Associations between social determinants and prosthesis obtained in Bangkok elders:

10 years after universal coverage policy implementation

Miss Chutimont Jindarojanakul

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

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By	Miss Chutimont Jindarojanakul
Field of Study	Geriatric Dentistry and Special Patients Care
Thesis Advisor	Assistant Professor ORAPIN KOMIN, D.D.S., PhD.

Accepted by the FACULTY OF DENTISTRY, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

.... Dean of the FACULTY OF DENTISTRY

(Assistant Professor SUCHIT POOLTHONG, DDS., MSc., PhD.)

THESIS COMMITTEE

.... Chairman

(Assistant Professor Jutharat Chimruang, D.D.S., PhD.)

.... Thesis Advisor

(Assistant Professor ORAPIN KOMIN, D.D.S., PhD.)

.... Examiner

(Associate Professor PATITA BHURIDEJ, DDS, PhD.)

.... Examiner

(Associate Professor MANSUANG ARKSORNNUKIT, D.D.S., Ph.D.)

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ในช่วงสิบปีที่ผ่านมาจำนวนผู้สูงอายุในกรุงเทพมหานครได้เพิ่มขึ้นในทุกๆปีและการสูญเสียฟันยังคงเป็นปัญหาสำคัญที่ส่งผลต่อการดำเนินชีวิต การแก้ปัญหาที่สำคัญคือการใส่ฟันเทียมทดแทนช่องว่างดังกล่าว ซึ่งมีปัจจัยหลายอย่างที่ส่งผลกระทบต่อการได้รับฟันเทียมของผู้สูงอายุในเขตกรุงเทพมหานคร สำหรับด้านการเงินนั้นรัฐบาลได้ให้การสนับสนุนผู้สูงอายุด้วยหลักประกันสุขภาพที่มีทั้งหมดสามระบบหลัก การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างปัจจัยทางสังคมและการได้รับฟันเทียมของผู้สูงอายุในเขตกรุงเทพมหานครในช่วงระยะเวลา 10 ปีหลังการดำเนินนโยบายหลักประกันสุขภาพ ข้อมูลที่นำมาวิเคราะห์นั้น ได้มาจากการสำรวจหลักสองการสำรวจ คือ การสำรวจประชากรผู้สูงอายุในประเทศไทย (พ.ศ.2550, 2557, และ 2560) และการสำรวจสภาวะสุขภาพช่องปากแห่งชาติของประเทศไทย (พ.ศ.2550, 2555, และ 2560) งานวิจัยนี้เป็น retrospective cross-sectional study ที่ใช้ข้อมูลจากการสำรวจประชากรผู้สูงอายุครั้งที่ 5 ในปี พ.ศ.2557 ในการวิเคราะห์ข้อมูล โดยใช้ Logistic regression ในการวิเคราะห์ความสัมพันธ์ของการได้รับฟันเทียมและปัจจัยเหตุทางสังคม ผลการศึกษาพบว่าแม้ผู้สูงอายุในกรุงเทพจะมีหลักประกันต่างๆที่สนับสนุนให้ได้รับฟันเทียม ผู้สูงอายุที่ได้รับฟันเทียมยังมีจำนวนน้อยกว่าครึ่งของจำนวนประชากร โดยมีหลายปัจจัยที่เกี่ยวข้องกับการได้รับฟันเทียม ไม่เพียงแต่ปัจจัยส่วนตัวของผู้สูงอายุ ปัจจัยทางสังคมและชุมชน รวมถึงการสนับสนุนจากรัฐบาลและหน่วยงานที่เกี่ยวข้องมีความเกี่ยวข้องกับการได้รับฟันเทียมเช่นกัน และอีกหนึ่งปัจจัยสำคัญ คือความต่างระหว่างการสนับสนุนจากภาครัฐกับค่าธรรมเนียมในการรักษาจริงยังคงสูงมากเมื่อเทียบกับรายได้ของผู้สูงอายุ นอกจากการประกันสุขภาพช่องปากแล้วปัจจัยอื่น ๆ ที่มีผลต่อการเข้าถึงและได้รับฟันเทียม ได้แก่ บุคคลที่อาศัยอยู่กับผู้สูงอายุ และ การได้รับข้อมูลและข่าวสารที่ถูกต้อง

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In these ten years, the number of elderly populations in Bangkok has increased every year and tooth loss is still a major oral problem in their daily life. The main treatment in solving this problem is to replace the edentulous ridge with a prosthesis. There are many factors that affect the elderly to obtain the prosthesis. For the financial aspect, the government has supported the elderly by three main supporting insurance systems. The aim of this study is to investigate the associations between social determinants and prosthesis obtained of the elderly in Bangkok, during 10 years after the implementation of the universal coverage policy. We analyzed data from two main surveys: the survey of the older persons in Thailand (2007, 2014, and 2017) and the Thai National Oral Health Survey (2007, 2012, and 2017). This study is a retrospective cross-sectional study that uses data from the 5th survey of the older persons in Thailand (2014) to analyze by using logistic regression model to analyze the association between prosthesis obtained and social determinant. The result showed that even the elderly in Bangkok got dental insurance to obtain prosthesis nevertheless, only less than half of the elderly got a prosthesis. There are many factors related to the prosthesis obtained. Not only the elderly characteristics, but social/community factors and government support have also associated with the prosthesis obtained. One of the important factors is a big gap between the price of the insurance coverage and the actual fee. Besides oral health insurance, another factor that affects the access is the person whom elderly is living with and receiving the information from.

Field of Study:	Geriatric Dentistry and Special Patients Care	Student's Signature	
Academic Year:	2019	Advisor's Signature	

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Chapter 1

Introduction

1.1 Background and Rationale

The Increase of life expectancy and lower birth rate are regarded as current global population situations that also affect Thailand. The number of the elders has increased continuously[1, 2]. The number has risen from 600 million to 2 billion within 50 years. This demonstrated that 1 of every 8 persons was an elder in 2015, and by 2050, the number of elders will exceed the number of youth and adolescents. According to the Elderly Act, B.E. 2546 (2003 A.D.)[3], the definition of Thai elderly is people with Thai nationality whose age is older than 60 years old. In Thailand, we have already become an aging society since 2005. There were 6 million elderly from 61 million population[4] or 10.4 percent of total population. From the United Nation and World Health Organization predictions, Thailand will become a super-aged society which refers to a society where more than 20% of their total population is 65 years old and above in 2032.

One of the most important and common problems of the elderly is a dental problem[5]. From Global burden of oral condition[5], severe tooth loss is one of the important problems and it could become a major problem that affects one's daily life, when comparing from 1990 to 2010[5]. Additionally, the World Health Organization reported that tooth loss is a problem that is becoming more severe year by year[6]. Even though its severity has increased, the prevalence and the incidence rate of tooth loss are decreasing[6]. Many researches[7-10] confirmed that tooth loss significantly affects the quality of life and the replacement of the missing tooth also affects their quality of life at least in moderate level. The 7th National Oral Health Survey in 2012[11] indicated that there were 7 main dental-related problems for Thai population, including tooth loss as a main problem that has a huge impact on them.

Thai elderly dental health plan (2014)[12] has focused on 4 main strategies. The strategies are as follows; (1) the development of service types, service system, quality improvement of dental health for the target group (those who is over 40 years old) (2) the study and development of innovations in elderly dental care (3) a human resource and an educational course development for elderly dental care, and (4) the administration and development of budgetary, data base, and follow-up systems.

When comparing between the 2nd (1984) and the 7th (2012) National Oral Health Survey, the result indicated that the trend of the tooth loss has decreased from the past and the remaining teeth are up to 20 teeth. From Thai elderly situation report in 2015, it showed that even though the elderly population was around 11 million people or 16 percent of Thai total population, there were only around 17 percent of 60 – 74 years old group and around 25.5 percent of 80 – 89 years old group who had prostheses. However, there are some government projects that support the dental treatment such as dentures program and the Oral Health Promotion for the Elderly from the royal inspired[13]. There were about 520,000 or 5.2 percent of Thai elderly who received prostheses from these projects in 2016. However, there were only 0.83 percent of elderly who received the denture from these projects in Bangkok. According to the information from the report[14], there were less than 30 percent of Thai elderly who had received the prostheses while more than 60 percent were in need for prostheses.

This study aims to investigate the associations between social determinants and prosthesis obtained in the elderly in Bangkok during 10 years after universal coverage policy implementation.

1.2 Key words

Prosthodontics, Decision Making, Oral Health Insurance, Universal coverage, Elders, Bangkok

1.3 Research Objectives

1.3.1 To examine the situation of prosthesis obtained among Thai elderly who live in Bangkok.

1.3.2 To determine the underlying social determinant that affect prosthesis obtaining in Bangkok elderly.

1.4 Expected Benefits

1.4.1 To know the situation of prosthesis obtained 10 years after the universal coverage policy had been implemented among Bangkok elderly.

1.4.2 To know the related factors for the prosthesis obtained among Bangkok elderly.

1.4.3 To determine the specific factors that related to the prosthesis insurance system among Bangkok elderly.

Chapter 2

Review Literature

2.1 Population aging in Thailand

According to World Health Organization (WHO) and the United Nation (UN) definitions, elderly or older people are people who are over 60 years old [1, 15]. However, the definition in each country can be varied. According to the Elderly Act of Thailand, B.E. 2546 (2003 A.D.)[3], the definition of Thai elderly is people with Thai nationality whose age are more than 60 years old. There are many sub-group definitions of elderly; The early and late elderly, the early elderly is an elderly whose age ranges between 60 – 74 years old, and the late elderly whose age is more than 75 years old[16]. And there are studies reporting about the relationship between age and dependency rate. They showed that the dependency rate will increase in older age group[17-19]. The global situation of elderly has become a major problem due to the increasing number of elderlies, the decreasing fertility rate, and a longer overall life expectancy. Thailand also has encountered the same situation. Aging society is a country or region in which the share of population aged over 60 years more than 10 percent, or older than 65 years old more than 7 percent of the whole population. Thailand has reached the stage of an aging society since 2005 with 10.15 percent of total population. In 2014, Thai people's life expectancy was 75.75 years old; the average age for males is 71.3 years old and 78.2 years old for females. While the population was 65.1 million people in which 9.11 million people or 13.99 percent were elderly. This demonstrated that Thailand has already become an aging society. Likewise, Bangkok has become an aging society since 2006 with 10.21 percent of total population. Moreover, the Foundation of Thai Gerontology Research and Development institute (TGRI) and the 5th National survey of Thailand national statistical office predicted that Thailand would become an aged society in 2021 and would escalate to a super-aged society in 2032. "**The survey of the older persons in Thailand**" was a survey conducted by the National Statistical Office of Thailand with the objective to collect the demographic, economy, social status, health conditions, supports, and living characteristics of the elderly who live in Thailand. From this survey, there were five formal reports since 1994. Because Bangkok is a capital city and the economic

center of Thailand, so it has the highest population density and the density has been increasing every year. Consequently, the number of people per household of Bangkok population has decreased from 2.59 people per household in 2007 to 2.13 people per household in 2014[20].

2.2 Situation of tooth loss

In general, when people get older, the body's systems will change accordingly. The older people will normally have lesser immunity which leads to a higher tendency to get sick or to develop any symptoms. Besides, the changes happen inside of the oral cavity in accordance with the age as well, for instance, changes in salivary glands and salivary secretion which cause dry mouth or Xerostomia, the stopping or decreasing turnover rate of teeth easily lead to tooth wear, the exposure of root surfaces (gingival recession) with medications that produce xerostomia result in root caries, the more advanced stage of Periodontitis is a result of the adulthood stage which could develop into a Chronic Severe Periodontitis and possibly cause tooth loss [21] According to a Global burden of oral conditions in 1990-2010,[5] it showed that severe periodontitis, untreated caries, and severe tooth loss were oral conditions that have always been in a high rank among other health conditions that impact on one's daily life.

From Japan studies said that the number and the distribution of functional teeth unit are related to chewing ability and difficulty[22, 23]. The World Health Organization (WHO) said that 20 natural permanent teeth were the most functional dentition for the elderly[24, 25]. In Thailand, 20 teeth with 4 occluding pairs were the indicators showing that Bureau of Dental Health has created a healthy oral cavity among the elderly[12]. Tooth loss is the main dental problem for elderly [5, 26]. In the past, tooth loss was highly prevalent, but the number of elderlies with tooth loss was lesser than the other age groups. In contrary, in recent years, the prevalence of tooth loss has decreased while the number of elderly with tooth loss has increased[27] due to the increasing number of elderly population.

Thai National Oral Health Survey was conducted by the Bureau of Dental Health to collect the epidemiological data of important oral diseases and factors affecting oral health conditions in all age groups. It has been continuously conducted

every 5 years. From the 7th Thai National Oral Health Survey in 2014[(11)], there were more than 95 percent of 60 – 74 years old people who had lost their teeth and the data reached 100 percent after 80 years old. While in Bangkok, the complete tooth lost in 60 – 74 years old group is 10.8 percent of the sample group provided that 80 – 89 age group did not participate in the survey.

Tooth loss is one of the age-related problems by any causes (such as number, location, distribution, etc.)[(24, 28-32)]. It also impairs the quality of life in both physical and mental aspects[(33, 34)]. Theoretically, it is recommended to replace the lost of teeth with prostheses to solve the problems in many aspects. It is not only a treatment of oral problem, but also a treatment for factors related to their quality of life.[(32)] For example, to improve patients' facial esthetic[(35)] by supporting facial muscles and structures, will make them feel more confident, to function[(36)] and increase their chewing ability[(35)], nutrition accuracy[(37)], and emotions[(38-40)]. In Thai National Oral Health Survey, the elderly in 60 – 74 years old group needed partial prostheses while elderly who was more than 80 years old had more need for a complete denture.

2.3 Oral Health, Denture substitution and quality of life

According to Japan studies, there are associations between age, functional tooth, masticatory and chewing ability. The number of teeth has an impact on both masticatory ability and chewing ability. The number of teeth including both natural teeth and the prosthesis one such as implant fixed or removeable prosthesis. In addition, from Thomson WM's (2010)[(41)] and Crocombe LA's studies (2011)[(42)] found that the patient in every age groups, who has a proper and continuous dental visit routine, will have a better oral health, and tends to have less tooth loss than the one who does not have a proper dental visit routine. Moreover, the patient who has a proper routine will also have better OHRQoL, in spite of his low socioeconomic status. As reported by Yoshida's studies (2001), tooth loss has an effect on social aspect of quality of life in the same way as other chronic diseases do, such as hypertension. Furthermore, the elderlies who are well satisfied with their daily lives are also well satisfied with their complete dentures[(43)]. Similarly, Lawrence's studies (2008) also showed that there are associations between socio-economic status (SES) and clinical oral health[(44)]. The best way to solve a tooth loss problem is the replacement of

edentulous with prosthesis. There are 2 main types of substitutions; fixed prostheses (such as crowns and bridges or implants) and removable prostheses. For elderly, the most suitable type of replacement is the removable denture that consists of partial and complete denture. Zhao (2011) and Swelem (2014) had the same conclusion that with more occluding pairs and after replacing the edentulous with any kinds of prosthesis, the OHRQoL of elderly has improved.[45, 46] In addition, even though the renewal of an old prothesis has no effect on general health at once, it has an effect on self-satisfaction, the condition of oral mucosa, the denture's efficiency and the acceptance for the denture.[47]. The improvement of the OHRQoL depends on age and Kennedy classification[46].

2.4 Thailand's dental care delivery system

From many previous studies indicated that socio-demographic and socio-economic factors such as age, sex, income, and educational level are related with oral health and denture treatment. As Baran et al[48] said that patients with different sex, age, educational level and income status will have different trends in denture treatment. Moreover, the location of the dental facilities is another factor that could affect the denture treatment for individuals. Other than age, sex, education, and income, the elderly who have married or have a partner in their daily lives will have more attention about their oral health or at least care about the oral health from the people who they are living with[49]. In Japan studies, it mentioned that social club participation and activities of daily life were one of the factors that related to the denture use[50]. Food consumption, such as fruit or vegetables, was another factor that associated with denture use[51, 52]; however, a knowledge of caregivers also had a great impact on denture use[53].

Regarding tooth loss situation that needs substitutes as a treatment, the 7th National Oral Health Survey showed that 7.2 percent of 60 – 74 years old group and 32.2 percent of 80 – 89 years old group had completely lost their teeth. Within the same samplings, 42 percent and 76 percent partially lost their teeth. With professional opinions about prostheses need, they concluded that 50 percent of partially edentulous and 5 percent of complete edentulous patients needed to receive prostheses.

In Thailand, there are 3 main government supportive insurances: Social Security Scheme (SSS), Universal Coverage Scheme (UCS), and Civil Servant Medical Benefit Scheme (CSMBS). SSS and UCS are mainly for company's employees or people who apply to the scheme in dental facilities, including dental clinic, dental department in the hospital, and dental school. On the other hand, CSMBS is specifically for civil servants, retired civil servants, state enterprises, independent state agencies, local government organization and employees in government dental clinic. Each scheme has different forms of support and benefits for dental treatments in which elderly can easily access to get such treatments. These supports may include scaling, filling, extraction, and prosthesis. Acrylic removable prosthesis is the only treatment option that every scheme has covered. However, the maximum support provided is 4,400 baht for a complete denture per year, while the support for acrylic removable partial denture cannot exceed 1,500 baht for replacing more than five teeth per year. Although the insurances have provided supports for the dental treatment including the prosthesis treatment, these benefits do not cover the total prosthesis fee. SSS and UCS only provide support for acrylic-based denture (CD & ARPD) while CSMBS extended the support to metal-based denture (MRPD). Depending on types of prostheses, SSS covers the cost of prostheses from 1,300 to 4,400 baht per five years. While CSMBS covers from 1,300 to 4,400 baht per three years. In the case of USC, although it does not provide the support by covering the expenses, the scheme provides a pair of CD/ARPD every five years and the payment can be reimbursed only through hospital registrations (Table 1). For additional denture fee exceeding the support limits, the elderly need to pay for themselves. Consequently, patients with different SES will access to different dental facilities. To illustrate, patients with low SES will apply for government's provided dental facilities which the government supportive insurances have covered. On the contrary, patients with high SES will apply for the private dental facilities which are more convenient for them.[54]

Table 1: Criteria of prosthesis support from government health insurance

Supporting rate (Baht) Insurance system	Complete Denture		Acrylic Removeable Partial Denture		Metal Removeable Partial Denture	
	Single arch	Both arch	1-5 teeth	>5 teeth	1-5 teeth	>5 teeth
SSS	2,400	4,400 (pair)	1,300	1,500	Not available in scheme	
USC	1 pair every 5 years		1 pair every 5 years		Not available in scheme	
CSMBS	2,400	4,400 (pair)	1,300	1,500	1,300	1,400

Remark: Data from announcement letter of Ministry of Finance: Types and rates of prosthesis and treatment devices (2013)[55],

In addition to these 3 health insurance schemes, there are other project which related to the prostheses such as "The Denture and Oral Health Promotion and Prevention Projects" to support the locals who have no access to public health services. Meanwhile the availabilities of this project were limited in a few dental facilities; therefore, elderly in Bangkok had lesser access to the above-mentioned projects.

In Bangkok, the state-owned dental facilities, such as the Ministry of Public Health, are not only covered by the CSMBS, but these dental facilities are also applicable for every government supportive projects. There are 429 dental facilities that are covered by SSS including 46 hospitals and dental schools, and 383 private dental clinics. Lastly, 103 dental facilities are covered by UCS including 49 hospitals and dental schools, and 54 private dental clinics

Even though there are a large number of dental facilities in the scheme, the distribution was not proper. From the online multimedia of UCS (Bangkok office)[56], most of hospital and dental facilities are in the center of Bangkok or in an economic area. While in outer Bangkok, there are only a few dental facilities who took part in the scheme even though they have larger area and more population.

The number of dentists is another significant factor which related to the prosthesis obtained. According to a dental personnel distribution report in 2007 by the Bureau of Dental Health, there were a total of 9,337 operating dentists in Thailand, in which 4,631 dentists were in Bangkok that created 1:1,230 of dentist-to-population ratios.[57] Later in 2014, there were a total of 12,600 operating dentists in Thailand, which 5,533 dentists were in Bangkok and a ratio of a dentist-to-population was 1:1,029.[58] Moreover, because prosthodontic treatment in public hospitals required

specific prosthodontists; therefore, the report showed that there was an after-graduated education in prosthodontic which 238 dentists of the government agencies had attended in 2007 with 81 dentists who were operating in Bangkok, so the ratio of prosthodontist-to-population in Bangkok was 1:70,320.44. Later in 2014, 373 dentists took the after-graduated education in prosthodontic and 145 dentists were operating in Bangkok which created 1:39,257.13 of prosthodontist-to-population ratio in Bangkok.

2.5 Commission of Social Determinants of Health (CSDH)

The theoretical framework about oral health that announced by WHO Commission is a Social Determinants of Health (CSDH) framework which highlights on the differences between the levels of causation, the distinction of mechanisms and the conditions of daily life [59]. As we see in figure 1, the socioeconomic and political context (left box) can develop or make changes to the socioeconomic position (second box), which indicated that the level of education, occupation, and income can make differences in the society. Furthermore, the differences of the society affect some factors that related to health and well-being such as the behavioral and mental responses to their health problems. This is a reflection that leads back to the socioeconomic and political context and position that have the influence on changes of the result.
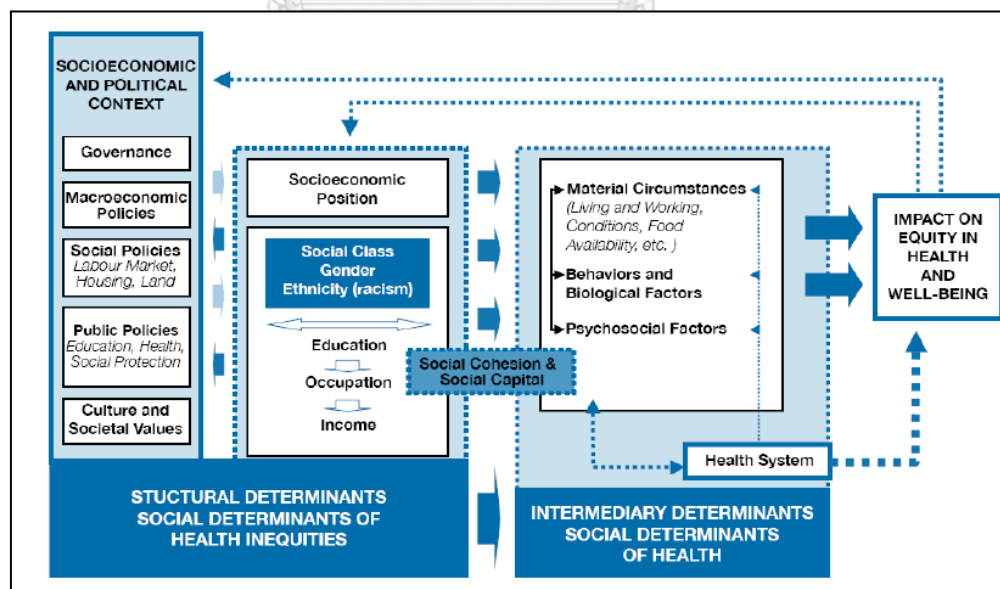

Figure 1: Commission on Social Determinants of Health (CSDH) framework (WHO, 2010)

Chapter 3

Methodology

The research is a retrospective cross-sectional study that use data from the 5th survey of older persons in Thailand (2014) to analyze the association between prosthesis obtained and social determinants that related with OHRQoL.

3.1 Sample

Sample is the population in the 5th survey of older persons in Thailand in 2014 including 83,880 sample households.

3.2 Data collection

This study's information refers to the 5th survey of older persons in Thailand in 2014, National Statistic office, Ministry of information and Communication Technology. For the interview part, the data that being used are as follows,

1) Demographic characteristics

Demographic characteristics including gender (male/female), age (60-69, 70-79, more than 80 years old), religion (Buddhist, Islam, Christ and others), marital status (single, married, separated, divorced, or widowed), financial support to child/grandchild, and educational attainment and literacy status (no formal education to primary; illiterate, no formal education to primary; literate, or higher than primary).

2) Economic characteristics

Economic characteristics including work requirement and its status (no need and not working, no need but working, need but not working, need and working), and average annual household income as of National poverty line (below, above but less than twice, greater than twice).

3) Health status

Health status including functional ability (poor, fair, good), visual and hearing ability (visual and hearing impairment, visual and hearing clarity by wearing glasses and hearing aid, both visual and hearing clarity), and health-enhancing behavior (eating

fruits and vegetables) in different frequency (none or low frequency, moderate or high frequency).

4) The care / support / visits

The care / support / visits including the need for someone to do the daily activities (no, yes) and the relationship between elderly and caregiver (no care giver, spouse, child (single), child (married), other relative, non-relative), health promotion and prevention subsidized by public welfare (annual health check-up, vaccination for pneumonia, (bird) influenza, glasses and eye operation) and home healthcare by public health personnel (visited by public health officer, taken care by public health volunteer).

5) Living conditions of the elderly (family) and suitable of household

There is no selected topic for living conditions of the elderly (family) and the suitable condition of household.

6) Participation in society informational awareness

Participation in society informational awareness including society or community club and village activity participation (never, either one(s) of club/activity), receiving and source of information: Television (In the past 1 month) (no, yes), and the satisfaction with the health care system of government services (very dissatisfied, dissatisfied, satisfied, very satisfied, never used, never received, unknown).

3.3 Study implementation

   3.3.1 Permission

The study was approved by the research ethics committee, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand (HREC-DCU 2018-074). The study uses the data from the 5th survey of the older persons in Thailand in 2014 which was simultaneously collected in form of oral interviews throughout the country in June to August 2014 by the interviewers from National Statistic Office.

   3.3.2 Recruitment criteria

The criteria for recruiting documents for this study are 1) The document that has the information about the classification of elderly in different age groups. 2) The

document that has the data of the prothesis obtained in elderly in Bangkok 3) The document that has the microdata which will be useful for the statistical analysis.

3.4 Data analysis

3.4.1 Dependent (outcome) variables

The dependent variables in this analysis are the prosthesis obtained in Thai elderly which only refer to the elderly who obtain the prothesis for their own. The analysis utilized the data from the report of elderly population survey conducted by National Statistical Office of Thailand (NSO) in 2014.

3.4.2 Independent variables

Independent variables were categorized into discrete data and were examined for association with the dependent outcomes. The independent variables that represented social determinants are demographic characteristics (age, sex, religious, marital status, living arrangement, functional ability, visual and hearing ability, health-enhancing behavior (eating fruits and vegetables), social support and cohesion (need someone to assist in daily activities, relationship between elderly and caregiver, health promotion and prevention subsidized by government welfare, society or community club and village activity participation, receiving and source of information from television (In the past 1 month), satisfying with government healthcare system services, and socioeconomic status (educational attainment and literacy status, work requirement, average annual household income as of National poverty line). As shown in table i in appendix. Chi-square test was used to find the association between independent variables and dependent variables.

3.4.3 Data analysis

In this study explained the data of population and the information of the government support scheme by using descriptive statistics and analyze the information to find the relationship between them by using the odds ratio(OR) including unadjusted or adjusted with 95% confidence interval (95% CI) from multiple logistic regression analysis on the underlying determinants and to control the influence of other factors outside the selected determinants. This data was analyzed by using STATA program version 16 (Stata Corp, College Station, TX, USA) which indicated the statistical significance when P value was less than 0.5.

3.5 Research Hypothesis

According to the research question and objectives, the hypothesis of this study is that there is a reasonable situation of prosthesis obtained among Thai elderly who live in Bangkok and there are no association between social determinant and prosthesis obtaining of Bangkok elderly.

3.6 Limitation of the study

The limitation of this study is that the data obtained in this study has limited to the secondary data from the survey of the older people in Thailand by the National Statistical Office of Thailand which might affect the accuracy and validity of research's requirements. Besides, by using the retrospective study approach which the data was collected from the data in the past; therefore, it was unable to control some factors and there might be some bias from the report when collecting the data. Lastly, because of the secondary data being used in this study, there was no information about prosthesis obtained specifically in Bangkok in 2007, while in 2017, there was no accessible microdata (microdata is a data from answer of the survey that will use in data analysis program.) provided for data analysis. Consequently, the only complete and valid data that was qualified by the research's requirements for relation analysis was the data from 2014. (Figure 2)
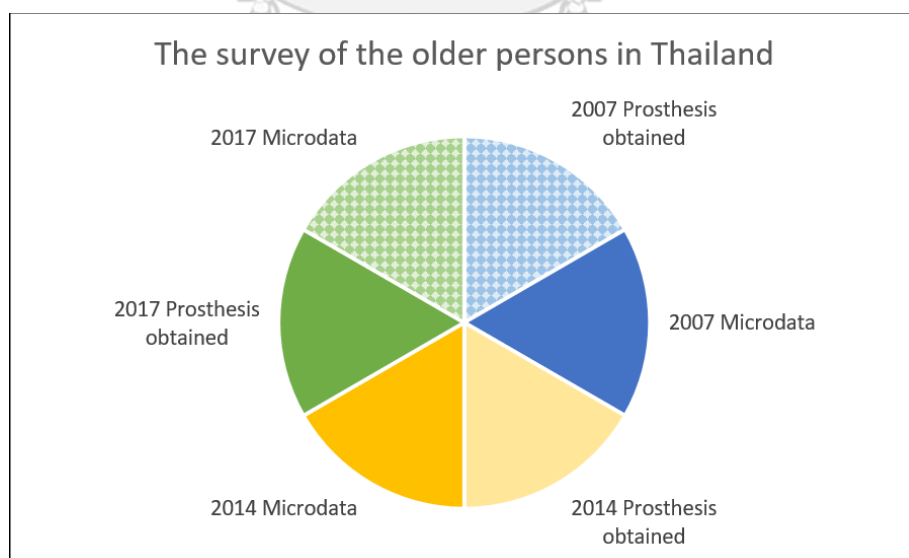

Figure 2: Data selected and limitation

Remark: The striped part mean data is unavaliable or missing.

Chapter 4

Result

In 2014, 16.56 percent of total population in Bangkok were elderly in which nearly 60 percent were early elderlies (60-69 years old), following by the middle elderlies (70-79 years old) and the late elderlies (more than 80 years old). (Table 2).

Table 2: Population, Gender, and Age range[60, 61]

Topic	Amount (person)
Bangkok population	5,692,284
Bangkok elderly population	942,586 (16.56%)
Sex: Male	412,760 (43.8%)
Sex: Female	529,826 (56.2%)
Age: 60 – 69 years old in Bangkok	560,182 (59.43%)
Age: 70 – 79 years old in Bangkok	263,596 (27.97%)
Age: More than 80 years old in Bangkok	118,808 (12.60%)

Remark: Data from the 5th survey of older persons in Thailand (2014)

There are more social factors that affect the access to dental treatment such as elderly income or financial status, dental literacy, the dental treatment process, especially prosthodontic process which needs frequent visits to complete the work, a distance from home to dental facilities, a distribution of dental care providers, and a local public transportations[62-66]. In 2014, the number of elderlies who lived with a child or grandchild were 609,137 people or 64.62 percent of total population in Bangkok. Followed by the number of 180,748 elderly people who lived alone or with spouses which equal to 19.18 percent of total Bangkok population. From the survey results, we noticed that 783,806 elderly people or 83.15 percent of total elderlies did not have any caregiver to look after their daily life activities. Most income of the elderly were from their family including spouses, child, parents, brother, sister, and relatives. Moreover, there were also government living allowance and saving interest, their savings and assets in the range of 10,000 – 49,999 baht per year in 2014 but there were some differences between each income rate range (Figure 3)[14, 60]. In the term of sufficiency, the number of elderlies who felt that this amount of income was enough for living was 817,090 people or 86.69 percent, and most of them had no work

requirement. The education level of elderly was mostly lower than high school, followed by high school to under bachelor (Table 3).
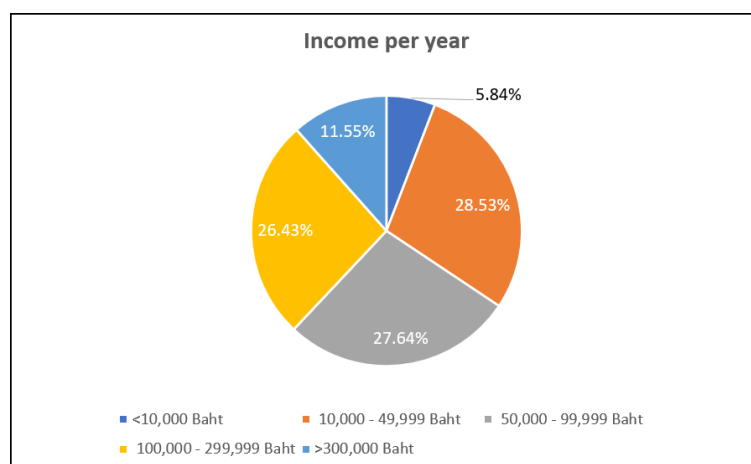

Figure 3: Income per year of Bangkok elderly [60]

Remark: Data from the 5th survey of older persons in Thailand (2014)

Table 3: The Income, the financial situation, and the educational level of the elderly in Bangkok[60]

Topic	Amount (person)
Source of income	
- Working	232,789
- Remuneration / Pension	133,673
- Government support	736,263
- Saving interest / Saving / Assets	676,933
- Family / Relative	932,862
- Others	10,221
Income sufficiency	
- Yes	664,326
- Somewhat	152,764
- No	125,496
Working requirement	
- Yes	156,081
- No	423,639
Education	

- No and Unknown	71,685
- Lower than high school	624,243
- High school to under bachelor	147,816
- Bachelor's degree	129,155
- Higher than bachelor's degree	37,462
- Other education	1,147

Remark: Data from the 5th survey of older persons in Thailand (2014)

The next factor is oral conditions (Table 4), from the 6th National Oral Health Survey (2007) found that elderly in the range of 60 – 74 years old who had 4 occluding teeth was 76.7 percent while a complete tooth loss was 6.7 percent of the sample. Later in the 7th National Oral Health Survey (2012), the percentage of 4 occluding teeth has decreased to 37.5 percent in which 64.3 percent of 60 – 74 years old elderly were having 20 teeth with 4 occluding teeth. It was also shown a higher percentage of the complete loss of their teeth. Moreover, the needs for partial denture of the elderly from the 7th National Oral Health Survey in 2012 have decreased, while the needs for full denture in the 6th National Oral Health Survey (2007) had decreased but the needs for prosthesis obtained of full denture had increased. According to the reports of elderly in Thailand (2014), the elderly who owned the prosthesis were 446,235 or 47.34 percent of the population.

Table 4: Oral condition of Elderly in Bangkok[14, 60, 67, 68]

Topic (% of sample)	2007	2012	2014
4 Occluding teeth (60-74 y/o)	76.7	64.3	Not Survey
20 teeth (60-74 y/o)	45.0	58.3	Not Survey
At least 20 teeth with 4 occluding pair: 60 - 74 years old	No Data	37.5	Not Survey
At least 20 teeth with 4 occluding pair: 80 - 85 years old	No Data	Not Survey	Not Survey
Complete tooth loss	6.7	10.8	Not Survey
Apply prosthesis: Yes	No Data	Not Survey	446,235 (47.34%)
Apply prosthesis: No	No Data	Not Survey	491,211 (52.66%)
Apply prosthesis: Unknown	No Data	Not Survey	7,551 (0.80%)

Remark: Data from the 5th survey of older persons in Thailand (2014) and the 7th Thai National Oral Health Survey (2012)

From the 7th National Oral Health Survey of Thailand, in 2012, the number of elderlies in the range of 60-74 years old in Bangkok who needed for the partial dentures were 36.7 percent of the sample and 1.7 percent of the sample who needed for full dentures. The percentage of elderly who already had partial dentures for their own in 2012 was 12.50 percent, and 9.20 percent of the sample who owned full dentures. Furthermore, the 5th survey of the older persons in Thailand pointed out the number of elderlies who had prosthesis in Bangkok (Table 4). The first time that the data collections were set specifically in Bangkok was in 2014, and the data was collected from 446,235 elderly people from the total of 942,586 elderly population in Bangkok. From the collected data, there were only 32,526 elderlies who had prosthesis supports from the government before the survey was conducted which equal to only 3.45 percent of total elderly in Bangkok.

Each government health scheme has different conditions and supportive rates for prostheses. The supportive rate of SSS and UCS covered only acrylic-based dentures (CD & ARPD) while the coverage of CSMBS extended to metal-based denture (MRPD). In 2014, SSS and CSMBS covered the cost of prostheses depending on the type of the prosthesis. SSS covered in the range of 1,300 to 4,400 Baht per five years for both private and public dental facilities. Meanwhile, CSMBS covered in range 1,300 to 4,400 Baht per three years only for public dental facilities. For USC, the scheme did not support for the denture cost but it provided supports for a pair of CD/ARPD every five years with no prognosis condition, and the payment can be reimbursed only through the government dental facilities (Table 1).

In Table 5, the data displayed the prosthesis price from various dental services in different locations in Bangkok. The price at dental universities was lower than the public and private hospitals and clinics. Moreover, the price at public and private hospitals and clinics in the center of Bangkok was the most expensive. The government health schemes also opened for private dental services to participate. Because the supportive rate of government health schemes might not cover all actual fees at some public or private dental services, so the elderly would have to pay the differences.

Table 5: Prosthesis price in Bangkok (Baht)

Prosthesis Cost	Complete Denture	Acrylic Removable Partial Denture	Metal Removable Partial Denture
Government hospital: In Government time	Start 4,100	Start 1,200– 1,400	Start 2,100– 2,200
Government hospital: Non-Government time	Start 10,000	Start 1,200–4,000	Start 3,800–6,000
Private hospital: Outside center Bangkok	Start 3,000-6,000	Start 1,500-3,200	Start 4,500
Private hospital: Center Bangkok	10,800 – 21,600	1,800 – 5,400	9,000 – 18,000
Private clinic: Outside center Bangkok	7,000 – 12,000	Start 1,000	Start 5,000 – 9,000
Private clinic: Center Bangkok	Start 12,000	Start 2,500	Start 8,000
Dental university: Undergraduate student	2,000 – 3,000	360 – 800	1,000 – 2,000
Dental university: Postgraduate student	2,500 – 7,500	800 – 2,400	2,000 – 6,000
Dental university: Special clinic	12,000 – 15,000	1,800 – 7,000	5,000 – 12,000

Remark: Data from dental facilities in Bangkok and dental school of Chulalongkorn University (Based on 2014 prices)

As the matter of the number of dentists, the ratio of dentist-to-population (dentist: population) in Bangkok was 1:1,029 in 2014. And the ratio of dentists who studied after graduations specifically for prosthodontists to population (prosthodontists: population ratio) was 1: 39,257.13.[58]

Not only the number of participated dental practices, but also the convenient transportation to dental practices for the elderly to get the dental services are also one of the important factors. Transportation by private car with caregiver is the most convenient. If a caregiver cannot accompany with the elderly, public local transportation is a major choice for elderly to travel to dental practices; therefore, elderly will require transportation cost to receive the dental heath services. There was no data of transporation fees collected in 2014 but there was the data in a survey in 2015 which was collected 12 months from March 2014 to March 2015. The data showed that the average of transportation fees to recieve dental services was 200-499 baht per visit.[69] These public local transportations will be expanded in few years and

suitable for independent elderly. On the other hand, it will be very difficult for the dependent elderlies who were limited to traveling to travel by themselves.

In this study we have used the logistic regression model to analyze the relation between factors and prosthesis in elderly. From this relation analysis, we have found that factors which significantly had the statistical relations with prosthesis were age, sex, religion, the educational attainment and literacy status, marital status, work requirement and its status, premium pension for the elderly, an average annual household income compared to the national poverty line, visual and hearing ability, health-enhancing behavior, the need for someone in daily activities, having a caregiver for daily activity.

Table 6: A significant social determinants that got relationship with prosthesis obtained of Bangkok elderly based on data of 2014[60]

Items	ORs (95%Cl)	p-value
Health promotion and prevention subsidized by government welfare	1.12 (1.07,1.17)	<0.001
Receiving and source of information: Television (In past 1 month)	2.38 (0.97,0.98)	<0.001
Society/Community club and village activity participation	2.91 (1.19,1.50)	<0.001
Visual and Hearing ability	2.23 (2.12,2.33)	<0.001
Marital status		
- Married	0.78 (0.70-0.86)	<0.001
- Separated / Divorced / Widowed	0.87 (0.78-0.97)	0.01
Educational attainment and literacy status		
- Primary school	1.20 (1.11,1.29)	<0.001
- High school	1.45 (1.31-1.59)	<0.001
- Bachelor's degree or higher	1.15 (1.02-1.30)	0.019
Age (years)		
- 70 - 79	1.80 (1.69,1.91)	<0.001
- More than 80	1.92 (1.76,2.10)	<0.001
Religious	2.04 (1.85,2.24)	<0.001
Pension premiums for the elderly	1.78 (1.63,1.93)	<0.001
Health-enhancing behavior		
- Eating fruits / vegetable	0.83 (0.79,0.88)	<0.001
- Exercise	0.91 (0.85,0.97)	0.007
Need someone to do the daily activities	1.28 (1.19,1.39)	<0.001

Sex	1.24 (1.17,1.30)	<0.001
Have caregiver for daily activity	1.31 (1.22-1.41)	<0.001
Functional ability	1.62 (1.53,1.71)	<0.001
Work requirement and its status	0.87 (0.81-0.95)	0.001
Average annual household income as of National poverty line	1.18 (1.06,1.31)	0.002

Note: The data was statistical significance at the level of 0.05.

From Table 6, it indicated that the majority of these factors were related with people in elderly's life; for instance, marital status, health promotion and prevention subsidized by government welfare, the educational attainment and literacy status, religion, the need for someone to do the daily activities, a caregiver for daily activity, an average annual household income as of National poverty line, social and community club and village activity participation, and receiving and source of information: Television (In past 1 month). There were also factors which related to the self-characteristic of elderly's personal health; for example, age, sex, visual and hearing ability, health-enhancing behaviors (eating fruits / vegetable and exercise), and functional ability.

Chapter 5

Disscussion and Conclusion

The elderly survey in 2017, after survey in 2014 that we studied, showed that the number of Bangkok population had slightly decreased by 9,869 people or 0.17 percent. In contrast, the number of elderly people in Bangkok had continuously increased by 35,869 people or 3.81 percent which mostly were the early and late elderlies. However, the main source of income, level of income, and educational level were in the same direction as of the survey in 2014. Child and/or grandchild are another important people for elderly in Bangkok because they are living with the elderly, and they are also the main caregivers and the main source of income for elderly. When the income of elderly has decreased, the gap between different range of income was also narrower which represented a better income distribution. When we compare the average income of Thai people with Thailand poverty line, it showed that the average income was higher than the poverty line. The results from Kishi's (2015), Sunee's (2015) and Aida's studies (2016) were in the same direction of this study which age, sex, socioeconomic status (income, education, and occupation), marital status, and society are associated with oral health and having teeth[70-72].

From Table 6, the variables that significantly affected the prosthesis obtained were the accessibilities to public health services, community and the source of information because people who have already obtained glasses, eye operation, vaccination for pneumonia and (bird) influenza, also the functional ability, and visual and hearing ability were people who had the accessibility to health knowledge and public health services, so they could take a good care of themselves or they had more concern about their health. Also, it indicated that there were a proper receiving and source of information, society or community club and village activity participation. Evidently, elderly who has obtained prosthesis already had the accessibility to proper public health services. This result was similar to Srisilapanan's (2016)[73], Karmacharya's (2017)[74], Dyas's (2017)[75] and Rajaraman's studies (2018)[76] which stated that the prosthesis obtained or not, had the oral impact on their daily lives. Furthermore, Yamamoto's studies (2014)[77] found that the participation in social groups was also related to prosthesis as well.

Regarding the oral condition in the 8th National Oral Health Survey in 2017,[(78)] elderly in Bangkok had lower percentage of tooth loss (natural loss of teeth excluding prothesis); however, the percentage of healthy oral indicator (At least 20 teeth with 4 occluding pair) was lower than the previous survey which related to the increase of prosthesis need (partial and full denture) and also related to the decrease of the prosthesis status from the 7th survey. In contrary, the prosthesis needs and prosthesis status in other parts other than Bangkok were in opposite directions.

During 2015-2018, the treatment conditions and the supportive rate of each government health scheme had been changing, and there was also some additional supportive scheme for elderly dental treatment. Regarding the prosthesis supports from SSS and UCS were unchanged, but UCS collaborated with the Denture and Oral Health Promotion and Prevention projects in 2015 which supporting prosthesis obtained in elderly from 9 faculty of dentistry without any payment and related document. As a result of this project, there were lesser prosthesis process for elderly, so it was more convenient and easier to receive such treatments. There were 5 faculties from 9 faculties that were in Bangkok and perimeters. Besides, the supportive rate and criteria of CSMBS have increased in 2016 (Table 7) which could also affect the number of prosthesis obtained in elderly.

Table 7: Criteria of prosthesis support from government health insurance (Update 2016)

Supporting rate (Baht) / Insurance rate	Complete Denture		Acrylic Removeable Partial Denture		Metal Removeable Partial Denture	
	Single arch	Both arch	1-5 teeth	>5 teeth	1-5 teeth	>5 teeth
SSS	2,400	4,400 (pair)	1,300	1,500	Not available in scheme	
USC	1 pair every 5 years		1 pair every 5 years		Not available in scheme	
CSMBS	3,000	6,000 (pair)	The announcement was not classified by material. Removeable 1,500 (1-5 teeth) & 2,000 (> 5 teeth).			

Remark: Data from announcement letter of Ministry of Finance: Types and rates of prosthesis and treatment devices (2016)[(79)].

According to the data mentioning above, there should be a higher number of prosthesis obtained; however, from the 6th survey of the older persons in Thailand (2017)[(80)] showed that the number of elderly who obtained prosthesis was 491,944 people or 45.13 percent of the population which has decreased by 2.11 percent of

the population from the previous survey. Similarly, the governmental supports for prosthesis within 12 months before the survey was conducted had decreased from 3.45 percent in 2014 to 2.15 percent in 2017. Apart from the governmental supports, there were 1.71 percent of the supports from the private sector which indicated that even though there were some additional supports from the private sectors, the number of prosthesis obtained in Bangkok elderly did not have a better outcome. Other than changes of the supports, the price of prosthesis in Bangkok has changed too, it has significantly increased; for example, the price of ARPD treatment in dental university by undergraduate students has increased from between 360 – 800 baht to 800 – 1,500 baht. This matter showed that although there were suitable changes of the supports, they were insufficient for the prosthesis treatment in total. To emphasize, table 7 presented the differences between prosthesis cost and the support rate from the government for prosthesis cost which in some case the differences were close to the average income of elderly. For example, the differences between a complete denture treatment cost in a private clinic in the center of Bangkok and the lowest supportive rate from the government were 15,600 – 47,600 baht, while the average of elderly income was around 10,000 – 49,999 baht. Provided that this amount of differences is a self-payment, so it has become another major barrier in decision-making process for prosthesis treatment.

In addition to the expenses, transportations and queues for the treatment were other concerns that elderly and patients in general have before deciding to go for a treatment. Nowadays, most of the dental facilities that are covered by the public dental health supportive projects are the government dental facilities which located in the accessible area. Moreover, prosthesis treatment specifically requires prosthodontists for the best outcome, but the ratio of prosthodontist-to-population is fairly high which created heavy duties for prosthodontists. Accordingly, there are a long-listed appointment in advance for such treatment with prosthodontists; however, the outcome will be different from the treatment by other dentists.

For these reasons, SSS has extended the cooperation with private hospitals and dental clinics in 2017 for medical procedure without paying in advance. There were 383 dental practices in Bangkok that participated in this project in 2018. For UCS project, there were 82 private dental clinics that took part in the project in 2019. Due to more distributions of dental facilities, the accessibility to dental treatment including

prosthesis has increased which diminished the transportation cost required to receive dental health service, including by private car from 622.1 baht per visit in 2014[69] to 100-499 baht per visit in 2017.[81] This data indicated that elderly can travel lesser or the distance to the dental facilities was shorter.

However, the limitation is the secondary data being used in this study was from the existing survey, not from the new data collection; therefore, the data obtained for relation analysis is limited to follow the research's requirement.

Table 8: Different between prosthesis cost and supportive prosthesis cost from government scheme (Baht) (Update 2018)

Prosthesis Cost / Facilities	Complete Denture		Acrylic Removable Partial Denture		Metal Removable Partial Denture
	SSS	CSMBS	SSS	CSMBS	CSMBS
Government hospital: In Government time	3,600 - 5,600	5,400 - 6,400	500 - 1,500	1,200 - 2,000	4,300 - 6,200
Government hospital: Non-Government time	12,600-14,600	14,400-15,400	1,000 - 5,500	1,700 - 6,000	5,600 - 10,700
Private hospital: Outside center Bangkok	7,600 - 17,600		0 - 1,000		
Private hospital: Center Bangkok	15,600-22,600	Not support in private clinic.	3,500 - 4,500	Not support in private clinic.	Not support in private clinic.
Private clinic: Outside center Bangkok	3,600 - 12,600		0 - 1,000		
Private clinic: Center Bangkok	15,600-47,600		3,000 - 6,500		
Dental university: Undergraduate student	No difference	0 to 400	No difference	0 - 500	0 - 1,100
Dental university: Postgraduate student	1,000 - 3,100	0 to 4,900	0 - 900	0 - 1,400	700 - 4,600
Dental university: Special clinic	At least 10,600	11,400-12,400	300 - 5,500	1,000 - 6,000	3,700 - 11,600

Remark: - Data from private dental clinic in Bangkok and dental school of Chulalongkorn University.

- USC did not support prosthesis fee.
- SSS and USC did not support Metal removable partial denture.

While many factors supporting elderly population have continuously developed including the demographic characteristic, social determinants such as a higher educational level[77], a better income distribution,[77] and the accessibility to community and information; however, the accessibility to governmental supports were still low. The suggestion would be to extend and offer more government supports to elderly and distribute what they are supposed to get from the government support. Moreover, we can seek additional supports from the private sectors which would make dental service more accessible. Despite the need for prosthodontists specially for prosthesis, the ratio of prosthodontists-to-population (Table 9) was low. Thus, the government should increase the number of prosthodontists in public dental facilities to supply the need for prosthesis and also decrease the barrier factors for receiving the services; for instance, the length of waiting time[82] and transportations to dental facilities[82]. Finally, we should collect prosthesis treatment data from private sectors to create a central database which could be used to evaluate the capability of the total dental support and also for further appropriate study in the future.

Table 9: Dentists and Prosthodontists : Population ratio

The ratio Year	Dentists : Population ration (person)	Prosthodontists : Population ratio (person)
2007	1 : 1,230	1 : 70,320.44
2014	1 : 1,029	1 : 39,257.13

Remark: Calculate ratio from data from Dental Public Health Personnel Report (2007, 2014)[57, 83]

In summary, the prothesis obtained in elderly situation in Bangkok tends to be better due to social factors and other supportive factors which created more accessibility for prosthesis obtaining. From this study, social factors, that have an influence on prosthesis obtained in elderly, are classified into groups as follows, (1) governmental supports such as health promotion and prevention subsidized by government welfare, and premium pensions for the elderly, (2) social coexistence such as marital

status, need/have caregivers, health-enhancing behavior, educational attainment and literacy status, an average annual household income, society or community club and village activity participation, (3) specific factors for elderly such as age, sex, visual and hearing ability, functional ability. These factors mentioning above are the main factors that affect prosthesis obtained of Bangkok elderly. Within these factors, the governmental support factors are the one that could make a significant change and have an effect on the accessibility for elderly to government dental services. By supporting social factors will reduce the barriers such as the price of the prosthesis, the queue for the treatment, and the accessibility to dental facilities. These barriers could withhold elderly from getting the treatment or could create the decision not to get prosthesis treatment. However, the relation of these factors and prosthesis obtained was analyzed using the 2014 database; therefore, it only represented the relation in 2014. As a result of the limitation of the database, we could not see the changes after 2014.

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จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

VITA

NAME	Chutimont Jindarojanakul
DATE OF BIRTH	23 September 1988
PLACE OF BIRTH	Bangkok
HOME ADDRESS	101 Soi Srihaburanukit11 Srihaburanukit Road Minburi Minburi Bangkok 10510
PUBLICATION	Jindarojanakul, C., & Komin, O.. (2020). Association between Social Determinants and Prosthesis Obtained in Bangkok Elderly: 10 Years after Universal Coverage Policy Implementation. Proceeding in RSU International Research Conference, May 1, 2020. Pathum Thani, Thailand. https://rsucon.rsu.ac.th/files/proceedings/inter2020/IN20-019.pdf

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