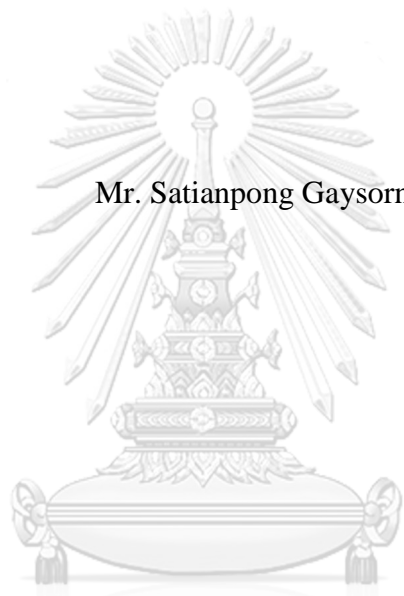


Relationship Between Workload and Obesity Among Dentists in Regional Health No.
8, Northeastern, Thailand



Mr. Satianpong Gaysorn

จุฬาลงกรณ์มหาวิทยาลัย

บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)
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ความสัมพันธ์ระหว่างภาระงานกับโรคอ้วนในทันตแพทย์สังกัดเขตสุขภาพที่ 8 ภาค
ตะวันออกเฉียงเหนือ ประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์
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Thesis Title	Relationship Between Workload and Obesity Among Dentists in Regional Health No.8, Northeastern, Thailand
By	Mr. Satianpong Gaysorn
Field of Study	Public Health
Thesis Advisor	Professor Sathirakorn Pongpanich, Ph.D.

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จุฬาลงกรณ์มหาวิทยาลัย
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เสฐียรพงษ์ เกษร : ความสัมพันธ์ระหว่างภาระงานกับโรคอ้วนในทันตแพทย์สังกัดเขตสุขภาพที่ 8 ภาคตะวันออกเฉียงเหนือ ประเทศไทย (Relationship Between Workload and Obesity Among Dentists in Regional Health No.8, Northeastern, Thailand) อ.ที่ปริกษาวิทยานิพนธ์หลัก: ศ. ดร. สติกร พงศ์พานิช, 91 หน้า.

เป้าหมาย: จุดประสงค์หลักคือการหาความสัมพันธ์ระหว่างภาระงานทันตแพทย์กับโรคอ้วน จุดประสงค์รองคือการหาความสัมพันธ์ระหว่างตัวแปรอื่นๆกับโรคอ้วน

รูปแบบ: เป็นการศึกษาแบบตัดขวางในกลุ่มประชากรทันตแพทย์ในเขตสุขภาพที่ 8 ทั้ง 365 คน จากสูตรต้องการกลุ่มตัวอย่างอย่างน้อย 191 คน จึงส่งแบบสอบถามออกไปให้ทุกคนในกรณีที่ไม่มีการตอบรับ แบบสอบถามภาระงานทันตแพทย์ถูกดัดแปลงและนำมาจากสมาคมทันตแพทย์อเมริกัน มหาวิทยาลัย Iowa และ Utah และราชวิทยาลัยทันตแพทย์แห่งประเทศไทย แบบสอบถามส่วนอื่นเป็นแบบสอบถามมาตรฐานจากองค์การอนามัยโลก ศูนย์โรคการนอนหลับ โรงพยาบาลรามารชิบดี และกรมอนามัย ในแบบสอบถามที่ส่งไปมีซองจดหมายติดแถมมาให้เพื่อที่จะให้ผู้เข้าร่วมส่งกลับโดยไม่มีค่าใช้จ่าย

ผลลัพธ์: มีผู้ตอบกลับแบบสอบถาม 209 คน ความสัมพันธ์ระหว่างเวลาทำงาน โดยรวมกับเวลาทำงานในเวลาราชการกับดัชนีมวลกายมีเพียงเล็กน้อยเท่านั้น และไม่มีความสัมพันธ์ระหว่างเวลาทำงานนอกเวลาราชการและจำนวนคนไข้กับดัชนีมวลกาย ทันตแพทย์ที่รักษาคอนไซค์ได้ครบทุกคนแต่รู้สึกว่าทำงานหนักเกินไปมีโอกาสที่จะเป็นโรคอ้วนและโรคอ้วนลงพุงมากกว่าระดับอื่น

คุณค่า: งานวิจัยนี้สามารถใช้เห็นหลักฐานสนับสนุนหากมีการร่างนโยบายเพื่อปกป้องและปรับปรุงคุณภาพชีวิตของทันตแพทย์ในประเทศไทย

สาขาวิชา สาธารณสุขศาสตร์

ปีการศึกษา 2560

ลายมือชื่อนิติต

ลายมือชื่อ อ.ที่ปริกษาหลัก

5978833653 : MAJOR PUBLIC HEALTH

KEYWORDS: THAI DENTISTS / OBESITY / APPROPRIATE WORKLOAD

SATIANPONG GAYSORN: Relationship Between Workload and Obesity Among Dentists in Regional Health No.8, Northeastern, Thailand. ADVISOR: PROF. SATHIRAKORN PONGPANICH, Ph.D., 91 pp.

Propose: Primary Objective is to find a relation between dentist's workload and obesity while secondary objective is to find a relation between other independent factors and Obesity.

Design: This is a descriptive cross-sectional study with population of all 365 dentists in Regional Health no.8 area. From formulation, the sample size need at least 191 but will send out questionnaire to all individual in population in case of people unwillingness or unqualified for the study. Dental Workload questionnaire will adapted from ADA, Iowa, Utah, and Royal College of Dental Surgeons of Thailand. Other than that standardized questionnaires from WHO GPAQ, WHO Audit, WHO MPOWER, Ramathibodi Hospital Sleep Disorder Center, Mahidol University, and Bureau of Health Promotion. All questionnaires were sent to all MOPH hospital within Health Region No.8. There's an envelope with stamp inside each questionnaire's sealbag so that the participant or hospital staff will send back to the author without any fee.

Findings: 209 participants sent the survey back. Relationship between overall working time and working time in office hour and BMI are only little positive correlation while working time outside office hour and number of patient doesn't significantly related to BMI at all. Completing all request appointment and felt overworked leads to higher chance of being obesity and abdominal obesity.

Value: This study could be a supporting evidence if there's an establishment of policy on protecting and improving Thai dentist's quality of life.

Field of Study: Public Health

Student's Signature

Academic Year: 2017

Advisor's Signature

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List of Abbreviations

ACGME: Accreditation Council for Graduate Medical Education
 ADA: American Dental Association
 CDC: Centers for Disease Control and Prevention
 cm: Centimeter
 kcal: Kilocalory
 kg: Kilogram
 MOPH: Ministry of Public Health (Thai)
 NCD: non-communicable disease
 PG: Postgraduate
 SPSS: Statistical Package for the Social Sciences
 WHO: World Health Organization

CHAPTER I: INTRODUCTION

1.1 Background and Rationale

1.1.1 Overweight and Obesity

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer.¹ Many researches and medical textbooks can explain the relationship between Obesity and various diseases deep into the mechanism level.^{2,3,4} It has very strong epidemiological evidence that link to health status.⁵ For example, there's a research published in Nature Journal that show mechanism linking obesity with cardiovascular disease, that adipose tissue releases a lot of bioactive mediators that affect body weight homeostatis and insulin resistance and also alter lipids, blood pressure, coagulation, fibrinolysis and inflammation, linking to endothelial dysfunction and atherosclerosis.⁶

Obesity was once considered a problem only in high income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese. Overall, about 13% of the world's adult population were obese in 2014. In 2014, 39% of adults aged 18 years and over were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014.⁷ BMI and waist circumference are the gold standard for measuring obesity in public health (note: not in medical evaluation) because not only they're easy to measure but according to Waist Circumference and Waist–Hip Ratio:Report of a WHO Expert Consultation, combining BMI with waist circumference give the best result in predicting various diseases.

1.1.2 Physical Activity

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical inactivity is the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally. Proper physical activity aids human in all sexes and ages. By doing a moderate load of physical activity regularly such as playing sports, running, or even brisk walking for half an hour, one can achieve significant improvement of health. Various chronic diseases such

as diabetes, cardiovascular disease, cancer, obesity, hypertension, depression, osteoporosis, premature death and so on, have been shown by abundant indisputable testimonies to be preventable on both primary and secondary level by sufficient amount of physical activity.⁸ This suggests that physical inactivity is a mortality predictor that as valuable as other mortality predictors such as overweight and obesity.⁹ One example of mechanism linking with cancer, according to research published in Nature Cancer Review, describe that physical activity decreases risk for various cancers by several mechanisms, including decreasing sex hormones, metabolic hormones and inflammation, and improving immune function.¹⁰ The relationship between health and physical activity is generally linear, meaning that the more physical activity the more health it can improve. While enough physical activity will prevent overweight or obesity, people that are already overweight or obese can achieve lower health risks through physical activity as well. In fact, they'll be even healthier (lower morbidity and mortality) than people that are in normal weight that have sedentary lifestyle. Research published in Cell Metabolism proposed two-tiered conceptual model of the integrative and hierarchical control defining the response to physical activity. In the other hand, physical inactivity escalates considerable non-communicable diseases and decrease lifespan as well. These relationships between unfavorable health statuses and physical inactivity have been supported by plethora of solid evidences. If all individual human has enough physical activity then we can expect 6-10% reduction of major non-communicable diseases and also elongation in life expectancy.¹¹ To measure physical activity in adults, WHO has developed the Global Physical Activity Questionnaire (GPAQ). This questionnaire helps countries monitor insufficient physical activity as one of the main NCD risk factors. The GPAQ has been integrated into the WHO STEPwise approach, which is a surveillance system for the main NCD risk factors.

1.1.3 Rationale

News relating to three Thai doctors died with overwork being one of the causes has been surfaced to public.¹² For medical doctor, there's a recommendation on how long they can work within a week (Thai's guideline is based on USA's ACGME). The recommendation has been violated a lot in Thailand.¹³ According to Evaluation & Operational Policies & Procedures by Commission on Dental Accreditation, American dentist's recommendation is as the same as medical doctor. No recommendation for

Thai dentist as of now but Thai Dental Council encourage to work more than 30 hours per week to receive scores from Continuing Dental Education Center.

Given that the public become aware of caring healthcare worker's health due to unrelated news on doctor's death from various causes, all link to overwork. It's important to look for a relationship between workload and cause of death for further study to implement policy to regulate healthcare worker's working time, with this research's objective is dedicated to find a link between dentist's workload in Thailand's Regional Health no.8 (which has the highest proportion of population to dentist ratio among all 12 regional health) and obesity/physical activity.

1.1.4 Research Gap

The research gap is that there's no relationship seeking between dentist workload and obesity/physical activity can be found using Google Scholar or PubMed. Previous studies also lack of standardized questionnaire of dental workload.

1.2 Research Questions

This research has three questions

1. Is there any relation between Dentist's Workload and Obesity?
2. If there's a relationship, what type of relationship it is? (Positive or negative)
3. Is there any relation between Dentist's Workload and Dentist Age, Sex, Income Workplace province, Physical activity, Smoking, Alcohol drinking, Stress, Sleeping duration, and Obesity?

1.3 Hypotheses

This study has three hypotheses respond to the research questions

1. There is a relation between Dentist's Workload and Obesity
2. The expected relationship is positive between Dentist's Workload and Obesity
3. There is no relation between Dentist Age, Sex, Income, Workplace province, Physical activity, Smoking, Alcohol drinking, Stress, Sleeping duration, , and Obesity

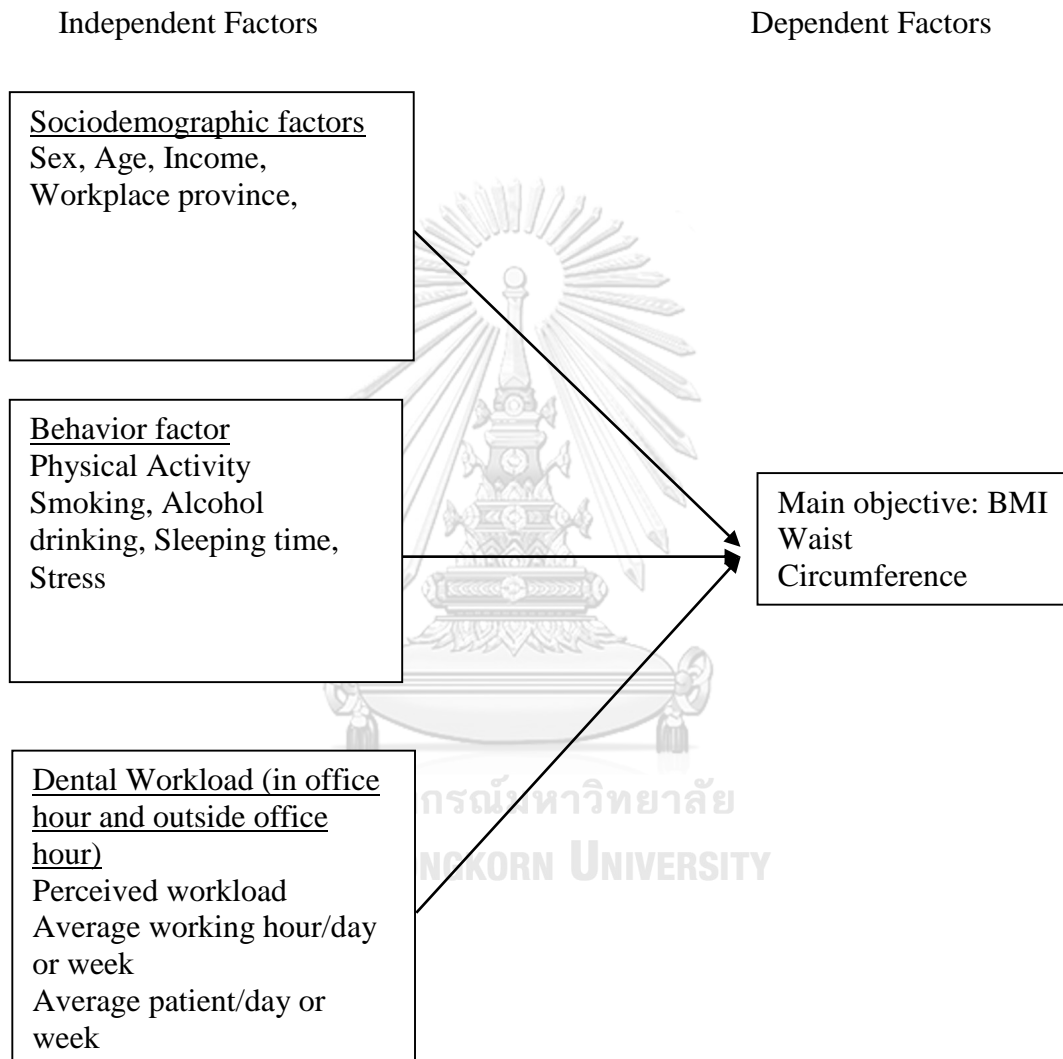
1.4 Objectives

This research's objectives are as followed

Primary Objective: To find a relation between Dentist's Workload and Obesity

Secondary Objective: To find a relation between other independent factors and Obesity

1.5 Conceptual Framework



1.6 Operational Definitions

1.6.1 Obesity

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). WHO suggested BMI categories for Asian populations as followed

Underweight = $\text{BMI} < 18.5$

Normal = $\text{BMI} 18.5$ to 22.99

Overweight = $\text{BMI} \geq 23$

Pre-Obese = $\text{BMI} 23$ to 24.99

Obesity Class I = $\text{BMI} 25$ to 29.99

Obesity Class II = $\text{BMI} \geq 30$

The instruction of how to measure weight and height will be adapted from guideline by CDC 'Measuring Height Accurately At Home' and 'Measuring Weight Accurately At Home'. These guidelines are based on measuring with measurer, not self-measured, for more accurate measurement. See guidelines at the appendix section at the end of this proposal.

Waist circumference (WC) is an indicator of health risk associated with excess fat around the waist. The cutoff point will be 90 cm for men and 80 cm for women according to Thai Health Promotion Foundation. The Instruction will used guideline WHO STEPS protocol for measuring waist circumference. See guideline at the appendix section at the end of this proposal.

For this research BMI will be the main indicator for obesity, with waist circumference being used as supportive data for descriptive part as abdominal obesity.

1.6.2 Defining Intensity of Physical Activities

Physical Activity means the movement of the body that requires body's energy expenditure. The GPAQ version 2 categorized physical activity in to 3 types

1. Activity at work such as ordinary working that require high or moderate physical activity
2. Travel to and from places such as walking and ride a bicycle

3. Recreational activities such as exercising, sports and free time activity

All three types of these activities will ask the intensity, the duration in minutes per day, and the frequency in day per week.

Intensity of physical activities

Vigorous intensity

1. Working that makes breath significantly heavier or much higher heart rate. With duration of at least 10 minutes per time such as holding heavy object, construction site working, farming, and gardening
2. Intense freetime activity such as exercise, sports that make breath significantly heavier or much higher heart rate. With duration of at least 10 minutes such as aerobic exercise, running, playing football

Moderate intensity

1. Working that makes breath heavier or moderately higher heart rate. With duration of at least 10 minutes per time such as walking in the workplace, cooking, holding light object
2. Traveling from one place to another place by walking or ride a bicycle for at least 10 minutes continuously
3. Activity such as sports, exercising or recreation that moderately intense for at least 10 minutes such as walking, ride a bicycle, volleyball, or swimming

Each intensity can be calculate into body energy expenditure in minute per day and per week by using metabolic equivalent (MET)

MET means proportion of body's energy expenditure while in physical activity to while resting, 1 MET = 1kcal/kg/hr in which the energy body use while sitting idly is 1 kcal per body weight of 1 kg per hour.

The relationship between intensity of physical activity and MET

Moderate intensity physical activity uses 4 times of energy compare to sitting idly and vigorous intensity physical activity uses 8 times, so

Table 1: MET of each physical activity type

Type of physical activity	MET
Working	Moderate MET = 4.0 Vigorous MET = 8.0
Traveling	Walking or Riding a bicycle MET = 4.0
Recreational activity	Moderate MET = 4.0 Vigorous MET = 8.0

MET calculation

1. Vigorous intensity physical activity: MET = the sum of time in minutes of vigorous intensity activity in one week x 8
2. Moderate intensity physical activity: MET = the sum of time in minutes of moderate intensity activity in one week x 4

Physical activity classification

Vigorous

1. Have vigorous intense of physical activity at least 3 days per week and total MET-minute/week at least 1500 or
2. Have vigorous or moderate intense of physical activity at least 7 days per week and total MET-minute/week at least 3000

Moderate

1. Physical activity from moderate to vigorous and
2. Have vigorous intense of physical activity at least 3 days per week and at least 20 minutes per day or
3. Moderate intense of physical activity or walking at least 5 days per week at least 30 minutes per day or
4. Vigorous and moderate physical activity or walking at least 5 days per week and total MET-minute/week at least 600

Light

Physical activity level below moderate and high

Sufficient physical activity

Sufficient physical activity means the level of physical activity of moderate or vigorous

1.6.3 Sociodemographic Factors

Age (self-inserted number) Age expressed as the number of birthday anniversaries passed on the date of reference. As it is the same as the number of completed years lived by a person, it is also referred to as "age in completed years"

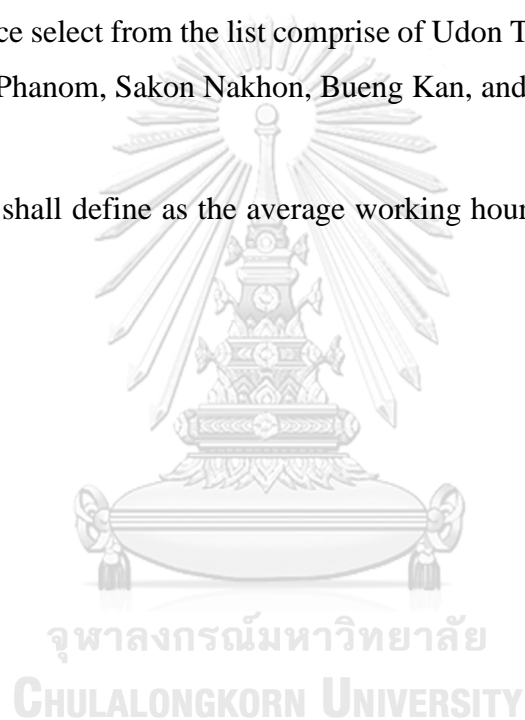
Sex (select from Male and Female) Legal Gender, Miss and Mrs classified as Female

Income (self-inserted number) money that is earned per month in Baht, average of the last three months

Workplace Province select from the list comprise of Udon Thani, Nongkhai, Nong Bua Lamphu, Nakhon Phanom, Sakon Nakhon, Bueng Kan, and Loei.

1.6.4 Workload

Hereby Workload shall define as the average working hour per week and the average patient per week



CHAPTER II: LITERATURE REVIEW

2.1 Dentist and Obesity

In 1st year Pakistan dental students, obesity group are likely to skip breakfast, eat snacks regularly, watch TV longer and more physically inactive than in group that's not obese. Overweight and obesity prevalence is high among PG trainee doctors. Obesity predictors among PG trainee doctors in one hospital in Pakistan are taking lunch outside the home, eating snacks and drinking tea between meals, longer training, obesity history in family, male gender and insufficient physical activity.¹⁴

2.2 Dentist and Workload

Survey of 6,762 dentists in Taiwan in 2010 shows the average working hours per week for all dentists were 42.9 hours, which is higher than the 40 hours of work per week for government employees and the 42 hours of working per week for laborers. On average, each dentist treated 80.2 patients a week.¹⁵

From American Dental Association survey in 2011, an average dentist sees 292 patient visits per month, 279 for a general dentist and 355 for a specialist.

In a setting of full-time faculty in baccalaureate dental hygiene programs, faculty reported an average work week of 50.5 hours, which includes 46.9 hours spent on paid activities and 3.6 hours spent on unpaid activities. In specific workload activities, the allocation of faculty time was: 56.8% on teaching undergraduate students, 14.9% on institutional service, and 9.5% on research/scholarship.¹⁶

2.3 Dental Workload and Other factors

In dental school, Based on student ratings of comparative workload. Courses with low workloads received significantly higher ratings from students for 11 of the 13 rating items. Student ratings in the dental school were significantly affected by the workload of a course. In the dental school setting, therefore, workload may serve as a biasing factor of student ratings.¹⁷

The work-related musculoskeletal disorders among Indian dentists not only decrease their efficiency but also are a major concern among them. Self-awareness and benefits of regular exercise is the need of the hour.¹⁸

In Lithuania, Most dentists (69.8%) worked more than 33 hours per week (legal limit), 7.9% more than 50 hours and 0.4% of them worked more than 60 hours per week. 94.2% of respondents indicated that long working hours affected their general health with as much as 41.7% of them reported experiencing the hazardous effects of working long hours on a frequent or very frequent basis.¹⁹

In the study of self-assessed and direct measured physical workload among dentists in public dental clinics in Sweden, the high scores found for perceived workload were associated with high measured muscular workload in the upper trapezius muscles. Furthermore, mechanical exposure at job level seems to be higher than for occupational groups with more varied work. Also, negative correlations were found between low angular velocities in the head, neck and upper extremities, on the one hand, and estimates for perceived workload.²⁰

Another study in Swedish dentist working in clinic points out that despite these dentists perceiving themselves as being faced with a stressful work situation involving a high workload, strong physical and psychosocial demands being placed on them and their having a low degree of control over their work situation, the high degree of social support they experienced may have made their work situation less stressful.²¹

2.4 Occupational Workload and Obesity

2.4.1 South Korea

There are various studies on workload and obesity in South Korea. In a study of data gathered by Community Health Survey 2008 of 42,234 participants found that working less than 40 or more than 60 hours per week significantly related with obesity, and in non-manual workers group the type of work (day and night/shift) significantly associated with obesity.²²

From research that composed of 1,145 paid workers collected by Sixth National Health and Nutrition Examination Survey 2014 points out that working 60 hours per week or more linked with metabolic syndrome among female workers.²³

From the study conducted using data from Korean National Health and Nutrition Examination Survey gathered from 2007 to 2010 in adult manual and non-manual workers excluding pregnant women, part-time workers, soldiers, housewives and

students also found that working 60 hours per week or more increased risk of obesity in male manual workers.²⁴

In a study of 711 participants of age 40 years old to 78 that had medical examination at Ewha Womans University Hospital found that obesity in women was associated with obesity.²⁵

Furthermore, from the research published in Nature's Scientific Reports that collected data from Korea National Health and Nutrition Examination Survey between 2007-2014 composed of 17,533 workers found that long working hours (more than 52 hours per week) are associated with periodontitis²⁶, so it's remained to be seen how workload can affect periodontal status of health occupation that deal directly with oral health, such as dentist. This can be study further in the future research.

2.4.2 Australia

From ABS Overweight and obesity in adults 2004-05, the percentage of male workers that are overweight or obese increases with working hours

Table 2: Overweight and Obesity and Working Hours from ABS

2004/2005		2007/2008	
<25 hours	≥49 hours	< 25 hours	≥49 hours
48%	70%	47%	75%

However, the percentage of women that are obese or overweight is similar regardless of working hours (average 51% according to ABS Overweight and obesity in adults in Australia: a snapshot 2007-08).

From a cross sectional study of shift and day workers comprised of 346 participants found that the mean BMI was significantly higher in shift workers than in day workers. In group that has long working hours has significantly higher mean BMI followed by group of medium working hours and group of short working hours. This study also found that obese individuals worked significantly longer hours and sleep less compare to group of normal BMI. It concludes that the most significant predictor of obesity is long working hours, followed by old age and short sleeping time.²⁷

In an original article of International Journal of Obesity that published in Nature uses survey of both 1996 and 1998 Australian Longitudinal Study of Women's Health

that were a representative sample of Australian population found that among employed women, working in 35-40 hours range, 41-48 hours range, and more than 49 hours was linked with increase weight gain compare to working in a part-time manner. It suggests that women that work in a longer time are more likely to have a lifestyle that linked with inclination of weight.²⁸

2.4.3 USA

Many studies focus on the relationship between working hours and obesity have conducted in USA. In a research note that use data from panel of Health and Retirement Study found that older workers that work more than 59 hours in a week are more likely to have weigh increase than in the same age group that work less than 59 hours per week.²⁹

In a study of 308 male firefighters in California found that those who work 17 to 21 shifts in the past month have significantly higher of all obesity measurement (BMI, waist circumference, and body fat percentage) than in a group that work only 8 to 11 shifts in the past months. Long sedentary work is also a risk factor for obesity by BMI. There is also a linear dose-response relationship of obesity by BMI and waist circumference and number of 24 hours shifts and sedentary work.³⁰ The author suggest that work and obesity mechanisms depend on working conditions, decreased energy expenditure that resulted from decreased work-related physical activity and decreased leisure-time physical activity, increased energy consumption that resulted from stress-induced overeating and choosing sweet/chocolates over fruit/fish/vegetables (Oliver and Wardle, 1995), chronic strain – hypothalamus dysfunction that resulted from alternations of the autonomic nervous system, endocrine systems, and circadian rhythms related to lipid metabolisms (Björntorp, 2001), and combinations of all of them.

In the study that is claimed to be the first attempt to assess by occupation groups in USA found that out of 40 occupational groups, only six occupation groups statistically significant to reduce the likelihood of being obese the longer hours they work: Athletes, entertainers, artists, writers, scientists and architects, and engineers.³¹ In the paper using data from American Time Use Surveys (ATUS) from 2006 to 2008 found that longer working hours seems to be related with a higher probability of being

obese and shows stronger relation in women than in men group. However, in a strenuous type of work, working longer (than 40 hours per week) in women group seems to have an opposite effect than the rest.³²

From the study that use data from the 1979 cohort of the National Longitudinal Survey of Youth shows that longer working hours can increase individual BMI and the likelihood of being obese but have tinier and statistically insignificant impact on spouse. Mother's longer working time can also affect children's likelihood of being overweight.³³

In a study that use 2,103 female nurse population found that longer working hours and jobs with lower physical strenuous and more limited movement are significantly related with overweight/obesity.³⁴

Contrastingly, the study of relationship between working hours and mortality among older workers in USA that use data from Health and Retirement Survey found a small negative association between working hours and the likelihood of mortality.³⁵

2.4.4 China

China is one of the country that has longest working hours per week and claimed by some source such as China Youth Daily that in every year six thousand Chinese people die because of "Guolaosi" translated to 'death by overwork' (Monet, 2014).

But from the study that use longitudinal data from China Health and Nutrition survey conclude that long working hours has insignificant effects on obesity, the results are contrast from existing studies in western countries. Furthermore, their results also didn't provide any evidence that long working hours have impact on other subjective or objective health measurement such as sleeping time, physical activity, or diets.³⁶

2.4.5 Systematic reviews

There are two contrasting results from two systematic reviews, from systematic review that search from Medline and Embase original articles published up to September 2012, with a total of 39 articles found that about 70% of studies show a positive relationship between long working hours and weight-related indications. This systematic reviews conclude that there are weak relationships between psychological factors such as work hours/working overtime, and weight gain, especially in men group.³⁷

The other systematic review gathers ten cross-sectional studies that focus on psychological workload and weight in both men and women. It concludes that there is no relationship between psychological workload and either abdominal or general obesity. It suggests that future study should be experimental or prospective instead.³⁸

2.5 Age, Gender, and Income and Obesity

From a study that analyze data of Thai National Food Consumption Survey, the mean BMI was significantly higher among women ($23.1 \pm 4.5 \text{ kg/m}^2$) than men ($22.1 \pm 3.4 \text{ kg/m}^2$), $p < 0.001$. In female age 46-55 (95% CI: 3.0-7.6 was significantly higher than age 26-35 (95% CI: 1.2, 2.7). Male with higher income or those who had annual household income more than USD \$3875.03 were 1.8 times (95% CI: 1.3–2.4) at risk of being overweight and obese than those who in the lowest quartile.³⁹

2.6 Genetic and Obesity

In a meta-analysis study published in Nature composed of 339,224 participants identified 97 genome-wide significance loci related with BMI, 56 of them are novel. 2.7% of variation in BMI is the effect of these loci and as much as 21% of variation BMI might be accounted by common genetic variation. The study estimated the possible pathways of the relationship between genetic and obesity are involved with central nervous system, including adipogenesis, lipid biology, energy metabolism, insulin action/secretion, signaling of glutamate, and synaptic function.⁴⁰

2.7 Stress and Obesity

Many diseases or disorders are caused by stressed (or at least, contributed), with obesity being one of them. Corticotropin-releasing-hormone is presented immediately after a person experiencing stressful event. This is so that the body will be less appetite and focus more on fight, flight or withdrawal so that the event can be managed. But after that for a few hours there's a glucocorticoid-mediated that induce food appetite and hunger. In a scenario of sudden stress that need physical action such as hunting interaction, the hypothalamic-pituitary-adrenal axis modulation of food intake permits dealing with stressful event and energy replenish after that. But in scenario of long psychological stress, the inclination of glucocorticoids level can induce eating habit, resulting in weight gain.⁴¹

2.8 Smoking and Obesity

Smoking and obesity have an incomplete, unclear relationship with many studies published contrasting results. Some studies conclude no relationship statistically between BMI and smoking status⁴², some convinced that smoking may actually lower BMI⁴³, and some study show that smoking cessation can increase BMI.⁴⁴

A research of 499,504 UK adults takes place to counter the beliefs that smoking is the barrier to obesity. It concludes that this idea may be oversimplistic especially in heavy and young smokers. While quitting smoke may be related with temporary weight inclination, it suggests that smoking cessation should support management of weight as well.⁴⁵

2.9 Alcohol Drinking and Obesity

In most cross-sectional studies after 2005 point out that light to moderate alcohol consumption is not likely to relate with likelihood of being obese.^{46,47,48,49,50,51} On the other hand, heavy alcohol consumption or drinking a lot of alcohol in a short period of time, so called binge drinking, is likely to increase the chance of overweight and higher body fat percentage in older adults and adolescents.^{52,53,54}

In longitudinal studies, light to moderate alcohol consumption is not related with weigh increase or waist circumference change.⁵⁵ Pattern of alcohol increase do induce weight gain though.^{56,57,58} Heavy drinking also related with weight inclination.^{59,60,61}

In a systematic review of relationship between alcohol consumption and obesity conclude that it is reasonable to include alcohol as a risk factor for obesity.⁶²

2.10 Calorie Intake and Obesity

Calorie intake is long well-known for directly contributed to weight change. However, there are some studies that measuring calorie intake by survey might be inaccurate.

An article by the Behavioural Insights Team, London 2016 investigate the event in the UK in which in the last 40 years there's decline in calorie consumption but at the same time the overall population has weight increase.⁶³ They conclude that

1. Calorie intake is being underestimated by national survey. Estimation from Doubly Labelled Water energy expenditure measurement shows consumption level is 30-50% more than calorie level reported in official statistics.

2. Even though there's a declination in physical activity, it doesn't provide a good enough explanation for the significantly weight gain

3. There are increasing numbers of surveys with under-report calorie intake.

The same phenomenal is also being observed in USA^{64,65} and South Korea⁶⁶

2.11 Sleep Duration and Obesity

In epidemiological studies the majority conclude that there's a significant relationship between short sleeping time (generally less than six hours per night) and increased likelihood of being obese.^{67,68,69,70}

There's a meta-analysis comprised of 18 studies of 604,509 adult population shows that less than 5 hours of sleep has an odds ratio of being obese at 1.55 (1.43-1.68 with $P < 0.0001$) and for each additional hour of sleep, the BMI decreased by 0.35 kg/m².⁷¹

2.12 Marital Status and Obesity

There are contrasting results of studies on the association of marital status and obesity. Many studies showed a positive relation^{72,73,74,75}, while some researches show no relation^{76,77,78}, or even negative relation^{79,80}, or different relation for different gender.^{81,82,83}

2.13 Underlying Diseases, Medication, and Obesity

Some endocrine system diseases can be the cause of obesity such as when adrenal cortex secretes too much corticosteroid hormones, resulting in Cushing syndrome collecting the lipid in the body, Hypothyroidism decreases the metabolism resulting in the body collecting more lipid. Furthermore some medication such as contraceptive pills and injectable birth control and long exposure to steroid drugs can induce food appetite.⁸⁴

CHAPTER III: RESEARCH METHODOLOGY

3.1 Research Design

This research's design is descriptive Cross-sectional Study from data collected in 2018 to serve its purpose of finding the relation at one point of the time.

3.2 Study Area

The study area is MOPH's hospitals in regional health no.8 which is selected because it has highest proportion of population to dentist ratio by network health service by Report on Public Health Resource 2013.

Table 3: Population to dentist ratio in each regional health

Regional Health no.	population to dentist ratio (2013)
Bangkok	2,932
1	7,579
2	10,791
3	11,677
4	8,515
5	8,436
6	8,543
7	10,800
8	15,444
9	14,850
10	14,821
11	9,736
12	8,940
Overall	8,395

In regional health no.8 data can be further breakdown into province from the data of the same year as followed.

Table 4: Number of dentist in each province in regional health no.8

Province	population to dentist ratio (2013)	Number of dentist from regional health database
BungKarn	14,801	19
Loei	13,146	62
Nong Khai	13,172	42
Province	population to dentist ratio (2013)	Number of dentist from regional health database
Nong Bua Lamphu	15,336	32
Udon Thani	16,428	87
Nakhon Phanom	15,098	54
Sakon Nakhon	17,684	69
Overall	15,444	365 Sum

แผนที่แสดงการจัดพื้นที่ในความรับผิดชอบของ สปสช. เขตทั้ง 13 เขต ครอบคลุมทั่วทุกภูมิภาคของประเทศ

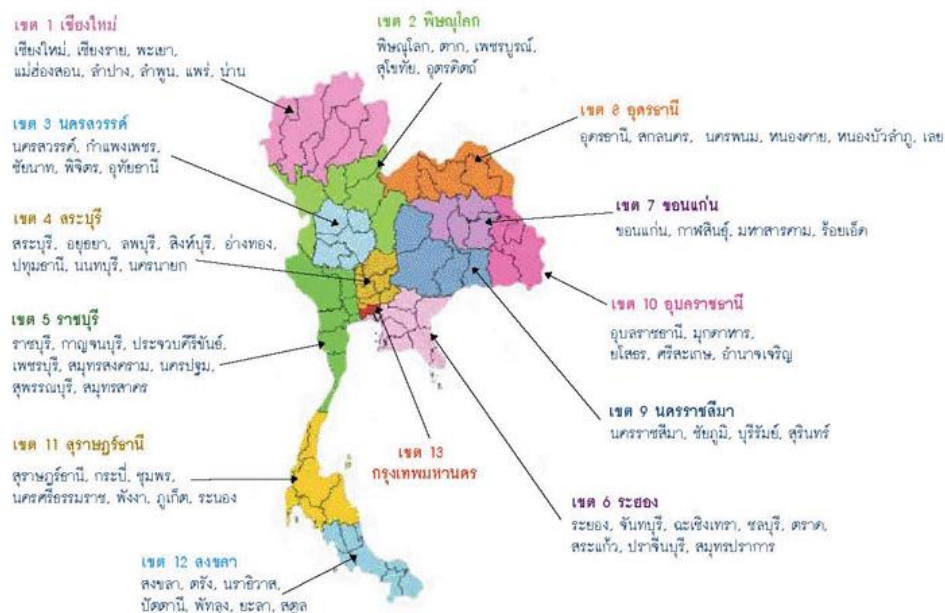


Figure 1: Map of Regional Health in Thailand (source: National Health Security Office)

3.3 Study Population

All active MOPH dentists in Regional Health no.8 area which has Udon Thani, Nongkhai, Nong Bua Lamphu, Nakhon Phanom, Sakon Nakhon, Bueng Kan, and Loei. Database currently list 365 dentists in this area.

เขตบริการสุขภาพที่ 8 ประกอบด้วย 7 จังหวัด ตั้งอยู่ภาคตะวันออกเฉียงเหนือตอนบน ได้แก่ อุดรธานี สกลนคร นครพนม เลย หนองบัวลำภู หนองคาย และบึงกาฬ ประกอบไปด้วย 89 อำเภอ 644 ตำบล 7,430 หมู่บ้าน 1,438,965 หลังคาเรือน ในปี 2556 มีประชากรทั้งสิ้น 5,491,263 คน แยกเป็นชาย 2,745,534 คน หญิง 2,745,729 คน



Figure 2: General Information of Regional Health no.8 (source: R8WAY AQES Executive Summary 2557)

The exclusion criteria are as followed

1. Not willing to participate
2. Not working on dental unit at least once in the past month

3.4 Sampling Technique

This study will use the whole eligible population with inclusion and exclusion criteria

3.5 Sample and Sample Size

The sample of this research is calculated by using Taro Yamane (Yamane, 1973) formula with 95% confidence level.

$$n = N / (1 + Ne^2)$$

Where

n = corrected sample size, N = population size, and e = Margin of error (MoE), $e = 0.05$ based on the research condition.

Population “All dentists in Regional Health no.8 area” was selected as potential participants. From the formula above the sample size needed are 191 out of 365 dentist population. However, since this is self-reported survey there might be incomplete questionnaire as many as 45% (164 sample) according to French E3N Cohort. To compensate for missing value, sending questionnaires to all eligible participants is the selected method, the number of usable questionnaires should be at least 191 forms.

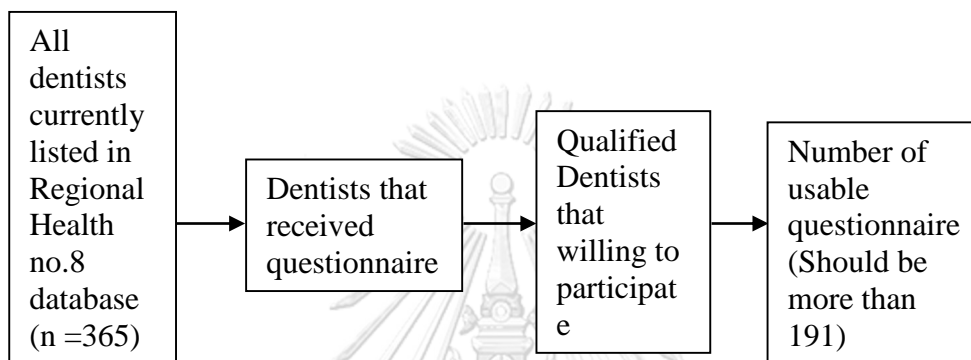


Figure 3: Sample inclusion and exclusion

3.6 Instruments

Components of Questionnaires, all parts except body measurement part are self-reported. All questionnaires will be translated to Thai

3.6.1 Sociodemographic Questions

This part comprised of four questions below for participants (dentist) to answer

1. Age (self-inserted number) Age expressed as the number of birthday anniversaries passed on the date of reference. As it is the same as the number of completed years lived by a person, it is also referred to as "age in completed years"
2. Sex (select from Male and Female) Legal Gender, Miss and Mrs classified as Female
3. Income (self-inserted number) money that is earned by test participant, average of the last three months in Baht
4. Workplace Province select from the list comprise of Udon Thani, Nongkhai, Nong Bua Lamphu, Nakhon Phanom, Sakon Nakhon, Bueng Kan, and Loei.

3.6.2 Body Measurement Part

This part is meant for hospital staff and will comprised of sections as followed

1. Weight (in kilogram with one decimal fraction)

2. Height (in centimeter with one decimal fraction)

3. Waist Circumference (in centimeter with one decimal fraction)

Measurement technique will be add to the recommendation part for hospital staff that will measure for dentists

3.6.3 Physical Activity

This study will use questionnaire and the analyze method that is identical to Global Physical Activity Questionnaire (GPAQ) Analysis Guide, version 2, in Thai language

3.6.4 Sleeping duration

There is no standard questionnaire for asking sleep duration, though most survey falls into 2 types, asking only average sleep duration in overall, and asking average sleep duration in weekend and weekday. The average sleeping time in single question is significantly shorter than average from weekend/weekday (7.03 hours vs. 7.28 hours).⁸⁵ Though both types are significantly different from sleep diaries.⁸⁶ For this study will use questions from “Sleepiness measurement and quality of sleep questionnaire” by Ramathibodi Hospital Sleep Disorder Center, Mahidol University which ask sleeping duration in both weekend and weekday.

3.6.5 Smoking

WHO Framework Convention on Tobacco Control introduce MPOWER, suggesting that all surveys that measure tobacco use should have three following questions

Q1. Current Tobacco Smoking Status

Do you currently smoke tobacco on a daily basis, less than daily, or not at all?

Daily -> End section

Less than daily -> Ask Q2a

Not at all -> Ask Q2b

Q2a. Past Daily Smoking Status

Have you smoked tobacco daily in the past?

Choices: Yes, No, Don't Know

Q2b. Past Smoking Status

In the past, have you smoked tobacco on a daily basis, less than daily, or not at all? If respondent has done both “daily” and “less than daily” in the past, check “daily”

Choices: Daily, Less than Daily, Not at All, Don’t Know

These questions have following indicator

1. Current Tobacco Smokers
2. Current Daily Tobacco Smokers
3. Former Daily Tobacco Smokers (Among All Adults)
4. Former Daily Tobacco Smokers (Among Ever Daily Smokers)

Daily means smoking at least one tobacco every day or almost every day in a month or more. If tried only once or twice in lifetime should be counted in ‘Not at All’ choice. ‘Don’t Know’ responses are not present to participant and excluded from calculation.

This study will use these questionnaire translated to Thai language by Bureau of Tobacco Control, Department of Disease Control, Ministry of Public Health Thailand.

3.6.6 Alcohol drinking

For alcohol consumption this study will use an official Thai translated WHO Alcohol Use Disorders Identification Test: Self Report Version. The AUDIT score interpretation is as follow:

0-7: Low risk drinker

8-15: Hazardous drinker

16-19: Harmful use

More than 20: Alcohol dependence

3.6.7 Stress

For this study, ST5 questionnaire by Department of Mental Health, Thailand will be used as follow

Introduction

Stress can occur to anyone. The causes of stress are many, such as insufficient income, debt, disaster, or sickness. Stress can be both benefit and detriment. If there’s too much

stress it'll worsen your body and your mind. Please self-evaluate by choosing 0-3 score that represent you.

0 score means almost never

1 score means sometimes

2 score means usually

3 score means always

Table 5: ST5 questionnaire

No.	Symptom or feeling that occur in the past 2-4 weeks	Score			
		0	1	2	3
1	Sleeping problem, can't sleep or sleeping too much				
2	Less focus				
3	Anxiety				
4	Bored				
5	Don't want to meet people				

Interpretation

Score 0-4 = Low stress

Score 5-7 = Moderate stress

Score 8-9 = High stress

Score 10-15 = Highest stress

3.6.8 Food Consumption Behavior

This survey will use "Food consumption and physical activity questionnaire" by Bureau of Health Promotion, Ministry of Public Health, Thailand. Questions in used are no.1- no.14 as questions no.15 – no.20 are not about food consumption. Always equal 5 scores, Sometimes is 3 while Never is 0. The score interpretation is as follow:

100% (70 scores): Very good food consumption behavior

80-99% (56-69 scores): Good food consumption behavior

60-79% (42-55 scores): Normal food consumption behavior

Less than 60% (41 scores or less): Food consumption behavior need improvement

3.6.9 Dentist Workload

As there's no standardized questionnaire on dentist workload, the researcher is adapting questions from survey of Utah Dentist Workforce, 2015 - Utah Medical Education Council, Iowa⁸⁷, and ADA, with change in specific type of work according to specialty categorized by Guideline of Oral Diagnosis 2016, Chiangmai University.

There will be three type of workload asked in the questionnaire: Perceive workload, average patient per time, and average working time. To compare with other studies mentioned in review literature, only average working time is the main indicator in this study. Perceive workload and average patient per time will be used as descriptive or alternative evidence.

Perceived workload will ask on what dentist feel in the past 12 months using 5 levels (U of Iowa Public Policy Center)

1. Too busy to treat all requesting appointments
2. Provided care to all requesting it, but felt overworked
3. Provided care to all requesting it, but did not feel overworked
4. Not busy enough, would have liked more patients
5. Practice limited, no new patients taken

Amount of workload will ask in the past 12 months, what is the dentist's average working hour and patient per day and week. In overall, and in according to specialty categorized by Guideline of Oral Diagnosis 2016, Chiangmai University. The 'other' category will only ask average working hour. The following is type of treatment plan according to the guideline.

1. Surgery (treating many diseases, injuries and defects in the head, neck, face, jaws and the hard and soft tissues of the oral and maxillofacial region)
2. Periodontics (focuses on supporting structures of teeth, as well as diseases and conditions that affect them)
3. Orthodontics (deals primarily with malpositioned teeth and the jaws)

4. Prosthetics (focuses on dental prostheses)
5. Endodontics (study and treatment of the dental pulp)
6. Filling (diagnosis and integrated management of diseases of the teeth and their supporting structures)
7. Other (dental workload that does not fall into any of the above categories)

The treatment plan guideline also includes X-ray, Surgical Pathology and Prophylaxis. X-ray and Surgical Pathology won't be included into questionnaire because they're part of diagnosis, not treatment, and Prophylaxis is part of Periodontics^{88,89}

So the questionnaire will be

Perceived Workload

In the past 12 months what do you feel about your workload

1. Too busy to treat all requesting appointments
2. Provided care to all requesting it, but felt overworked
3. Provided care to all requesting it, but did not feel overworked
4. Not busy enough, would have liked more patients
5. Practice limited, no new patients taken

Amount of workload

In the past 12 months

What is your average working hour per week?

What is your average patient per week?

What is your average day-off per week?

What is your average surgery / Periodontics / Orthodontics / Prosthetics / Endodontics / Filling / Others working hour per week? (separate)

What is your average surgery / Periodontics / Orthodontics / Prosthetics / Endodontics / Filling patient per week? (separate question)

To reflect with review literature that working in shift work might related to obesity, all of these set of questions will be ask two times, one in an in-office hours, and another one in private practice/shift work outside office hours.

3.7 Validity

Table 6: Questionnaire Standard

Questionnaire part	Standard
Physical Activity	WHO GPAQ Thai version
Alcohol Drinking	WHO Audit Thai version by WHO
Tobacco Smoking	WHO MPOWER Thai version by Bureau of Tobacco Control
Sleeping Duration	Ramathibodi Hospital Sleep Disorder Center, Mahidol U
Food Consumption	Bureau of Health Promotion

Dental workload questionnaire part was adapted from ADA, Iowa, Utah, Guideline of Oral Diagnosis 2016, Chiangmai University. It was consulted with:

1. Assoc. Prof. Ratana Somrongthong, Ph.D. College of Public Health, Chulalongkorn University
2. Pirunee Sappaso, M.D., Diploma of the Thai Board of Family Medicine
3. Kittipun Janthawongunsak, D.D.S.

The IOC (Index of item objective congruence) calculated from those three are 1.0 overall with every questions (10 items) score 1.0.

3.8 Reliability

All questionnaire parts used standard questionnaire except the dental workload part. The dental workload questions were conducted a pilot test using 30 participants that have similar setting as the target population but are actually outside target population (MOPH's dentists in other regional health).

Cronbach's alpha of overall items in dental workload part is 0.828, which can be interpreted as 'Good' from the table follow:

Table 7: Cronbach's Alpha Interpretation (Source: George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon)

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.9 Data Collection

The questionnaires will be sending out to all eligible participants' hospitals by Thai EMS postal by author. Every questionnaires will include an empty envelope with stamp so that it will be sent back to researcher without requiring participants to pay for the mailing fee. Normally the hospital staffs will be the one who will put the envelope to post box as they'll be the one who help measuring participant in the last section as stated in the instruction box with author's contact info but the author doesn't object if participants will be the one who send the letter themselves.

In case there's lack of participants below the statistic threshold the author will create an awareness of this study in LINE Messenger group that exclusively feature dentists in regional health no.8 and encourage everyone that receive the questionnaire to participate and send the form back and resend the form if any participant inform the author that they haven't receive the questionnaire yet. If the feedback still doesn't well received the author will make a telephone call to health staff segment of hospital that hast low ratio of survey's sent back.

If the collection period is over and participant number is still lower than minimum requirement the author will ask thesis's advisor to extend the deadline over a period of time. After all samples complete the survey or reaching the dateline, the researcher will type data into SPSS 17 database. GPAQ data will be cleaned with EpiInfo.

3.10 Data Analysis

All data will be type into database and label accordingly to its original content directly in SPSS 17 and will be analyzed using many functions from the program. P-value of 0.05 as standard statistical significant for this research

The thesis paper will be made in Microsoft Office Word 2007 with EndNote X6 to tag reference and citation. For descriptive part, this study will use mean, s.d., percentile, range on age, income, weight, sleeping duration, height, BMI, waist circumference, amount of workload with proportion for classified BMI, waist circumference, classified level of physical activity, smoking status, workplace province, stress, alcohol drinking status.

The factors and their scale of measurement are shown as below

Table 8: Scale of measurement of factors

Independent factors	Scale of measurement
Sex	Nominal Scale (Male/Female)
Age	Continuous Variable
Income	Continuous Variable or Nominal Scale by quartile
Physical Activity classification	Nominal Scale (Physically active/inactive) or (Light/Moderate/High)
Sleeping duration in workday	Continuous Variable
Sleeping duration in non-workday	Continuous Variable
Stress	Nominal Scale (Low/Moderate/High/Highest)
AUDIT score	Discrete Variable
AUDIT interpretaion	Nominal Scale (4 levels)
Workplace Province	Nominal Scale (7 provinces)
Independent factors	Scale of measurement

Current Tobacco Smoking Status	Nominal Scale (Daily/ Less than Daily/ Not at All)
Past Daily Smoking Status	Nominal Scale (Yes/No)
Past Smoking Status	Nominal Scale (Daily/ Less than Daily/ Not at All)
Food consumption behavior interpretation	Nominal Scale (4 levels)
Perceived workload (In/Out office hours)	Nominal Scale
Overall average working hour per week (In/Out office hours)	Continuous Variable
Overall average patient per week (In/Out office hours)	Continuous Variable
Overall average day-off per week	Continuous Variable
Specialty average working hour per week (7 factors) (In/Out office hours)	Continuous Variable
Food consumption behavior score	Discrete Variable
Specialty average patient per week (6 factors) (In/Out office hours)	Continuous Variable
Dependent factors	Scale of measurement
Weight	Continuous Variable
Height	Continuous Variable
BMI	Continuous Variable
BMI classification	Nominal Scale
Waist circumference	Continuous Variable
Waist circumference classification of abdominal obesity	Nominal Scale

BMI and Waist circumference will be the main dependent factors for finding a relationship with independent factors, and will be tested for assumptions before using each statistic methods. In the table below, the first line show that this method will be

used if the data fulfil its assumptions, such as normal distribution of the data. The second line will be the alternative methods if one or more assumptions has breached.

Table 9: Statistics implementation

Factor	BMI (continuous)	Waist Circumference (continuous)
Sex (2 Categories)	Independent Sample T-Test Mann–Whitney U test	Independent Sample T-Test Mann–Whitney U test
Age (Continuous)	Pearson Spearman	Pearson Spearman
Province (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Income	Pearson Spearman	Pearson Spearman
Physical Activity level (2 Categories)	Independent Sample T-Test Mann–Whitney U test	Independent Sample T-Test Mann–Whitney U test
Sedentary Time (Continuous)	Pearson Spearman	Pearson Spearman
Smoking Status (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Sleeping Duration (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Stress (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Food Consumption Behavior level (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis

Perceived Workload (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Offday per week (>2 Categories)	One-way ANOVA Kruskal–Wallis	One-way ANOVA Kruskal–Wallis
Workload (Continuous)	Pearson Spearman	Pearson Spearman

Statistically significant at <0.05

Table 10: : correlation interpretation from Hinkle, Wiersma, & Jurs (2003). *Applied Statistics for the Behavioral Sciences* (5th ed.).

Size of Correlation	Interpretation
± 0.90 to 1.00	Very high positive (negative) correlation
± 0.70 to 0.90	High positive (negative) correlation
± 0.50 to 0.70	Moderate positive (negative) correlation
± 0.30 to 0.50	Low positive (negative) correlation
± 0.00 to 0.30	Little if any correlation

3.11 Ethical Consideration

3.11.1 Consent

Obtaining the consent of a person to participate in research is plainly important. Consent functions as a protection for participants, ensuring that they are never subject to research which they don't want. Typically, in fulfillment of consent, potential participants need to be adequately informed about what is proposed. This means writing an information sheet for participants which is clear, fully states the purpose of the research as well as what the information is to be used for. Other information may include how data is to be stored, and for how long. Furthermore, participants are assured that they can withdraw their consent at any point in the research, without the need to give any reason, and without any penalty or come back.

3.11.2 Confidentially

The participant is assured that only those actually taking data will get to know who the data came from, that the data will be kept hidden away from others, and that no third party (such as a statistician or the reader of a journal) will be able to connect the data with an individual participant. Efforts to protect confidentiality are understood to continue throughout the period of data collection and analysis, presentation and final storage and destruction. (Universities and professional associations may demand a storage period of raw data of a number of years.)

3.11.3 Protocol

Before proceeding to the question part, subject has to read and accept term and condition. Even after that, they're free to cancel the survey anytime; their data (with previous answered questions) will not be included into the study. The researcher get an approval from ethic boards of Kasetsart University Chalermpkrakiat Sakonnakhon Province Campus.

3.11.4 Declaration of Relationship to Participants

The researcher is one of the participants according to the study population and inclusion/exclusion criteria. To prevent the unwanted potentially biased data, the researcher will excluded himself from participate in this study.

3.12 Budget

Table 11: Budget Table

Cost	Baht
Ethic Committee Approval	500
Poster Presentation	2,000
Questionnaires and envelopes for 466 dentists	4,660

3.13 Timetable

Table 12: Timetable

Activity	Date
Literature Review	May-October 2017
Developing Proposal	October 2017-January 2018
Proposal Examination	29 January 2018
Ethical Process	May 2018
Collecting Sample	June 2018
Analyze Data	June 2018
Thesis Examination	20 July 2018
Revise for Publish	August 2018

CHAPTER IV: RESULTS

After obtaining ethical approval from Kasetsart University, Sakon Nakhon Campus no. KUCSC.HE-61-007 and sent questionnaire to all eligible participant during June 2018. 209 participants sign the approval to participate and send the form back to researcher.

4.1 Sociodemographic characteristics

The majority of participants that sent questionnaires back are female (56.5%) and male has slightly below that (43.5%). With age group 20-29 has more than half of the sample (52.6), follow by 30-39 age group (23.9%), 40-49 age group (18.2%), and lastly 50-59 age group (5.3%). The average age of this study is 32.78 years with SD of 7.98. The minimum age in this group is 24 years old and the maximum age is 57 years old (3 years before retirement age of civil servant). Sakon Nakhon and Nongkhai send back the most questionnaire (each 17.2%) follow by Udon Thano (15.3%), Nong Bua Lamphu (13.9%) and lastly Nakhon Phanom and Bueng Kan (each 11.5%). For Income, group with income 25,001-50,000 is plurality group with 44%, follow by group with income 75,001-100,000 (23%), 50,001-75,000 (22.5%), more than 100,000 (7.7%), and lastly 25,000 or less (2.9%). The average income is 67,761 baht per month with SD of 37798.155. The person with the lowest income received 24,000 baht per month while the person that has the highest income received ten times of that (240,000).

Table 13: Distribution of respondents by sociodemographic characteristics

Characteristics	Number (n=209)	Percent
Sex		
Male	91	43.5
Female	118	56.5
Age		
20-29	110	52.6

30-39	50	23.9
40-49	38	18.2
50-59	11	5.3
Province		
Udon Thani	32	15.3
Nong Bua Lamphu	29	13.9
Sakon Nakhon	36	17.2
Loei	28	13.4
Nongkhai	36	17.2
Nakhon Phanom	24	11.5
Bueng Kan	24	11.5
Income		
≤25,000	6	2.9
25,001-50,000	92	44.0
50,001-75,000	47	22.5
75,001-100,000	48	23.0
>100,000	16	7.7

4.2 Health-related behaviors

Dentists in this study are mostly doing physical activity enough to meet WHO Recommendation (68.4%) with only 31.6% don't meet the cut point of 600 MET. The average MET, however, is 1451.58 with an SD of 1079.096. Dentist with lowest MET spend has only 180, less than half of what's recommended, while dentist with highest MET has 3,600, six times of the recommendation cut point. For sedentary time, the average is 154.71 minutes with an SD of 131.088. The dentist that spend least sedentary time has only 10 minutes while dentist that spend the most sedentary time has 800 minutes or more than 13 hours. No dentist is the currently active smoker, however 4.8% of dentists were the past smokers that used to smoke less than daily. All dentists in this study are low risk drinker. Dentists in this study have an average of 6.79 hours of sleep per day in working day with an SD of 1.007. Dentist with least sleeping duration on working day has 5 hours of sleep while the most sleeping duration on working day has 10 hours of sleep. More than two third majority of dentists have enough sleeping duration according to national sleeping foundation with 7-9 hours (68.4%) and the rest

(31.6%) has 6 hours of less sleeping duration per working day .On off-day, the average sleeping hour increased to 7.68 hours per day with an SD of 1.175. The minimum sleeping duration is 5 hours while the maximum is 10 hours in off-day. More than two third majority of dentists have enough sleeping duration according to national sleeping foundation with 7-9 hours (79%) while dentist that sleep 6 hours or less and 10 hours or more have the same number (each 10.5%). 63.2% of dentist in this study have low level of stress and 36.8% of dentist have moderate level. No dentist score ST-5 part with high or highest level of stress. For food consumption, more than half of dentist have normal level of food consumption behavior (52.2%), follow by good level of behavior (45.5%). 2.4% of dentist need improvement on food consumption behavior. No dentist has perfect score (very good level) of food consumption behavior.

Table 14: Distribution of respondents by Health-related behaviors

Behaviors	Number (n=209)	Percent
Physical Activity		
<600 MET (Not Enough)	66	31.6
≥600 MET (WHO Enough)	143	68.4
Current Smoking		
Daily	0	0.0
Less than Daily	0	0.0
Not at All	209	100.0
Past Smoking		
Daily	0	0.0
Less than Daily	10	4.8
Not at All	199	95.2
Alcohol Drinking		
Low Risk Drinker	209	100.0
Hazardous Drinker	0	0.0
Harmful Use	0	0.0
Alcohol Dependence	0	0.0

Sleeping hour in Workday		
≤6	66	31.6
7-9	143	68.4
≥10	0	0.0
Sleeping hour in Off Day		
≤6	22	10.5
7-9	165	79.0
≥10	22	10.5
Stress		
Low	132	63.2
Moderate	77	36.8
High	0	0.0
Highest	0	0.0
Food Consumption		
Very Good	0	0.0
Good	95	45.5
Normal	109	52.2
Need Improvement	5	2.4

4.3 Body measurement and Obesity

The average weight of dentist in this population is 60.23 kg with an SD of 13.86. The lightest dentist weighted 42.3kg while the heaviest dentist weighted 110kg. The average height of dentist is 163.83cm with an SD of 8.08. The average BMI is 22.237 with an SD of 3.528. The dentist with least BMI has 17.9 while dentist with most BMI has 34.72. More than half of the dentists have normal BMI classification (57.4%), follow by 20.6% that are Obesity class 1, 10% are underweight, 8.6% are pre-obese and 3.3% are obesity class 2. The average waist circumference is 75.69cm with an SD of 11.53. Waist circumference range from 59 to 102. 88.5% of dentist have normal waist circumference while 11.5% have abdominal obesity.

Table 15: Distribution of respondents by Health-related behaviors

Characteristics	Number (n=209)	Percent
BMI Classification		
Underweight	21	10
Normal	120	57.4
Pre-obese	18	8.6
Obesity Class 1	43	20.6
Obesity Class 2	7	3.3
Waist Circumference Classification		
Normal	185	88.5
Abdominal Obesity	24	11.5

4.4 Workload Characteristics

Dentist in this study have only either 1 or 2 day off per week. 51.7% have 1 day off while 48.3% have 2 days off. For perceived workload in an office hour, dentists answer 'Provided care to all requesting it, but did not feel overworked' the most (52.6%) followed by 'Provided care to all requesting it, but felt overworked' at 28.2%, 'Too busy to treat all requesting appointments' at 13.4%, 'Practice limited, no new patients taken' at 3.8% and 'Not busy enough, would have liked more patients' at 1.9%. For perceived workload outside office hour 'Provided care to all requesting it, but did not feel overworked' are still the most selected answer with 52.6% (the same as in office hour), follow by 'Provided care to all requesting it, but felt overworked' at 15.8%, 'Practice limited, no new patients taken' at 13.4%, 'Too busy to treat all requesting appointments' at 10%, and lastly 'Not busy enough, would have liked more patients' at 8.1%

Table 16: Distribution of respondents by Workload Characteristics

Characteristics	Number (n=209)	Percent
Off day per week		
1	108	51.7
2	101	48.3

Perceived Workload in Office Hour

Practice limited, no new patients taken	8	3.8
Not busy enough, would have liked more patients	4	1.9
Provided care to all requesting it, but did not feel overworked	110	52.6
Provided care to all requesting it, but felt overworked	59	28.2
Too busy to treat all requesting appointments	28	13.4

Perceived Workload outside Office Hour

Practice limited, no new patients taken	28	13.4
Not busy enough, would have liked more patients	17	8.1
Provided care to all requesting it, but did not feel overworked	110	52.6
Provided care to all requesting it, but felt overworked	33	15.8
Too busy to treat all requesting appointments	21	10.0

For working time, the average working time in an office hour in this study is 31.56 hours per week with an SD of 11.81. Dentist that has least working time has only 4 hours while the most have 50 hours per week. For outside office hour, the average working time is 8.43 hours per week with and SD of 7.75. There are dentist that don't perform outside office hour (0 hours per week) while the most perform 35 hours per week. For number of patient, the average patient in an office hour in this study is 41.77 patients per week with an SD of 17.75. There are dentist that don't have patient even in an office hour while the most have 80 patients per week. For outside office hour, the average patient is 11.4 patients per week with and SD of 13.47. There are dentist that don't perform outside office hour (0 patient per week) while the most have 60 patients per week. For surgical treatment the average time is 13.51 hours per week with an SD of 11.67 (range 0-40), the average patient is 20.61 patients per week with an SD of 18.98 (range 0-80). For orthodontic treatment the average time is 0.76 hours per week with an SD of 2.67 (range 0-14), the average patient is 0.46 patients per week with an SD of 1.53 (range 0-8). For periodontic treatment the average time is 6.83 hours per week with an SD of 6.35 (range 0-24), the average patient is 9.94 patients per week with an SD of 8.43 (range 0-30). For prosthetic treatment the average time is 6.24 hours per week with an SD of 5.56 (range 0-25), the average patient is 6.70 patients per week with an SD of 7.67 (range 0-35). For endodontic treatment the average time is 2.63

hours per week with an SD of 2.49 (range 0-10), the average patient is 2.08 patients per week with an SD of 1.88 (range 0-10). For operative treatment the average time is 7.1 hours per week with an SD of 5.77 (range 0-27), the average patient is 11.22 patients per week with an SD of 7.89 (range 0-30). The average unclassified other type of work is 7.1 hours per week with an SD of 8.54 (range 0-35).

Table 17: Average workload with Std. Deviation in brackets.

Type of Work	Number of Patients		Time (Hours)	
	In Office Hour	Out Office Hour	In Office Hour	Out Office Hour
Overall	Overall 53.17 (26.57)		Overall 39.99 (15.47)	
	41.77 (17.75)	11.40 (13.47)	31.56 (11.81)	8.43 (7.75)
Surgery	18.07 (16.40)	2.54 (4.53)	11.47 (10.55)	2.04 (2.91)
Periodontal	7.21 (6.11)	2.73 (4.41)	4.45 (3.99)	2.38 (3.05)
Orthodontics	0.38 (1.33)	0.08 (0.44)	0.38 (1.33)	0.38 (1.33)
Prosthetics	4.64 (3.77)	2.06 (4.65)	4.85 (3.81)	1.40 (2.57)
Endodontics	1.28 (1.00)	0.79 (1.17)	1.53 (1.64)	1.10 (1.58)
Operative	8.23 (6.35)	3.00 (4.31)	5.09 (4.43)	2.00 (4.31)
Other			5.16 (7.14)	1.95 (3.10)

4.5 Association between Sociodemographic Characteristics and BMI and Waist Circumference

Male has BMI Mean Rank 147.06 which is statistically significant higher than Female which is 72.56 (p-value<0.001). Male also has Waist Circumference Mean Rank 155.31 which is statistically significant higher than Female which is 66.20 (p-value<0.001).

Age has statistically significant little positive correlation to BMI (+0.254 with p-value<0.001) and Waist Circumference (+0.178 with p-value=0.010).

Nakonphanom has the highest BMI mean rank (117.10) followed by Buengkarn (113.58), Nongkai (105.35), Sakonnakhon (104.56), Loei (103.52), Udonthani (98.88), and Nongbualumpoo (96.19) however the difference is statistically insignificant (p-value=0.878)

Sakonnakhon has the highest Waist Circumference mean rank (114.06) followed by Buengkarn (112.48), Nakonphanom (106.38), Udonthani (104.20), Nongkai (103.28), Nongbualumpoo (98.52), and Loei (95.61) however the difference is statistically insignificant (p-value=0.895)

Income has statistically significant low positive correlation to BMI (+0.350 with p-value<0.001) and little positive correlation to Waist Circumference (+0.243 with p-value<0.001).

Table 18: Association between Sociodemographic Characteristics and BMI and Waist Circumference

Characteristics	BMI Mean Rank	BMI p-value	Waist Circumference Mean Rank	Waist Circumference p-value
Sex				
Male	147.06	<0.001 ^a	155.31	<0.001 ^a
Female	72.56		66.20	
Province				
Nakonphanom	117.10	0.878 ^b	106.38	0.895 ^b
Buengkarn	113.58		112.48	
Nongkai	105.35		103.28	
Sakonnakhon	104.56		114.06	
Loei	103.52		95.61	
Udonthani	98.88		104.20	
Nongbualumpoo	96.19		98.52	

a: Man-Whitney U-Test

b: Kruskal–Wallis H test

Table 19: Correlation between Sociodemographic Characteristics and BMI and Waist Circumference

Characteristics	BMI correlation	BMI p-value	Waist Circumference correlation	Waist Circumference p-value
Age	+0.254	<0.001 ^a	+0.178	0.010 ^a
Income	+0.350	<0.001 ^a	+0.243	<0.001 ^a

a: Spearman's Rho

4.6 Association between health-related behavior and BMI and Waist Circumference

Dentists with sufficient physical activity have higher BMI mean rank (110.47) than insufficient physical activity (93.15) but they're not statistically significant (p-value=0.054) and dentist with sufficient physical activity also have higher waist circumference mean rank (109.74) than insufficient physical activity (94.73) but they're also not statistically significant (p-value=0.094)

Sedentary time has statistically significant (p-value<0.001) little negative correlation to BMI (-0.228) and waist circumference (-0.256)

Dentists that answer 'less than daily' in past smoking have higher BMI mean rank (158.00) and Waist Circumference (141.25) than answer 'Not at all' BMI mean rank (102.34) waist circumference (103.18) but it's only statistically significant in BMI (p-value=0.005), not Waist Circumference (p-value=0.051). There's no active smokers among dentist in this study.

Insufficient sleep hour is statistically significant related to higher BMI mean rank than recommended duration in both workday (134.85 vs 91.22 p-value<0.001) and day-off (126.91 vs. 99.59 p-value=0.039) and also related to higher waist circumference in both workday (149.80 vs. 84.32 p-value<0.001) and day-off (146.50 vs. 100.62 p-value=0.003)

Low stress has statistically significant higher mean rank BMI (111.55) than moderate (93.78) (p-value=0.040), low stress also has higher mean rank waist

circumference (105.42) than moderate (104.27) however it's not statistically significant (p-value=0.894)

For BMI Mean rank dentist with bad food consumption behavior is lower (66.80) than normal (100.39) and good (112.30) though it's not statistically significant (p-value=0.134). For waist circumference dentist with good food consumption behavior is lower (97.74) than normal (110.74) and bad (117.90), though it's also not statistically significant (p-value=0.272)

Table 20: Association between health-related behavior and BMI and Waist Circumference

Behavior	BMI Mean Rank	BMI p-value	Waist Circumference Mean Rank	Waist Circumference p-value
Physical Activity				
Enough	110.47	0.054 ^a	109.74	0.094 ^a
Not Enough	93.15		94.73	
Past Smoking Status				
Less than Daily	158.00	0.005 ^a	141.25	0.051 ^a
Not at all	102.34		103.18	
Working Day Sleeping Duration				
5-6 hours	134.85	<0.001 ^a	149.80	<0.001 ^a
7-9 hours	91.22		84.32	
Off Day Sleeping Duration				
5-6 hours	126.91		146.50	
7-9 hours	99.59	0.039 ^b	100.62	0.003 ^b
10 hours	124.36		96.39	
Stress				
Low	111.55	0.040 ^a	105.42	0.894 ^a

Moderate	93.78		104.227	
Food Consumption Behavior				
Bad	66.80		117.90	
Normal	100.39	0.134 ^b	110.74	0.272 ^b
Good	112.30		97.74	

a: Man-Whittney U-Test

b: Kruskal–Wallis H test

Table 21: Correlation between health-related behavior (Sedentary Time) and BMI and Waist Circumference

Characteristics	BMI correlation	BMI p-value	Waist Circumference correlation	Waist Circumference p-value
Sedentary Time	-0.228	0.001 ^a	-0.256	0.010 ^a

a: Sperman's Rho

4.7 Association between workload and BMI and Waist Circumference

In perceived workload part, group that answer 'Provided care to all requesting it, but felt overworked' has statistically significant ($p\text{-value} < 0.001$) highest mean rank compare to other group in both BMI (145.24) and waist circumference (136.80) in office hour and waist circumference (134.20) outside office hour, where in BMI mean rank the group 'Practice limited, no new patients taken' is higher (129.20).

Dentists with only 1 day-off per week have higher mean rank BMI (109.62) and Waist Circumference (111.31) than dentists with 2 days-off per week (100.06 for BMI and 98.25 for waist circumference), though both are statistically insignificant (BMI $p\text{-value} = 0.254$ waist circumference $p\text{-value} = 0.117$).

Overall working time (+0.189) and working time in office hour (+0.239) are statistically significant to BMI ($p\text{-value} = 0.006$ and 0.001 only in office hour), though with only little positive correlation. Overall working time is statistically significant ($p\text{-value} = 0.038$) to waist circumference with only little positive correlation (+0.144).

Working time in office hour has moderate negative correlation (-0.530) to waist circumference but it's not statistically significant (p-value=0.448). Overall working time outside office hour is statistically insignificant to both BMI (very high positive correlation, +0.97 with p-value=0.164) and waist circumference (little positive correlation, +0.108 with p-value=0.119)

Overall patient both in and outside office hour have little to low positive correlation to BMI (+0.360 for in office hour, +0.470 for outside) and waist circumference (+0.120 for in office hour, +0.010 for outside), though they're all statistically insignificant (p-value range from 0.497 to 0.987).

In surgery treatment has statistically significant correlation to BMI and waist circumference range from little (number of patient to BMI and waist circumference) to moderate (time use in surgery to waist circumference)

In periodontics it's the only type of work that has statistically significant little negative correlation to BMI. Waist circumference correlations are very high negative but are statistically insignificant.

In both orthodontics and prosthetics they're all have positive correlation to both BMI and waist circumference that are statistically significant, though they're also all only little to low positive correlation.

In endodontics, time use has little negative while number of patient has little positive to BMI, though they're both statistically insignificant. But they both have little positive correlation to waist circumference that are also statistically significant.

In operative dentistry they're all have statistically significant little to low positive correlation to BMI and waist circumference except in number of pertinent and BMI relationship, where it's statistically insignificant.

Other type of works have statistically significant low positive correlation to BMI and waist circumference.

Table 22: Association between Workload and BMI and Waist Circumference

Behavior	BMI Mean Rank	BMI p-value	Waist Circumference Mean Rank	Waist Circumference p-value
Perceived Workload in Office Hour				
Too Busy	76.66		120.32	
Treat All Felt Overworked	145.24		136.80	
Treat All Not Overworked	96.18	<0.001	91.62	<0.001
Not Busy Enough	40.88		45.63	
No Patient	60.81		30.50	
Perceived Workload outside Office Hour				
Too Busy	70.93		118.26	
Treat All Felt Overworked	125.88	<0.001 ^b	134.20	<0.001 ^b
Treat All Not Overworked	100.82		91.41	
Not Busy Enough	93.76		86.03	
No Patient	129.20		125.55	
Offday per week				
1	109.62	0.254 ^a	111.31	0.117 ^a
2	100.06		98.25	

a: Man-Whittney U-Test

b: Kruskal–Wallis H test

Table 23: Correlation between Workload and BMI and Waist Circumference

Characteristics	BMI correlation	BMI p-value	Waist Circumference correlation	Waist Circumference p-value
Overall Time	+0.189	0.006	+0.144	0.038
Overall Patient	+0.074	0.289	-0.011	0.872
Overall Time in Office Hour	+0.239	0.001	-0.530	0.448
Overall Time outside Office Hour	+0.970	0.164	+0.108	0.119
Overall Patient in Office Hour	+0.360	0.602	+0.120	0.865
Overall Patient outside Office Hour	+0.470	0.497	+0.010	0.987
Surgery (time)	+0.431	<0.001	+0.540	<0.001
Surgery (patient)	+0.262	<0.001	+0.277	<0.001
Periodontics (time)	-0.259	<0.001	-0.910	0.190
Periodontics (patient)	-0.275	<0.001	-0.990	0.153
Orthodontics (time)	+0.189	0.006	+0.411	<0.001
Orthodontics (patient)	+0.193	0.005	+0.363	<0.001
Prosthetics (time)	+0.270	<0.001	+0.363	<0.001

Characteristics	BMI correlation	BMI p-value	Waist Circumference correlation	Waist Circumference p-value
Prosthetics (patient)	+0.255	<0.001	+0.312	<0.001
Endodontics (time)	-0.25	0.721	+0.217	0.002
Endodontics (patient)	+0.061	0.377	+0.272	<0.001
Operative (time)	+0.351	<0.001	+0.279	<0.001
Operative (patient)	+0.167	0.015	+0.052	0.452
Other (time)	+0.423	<0.001	+0.424	<0.001

4.8 Prediction Model

In Multi Linear Regression analysis the independent variables with significant relation to the dependent variable and at least moderately correlate to dependent variable are selected into the analysis. On the first analysis for BMI dependent shows that only sex, stress, sleeping duration on working day, and perceived workload outside office hour significantly tribute to the predicted model (sig<0.05) while past smoking status, sleeping duration on off-work day, and perceived workload in office hour have sig>0.05. For the first analysis for waist circumference dependent shows that only sex, sleeping duration on working day, perceived workload in office hour, and time used in surgery treatment significantly tribute to the predicted model (sig<0.05) while, sleeping duration on off-work day, and perceived workload outside office hour have sig>0.05. The analysis are as followed

Table 24: Prediction Model for BMI and Waist Circumference

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
BMI	0.654	0.428	0.417	2.69518	1.825
Waist Circumference	0.839	0.704	0.699	6.33053	1.672

In BMI Model has $R = 0.654$ which indicate moderate degree of correlation while R square = 0.428 indicate that 42.8% of total variation in dependent variable can be explained by this model. While waist circumference model has $R = 0.839$ which indicate high degree of correlation while R square = 0.704 indicate that 70.4% of total variation in dependent variable can be explained by this model. Both model have Durbin-Watson value within 1.5-2.5 so we can assume that there is no first order linear auto-correlation in our multiple linear regression data.

Table 25: F-ratio of overall BMI regression model

BMI	Sum of Squares	df	Mean Square	F	p-value
Regression	1107.799	4	276.950	38.126	.000
Residual	1481.850	204	7.264		
Total	2589.649	208			

Table 26: F-ratio of overall Waist Circumference regression model

Waist Circumference	Sum of Squares	df	Mean Square	F	p-value
Regression	19477.797	4	4869.449	121.507	.000
Residual	8175.425	204	40.076		
Total	27653.222	208			

Both model show $p\text{-value} < 0.01$ means that they're statistically significant.

Table 27: Estimated model coefficients of multiple regression for BMI

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	33.449	1.011		33.098	.000	31.457	35.442		
Sex	-3.722	.395	-.524	-9.426	.000	-4.500	-2.943	.907	1.103
Sleep Workday	-1.324	.424	-.175	-3.125	.002	-2.160	-.489	.896	1.116
Stress	-1.545	.388	-.212	-3.982	.000	-2.310	-.780	.992	1.008
<u>Perceived Workload</u> Outside Office	-.520	.173	-.160	-3.005	.003	-.861	-.179	.986	1.014

Table 28: Estimated model coefficients of multiple regression for Waist Circumference

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	105.134	2.961		35.511	.000	99.297	110.972		
Sex	-13.021	.996	-.561	-13.079	.000	-14.984	-11.058	.787	1.271
Sleep Workday	-8.400	1.007	-.339	-8.339	.000	-10.386	-6.414	.875	1.143
Perceived Workload Inside Office	1.287	.529	.099	2.432	.016	.244	2.330	.874	1.144
Time used in Surgery Operation	.142	.040	.144	3.532	.001	.063	.221	.874	1.144

Collinearity statistics of both model have tolerance > 0.1 and VIF < 10 show that the multicollinearity is not on the problematic level.

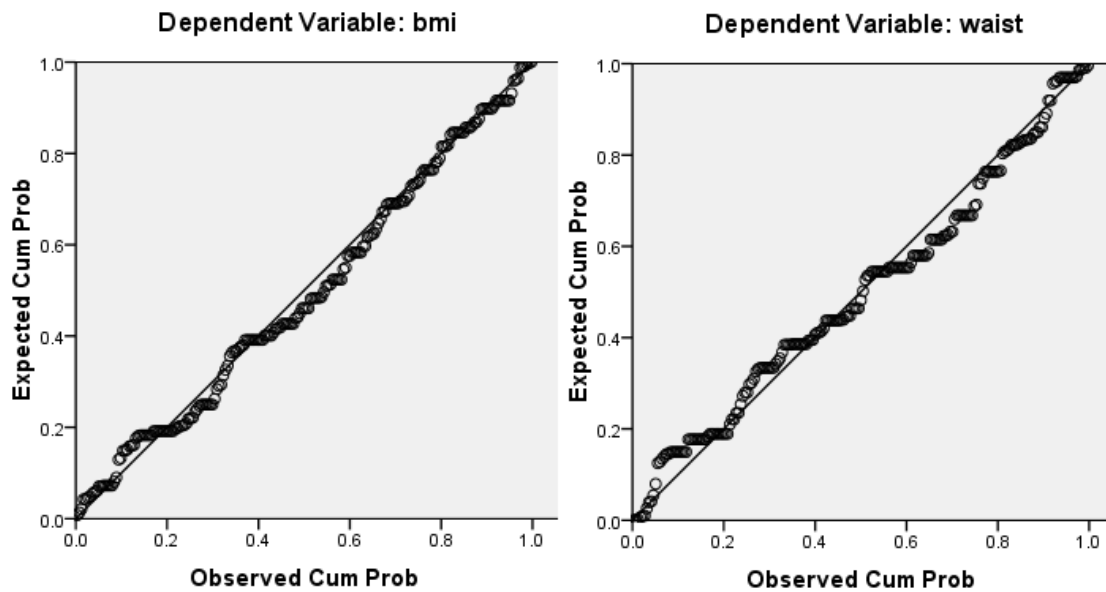


Figure 4: Normal P-P plot of BMI and Waist Circumference

Lastly, normality of residuals with a normal P-P plot was checked. The plot shows that the points generally follow the normal (diagonal) line with no strong deviations. This indicates that the residuals are normally distributed.

The model for BMI is $BMI = 33.449 + (-3.722)(Sex) + (-1.324)(Sleeping\ Duration\ on\ Working\ Day) + (-1.545)(Stress) + (-0.52)(Perceived\ Workload\ Outside\ Office\ Hour)$

The model for Waist circumference is $Waist\ Circumference = 105.134 + (-13.021)(Sex) + (-8.4)(Sleeping\ Duration\ on\ Working\ Day) + (1.287)(Perceived\ Workload\ in\ office\ hour) + (0.142)(hours\ use\ on\ surgery\ patient)$

The valuables are as followed

Sex: Male = 1, Female = 2

Sleeping Duration on Working Day: 5-6 hours per day = 1, 7-9 hours per day = 2.

Stress: Low = 1, Moderate = 2

Perceived Workload In/Outside office hour:

Too busy to treat all requesting appointments = 4

Provided care to all requesting it, but felt overworked = 3

Provided care to all requesting it, but did not feel overworked = 2

Not busy enough, would have liked more patients = 1

Practice limited, no new patients taken = 0

CHAPTER V: CONCLUSION

5.1 Overview

Overweight and obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. BMI and waist circumference are the gold standard for measuring obesity in public health (note: not in medical evaluation) because not only they're easy to measure but according to Waist Circumference and Waist–Hip Ratio: Report of a WHO Expert Consultation, combining BMI with waist circumference give the best result in predicting various diseases. Given that the public become aware of caring healthcare worker's health due to unrelated news on doctor's death from various causes, all link to overwork. It's important to look for a relationship between workload and cause of death for further study to implement policy to regulate healthcare worker's working time, with this research's objective is dedicated to find a link between dentist's workload in Thailand's Regional Health no.8. Primary Objective is to find a relation between dentist's workload and obesity while secondary objective is to find a relation between other independent factors and Obesity.

The study area is MOPH's hospitals in regional health no.8 which is selected because it has highest proportion of population to dentist ratio by network health service by Report on Public Health Resource 2013. Study population are all active MOPH dentists in Regional Health no.8 area which has Udon Thani, Nongkhai, Nong Bua Lamphu, Nakhon Phanom, Sakon Nakhon, Bueng Kan, and Loei. Database currently list 365 dentists in this area. The sample of this research is calculated by using Taro Yamane (Yamane, 1973) formula with 95% confidence level. From the formula above the sample size needed are 191 out of 365 dentist population, to compensate for the chance of missing data as many as 45% according to French E3N Cohort due to the nature of mailed questionnaire the survey was sent to all eligible participants. Dental Workload questionnaire will adapted from ADA, Iowa, Utah, and Royal College of Dental Surgeons of Thailand. Other than that standardized questionnaires from WHO GPAQ, WHO Audit, WHO MPOWER, Ramathibodi Hospital Sleep Disorder Center, Mahidol University, and Bureau of Health Promotion. All questionnaires were sent to

all MOPH hospital within Health Region No.8. There's an envelope with stamp inside each questionnaire's seal bag so that the participant or hospital staff will send back to the author without any fee.

209 participants sent the survey back. Relationship between overall working time and working time in office hour and BMI are only little positive correlation while working time outside office hour and number of patient doesn't significantly related to BMI at all. Completing all request appointment and felt overworked leads to higher chance of being obesity and abdominal obesity. This study could be a supporting evidence if there's an establishment of policy on protecting and improving Thai dentist's quality of life.

5.2 Discussion

5.2.1 Association between Sociodemographic Characteristics and BMI and Waist Circumference

Sex is clearly significant factor with male has more than double mean rank of female, while this is contrary to what Thai National Food Consumption Survey found, it's in the study that find male with higher income has higher chance to be obese and overweight.³⁹ A study that used data from Allied Dunbar National Fitness Survey that recruited 4,316 English healthy people age 16 and over however, has shown that male has statistically significant higher mean BMI than female ($P < 0.001$). [Nevill, A. M., & Metsios, G. S. (2015). The need to redefine age-and gender-specific overweight and obese body mass index cutoff points. *Nutrition & diabetes*, 5(11), e186.] Cross-sectional national survey data from the Third National Health and Nutrition Examination Survey (NHANES III) in nonsmoking people age 20 and over (11,404 total) in the United States also shows that men has median BMI value at 24.5 kg/m² while women has median BMI value at 21.5 kg/m². Moreover, among all underweight samples (21 people), 19 people (90.5%) are female which is in contrast to what NHES 5th edition found that female has 8.6% underweight while male has 10% underweight population.

The result for age association is consistence to what Thai National Health Examination Survey (NHES V) found, that average BMI will increase with age, and

will peak at age group 30-59 and then decrease to the lowest average BMI at age 80 and over. This study, however, doesn't have sample with age over 60 since it's past retirement age. Study with population from healthcare workers in two large academic hospitals in the Boston, USA also show that overweight and obesity increased with age ($p < 0.01$) [Nelson, C. C., Wagner, G. R., Caban-Martinez, A. J., Buxton, O. M., Kenwood, C. T., Sabbath, E. L., ... & Sorensen, G. (2014). Physical activity and body mass index: the contribution of age and workplace characteristics. *American journal of preventive medicine*, 46(3), S42-S51.]

Each province has different population to dentist ratio. The result show that the difference in population to dentist ration in each province may not be strong enough to statistically link with BMI and waist circumference, or that many other socio-demographic factors are complicating the result.

Generally many studies conduct in developing countries find the inverse relationship between prevalence of obesity and family income. However, the result might be in the line with the result from longitudinal data from China, the China Health and Nutrition Survey (CHNS) that shows BMI will first increase with family income at a decreasing rate. Though it should be noted that the causal link may not be established until more evidence becomes available regarding the intermediate mechanisms through which income affects obesity. [Asiseh, F., & Yao, J. (2016). Family income and body mass index—what have we learned from China. *Health economics review*, 6(1), 52.]

5.2.2 Association between Health-related behaviors and BMI and Waist Circumference

Most studies indicate an inverse relationship between physical activity (PA) and body mass index (BMI). However, the impact of obesity on this relationship is unclear. One study found only weak association between BMI and PA in non-obese people, but the association become strong in obese group. [Hemmingsson, E., & Ekelund, U. (2007). Is the association between physical activity and body mass index obesity dependent?. *International journal of obesity*, 31(4), 663.] A study in healthy students age 14-18 found no relationship between physical fitness, physical activity and body mass index. [Cruz, C., Sequeira, S., Gomes, H., Pinto, D., & Marques, A. (2011). Relationship between physical fitness, physical activity and body mass index of adolescents. *Br J Sports Med*, 45(15), A8-A9.] Another study also found that PA is more related to BMI in people with obesity, not just overweight. [Dickerson, J. B.,

Smith, M. L., Benden, M. E., & Ory, M. G. (2011). The association of physical activity, sedentary behaviors, and body mass index classification in a cross-sectional analysis: are the effects homogenous?. *BMC Public Health*, 11(1), 926.]

Study conducted in 2009, in Curitiba, Parana, Brazil with adults aged 18-65 years (1,411) shows that Sedentary time doesn't have an impact on BMI (but PA does) [Gonçalves, P. B., Lopes, A. A. D. S., Silva, A. A. D. P., Silva, J. S. B., Silva, A. T. D., Becker, L. A., ... & Reis, R. S. (2017). Combined physical activity and sitting time and their contribution to body mass index in adults. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 19(2), 174-184.] Longitudinal study of 4595 men and women who attended University of North Carolina in Chapel Hill also shows that Sedentary time alone did not predict changes in BMI, except when changes in physical activity were taken into account ($p < 0.001$). [Mortensen, L. H., Siegler, I. C., Barefoot, J. C., Grønbaek, M., & Sørensen, T. I. (2006). Prospective associations between sedentary lifestyle and BMI in midlife. *Obesity*, 14(8), 1462-1471.]

Cigarette smoking has dropped dramatically amongst health professionals, including dentists, in recent decades [Smith DR, Leggat PA (2006) A comparison of tobacco smoking amongst dentists in 15 countries. *Int Dent J* 56, 383–8.] In a study comprised 499,504 adults aged 31 to 69 years in UK. Former smokers were more likely to be obese than both current smokers (adjusted OR 1.33 95% CI 1.30-1.37) and never smokers (adjusted OR 1.14 95% CI 1.12-1.15). After 30 years, former smokers still had higher risk of obesity than current smokers but the same risk as never smokers. However, association does not necessarily imply causation. There is a lack of consensus on whether an association between smoking status and obesity could be causal. Possible causal mechanisms include reduced calorific intake, due to a central effect, impaired smell or taste, a change in food preference, or a direct metabolic effect on the absorption or storage of calories, or increased energy expenditure [Dare, S., Mackay, D. F., & Pell, J. P. (2015). Relationship between smoking and obesity: a cross-sectional study of 499,504 middle-aged adults in the UK general population. *PloS one*, 10(4), e0123579.]

Group that has appropriate sleeping hour recommended by National Sleeping Foundation (7-9 hours) has the lower mean rank compare to other group in almost all condition except in sleeping time in day off scenario, which it's roughly on par with oversleep group, showing that this result is in the line with many other studies that

conclude less sleep people will have higher chance of being obese. ^{67,68,69,70} The group that has less sleeping hour than recommendation level has highest mean risk as expected.

The result is in contrast to many studies including a longitudinal study conduct with total of 5,118 participants of AusDiab that found stress and stressful event experience have positive correlation with BMI [Harding, J. L., Backholer, K., Williams, E. D., Peeters, A., Cameron, A. J., Hare, M. J., ... & Magliano, D. J. (2014). Psychosocial stress is positively associated with body mass index gain over 5 years: evidence from the longitudinal AusDiab study. *Obesity*, 22(1), 277-286.] Though some studies such as Finnish cohort study conduct from 45,810 female and male employees only conclude a weak association between work stress and BMI, with men group actually associate with higher BMI if the job demand is lower. [Kouvonen, A., Kivimäki, M., Cox, S. J., Cox, T., & Vahtera, J. (2005). Relationship between work stress and body mass index among 45,810 female and male employees. *Psychosomatic medicine*, 67(4), 577-583.] Also, no significant associations were detected between perceived stress and BMI in either men ($P = 0.09$) or women ($P = 0.58$) in cross-sectional study included 5,063 men and 6,982 women aged 40-69 years in Japan, but it concluded that coping strategies may have an important role in developing overweight/obesity, particularly in men. Though in our research doesn't study on coping strategies. [Shimano, C., Hara, M., Nishida, Y., Nanri, H., Otsuka, Y., Nakamura, K., ... & Horita, M. (2015). Perceived stress and coping strategies in relation to body mass index: cross-sectional study of 12,045 Japanese men and women. *PloS one*, 10(2), e0118105.] Stress among dentists is thought to result from many sources, including job satisfaction, business income, working hours and staff vs patient interactions. [Scully C, Cawson RA, Griffiths M. Chapter 1: Mortality and some aspects of morbidity. In: *Occupational Hazards to Dental Staff*. London 1990; 1-21.] Dentists have been shown to be dissatisfied with aspects such as their level of stress, threat of malpractice, and a limited amount of personal time. [Wells A, Winter PA. Influence of practice and personal characteristics on dental job satisfaction. *J Dent Educ* 1999;63:805-12] Though it should be noted that in this study it lacks a sample in high and very high group, only low and moderate stress group were observed and compared.

Food consumption behavior doesn't show significant difference at all, this might due to limitation of questionnaire nature to reflect real world calorie intake.⁹⁰

5.2.3 Association between Workload and BMI and Waist Circumference

A study that use systematic search from Medline from 1966 onwards and PsycINFO from 1989 found no associations between psychological workload and either general or abdominal obesity. Though it marks that some elements of psychological workload have weak positive association with overall overweight. [Overgaard, D., Gyntelberg, F., & Heitmann, B. L. (2004). Psychological workload and body weight: is there an association? A review of the literature. *Occupational Medicine*, 54(1), 35-41.] Though it gives one explanation on positive relation in that a number of studies have suggested that a stressful job may promote unhealthy behaviours and that such behaviours are different for men and women. [Cheng Y, Kawachi I, Coakley EH, Schwartz J, Colditz G. Association between psychosocial work characteristics and health functioning in American women: prospective study. *Br Med J* 2000;320:1432–1436.] [Krantz G, Östergren P. Common symptoms in middle aged women: their relation to employment status, psychosocial work conditions and social support in a Swedish setting. *J Epidemiol Community Health* 2000;54:192–199.] Some women may react to stress by overeating, which subsequently leads to a high BMI. [Greeno C, Wing RR. Stress-induced eating. *Psychol Bull* 1994;115:444–464.] For instance when feeling stressed more women than men seem to react by overeating. On the other hand, men may increase alcohol use when feeling overloaded. [Vasse RM, Nijhuis FJN, Kok G. Associations between work stress, alcohol consumption and sickness absence. *Addiction* 1998;93:231–241.] In our research the answer 'Provided care to all requesting it, but felt overworked' dominated other choices in all scenario except outside office hour in which 'No new patient' has the most mean rank BMI, suspecting that dentists might use their free-time in a unhealthy lifestyle.

A cross-sectional study from Ireland comprised of 129 participants age 21 to 60 found no evidence of relationship between day-off (measured in raw hours) and BMI neither in non-obese group nor in obese group. [Keane, Aoife. *The Relationship Between Absenteeism and Obesity and The Role of Workplace Health Promotion Programmes in Relation to Both*. 2013] A study from data source of 2009–2010 Canadian Community Health Survey found that there's weak positive association

between day-off and obesity. [Bustillos, A. S., Vargas III, K. G., & Gomero-Cuadra, R. (2015). Work productivity among adults with varied body mass index: results from a Canadian population-based survey. *Journal of epidemiology and global health*, 5(2), 191-199.] Dentists are reported to miss very few workday compare to other occupation during their working life. [Wall TP, Ayer WA (1984) Work loss amongst practicing dentists. *J Am Dent Assoc* 108, 81–3.]

A study that use data from U.S. Census Bureau shows that for workers in non-strenuous jobs, 10 additional hours spent working are associated with an increase in BMI of 0.424 for women and 0.197 for men. It doesn't find the relationship between working time and BMI in workers in strenuous job. [Abramowitz, J. (2016). The connection between working hours and body mass index in the US: a time use analysis. *Review of Economics of the Household*, 14(1), 131-154.] A longitudinal USA survey that estimates workplace sitting time that linked from an external database (Occupational Information Network) shows that longer sitting time was significantly associated with higher BMI for the overall sample ($\beta = 0.054$; $p < 0.05$). [Lin, T. C., Courtney, T. K., Lombardi, D. A., & Verma, S. K. (2015). Association between sedentary work and BMI in a US national longitudinal survey. *American journal of preventive medicine*, 49(6), e117-e123.] One explanation might be that longer working time dentists lean toward unhealthy convenience foods for substitution of healthy meal influence the weight.³³ Another study found that working hours tend to be longer among dentists than the standard working week or around 35 hours. [Truter, M., & Ligthelm, A. J. (1997). Working patterns of male and female dentists in South Africa. *The Journal of the Dental Association of South Africa= Die Tydskrif van die Tandheelkundige Vereniging van Suid-Afrika*, 52(1), 15-17.] The working hours may have increased from what was reported to be an average working week for dentists more than 30 years ago. [Deverall A. The health of dentists in South Africa. *J Dent Assoc S Afr* 1969;24:368-71.]

There's no literature on number of patient and healthcare worker's health indication, though there are studies on shift work, such as one study that found shift work has many associations to negative health effects in 9,291 Canadian nurse, including obesity. [Smith, P., Fritschi, L., Reid, A., & Mustard, C. (2013). The

relationship between shift work and body mass index among Canadian nurses. *Applied Nursing Research*, 26(1), 24-31.]

In a subcategory type of work question part, only group of dentist that spend more time doing surgery case moderately correlated to higher waist circumference in a positive direction. This might due to the force that use to push and pull the tooth extraction (around 1 bar per one incisive tooth)⁹¹ is not vigorous enough to meet minimum physical activity movement recommendation. Other explanation is that the nature of the surgery work usually require waiting for local anesthesia substance to suppress the patient's sensation for at least 5 minutes or longer in case of re-injection, so the dentist has more sedentary time than other treatment type. Surgery hour is also reported to be one of the agent that induce stress among dentist. [Leggat, P. A., Kedjarune, U., & Smith, D. R. (2007). Occupational health problems in modern dentistry: a review. *Industrial health*, 45(5), 611-621.]

While endodontics treatment has little positive correlation to waist circumference, Endodontic treatment can cause occupational stress for most dental students and even endodontists due to the type of treatment, indirect view of the field of work and anatomical variations and complexities of the root canal system [Rada RE, Johnson-leong C. Stress, burn out, anxiety and depression among dentist. *J Am Dent Assoc*. 2004 Jun;135(6):788-94.] [Leggat PA, Kedgarune U, Smith DR. Occupational health problem in modern dentistry: A Review. *Ind Health*. 2007 Oct;45(5):611-21.] Moreover, endodontics also induce a chance for dentists' eyes to become injured due to endodontics material accidentally splash into their eyes. [Lipski, M., Buczkowska-Radlinska, J., & Góra, M. (2012). Loss of sight caused by calcium hydroxide paste accidentally splashed into the eye during endodontic treatment: case report. *Journal of the Canadian Dental Association*, 78(3), 175.]

Periodontics treatment is the only subcategory that gives little negative correlation to BMI (and not statistically significant very high negative correlation to waist circumference). While there's lack of evidence that periodontics is more strenuous than other type of work, a study carried out among the dental students at University of Cartagena reported that 80% of the students suffered from muscular pain due to the clinical practice which more pain were found in surgery and periodontics. [Diaz-Caballero, A. J., Gómez-Palencia, I. P., & Díaz-Cárdenas, S. (2010). *Ergonomic*

factors that cause the presence of pain muscle in students of dentistry. *Med Oral Patol Oral Cir Bucal*, 15(6), e906.] Other dangerous complication from giving this treatment exists, such as mild neuropathy among dental personnel from exposure to high frequency vibrations from dental equipment, particularly low and high speed hand pieces and ultrasonic scalers. [Akesson I, Lundborg G, Horstmann V, Skerfving S (1995) Neuropathy in female personnel exposed to high frequency vibrations. *Occup Environ Med* 52, 116–23.] This condition was previously shown to manifest as diminished sensitivity of the fingertips in a study of Flemish dentists. [Gijbels F, Jacobs R, Princen K, Nackaerts O, Debruyne F (2006) Potential occupational health problems for dentists in Flanders, Belgium. *Clin Oral Investig* 10, 8–16.]

Orthodontics and prosthetics factor both give little positive correlation to BMI and waist circumference. Even though there's a lack of evidence in other study that high workload will lead to higher BMI and waist circumference, dentists that do these type of work will have to exposed to many hazardous dental biomaterial, mainly polymer, which can cause a wide range of adverse health effects such as irritation to skin, eyes, mucous membranes, asthma and paresthesia of the fingers. Additionally, disturbances of the central nervous system such as headache, pain in the extremities, nausea, loss of appetite, fatigue, sleep disturbances, irritability, loss of memory and changes in blood parameters may also be noted.

Operative dentistry gives little positive correlation to BMI and waist circumference. While there's a lack of study that link this workload to obesity, other complication should be cautious. Especially in Thailand where Amalgam is still allowed to used. As it is the source of mercury in which dentists most likely inhale from it. Although amalgam containing mercury has been used for more than 150 yr and is generally considered safe in this form [Fédération Dentaire Internationale (1997) Policy statement: WHO Consensus Statement on Dental Amalgam.], most dentists in a previous Thai study reported using sealed mercury amalgam capsule systems, at least sometimes, however the disposal of these capsules in the bin by nearly half of them, mainly in the older age groups [Leggat PA, Chohanadisai S, Kukiattrakoon B, Yamong B, Kedjarune U (2001) Occupational hygiene practices of dentists in southern Thailand. *Int Dent J* 51, 11–6.] , may warrant further investigation

5.3 Conclusion

The majority of participants that sent questionnaires back are female (56.5%) and male has slightly below that (43.5%). With age group 20-29 has more than half of the sample (52.6), follow by 30-39 age group (23.9%), 40-49 age group (18.2%), and lastly 50-59 age group (5.3%). The average age of this study is 32.78 years with SD of 7.98. The minimum age in this group is 24 years old and the maximum age is 57 years old (3 years before retirement age of civil servant). Sakon Nakhon and Nongkhai send back the most questionnaire (each 17.2%) follow by Udon Thano (15.3%), Nong Bua Lamphu (13.9%) and lastly Nakhon Phanom and Bueng Kan (each 11.5%). For Income, group with income 25,001-50,000 is plurality group with 44%, follow by group with income 75,001-100,000 (23%), 50,001-75,000 (22.5%), more than 100,000 (7.7%), and lastly 25,000 or less (2.9%). The average income is 67,761 baht per month with SD of 37798.155. The person with the lowest income received 24,000 baht per month while the person that has the highest income received ten times of that (240,000).

Dentists in this study are mostly doing physical activity enough to meet WHO Recommendation (68.4%) with only 31.6% don't meet the cut point of 600 MET. The average MET, however, is 1451.58 with an SD of 1079.096. Dentist with lowest MET spend has only 180, less than half of what's recommended, while dentist with highest MET has 3,600, six times of the recommendation cut point. For sedentary time, the average is 154.71 minutes with an SD of 131.088. The dentist that spend least sedentary time has only 10 minutes while dentist that spend the most sedentary time has 800 minutes or more than 13 hours. No dentist is the currently active smoker, however 4.8% of dentists were the past smokers that used to smoke less than daily. All dentists in this study are low risk drinker. Dentists in this study have an average of 6.79 hours of sleep per day in working day with an SD of 1.007. Dentist with least sleeping duration on working day has 5 hours of sleep while the most sleeping duration on working day has 10 hours of sleep. More than two third majority of dentists have enough sleeping duration according to national sleeping foundation with 7-9 hours (68.4%) and the rest (31.6%) has 6 hours of less sleeping duration per working day. On off-day, the average sleeping hour increased to 7.68 hours per day with an SD of 1.175. The minimum sleeping duration is 5 hours while the maximum is 10 hours in off-day. More than two third majority of dentists have enough sleeping duration according to national sleeping

foundation with 7-9 hours (79%) while dentist that sleep 6 hours or less and 10 hours or more have the same number (each 10.5%). 63.2% of dentist in this study have low level of stress and 36.8% of dentist have moderate level. No dentist score ST-5 part with high or highest level of stress. For food consumption, more than half of dentist have normal level of food consumption behavior (52.2%), follow by good level of behavior (45.5%). 2.4% of dentist need improvement on food consumption behavior. No dentist has perfect score (very good level) of food consumption behavior.

The average weight of dentist in this population is 60.23 kg with an SD of 13.86. The lightest dentist weighted 42.3kg while the heaviest dentist weighted 110kg. The average height of dentist is 163.83cm with an SD of 8.08. The average BMI is 22.237 with an SD of 3.528. The dentist with least BMI has 17.9 while dentist with most BMI has 34.72. More than half of the dentists have normal BMI classification (57.4%), follow by 20.6% that are Obesity class 1, 10% are underweight, 8.6% are pre-obese and 3.3% are obesity class 2. The average waist circumference is 75.69cm with an SD of 11.53. Waist circumference range from 59 to 102. 88.5% of dentist have normal waist circumference while 11.5% have abdominal obesity. 90% of underweight dentists are female.

In sociodemographic and health-related factor, male linked to higher BMI than female, age has little to positive correlation to BMI, income has low positive correlation to BMI, sedentary time has little negative correlation to BMI, past smoking status of less than daily linked to higher BMI than not smoking in the past at all, insufficient sleep linked to higher BMI than sufficient sleep, and low level of stress linked to higher BMI than moderate level of stress

Perceived workload, overall working time and working time in office hour, time treatment of surgery, periodontics, orthodontics, prosthetics, operative dentistry, and unclassified other type of work are statistically significant related to BMI. Overall time and working time in office hour has little positive correlation to BMI. Treatment of surgery has little to low positive, periodontics has little negative, orthodontics and prosthetics have little positive, operative dentistry and unclassified other type of work have low positive correlation to BMI.

5.4 Limitation

The limitation of this study is that the participants may be too few that resulting in many statistically insignificant factors, despite some of those factors are well-established in many other researches, such as physical activity and food consumption behavior. And while the questionnaire instruction did tell the participant to use hospital's tools and staffs for measurement, the author doesn't present there in person while measuring, so the data might deviated from actual measurement.

The non-standardized questionnaires on workload part also pose some problems, as there's no generalized survey on dentist's workload that is divided into many subcategories on type of work, mainly treatment work. The questionnaires also lack on focusing on non-treatment work part, as dentist may perform other duties such as lecturing, giving oral health instruction, managing the document and check hospital's material stock.

Lack of previous study on dental workload and obesity makes it difficult to do review literature and discussion, in the end this research has to discuss mostly on dentist's occupational hazard that had been previously studied before to describe the important of each risk factors.

The BMI and Waist circumference as health indicators also received many criticism over their oversimplification of the predictor.

5.5 Recommendation

In the future the author is likely to conduct this research in a different population area or expand to the national level to increased participant numbers. One possible solution to the limitation is to create a survey booth in an annual dental association conference where dentists from all over the country participate in the conference, so that the weight, height, and waist circumference can be measuring by researcher's team.

If available, using dentist workload's data directly from the program that dentist use to record the OPD such as HosXP might give a more accurate data, though it might pose a difficulty in obtaining ethics permission as these data are sensitive and covered by privacy laws.

The perceived from patient to dentist's BMI is also an interesting agenda, as there's a study from John Hopkins, Baltimore, USA that found patient trust primary care physicians that are overweight on diet topic than non-overweight primary care physicians. Though it also reported that the patients feel like they're being judge by obese primary care physicians than in normal primary care physicians.

From the result of this study, completing all request appointment and felt overworked leads to higher chance of being obesity and abdominal obesity. The author recommend a new policy helping dentist's quality of life (which hasn't been promoted in Thailand yet) construct based on a new found evidence in Thailand. If the policy is based on this research data, to reduce the chance of exceeding BMI and waist circumference, a clear cut working hour for dentist or a better management of patient appointment system should be introduced. But for a small and convenience program, the author encourage dentist in a public sector, co-operation with healthcare workers and people that are interested in joining a relax program to relieve an overwork pattern.

The American Dental Association had already launch a program on Dentist Health and Wellness, to preserve the quality of their performance and advance the welfare of patients, dentists are encouraged to maintain their health and wellness, construed broadly as preventing or treating acute or chronic diseases, including mental illness, addictive disorders, disabilities and occupational stress. When health or wellness is compromised, so may be the safety and effectiveness of the dental care provided. When failing physical or mental health reaches the point of interfering with a dentist's ability to engage safely in professional activities, the dentist is said to be impaired. In addition to maintaining healthy lifestyle habits, every dentist is encouraged to have a personal physician whose objectivity is not compromised. Impaired dentists whose health or wellness is compromised are urged to take measures to mitigate the problem, seek appropriate help as necessary and engage in an honest self-assessment of their ability to continue practicing. Dentists are encouraged to participate in the ADA's Health Screening Program when they attend annual session, both to assist them in monitoring key indicators of personal health and to contribute to the body of knowledge about dentist health and well-being. Dentists are strongly encouraged to have adequate disability and overhead protection insurance coverage which they review on a regular basis.

APPENDICES

Guideline for Measuring

Measuring Height

Remove the shoes, bulky clothing, and hair ornaments, and unbraided hair that interferes with the measurement.

Take the height measurement on flooring that is not carpeted and against a flat surface such as a wall with no molding.

Stand with feet flat, together, and against the wall. Make sure legs are straight, arms are at sides, and shoulders are level.

Looking straight ahead and that the line of sight is parallel with the floor.

Take the measurement stands with head, shoulders, buttocks, and heels touching the flat surface (wall) Depending on the overall body shape, all points may not touch the wall.

Use a flat headpiece to form a right angle with the wall and lower the headpiece until it firmly touches the crown of the head.

Make sure the measurer's eyes are at the same level as the headpiece.

Lightly mark where the bottom of the headpiece meets the wall. Then, use a metal tape to measure from the base on the floor to the marked measurement on the wall to get the height measurement.

Accurately record the height to the nearest 1/8th inch or 0.1 centimeter.

Measuring Weight

Use a digital scale. Avoid using bathroom scales that are spring-loaded. Place the scale on firm flooring (such as tile or wood) rather than carpet.

Remove shoes and heavy clothing, such as sweaters.

Stand with both feet in the center of the scale.

Record the weight to the nearest decimal fraction (for example, 55.5 pounds or 25.1 kilograms).

Measuring Waist Circumference

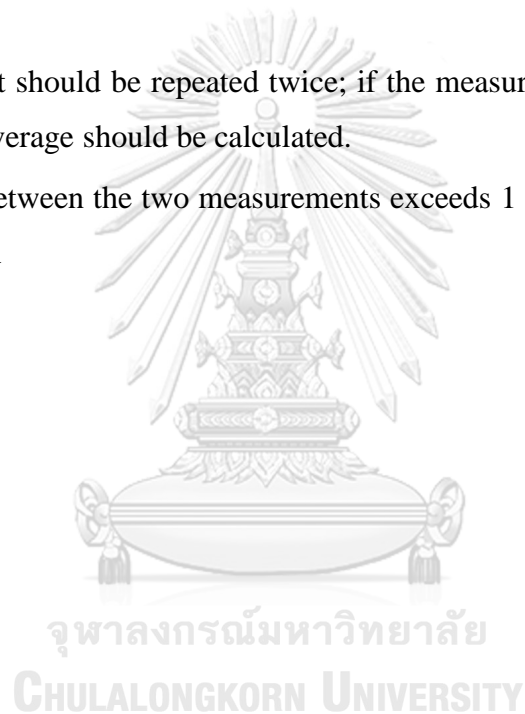
Waist circumference should be measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape that provides a constant 100 g tension

the subject should stand with feet close together, arms at the side and body weight evenly distributed, and should wear little clothing.

The subject should be relaxed, and the measurements should be taken at the end of a normal expiration.

Each measurement should be repeated twice; if the measurements are within 1 cm of one another, the average should be calculated.

If the difference between the two measurements exceeds 1 cm, the two measurements should be repeated



Drafted Questionnaire

Questionnaire ID _____

Please answer questions below or checked or on choice that represents you in each question

Socio-demographic	
Question	Answer
1. What is your gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female
2. How old are you?	I'm _____ completed years old
3. How much is your income per month, an average of the past three months?	_____ Baht
4. What is your workplace province?	<input type="checkbox"/> Udon Thani <input type="checkbox"/> Nongkhai <input type="checkbox"/> Nong Bua Lamphu <input type="checkbox"/> Nakhon Phanom <input type="checkbox"/> Sakon Nakhon <input type="checkbox"/> Bueng Kan <input type="checkbox"/> Loei

Physical Activity		
Question	Response	Code
<p>Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.</p>		
Work		
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 4	P1
In a typical week, on how many days do you do vigorous intensity activities as part of your work?	Number of days _____	P2
How much time do you spend doing vigorous-intensity activities at work on a typical day?	_____ Hours _____ Minutes	P3 (A-B)

Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 7	P4
In a typical week, on how many days do you do moderate intensity activities as part of your work?	Number of days _____	P5
How much time do you spend doing moderate-intensity activities at work on a typical day?	_____ Hours _____ minutes	P6 (A-B)
Travel to and from places		
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship.		
Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 If No, go to P 10	P7
In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days _____	P8
How much time do you spend walking or bicycling for travel on a typical day?	_____ Hours _____ minutes	P9 (A-B)

Physical Activity, Continued		
Question	Response	Code
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure)		
Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 13	P10
In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational (leisure) activities?	Number of days _____	P11
How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	_____ Hours _____ minutes	P12 (A-B)

Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously?	Yes 1 No 2 If No, go to P 16	P13
In a typical week, on how many days do you do moderate intensity sports, fitness or recreational (leisure) activities?	Number of days _____	P14
How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	_____ Hours _____ minutes	P15 (A-B)
Sedentary behaviour		
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.		
How much time do you usually spend sitting or reclining on a typical day?	_____ Hours _____ minutes	P16 (A-B)

Tobacco Smoking	
Question	Answer
1. Do you currently smoke tobacco on a daily basis, less than daily, or not at all?	<input type="checkbox"/> Daily → End of this section <input type="checkbox"/> Less than Daily → Go to Question 2 <input type="checkbox"/> Not at all → Go to Question 3
2. Have you smoked tobacco daily in the past?	<input type="checkbox"/> Yes → End of this section <input type="checkbox"/> No → End of this section
3. In the past, have you smoked tobacco on a daily basis, less than daily, or not at all? If done both daily and less than daily, please check "Daily"	<input type="checkbox"/> Daily <input type="checkbox"/> Less than Daily <input type="checkbox"/> Not at all

Alcohol Use Disorders Identification Test: Self-Report Version					
Question	0	1	2	3	4
How often do you have a drink containing alcohol?	Never	Monthly or less	2 - 4 times per month	2 - 3 times per week	4+ times per week

How many units of alcohol do you drink on a typical day when you are drinking?	1 -2	3 - 4	5 - 6	7 - 9	10+
How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you failed to do what was normally expected from you because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

How often during the last year have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
Have you or somebody else been injured as a result of your drinking?	No		Yes, but not in the last year		Yes, during the last year
Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down?	No		Yes, but not in the last year		Yes, during the last year

Sleep duration	
Question	Answer
1. How many hours do you sleep in workday?	___ hours
2. How many hours do you sleep in non-workday?	___ hours

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Stress				
Symptom or feeling that occur in the past 2-4 weeks	Almost Never	Sometimes	Usually	Always
Sleeping problem, can't sleep or sleeping too much				
Less focus				
Anxiety				
Bored				
Don't want to meet people				

Food Consumption Behavior	
	Frequency

Articles	Always (5-7 days per week)	Sometimes (1-4 days per week)	Never
1. Eat all 5 food groups			
2. Eat many kind of food, not repetitive			
3. Eat vegetables more than 3 ladles a day			
4. Eat fruits at least 2-3 portions a day			
5. Eat fish at least one meal a day			
6. Eat non-fat meat at least 2-3 meal a week			
7. Drink non-fat milk 1-2 glasses per day			
8. Eat dinner at least 4 hours away from bedtime			
9. Eat boil or steam type of food			
10. Avoid high-fat food			
11. Avoid sweets or sweeten drinks			
12. Eat mild-taste food			
13. Choose water instead of carbonated or sweeten drink			
14. Avoid alcohol drinks			

Dental Workload in the past 12 months		
Question	In office hours	Private/Shifted work
1. What do you feel about your dental workload	<input type="checkbox"/> Too busy to treat all requesting appointments <input type="checkbox"/> Provided care to all requesting it, but felt overworked <input type="checkbox"/> Provided care to all requesting it, but did not feel overworked <input type="checkbox"/> Not busy enough, would have liked more patients <input type="checkbox"/> Practice limited, no new patients taken	<input type="checkbox"/> Too busy to treat all requesting appointments <input type="checkbox"/> Provided care to all requesting it, but felt overworked <input type="checkbox"/> Provided care to all requesting it, but did not feel overworked <input type="checkbox"/> Not busy enough, would have liked more patients <input type="checkbox"/> Practice limited, no new patients taken
2. What is your average workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
3. What is your average non-workday per week?	_____ day	

4. What is your average oral surgery workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
5. What is your average periodontics workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
6. What is your average orthodontics workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
7. What is your average prosthetics workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
8. What is your average endodontics workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
9. What is your average filling workload?	_____ hour per week _____ patient per week	_____ hour per week _____ patient per week
10. What is your average workload for work that is not classified in above questions? (non-clinical)	_____ hour per week	_____ hour per week

Segment for Health Supporting Staff

Questionnaire ID _____

Please read the guideline provided for accurate measurement

Weight _____ kilograms (with one decimal fraction)

Height _____ centimeters (with one decimal fraction)

Waist circumference _____ centimeters (with one decimal fraction)

Please put questionnaire into the envelope, seal it, and send back to this receiver's address with provided stamp:
 Satianpong Gaysorn
 PHANGKHON HOSPITAL 188/6 Moo 9 Nittayo Road, Phang Khon,
 Sakon Nakhon 47160
 Any questions regarding this study can be asked via
 Email: pookpooi@msn.com
 Phone: 0834028335
 LINE ID: pookpooi

Reference

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REFERENCES

APPENDIX



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VITA

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2016

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