower-middle	115(29.9)	270(70.1)		100(26.0)	285(74.0)		126(37.7)	208(62.3)		93(30.2)	215(69.8)	
	Upper-middle	42(20.7)	161(79.3)		54(27.3)	144(72.7)		55(31.4)	120(68.6)		46(30.7)	104(69.3)	
	High	29(22.0)	103(78.0)		27(24.8)	82(75.2)		28(23.9)	89(76.1)		19(17.9)	87(82.1)	
Education level	Below elementary	187(35.0)	347(65.0)	0.213	229(34.7)	431(65.3)	<0.001	258(37.7)	426(62.3)	0.014	265(33.6)	523(66.4)	0.222
	Middle school	66(34.0)	128(66.0)		59(29.9)	138(70.1)		55(32.7)	113(67.3)		44(27.8)	114(72.2)	
	High school	76(28.6)	190(71.4)		58(26.7)	159(73.3)		67(33.8)	131(66.2)		44(24.9)	133(75.1)	
	College or higher	38(22.6)	130(77.4)		23(17.3)	110(82.7)		22(18.3)	98(81.7)		21(28.8)	52(71.2)	
Health insurance	Regional	142(31.2)	313(68.8)	0.305	127(31.9)	271(68.1)	0.169	147(37.5)	245(62.5)	0.274	121(32.2)	255(67.8)	0.264
	Workplace	230(31.4)	502(68.6)		233(29.4)	560(70.6)		231(31.7)	497(68.3)		207(29.7)	491(70.3)	
	Medical assistance	28(43.1)	37(56.9)		43(41.7)	60(58.3)		30(40.5)	44(59.5)		34(37.0)	58(63.0)	
Economic activity status	Yes	143(30.4)	328(69.6)	0.833	136(31.7)	293(68.3)	0.326	119(32.3)	249(67.7)	0.288	119(34.2)	229(65.8)	0.328
	No	222(32.5)	462(67.5)		233(29.9)	547(70.1)		284(35.4)	519(64.6)		255(30.1)	593(69.9)	
Health-related psychological & behavioral factors													
Alcohol consumption	Drinks	281(34.1)	542(65.9)	0.048	270(32.7)	556(67.3)	0.056	279(34.8)	522(65.2)	0.492	261(32.2)	549(67.8)	0.355
	Abstinent (less than 1 drink per month)	119(27.8)	309(72.2)		133(28.4)	336(71.6)		138(33.0)	280(67.0)		113(29.3)	273(70.7)	
Smoking	Past smoker / non-smoker	364(32.2)	766(67.8)	0.946	371(31.5)	807(68.5)	0.358	382(34.2)	734(65.8)	0.919	332(31.3)	729(68.7)	0.587
	Smoker	36(29.5)	86(70.5)		32(27.4)	85(72.6)		36(34.6)	68(65.4)		42(31.1)	93(68.9)	
Stress perception	Low	331(30.9)	740(69.1)	0.062	293(28.0)	752(72.0)	<0.001	301(31.2)	665(68.8)	<0.001	262(27.8)	680(72.2)	0.001
	High	69(38.3)	111(61.7)		108(43.7)	139(56.3)		116(46.4)	134(53.6)		111(44.0)	141(56.0)	
Aerobic physical activity	Low	249(32.9)	508(67.1)	0.300	268(32.6)	553(67.4)	0.006	276(36.7)	476(63.3)	0.455	356(31.3)	783(68.7)	0.558
	High	114(29.1)	278(70.9)		101(26.1)	286(73.9)		129(30.9)	288(69.1)		16(30.8)	36(69.2)	
Regular medical check-up	Yes	240(27.2)	643(72.8)	<0.001	252(28.1)	646(71.9)	0.001	263(31.6)	568(68.4)	0.004	264(33.3)	528(66.7)	0.019
	No	125(45.1)	152(54.9)		116(37.3)	195(62.7)		143(40.9)	207(59.1)		108(27.2)	289(72.8)	
Oral health-related factors													
Oral hygiene product use (interdental brushes)	No	300(35.6)	543(64.4)	0.018	348(34.7)	656(65.3)	<0.001	389(34.9)	727(65.1)	<0.001	331(31.7)	713(68.3)	0.475
	Yes	100(24.4)	309(75.6)		55(18.9)	236(81.1)		29(27.9)	75(72.1)		43(28.3)	109(71.7)	
Chewing discomfort	No	179(22.7)	610(77.3)	<0.001	164(21.6)	595(78.4)	<0.001	129(20.6)	498(79.4)	<0.001	108(17.4)	513(82.6)	<0.001
	Yes	221(47.7)	242(52.3)		239(44.6)	297(55.4)		289(48.7)	304(51.3)		266(46.3)	309(53.7)	
Oral checkup (within past year)	No	300(43.4)	392(56.6)	<0.001	336(39.5)	515(60.5)	<0.001	365(40.6)	534(59.4)	<0.001	314(32.6)	650(67.4)	0.758
	Yes	100(17.9)	460(82.1)		67(15.1)	377(84.9)		53(16.5)	268(83.5)		60(25.9)	172(74.1)	

*by chi-square test

Table 3. Factors affecting unmet dental care

Characteristics	Division	2022		2019		2016		2013	
		OR(95% CI)	p^*	OR(95% CI)	p^*	OR(95% CI)	p^*	OR(95% CI)	p^*
Socio-demographic characteristics									
Gender	Male	1.461(0.981-2.177)	0.062	1.194(0.825-1.727)	0.347	1.576(1.106-2.246)	0.012	0.745(0.509-1.090)	0.129
	Female	reference		reference		reference		reference	
Co-habitation	No	1.282(0.822-1.998)	0.273	0.866(0.562-1.334)	0.513	1.260(0.804-1.977)	0.312	0.918(0.625-1.350)	0.664
	Yes	reference		reference		reference		reference	
Income	Low	1.694(0.875-3.282)	0.118	1.009(0.532-1.910)	0.979	0.932(0.476-1.824)	0.836	2.324(1.082-4.994)	0.031
	Lower-middle	1.455(0.851-2.488)	0.806	1.281(0.758-2.164)	0.885	1.235(0.586-2.605)	0.578	1.245(0.776-1.998)	0.053
	Upper-middle	1.552(1.033-2.332)	0.620	1.060(0.713-1.577)	0.528	1.105(0.529-2.307)	0.790	1.111(0.717-1.722)	0.116
	High	reference		reference		reference		reference	
Education level	Below elementary	0.681(0.387-1.196)	0.180	1.275(0.665-2.444)	0.463	1.111(0.571-2.162)	0.755	0.646(0.305-1.370)	0.254
	Middle school	0.975(0.536-1.773)	0.934	1.478(0.817-2.674)	0.196	1.255(0.657-2.397)	0.491	0.809(0.347-1.885)	0.623
	High school	1.201(0.697-2.068)	0.508	1.886(0.945-3.767)	0.072	1.641(0.770-3.497)	0.199	0.613(0.284-1.322)	0.211
	College or higher	reference		reference		reference		reference	
Health-related psychological & behavioral factors									
Alcohol consumption	Drinks	1.090(0.723-1.643)	0.681	1.016(0.742-1.389)	0.923	0.818(0.585-1.145)	0.241	0.934(0.680-1.282)	0.671
	Abstinent (less than 1 drink per month)	reference		reference		reference		reference	
Stress perception	Low	1.199(0.797-1.802)	0.383	1.509(0.986-2.309)	0.058	1.744(1.216-2.502)	0.003	1.474(1.035-2.099)	0.032
	High	reference		reference		reference		reference	
Aerobic physical activity	Low	1.015(0.723-1.425)	0.931	1.210(0.803-1.824)	0.361	0.805(0.580-1.118)	0.195	1.139(0.559-2.321)	0.720
	High	reference		reference		reference		reference	
Regular medical check-up	Yes	1.737(1.170-2.579)	0.006	1.275(0.891-1.825)	0.183	0.710(0.500-1.010)	0.057	1.439(1.013-2.042)	0.042
	No	reference		reference		reference		reference	
Oral health-related factors									
Oral hygiene product use (interdental brushes)	No	0.963(0.605-1.534)	0.874	1.695(1.097-2.618)	0.018	1.331(0.746-2.374)	0.332	1.064(0.656-1.725)	0.802
	Yes	reference		reference		reference		reference	
Chewing discomfort	No	2.440(1.679-3.546)	<0.001	2.303(1.679-3.160)	<0.001	2.976(2.184-4.055)	<0.001	3.084(2.298-4.140)	<0.001
	Yes	reference		reference		reference		reference	
Oral checkup (within past year)	No	3.352(2.408-4.667)	<0.001	3.163(2.241-4.465)	<0.001	3.497(2.222-5.503)	<0.001	0.971(0.587-1.607)	0.909
	Yes	reference		reference		reference		reference	

*by multiple logistic regression analysis

https://doi.org/10.13065/jksdh.2025.25.2.3

Discussion

This study analyzed data from the 6th (2013) to the 9th (2022) National Health and Nutrition Survey (KNHANES) to identify factors influencing dental care utilization among the elderly in Korea and to provide foundational data for elderly health policies.

The analysis of unmet dental care characteristics based on the subjects' characteristics revealed that gender, health checkup utilization, and chewing discomfort were consistently identified as significant variables. In 2013, significant differences were observed in gender, income, health checkups, stress, and chewing discomfort. In 2016, all these factors, except for income, showed similar results to 2013. Additionally, education level, oral hygiene products (interdental brushes), and oral checkups (within the past year) were added as significant factors. In 2019, the same factors that were significant in 2016 (gender, education level, health checkups, stress, oral hygiene products, and chewing discomfort) remained significant, with income level reappearing as a factor, and aerobic physical activity also added. In 2022, cohabitation status and monthly alcohol consumption emerged as significant variables, while education level, stress, and aerobic physical activity were excluded.

Gender consistently showed significant differences over the past decade. Gender differences in unmet dental care are often attributed to differences in healthcare access, economic conditions, and social roles. Women are more likely to postpone dental treatments due to economic burdens and lack of time, particularly because of caregiving responsibilities, which lead them to prioritize other matters over dental visits. Economic hardship was highlighted as a primary cause of unmet care [15,16]. This study also confirmed that income was significantly correlated with dental care in 2013, 2019, and 2022, reinforcing the notion that both gender and income are key factors in dental treatment. Previous studies have shown that women feel a greater economic burden than men, often leading them to delay preventive dental care and regular checkups due to psychological and financial stress [15,17]. The study found higher unmet dental care rates among women, a trend that has persisted over the last decade. To address unmet dental care for the elderly, it is necessary to examine policy support for gender differences and implement social support measures tailored to each gender.

Oral health examinations were significantly analyzed in the surveys of 2016, 2019, and 2022, confirming that health check-ups and oral health examinations are significant variables in dental treatment. Health checkups are vital for the early detection of diseases and preventive actions. Previous studies have emphasized that preventive health checkups reduce unmet dental care, and comprehensive health checkups, including oral health, are critical in ensuring timely dental treatment for the elderly[18-24]. Several studies suggest that factors such as personal, economic, and geographical barriers to oral checkups need to be analyzed in detail to improve dental visits and encourage preventive care [7,25]. The elderly face significant barriers to dental care due to mobility issues, lack of information, and economic constraints. Therefore, policies such as mobile health checkups or collaboration with local communities to offer checkups in frequently visited places by seniors would be beneficial.

Chewing discomfort has also been a consistent factor influencing unmet dental care over the past decade. Previous studies [16,19] also found that those with chewing discomfort are more likely to have unmet dental care, which aligns with the results of this study. The elderly often lack the resources or information to resolve dental issues such as pain or discomfort, leading to unmet needs [26]. Moreover, the elderly face significant challenges due to physical and mental health decline, loss of economic capacity due to retirement, and higher medical costs [27]. Such unmet healthcare can lower an individual's quality of life and have negative impacts on mental health. Therefore, chewing discomfort and unmet healthcare go beyond just oral health issues and can significantly affect overall physical, mental, and social well-being. As the elderly population continues to grow, the incidence of unmet dental care will likely rise. Therefore, comprehensive strategies are necessary to improve dental care accessibility for the elderly.

Dental care utilization in Korea has steadily evolved over the past decade, with an increase in elderly utilization due to aging population concerns and the expansion of the health insurance system [28]. Recent trends suggest that access to dental care is influenced by various socio-economic factors. However, elderly populations still exhibit limited utilization of dental care, with factors such as gender, health checkups, and chewing discomfort continuing to have significant impacts. To address this issue, it is

necessary to introduce facility-based health check-up or mobile screening vehicles to provide regular oral health check-ups at public institutions, welfare centers, and elderly facilities that seniors frequently visit. Additionally, policies should be strengthened to offer comprehensive screening services, including oral health, as part of existing health check-ups, enabling preventive health management. In the past, elderly dental care utilization was mostly focused on treating symptoms or functional rehabilitation. However, as perspectives on healthy life expectancy change and there is a growing demand for improved quality of life, there is a need to shift from treatment-focused services to a more integrated approach of treatment, prevention, and health promotion for oral health. To increase dental service utilization among the elderly, it is essential to establish a policy support system and reform the system to enhance accessibility and effectiveness.

The limitations of this study include the fact that it is a cross-sectional study rather than a cohort study, making it difficult to establish causality. Additionally, due to changes in survey criteria and items according to the KNHANES cycle, some necessary variables may not have been considered. Therefore, it is deemed necessary to conduct further analyses incorporating a wider range of variables. Nevertheless, this study is meaningful in that it identifies the factors influencing dental care utilization among Korean older adults over a 10-year period from 2013 to 2022 and suggests directions for oral health policy.

Conclusions

This study utilized data from the Health Survey of the Korea National Health and Nutrition Examination Survey (KNHANES) from the first year of the 6th period (2013) to the first year of the 9th period (2022), to identify factors related to unmet dental care by conducting surveys every 4 years.

1. Over the 10 years (2013–2022), unmet dental care showed statistically significant differences in gender ($p<0.05$), health checkup utilization ($p<0.05$), and chewing discomfort ($p<0.05$).

2. In 2013, gender, income, health checkup utilization, stress, and chewing discomfort were statistically significant ($p<0.05$).

3. In 2016, gender, education level, health checkup utilization, stress, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the last year) were statistically significant ($p<0.05$).

4. In 2019, gender, income, education level, health checkup utilization, alcohol consumption, stress, aerobic physical activity, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the last year) were statistically significant ($p<0.05$).

5. In 2022, gender, cohabitation status, income, health checkup utilization, alcohol consumption, use of oral hygiene products (interdental brushes), chewing discomfort, and oral checkups (within the last year) were statistically significant ($p<0.05$).

6. The multiple logistic regression analysis of factors affecting unmet dental care showed that the chewing discomfort variable was statistically significant in all years from 2013 to 2022 ($p<0.001$).

The results of this study showed that the chewing discomfort variable has consistently been an influencing factor for unmet dental care over the past 10 years. Therefore, it is believed that comprehensive measures to improve dental care accessibility for the elderly population are necessary to facilitate early disease detection and treatment.

Notes

Author Contributions

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

Conflicts of Interest

The author declared no conflicts of interest.

Funding

This research was supported by Kyungdong University Research Fund, 2023.

Ethical Statement

None.

Data Availability

Data can be obtained from The Korea Disease Control and Prevention Agency(The Korea National Health and Nutrition Examination Survey 2013-2022) repository source.

Acknowledgements

None.

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한국 노인의 10년간 치과의료이용 영향 요인 변화 추이 : 국민건강영양조사 6th(2013)-9th(2022)

초록

연구목적: 미충족 치과의료는 노인의 구강건강 악화의 주요 원인으로 주목되고 있다. 본 연구에서는 미충족 치과진료의 다년간 추이를 비교함으로써 치과진료 접근성을 향상시키는 방안을 모색하고자 하였다. **연구방법:** 국민건강영양조사(KNHANES) 자료를 활용하여 제6기 1차년도(2013)-제9기 1차년도(2022)까지 매 4년을 주기로 조사시기별 미충족 치과진료 관련 요인을 파악하였다. 연구대상자는 65세 이상 노인 1,375명(제6기), 1,632명(제7기), 1,735명(제8기), 1,666명(제9기)을 선정하여 분석하였다. 인구사회학적 특성, 건강관련 심리·행동 요인, 건강상태 요인의 특성은 빈도분석과 교차분석을 실시하였으며 로지스틱 회귀분석을 실시하여 미충족 치과진료영향 요인을 확인하였다. **연구결과:** 10년간(2013년-2022년) 미충족 치과진료는 성별(p<0.05), 건강검진(p<0.05), 저작불편(p<0.05) 항목에서 통계적으로 유의하였다. 10년간(2013년-2022년) 미충족 치과진료에 영향을 미치는 요인에 대한 다중 로지스틱 회귀분석 결과 저작불편 변수가 통계적으로 유의하였다(p<0.001). **결론:** 본 연구결과 저작불편 변수가 지난 10년간 일정하게 치과의료 미충족에 영향을 미치는 요인으로 분석되었으며 노인 인구를 대상으로 한 치과의료 접근성 향상을 위한 종합적인 대책이 필요할 것으로 사료된다.

색인: 저작불편, 국민건강영양조사, 노인, 구강, 미충족치과치료