

## Dental care expenditure and related factors among older patients in a university dental hospital, Thailand

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### Abstract

This study aimed to identify the factors associated to dental health spending in the older people. This retrospective descriptive study, involving secondary data analysis, was conducted during the period of February to March 2023. Independent variable data were extracted from an initial telephone-based survey, while dependent data on dental health expenditures were obtained from the University Dental Hospital's record system. Descriptive statistics, including median and range, were employed to present age and dental health expenditure. Categorical variables i.e., age group, income level, educational level and self-rated oral health were presented using frequencies and percentages. Inferential statistics involved the application of Pearson's Chi-squared test to assess associations among categorical variables. A total of 367 older people were incorporated into this study. Through the utilization of Pearson's chi-squared test, statistically significant relationships were discovered between dental health expenditure and some independent variables, including educational level ( $p=0.032$ ), monthly income ( $p=0.003$ ), and self-rated oral health ( $p=0.017$ ). On the other hand, there was no significant association between age and dental health expenditure ( $p=0.105$ ). There are the association between higher educational level, higher income and good or fair self-reported oral health with higher dental health expenditure. As a result, there is a pressing need to actively advocate for the promotion of self-assessed oral health awareness within the Thai older people who received dental treatment at university dental hospital in Bangkok.

**Keywords:** geriatric dentistry, older people, dental expenditure, oral health, university dental hospital.

### Introduction

The escalation in dental health expenditures among the older people serves as a prominent barrier to their access to essential dental services.<sup>1,2</sup> Older people who possess limited income, lack coverage under dental insurance, experience unfavorable self-assessed oral health, and face

substantial dental treatment costs exhibit a higher tendency to abstain from dental consultations.<sup>2,3</sup> This, in turn, impacts their accessibility of dental care and the regularity of their dental appointments, as evidenced by previous studies.<sup>1-4</sup>

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Subsequently, More severe dental discomfort and diseases could occur from the postponement or avoidance of dental visits, resulting in costly treatments.<sup>5</sup> For instance, older people afflicted with periodontitis who postpone their maintenance visits might encounter recurrences of dental calculus and tooth loss, requiring pricier prosthodontic treatments to reserve their oral function.<sup>6</sup> Notably, even when dental insurance coverage is available, certain schemes might exclude coverage for specialized and costly treatments.<sup>7</sup>

A preceding investigation in Bangkok revealed a correlation between dental care expenses and the utilization of dental services among older people attending the No. 54 health center situated in Bangkok, which predominantly serves the healthcare needs of residents within the Thung Kru district. The study noted that older people who thought that the dental fee was inexpensive exhibited a higher frequency of visits to the center.<sup>8</sup>

However, a notable gap exists in the available research concerning dental health expenditures and the associated factors among the older people attending tertiary care institutions. Our university dental hospital, situated in Bangkok, Thailand, caters to older people from various backgrounds who seek dental care services.

This study endeavors to pinpoint the factors related to dental health expenditures among older people receiving dental care services at the university dental hospital. The underlying hypothesis was that there is a statistically significant relationship existing between independent variables (i.e., older age, higher educational level, higher income level, good of fair self-reported oral health) and higher dental health expenditure.

## Methods

### Study Design, Period, and Setting

This retrospective descriptive study was carried out during the period spanning from February 15, 2023, to March 30, 2023, within the dental hospital affiliated with the Faculty of Dentistry at Chulalongkorn University, which also serves as a university dental hospital.

The study's protocol and the consent form received approval from the Ethics Review Committee of Chulalongkorn University's Faculty of Dentistry under the reference HREC-DCU 2021-039. Notably, all participants involved in the initial study provided their verbal informed consent prior to the telephone interview.<sup>9</sup>

### Data Sources, Study Participants, Inclusion Criteria, and Exclusion Criteria

The research conducted by using secondary data from two sources, including a previous telephone-based cross-sectional survey<sup>9</sup>, along with dental health expenditure data from the electronic dental record system of the Chulalongkorn University dental hospital.

The study participants were recruited based on the population frame established during the initial telephone-based cross-sectional survey.<sup>9</sup> This survey was previously conducted by the authors during 2021 - 2022 through the telephone interview, targeting the individuals aged 60 years and above who had sought dental treatment at the university dental hospital within the timeframe of January 1 to December 31, 2020. While, another data source is the electronic record system of the dental hospital of Chulalongkorn University, which contains the dental health expenditure data required in this study.

The participants who both completed previous survey and had their dental health expenditure data in the electronic record system are included in this current study. Conversely, older people who lacked complete dental health expenditure data in their records were excluded from the analysis. Therefore, 367 participants are included in present study.

#### Study Variables

The independent variables for this study were drawn from the initial cross-sectional survey<sup>9</sup>, including: age, income level, educational level and self-rated oral health. On the other hand, the dependent variable was the dental health expenditure recorded in the electronic record system of the dental hospital. This expenditure was calculated as the cumulative sum of all dental health-related expenses incurred during the period spanning 2019 to 2020 at the dental hospital of Chulalongkorn University for each participant.

#### Data Measurements and Bias Reduction

The questionnaire's validity was assessed, demonstrating a satisfactory Item-Objective Congruence Index of 0.77. Furthermore, its internal consistency reliability, as evaluated using Cronbach's alpha coefficient, yielded an acceptable score of 0.70.<sup>9</sup> To mitigate recall bias among participants, the utilization of recorded dental expenditure data spanning the years 2019 to 2020 was implemented.

#### Sample Size and Sampling Technique

The sample size in this study was calculated by estimating a population proportion with specified absolute precision using the following formula,

$$n = \frac{Z_{1-\alpha/2}^2 P(1-P)}{d^2}$$

The Z-value serves as both the confidence interval and the tail in hypothesis testing. The parameter «P» represents the proportion of older people who made use of dental services in this

study, a figure amounting to 38.1% as reported in the 8th National Survey.<sup>10</sup> «d» symbolizes the chosen margin of error, which in this instance was designated as 5%.<sup>11</sup> Given these defined parameters, this study required a minimum of 363 participants.

The purposive sampling method was employed for participant selection. For the purpose of secondary data analysis, dental health expenditure data spanning the years 2019 to 2020 were sourced from the dental record system.

#### Data analysis

All secondary data underwent analysis using SPSS software, version 28. A significance level (alpha) of 0.05 and a confidence interval (CI) of 95% were utilized for conducting data analyses. The normality of the distribution of continuous variables, namely age and dental expenditure, was evaluated using the Kolmogorov–Smirnov test, revealing that these variables did not exhibit a normal distribution.

Descriptive statistics were employed for data presentation. The median and range were used for continuous variable, while frequencies and percentages were used for categorical variables. Pearson's Chi-squared test was employed as inferential statistics to explore associations between categorical variables.

## Results

### Socio-demographic characteristics of the study participants

Table 1 displays the distribution of the outcome and all independent variables. The mean age of participants is 69.59. The age range of our study participants are 61 to 94 years. Across a span of two years, the median dental expenditure was calculated at 4,750 THB (136 USD). The Kolmogorov-Smirnov normality test revealed that both age and total dental health expenditure demonstrated non-normal distributions ( $p < 0.001$ ). Consequently, we categorized our participants into two distinct age groups, namely 61–69 years and >69 years. In

a similar manner, dental health expenditure was classified into two groups: 0–4,750 THB and >4,750 THB.

**Factors associated with dental health expenditure**

Table 2 presents the outcomes of Pearson’s Chi-squared test, illustrating the associations

between dental health expenditure and independent factors (N = 367). Notably, there were significant associations related to educational level (p=0.032), monthly income (p=0.003), and self-rated oral health (p=0.017). Conversely, no significant association was identified between dental health expenditure and age.

**Table 1** General characteristics of the study participants (N = 367)

Variables	Number	Percentage
<b>Age: years</b>		
61–69	204	55.6
>69	163	44.4
<b>Educational level:</b>		
>Primary education	310	84.5
≤Primary education	57	15.5
<b>Income per month:</b>		
≥15,000 THB (429 USD)	210	57.2
<15,000 THB	157	42.8
<b>Self-reported oral health:</b>		
Good/Fair	323	88.3
Poor	43	11.7

**Table 2** Factors associated with dental health expenditure

Variables	Dental health expenditure Number (Percentage)		P-value <sup>a</sup>
	0 - 4,750 THB (0-136 USD)	Over 4,750 THB (>136 USD)	
<b>Age: years</b>			0.105
61-69	110 (53.9)	94 (46.1)	
>69	74 (45.4)	89 (54.6)	
<b>Educational level:</b>			0.032
>Primary education	148 (47.7)	162 (52.3)	
≤Primary education	36 (63.2)	21 (36.8)	
<b>Income per month:</b>			0.003
≥15,000 THB (429 USD)	91 (43.3)	119 (56.7)	
<15,000 THB	93 (59.2)	64 (40.8)	
<b>Self-rated oral health:</b>			0.017
Good/Fair	155 (48.0)	168 (52.0)	
Poor	29 (67.4)	14 (32.6)	

Notes: <sup>a</sup> P-value from Pearson’s chi-squared test

Abbreviations: THB, Thai baht; USD, The United States dollar

## Discussion

This study revealed a noteworthy correlation between increased dental expenditures and certain factors, including higher educational level, greater income levels, and positive self-reported of oral health.

As observed from Table 1, a majority of the participants were under 70 years of age, predominantly females, possessed an education beyond the primary level, an income of 15,000 THB or more, and self-reported their oral health as good or fair.

As indicated in Table 2, educational level displayed a statistically significant correlation with dental health expenditure. There was a certain study discovering the relation between lower dental expenditure and lower educational levels.<sup>12</sup> Research concerning dental utilization among the older people in Thailand has also reported that older people with an education beyond primary level were more inclined to utilize dental services.<sup>13,14</sup> However, some studies reported no association between educational level and dental health expenditure.<sup>15</sup>

Participants with a monthly income of at least 15,000 THB exhibited a greater likelihood of incurring dental health expenditures. This outcome is in line with findings reported in various studies.<sup>15,16</sup> Our results align with those from several investigations conducted in Thailand, which underscored that older people with higher income levels were more inclined to avail dental services.<sup>8,14</sup>

Older people who assessed their oral health as good or fair exhibited a greater propensity for higher dental health expenditures. This finding echoes a similar outcome from a study among Chinese adults that participants with self-perceived oral health tended to spend lesser on dental health.<sup>17</sup> In contrast, the opposite result found in the studies from France and Canada, considering the increased subsequent fee.<sup>16,18</sup>

According to table 2, participants with higher age did not show any association with dental health expenditure. The result was consistent with the study related to dental service utilization among older people in Bangkok in 2012.<sup>8</sup> However, another previous study in Thailand reported that older people seemed to have greater odd of dental health utilization, which might be related with higher dental health expenditure.<sup>13</sup>

This study directly examines the relation between dental health expenditure and various factors, including general characteristics and self-rated oral health, among older people receiving care at the University dental hospital in Bangkok, Thailand. However, a primary limitation of this study is an inability to consider out-of-pocket expenditure due to constraints within the recorded system of the University dental hospital, which recorded the amount before discount by any dental health insurance and benefit scheme.

In terms of generalizability, this study drew upon the proportion of older people who accessed dental services in university dental hospital in Bangkok. Additionally, the modified questionnaire employed in the initial survey was adapted from the 8th Oral Health National Survey.<sup>9,10</sup> As a result of these considerations, the findings of this study can be reasonably inferred within older people who receive dental service from university dental hospital in Bangkok. However, it's important to acknowledge that the examination of out-of-pocket expenditure and the corresponding influencing factors would benefit from exploration in future research.

## Conclusions

The increased dental health expenditure observed among the older people utilized dental service at University Dental Hospital was found to be associated with higher educational level, greater income level, and positive self-assessed oral health. Therefore, dental health providers should prioritize

the implementation of oral health promotion for upholding positive self-assessed oral health, in order to help decrease further expensive dental expenditure. While educational and income levels are unchangeable, the issue of financial barriers that impede access to dental services among older people in Bangkok should also be addressed.

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