

# DENTAL STATUS AND ITS IMPACT ON THE QUALITY OF LIFE OF ELDERLY IN PHON SAWAN, NAKHON PHANOM PROVINCE

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**Abstract.** The number of elderly people in Thailand is increasing. Oral health is an important part of overall wellbeing. We studied the impact of oral health on the quality of life among elderly attending Phonsawan Hospital, Nakhon Phanom Province, Thailand, in 2010. We studied 107 males and 278 females, aged 60-93 years. We studied the impact of oral health on the quality of life using the Oral Health Impact Profile-49 (OHIP-49) questionnaire. The OHIP-49 questionnaire is divided into seven areas: functional limitations, physical pain, physical disability, psychological discomfort, psychological disability, social disability and handicaps. The data were analyzed using descriptive, bivariate and multivariable logistic regression analyses. Seventy-one point nine percent of subjects had untreated dental caries, with the mean number of decayed, missing and filled teeth of 10.77. Eighty-nine point one percent of subjects had lost at least 1 tooth and the mean number of missing teeth was 8.22. Sixty-three point six percent of people had tooth attrition and 16.1% of people had a pocket depth of  $\geq 6$  mm. The mean OHIP-49 was 54.25. Multivariable logistic regression analysis showed a OHIP-49 score greater than the median of 56 was directly associated with tooth attrition, tooth sensitivity, gingival swelling, oral ulcers, poor oral hygiene and never having received oral hygiene instructions. Community oral health education programs need to be developed and implemented.

**Keywords:** elderly, OHIP-49, oral health related quality of life, Thailand

## INTRODUCTION

Number of elderly people in Thailand is increasing rapidly. Thailand will soon be facing an era of having an "aging population". The number of elderly in Thailand will increase to 10 million by 2020 (NESDB, 2004). The elderly are more

prone to develop both communicable and non-communicable diseases (Thailand National Statistical Office, 2008). Oral health is an essential component of health and is associated with physical, mental, social quality of life and is an integral part of the overall health of individuals. It impacts the daily functioning and well-being of an individual. Poor oral health may have an impact on people both physically and psychologically (Allen, 2002). The oral health problems found in Thai elderly include periodontal disease,

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dental caries, including root caries, and tooth loss (Allen, 2002). A variety of oral health quality of life instruments have been developed in the past 20 years (Slade, 1997). Oral health quality of life instruments used for adults include the General Oral Health Assessment Index (Atchison and Dolan, 1990), the Oral Health Impact Profile (Slade and Spencer, 1994), the Oral Impact on Daily Performance (OIDP) (Adulyanon and Sheiham, 1997) and the Oral Health Impact Profile-49 (OHIP-49) questionnaire (Slade and Spencer, 1994). The OHIP-49 was developed to measure the impact of oral health conditions on quality of life. It is presently the most comprehensive measure of oral health related quality of life that has been used in descriptive population studies and also as an outcome measure in clinical trials (Awad *et al*, 2000; McMillan, 2003; Bae *et al*, 2006; Lopez-Jornet and Camacho-Alonso, 2008; Rener-Sitar *et al*, 2008; Furuyama *et al*, 2012; Ozhayat and Gottfredsen, 2012). This study aimed to determine oral health status and its impact on quality of life among the elderly in Phon Sawan District, Nakhon Phanom Province, Thailand, during 2010.

## MATERIALS AND METHODS

### Study population

The study population consisted of 107 men and 278 women, aged 60-93 years, residing in Phon Sawan District, Nakhon Phanom Province, Thailand who were willing to participate in the study. After giving written informed consent, subjects were interviewed and examined orally. The study protocol was approved by the Human Research Ethics Committee, Khon Kaen University (HE532233).

### Data collection

Oral health related quality of life

(OHRQoL) was determined using the Oral Health Impact Profile-49 (OHIP-49) questionnaire, which consisted of 49 questions subdivided into seven areas: functional limitations, physical discomfort, psychological discomfort, physical disabilities, psychological disabilities, social disabilities, and handicaps. These areas were based on the oral health model described by Locker (1988). For each question on the OHIP-49, the subject was asked how frequently they had experienced the problem during the preceding 12 months. Responses were recorded using a 5-point Likert scale: 0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often and 4 = very often. The OHIP-49 score was counted for each subject, and the impact was reported as a frequency, such as "fairly often" or "very often". In addition to the questionnaire, sociodemographic information, such as age, gender, marital status, educational level, income and timing of their last dental visit were also recorded.

The oral examination was performed to detect periodontal status and dental caries status reported as decayed, missing, or filled teeth (DMFT). The examinations were conducted by three dentists, who had previously been trained to be able to measure oral health indices consistently with a Kappa value for repeatability of at least 0.80. The instruments used to perform the oral examination included a mouth mirror and a WHO 621 probe. The periodontal conditions detected included periodontal pockets, calculus, gingival bleeding and loss of the periodontal clinical attachment level (CAL) using a WHO 621 probe. Periodontal CAL was measured for each tooth at six sites (three buccal and three lingual aspects). Oral hygiene was assessed using the simplified oral hygiene index (OHI-S) (Greene and

Table 1  
Total and subscale OHIP-49 score among study subjects.

OHIP-49	Minimum	Maximum	Mean	SD
Functional limitations	0	29.0	12.06	5.59
Physical discomfort	0	28	11.43	6.23
Psychological discomfort	0	17	5.96	3.87
Physical disabilities	0	29	9.49	5.68
Psychological disabilities	0	20	6.07	3.64
Social disabilities	0	16	4.17	2.94
Handicaps	0	23	4.99	2.94
Total OHIP-49 scores	2	153	54.25	26.57

Vermillion, 1964; Greene, 1967) based on criteria described elsewhere (WHO, 1987).

#### Control of data quality

Repeated examinations among 10% of subjects yielded Kappa values greater than 0.80. The questionnaire was administered in the form of a structured interview by a skilled interviewer. Double data entry was performed independently by two people. Data were checked for completeness and correctness prior to analysis.

#### Data analysis

Data analysis was done using SPSS for Windows, version 17.0 (SPSS, Chicago, IL). Descriptive statistics, such as percentages, means and standard deviations, were used to describe basic information, including sex, age, marital status, religion, education level, main occupation, monthly income, oral health status (checking for periodontitis and dental caries) and tooth attrition. Bivariate statistics using the chi-square test and independent *t*-test were employed to assess a preliminary relationship between the outcome (a total OHIP-49 score higher than the median (56) and potential predictor variables, not yet adjusting for confounding factors. The final multivariable logistic regression model was constructed to define a set

of variables related to the outcome, and the adjusted odds ratios along with their 95% confidence intervals (CI) for all the variables associated with the outcome. A *p*-value < 0.05 was considered significant.

## RESULTS

We studied 107 men and 278 women, aged 60-93 years, with a mean age 67 years. Ninety-seven point seven percent of subject had a primary education, 1.6% had no formal education and 0.8% had a secondary education. Twenty-nine point six percent of subjects were self employed, 29.4% were private employees and 33.3% were public employees. Zero point two percent stated they were retired. Fifty-one point two percent of subjects had visited a dentist within the previous year, 24.4% had never visited a dentist, 15.3% had visited a dentist in the previous 1 to 2 years and 9.1% had not visited a dentist within the previous 2 years. Most of the subjects had visited the dentist to have a tooth extraction. Seventy-one point nine percent had experienced dental caries. The mean DMFT score was 10.77 teeth. Eighty-nine point one percent had experienced tooth loss. The mean tooth loss was 8.22 teeth per person. Sixty-three point six percent

Table 2  
Bivariate analysis of the relationship between the median OHIP-49 score and selected variables.

Variable	Total OHIP-49 score		p-value
	≤ median (N=194)	> median (N=191)	
Sex			0.805 <sup>a</sup>
Male	55 (28.4%)	52 (27.2%)	
Female	139 (71.6%)	139 (72.8%)	
Marital status			0.011 <sup>a</sup>
Single	6 (3.1%)	14 (7.3%)	
Married	120 (61.9%)	133 (69.6%)	
Separated	65 (35.1%)	44 (23.1%)	
Income			<0.001 <sup>a</sup>
Surplus	13 (6.7 %)	4 (2.1 %)	
Enough but no surplus	73 (37.6 %)	109 (57.1 %)	
Not enough but no debt	33 (17%)	55 (28.8 %)	
Not enough and in debt	75 (38.7%)	23 (12%)	
Education			0.497 <sup>b</sup>
No formal education	4 (2.1 %)	2 (1%)	
Primary education	187 (96.4%)	189 (99%)	
Secondary education	3 (1.5%)	0 (0%)	
Occupation			0.561 <sup>a</sup>
Farmer	94 (48.5%)	98 (51.3%)	
Unoccupied/retired	93 (47.9%)	83 (43.5%)	
Own business/employee	7 (3.6%)	10 (5.2 %)	
Frequency of brush teeth			0.001 <sup>a</sup>
1 time/day	13 (6.7 %)	31 (16.2 %)	
2 times/day	167 (86.1%)	156 (81.7%)	
3 times/day	14 (7.2 %)	4 (2.1%)	
Brushing time			<0.001 <sup>a</sup>
< 2 minutes	71 (43%)	87 (65.4%)	
> 2 minutes	94 (57%)	46 (34.6%)	
Oral hygiene instruction			<0.001 <sup>a</sup>
Ever	60 (30.9%)	27 (14.1%)	
Never	134 (69.1%)	164 (85.9%)	
Last dental visit			0.933 <sup>a</sup>
Never	47 (24.2%)	47 (24.6%)	
Saw dentist < 1 year ago	98 (50.5%)	99 (51.8%)	
Saw dentist 1-2 years ago	32 (16.5%)	27 (14.1%)	
Saw dentist > 2 years ago	17 (8.8%)	18 (9.4%)	
Smoking status			0.012 <sup>a</sup>
Current smoker	25 (12.9%)	9 (4.7%)	
Non-smoker	152 (78.4%)	158 (82.7%)	
Ex-smoker	17 (8.8%)	24 (12.6%)	

<sup>a</sup>Test of difference between proportions (chi-square test).

<sup>b</sup>Test of difference between proportions (Fisher's exact test).

Table 3  
Bivariate analysis of the relationship between the total OHIP-49 score and oral health status.

Oral health status	Total OHIP-49 score		<i>p</i> -value
	≤ median (N=194)	> median (N=191)	
Mean number of DMFT (±SD)	11.14±8.13	10.40±8.48	0.385 <sup>a</sup>
Mean number of decayed teeth (±SD)	2.86±2.93	2.17±2.66	0.015 <sup>a</sup>
Mean number of missing teeth (±SD)	8.25±7.70	8.19±8.08	0.942 <sup>a</sup>
Mean number of filled teeth (±SD)	0.03±0.16	0.04±0.25	0.447 <sup>a</sup>
Mean number of attrition teeth (±SD)	4.25±7.33	11.18±10.42	<0.001 <sup>a</sup>
Mean number of remaining teeth (±SD)	23.80±7.70	23.74±8.08	0.942 <sup>a</sup>

<sup>a</sup>Test of difference between means (Independent *t*-test).

Table 4  
Bivariate analysis of the relationship between the total OHIP-49 score and oral health problems.

Variable	Total OHIP-49 score		<i>p</i> -value
	≤ median (N=194)	> median (N=191)	
Gingival swelling			<0.001 <sup>a</sup>
Ever	63 (32.5%)	118 (61.8%)	
Never	131 (67.5%)	73 (38.2%)	
Bad breath			0.010 <sup>a</sup>
Ever	123 (63.4%)	95 (50.5%)	
Never	71 (36.6%)	95 (49.5%)	
Tooth mobility			0.529 <sup>a</sup>
Ever	117 (60.3%)	122 (63.9%)	
Never	77 (39.7%)	69 (36.1%)	
Tooth sensitivity			<0.001 <sup>a</sup>
Ever	108 (55.7%)	151 (79.1%)	
Never	86 (44.3%)	40 (20.9%)	
Tooth pain			0.004 <sup>a</sup>
Ever	112 (62.9%)	146 (76.4%)	
Never	72 (37.1%)	45 (23.8%)	
Oral ulcer			<0.001 <sup>a</sup>
Ever	6 (3.1%)	42 (22%)	
Never	188 (96.9%)	149 (78%)	
Oral hygiene			<0.001 <sup>a</sup>
Fair	16 (18%)	73 (82%)	
Poor	65 (37.4%)	109 (62.8%)	

<sup>a</sup>Test of difference between proportions (chi-square test).

Table 5  
Final multivariable logistic regression model evaluating the relationship between the median OHIP-49 score and selected variables (Nagelkerke  $R^2 = 54.4\%$ ).

Variable	Adjusted Odds Ratio	95% Confidence limits		p-value
		Lower	Upper	
Tooth attrition	1.088	1.044	1.133	<0.001
Poor oral hygiene	5.332	2.342	12.136	<0.001
Fair oral hygiene	1			
Tooth sensitivity	6.308	2.721	14.621	<0.001
Never	1			
Oral ulcers	6.163	1.615	23.517	0.008
Never	1			
Gingival swelling	3.452	1.73	6.888	<0.001
Never	1			
Oral hygiene instructions	2.639	1.24	5.617	0.012
Ever	1			

of subjects had severe tooth attrition. The mean tooth attrition was 7.69 teeth per person. A pocket depth  $\geq 5\text{mm}$  was found in 48.1% of subjects. Eighty-one point six percent of subjects had a CAL of  $>5\text{ mm}$ . Sixty-seven point three percent had tooth sensitivity, 69.6% had tooth pain and 85.2% had to stop working because of oral problems.

The mean total OHIP-49 score was 54 (SD 26) and the median was 56. Eighty-one point six percent of subjects reported oral problems had a negative impact on them during the previous year. The mean scores for each of the seven subscales and the total OHIP-49 score are shown in Table 1. The most common negative impact was getting food caught in the teeth followed by difficulty in chewing and dental pain (data not tabulated). Because the total OHIP-49 scores and the seven subscales were not normally distributed, we divided the total OHIP-49 score into 2 groups using the fiftieth percentile as a cut-off point, and used a total OHIP-49 score greater than the median as an out-

come for analysis. Findings on bivariate analysis (Tables 2-4) showed sociodemographic factors, dental behavior, and dental health status were associated directly with the outcome of a total OHIP-49 score greater than the median. Table 5 shows the findings of multivariable logistic regression. Based on this model, the predictive power was high and the Nagelkerke  $R^2$  was 54.4%. A total OHIP-49 score greater than the median value was significantly associated with tooth attrition, tooth sensitivity, gingival swelling, oral ulcers, poor oral hygiene and never having received oral hygiene instructions with adjusted odds ratios and 95% CIs found in Table 5.

## DISCUSSION

In this study 81.6% of subject stated dental disease had an impact on the quality of life during the previous year. The total OHIP-49 score in this study was higher than those reported among similar age groups in other studies (Wong *et al*, 2002; Pires *et al*, 2006). However,

the scores was lower for burning mouth sensation (Lopez-Jornet *et al*, 2009) and temporomandibular disorder (Durham *et al*, 2011) were lower in our study. The items most commonly having a negative impact were food catching in the teeth and difficulty in chewing, similar to the findings from China among subjects aged 60-80 years (Wong *et al*, 2002). The finding that reported health problems, such as tooth sensitivity, gingival swelling and oral ulcers had an association with the OHIP-49 score seen in our study are similar to previous studies (Locker and Grushka, 1987; Luo *et al*, 2007). The elderly with poor oral hygiene also had a higher total OHIP-49 score. This could be due to the reason having poor oral hygiene can lead to oral disease and oral problems. Previous studies have reported tooth loss has an impact on quality of life (Mack *et al*, 2005; Pallegedara and Ekanayake, 2008; Lahti *et al*, 2008; Gerritsen *et al*, 2010), but this study found no association between tooth loss and quality of life among our subjects. Our study found tooth attrition had an impact on quality of life in the elderly, similar to previous studies (Al-Omiri *et al*, 2006; Ibiyemi *et al*, 2010).

An important limitation of this study was the absence of OHIP-49 scores for the elderly in Thailand. Thus, the validity of the association assessed in this study might be questionable. Another limitation was the purposive samples used in this study, which may influence its interpretation and generalizability to the elderly Thai population as a whole. This would be better assessed by a Thai national survey.

In conclusion, this study shows oral disease and oral health problems, such as tooth attrition, tooth sensitivity, gingival swelling and oral ulcers, have an impact on the quality of life among elderly Thais. Community oral health education pro-

grams need to be developed and implemented in Thailand.

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#### REFERENCES

- Adulyanon S, Sheiham A. Oral Impacts on Daily Performances. In: Slade GD, ed. Measuring oral health and quality of life. Chapel Hill: University of North Carolina, 1997: 151-60.
- Allen PF. Teeth for life for older adults. London, Chicago: Quintessence Pub, 2002.
- Al-Omiri MK, Lamey PJ, Clifford T. Impact of tooth wear on daily living. *Int J Prosthodont* 2006; 19: 601-5.
- Atchison KA, Dolan TA. Development of the geriatric oral health assessment index. *J Dent Educ* 1990; 54: 680-7.
- Awad MA, Locker D, Korner-Bitensky N, *et al*. Measuring the effect of intra-oral implant rehabilitation on health-related quality of life in a randomized controlled clinical trial. *J Dent Res* 2000; 79: 1659-63.
- Bae KH, Kim C, Paik DI, *et al*. A comparison of oral health related quality of life between complete and partial removable denture-wearing older adults in Korea. *J Oral Rehabil* 2006; 33: 317-22.
- Durham J, Steele JG, Wassell RW, *et al*. Creating a patient-based condition-specific outcome measure for temporomandibular disorders (TMDs): Oral Health Impact Profile for TMDs (OHIP-TMDs). *J Oral Rehabil* 2011; 38: 871-83.
- Furuyama C, Takaba M, Inukai M, *et al*. Oral health-related quality of life in patients treated by implant-supported fixed dentures and removable partial dentures. *Clin Oral Implants Res* 2012; 23: 958-62.
- Gerritsen AE, Allen PF, Witter DJ, *et al*. Tooth loss and oral health-related quality of life: a systematic review and meta-analysis.

- Health Qual Life Outcomes* 2010; 8: 126.
- Greene JC. The simplified oral hygiene index development and use. *J Periodontol* 1967; 38: 625-37.
- Greene JC, Vermillion JR. The simplified oral hygiene index. *J Am Diet Assoc* 1964; 68: 7-13.
- Ibiyemi O, Oketade IO, Taiwo JO, *et al.* Oral habits and tooth wear lesions among rural adult males in Nigeria. *Arch Orofac Sci* 2010; 5: 31-5.
- Lahti S, Suominen-Taipale L, Hausen H. Oral health impacts among adults in Finland: competing effects of age, number of teeth, and removable dentures. *Eur J Oral Sci* 2008; 116: 260-6.
- Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988; 5: 3-18.
- Locker D, Grushka M. The impact of dental and facial pain. *J Dent Res* 1987; 66: 1414-7.
- Lopez-Jornet P, Camacho-Alonso F. Quality of life in patients with Sjögren's syndrome and sicca complex. *J Oral Rehabil* 2008; 35: 875-81.
- Lopez-Jornet P, Camacho-Alonso F, Lucero Berdugo M. Measuring the impact of oral mucosa disease on quality of life. *Eur J Dermatol* 2009; 19: 603-6.
- Luo Y, McMillan AS, Wong Mc, *et al.* Orofacial pain conditions and impact on quality of life in community-dwelling elderly people in Hong Kong. *J Orofac Pain* 2007; 21: 63-71.
- Mack F, Schwahn C, Feine JS, *et al.* The impact of tooth loss on general health related to quality of life among elderly Pomeranians: results from the study of health in Pomerania (SHIP-O). *Int J Prosthodont* 2005; 18: 414-9.
- McMillan AS. Oral health and quality of life following radiotherapy for nasopharyngeal carcinoma. *J HK Coll Radiol* 2003; 6: 75-7.
- Ozhayat EB, Gotfredsen K. Effect of treatment with fixed and removable dental prostheses. An oral health-related quality of life study. *J Oral Rehabil* 2012; 39: 28-36.
- Pallegedara C, Ekanayake L. Effect of tooth loss and denture status on oral health-related quality of life of older individuals from Sri Lanka. *Community Dent Health* 2008; 25: 196-200.
- Pires CP, Ferraz MB, de Abreu MH. Translation into Brazilian Portuguese, cultural adaptation and validation of the oral health impact profile (OHIP-49). *Braz Oral Res* 2006; 20: 263-8.
- Rener-Sitar K, Celebic A, Stipetic J, *et al.* Oral health related quality of life in Slovenian patients with craniomandibular disorders. *Coll Antropol* 2008; 32: 513-7.
- Slade GD. Measuring oral health and quality of life. Chapel Hill: University of North Carolina, 1997.
- Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. *Community Dent Health* 1994; 11: 3-11.
- Thailand National Statistical Office. Report of the Thai elderly survey. 2007. Bangkok: Thailand National Statistical Office, 2008.
- Thailand Office of the National Economics and Social Development Board (NESDB). Estimation of Change in Thai population during 1990-2020. Bangkok: NESDB, 2004.
- Wong MC, Lo EC, McMillan AS. Validation of a Chinese version of the Oral Health Impact Profile (OHIP). *Community Dent Oral Epidemiol* 2002; 30: 423-30.
- World Health Organization (WHO). Oral health survey, basic methods. 3<sup>rd</sup> ed. Geneva: WHO, 1987.