

Health status and behavior influences to sleep quality among community-
dwelling elderly in Chanthaburi Province, Thailand

Miss Chanisa Siripanich



บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)
เป็นแฟ้มข้อมูลของนิสิตเจ้าของวิทยานิพนธ์ ที่ส่งผ่านทางบัณฑิตวิทยาลัย

The abstract and full text of theses from the academic year 2011 in Chulalongkorn University Intellectual Repository (CUIR)
are the thesis authors' files submitted through the University Graduate School.

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Program in Public Health
College of Public Health Sciences
Chulalongkorn University
Academic Year 2017
Copyright of Chulalongkorn University

ภาวะสุขภาพและพฤติกรรมที่มีผลต่อคุณภาพการนอนหลับในกลุ่มผู้สูงอายุที่อาศัยใน
ชุมชน จังหวัดจันทบุรี ประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2560
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

ชนิศา ศิริพานิช : ภาวะสุขภาพและพฤติกรรมที่มีผลต่อคุณภาพการนอนหลับในกลุ่มผู้สูงอายุที่อาศัย
ในชุมชน จังหวัดจันทบุรี ประเทศไทย (Health status and behavior influences to sleep quality
among community-dwelling elderly in Chanthaburi Province, Thailand) อ.ที่ปริกษาวิทยานิพนธ์
หลัก: รศ. ดร.รัตนา สำโรงทอง, 63 หน้า.

วัตถุประสงค์ – ปัญหาเรื่องการนอนหลับมีแนวโน้มเพิ่มมากขึ้นตามช่วงอายุ เนื่องจากการเปลี่ยนแปลง
ทางภาวะสุขภาพและพฤติกรรมเสี่ยงนำไปสู่การนอนหลับที่ไม่ดี ดังนั้นวัตถุประสงค์ของการศึกษานี้เพื่อศึกษา
อัตราและปัจจัยที่สัมพันธ์ต่อคุณภาพการนอนหลับที่ไม่ดีในกลุ่มผู้สูงอายุที่อาศัยอยู่ในชุมชน จังหวัดจันทบุรี
ประเทศไทย

วิธีดำเนินการวิจัย – การศึกษาแบบตัดขวางในกลุ่มผู้สูงอายุจำนวน 208 คน โดยผ่านการสุ่มโดยอาศัย
หลักความน่าจะเป็นโดยการสุ่มตัวอย่างแบบชั้นภูมิ และการสุ่มกลุ่มตัวอย่างอย่างเป็นระบบ ผู้เข้าร่วมวิจัยจะได้รับ
การสัมภาษณ์ ประเมินคุณภาพการนอนหลับโดยใช้แบบประเมินคุณภาพการนอนหลับของพิตส์เบิร์กฉบับ
ภาษาไทย คะแนนคุณภาพการนอนหลับโดยรวมที่วัดได้ตั้งแต่ 5 คะแนนขึ้นไปแสดงถึงคุณภาพการนอนหลับอยู่
ในเกณฑ์ไม่ดี วิเคราะห์หาปัจจัยที่มีความสัมพันธ์ต่อคุณภาพการนอนหลับ โดยการทดสอบไคสแคว์และการ
วิเคราะห์ถดถอยโลจิสติกส์ที่ระดับนัยสำคัญทางสถิติ $p.value < 0.05$

ผลการศึกษา – จากกลุ่มผู้สูงอายุ 208 คน พบ 66.3% ที่มีคุณภาพการนอนหลับไม่ดีด้วยคะแนนตั้งแต่
5 คะแนนขึ้นไป เมื่อวิเคราะห์ถดถอยโลจิสติกส์พบว่าผู้สูงอายุที่ไม่ร่วมกิจกรรมทางสังคมมีโอกาส 5.96 เท่า
($p.value < 0.05$; 95% CI 1.459 – 24.361) ผู้สูงอายุที่ไม่เคยสวดมนต์ก่อนนอนมีโอกาส 1.48
เท่า ($p.value < 0.05$; 95% CI 0.273 – 0.838) เมื่อเทียบกับผู้สูงอายุที่สวดมนต์ก่อนนอน นอกจากนี้ผู้สูงอายุที่
รับรู้ปัญหาด้านระบบกล้ามเนื้อโอกาสมีคุณภาพการนอนหลับไม่ดี 2.29 เท่า ($p.value < 0.05$; 95% CI 1.249 –
4.192) เมื่อเทียบกับผู้สูงอายุที่ไม่มีปัญหาด้านระบบกล้ามเนื้อ ผู้สูงอายุที่รับรู้ปัญหาด้านการปัสสาวะมีโอกาสต่อ
คุณภาพการนอนหลับไม่ดี 2.62 เท่า ($p.value < 0.05$; 95% CI 1.084 – 6.327) เมื่อเทียบกับผู้สูงอายุที่ไม่มีปัญหาด้าน
การปัสสาวะ ภาวะซึมเศร้าเพิ่มโอกาสเสี่ยงต่อคุณภาพการนอนหลับไม่ดี 3.28 เท่า ($p.value < 0.05$; 95% CI
1.179 - 9.095) เมื่อเทียบกับผู้ที่ไม่มีภาวะซึมเศร้า และการสูบบุหรี่ ผู้สูงอายุที่สูบบุหรี่มีโอกาสเสี่ยงต่อคุณภาพ
การนอนหลับไม่ดี 2.15 เท่าเมื่อเทียบกับผู้สูงอายุที่ไม่สูบบุหรี่ที่ระดับนัยสำคัญทางสถิติ $p.value < 0.05$

สรุป – การพัฒนานโยบายยุทธศาสตร์ด้านการสาธารณสุข โดยการส่งเสริมกิจกรรมทางสุขภาพเพื่อ
ป้องกันปัญหาโรคเรื้อรัง และสนับสนุนกิจกรรมทางสังคมเพื่อป้องกันโรคซึมเศร้าในกลุ่มผู้สูงอายุที่มีความสำคัญ
อย่างยิ่ง

การเข้าร่วมกิจกรรมทางสังคม ปัญหาด้านระบบกล้ามเนื้อและกระดูก และภาวะซึมเศร้า มีผลต่อ
คุณภาพการนอนหลับที่ไม่ดี ดังนั้นควรกำหนดนโยบายและแผนงานในการส่งเสริมสุขภาพทางกายและจิตใจ
รวมทั้งกิจกรรมทางสังคมเพื่อพัฒนาคุณภาพการนอนหลับในกลุ่มผู้สูงอายุให้ดียิ่งขึ้น

คำสำคัญ – ภาวะสุขภาพ พฤติกรรม คุณภาพการนอนหลับ และผู้สูงอายุ

สาขาวิชา สาธารณสุขศาสตร์

ลายมือชื่อนิติ
.....

ปีการศึกษา 2560

ลายมือชื่อ อ.ที่ปริกษาหลัก
.....

5978829153 : MAJOR PUBLIC HEALTH

KEYWORDS: HEALTH STATUS / BEHAVIOR / SLEEP QUALITY / ELDERLY

CHANISA SIRIPANICH: Health status and behavior influences to sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand. ADVISOR: ASSOC. PROF. RATANA SOMRONGTHONG, Ph.D., 63 pp.

Purpose – The trend of sleep disorder is typically more common in aged changes due to health condition changes leading to poor sleep satisfies. Therefore the purpose of this study was to examine the rate and factors associated to sleep quality among Community-Dwelling Elderly in Chanthaburi Province, Thailand.

Design/methodology/approach – A cross-sectional was conducted in 208 elderly by multi-stage sampling. All participants were interviewed by the questionnaire. sleep quality was assessed by Pittsburgh sleep quality index (PSQI). Sleep quality score ≥ 5 indicating poor sleep quality. Chi-square tests and Multivariate logistic regression models were performed to find significant associations.

Findings – We found that 208 participants found 66.3% were poor sleep quality with score ≥ 5 PSQI. The adjusted odds ratio (AOR) for gender, age, and BMI, the multivariate logistic regression model, presented that elders had never participated social activities was increased poor sleep quality 5.962-fold odds (p.value <0.05 ; 95% CI 1.459 – 24.361). Elders had never prayed before sleep was increased poor sleep quality 1.478-fold odds (p.value <0.05 ; 95% CI 0.273 – 0.838). Perception of musculoskeletal problem was increased poor sleep quality 2.288-fold odds (p.value <0.05 ; 95% CI 1.249 – 4.192). Bladder problem perception was increased poor sleep quality 2.618-fold odds (p.value <0.05 ; 95% CI 1.084 – 6.327). Depression was increased poor sleep quality 3.275-fold odds (p.value <0.05 ; 95% CI 1.179 - 9.095). Lastly, smoking was increased poor sleep quality 2.147-fold odds (p.value <0.05 ; 95% CI 1.062 – 4.340).

Originality/value – Promoting intervention regulation strategies particularly improving social participation, health education to prevent chronic diseases, and engages the mental health among elderly are essential.

Field of Study: Public Health

Academic Year: 2017

Student's Signature

Advisor's Signature

ACKNOWLEDGEMENTS

The author is grateful to the elderly people who agreed to participate and the administration who assisted the data collection in Wang-sapparos community, Chanthaburi province, Thailand. Moreover, thank you very much Prof. Sathirakorn Pongpanich, Ph.D., Assoc. Prof. Ratana Somrongthong, Ph.D., and Assist. Prof. Nutta Taneepanichskul, Ph.D. of College of Public Health Sciences Chulalongkorn University. Additionally, Dr. Phitsanuruk Kanthawee, Ph.D. from School of Health Science, Mae Fah Luang University for providing professional opinions to the study.



CONTENTS

	Page
THAI ABSTRACT	iv
ENGLISH ABSTRACT.....	v
ACKNOWLEDGEMENTS	vi
CONTENTS.....	vii
Chapter I : Introduction.....	2
1.1 Background and Rational	2
1.2 Research questions.....	6
1.3 Research objectives	7
1.4 Hypothesis	7
1.5 Conceptual Framework.....	8
1.6 Operational definition.....	8
Chapter II : Literature Review	12
2.1 Sleep	12
2.2 Sleep quality	14
2.3 Social participation influences.....	14
2.4 Health status influences	15
2.5 Behavioral influences	16
2.6 Environmental influences	18
2.7 Research related to sleep quality	19
Chapter III : Research Methodology.....	22
3.1 Research design	22
3.2 Study setting	22
3.3 Study period.....	22
3.4 Study population.....	22
3.5 Instruments	25
3.6 Validity	31
3.7 Reliability	32
3.8 Data collection	32

	Page
3.9 Data analysis	33
3.10 Ethical consideration	36
Chapter IV: Results.....	38
Chapter V : Discussion, Conclusion, and Recommendation	63
REFERENCES	2
VITA.....	9



Table of Contents

Table 1 Sample size of each communities	24
Table 2 Descriptive statistic with variables	33
Table 3 Inferential statistic with variables	35
Table 4 Socio-demographic of elderly (n=208).....	38
Table 5 Social participation of elderly (n=208).....	40
Table 6 Health status of elderly (n=208)	41
Table 7 Behavioral of elderly (n=208)	44
Table 8 Environment exposure of elderly (n=208).....	46
Table 9 Subjective sleep quality of elderly (n = 208).....	46
Table 10 Subjective sleep latency of elderly (n = 208)	47
Table 11 Subjective sleep duration of elderly (n = 208).....	47
Table 12 Subjective habitual sleep efficiency of elderly (n = 208)	48
Table 13 Subjective sleep disturbances of elderly (n = 208).....	48
Table 14 Subjective use of sleeping medication of elderly (n = 208)	49
Table 15 Subjective daytime dysfunction of elderly (n = 208)	49
Table 16 Sleep quality of elderly (n=208)	49
Table 17 Association between demographic and sleep quality among elderly (n=208).....	50
Table 18 Association between social participation and sleep quality among elderly (n=208).....	52
Table 19 Association between health status and sleep quality among elderly (n=208).....	53
Table 20 Association between behavior and sleep quality among elderly (n=208)	57
Table 21 Association between environment factors and sleep quality among elderly (n=208)	59
Table 22 Odds ratios (OR) and 95% confidence intervals (CI) of sleep quality in elderly	61

Chapter I : Introduction

1.1 Background and Rational

Sleep refers to the mechanism of brain and body shut down. Sleep is a necessary daily routine for the body to be improved and repaired(1). During early evening and towards the first two hours of the sleep. Melatonin is released and it causes drowsiness until the middle of the night. Guideline of healthy sleep by National Heart Lung and Blood Institute presented two basic types of sleep that included Rapid Eye Movement (REM) sleep and Non- Rapid Eye Movement (Non-REM) Sleep. Non-REM sleep was an important period which was affected by strong immune system, digestive system, response to growth hormone release. Non-REM sleep was divided into 3 stages. Stage 1 Non-REM sleep, which was on stage 1 also called "*awake easily*", muscles twitching or hypnicmyoclonia and slow eye movement occurred during that period. Stage 2 Non-REM sleep was known as "*light sleep*" or true sleep in which eye movement stops, and slow brain waves with occasional bursts of rapid brain waves. This stage holded for half of the night. Stage 3 Non-REM sleep was called "*deep sleep*" and it was difficult to be awake in this stage. The brain waves were slow also called Delta waves. Heart rate and respiratory rates were slow and the muscles were quite relaxed and then the stage reached was REM sleep. "*REM sleep*" ocured an hour to an hour and a half after sleep. Dreaming ocured during REM sleep. If a person becomed awake at this stage they recognized their dream. The eyes moved rapidly despite the fact the eyelids closed. Respiratory rate became more rapid, irregular and shallow breathing occurs.

Regularly inadequate sleep risked to multiple health problems. The body and muscles lose much energy from activities during the day. Therefore the immune system weaken as a result the poor health develops and the state of disease occurs finally. There were various health problems resulting from the poor sleep quality (SQ) that included obesity and Diabetes Mellitus (DM). Furthermore less sleep duration significantly correlated to high Body Mass Index (BMI) (2).The Keokuk Country Rural Health Cohort Study (KCRHS) conducted the study related to community-based, environmental, occupational, and general health in the rural area. The goal was to

determine whether sleep duration were related to BMI and obesity by conducting a cross-sectional study found that average BMI of 29.5 reached criteria of class I obesity. The majority of respondents slept 7 to almost 8 hours per night but the high BMI was found among those who slept less than 6 hours. The previous study revealed that sleep of 4 hours associated 40% glucose tolerance reduction with intravenous glucose and another 30% reduction in acute insulin response to glucose. The relationship between sleep duration and metabolic problem were conducted in several experimental studies. Prospective studies presented sleep less increased the risk of type 2 DM and reduced sleep quality (3).

The prevalence of sleep disorders increased with aged individuals due to physical health changes and degenerates. Furthermore due to sleep pattern changed and reported that poor sleep satisfies. A typical elderly took a long nap on daytime and remained average three to four awake each night then also wakes up earlier in the morning. Most common sleep problem among older people were insomnia, legs paralysis, narcolepsy, hypersomnia, and obstructive sleep apnea. Because of the impacts from sleep disorder led to poor SQ particularly in an aging group. From Canadian health measured survey conducted a cross-sectional survey of sleep pattern and SQ among the population aged 18 to 79 years old. The results showed the sleep duration was 7.12 and 7.24 hours per night for aged 18 – 64 and 65 – 79 years old respectively. The trend was estimated up to 65% of 18 – 65 years old and 54% of elders slept following the recommended. However sleep disorder was typically more common in aged changes. About 43% of males and 55% for females in population aged 18 – 64 years old reported sleep disturbance (4). Centers for Disease Control and Prevention analyzed the secondary data from the Behavioural risk factor surveillance system (2014) all 50 states and District of Columbia in America to identify the prevalence of healthy sleep duration that more than 7 hours as the recommendation. The finding was 65.2% and 34.8% were measured to healthy and poor sleep duration. 11.8%, 23.0%, 29.5%, 27.7%, 4.4%, and 3.6% reported sleep less than 5 hours, 6 hours, 7 hours, 8 hours, 9 hours, and more than 10 hours respectively (5). A cross-sectional study from China conducted in community centres and in central and western Hong Kong in 2010. SQ was assessed by Pittsburgh sleep quality index (PSQI) with five cut off point indicated poor SQ. Seventy-seven percent individuals were assessed as poor sleepers.

A study in urban Shanghai almost fifty percent were poor SQ in Chinese elderly and commonly found the higher rate in female than male. One study in type 2 DM Chinese investigated SQ and quality of life (QOL) in patients. About 944 patients with type 2 DM were enrolled into the study. Poor SQ was measured by PSQI with 7 cut off point. The result revealed that 33.6% of patients were poor sleepers(6). Poor QOL related to long duration of diabetes, a greater number of complication, no alcohol drinking, poor glycemic control, depressive symptom, and anxiety ($p.value < 0.001$) and it influenced by poor SQ (7). Insomnia research in Hunan province of China presented a prevalence of insomnia as 26.6%. Significantly differences were found in males and females but higher score PSQI in females than males. Moreover the trend had higher scores in rural than urban areas (8). The patients with hypertension (HT) associated insomnia and slept for short duration. The previous study investigated SQ in 222 resistant HT patients by PSQI with five cut off point indicated poor SQ. Findings were 38.2% had poor SQ in general population. The resistant HT women group had better SQ than non-resistant HT women (9). New risk factor for cardiovascular disease was a sleep disorder. One cohort study conducted in cardiovascular patients to investigate factors related to poor SQ. The results showed 43% patients were measured to poor SQ by PSQI at five scores(10).

There is an internal and external stimulus to sleep. The bedroom's environment also results in poor sleep which includes watching television before bedtime in the bedroom, talking phone on the beds, sleep while turn on the light, and disturbed from sleep partner (11). Psychological problems were the major of insomnia which was commonly found among people with stress and depressive symptom. Sleep pattern changes can be affected by several factors including age, underlying disease, daytime napping, and individual behaviors such as caffeine and alcohol drinking, exercise and environmental factor. Insomnia was a state of inadequate sleep, leading to waking up without feeling fresh and also included spending more time to full sleep up to 30 minutes. Additionally if someone often wakes up during night time, wakes up early in the morning and feeled sleepy while working. Insomnia influenced to physical, mental and social well-being of the individual (1). From many previous prospective and cross-sectional studies conducted to investigate the factors associated with SQ. A cross-sectional study in China, which was conducted in community centres, central

and western Hong Kong in 2010. The finding showed those who slept more than 5.5 hours/night associated with health-related QOL, emotional, and physical function. Health problems about muscle pain were significantly associated with good sleepers in different age groups (6). A study in urban Shanghai elderly recruited older aged more than or equal 60 years. The result found that almost fifty percent had poor SQ. It was significantly correlated to age increasing (OR=1.03, 95%CI=1.01 – 1.05, p.value<0.001), less education duration (OR=1.04, 95%CI=1.01 – 1.08, p.value=0.014), living alone (OR=1.62, 95%CI=1.02 – 2.58, p.value=0.04), anxiety (OR=1.09, 95%CI=1.05 – 1.12, p.value<0.001), number of chronic diseases (OR=1.18, 95%CI=1.07 – 1.30, p.value=0.14), and arthritis (OR=1.45, 95%CI=1.05 – 2.01, p.value=0.025) (6). Moreover, the trend had higher scores in rural than urban areas. Insomnia associated with female, older age, high education level, unmarried, and living in the rural (8). A cross-sectional study in Taiwan investigated the association between poor SQ and BMI. Factors significantly associated with a sleep disorder were current smoking and working night shifts. There was no statistically significance association between body mass index and sleep quality (12). One study in Type 2 DM Chinese investigated SQ and QOL in patients. Social relationship and overall quality domains were significantly associated with SQ, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. Poor QOL was related to longer duration of diabetes, a greater number of complications, no alcohol drinking, poor glycemic control, depressive symptom, and anxiety (p.value< 0.001) and it influenced poor SQ (7).

Thai study conducted among university students in Southern of Thailand to determine the prevalence and influencing factors of SQ. The study found 73.6% was measured as poor SQ by PSQI more than 5 scores. Furthermore health status perception, sleep hygiene and stress were associated with poor SQ (13). A descriptive research was conducted in nursing students. A finding presented 42.47% poor SQ was associated with stress, anxiety, well-ventilated room, and sleep in the quite room (14, 15). A cross-sectional investigation of SQ in breast cancer patients found that most respondents (37.7%) slept less than 5 hours per night with poor SQ. The factors associated with SQ included fatigue from chemotherapy and depressive symptom (16). SQ was measured by a cross-sectional study among Hospitalized patients in medical units. A finding

showed fifty percent was poor SQ. The common problems among those included sleeping difficult, awakening during the night, and waking without feeling fresh. Health status perceptions consisted of muscle ache, dyspnea and regularly urination. Mental problems included anxiety about family and underlying disease, and the fear of diagnosis and treatment. Environment factors were noise and light. However health status perception and environmental factors were negative significantly associated with SQ (17). A few studies investigated SQ in elderly such as one study conducted in Banglamung nursing home, Thailand. The finding showed that over 57.14% of poor SQ and the study reported pain and senility were significantly associated with SQ (18). A little was known about the prevalence of poor SQ and the association between subjective health status, behavior, social participation, and environment factor to SQ among community-dwelling elderly in the rural. Therefore the current study aims to assess SQ and identify health status, behavior, social participation and environment factor associated with the poor SQ among Community-Dwelling Elderly in Chanthaburi Province, Thailand. The present study was carried out in order to promote and support properly sleeping among elderly through health education and intervention.

1.2 Research questions

1. What was the rate of poor sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?
2. What was the association between social participation and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?
3. What was the association between health status and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?
4. What was the association between behavior and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?
5. What was the association between environmental factors and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

1.3 Research objectives

General objective: To identify the factors associated to sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand

Specific objectives:

1. To assess the rate of poor sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand
2. To determine the association between social participation and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand
3. To investigate the association between health status and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand
4. To indicate the association between behavior and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand
5. To identify the association between environmental factors and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand

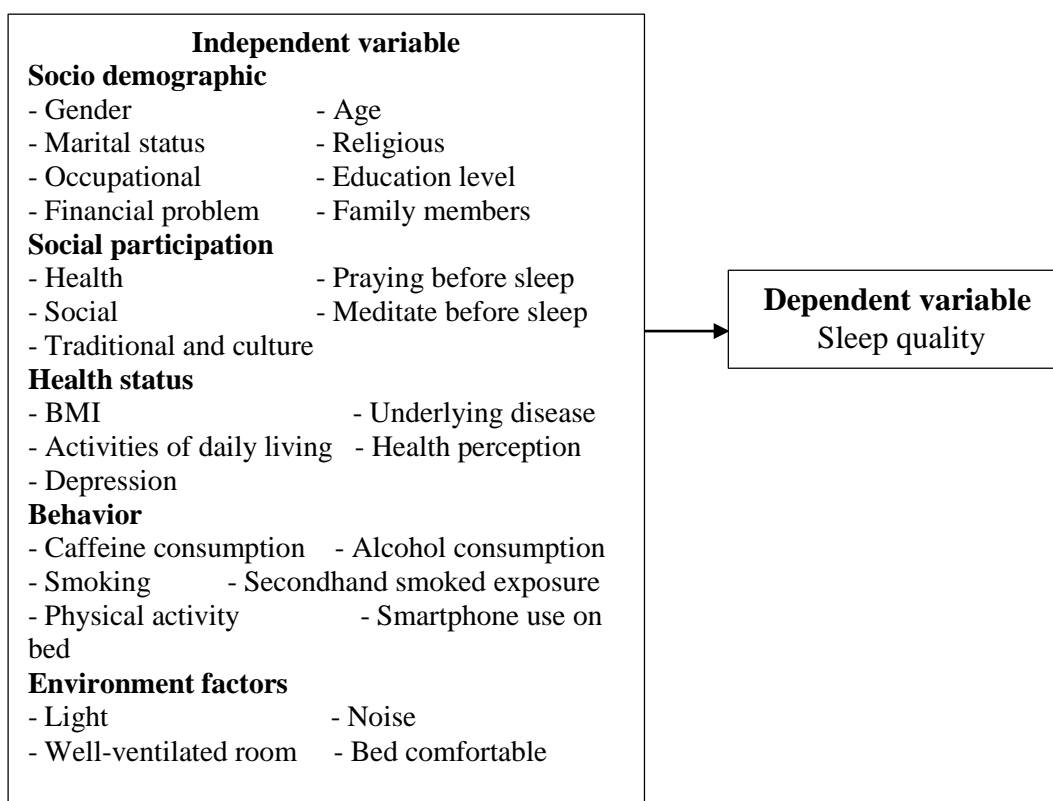
1.4 Hypothesis

Null hypothesis: There was no association between health status, behavior, social participation, and environmental factor to sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand

Alternative hypothesis: There were an association between health status, behavior, social participation, and environmental factors to sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand

1.5 Conceptual Framework

Figure 1 Conceptual framework



1.6 Operational definition

Sleep quality referred to good or poor sleep quality which measured by PSQI. PSQI consists of 7 components that includes subjective SQ, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and daytime dysfunction over the last month. SQ was divided into 2 level as good and poor.

Behavior referred to the personal action either poor or good behavior that impacts health status and mental health. The current study investigated the behavior of caffeine and alcohol consumption, smoking, smartphone use on a bed and physical activity.

Health status referred to the state of someone was diagnosed to be one or more disease by the physician including those are experiencing health problems, it influenced physical discomfort. Health status consisted of physical and mental components.

Elderly referred to people whose age was equal to or more than 60 years-old with or without limitation activity.

Socio-demographic

Gender was the characteristic assigned a newborn's sex as either male or female.

with significant others. The current study classified to single, married, separated, divorced, and widowed.

Religion was a personal set or institutionalized system of religious attitudes, beliefs, respects and practices. The current study classified into Buddhism, Christianity, Islam, and others.

Education level referred to the personal highest degree of education completed. The current study classified into not educated, primary and secondary school, high school, vocational certificate and diploma, bachelor's degree and more than bachelor's degree.

Occupational was the person's role in the society. The often regular activity performed by exchange of the payment. Occupation referred only one job that mostly performed as the annual. The current study classified into employment, agriculture/gardener, housewife, trade, private business and retirement.

Financial problem was the status of adequate or inadequate income to expenditure per monthly. Financial problem was typically caused by debt and money worries. The current study classified the financial problem into adequate income with and without debt and inadequate income with and without debt.

Family members were the number of people who live together even though either significant or not significant in the family and with specifying family members.

Social participation

Social participation referred to the participation of older people to the community about health activities, social activities, tradition and culture activities, praying and meditation before sleep.

Health status

BMI was a measurement of body fat on height and weight. BMI calculation divides an adult's weight in kilograms by height in metres squared.

Underlying disease was the disease that was diagnosed by the physician. The current study classifies into five common non-communicable diseases include DM, HT, Cardiovascular disease, Stroke and Chronic respiratory disease

Activities of daily living was the capacity to do general activities in the daily included feeding, grooming, transfer, toilet use, mobility, dressing, stairs, bathing, bowels, and bladder. Activities of daily living was assessed by Barthel Activities of daily living (ADL) index.

Health perception referred to health problem that are didn't diagnosed by the physician. Elderly was typically experiencing with muscle ache, muscle cramp, acid reflux, constipation, diarrhea, dyspnea, snoring, dysuria, urinary incontinence, awakening night-time during urination.

Depression was the status of mood disorder that results into depressive symptoms. In the current study, depression was assessed by Patient Health Questionnaire-9 (PHQ-9).

Behavior

Caffeine consumption referred to drinking beverages containing caffeine or tea by elderly.

Alcohol consumption referred to drinking beverages containing alcohol by elderly.

Smoking referred to the individual behavior of cigarette use or either its substance use, or electronic cigarette use by elderly.

Secondhand smoked exposure referred to non-smoker exposed to smoke's smog.

Smartphone use on bed referred to the individual behavior of smartphone use during on bed or before sleeping by elderly.

Physical activity referred to body movements produced by muscles that require energy expenditure. Physical activity among elderly was not only hard exercised but also means any activities required moderate and high energy to do additional they had

tried and rapid respiratory rate than normal activity. Physical activity was classified into 3 levels including light intensity, moderate intensity, and vigorous intensity.

Environment factors

Light disturbance was defined as electromagnetic spectrum range from radio waves to gamma rays. Source of light during nighttime may be produced from the television's light, light turned on during sleeping, and light from smartphone use before sleep.

Noise disturbance referred to disturbance sound during sleep. Noise might be resulted from open television, mobile's notification sound, unwanted sound from surrounding during sleep such as house located nearby the factory, airport, train station and bus station.

Ventilation electronics referred to the air circulation by either mechanical or natural ventilation during sleep. The current study classified into the use of a fan, air conditioner and open of a windows during sleep.

Bed comfortable referred to a characteristic of the bed that makes comfortable to sleep well. The current study classified into soft, medium-soft, medium and hard beds.

Chapter II : Literature Review

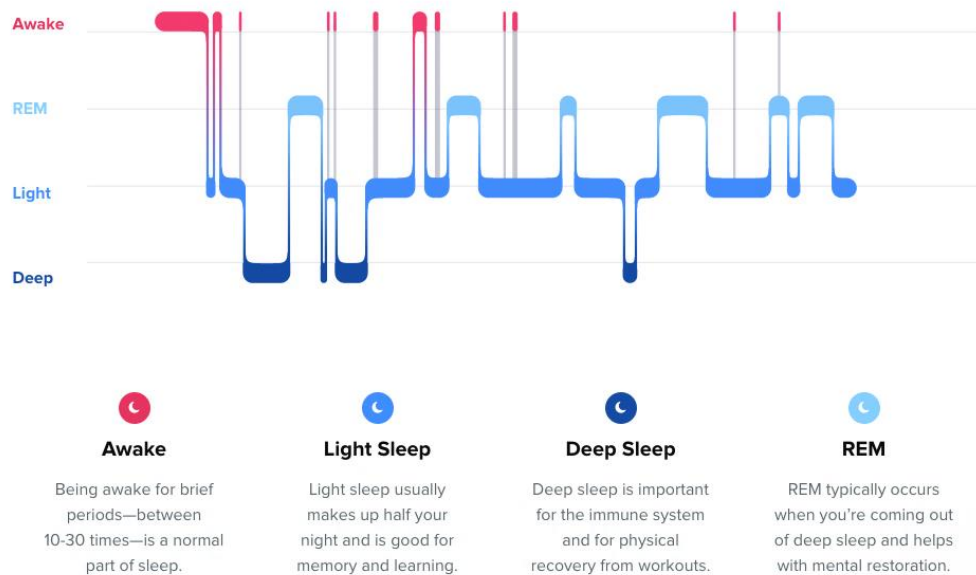
The literature review of “Health Status and Behavior Influences to Sleep Quality among Community-Dwelling Elderly in Chanthaburi Province, Thailand” at Wang-Sapparos Sub-district, Chanthaburi presented as following:

- 2.1 Sleep
- 2.2 Sleep quality and impact
- 2.3 Social participation influences
- 2.4 Health status influences
- 2.5 Behavior influences
- 2.6 Environmental influences
- 2.7 Research related to sleep quality

2.1 Sleep

Sleep refers to the mechanism of brain and body shut down. Sleep was a necessary daily routine for the body to be improved and repaired (1). During early evening and towards the first two hours of the sleep, Melatonin was released and it caused drowsiness until the middle of the night. Guideline of healthy sleep by National Heart Lung and Blood Institute presents two basic types of sleep that included Rapid Eye Movement (REM) sleep and Non- Rapid Eye Movement (Non-REM) sleep. Non-REM sleep was an important period which was affected by strong immune system, digestive system, response to growth hormone release. Non-REM sleep was divided into 3 stages. Stage 1 Non-REM sleep, which was on stage 1 also called “*awake easily*”, muscles twitching or hypnicmyoclonia and slow eye movement occurs during that period. Stage 2 Non-REM sleep is known as “*light sleep*” or true sleep in which eye movement stops, and slow brain waves with occasional bursts of rapid brain waves. This stage holded for half of the night. Stage 3 Non-REM sleep was called “*deep sleep*” and it was difficult to awake in this stage. The brain waves were slow also called Delta waves. Heart rate and respiratory rates were slow and the muscles were quite relaxed and then the stage reached is REM sleep. “*REM sleep*” occured an hour to an hour and a half after sleep. Dreaming always occurred during REM sleep. If a person became

awake at this stage they recognize their dream. The eyes moved rapidly despite the fact the eyelids closed. Respiratory rate became more rapid, irregular and swallowed breathing occurs. Furthermore heart rate and blood pressure was also increased. The musculoskeletal particularly arms and legs muscles became paralyzed. Additionally the penile was erected.



Picture 1 Sleep cycle

National Sleep Foundation (NSF) recommended adequate sleep average 14-17 hours for newborn, two hours to 12-15 hours for infant, one hour to 11-14 hours for a toddler, one hour to 10-13 hours for a preschooler, one hour to 9-11 hours for school-age children, one hour to 8-10 hours for a teenager and for most adults the sleep range does not change at 7-9 hours but when age reaches older adult sleep range was 7-8 hours. Canadian health measures survey recommended sleep duration 7 – 9 hours per night at ages 18 – 64 years and 7 – 8 hours per night for ages 65 or over (4). The American's recommendation to sleep was at least 7 hours per night for 18 – 60 years old to promote health status and quality of life (5).

2.2 Sleep quality

Sleep quality was changed by timely and determinant relevant. The key factor of SQ include: sleeping more time while in bed more than 85%, fall sleep in 30 minutes or less, one or fewer awaking per night, and awake after sleep onset 20 minutes or less. All elements as an appropriate to indicate a good SQ (19). Some subjective of SQ were evaluated as quantitative for example sleep duration, sleep latency, and frequency of awaken (20). There were several studies conducted SQ among general population and patients. A cross-sectional study from China conducted in community centres and in central and western Hong Kong in 2010. SQ was assessed by PSQI with five cut off point indicated poor SQ. Seventy-seven percent individuals were assessed as poor sleepers (6). A study in urban Shanghai almost fifty percent were poor SQ in Chinese elderly and commonly found the higher rate in female than male (6). One study in type 2 DM Chinese investigated SQ and QOL in patients. About 944 patients with type 2 DM were enrolled into the study. Poor SQ was measured by PSQI with 7 cut off point. The result revealed that 33.6% of patients were poor sleepers. Poor QOL related to long duration of DM, a greater number of complication, no alcohol drinking, poor glycemic control, depressive symptom, and anxiety ($p.value < 0.001$) and it influenced by poor SQ (7). Insomnia research in Hunan province of China presented a prevalence of insomnia as 26.6%. Significantly differences were reported in males and females but higher score PSQI in females than males. Moreover the trend had higher scores in rural than urban areas (8). The current study assessed sleep quality condition by using PSQI that indicating poor sleep quality at 5 score.

2.3 Social participation influences

Social relationship referred to relationship of two or more individual. Social relationship can be generated by interaction between two or more people or institution to participate the same activity. For Thai elderly had the right to receive monthly subsistence allowance that was Thai policy of the government. Not only older people but also people with disabled is provided subsistence allowance. Furthermore social interaction can be induced good SQ as the previous researches. Close relationship associated to sleep disturbance and related to SQ(21). Previous study conducted in

being 65 years or more and the result found that there was significantly associated between sleep disorder and perception of social support. Moreover the respondents reported took too long time for falling asleep(22). Consistency with case-control study represented high social support was associated with awaken after onset sleep both non-clinical and clinical groups. Furthermore the social interaction was associated with short period of sleep latency in clinical group(23). QOL also effects to sleep pattern and SQ. The issue can be confirmed by cross-sectional study from China, the study conducted in community centers revealed sleep more than 5.5 hours/night associated with health-related QOL(24, 25). Research that investigated SQ and QOL in DM patients. Social relationship and overall quality domains were significantly associated with SQ, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. Whilst poor QOL was related to longer duration of diabetes, a greater number of complications, no alcohol drinking, poor glycemic control, depressive symptom, and anxiety (p.value< 0.001) and it influenced poor sleep quality (7). The current study investigated participation of health activities, social activities, traditional and cultural activities, praying and meditation before sleep.

2.4 Health status influences

The association between sleep and health was essential to surveillance. Patients of chronic diseases had experiencing with sleepless and results to weakness, fatigue, and others imbalanced metabolism system. Chronic diseases related sleepless including DM, HT, heart disease, kidney disease. Moreover people with psychological disorder was abnormal mental health. They took sleep medication to engage fall asleep. There were three researches conducted about sleep duration and chronic diseases. Firstly sleep deprivation study, conducted among healthy subjects to examine psychological changes and trigger diseases. For instance, the finding as sleep deprivation associated with stress, high blood pressure, and high sugar level in blood. Secondary cross-sectional study, examine the sleep habits and particular chronic disease at the same time. The study found that sleep duration related to obesity, DM, and HT. Lastly, the observational confirmed by the longitudinal study conducted in health volunteer and follow-up long term sleep habits which it associated to

development of chronic medical disease (26). Research found that among DM patients' BMI was highest with 25.2 in those individuals who slept for less than or equal 5 hours per night and 10% of them wear always snoring. Short sleep duration was known to influence raise in DM diagnosis (27). Centers for disease control and prevention (CDC) reported the association sleep and chronic disease including DM, cardiovascular disease, obesity, and depression. Research had found that inadequate sleep led to type 2 DM development. Hemoglobin A1c level was predicted by sleep duration and SQ. Furthermore research recommended to optimal sleep for engaging sugar level control in type 2 DM (3). CDC reported people is diagnosed as HT, stroke, coronary heart disease, and others people with cardiac arrhythmias have common found sleep disorder and sleep apnea. Likewise sleep apnea seem as one of cardiovascular disease's marker(28). Sleepless significantly correlated to high BMI (2). Several experimental studies were conducted to find out the relationship between sleep duration and metabolic problem. The finding was confirmed that sleep of 4 hours was associated 40% glucose tolerance reduction with intravenous glucose and another 30% reduction in acute insulin response to glucose (3). The Keokuk Country Rural Health Cohort Study conducted the study related to community-based, environmental, occupational, and general health in the rural area. The goal was to determine whether sleep duration are related to BMI and obesity by conducting a cross-sectional study. The finding presented average BMI of 29.5 reached criteria of class I obesity. Moreover those slept less than 6 hours regularly (2). The current study investigated underlying disease, BMI, activities of daily living, health perception, and depression.

2.5 Behavioral influences

Key determinant of most disease related to poor health behavior. SQ also depend on behavior including caffeine drinking, alcohol drinking, physical activity, smoking, and smartphone use. Caffeine drinking was popular around the world among adolescent till older people. Caffeine was the central-nervous-system stimulant. It blocked the receptor of adenosine action to prevent sleepiness. Therefore mostly people drink in the morning in order to alert during the day and difficult to fall asleep in the night time. At normal level intake, caffeine effects on memory and learning but engages the power in moderate dese (29). From National Health and Nutritional

Examination Survey the consumption of caffeine and difficult falling asleep. Average slept 6.8 hours whilst insomnia prevalence as 28.4%. Caffeine drinking was likely to difficult fall asleep. Moreover sleep duration significantly associated to insomnia for adjusted and unadjusted analysis (30). Alcohol beverages basic knows as beer, wine, cider, mead, and pulque. NSF report over 20% American drink alcohol beverages to engaged fall asleep.

Actually drinking of alcohol before bedtime related to slow-wave sleep pattern known as delta activity, at the same time brain pattern or alpha activity was turned on. The interaction of alpha and delta activity might inhibit restorative sleep. Furthermore alcohol interfere circadian rhythm. Drinker will wake up during nighttime. It was confirmed by explanation study found that the (chemical production in the body was interrupted and stimulate sleepiness for a long daytime. In addition alcohol inhibited REM sleep. Drinker was possible feeling to unfocused and screwed. Longitudinal study assessed sleep duration and SQ in children and follow up alcohol and cannabis use in lifetime. The finding presented sleep duration and SQ were associated to multiple earlier substance use. Sleepless was associated with earlier use and repeated alcohol and cannabis use. Analysis of SQ found that poor SQ was associated with earlier alcohol, cannabis use and repeated use (31). Additionally frequency of alcohol drinking was likely to predict initial insomnia (32).

New study recommended if people exercise at least 150 minutes once a week, they will sleep better. National Sleep Foundation reported over 2,600 men and women aged 18 – 85 years did physical activity at least 150 minutes of moderate to vigorous activity once a week. Moreover 65% of them had developed SQ and less nap during the day (33). Cross-sectional study in multiple sclerosis revealed awaken after slept onset positive correlated with light, moderate, and moderate vigorous physical activity(34). Quasi-experimental study conducted moderate-intensive exercise program for 12 months or general education program among adult 55 or over. The fining represented that the participant in the intervention group had SQ better than control group(35). The results was consistency with smoker, research found that 64% of REM sleep disorder had smoked (36). Analytical study represented people who current smoked and smokeless cigarette use 2.21 times to sleep less when compared to non-smoker and

non-smokeless cigarette use. In addition there was higher risk to sleep less among second-hand smoked exposed than those without (37).

Nowadays electronic devices was popular in all age groups. Poor using electronic used is also effect to body system. Electronic devices using before sleep stimulate brain sensitivity and impact to sleep disorder. In the present there were many electronic devices such as smartphone, tablets, laptops, etc. it exactly effected to suppress melatonin releasing and difficult to fall asleep. Previous studied at Mexico adolescents 81.58% reported use smartphone during on bed. 29.03% informed that smartphone interrupts sleep and 25.81% had long time to fall asleep after used smartphone (38). The current study examined frequency of caffeine drinking, alcohol drinking, smoking, secondhand smoked, smartphone before sleep, physical activity (light, moderate, and vigorous physical activity).

2.6 Environmental influences

The bedroom environment influences to sleep in all age groups. NSF presented affect senses surrounding inside bedroom including see, noise, hear, touch, smell, and taste. The best environment creates a good sleep. A great night's sleep depend on the visual conditions in bedroom environment. The central circadian clock in the brain is received a signals which is activated once the visual is perceived from light. Sleep duration and the homeostatic effects to inadequate or adequate sleep. Homeostatic mechanisms is pathway that assist normalize the body consisted of balancing of body temperature, body fluid composition, blood sugar level, blood pressure, and gas concentration. A pathway is influenced by bright light activates hormones secretion which is melatonin. Melatonin as the natural hormone which made by the pineal of body. It is located above the middle of brain. The pineal is inactivated in the daytime but once the sun or artificial light goes up, the pineal is turned on and then melatonin is released into the blood (39). In the opposite, dim to bright light inhibits secretion of melatonin(40). One study about fluorescent light with colours significantly impacted circadian physiology and cognitive performance (41). From NSF survey found that 73% of Americans sleep in dark room as the significant to a good night's sleep. From the poll presented average sleep duration was 6 hours and 44 minutes for work night and 7 hours and 35 minutes for non-work night (19).

Not only the visual perception effected to sleep disturbances but the auditory stimuli also. During awake and stage Non-REM, bilateral stimulation in auditory cortex, thalamus, and caudate are produced. In addition to the brain activation associated to auditory stimulation (42). The sound surrounding alert the brain and disturbs sleep. Even though slept 7 – 9 hours but still drowsy when awake that it is likely to disturb from the noise. Sources of noise come from white noise such as sound of air conditioner, a fan, and door slamming. Family noise is a one determinant that mention by NSF. For family is having children, the appropriate time for kids as between 7.00 to 8.00 p.m. Before fall asleep at least 30 minutes should make a soft music, turn off the light, and keep television out of children's room. However the parents might be disturbed and then awake by children's sound. Moreover sleep partner's sound for example snoring and wriggle. From The Sleep America Poll report that 74% sleep with a quiet bedroom is essential for good night's sleep. A little rate 5% of white sound from air conditioner disturbed during sleep (19).

The weather as also important to sleep. Normally the body temperature reduces while sleeping. Therefore the regular humidity in bedroom's environment is essential too. The air conditioner can assist to reduce the excess moisture if it is operated in warm temperature. However the fan can be used instead of air conditioner. Opening fan to airflow and diminish moisture out of the air. However too less humidity is not proper for sleep. Dry air is common causes irritated nasal, sneezing, and stuffy nose. Moreover might cause bacteria or virus growth. Asthma patient's symptoms always occurs during nighttime due to airway constricts then inflames moreover results to coughing, wheezing, and breathlessness which disturbed their sleep (43). The current study considered light disturbance, noise disturbance, ventilation electronic, and bed characteristic.

2.7 Research related to sleep quality

Cross-sectional study from China, The study conducted in community centers and central and western Hong Kong in 2010. Sleep quality was assessed by PSQI with five cut off point indicated to poor SQ. Seventy-seven percentages had assessed as poor sleepers. Sleep more than 5.5 hours/night associated with health-related QOL.

Emotional, physical function. Health problems about muscle pain were significantly associated good sleepers in different age group (6).

A study in urban Shanghai elderly recruited older aged more than or equal 60 years completed PSQI and socio-demographic questionnaires. The result found that high almost fifty percentages had poor SQ. It was significantly with aged increasing (OR=1.03, 95%CI=1.01 – 1.05, p.value<0.001), less education duration (OR=1.04, 95%CI=1.01 – 1.08, p.value=0.014), living alone (OR=1.62, 95%CI=1.02 – 2.58, p.value=0.04), anxiety (OR=1.09, 95%CI=1.05 – 1.12, p.value<0.001), number of chronic disease (OR=1.18, 95%CI=1.07 – 1.30, p.value=0.14), and arthritis (OR=1.45, 95%CI=1.05 – 2.01, p.value=0.025) (6). Insomnia research in Hunan province of China presented a prevalence of insomnia as 26.6%. Significantly difference was found in male and female but high score PSQI higher in female than male. Insomnia associated with female, older age, high education level, unmarried, living in the rural area (8). One study in Type 2 DM Chinese investigated SQ and QOL in patients. 944 patient type 2 DM was enrolled into the study. General characteristic and laboratory testing were measured by questionnaire and SQ measured by PSQI with 7 cut off point indicated poor SQ. The result revealed that 33.6% of patients were poor sleepers to PSQI. Social relationship and overall quality domains were significantly associated with SQ, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Poor QOL was related to longer duration of diabetes, a greater number of complication, no alcohol drinking, poor glycemic control, depressive symptom, and anxiety (p.value<0.001) and it influenced to poor SQ (7).

Insomnia research in Hunan province of China presented a prevalence of insomnia as 26.6%. Significantly difference was found in male and female but high score PSQI higher in female than male. Moreover tends high scores in rural than urban areas. Insomnia associated with female, older age, high education level, unmarried, living in the rural area (8).

A cross-sectional study in Taiwan investigated the association between poor SQ and BMI. The study found that 20.9% had a sleep disorder. Factors significantly associated with sleep disorder were current smoking and working night shifts. There was no statistically significant association between BMI and SQ (12).

The patients with hypertension associated insomnia and sleep in short duration. Therefore the previous study had investigated SQ in 222 resistant HT patients by PSQI five cut off point indicated poor SQ. Finding was 38.2% had poor SQ in general population. Resistant HT associated with poor SQ, raised sleep latency, and declined sleep efficiency. The resistant HT women group had higher poor SQ than non-resistant HT women (9).

New risk factor for cardiovascular disease is a sleep disorder. One cohort study conducted in cardiovascular patients to investigate factors related to poor SQ found 43% patients were measured to poor SQ by PSQI at five scores. The factors contributed to poor SQ included female sex and solitary living status. Poor SQ was related to higher depression especially females than males when adjusting for patient background, medical risk factors, and laboratory data. Moreover the previous study measured anxiety symptom presented anxiety associated with poor SQ in a patient without coronary artery diseases (10). The finding was 65.2% and 34.8% were measured to healthy and poor sleep duration. 11.8%, 23.0%, 29.5%, 27.7%, 4.4%, and 3.6% reported sleep less than 5 hours, 6 hours, 7 hours, 8 hours, 9 hours, and more than 10 hours. A low significantly association to non-Hispanic blacks, American Indians/Alaska Natives, Native Hawaiians/Pacific Islanders, and multiracial sample compared with non-Hispanic white, Hispanics, and Asians for aged adjusting. Additionally high healthy sleep prevalence associated respondents with aged more than 65 years old, employed, college degree of higher, and married respondents(5).

A Japan study conducted in white-collar employees marketing at Telecommunications Company in Tokyo metropolitan area. Thirty to forty-five percent poor SQ resulting from demographic included age and gender. Moreover respondents with perceived stress, dissatisfaction from job, unmarried, uncomfortable bedroom conditions, low academic attainment, younger age, and HT had a high risk of poor SQ (44).

Chapter III : Research Methodology

According to conceptual framework and literature review can determine study design in entitle “Health Status and Behavior Influences to Sleep Quality among Community-Dwelling Elderly” by defined independent and dependent variables, hypothesis, population and sample size, instruments, data collection, data analysis, and ethical consideration to assess poor sleep quality and identify subjective of health status, behavior, social relationship, and environment factor associated to poor sleep quality among Wang-sapparos community-dwelling elderly.

3.1 Research design

This study design as a cross-sectional study

3.2 Study setting

Wang-sapparos Sub-district was chosen purposively as a study setting. Wang-sapparos Sub-district located in Khung District, Chanthaburi province in the East of Thailand. Wang-sapparos Sub-district consisted of 9 communities including Ban-Satoy, Ban-Jungkin, Ban-Tunhan, Ban-don, Ban-royru, Ban-Tumlungtong, Ban-nongbua, Ban-nongkwang, and Ban-Tokpok. The main occupation was gardener. So many older people were working even though they had high aged. In additional, in the harvest season March to July, they always were sleepless and some people use sleep medication. Therefore the available time to collect data held on 9 am. to 4 pm.

3.3 Study period

The study period was approximately from January 2018 to August 2018

3.4 Study population

The study population included elderly people aged ≥ 60 years-old living in Wang-sapparos Sub-district. From official statistics registration system updated in December 2016 had recorded 430 older people

Sample size calculated by formula of Taro Yamane at the confident interval 95% as following:

$$n = \frac{N}{1 + Ne^2}$$

n = Sample size

N = Total population

e = For error of random sampling, determined that 5 % or 0.05

In the formula

$$n = \frac{430}{1 + 430(0.05)^2}$$

$$n = 207.23$$

For sample calculation by Taro Yamane got 208 sample size.

Eligibility criteria

Inclusion-exclusion criteria were applied to select the appropriate sample to response the study's objective.

3.4.1 Inclusion criteria

1. Age \geq 60 years-old both male and female
2. Living in Wang-sapparos community and had registered in house registration
3. Understand and answer the questionnaire in Thai language
4. Willing to participate and write consent form

3.4.2 Exclusion criteria

Those people who do not meet the above-listed inclusion criteria will be excluded from the study. The exclusion criteria as follows:

1. People who were diagnosed with psychological disorder and/or taking some psychological drug.
2. People who were Obstructive Sleep Apnea diagnosis
3. People who had surgery respiratory system
4. People who were taking melatonin
5. People with hearing loss

6. Severely ill people who had difficulty in answering the questionnaire

Sampling technique

This study applied Multi-stage sampling to selected the participant. Every elders had a equal chance to be the participant.

Probability sampling by Stratified Sampling from 9 communities, calculated Proportional Stratified Sampling as following:

$$n = \frac{\text{Number of elders in each community} \times \text{Sample size}}{\text{All edlers in Sub-district}}$$

Ref: Boonchai Srisatidnarakul

Table 1 Sample size of each communities

Community	All elders	Sample size
Ban Satoy	45	21
Ban Jungkin	45	21
Ban Tunhan	69	34
Ban Don	59	29
Ban Royru	42	20
Ban Tumlengtong	48	24
Ban Nongbua	50	24
Ban Nongkwang	44	21
Ban Tokpok	28	14
Total	430	208

The researcher reviewed a list of names that dwelling elderly which was used to apply in **Systematic random sample**. The first name was selected to be the first participant. Sampling interval was population/sample size equal 2. Therefore every two person were selected to be the participant. Furthermore the sample was screened by inclusion-exclusion criteria as following:

3.5 Instruments

Instrument to collect the data as a questionnaire. The questionnaire consisted of 6 parts to assess poor sleep quality and identify subjective of health status, behavior, social participant, and environment factor associated with sleep quality among Wang-sapparos community-dwelling elderly as follows:

Part 1 Socio-demographic

1.1 Age

1.2 Marital status was classified into single, married, separated, divorced, and widowed.

1.3 Religion was classified into Buddhism, Christianity, Islam, and other with specify.

1.4 Education level was classified into not educated, primary and secondary school, high school, vocational certificate and diploma, bachelor's degree, and more than bachelor's degree.

1.5 Occupational was classified into employment, agriculture/gardener, housewife, trade, private business, and retirement.

1.6 Financial problem was classified the financial problem into adequate income with and without debt and inadequate income with and without debt.

1.7 Family members were people who live together even though either significant or not significant in the family. It was classified into living alone, parents, husband/ wife, and relatives

Part 2 Social participation

2.1 Social participation was the participation of older people to the community about health activities, social activities, religion and culture activities, praying, and meditation before sleep. Social participation was responded by always, sometimes, and rarely/never.

Part 3 Health status

3.1 BMI was calculated by an adult's weight in kilograms by height in metres squared. Weight was measured by Weighing scales. Height was measured by Height Measuring Scales. Weight and Height were measured by the principal research and assistants

3.2 Underlying disease was classified into five commons Non-Communicable Diseases includes Diabetes Mellitus, Hypertension, Cardiovascular disease, Stroke, and Chronic respiratory disease

3.3 Medication for underlying disease was classified into No and Yes

3.4 Activities of daily living assessment was measured by Barthel ADL index. The questions are about general activities capacity including feeding, grooming, transfer, toilet use, mobility, dressing, stairs, bathing, bowels, and bladder. Daily living activities is categorized into 3 level as Independent Living (score 12 or over), Minor help (score 5 - 11), and Dependence living (score 0 – 4).

3.5 Health Perception consisted of 4 health perception include 1. Musculoskeletal problem perception i.e. muscle pain or muscle cramp before or during sleep. 2. Gastrointestinal problem perception i.e. acid reflux constipation, diarrhea, and dyspnea. 3. Respiratory problem perception i.e. obstructive sleep apnea or snoring during sleep. 4. Excretory problem perception i.e. dysuria, urinary incontinence, awakening night-time for urination. All questions were responded by Rarely/never, Sometimes, and Often.

3.6 Depression was assessed by PHQ-9. PHQ-9 was the instrument to screen depressive symptom in the primary care. PHQ9 was translated into the Thai language. There were 9 items with responses on 4 Likert scale; near every day-3, more than haft of the days-2, Several days-1, and Not at all-0 (45). From Department of Mental Health, Ministry of Public Health, Thailand recommends cut off score <7 no depression, 7-12 mild depression, 13-18 moderate depression, and ≥ 19 severe depression.

Part 4 Behavior

4.1 Caffeine drinking was classified into Never, Former, and Current. Drinking duration and amount of glasses per week are interviewed among those former and current.

4.2 Alcohol drinking was adapted from Department of Health, Ministry of Public Health, Thailand. It was classified into Never, Former, and Current. Drinking duration and amount of glasses per week are interviewed among those former and current.

4.3 Smoking was adapted from Department of Health, Ministry of Public Health, Thailand. It was classified into Never, Former, and Current. Smoking duration and amount of cigarette per week are interviewed among those former and current.

4.4 Secondhand smoked exposure referred to non-smoker exposed to smoke's smog in the past 7 day. It is classified into never, sometimes, always.

4.5 Smartphone use on the bed was classified into non-use and use. Smartphone using duration before fall asleep is interviewed among those regular use.

4.6 Physical activity was adapted by Thailand Recommendations on Physical Activity, Non-Sedentary Lifestyles and Sleeping for Elderly (Age 60 years and over) from Department of Health, Ministry of Public Health, Thailand. The questions asked the frequency of physical activity. The assessment divided into 3 level including light intensity, moderate intensity, and vigorous intensity. Physical activity is responded on 3 categories have never, sometimes, and always.

Part 5 Environment factors

5.1 Light disturbance during sleep was classified into No and Yes

5.2 Noise disturbance during sleep was classified into No and Yes

5.3 Ventilation electronic that were used for ventilation during sleep which was classified into a fan, air conditioner, and open the window.

5.4 Bed comfortable was classified into soft, medium-soft, medium, and hard beds.

Part 6 Sleep Quality Assessment

Sleep quality was measured by PSQI. PSQI was an effective instrument to assess sleep quality in both general population and patients. PSQI consisted of ten main items to evaluate seven components include sleep quality, sleep latency, sleep duration, habitual sleep efficacy, sleep disturbances, sleep medication use, and daytime dysfunction over the last month. Sum score of all components will be calculated as sleep quality.

Question #1: When do you usually go to bed?

Question #2: How long (in minutes) has it taken you to fall asleep each night?

Question #3: What time have you usually get up in the morning?

Question #4: A. How many hours of actual sleep did you get at night?

B. How many hours were you in bed?

Question #5a – #5j: During the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes, wake up in the middle of the night or early morning, have to get up to use the bathroom, cannot breathe comfortably, cough or snore loudly, feel too cold, feel too hot, have bad dreams, and have pain.

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Question #6: How would you rate your sleep quality overall during the past month?

Response	Score
Very good	0
Fairly good	1
Fairly bad	2
Very bad	3

Question #7: How often have you taken medicine to help you sleep during the past month?

Response	score
-----------------	--------------

Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Question #8: How often have you had trouble staying awake while driving, eating meals, engaging in the social activity during the past month?

Response	Score
Never	0
Once or twice	1
Once or twice each week	2
Three or more twice times each week	3

Question #9: How much of a problem has it been for you to keep up the enthusiasm to get things done during the past month?

Response	Score
No problem	0
Only a very slight problem	1
Somewhat of a problem	2
A very big problem	3

Question #10: Do you have a roommate or a resident of the same house?

Ten questions will be responded on 4 Likert scale: Not during the past month-0, Less than once a week-1, Once or twice a week-2, and Three or more times a week-3. The effective cut off point as 5 that ≥ 5 indicates poor sleep quality.

3.6 Data interpretation

As mention PSQI consisted of seven components included sleep quality, sleep latency, sleep duration, habitual sleep efficacy, sleep disturbances, sleep medication use, and daytime dysfunction over the last month. Sum scores of all components calculated as sleep quality.

Component 1: Subjective sleep quality; Question #6 is assigned scores as 0-very good, 1-fairly good, 2-fairly bad, and 3-very bad.

Component 2: Sleep latency; Sum score of Question #2 and Question #5a are assigned score following:

Sum of #2 and #5a	Component 2 score
0	0
1 – 2	1
3 – 4	2
5 – 6	3

Component 3: Sleep duration; Question #4 is assigned scores as following:

Response	Component 3 score
>7 hours	0
6 – 7 hours	1
5 – 6	2
<5 hours	3

Component 4: Habitual sleep efficiency; is calculated by (Number of hours slept/Number of hours spent in bed) x 100 = Habitual sleep efficiency (%). Component 4 score as following:

Habitual sleep efficiency %	Component 4 score
> 85%	0
75 – 84%	1
65 – 74%	2
< 65%	3

Component 5: Step disturbances; examine Question #5b – 5j and assign scores as following:

Sum of #5b – 5j	Component 5 score
0	0
1 – 9	1
10 – 18	2
19 – 27	3

Component 6: Use of sleeping medication; examine Question #7 and assign scores as follows:

Response	Component 6 score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Component 7: Daytime dysfunction; Sum score of Question #8 and Question #9 are assigned score following:

Sum of #8 and #9	Component 7 score
0	0
1 – 2	1
3 – 4	2
5 – 6	3

Sum score of all components were measured as sleep quality:

Score	Sleep quality
< 5	Good sleep quality
≥ 5	Poor sleep quality

3.6 Validity

The questionnaire was adapted by significantly finding from previous studies and standardize existing questionnaire which was validated assessment by the experts. However, the current questionnaire was modified according to study area and population. IOC was done to assess the internal consistency by Assoc. Prof. Ratana Somrongthong, Ph.D. experienced in community assessment and reproductive health filed, College of Public Health Science, Chulalongkorn University. Asst. Prof. Nutta Taneepanichskul, Ph.D., experienced in sleep quality assessment and environment and occupational health, College of Public Health Science, Chulalongkorn University. Phitsanuruk Kanthawee, Ph.D. experienced in community assessment, School of Health Science, Mae Fah Luang University. IOC value is 0.95

3.7 Reliability

A Cronbach's alpha for scale reliability was used to test the internal consistency with 30 participants to detect the questionnaire's problems, unavailable's question, inability to interview, and preparing research process. A reliability coefficient of .70 or higher was considered "acceptable". The alpha coefficient for overall items was 0.726

3.8 Data collection

Data collection was done by face to face interview at respondent's convenience by the researcher and assistants. The collection of data comprised of following steps:

1. Village health volunteers those who had to experience in the field of elderly social and understanding of the study expectation were hired as assistants.

2. Training was provided by the principal researcher with the aim to develop the skill to conduct interviews. The principal researcher described the information sheet, informed consent form, and questionnaire to assistants.

3. Principal researcher advertised the study by using the poster. The poster held at every community halls.

4. The sample was randomized according to a list of elderly who registered to receive the elderly allowance from Wang-sapparos Sub-district Administration Organization.

5. Principal researcher and assistants reached to the resident of older people who was selected to be the sample by systemic random technique

6. Principal researcher and assistants provided the research information, research objective, data collection. In addition, Principal researcher and assistants informed to the participant whether they are voluntary and willing to participate in this study. The participants had to sign the inform consent form. However, the participants can withdraw from the study at any time without impact to elderly allowance. Additionally, the data from interviewing will be confidentiality and show the result as the overview.

7. The questions were asked in the Thai language to the participants with quality control by researcher or assistants

8. Each participant was interviewed for about 20 – 30 minutes.

9. The researcher and assistants checked the questionnaires to ensure that all questions were answered.

3.9 Data analysis

The completed respondents included in data entry for analysis. The researcher verified the complete and accurate then entry data into SPSS Software Version 20 Windows by coding. The descriptive statistic will be done as the following table:

3.9.1 Descriptive statistic:

The descriptive statistic was used to describe the independents variables include socio-demographic, social relationship, health status, the behavior of participants, and environment factor from data collection by frequency, percentage, mean, and S.D.

Table 2 Descriptive statistic with variables

Variables	Measurement scale	Descriptive statistic
Socio demographic		
Gender	Nominal scale	Frequency, Percentage
Age	Ratio scale	Mean, S.D.
Marital status	Nominal scale	Frequency, Percentage
Religious	Nominal scale	Frequency, Percentage
Occupational	Nominal scale	Frequency, Percentage
Education level	Nominal scale	Frequency, Percentage
Financial problem	Nominal scale	Frequency, Percentage
Family members	Nominal scale	Frequency, Percentage
Social participation		
Health	Ordinal scale	Frequency, Percentage
Social	Ordinal scale	Frequency, Percentage
Regional and culture	Ordinal scale	Frequency, Percentage
Health status		
BMI	Nominal scale	Frequency, Percentage
Underlying disease	Nominal scale	Frequency, Percentage
Medication for underlying	Nominal scale	Frequency, Percentage

disease		
Activities of daily living	Ordinal scale	Frequency, Percentage
Health perception	Nominal scale	Frequency, Percentage
Depression	Ordinal scale	Frequency, Percentage
Behavior		
Caffeine consumption	Nominal scale	Frequency, Percentage
Alcohol consumption	Nominal scale	Frequency, Percentage
Smoking	Nominal scale	Frequency, Percentage
Secondhand smoked exposure	Nominal scale	Frequency, Percentage
Smartphone use on bed	Nominal scale	Frequency, Percentage
Physical activity		
Environmental factor		
Light	Nominal scale	Frequency, Percentage
Noise	Nominal scale	Frequency, Percentage
Ventilation electronic	Nominal scale	Frequency, Percentage
Bed comfortable	Nominal scale	Frequency, Percentage

3.9.2 Inferential statistic:

The researcher tested normal distribution of the continuous variables before analyzes data. It was categorized into poor and good quality levels. Therefore sleep quality was categorical variable. Bivariate and multivariate analysis were used to examine the association between independent variables and dependent variable.

Bivariate analysis was two variables were analyzed together for any possible association. Categories variables were tested the association by Chi-square or Fisher's exact test if the cells were less than 20% with a statistical significance level of less than .05 regardless test of the normal distribution. Whilst continuous variables was tested by Mann–Whitney U test (Age).

Multivariate analysis was used to find out multiple independent variables were analyzed together for any possible association at a time. Since dependent variable, poor and good sleep quality level were coded to dichotomous variable 0 = good sleep quality and 1 = poor sleep quality then Multivariable logistic regression was used.

Table 3 Inferential statistic with variables

Independent Variables	Dependent Variables	Bivariate Analysis	Multivariate Analysis
Socio demographic Gender Age Marital status Religious Occupational Education level Financial problem Family members	Poor and good Sleep quality levels	Chi-square Fisher's exact test (if the cells are less than 20%) Independent t-test (normal distribution) Mann-Whitney U test (non- normal distribution)	Multivariable logistic regression
Social participation Health Social Traditional and cultural Praying before sleep Meditation before sleep	Poor and good Sleep quality levels	Chi-square Fisher's exact test (if the cells are less than 20%)	Multivariable logistic regression
Health status BMI Underlying disease Medication for underlying disease	Poor and good	Chi-square Fisher's exact test	

Activities of daily living Health perception Depression	Sleep quality levels	(if the cells are less than 20%)	Multivariable logistic regression
Behavior Caffeine consumption Alcohol consumption Smoking Secondhand smoked exposure Smartphone use on bed Physical activity	Poor and good Sleep quality levels	Chi-square Fisher's exact test (if the cells are less than 20%) Independent t-test (normal distribution) Mann-Whitney U test (non-normal distribution)	Multivariable logistic regression
Environmental factor Light Noise Ventilation electronic Bed comfortable	Poor and good Sleep quality levels	Chi-square Fisher's exact test (if the cells are less than 20%)	Multivariable logistic regression

3.10 Ethical consideration

This study “Health Status and Behavior Influences to Sleep Quality among Community-Dwelling Elderly in Chanthaburi Province, Thailand” was reviewed and approved by The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University (CoA No. 160/2018).

The current study was the cross-sectional descriptive study design. Data was collected by face to face interview. The instrument was questionnaire without intervention. Moreover, there was no history of the serious adverse event from the similarly previous studied. In addition to the researcher and assistants kept the participant's confidentiality. The researcher and assistants respect human being, the

participant had the rights to withdraw from the study whenever without providing reasons and there was no any effect to a human being. The aim of this study was to assess and investigate the influencing factors of poor sleep quality. The present study was carried out in order to promote and support proper sleeping among elderly through health education and intervention.



Chapter IV: Results

The research was a cross sectional study. The main objective of this study was to identify the factors associate with sleep quality among Community-Dwelling Elderly in Chanthaburi Province, Thailand. Data collection by the interview according to questionnaire. Sample size was 208 older people aged 60 years or more who were living in Wang-sapparos community. The data was analyzed by descriptive statistic and inferential statistic. The results shown six parts as following to conceptual framework; socio-demographic, social participation, health status, behavior, environment exposure, and sleep quality assessment.

Part 1 Socio-demographic

Table 4 Socio-demographic of elderly (n=208)

Socio-demographic	Number	Percent
Gender		
Male	76	36.5
Female	132	63.5
Age	72.01 ± 8.862	
	60 – 97	
Marital status		
Single	12	5.8
Married	112	53.8
Divorce	16	7.7
Widow	61	29.3
Separate	7	3.4
Religion		
Buddhism	207	99.5
Christianity	0	0.0
Islam	1	0.5

Socio-demographic	Number	Percent
Education level		
Not educated	15	7.2
Primary level	185	88.9
High school	5	2.4
Diploma	0	0.0
Bachelor's degree	3	1.4
Higher than Bachelor's degree	0	0.0
Occupation		
Employee	14	6.7
Agricultural	120	57.7
Wife house	51	24.5
Trade	13	6.3
Private business	6	2.9
Retired	4	1.9
Financial problem		
Sufficient income without debt	81	38.9
Sufficient income with debt	67	32.2
Insufficient income without debt	22	10.6
Insufficient income with debt	38	18.3
Family partner		
Living alone	21	10.1
Parents	11	5.3
Husband wife and children	161	77.4
Relatives	15	7.2

As Table 1 showed Socio-demographic of 208 elderly, found that mostly 63.5% were female and 36.5% were male. Average aged of the participants was 72 years old. Most of them were in normal condition. More than 50% of participants were married, 29.3% were widow, divorce, separate and single accordingly. A majority religion of participants was Buddhism which was about 99.5% and there was only a person whom was Islam. The study showed that most of participants were not well-educated, more

than 80% were in primary level and 7.2% in not educate whereas there was only 2.4% in high school and 1.4% in Bachelor's degree. In addition to the education level, it led to the occupations which more than half of the participants are agricultural, 24.5% are wife house and the rest are employee, trade, private business and retired consequently.

In term of financial problem, more than 60% tend to have sufficient income which it can be classified into sufficient income without debt about 38.9% and sufficient income without debt about 32.2%. On the other hand, an estimated 28.9% of respondents have insufficient income. More than 70% of the family partner are husband, wife and children then 10.1% of respondents indicated living alone.

Part 2 Social participation

Table 5 Social participation of elderly (n=208)

Activities participation	Number	Percent
Health participation		
Always	51	24.5
Sometimes	125	60.1
Rarely/ Never	32	15.4
Social participation		
Always	32	15.4
Sometimes	132	63.5
Rarely/ Never	44	21.2
Traditional and cultural participation		
Always	65	31.3
Sometimes	117	56.3
Rarely/ Never	26	12.5
Praying before sleep		
Always	52	25.0
Sometimes	101	48.6
Rarely/ Never	55	26.4

Activities participation	Number	Percent
Meditate before sleep		
Always	15	7.2
Sometimes	71	34.1
Rarely/ Never	122	58.7

Part 2 social participation, in this section showed the participants get involved in any activities. It seems that they participated in health activity and social activity in both traditional and cultural some time which showed about 60.1% and 63.5% accordingly. The number showed that an estimate 48.6% of respondents will pray before sleep some time, but most of them are rarely or never meditated before sleep as the number showed 58.7%.

Part 3 Health Status

Table 6 Health status of elderly (n=208)

Health status	Number	Percent
Body Mass Index		
Underweight (< 18.5)	28	13.5
Normal (18.5 – 22.9)	97	46.6
Pre-obese (23.0 – 24.9)	28	13.5
Obese I (25.0 – 29.9)	46	22.1
Obese II (\geq 30)	9	4.3
Underlying diseases		
Yes	101	48.6
No	107	51.4

Health status	Number	Percent
Diseases		
Diabetes Mellitus	29	13.94
Hypertension	82	39.42
Cardiovascular diseases	19	9.13
Stroke	10	4.81
Respiratory tract diseases	19	9.13
Kidney disease	9	4.33
Liver disease	5	2.40
Dyslipidemia	4	1.92
Musculoskeletal diseases	2	0.96
Hyperthyroidism	2	0.96
Cancer	2	0.96
Health care service		
Health Promoting Hospital	39	38.61
District hospital	32	31.68
Provincial hospital	21	20.79
Private hospital	9	8.91
Activities of daily living		
Independent living	201	96.6
Minor-help	7	3.4
Dependent living	0	0.0
Musculoskeletal problem perception		
Always	17	8.2
Sometimes	97	46.6
Rarely/ Never	94	45.2
Bowel problem perception		
Always	6	2.9
Sometimes	76	36.5
Rarely/ Never	126	60.6

Health status	Number	Percent
Respiratory problem perception		
Always	5	2.4
Sometimes	63	30.3
Rarely/ Never	140	67.3
Bladder problem perception		
Always	6	2.9
Sometimes	56	26.9
Rarely/ Never	146	70.2
Depression		
No depression	150	72.1
Mild depression	57	27.4
Moderate depression	1	0.5
Severe depression	0	0.0

Part 3 health status, Body Mass Index (BMI) indicated that 46.6% of participants are normal whereas some of them were in obese I condition about 22.1%, underweight and pre-obese got the same number which is 13.5%. There were about half of them (50.1%) had underlying disease. Mostly 39.42% were hypertension, 13.94% were diabetes mellitus and 9.13% were cardiovascular disease and respiratory tract disease. The most popular of the health care service was health promoting hospital about 38.61%, 31.68% was district hospital and 20.79% was provincial hospital. The survey showed that 96.6% of the activities of daily living was independent living and 3.4% was minor-help. In term of health problems, an estimated 54.8% had muscle problems, 46.6% of participants had bowel problem sometimes, 67.3% of participants rarely or never had respiratory problem and about 70% of them were rarely or never had bladder problem. More than 70% of participants lived without depression and only 27.4% lived with mild depression.

Part 4 Behavioral

Table 7 Behavioral of elderly (n=208)

Behavior characteristics	Number	Percent
Caffeine drinking		
Never	132	63.5
Former	17	8.2
Current	59	28.4
Duration of caffeine drinking (year)	20.26 ± 14.25	
Amount of glass (per week)	7.30 ± 6.63	
Alcohol drinking		
Never	167	80.3
Former	15	7.2
Current	26	12.5
Duration of alcohol drinking (year)	26.62 ± 13.17	
Amount of glass (per week)	12.17 ± 14.02	
Smoking		
Never	161	77.4
Former	19	9.1
Current	28	13.5
Duration of smoking (year)	29.89 ± 18.05	
Amount of cigarette (per week)	29.77 ± 30.49	
Secondhand smoked		
Never	84	40.4
Sometimes	95	45.7
Everyday	29	13.9
Smartphone use before sleep		
Used	24	11.5
Non-used	181	88.5
Light physical activity		
Always	47	22.6
Sometimes	65	31.3

Behavior characteristics	Number	Percent
Rarely/ Never	96	46.2
Moderate physical activity		
Always	33	15.9
Sometimes	78	37.5
Rarely/ Never	97	46.6
Vigorous physical activity		
Always	3	1.4
Sometimes	31	14.9
Rarely/ Never	174	83.7

Part 4 behavioral, in this section it shows participants' daily live. First is about drinking behavior. More than a half of participants did not drink caffeine, alcohol and smoking as the number indicated 63.5%, 80.3% and 77.4% accordingly. However, there were some of them that did the opposite as it showed 28.4%, 12.5% and 13.5%. The participants drank caffeine about 7 glasses per week and 20 glasses per year amount whereas they drank alcohol about 12 glasses per week and 26 glasses per year.

Second is about smoking behavior, Most of them did not smoke, the number indicated that 77.4% were non-smoking whereas 13.5% were smoker. They smoked about 29 cigarettes per week. An estimated 40.4% never tries the secondhand smoked, but almost a half which was about 45.7% did it sometimes. For using the smartphone before sleep, the number indicated that most of them did not use the phone before sleep as 88.5%

Lastly is about their physical activity. From interviewing, they are most likely doing the light physical activity rather than the moderate physical activity as the numbers showed 22.6% for those who were always doing the light physical activity compare to 15.9% for those who were always doing the moderate physical activity. However, the survey showed that there was a few people doing the vigorous physical activity about 1.4%

Part 5 Environment factors

Table 8 Environment exposure of elderly (n=208)

Environment exposure	Number	Percent
Light Disturbance		
Yes	32	15.4
No	176	84.6
Noise Disturbance		
Yes	41	19.7
No	167	80.3
Ventilation electronic		
Fan	153	73.6
Air conditioner	35	16.8
Opened window	20	9.6
Bed characteristic		
Soft	73	35.1
Soft-medium	79	38.0
Medium	18	8.7
Hard	38	18.3

Part 5 is about the environment exposure while sleeping. More than a half did not get disturbed by the light and the noise as the number indicated 84.6% and 80.3%. Most of them slept in room with fan rather than air conditioner as it showed 73.6% and 16.8% accordingly. For bed characteristic, it showed that they tend to have the soft-medium bed slightly higher than the soft bed as the numbers showed 38% and 35.1%

Part 6 Sleep quality assessment

Subjective sleep quality

Table 9 Subjective sleep quality of elderly (n = 208)

Sleep quality	Number	Percent
Very good	64	30.8
Fairly good	126	60.6

Fairly bad	15	7.2
Very bad	3	1.4

Most of participants was assesses subjective sleep quality indicated that 60.6%, fairly good sleep quality, 30.8% very good, 7.2% fairly bad, and 1.4% very bad as Table 9.

Subjective sleep latency

Table 10 Subjective sleep latency of elderly (n = 208)

Sleep latency	Number	Percent
No difficulty	50	24.0
Mild difficulty	71	34.1
Moderate difficulty	71	34.1
Severe difficulty	16	7.7

For subjective of sleep latency, it refers to the length of time that it takes to accomplish the transition from full wakefulness to sleep. This subjective was measured by the duration that it takes you to falls asleep each night and during the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes. As descriptive analysis found that mild and moderate difficulty (34.1%) to sleep latency was presented among older people, 24% no difficulty, and 7.7 severe difficulty to sleep latency as shown Table 10.

Subjective sleep duration

Table 11 Subjective sleep duration of elderly (n = 208)

Subjective sleep duration	Number	Percent
> 7 hours	93	44.7
6 – 7 hours	74	35.6
5 – 6 hours	29	13.9
< 5 hours	12	5.8

Sleep duration was measured by the duration of actual sleep did you get at night during the past month. Mostly of participants sleep duration > 7 hours with 44.7%, 35.6% sleep 6 – 7 hours, 13.9% sleep 5 – 6 hours, and sleep < 5 hours as Table 11.

Subjective habitual sleep efficiency

Table 12 Subjective habitual sleep efficiency of elderly (n = 208)

Subjective habitual sleep efficiency	Number	Percent
No difficulty (> 85%)	92	44.2
Mild difficulty (75 – 84%)	57	27.4
Moderate difficulty (65 – 74%)	42	20.2
Severe difficulty (< 65%)	17	8.2

For subjective habitual sleep efficiency was calculated by number of hours slept/Number of hours spent in bed) x 100. Mostly 44.2% no difficulty of habitual sleep efficiency (>85%), 27.4% mild difficulty(75 – 84%), 20.2% moderate difficulty (65 – 74%) and 8.2% severe difficulty habitual sleep efficiency (<65%) as Table 12.

Subjective sleep disturbances

Table 13 Subjective sleep disturbances of elderly (n = 208)

Sleep disturbances	Number	Percent
No difficulty	29	13.9
Mild difficulty	112	53.8
Moderate difficulty	63	30.3
Severe difficulty	4	1.9

Sleep disturbances was measured by during the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes, wake up in the middle of the night or early morning, have to get up to use the bathroom, cannot breathe comfortably, cough or snore loudly, feel too cold, feel too hot, have bad dreams, and have pain. Mostly 53.8% mild difficulty to sleep, 30.3% moderate difficulty to sleep, 13.9% no difficulty, and 1.9% severe difficulty to sleep.

Subjective use of sleeping medication

Table 14 Subjective use of sleeping medication of elderly (n = 208)

Subjective use of sleeping medication	Number	Percent
Not during the past month	208	100
Less than once a week	0	0.0
Once or twice a week	0	0.0
Three or more times a week	0	0.0

All participants did not use sleep medication during the past month.

Subjective daytime dysfunction

Table 15 Subjective daytime dysfunction of elderly (n = 208)

Daytime dysfunction	Number	Percent
No difficulty	149	71.6
Mild difficulty	43	20.7
Moderate difficulty	14	6.7
Severe difficulty	2	1.0

Daytime dysfunction was assessed by the sum of How often have you had trouble staying awake while driving, eating meals, engaging in the social activity and How much of a problem has it been for you to keep up the enthusiasm to get things done during the past month? Most of participants 71.6% no difficulty to sleep, 20.7% mild difficulty to sleep, 6.7% moderate difficulty to sleep, and one percent severe difficulty to sleep because of daytime dysfunction

Overall sleep quality

Table 16 Sleep quality of elderly (n=208)

Sleep quality	Number	Percent
Good	70	33.7
Poor	138	66.3

Part 6 is about the sleep quality assessment. An estimate 66.3% mentioned that they had a poor sleep quality and 33.7% had a good sleep quality as Table 9.

Table 17 Association between demographic and sleep quality among elderly (n=208)

Demographic	Total	Sleep quality				p.value
		Good		Poor		
	N	N	%	N	%	
Gender						0.651 ^a
Male	76	24	31.6	52	68.4	
Female	132	46	34.8	86	65.2	
Age (mean)	208	99.40		107.09		0.384 ^c
Marital status						0.428 ^a
Married	112	35	31.2	77	68.8	
Unmarried	96	35	36.5	61	63.5	
Religion						1.000 ^b
Buddhism	207	70	33.8	137	66.2	
Islam	1	0	0.0	1	100.0	
Education level						0.084 ^a
Educated	193	68	35.2	125	64.8	
Non-educated	15	5	13.3	13	86.7	
Occupation						0.681 ^a
Agricultural	120	39	32.5	81	67.5	
Non-agricultural	88	31	35.2	57	64.8	
Financial problem						0.434 ^a
No	103	32	31.1	71	68.9	
Yes	105	38	36.2	67	63.8	
Family partner						0.108 ^a
Living alone	21	7	33.3	14	66.7	
Parents	11	0	0.0	11	100.0	
Husband wife and children	161	57	35.4	104	64.6	
Relatives	15	6	40.0	9	60.0	

^a Chi-square test, ^b Fisher's exact test, ^c Mann-Whitney U test

The socio-demographic and sleep quality of the present sample were listed in Table 17. Among 208 study participants, 52 (68.4%) were male and 86 (65.2%) were female which were assessed poor sleep quality by PSQI indicating 5 score or more. However gender was not significantly associated to sleep quality.

Married people was assessed good sleep quality 35 people (31.2%) and poor sleep quality 77 people (68.8%). Whilst 35 unmarried elders (36.5%) were assessed good sleep quality and 61 elders (63.5%) as poor sleep quality. Marital status was not significantly associated to sleep quality.

The majority of religion were Buddhism. Among 207 Buddhism, 70 elders (33.8%) was assessed to good sleep quality but 137 people (66.2%) was assessed poor sleep quality. One participant was Islam religion. The one was assessed to poor sleep quality. However religion was not significantly associated to sleep quality.

There were 68 elders had educated (35.2%) was assessed to good sleep quality but 125 elder or (64.8%). Among 15 non-educated elders, there were 5 people (13.3%) and 13 people assessed to good and poor sleep quality respectively. Nevertheless Education level was not significantly associated to sleep quality.

The common occupation in study setting is agricultural. Of 120 agricultural participants, the were 39 people (32.5%) and 81 people (67.5%) were assessed good and poor sleep quality. On the other 88 elders who did not work as agricultural, found that 31 people (35.2%) and 57 people (64.8%) were measured good and poor sleep quality. Nevertheless occupation was not significantly associated to sleep quality.

Among of 103 elders did not have financial problem or debt, 32 people (31.1%) and 71 people (68.9%) were measured to good and poor sleep quality. Whilst elders with financial problem 38 people (36.2%) and 67 people (63.8%) were good and poor sleep quality respectively. However financial problem did not significantly associated to sleep quality.

For family partner, Most of participants were living with husband, wife, and children (161 people). There were 57 people (35.4%) and 104 people (64.6%) were assessed good and poor sleep quality. However there was no association between family partner and sleep quality.

Table 18 Association between social participation and sleep quality among elderly (n=208)

Participation	Total	Sleep quality				p.value
		Good		Poor		
		N	%	N	%	
Health participation						0.591 ^a
Always	51	20	39.2	31	60.8	
Sometimes	125	39	31.2	86	68.8	
Rare/ Never	32	11	34.4	21	65.6	
Social participation						0.040 ^a
Always	32	17	53.1	15	49.6	
Sometimes	132	40	30.3	92	69.7	
Rare/ Never	44	13	29.5	31	70.5	
Traditional and cultural participation						0.016 ^a
Always	65	27	41.5	38	58.5	
Sometimes	117	30	25.6	87	74.4	
Rare/ Never	26	13	50.0	13	50.0	
Praying before sleep						0.037 ^a
Always	52	15	28.8	37	71.2	
Sometimes	101	30	29.7	71	70.3	
Rare/ Never	55	25	45.5	30	54.5	
Meditation before sleep						0.054 ^a
Always	15	6	40.0	9	60.0	
Sometimes	71	31	43.7	40	56.3	
Rare/ Never	122	33	27.0	89	73.0	

^a Chi-square test, ^b Fisher's exact test, ^c Mann-Whitney U test

The social participation and sleep quality of the present sample were listed in Table 18. Mostly of activities sometime participated 125 people. There were 39 people (31.2%) and 86 people (68.8%) were assessed to good and poor sleep quality. The

association between health participation and sleep quality was not presented in this study.

There were 132 participants sometime participated social activities which 40 people (30.3%) was had assessed good sleep quality but 92 people (69.7%) as poor sleep quality. In addition social participation significantly associated sleep quality at $p.value < 0.05$

Additionally, traditional and cultural participation significantly associated to sleep quality at $p.value < 0.05$. Most of participants (117 people) sometime participated the traditional and cultural activities, presented 87 people (74.4%) were poor sleep quality and 30 people (25.6%) were good sleep quality.

The significantly association between praying before sleep and sleep quality was found in the current study. Most of participants sometime prayed before sleep 101 people was assessed to good sleep quality 30 people (29.7%) and poor sleep quality 71 people (70.3%).

Among 122 people rare/never meditated before sleep were assessed to good sleep quality 33 people (27%) and 89 people (73%) as poor sleep quality. Nevertheless, meditation before sleep was not significantly associated to sleep quality.

Table 19 Association between health status and sleep quality among elderly (n=208)

Health status	Sleep quality					p.value
	Total	Good		Poor		
	N	N	%	N	%	
BMI						0.942 ^a
Underweight	28	9	32.1	19	67.9	
Normal	97	32	33.0	65	67.0	
Pre-obese	74	26	35.1	48	64.9	
Diabetes						0.748 ^a
No	179	61	34.1	118	65.9	
Yes	29	9	31.0	20	69.0	
Hypertension						0.307 ^a
No	126	39	31.0	87	69.0	

Yes	82	31	37.8	51	62.2	
Cardiovascular disease						0.478 ^a
No	189	65	34.4	124	65.6	
Yes	19	5	26.3	14	73.7	
Stroke						1.000 ^b
No	198	67	33.8	131	66.2	
Yes	10	3	30.0	7	70.0	
Respiratory disease						0.690 ^b
No	201	67	33.3	134	66.7	
Yes	7	3	42.9	4	57.1	
Activities of daily living						0.427 ^b
Independent living	201	69	34.3	132	65.7	
Minor-help	7	1	14.3	6	85.7	
Health perception						
Musculoskeletal problem						0.000 ^a
No	94	46	48.9	48	51.1	
Yes	114	24	21.1	90	78.9	
Bowel problem						0.093 ^a
No	126	48	38.1	78	61.9	
Yes	82	22	26.8	60	73.2	
Respiratory problem						0.127 ^a
No	140	52	37.1	88	62.9	
Yes	68	18	26.5	50	73.5	
Bladder problem						0.012 ^a
No	146	57	39.0	89	61.0	
Yes	62	13	21.0	49	79.0	
Depression						0.005 ^a
No	150	59	39.3	91	60.7	
Yes	58	11	19.0	47	81.0	

^a Chi-square test, ^b Fisher's exact test, ^c Mann-Whitney U test

Health status and sleep quality of the present sample were listed in Table 19. BMI was categorized to 3 level included underweight, normal, and pre-obese. Most of participants were normal BMI 97. Among of them, Thirty-two elders (33%) were assess to good sleep quality but 65 elders (67%) of poor sleep quality. High number of pre-obese found that, 26 people (35.1%) had good sleep quality whilst 48 people (64.9%) had poor sleep quality. However BMI was not significantly associated to sleep quality.

Underlying diseases was investigated in this study. The majority of participants did not Diabetes Mellitus. There were 61 elders (34.1%) without DM was assessed to good sleep quality and 118 elders (65.9%) as poor sleep quality. Furthermore among 29 people with DM, Nine DM patients (37.8%) had good sleep quality. Whereas there were 20 people (69%) had poor sleep quality. However the association between DM and sleep quality was not present in this study.

Hypertension was the common diseases in this study participants. Among of 82 HT patients, 31 people (37.8%) and 51 people (62.2%) were assessed good and poor sleep quality respectively. There were 39 participants (31%) and 87 people (69%) without HT had good and poor sleep quality, respectively. HT disease was not significantly associated to sleep quality.

This study found 19 elders with cardiovascular disease. There were 5 people (26.3%) had good sleep quality and 14 people (73.7%) had poor sleep quality. Whilst among of 189 elders without cardiovascular disease, 65 people (34.4%) had good sleep quality and 124 people (65.6%) had poor sleep quality. There was no association between cardiovascular disease and sleep quality.

There were ten elders with stroke. Among of them 3 people (30%) had good sleep quality but 7 people (70%) had poor sleep quality. From 198 elders without stroke, there were 67 people (33.8%) had good sleep quality but 131 people (66.2%) had poor sleep quality. The association between stroke and sleep quality was not presented in this study.

There were report that seven people were respiratory disease which 3 people (42.9%) had good sleep quality whilst 4 people (57.1%) had poor sleep quality. Of two hundreds and one elders without respiratory disease, 67 people (33.3%) had good sleep quality and 134 people (66.7%) had poor sleep quality. However respiratory disease was not significantly associated to sleep quality in this study.

Activities of daily life was assessed among elderly by using Barthel ADL index. The result found that 201 were independent living, among of them 69 people (34.3%) had good sleep quality but 132 people (65.7%) had poor sleep quality. There were 7 elders need minor help. Only one person (14.3%) had good sleep quality and six people (85.7%) had poor sleep quality.

Health perception was investigated in this study which included musculoskeletal problem, bowel problem, respiratory problem, and bladder problems while sleeping.

Musculoskeletal problem perception was significantly associated to sleep quality at p .value < 0.05 . Among of 94 elders without musculoskeletal problem, There were 46 people (48.9%) had good sleep quality but 48 people (51.1%) had poor sleep quality. Whilst there were 114 people who had muscle problems while sleeping. Among of them 24 people (21.1%) had good sleep quality but 90 people (78.9%) had poor sleep quality.

Bowel problem perception was not significantly associated to sleep quality. Among of 126 elders without bowel problem, There were 48 people (38.1%) had good sleep quality but 78 people (61.9%) had poor sleep quality. Whilst there were 82 people who had bowel problems while sleeping. Among of them 22 people (26.8%) had good sleep quality but 60 people (73.2%) had poor sleep quality.

Respiratory problem perception was not significantly associated to sleep quality. Among of 140 elders without problem, There were 52 people (37.1%) had good sleep quality but 88 people (62.9%) had poor sleep quality. Whilst there were 68 people who had respiratory problems while sleeping. Among of them 18 people (26.5%) had good sleep quality but 50 people (73.5%) had poor sleep quality.

Bladder problem perception significantly associated to sleep quality at p .value < 0.05 . Among of 146 elders without problem, There were 57 people (39%) had good sleep quality but 89 people (61%) had poor sleep quality. Whilst there were 62 people who had problems while sleeping. Among of them 13 people (21.%) had good sleep quality but 49 people (79%) had poor sleep quality.

Depression significantly associated to sleep quality at p .value < 0.05 . Among of 150 elders without problem, There were 59 people (39.3%) had good sleep quality but 91 people (60.7%) had poor sleep quality. Whilst there were 58 people who were

assessed to depression. Among of them 11 people (19%) had good sleep quality but 47 people (81%) had poor sleep quality.

Table 20 Association between behavior and sleep quality among elderly (n=208)

Behavior	Total	Sleep quality				p.value
		Good		Poor		
		N	%	N	%	
Caffeine drinking						0.558 ^a
Never	132	41	31.1	91	68.9	
Former	17	6	35.3	11	64.7	
Current	59	23	39.0	36	61.0	
Alcohol drinking						0.205 ^a
Never	167	61	36.5	106	63.5	
Former	15	3	20.0	12	80.0	
Current	26	6	23.1	20	76.9	
Smoking						0.020 ^a
Never	161	59	36.6	102	63.4	
Former	19	8	42.1	11	57.9	
Current	28	3	10.7	25	89.3	
Secondhand smoked						0.071 ^a
Never	84	34	40.5	50	59.5	
Sometimes	95	31	32.6	64	67.4	
Everyday	29	5	17.2	24	82.8	
Smartphone use before sleep						0.621 ^a
Used	24	7	29.2	17	70.8	
Non-used	184	63	34.2	121	65.8	
Light physical activity						0.704 ^a
Always	47	18	38.3	29	61.7	
Sometimes	65	20	30.8	45	69.2	
Rarely/ Never	96	32	33.3	64	66.7	

Behavior	Total	Sleep quality				p.value
		Good		Poor		
		N	%	N	%	
Moderate physical activity						0.742 ^a
Always	33	13	39.4	20	60.6	
Sometimes	78	25	32.1	53	67.9	
Rarely/ Never	97	32	33.0	65	67.0	
Vigorous physical activity						0.839 ^a
Always	3	1	33.3	2	66.7	
Sometimes	31	9	29.0	22	71.0	
Rarely/ Never	174	60	34.5	114	65.5	

^a Chi-square test, ^b Fisher's exact test, ^c Mann-Whitney U test

Behavior and sleep quality of the present sample were listed in Table 20. Most of elders (132 people) had never drunk the caffeine beverage. Among of them, 41 people (31.1%) had good sleep quality but 91 people (68.9%) had poor sleep quality. There was no association between caffeine drinking and sleep quality among elderly.

There was no association between alcohol drinking and sleep quality among elderly. The majority of elders (167 people) had never drunk the alcohol beverage. Among of them, 61 people (36.5%) had good sleep quality but 106 people (63.5%) had poor sleep quality.

There was significantly association between smoking and sleep quality among elderly at p,value < 0.05. Most of elders (161people) had never smoked. Among of them 59 people (36.6%) had good sleep quality but 102 people (63.4%) had poor sleep quality.

There was no association between secondhand smoked and sleep quality among elderly. Most of elders (95 people) sometime exposed secondhand smoked. Among of them, 31 people (32.6%) had good sleep quality but 64 people (67.4%) had poor sleep quality.

There was no association between smartphone use before sleep and sleep quality among elderly. Most of elders (184 people) did not use smartphone before sleep. Among of them, 63 people (34.2%) had good sleep quality but 121 people (65.8%) had poor sleep quality.

Light physical activity was not significantly associated to sleep quality. Among 96 elders, there were 32 people (33.3%) had good sleep quality but 64 people (66.7%) had poor sleep quality.

Moderate physical activity was not significantly associated to sleep quality. Among 97 elders, there were 32 people (33%) had good sleep quality but 65 people (67%) had poor sleep quality.

Vigorous physical activity was not significantly associated to sleep quality. Among 174 elders, there were 60 people (34.5%) had good sleep quality but 114 people (65.5%) had poor sleep quality.

Table 21 Association between environment factors and sleep quality among elderly (n=208)

Environment factors	Total	Sleep quality				p.value
		Good		Poor		
		N	%	N	%	
Light Disturbance						0.006 ^a
No	176	66	37.5	110	62.5	
Yes	32	4	12.5	28	87.5	
Noise Disturbance						0.032 ^a
No	167	62	37.1	105	62.9	
Yes	41	8	19.5	33	80.5	
Ventilation electronic						0.052 ^a
Fan	153	51	33.3	102	66.7	
Air conditioner	35	8	22.9	27	77.1	
Opened window	20	11	55.0	9	45.0	
Bed characteristic						0.660 ^a
Soft	73	24	32.9	49	67.1	

Environment factors	Total	Sleep quality				<i>p.value</i>
		Good		Poor		
	N	N	%	N	%	
Soft-medium	79	30	38.0	49	62.0	
Medium	18	6	33.3	12	66.7	
Hard	38	10	26.3	28	73.7	

^a Chi-square test, ^b Fisher's exact test, ^c Mann-Whitney U test

Environment factors and sleep quality of the present sample were listed in Table 21. Light disturbance was significantly associated to sleep quality at $p.value < 0.05$. Most participants was not disturbed by the light while sleeping (176 people). Among of them, presented 66 people (37.5%) had good sleep quality but 110 people (62.5%) had poor sleep quality. Whilst 32 elders with light disturbance, there were 4 people (12.5%) had good sleep quality and 28 people (87.5%) had poor sleep quality.

Noise disturbance was significantly associated to sleep quality at $p.value < 0.05$. Most participants was not disturbed by the noise while sleeping (167 people). Among of them, presented 62 people (37.1%) had good sleep quality but 105 people (62.9%) had poor sleep quality. Whilst 41 elders with noise disturbance, there were 8 people (19.5%) had good sleep quality and 33 people (80.5%) had poor sleep quality.

Ventilation electronic was not significantly associated to sleep quality. Most participants used the fan 153 people. Among of them, 51 people (33.3%) had good sleep quality but 102 people (66.7%) had poor sleep quality.

Bed characteristic was not significantly associated to sleep quality. Most participants used the soft-medium 79 people. Among of them, 30 people (38%) had good sleep quality but 49 people (62%) had poor sleep quality.

Table 22 Odds ratios (OR) and 95% confidence intervals (CI) of sleep quality in elderly

Characteristics	Odd ratio Adjusted	95% Confident Interval		p.value
		Lower	Upper	
Gender				
Male	1.00 (ref)			
Female	0.634	0.273	1.473	0.289
Age	1.006	0.964	1.049	0.790
BMI	0.975	0.884	1.075	0.609
Social participation				
Yes	1.00 (ref)			
No	5.962	1.459	24.361	0.013
Traditional and cultural participation				
Yes	1.00 (ref)			
No	0.574	0.284	1.160	0.122
Praying before sleep				
Yes	1.00 (ref)			
No	1.478	0.273	0.838	0.010
Musculoskeletal problem				
No	1.00 (ref)			
Yes	2.288	1.249	4.192	0.007
Bladder problem				
No	1.00 (ref)			
Yes	2.618	1.084	6.327	0.032
Depression				
No	1.00 (ref)			
Yes	3.275	1.179	9.095	0.023

Characteristics	Odd ratio Adjusted	95% Confident Interval		p.value
		Lower	Upper	
Smoking				
Non-smoker	1.00 (ref)			
Smoker	2.147	1.062	4.340	0.033
Light Disturbance				
No	1.00 (ref)			
Yes	2.919	0.416	20.481	0.281
Noise Disturbance				
No	1.00 (ref)			
Yes	1.162	0.255	5.285	0.846

* Adjusted age, gender, BMI

Table 14 shows the Adjusted Odd Ratio (AOR) for gender, age, and BMI. In multivariable adjusted model, social participation, Praying before sleep, musculoskeletal problem, bladder problem, depression, and smoking were statistically significant associated to poor sleep quality at $p.value < 0.05$

Social participation was increased 5.96-fold odds (AOR = 5.962; 95% CI 1.459 – 24.361). Praying before sleep increased 1.48-fold odds (AOR = 1.478; 95% CI 0.273 – 0.838). Musculoskeletal problem increased 2.29-fold odds (AOR = 2.288; 95% CI 1.249 – 4.192). Bladder problem increased 2.62-fold odds (AOR = 2.618; 95% CI 1.084 – 6.327). Depression had increased 3.28-fold odds (AOR = 3.275; 95% CI 1.179 - 9.095). Lastly, Smoking increased 2.15-fold odds (AOR = 2.147; 95%CI 1.062 – 4.340) as Table 22.

Chapter V : Discussion, Conclusion, and Recommendation

5.1 Discussion

In this chapter, a brief explanation of the findings and their significances to conclusion of sleep quality in elderly will be discussed according to research questions. The purpose of this study was to determine the rate and factors associate to sleep quality among Wang-sapparos community-dwelling elderly age 60 years or more. This was cross sectional study. Structured questionnaire was used for face to face interview with 208 respondents. All data were analyzed and shown significances findings with Odd Ratio and 95% confident interval.

5.1.1 Research question #1: What was the rate of poor sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

The participants of this study were 208 older people aged 60 – 97 and were living in Wang-sapparos community. Chanthaburi province, Thailand (76 males and 132 females). In this study, most of participants 66.3% had PSQI sleep quality score ≥ 5 indicating poor sleep quality which more than those of community-dwelling elders in Taipei study. The prevalence presented that 49% with poor sleep quality but a half of them had short sleep onset (<15 minutes) (11). There were twenty-two percent of elders use psychoactive medication sleep but the current study excluded the people who used sleep medication and psychological drug. Poor sleep quality rate from this study was higher than study in Thailand such a study conducted in elderly nursing home in Chonburi reported that there were 57.1% of elders had poor sleep quality (18). But the prevalence in this study was lower than study in Turkey. The study conducted in elderly people who lived in service area of a family health center. The finding shown that 73.3% elders had poor sleep quality(46). A study in urban Shanghai almost fifty percent were poor SQ in Chinese elderly and commonly found the higher rate in female than male (6). Consistency with this study presented that 86 females and 52 males older people had poor sleep quality. However gender was not associated to sleep quality that inconsistent with several studies. Those reported female sex significantly associated to

sleep quality (p .value < 0.05) (10, 11, 47). Nevertheless 132 the female participants had 34.8% of good sleep quality and 65.2% poor sleep quality. Whilst among 76 male participants had 31.6% of poor sleep quality and 68.4% of good sleep quality. In the real, older people average slept 7 hours, did daytime sleeping, some people cannot focus to do activities and almost participants were facing muscle pain while sleeping therefore it was leading to sleep disturbance and poor sleep quality.

5.1.2 Research question #2: What was the association between social participation and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

For descriptive statistic analysis presented most of participants 60.1% sometimes participated health activities, 63.5% sometimes social activities, 56.3% traditional and cultural activities, 48.6% sometimes prayed before sleep, 58.7% rarely/never meditate before sleep.

From Chi-square test shown that social participation, traditional and cultural participation and praying before sleep were significantly associated to sleep quality at p .value < 0.05 . There were 132 participants sometime participated social activities which 40 people (30.3%) was had assessed good sleep quality but 92 people (69.7%) as poor sleep quality. Additionally, traditional and cultural participation significantly associated to sleep quality at p .value < 0.05 . Most of participants (117 people) sometime participated the traditional and cultural activities, presented 87 people (74.4%) were poor sleep quality and 30 people (25.6%) were good sleep quality.

In multivariate model, the present study found that participated social activities was likely to increase 5.96 time to poor sleep quality. Similarity to previous study conducted in being 65 years or more. The result found that there was significantly associated between sleep disorder and perception of social support. Moreover the respondents reported took too long time for falling asleep(35). Consistency with case-control study represented high social support was associated with awaken after onset sleep both non-clinical and clinical groups. Furthermore the social interaction was associated with short period of sleep latency in clinical group(36). Social activities should be provided such as elderly club to engage elders do activities together and leading to happiness. There are two hormones related to happiness included serotonin and melatonin. Both hormones effect to appetite, mood and sleep. Melatonin is

produced by serotonin hormone in the pineal gland. It is apart of vertebrate brain. It roles regulation on circadian rhythm. Serotonin is the body's natural happiness drug. It's a feel-good hormone that increases positivity and relaxation, as well as helping us feel all-around more energized during the day. Serotonin helps you feel awake when you get up the next day. Whilst melatonin is produced in the pineal gland of the brain when you find yourself in a dark environment. The change in light causes messages to be sent from the eye to the brain telling it that more melatonin should be produced. The melatonin winds the body down to a more lethargic and sleep-ready state. Study shown that happiness level related to melatonin level in blood (48). The majority of older people in Wang-sapparos Sub-district were Thai National and respect on Buddhism religion. There were six temples distributed around the study setting. Every religious days in Buddhism. For example, Visakhabucha day, Makhabucha day and Asarnlahabucha day. Older people had gone to participate at the temple. At the same time, they had joined health promoting, health screening, and career skills promoting in the elder club. But among disabled elders had inconvenienced to participate, therefore home visit will be provided among those regularly by multidisciplinary team.

The significantly association between praying before sleep and sleep quality was found in the current study. Most of participants sometime prayed before sleep 101 people was assessed to good sleep quality 30 people (29.7%) and poor sleep quality 71 people (70.3%). Additionally, in multivariate model, the current found that praying before sleep was likely to increase 1.48 time to poor sleep quality. Praying before sleep is the vibrational therapy or vibration medicine. It is using of radio to treat the illness. Praying is the principle of sound waves to stimulate the body heals. The mechanism begins at the ears, sent the signals to primary auditory cortex in Temporal lobe and to Brainstem. Professional from Nursing care Program, Public Health Major, Mahidol University reported Once the brain is stimulated regularly 15 minutes by slowly sound waves, the pineal gland releases the hormone called serotonin. An essential connection is controlled by the hypothalamus-pituitary-adrenal axis (HPA). For example, controlling of depression, digestive system, immunization system, emotional, and metabolism. Serotonin is changed to melatonin. It engages neuron cell, body cell and improve sleep. It related to traditional and cultural participation among older people. For example, Visakhabucha day, Makhabucha day and Asarnlahabucha day.

5.1.3 Research question #3: What was the association between health status and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

The present study reported according to descriptive analysis that half of them (50.1%) had underlying disease. Mostly 39.42% were hypertension, 13.94% were diabetes mellitus and 9.13% were cardiovascular disease and respiratory tract disease. The results showed that 96.6% of the activities of daily living was independent living and 3.4% was minor-help. In term of health problems, an estimated 54.8% had muscle problems, 46.6% of participants had bowel problem sometimes, and 27.4% lived with mild depression.

When we analyzed the significances association. Health perception was investigated in this study which included musculoskeletal problem, bowel problem, respiratory problem, and bladder problems while sleeping.

Perception of musculoskeletal problem significantly associated to sleep quality at p -value < 0.05 . Among of 94 elders without musculoskeletal problem, There were 46 people (48.9%) had good sleep quality but 48 people (51.1%) had poor sleep quality. Whilst there were 114 people who had muscle problems while sleeping. Among of them 24 people (21.1%) had good sleep quality but 90 people (78.9%) had poor sleep quality. In multivariate model, elders who had musculoskeletal problems was likely to poor sleep quality about 2.29 times when compared to elders without musculoskeletal problems. The finding was confirmed by study in Russia to investigated the effect of 10 days evening administration of 1.5 mg of melatonin in fibromyalgia patients. Sleep disorder was measured by Polysomnography which presented night sleep disorder in all subjects. They were difficultly in falling asleep, increased number of wake periods, and sleep movements. After administration of 1.5 mg melatonin the patients reported sleeping improvement, shorter wake periods during sleep and feeling better once wake in the next day. These patients also reported a certain decrease of pain and depression levels (49). Chronic pain syndromes are almost always linked with one or another degree of impairment to biological rhythms. The use of melatonin, acting via normalization of circadian rhythms and intrinsic analgesic mechanisms, decreases the frequency and severity of pain syndromes(50). Despite the fact that older people in Wang-sapparos Sub-district had perceived to health problem such as musculoskeletal.

For example muscle pain, joint pain, and low back pain. Consistent with elderly Thai study reported health problem, dyspnea, cough, urinary at night, and muscle twitching were positively correlated to poor sleep quality (18) and systemic review study investigated three main factors to insomnia included predisposing factors, precipitating factors, and perpetuating factors. The finding concluded that diseases and physical disorder influenced to sleeping (51).

Perception of bladder problem significantly associated to sleep quality at $p.value < 0.05$. Among of 146 elders without problem, There were 57 people (39%) had good sleep quality but 89 people (61%) had poor sleep quality. Whilst there were 62 people who had problems while sleeping. Among of them 13 people (21%) had good sleep quality but 49 people (79%) had poor sleep quality. In multivariate model elders who had bladder problems was likely to poor sleep quality about 2.62 times when compared to elders without problems. This finding was likely consistency to observational study at urology department, presented urinary incontinence, storage symptoms, and nocturia were suspected of contribution a poor sleep quality (52).

Depression significantly associated to sleep quality at $p.value < 0.05$. Among of 150 elders without problem, There were 59 people (39.3%) had good sleep quality but 91 people (60.7%) had poor sleep quality. Whilst there were 58 people who were assessed to depression. Among of them 11 people (19%) had good sleep quality but 47 people (81%) had poor sleep quality. Similarity, previous study (7, 16) present depressive symptom, and anxiety ($p.value < 0.001$) influenced to sleep quality. In multivariate model, elders who was assessed as depression by PHQ-9 was likely to poor sleep quality about 3.28 times when compare to those of them without condition. Depression was common abnormal psychology in elderly. Particularly elders were living lonely and never participated social activities. Consistent to previously study (10) presented poor sleep quality was associated with higher depressive symptom that assessed by Hospital Anxiety and Depression Scale (HADS). Additionally, cross-sectional studies showed a strong relationship between symptoms of depression and insomnia which outcomes of poor sleep quality (53). National Sleep Foundation reported people with depression were found to be five times more likely to suffer from sleep-disordered breathing (54).

5.1.4 Research question #4: What was the association between behavior and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

The current study reported according to descriptive analysis that, Behavior part showed 28.4% current caffeine drinking, 12.5% alcohol drinking and 13.5% smoking. They smoked about 29 cigarettes per week. An estimated 40.4% never exposed the secondhand smoked, but almost a half which was about 45.7% did it sometimes. For using the smartphone before sleep, the number indicated that most of them did not use the phone before sleep as 88.5%. Lastly is about their physical activity. The current study found that physical activity was not associated to sleep quality from interviewing, they are most likely doing the light physical activity rather than the moderate physical activity as the numbers showed 22.6% for those who were always doing the light physical activity compare to 15.9% for those who were always doing the moderate physical activity. However, the survey showed that there was a few people doing the vigorous physical activity about 1.4%. Inconsistency with study in multiple sclerosis report light, moderate, and moderate to vigorous physical activity level correlated to sleep onset and effects to poor sleep quality (34). Quasi-experimental study was conducted in general population revealed once compared with general health education, A 12- month moderate-intensity exercise program greater improved sleep disturbance score. The intervention group had sleep quality better than control group (35).

In multivariate model, elders who smoked was likely to poor sleep quality about 2.15 times when compare to those of non-smoker. Consistency to insufficient rest and poor sleep quality for those who were both current smokers and current smokeless tobacco. Previously study examined second-hand smoked and poor sleep quality presented it was the one causal for poor sleep quality. Whilst the second-hand smoked was not associated to sleep quality in this study. The mechanism of active smoking related to sleep disorder. The active component of cigarette smoked knows as nicotine. It stimulates the neurotransmitter triggers including dopamine and serotonin (37).

5.1.5 Research question #5: What was the association between environmental factors and sleep quality among community-dwelling elderly in Chanthaburi Province, Thailand?

The current study found that light disturbance was significantly associated to sleep quality at p .value < 0.05 . Most participants was not disturbed by the light while sleeping (176 people). Among of them, presented 66 people (37.5%) had good sleep quality but 110 people (62.5%) had poor sleep quality. Whilst 32 elders with light disturbance, there were 4 people (12.5%) had good sleep quality and 28 people (87.5%) had poor sleep quality. Light exposure can have profound effects on sleep. When the environment transitions from darkness to light, our brains tend to wake, whether we have had our regular sleep or not. The ganglion cells in the eyes' retinas are connected directly to the Suprachiasmatic nucleus (SCN). The light stimuli SCN by receptor of melanopsin which in retina and Retinohypothalamic tract. During the night, melatonin stimuli SCN then sending the signal throughout nervous system and mechanism controlling in the body as the normal condition.

Most participants was not disturbed by the noise while sleeping (167 people). Among of them, presented 62 people (37.1%) had good sleep quality but 105 people (62.9%) had poor sleep quality. Whilst 41 elders with noise disturbance, there were 8 people (19.5%) had good sleep quality and 33 people (80.5%) had poor sleep quality. The present study found that noise disturbance was significantly associated to sleep quality at p .value < 0.05 . Consistency to study of simultaneous EEG and fMRI monitoring in humans presented auditory stimuli produces bilateral activation in auditory cortex, thalamus, and caudate during wakefulness and Non-Rapid Eye Movement (NREM) (42).

Ventilation electronic was not significantly associated to sleep quality. Most participants used the fan 153 people. Among of them, 51 people (33.3%) had good sleep quality but 102 people (66.7%) had poor sleep quality. However ventilation electronic was not significantly associated to sleep quality.

Bed characteristic was not significantly associated to sleep quality. Most participants used the soft-medium 79 people. Among of them, 30 people (38%) had good sleep quality but 49 people (62%) had poor sleep quality. However bed characteristic was not significantly associated to sleep quality.

5.2 Conclusion

The study found that 66.3 percent of Wang-sapparos community-dwelling elderly had reported poor sleep quality with PSQI score ≥ 5 . Our study found that poor sleep quality was associated with social participation, praying before sleep, musculoskeletal problem perception, bladder problem perception, depression, and smoking. Therefore, public health strategic development by promoting for health activities to prevent chronic diseases and engagement social participation to prevent depression among elderly are essential.

5.3 Recommendation of this study

Policy recommendation

From the present study found that social participation was the risk to poor sleep quality. Since the researcher is working as Public Health Technique Officer in Sub-district Administration Organization. Social activities should be provided in the people who will reach 60 years to engage they participate social activities together through Elderly club monthly. However, praying before sleep was the factor associated to poor sleep quality. Therefore, the government should support the budget into the social welfare elderly strategy for monthly home visit, health monitoring project, and Buddhist activities in Songkran festival, The Buddhist Lent Day, Visakha Puja Day.

Although the physical activity was not associated to sleep quality but the perception of musculoskeletal problem is the factor of sleep so the participants should be provided the education of properly health behavior to prevent chronic diseases including bladder problem. Additionally, mental health problem induces poor sleep quality.

Generally, The study setting will receive the funds from NHSO to promote, support, treatment, and rehabilitation of health among pregnancy, children, reproductive group, risk group, age group, and disability. In addition, Sub-district Administration Organization should support the budget into National Health Security Office (NHSO) in level of Sub-district for health promotion and prevention the chronic diseases. So that to solve the health problems and mental problems. It is recommended that awareness of the mental health that as key determinants of poor sleep quality.

Further research

Since the present study was conducted in small sample size and affect to results Therefore, the scope of further research should be broadened to include a lager representative sample size.

This study reported the risk factor to poor sleep quality but did not present the logical reasoning. Therefore the further study should in-depth interview to support the significantly factor as Mixed-method study.

This study was cross-sectional study design, which limits the confirmation of result temporality. The further research should be conducted as the long term monitoring intervention to examine the risk factor and solving sleep disorder.

5.4 Strength of this study

1. This study was Multi stage sampling that included stratified sampling, systematic sampling, and purposive sampling therefore the participant distributed in all age (min.60 years – max. 97 years).

2. BMI variable, measurement of weight and height were measured by weighing scales and height measuring scales. Therefore the value of BMI was accurately.

5.5 Limitation of this study

The survey of this study was conducted by Multi-stage sampling random. However there are many benefits but there are some limitations as well:

1. Obstructive sleep apnea was not assessed by the effective tool or medical professional. However elder was diagnosed to sleep obstructive apnea will be excluded from the study.

2. This study was cross-sectional study design, which limits the confirmation of result temporality.

3. Since the data was collected by the collection assistants therefore may be biased.

4. Possibility of a sampling error since the first name in elders list was selected to be the participant.



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

REFERENCES

1. National Heart, Lung, and Blood Institute. Healthy Sleep; 2011.
2. Neal D, Kohatsu RT, Young T, VanGilder R, Leon F, Burmeister AM, et al. Sleep duration and body mass index in a rural population. *ARCH INTERN MED*. 2006;166:1701-5.
3. Knutson KL, Ryden AM, Mander BA, Cauter V. Role of sleep duration and quality in the risk and severity of type 2 diabetes mellitus. *Arch Intern Med*. 2006;166(16):1768-74.
4. Chaput JP, Wong SL, Michaud I. Duration and quality of sleep among Canadians aged 18 to 79. *Health reports* 2017;28(9):28-33.
5. Liu Y, Chapman DP, Cunningham TJ, Lu H, Croft JB. Prevalence of healthy sleep duration among adults — United States, 2014. *Morbidity and Mortality Weekly Report, US Department of Health and Human Services/Centers for Disease Control and Prevention* 2014;65(6):137-41.
6. Luo J, Zhu G, Zhao Q, Guo Q, Meng H, Hong Z, et al. Prevalence and risk factors of poor sleep quality among Chinese elderly in an urban community: results from the Shanghai aging study. *PLoS One*. 2013;8(11):e81261.
7. Lou P, Qin Y, Zhang P, Chen P, Zhang L, Chang G, et al. Association of sleep quality and quality of life in type 2 diabetes mellitus: a cross-sectional study in China. *Diabetes Res Clin Pract*. 2015;107(1):69-76.
8. Tang J, Liao Y, Kelly BC, Xie L, Xiang YT, Qi C, et al. Gender and regional differences in sleep quality and insomnia: A general population-based study in hunan province of China. *Sci Rep*. 2017;7:43690.
9. Bruno RM, Palagini L, Gemignani A, Viridis A, Giulio DA, Ghiadoni L, et al. Poor sleep quality and resistant hypertension. *Sleep Med*. 2013;14(11):1157-63.
10. Matsuda R, Kohno T, Kohsaka S, Fukuoka R, Maekawa Y, Sano M, et al. The prevalence of poor sleep quality and its association with depression and anxiety scores in patients admitted for cardiovascular disease: A cross-sectional designed study. *Int J Cardiol*. 2017;228:977-82.

11. Wu CY, Su TP, Fang CL, Yeh Chang M. Sleep quality among community-dwelling elderly people and its demographic, mental, and physical correlates. *J Chin Med Assoc.* 2012;75(2):75-80.
12. Chen DR, Truong KD, Tsai MJ. Prevalence of poor sleep quality and its relationship with body mass index among teenagers evidence from Taiwan. *Journal of School Health* 2012;83:582-8.
13. Chanamanee TS, Intanon T. Sleep quality and related factors among university students in southern Thailand. *Songkla Med J.* 2006;24(3):163-73.
14. Potaros D. Factors related to sleeping quality of nursing students. *The Journal of Faculty of Nursing Burapha University.* 2017;25(1):25-36.
15. Arayasinlapathon N, Somkumlung P, Seelawut J, Phoobunerb J, Mulmuangsaen J. Factors affecting sleep quality among nursing students in one college of nursing. *Journal of Phrapokkiao Nursing College.* 2013;28(1):38-50.
16. Ponsuwan N, Srimoragot P, Saneha C, Oacharenrat P. Factors predicting sleep quality among women with cancer after chemotherapy. *Songklanagarind Journal of Nursing.* 2014;34(3):19-37.
17. Chaiarj S, Tachaudomdach C, Boonchuang P, Srisuphan W. Sleep quality and factors interfering with sleep among hospitalized patients in medical units. *Thai Journal of Nursing Council* 2007;22(4):50-63.
18. Choombuathong A, Chalopatham W, Dhongyooyen P, Chokchaiworrarat S, Thamwattana K, Changsap B, et al. Sleep quality and factors related to sleep and self-esteem in the elderly. *Journal of Health Science.* 2015;24(5):833-43.
19. National Sleep Foundation . *Sleep in America Poll Communications Technology in the Bedroom.* 2011.
20. Al-Kandari S, Alsalem A, Al-Mutairi S, Al-Lumai D, Dawoud A, Moussa M. Association between sleep hygiene awareness and practice with sleep quality among Kuwait University students. *Sleep Health.* 2017;3(5):342-7.
21. Troxel WM, Robles TF, Hall M, Buysse DJ. Marital quality and the marital bed: examining the covariation between relationship quality and sleep. *Sleep Med Rev.* 2007;11(5):389-404.

22. Costa SV, Ceolim MF, Neri AL. Sleep problems and social support frailty in a Brazilian elderly multicenter study. *Rev Latino-Am Enfermagem*. 2011;19(4):920-7.
23. Troxel WM, Buysse DJ, Monk TH, Begley A, Hall M. Does social support differentially affect sleep in older adults with versus without insomnia? *J Psychosom Res*. 2010;69(5):459-66.
24. Li J, Yao YS, Dong Q, Dong YH, Liu JJ, Yang LS, et al. Characterization and factors associated with sleep quality among rural elderly in China. *Archives of Gerontology and Geriatrics* 56. 2013; 237-43.
25. Catherine MH, Lee PH. Prevalence and impacts of poor sleep on quality of life and associated factors of good sleepers in a sample of older Chinese adults. *Lo and Lee Health and Quality of Life Outcomes*. 2012;10(72).
26. The division of Sleep Medicine at Harvard Medical School. *Healthy Sleep* 2007; [update: 2007 Dec 18; cited 2018 May 25]. Available from: <http://healthysleep.med.harvard.edu/healthy/matters/consequences/sleep-and-disease-risk>.
27. Ayas NT, White DP, Al-Delaimy WK, Manson JE, Stampfer MJ, Speizer FE, et al. A prospective study of self-reported Sleep Duration and Incident Diabetes in Women. *DIABETES CARE*, 2002;26(2):380-4.
28. Kasasbeh E, Chi DS, Krishnaswamy G. Inflammatory aspects of sleep apnea and their cardiovascular consequences. *Southern Medical Journal* 2006;99(1):58-67.
29. National Sleep Foundation. *Caffeine and sleep*; 2010 [update: 2012 Dec 8; cited 2018 May 20]. Available from: <https://sleepfoundation.org/sleep-topics/caffeine-and-sleep>.
30. Chaudhary NS, Grandner MA, Jackson NJ, Chakravorty S. Caffeine consumption, insomnia, and sleep duration: Results from a nationally representative sample. *Nutrition*. 2016;32(11-12):1193-9.
31. Mike TB, Shaw DS, Forbes EE, Sitnick SL, Hasler BP. The hazards of bad sleep-Sleep duration and quality as predictors of adolescent alcohol and cannabis use. *Drug Alcohol Depend*. 2016;168:335-9.

32. Marmorstein NR. Sleep patterns and problems among early adolescents: Associations with alcohol use. *Addict Behav.* 2017;66:13-6.
33. National Sleep Foundation. Study: Physical activity impacts overall quality of sleep 2011 [update: 2014 Jun 20; cited 2018 May 25]. Available from: <https://sleepfoundation.org/sleep-news/study-physical-activity-impacts-overall-quality-sleep>.
34. Aburub A, Khalil H, Al-Sharman A, Alomari M, Khabour O. The association between physical activity and sleep characteristics in people with multiple sclerosis. *Mult Scler Relat Disord.* 2017;12:29-33.
35. King AC, Pruitt LA, Woo S, Castro CM, Ahn DK, Vitiello MV, et al. Effects of moderate-intensity exercise on polysomnographic and subjective sleep quality in older adults with mild to moderate sleep complaints. *Journal of Gerontology: Medical Sciences* 2008;63A(9):997-1004.
36. National Sleep Foundation. Smoking, head injury, pesticide use may be risk factors for rare sleep disorder 2012; [update: 2012 Jun 27; cited 2018 May 25]. Available from: <http://www.sleepfoundation.org/sleep-news/smoking-head-injury-pesticide-use-may-be-risk-factors-rare-sleep-disorder/page/0/1>.
37. Sabanayagam C, Shankar A. The association between active smoking, smokeless tobacco, second-hand smoke exposure and insufficient sleep. *Sleep Med.* 2011;12(1):7-11.
38. Garcia A, Ramirez C, Aguillon A, Tirado V, Paredes L, Ibarra A, et al. Smartphone use during sleep time in Mexican adolescents. *Sleep Medicine.* 2017;40:e106-e7.
39. National Sleep Foundation. Melatonin and sleep 2015; [update: 2017 Jul 15; cited 2018 May 25]. Available from: <https://sleepfoundation.org/sleep-topics/melatonin-and-sleep>.
40. Leproult R, Colecchia EF, L'Hermite-Balériaux M, Van Cauter E. Transition from dim to bright light in the morning induces an immediate elevation of cortisol levels. *The Journal of Clinical Endocrinology & Metabolism.* 2000;86(1).

41. Chellappa SL, Steiner R, Blattner P, Oelhafen P, Gotz T, Cajochen C. Non-visual effects of light on melatonin, alertness and cognitive performance: can blue-enriched light keep us alert? *PLoS One*. 2011;6(1):e16429.
42. Portas CM, Krakow K, Allen P, Josephs O, Armony JL, Frith CD. Auditory processing across the sleep-wake cycle:simultaneous EEG and fMRI monitoring in humans. *Journal of Neuron* 2000;28:991-9.
43. National Sleep Foundation. Asthma and sleep 2013 [update: 2017 Jul 1; cited 2018 May 25]. Available from: <https://sleepfoundation.org/sleep-disorders-problems/asthma-and-sleep>.
44. Doi Y, Minowa M, Tango T. Impact and correlates of poor sleep quality in Japanese White-Collar employees. *Sleep*. 2003;26(4):467-71.
45. Lotrakul M, Sumrithe S, Saipanish R. Reliability and validity of the Thai version of the PHQ-9. *BMC Psychiatry*. 2008;8:46.
46. Tel H. Sleep quality and quality of life among the elderly people. *Neurology, Psychiatry and Brain Research*. 2013;19(1):48-52.
47. Shim J, Kang SW. Behavioral Factors Related to Sleep Quality and Duration in Adults. *Journal of Lifestyle Medicine* 2017;7(1):18-26.
48. Dariush D, Maryam M, Mohammad K. Happiness & health: The Biological Factors- Systematic Review Article. *Iranian Journal Public Health*. 2014;43(11):1468-77.
49. Sanchez-Barcelo EJ, Rueda N, Mediavilla MD, Martinez-Cue C, Reiter RJ. Clinical Uses of Melatonin in Neurological Diseases and Mental and Behavioural Disorders. *Current Medicinal Chemistry*. 2017;24(35):3851-78
50. Danilov Y. Melatonin in chronic pain syndromes. *Neuroscience and behavioral physiology*. 2017;47(7):806-12.
51. Chaiarj S, Panya P. Insomnia and related factors. *The Thai Journal of Nursing Council*. 2005;20(2):1-12.
52. Shimizu N, Nagai Y, Yamamoto Y, Minami T, Hayashi T, Tsuji H, et al. Survey on lower urinary tract symptoms and sleep disorders in patients treated at urology departments. *Nat Sci Sleep*. 2013;5:7-13.

53. Peter L. Franzen DJ. Sleep disturbances and depression risk relationships for subsequent depression and therapeutic implications. *Journal of Dialogues in Clinical Neuroscience* 2008;10(4):473-81.
54. Ohayon M. Depression and sleep 2007; [update: 2012 Apr 20; cited 2018 June 17]. Available from: <https://sleepfoundation.org/sleep-disorders-problems/depression-and-sleep>.



APPENDIX



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

VITA

Name Miss Chanisa Siripanich

Address 19/2 Moo 2, Paknum Sub-district, Leamsing District, Chanthaburi province,
Thailand

Email ch.siripanich@gmail.com

Nationality Thai

Religion Thai

Education

Master degree Public Health Major, College of Public Health Sciences,
Chulalongkorn University, Bangkok, Thailand

Bachelor's degree Public Health Major, School of Health Science, Mae Fah Luang
University, Chiang Rai province, Thailand

High school Science- Mathematics, Sriyanuson school, Chanthaburi province,
Thailand

Work Experience

August 2016 - January 2018 Clinical Research Associate of The HIV Netherlands
Australia Thailand Research Collaboration, Bangkok, Thailand

February 2018 - Present Public Health Technique Officer of Wang-Sapparos
Sub-district Administration Organization, Chanthaburi province, Thailand