

ASSOCIATIONS AMONG SOCIAL HEALTH DETERMINANTS AND ORAL-RELATED HEALTH BEHAVIORS AMONG ELDERLY THAIS IN 2015

Truong Le Thu Nhan, Tewarit Somkotara and Patita Bhuridej

Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Abstract. Oral-related health behaviors could be indicators of social determinants of health. Here, using data from a 2015 National Health and Welfare Survey of the National Statistical Office of Thailand, oral-related health behaviors and their association with social determinants of health were examined among Thai elderly population. Subjects ($n = 26,566$) were ≥ 60 years of age, 43.7% being males, 54.3% residing in municipal areas, 87.3% with primary education or lower, 46.0% were alcohol users, 86.6% were nonsmokers, 47.6% drank a sweetened drink at least once a day, and 56.0% suffered from chronic diseases. The majority received no health promotion (82.3%) or any dental service (93.7%) in the past 12 months. Significantly more males and younger elderly (<75 years of age) drank alcohol (p -value <0.001 respectively) and smoked (p -value <0.001 respectively), and more younger elderly (irrespective of gender) used dental services (p -value <0.001). Logistic regression analysis revealed among oral-related health behaviors, alcohol consumption is a significant independent parameter associated with social determinants of health. In conclusion, a survey of the Thai elderly population in 2015 shows alcohol consumption is a significant factor associating with the social determinants of health. These findings should provide a valuable input in future planning of a national health care policy in an aging society.

Keywords: aging society, elderly Thai population, social determinant of health, oral-related health behavior

Correspondence: Patita Bhuridej, Department of Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Henri-Dunant Road, Pathum Wan District, Bangkok 10330, Thailand

Tel: +66 (0) 2218 8545 E-mail: patita.b@chula.ac.th

INTRODUCTION

An aging population has become one of the vital problems of concern in several countries (Moody and Sasser, 2021; UNFPA and HelpAge International, 2012). Demographic transitions in Southeast Asian countries, such as population aging, uncontrolled urbanization, fertility decline, improved communication and technology are influences affecting people lifestyle and health (Chongsuvivatwong *et al*, 2011). Thailand has a rapidly aging population resulting from a decline in births combined with increased longevity (WHO, 2015). A 2014 survey of the elderly population (≥ 60 years of age) in the country revealed 34.3% had an income below the poverty line, reflecting an inability to purchase food and other basic needs for a sustainable and healthy life (NSO, 2014). Moreover, 33.9% of the elderly still have to work. Similar to other developing countries, the demographic transition to an aging population in Thailand results in non-communicable diseases (NCDs), such as chronic obstructive pulmonary disease (COPD), diabetes, ischemic heart disease and stroke, as the leading causes of death (Dans *et al*, 2011). A “double burden of disease” (infectious and NCDs) is associated with an increasing demand for health care leading to rising costs in health-care and long-term care (WHO, 2014).

Health behaviors related to oral health comprise of both compromising

(*eg*, alcohol consumption, tobacco smoking and unhealthy diet) and enhancing (*eg*, exercise, regular tooth brushing, utilization of health care services, and vegetable consumption) behaviors. Many population groups, especially the elderly, have refrained from compromising health behaviors responsible for oral diseases (Harford, 2009), and when combined with reduction in risk factors of chronic diseases or functional activities, the elderly population can expect to enjoy a longer and higher quality of life. Impact of oral diseases on the general health and quality of life of the elderly and the significance of oral health promotion have been well documented (Harford, 2009; Dental Health Services Victoria, 2011).

Social health determinants (SHDs) comprise the underlying factors, which influence causes of ill health or “causes of the causes” (Navarro, 2009; Sheiham *et al*, 2011). SHDs are usually defined by social capital, class, positions, support and network, and by income, housing geographic location, educational level and socioeconomic status (SES). Studies on associations between SHDs and oral-related health behaviors in Southeast Asian countries, including Thailand, are still limited (BDH, 2018; Limpuangthip *et al*, 2019). Previous national studies among Thai adolescents and adults highlighted the various social and environment factors associated with oral-related health behaviors (Pongsupathananon,

2015; Tienkon, 2015). Here, using the National Health and Welfare Survey of Thai elderly for 2015 (NSO, 2016), we sought to identify SHDs related to oral-related health behaviors and to determine the associations among SHDs and oral-health related behaviors in the Thai elderly population. We expect that the results of this study will provide valuable input for policy makers in promoting health and well-being of Thailand's aging society.

MATERIALS AND METHODS

Data source and subject selection

Data were retrieved from the National Health and Welfare Survey (HWS) of the National Statistical Office of Thailand (NSO, 2016). Subjects included those residing in non-institutional households located in both municipal (urban) and non-municipal areas (rural) of each province. A two-stage stratification sampling and survey were performed to characterize the country population, namely, a primary sampling component comprising blocks in municipal and villages in non-municipal areas, selected separately and independently in each municipal and non-municipal area using a probability proportional to the total number of households in that block or village; and a secondary sampling component comprising randomly chosen 10 to 15 households from each sample block or village. Only subjects ≥ 60 years of age residing

in the same location for at least one year were included in the study.

The secondary data analysis was approved by the Human Research Ethics Committee, Faculty of Dentistry, Chulalongkorn University (study code: HREC-DCU 2017-059).

Data analysis

Descriptive statistics were used to assess prevalence and distribution of health behaviors related to oral health. Pearson chi-square test was used to determine association between each oral-related health behavior and SHD, and logistic regression modeling to examine association of each SHD with oral health-related behavior and underlying determinant. Result is expressed as odds ratio (OR) plus 95% confidence interval (95% CI). A p -value < 0.05 is considered significant. Calculations were carried out using the Statistical Package for Social Science (SPSS[®]) for Windows version 22.0 (IBM Corp, Armonk, NY).

RESULTS

Of the Thai elderly subjects ($n = 26,566$) included in the study, 73.1% are between 60-75 years of age, 43.7% are males, 54.3% reside in municipal areas, 87.3% have primary or lower education, 46.0% are alcohol drinkers, 13.4% smoke, 47.6% consume sweetened drink daily, 56.0% suffer from some type of chronic diseases, and during the period of the study 82.3% did not receive any health promotion

and 93.7% did not receive any dental service during the past 12 months (Table 1).

When oral-health related behavior was stratified according to SHD, smoking is significantly associated more with males than females, younger (<75 years of age) than older group, geographical region outside than within and surrounding Bangkok, location of residence in non-municipal than municipal area, above than below poverty line, education at elementary and lower than higher level, having no than with chronic disease, non-utilization than utilization of health facilities, and non-drinking than drinking sweetened beverage daily (Table 1). Regarding alcohol drinking, associated SHDs are the same as those for smoking, except for association with residence in municipal area and with chronic disease (Table 1). As regards utilization of dental service during the past 12 months, there is significant association with subjects <75 years of age, regions outside Bangkok and surrounding region, residence in municipal area, income above poverty line, education at elementary or lower, with chronic diseases, not receiving health promotion and no daily consumption of sweetened drink. Only gender is not significantly associated with the utilization of dental service (Table 1).

When logistic regression modeling was used, there is no association of receiving health promotion,

chronic diseases and residential area with smoking, alcohol drinking and utilization of dental service, respectively (Table 2).

DISCUSSION

The study examined the relationship of several SHDs with oral-related health behaviors (smoking, alcohol consumption and utilization of dental service) among the Thai elderly population in 2015.

Similar to other countries, our results show that smoking among male Thai elderly is more common than among females (WPR, 2019). Similar observations were reported for all smokers regardless of age in Southeast Asian countries, being particularly high in Indonesia (Sreeramareddy *et al*, 2014). The smoking habit is associated with socioeconomic status similar to that reported in other countries, both developing and developed (Khang and Cho, 2006; Siahpush *et al*, 2008; Sinha *et al*, 2016). Logistic regression modeling revealed being female, having chronic disease, or with higher education are independent associations with non-smokers. Surprisingly, receiving any health promotion had no bearing on smoking status. However, R^2 value of the final model (0.173) indicated only 17.3% of the selected SHDs were related to oral-related health behavior of smoking in the Thai elderly population.

In this study, alcohol consumption in male Thai elderly is significantly

Table 1
Social health determinants and oral-related health behaviors among elderly population in Thailand (2015)

Social health determinant	Smoking (N = 26,566)		Alcohol consumption (N = 26,566)		Utilization of dental care services (N = 26,566)		p-value*
	Non-smoker n (%)	Smoker n (%)	Non-drinker n (%)	Alcohol drinker n (%)	Non-utilizer n (%)	Service utilizer n (%)	
Gender							0.08
Male	8,371 (36.4)	3,246 (91.2)	2,528 (17.6)	9,089 (74.4)	10,916 (43.9)	701 (41.7)	
Female	14,637 (63.6)	312 (8.8)	11,816 (82.4)	3,133 (25.6)	13,967 (56.1)	982 (58.3)	
Age							<0.001
60-74 years old	16,480 (71.6)	2,940 (82.6)	10,073 (70.2)	9,347 (76.5)	18,011 (72.4)	1,409 (83.7)	
>75 years old	6,528 (29.4)	618 (17.4)	4,271 (29.8)	2,875 (23.5)	6,872 (27.6)	274 (16.3)	
Geographic region							<0.001
Bangkok	889 (3.9)	70 (2.0)	605 (4.2)	354 (2.9)	818 (3.3)	141 (8.4)	
Central (excluding Bangkok)	6,705 (29.1)	860 (24.2)	4,576 (31.9)	2,989 (24.4)	7,117 (28.6)	448 (26.6)	
North	5,767 (25.0)	972 (27.3)	2,803 (19.5)	3,936 (32.2)	6,277 (25.2)	462 (27.4)	
Northeast	6,403 (27.9)	1,121 (31.5)	3,628 (25.3)	3,896 (31.9)	7,122 (28.6)	402 (23.9)	
South	3,244 (14.1)	535 (15.0)	2,732 (19.1)	1,047 (8.6)	3,549 (14.3)	230 (13.7)	
Residential area							<0.001
Municipal area	12,807 (55.6)	1,618 (45.5)	7,939 (55.3)	6,486 (53.1)	13,414 (53.9)	1,011 (60.1)	
Non-municipal area	10,201 (44.4)	1,940 (54.5)	6,405 (44.7)	5,736 (46.9)	11,469 (46.1)	672 (39.9)	

Table 1 (cont)

Social health determinant	Smoking (N = 26,566)		Alcohol consumption (N = 26,566)		Utilization of dental care services (N = 26,566)		p-value*
	Non-smoker n (%)	Smoker n (%)	Non-drinker n (%)	Alcohol drinker n (%)	Non-utilizer n (%)	Service utilizer n (%)	
Income							<0.001
Under poverty line [†]	11,779 (51.2)	1,326 (37.3)	7,813 (54.5)	5,292 (43.3)	12,503 (50.2)	602 (35.8)	
Above poverty line	11,229 (48.8)	2,232 (62.7)	6,531 (45.5)	6,930 (56.7)	12,380 (49.8)	1,081 (64.2)	
Education							<0.001
Up to primary education	19,922 (86.6)	3,262 (91.7)	12,742 (88.8)	10,442 (85.4)	21,972 (88.3)	1,212 (72.0)	
Secondary education	798 (3.5)	102 (2.9)	374 (2.6)	526 (4.3)	808 (3.2)	92 (5.5)	
Vocational education	208 (0.9)	19 (0.5)	105 (0.8)	122 (1.0)	193 (0.8)	34 (2.0)	
Higher than secondary education	2,080 (9.0)	175 (4.9)	1,123 (7.8)	1,132 (9.3)	1,910 (7.7)	345 (20.5)	
With chronic diseases			(n = 14,343)				<0.001
No	2,280 (64.1)	2,280 (64.1)	5,766 (40.2)	5,914 (48.4)	12,503 (50.2)	602 (35.8)	
Yes	1,278 (35.9)	1,278 (35.9)	8,577 (59.8)	6,308 (51.6)	12,380 (49.8)	1,081 (64.2%)	
Utilization of health promotion							<0.001
No	3,053 (85.8)	3,053 (85.8)	11,951 (83.3)	9,920 (81.2)	20,778 (83.5)	1,093 (64.9)	
Yes	505 (14.2)	505 (14.2)	2,393 (16.7)	2,302 (18.8)	4,105 (16.5)	590 (35.1)	

Table 1 (cont)

Social health determinant	Smoking (N = 26,566)		Alcohol consumption (N = 26,566)		Utilization of dental care services (N = 26,566)		p-value*
	Non-smoker n (%)	Smoker n (%)	Non-drinker n (%)	Alcohol drinker n (%)	Non-utilizer n (%)	Service utilizer n (%)	
Consumption of sweetened beverage per day							<0.001
No consumption	7,738 (33.6)	871 (24.5)	4,936 (34.4)	3,673 (30.1)	8,059 (32.4)	550 (32.7)	<0.001
<1 can/bottle/glass	3,641 (15.8)	563 (15.8)	2,317 (16.1)	1,887 (15.4)	3,886 (15.6)	318 (18.9)	
1-2 cans/bottles/glasses	2,697 (11.7)	572 (16.1)	1,609 (11.2)	1,660 (13.6)	2,990 (12.1)	279 (16.6)	
>2 cans/bottles/glasses	261 (1.1)	76 (2.1)	167 (1.2)	170 (1.4)	306 (1.2)	31 (1.8)	
No available data	8,671 (37.8)	1,476 (41.5)	5,315 (37.1)	4,832 (39.5)	9,642 (38.7)	505 (30.0)	

Data were retrieved from the National Health and Welfare Survey (HWS) of the National Statistical Office of Thailand (NSO, 2016)

*Significant if $p < 0.05$; †Cut-off point for poverty line is monetary income lesser than THB2,500 per month

THB: Thai Baht

Table 2
 Logistic regression models of association of social health determinants and oral-related health behaviors among elderly population (N = 16,419) in Thailand (2015)

Social health determinant	Degree of freedom	Smoker (R ² = 0.173)		Alcohol drinker (R ² = 0.336)		Utilization of dental service (R ² = 0.029)	
		p-value*	OR (95% CI)	p-value*	OR (95% CI)	p-value*	OR (95% CI)
Gender	1	<0.001	0.06 (0.05-0.07)	<0.001	0.06 (0.05-0.06)	0.002	1.23 (1.08-1.39)
Age	1	<0.001	0.64 (0.56-0.74)	<0.001	0.77 (0.70-0.85)	<0.001	0.62 (0.52-0.73)
Geographic region							
Bangkok	4	<0.001	1.00	<0.001	1.00	<0.001	1.00
Central (excluding Bangkok)	1	0.087	1.42 (0.95-2.13)	0.916	1.01 (0.79-1.29)	<0.001	0.45 (0.35-0.59)
North	1	0.002	1.90 (1.27-2.83)	<0.001	3.04 (2.38-3.88)	<0.001	0.52 (0.40-0.68)
Northeast	1	0.007	1.73 (1.16-2.59)	<0.001	2.17 (1.70-2.76)	<0.001	0.43 (0.33-0.57)
South	1	0.010	1.72 (1.14-2.59)	<0.001	0.40 (0.31-0.52)	<0.001	0.47 (0.35-0.63)
Residential area	1	<0.001	1.40 (1.26-1.56)	0.007	1.12 (1.03-1.21)	N/A	N/A
Income	1	0.037	1.13 (1.01-1.26)	0.038	1.09 (1.00-1.19)	0.002	1.24 (1.08-1.42)

Table 2 (cont)

Social health determinant	Degree of freedom	Smoker (R ² = 0.173)		Alcohol drinker (R ² = 0.336)		Utilization of dental service (R ² = 0.029)	
		p-value*	OR (95% CI)	p-value*	OR (95% CI)	p-value*	OR (95% CI)
Education							
Up to primary education	3	<0.001	1.00	0.008	1.00	<0.001	1.00
Secondary education	1	<0.001	0.52 (0.40-0.69)	0.702	1.04 (0.84-1.30)	<0.001	1.72 (1.30-2.28)
Vocational education	1	<0.001	0.25 (0.12-0.53)	0.566	0.88 (0.58-1.35)	0.001	2.28 (1.42-3.66)
Higher than secondary education	1	<0.001	0.31 (0.25-0.40)	0.001	0.78 (0.67-0.90)	<0.001	2.42 (2.03-2.88)
With chronic diseases	1	<0.001	0.50 (0.45-0.55)	N/A	N/A	0.014	1.17 (1.03-1.33)
Utilization of health promotion	1	N/A	N/A	<0.001	1.43 (1.30-1.58)	<0.001	2.47 (2.17-2.00)
Consumption of sweetened beverage per day							
No consumption	3	<0.001	1.00	<0.001	1.00	0.031	1.00
<1 can/bottle/glass	1	<0.001	1.26 (1.11-1.43)	0.011	1.13 (1.03-1.24)	0.017	1.20 (1.03-1.39)
1-2 cans/bottles/glasses	1	<0.001	1.54 (1.35-1.76)	<0.001	1.23 (1.11-1.36)	0.014	1.22 (1.04-1.42)
>2 cans/bottles/glasses	1	<0.001	2.39 (1.75-3.27)	0.001	1.59 (1.21-2.10)	0.329	1.22 (0.82-1.81)
Constant	1	<0.001	8.88	<0.001	31.625	<0.001	0.029

*Significant if *p*<0.05

N/A: not applicable; OR: odds ratio; 95% CI: 95% confident interval

higher than in females which is consistent with observations in other countries (Ritchie and Roser, 2018). This may be due to the Thai culture and more activities among males conducive to alcohol drinking. Middle-income Southeast Asian countries, with the exception of Malaysia and the Philippines, increase their alcohol consumption along with economic development between 2010 and 2017 (Sornpaisarn *et al*, 2020). In the Asian region, 55% of Chinese older than 50 years of age used alcohol (2016 survey), with 13 times more male than female alcohol drinkers (Li *et al*, 2019; Gu and Ming, 2020). Logistic regression modeling confirmed primary statistical analysis of other SHDs associated with alcohol consumption, but excluded chronic diseases. Studies in China reported the elderly, those with higher levels of education and living with spouse or partner are associated with lower drinking habit, whereas low education level and high income are indicators of higher prevalence of alcoholism (Gu and Ming, 2020). R^2 value of the final model (0.336) indicated the chosen SHDs covered a significant portion of factors associated with the oral-related health behavior of alcohol consumption among the Thai elderly population.

Only 6.3% of the Thai elderly had dental care during the past 12 months. Utilization of dental services is remarkable different between industrialized and developing

countries: more than 70% of the elderly in Germany and Sweden (Listl, 2011) and more than 45% in Japan (Eguchi *et al*, 2018) compared to less than 22% in China had dental care within a calendar year (Li and Yao, 2021). Logistic regression modeling confirmed the primary statistical analysis of the associations of the various SHDs with dental service utilization, with the exception of residential area. R^2 value of the final model (0.029) indicated that other SHDs will need to be included in future studies.

The major limitation of this cross-sectional study was the inability to distinguish between variables existing before or during the data collection period, thus not being able to infer whether or not the observed associations are causal interferences. Missing data on daily consumption of sweetened beverages limited application of any conclusion reached to the general Thai elderly population.

In conclusion, this is the first study to empirically provide associations of several social health determinants and oral-related health behaviors (smoking, alcohol consumption and utilization of dental care services) among Thai elderly population in 2015. Although logistic regression analysis indicated that the chosen determinants were not sufficiently comprehensive to account for all possible social health determinants impacting on each of the selected oral-related health behaviors, the data should provide a baseline from

which to develop oral health programs to bridge the gaps on distribution and availability of dental care facilities for the elderly throughout the country, and to launch programs directed at the younger population to deter social behaviors with detrimental impact on oral hygiene and health later on in life. Thailand is becoming an aging society and measures to maintain oral and physical health will benefit each elderly individual and help reduce the country's current and future health cost burden.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare no conflicts of interest.

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