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Oral Health and Non-Communicable Disease Factors Among Older Adults: A Community-Based Survey in Thailand

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Abstract

Background

Disparities in oral health among older adults contribute to poor health outcomes, limited social engagement, and reduced quality of life. Older adults commonly experience tooth loss, much of which is preventable. Therefore, this study aimed to assess oral health status and identify factors associated with oral health problems among older adults.

Methods

A community-based cross-sectional survey was conducted in four provinces across Thailand. A total of 2,320 respondents aged 60 years and older were included. Oral health problems were assessed using the 12-item General Oral Health Assessment Index (GOHAI) through face-to-face interviews. Data were analyzed using multiple logistic regression.

Results

Approximately 48% of older adults had poor-to-moderate oral health. This finding showed that unemployment (OR = 1.45, 95% CI: 1.15–1.83), coverage under the national health scheme (OR = 3.84, 95% CI: 2.94–5.03), hypertension (OR = 1.49, 95% CI: 1.14–1.96), and chronic kidney disease (OR = 3.18, 95% CI: 1.60–6.32) were significantly associated with oral health problems. In contrast, diabetes, CHC, comorbidity,

Conclusion

Older adults in Thailand face oral health problems, particularly those with hypertension and chronic kidney disease. Health providers should consider prioritizing dental screening and appropriate treatment for these high-risk groups.

Introduction

Oral health significantly affects overall health and quality of life. particularly in older adults. They have been linked to the risk of previous diseases such as heart disease (1), stroke, diabetes (2), and respiratory infections (3), made existing health conditions worsen (4), reduced the quality of life according to the cause of pain and difficulty eating; and affected social interactions. Oral health is a preventable disease, and it is estimated that nearly 3.7 billion people are affected, which means half of the population suffers from one or more oral diseases (5). These conditions include untreated caries, severe periodontitis, edentulism, and other disorders, which have remained high and largely unchanged over three decades and contributed to the loss of healthy life years due to disparities in unequal access

to oral healthcare, education, and preventive services (6). Edentulism, or tooth loss, both partial and total, in older adults is an important indicator reflecting the quality of care and services related to oral health issues in all age groups. It is well known that tooth loss leads to poor diet, reduced self-esteem, and a lower quality of life (7). Total tooth loss affects approximately 11% of older adults, with higher prevalence among the oldest-aged groups [(8)]. In addition, gum disease, tooth decay, osteoporosis, and injuries were linked to tooth loss, and it was caused by poor oral healthcare behaviors, including poor oral hygiene, tobacco use, unhealthy dietary habits, and lack of access to dental care.

The Geriatric Oral Health Assessment Index (GOHAI) is a widely used instrument for assessing the functional, pain-related, and psychosocial impacts of oral health conditions(9, 10). Several studies indicated that GOHAI demonstrated had high internal consistency and reliability when applied to older adults across more than 30 countries (10, 11). The original version of instrument focused on self-reported assessments of oral health problems among older adults (12). Although previous studies (13–16) used GOHAI to determine the oral health – related quality of life (OHRQoL), original objective found the worse GOHAI scores were significantly associated with need for dental care and services (12). This highlights the utility of GOHAI for or preliminary screening and identifying oral health problems among community-dwelling older adults.

Previous studies (9, 16, 17) have consistently demonstrated that GOHAI score among older adults ranges from poor to moderate. For instance, Ceylan Sen (9) found that 45% of older adults in Turkey reported significant oral health impacting their daily lives. Similarly, a study in Malaysia (17) indicated that a substantial portion of the elderly population experiences "low" OHRQoL, with researchers noting that nearly 40% of participants reported functional limitations that hindered their social participation and nutritional intake. Furthermore, a study by Kim et al. (18) found that community dwelling older adults with fewer than 20 remaining teeth were significantly more likely to report lower GOHAI scores. Similarly, those who wore dentures and rated their oral health as poor also had lower GOHAI scores. A study in Unite Arab Emirates (15) demonstrated older adults attended a dental healthcare center had a poor perception of their oral health. As mentioned, older adults' perception of their oral health was generally poor, particularly among those with existing health problems.

Furthermore, most older adults are facing non-communicable diseases (NCDs), with a continuously increasing trend (19). Several studies (20, 21) have indicated that the prevalence of NCDs tends to increase with age, often accompanied by comorbidities, while some conditions remain undiagnosed or untreated. Additionally, emerging evidence also highlights the association between oral health and systemic complications including diabetes, hypertension, CVD. Previous studies (1, 22–24) indicate that poor oral health, particularly severe periodontitis, is associated with an increased risk of CVD among older adults. This association appears more pronounced in females, potentially due to the synergistic effects of post-menopausal hormonal changes and systemic inflammation, which can accelerate both bone loss and atherosclerosis (25). Similar with a study of Lim (24) demonstrated that poor oral health related to CVD. Similar with a systematic review (26) indicated that patients who faced with diabetes type 2 had approximately 3 times of oral health problem compared non-diabetes people. However, a

study in Poland (27) indicated that older adults with NCDs, including diabetes and hypertension, showed an association with GOHAI scores, whereas specific conditions such as myocardial infarction were not associated with GOHAI scores.

Recently, Thailand has transitioned into an aging society. In 2024, the proportion of older adults reached 20% of the total population, making Thailand the second-highest in Southeast Asia after Singapore (28, 29). Additionally, older adults experience economic burdens and engage in several health risk behaviors such as 8% are current cigarette smokers, and 62% do not participate in regular exercise (29). Furthermore, hypertension was present in 47% of older adults, diabetes in 22%, stroke in nearly 3%, and cardiovascular disease in 2%, representing the most prevalent non-communicable diseases (NCDs) in this population (30). In term of oral health, a previous national survey in Thailand indicated that approximately 60% of older adults had periodontal diseases (31). Moreover, the severity of periodontal disease appears to be higher in specific settings, such as healthcare facilities, where nearly 70% of older adults were affected. In these settings, 68.7% had gingivitis, 65.1% had calculus, 36.1% exhibited tooth mobility, and 11.4% had periodontal pockets greater than 6 mm (32). As mentioned above, NCDs are related to oral health problems and may contribute to the burden of oral health issues in Thailand. However, our previous study, which was based on a small sample size, found that NCDs did not significantly predict oral health problems and did not use standardized measurements. For example, a survey conducted in an urban area reported that approximately 50% of older adults experienced oral health problems (33). Therefore, this present study aims to determine the prevalence of oral health problems using the GOHAI and to identify the specific socioeconomic and clinical factors - including gender, employment status, health scheme utilization, and chronic comorbidities like hypertension, diabetes, and chronic kidney disease-that influence oral health problem among older adults across four diverse provinces in Thailand.

Methods

Participants and setting

A community-based cross-sectional survey under the research project “oral health and oral healthcare behaviors among older adults in Thailand” (Fundamental Fund: fiscal year 2024 [grand no. FF-134/2567]) was conducted between December 2024 – May 2025 across four provinces in Thailand included Kanchanaburi, Nakhon Sawan, Nakhon Ratchasima, and Krabi Provinces. Participants were older adults aged 60 years and above who had been registered residents in the study areas for at least one year. Exclusion criteria included older adults who were not present in the study areas during data collection, were unable to communicate, were under the supervision of caregivers, or were in self-isolation or quarantine. The sample size was calculated using a single population proportion formula, with a 95% confidence level (Z = 1.96), an estimated proportion of 0.6712, and a margin of error of 0.04. The minimum required sample size was 529 participants per setting. adding 10% of calculation sample size, average 580 participants per setting. totally 2,320 participants enrolled in this study.

Multistage random sampling was used in the first four provinces of Thailand, including Nakhon Ratchasima (Northeast), Krabi (South), Nakhon Sawan (Central), and Kanchanaburi (West). In each province, one district was chosen at random. Subsequently, two subdistricts were chosen randomly from each district. Finally, participants were selected at random from a list of older persons from the database of the subdistrict health-promoting hospitals. Each subdistrict contributed 580 participants.

Materials and instruments

General characteristics included age, sex (male, female), marital status (single, married, divorced, widowed, or separated), educational level (no formal education, primary education, and secondary education or higher), and employment status (employed or unemployed).

Information on income sufficiency (sufficient or insufficient), health scheme utilization for accessing healthcare services including Universal Health Coverage (UHC), Civil Servant Medical Benefit Scheme (CMBS), and history of chronic diseases (hypertension, diabetes mellitus, chronic heart disease, and chronic kidney disease) was also collected.

Oral health problems were assessed using the 12-item Geriatric Oral Health Assessment Index (GOHAI). Each item was scored on a three-point Likert scale (1 = never or rarely, 2 = sometimes, and 3 = often or very often). Three positively worded items were reverse-coded prior to summing the total score. The total score ranged from 12 to 36, with higher scores indicating worse oral health status. Oral health status was categorized into three levels: poor (29–36 points), moderate (21–28 points), and no or slight problems (12–20 points).

Data analysis

Data were analyzed using SPSS version 31. Descriptive statistics were used to summarize the data, including frequency, percentage, mean, and standard deviation. Binary logistic regression analysis was performed to examine the association between oral health problems and independent variables, including sex, marital status, educational level, employment status, income sufficiency, health scheme utilization, history of illness, and comorbidity. Variables with statistical significance in the binary analysis were further included in a multiple logistic regression model to identify factors independently associated with oral health problems. These variables included sex, employment status, health scheme utilization, hypertension, chronic kidney disease, and comorbidity. The results were presented as odds ratios (ORs) with 95% confidence intervals (95% CIs) and p-values. A p-value of less than 0.05 was considered statistically significant.

Ethical consideration

This study approved ethical The Ethical Review Committee for Human Research, Faculty of Public Health, Mahidol University approved this study (COA no. MUPH 2024 – 130; Protocol no. 167/2024). This

study was performed according to the Helsinki Declaration. All participants gave informed consent to participate in the study before data collection were stared.

Results

Of 2,320 participants across Thailand, approximately 60% were female and married. Most of them have primary school or lower (86%); 65% are currently working, and 53% had sufficient income. In tern of health scheme utilization, 71% of them used national health when they used healthcare services included 91.6% of universal health coverage (UHC), and 8.4% of civil medical benefit scheme (CMBS). Of 65% of them had chronical illness included 68.6% of hypertension, 35.3% of dyslipidaemia, 23.3% of diabetes mellites, 9.2% of chronic kidney disease (CKD), and 3.0% of chronic heart disease. Additionally, 42% of them had comorbidity. The details are presented in Table 1.

Prevalence of oral health problem among older adults found that 51.9% of respondents had no or only slight oral health problems, while 43.2% had moderate problems and 4.9% had severe problems as showed in Table 1.

Table 1
Characteristics of participants

Variables	**n (%)**
Gender	
♣ Male	960(41.4%)
♣ Female	1,360(58.6%)
Marital status	
♣ Married	1,401(60.4%)
♣ Single or other	173 (7.5%)
♣ Widowed	641 (27.6%)
♣ Divorce	52 (2.2%)
♣ Separate	53 (2.3%)
Educational level	
♣ Primary school or lower	2,005(86.4%)
♣ Secondary school or higher	315(13.6%)
Employment status	
♣ Employer	1,503(64.8%)
♣ Unemployed	817(35.2%)
Income sufficiency	
♣ Sufficiency	1,227(52.9%)
♣ Insufficiency	1,093(47.1%)
National Health scheme utilization	
♣ Other	673(29.0%)
♣ National Health Scheme	1,647(71.0%)
♣ CMBS	139(8.4%)
♣ Universal Health Coverage (UHC)	1508(91.6)
History of illness	
♣ No	805(34.7%)
♣ Yes	1,515(65.3%)
♣ Diabetes mellitus (DM)	353(23.3%)

Variables	n (%)
♣ Hypertension (HT)	1,039(68.6%)
♣ Dyslipidemia	534(35.3%)
♣ Chronic heart diseases	140(9.2%)
♣ Chronic kidney disease	45(3.0%)
Comorbidity	636(42.0%)
Oral Health Problem	
♣ No problem	1203 (51.9%)
♣ Fair problem	1003 (43.2%)
♣ High problem	114 (4.9%)

Factors related with oral health problem among older adults

Our findings revealed several factors linked to oral health problems in older adults. These factors include being female, unemployment, insufficient income, use of the national health scheme, hypertension, chronic kidney disease, and the presence of at least two chronic conditions. Female participants were significantly more likely to have oral health problems than males (OR = 1.19, 95% CI: 1.01–1.41). Participants with unemployment had a higher likelihood of oral health problems compared to those with employment status (OR = 1.46, 95% CI: 1.23–1.74). Additionally, participants with insufficient income were more likely to have oral health problems than those with sufficient income (OR = 1.64, 95% CI: 1.38–1.95). With health scheme utilization, participants under the main national health scheme were more likely to have oral health problems compared to those under other schemes or pay out- of - pocket (OR = 4.75, 95% CI: 3.78–5.96). Regarding health conditions, patients with hypertension (OR = 1.46, 95% CI: 1.16–1.83) and chronic kidney disease (OR = 2.89, 95% CI: 1.56–5.37) were significantly associated with oral health problems. In addition, participants with comorbidity were more likely to have oral health problems compared to those without (OR = 1.27, 95% CI: 1.03–1.57, p = 0.02). In contrast, marital status, educational level, history of illness, diabetes mellitus, dyslipidaemia, and chronic heart diseases were not significantly associated with oral health problems ($p > 0.05$). The details are presented in Table 2.

Table 2
Oral health was measured by GOHAI consisted of 12 items

Variables	No Problem	Problem	OR (95%CI)	p-value
Gender				
♣ Male	614 (64.0%)	346 (36.0%)	ref.	
♣ Female	814 (59.9%)	546 (40.1%)	1.19 (1.01–1.41)	0.04*
Marital Status				
♣ Single or other	108 (62.4%)	65 (37.6%)	ref.	
♣ Married	912 (65.1%)	489 (34.9%)	0.89 (0.64–1.24)	0.48
Educational level				
♣ Secondary school or higher	204 (64.8%)	111 (35.2%)	ref.	
♣ Primary school or lower	1224 (61.0%)	781 (39.0%)	1.17 (0.92–1.50)	0.21
Working status				
♣ Working	973 (64.7%)	530 (35.3%)	ref.	
♣ No working	455 (55.7%)	362 (44.3%)	1.46 (1.23–1.74)	< 0.01**
Income sufficiency				
♣ Sufficiency	823 (67.1%)	404 (32.9%)	ref.	
♣ Insufficiency	605 (55.4%)	488 (44.6%)	1.64(1.38–1.95)	< 0.01**
Health Scheme utilization				
♣ Other	565 (84.0%)	108 (16.0%)	ref.	
♣ NSO	863 (52.4%)	784 (47.6%)	4.75 (3.78–5.96)	< 0.01**
History of illness				
♣ no	511 (63.5%)	294 (36.5%)	ref.	
♣ yes	917 (60.5%)	598 (39.5%)	1.23 (0.95–1.35)	0.16
Diabetes mellitus				
♣ no	697 (60.5%)	456 (39.5%)	ref.	
♣ yes	217 (61.5%)	136 (38.5%)	0.96 (0.75–1.22)	0.73
Hypertension				
♣ no	312 (66.8%)	155 (33.2%)	ref.	
♣ yes	602 (57.9%)	437 (42.1%)	1.46 (1.16–1.83)	0.01**

Variables	No Problem	Problem	OR (95%CI)	p-value
Dyslipidemia				
♣ no	587 (60.4%)	385 (39.6%)	ref.	
♣ yes	327 (61.2%)	207 (38.8%)	0.97(0.78–1.20)	0.74
Chronic heart diseases				
♣ no	827 (60.5%)	539 (39.5%)	ref.	
♣ yes	87 (62.1%)	53 (37.9%)	0.94 (0.65–1.34)	0.71
Chronic kidney disease				
♣ no	898 (61.5%)	563 (38.5%)	ref.	
♣ yes	16 (35.6%)	29 (64.4%)	2.89 (1.56–5.37)	< 0.01**
Combability				
♣ no	549 (63.1%)	321 (36.9%)	ref.	
♣ yes	365 (57.4%)	271 (42.6%)	1.27 (1.03–1.57)	0.02*

Remak

Binary logistic regression analysis, OR = odd ratio, 95%CI = 95% confident interval, * p-value accepted at 0.05, and ** p-value accepted at 0.05.

Factors associated with oral health problems among older adults

Table 3 demonstrates that non-working, utilization of the national health scheme, hypertension, and chronic kidney disease were significantly associated with oral health problems among older adults. The finding showed that participants who were not working were more likely to have higher oral health problems than those who were working (OR = 1.45, 95% CI: 1.15–1.83, p < 0.01). Similarly, individuals using the national health scheme were more likely to experience the outcome (OR = 3.84, 95% CI: 2.94–5.03, p < 0.01). Regarding health conditions, patients with hypertension were significantly associated with the oral health problem more than those who have not (OR = 1.49, 95% CI: 1.14–1.96, p < 0.01) and patients with chronic kidney disease showed a strong association (OR = 3.18, 95% CI: 1.60–6.32, p < 0.01). In contrast, gender (OR = 1.07, 95% CI: 0.85–1.35, p = 0.55), insufficient income (OR = 1.03, 95% CI: 0.81–1.29, p = 0.83), and comorbidity (OR = 0.92, 95% CI: 0.72–1.17, p = 0.50) were not significantly associated with the outcome.

Table 3
Factors associated with oral health problem among older adults

Variables	OR (95%CI)	P-value
♣ Female	1.07 (0.85–1.35)	0.55
♣ Unemployment	1.45 (1.15–1.83)	< 0.01**
♣ Insufficient income	1.03 (0.81–1.29)	0.83
♣ Using national health scheme	3.84 (2.94–5.03)	< 0.01**
♣ Hypertension	1.49 (1.14–1.96)	< 0.01**
♣ Chronical kidney diseases	3.18 (1.60–6.32)	< 0.01**
♣ Combability	0.92 (0.72–1.17)	0.50

Remak

Multiple regression analysis; OR = odd ratio, 95%CI = 95% confident interval, * p-value accepted at 0.05, and ** p-value accepted at 0.05.

Discussion

The present study investigated the prevalence and factors associated with oral health problems among 2,320 older adults in Thailand. Our results indicate that nearly half of the participants (48.1%) experienced moderate to severe oral health problems as measured by the GOHAI. This prevalence is consistent with findings in other middle-income countries, such as Turkey, where 45% of older adults reported poor-to-moderate oral health (9), but it is notably higher than the 36.5% reported in earlier Thai studies using different impact measures (34) or other studies (15, 17, 18) indicated that majority of older adults had poor oral health. This high prevalence underscores the persistent burden of oral disease in the aging population, which contributes to the loss of healthy life years due to disparities in access and preventive services (35).

Our findings demonstrated that oral health among older adults was influenced by socioeconomic determinants, such as unemployment, as well as access to health schemes. These findings are consistent with previous studies (36) indicating that occupation and health scheme utilization are associated with oral health. In Thailand, main health care scheme used in Thais older adults is universal health coverage, following by Civil Servant Medical Benefit Scheme (CMBS). Primary care services include basic oral healthcare, such as oral hygiene, which are provided at primary care units, namely Subdistrict Health Promotion Hospitals, and are offered free of charge if they are under UHC scheme or at low cost. However, convenient access to healthcare services can facilitate both treatment and the prevention of oral health problems. Nevertheless, this study collected data from diverse settings, including rural, urban, and peri-urban areas. In some locations, there was a shortage of dental personnel, and the absence of a full-time dentist in PCUs further limited the capacity and scope of services,

particularly in managing patients with NCDs. As a result, some patients are required to travel to affiliated hospitals to receive appropriate care. For those without family support, such as children to accompany them, access to hospital services becomes even more difficult, leading to inadequate oral healthcare. Alternatively, some individuals choose to seek care at private clinics, which may involve higher costs. These circumstances may explain the observed associations between these variables in this study. In contrast, this study found that gender was not associated with oral health. This finding is consistent with a systematic review by Leng et al. (37) and a study of Ceylan Sen (9), which also reported no significant association between gender and oral health. However, this result contrasts with findings from a study conducted in Poland (27).

Furthermore, our finding revealed that hypertension and CKD are independent predictors of oral health problems. The link between hypertension and poor oral health is well-documented; many antihypertensive medications are known to cause xerostomia (dry mouth), which increases the risk of dental caries and periodontal disease (34, 38). The even stronger association with CKD is particularly noteworthy. Patients with CKD often suffer from systemic inflammation, uremia-related oral mucosal changes, and strict dietary requirements that can exacerbate oral conditions. Conversely, severe periodontitis has been recognized as a potential risk factor for the progression of renal dysfunction, suggesting a bidirectional relationship that severely diminishes quality of life (39). Surprisingly, this study found that diabetes and cardiovascular disease (CVD) were not associated with oral health among older adults. This finding contrasts with previous studies (18, 22, 23, 25) that reported an association between CVD and GOHAI scores. As mentioned above, dental care services, including early screening, are available in several primary care units (PCUs). Additionally, national guidelines for dental screening among patients with non-communicable diseases (NCDs) have been implemented, particularly for patients with diabetes. Consequently, our findings were inconsistent with previous studies.

Lastly, the strength of this study lies in its large, representative sample size across four diverse regions of Thailand and the use of the validated GOHAI instrument. However, several limitations must be acknowledged. First, the cross-sectional design prevents us from establishing a causal relationship between chronic diseases and oral health problems. Second, oral health status was self-reported via GOHAI without clinical dental examinations, which may lead to underreporting or recall bias. Future longitudinal studies incorporating clinical assessments are needed to further clarify these associations.

Conclusion

In conclusion, oral health problems remain a significant public health challenge for older adults in Thailand, particularly those with hypertension and chronic kidney disease. Strengthening the integration of oral health services into the national health scheme and focusing on preventive care for unemployed seniors and those with chronic conditions are essential strategies to improve the quality of life in this population.

Abbreviations

95% CI
95% Confidence Interval
CVD
Cardiovascular Diseases
CKD
Chronic Kidney Disease
CMBS
Civil Servant Medical Benefit Scheme
GOHAI
Geriatric Oral Health Assessment Index
NCD
Non-Communicable Diseases
OHC
Oral Health Care
OHRQoL
Oral Health–Related Quality of Life
OR
Odds Ratio
PCU
Primary Care Units
UHC
Universal Health Coverage

Declarations

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Ethics approval and consent to participants

This study obtained ethical approval for human research from the Ethics Committee of the Faculty of Public Health, Mahidol University, Thailand (COA. No. MUPH 2024-130; Protocol no. 167/2024). All participants provided written informed consent prior to their participation in the study. The study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments.

Consent for publication

Written informed consent was obtained for publication of the study data. All the data collected during the study were anonymized to ensure the confidentiality and privacy of participants. Identifiable information was coded prior to analysis, in accordance with the ethical standards.

Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

There are no competing interests for any author.

Authors' contributions

KY, PB, KZ and LC made substantial contributions to the conception and design of the work; KY and PB contributed to the acquisition, analysis, and interpretation of the data; KY and KZ drafted the work; and PB and LC edited and revised the manuscript. All the authors read and approved the final manuscript.

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