FACTORS AFFECTING THE SLEEP QUALITY OF THE ELDERLY

IN THAILAND

BOONSHAN SANGFAI

A Thesis Paper Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science

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ใบรับรองวิทยานิพนธ์

วิทยาลัยการแพทย์บูรณาการ มหาวิทยาลัยธุรกิจบัณฑิตย์

ปริญญาวิทยาศาสตรมหาบัณฑิต

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ABSTRACT

One of challenging global phenomena is the growth of elderly population which underlines human longevity across the globe. It is consequently impacting vulnerable health in the elderly. Sleep problems are neither uncommon nor inherent of physiological change of ageing process. One of the elderly health vulnerability and complex evidently derive from sleep problems. Thailand is a full-fledged society of older people under the WHO guidelines. There are various studies on sleep problems and disorders among the elderly whose focus was aimed at specific groups and locations in Thailand. This research explored and presented sleep problems of the elderly at national perspective scales. Research objectives were established to examine sleep quality throughout the country and explore correlation between individual factors and sleep quality in the elderly. The established research question asks "How do individual factors affect sleep quality in the elderly in Thailand?" This correlative study was purposely designed to explore the relationship of essential elements of individual factors and sleep quality in the elderly in Thailand. The stratified sampling method was employed in identifying 400 samplings in 15 provinces of 4 regions across Thailand. The field survey approach engages the in-depth interview by using the modified PSQI questionnaire whose validity and reliability was approved by the established the Expert Committee. The data collection and compilation took place during July-November 2021 coinciding with the Covid-19 pandemic impacting the field survey. The study results succinctly identified three core elements. The first one is related to individual and

personal factors. The majority of samplings occupied age ranges of 65-70 years who are mostly male and married and have adequate income and their own lodgings. Though having personal medical conditions, the majority drank neither alcohols nor caffeine and do not smoke and do not practise physical exercise either. The most disturbing environment affecting sleep is noise. The majority experienced depression and did not perform prayers or meditation before sleep. The second element is related to the sleep quality under the PSQI guidelines. It was found that the majority of 315 persons (78.8%) did not have a good sleep quality with the total PSQI scores of greater than 5 points. The minority of 85 persons (21.2 %(had a good sleep quality with the total PSQI scores of less than 5 points. The third element captures and present the result of hypothesis testing which found that age, marital status, medical conditions, consumption of alcohol and caffeine, physical exercise, disturbing environment, depression with known and unknown causes and practice of prayers and meditation before sleep are correlated with sleep quality of the elderly. Gender has no correlation with sleep quality of the elderly as the good and bad sleep quality of either gender are of proportional results. The conclusive result of this study indicated that the majority of 315 persons (78.8%) reached the PSQI total scores greater than 5 points indicating the bad sleep quality. While the minority of 85 persons (21.2%) reached the total PSQI scores of less than 5 points indicating a good sleep quality. Therefore, the majority of samplings experienced bad sleep quality under PSQI Guidelines. The analysis and calculation of 7 PSQI components incorporating relevant elements of individual personal factors/independent variables which substantiate the effect and correlation with sleep quality of the elderly/dependent variables.

Keywords: Sleep quality, Elderly, Individual factors, PSQI

Acknowledgement

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Chapter 1

Introduction

1.1 Background

The greying of the nations is referred to the global phenomena of dramatic growth of older persons as described by the World Health Organization (Hafez, 1994). The United Nations declared the 1st October as the International Day of Older Persons. It indicates the contemporary global demography that 1 of every 10 persons is 60 years or older and by 2050, 1 of 5 persons will be 60 as well as by 2150, 1 of 3 persons will become older persons. The aging pace is similarly in a faster track worldwide and impacts the demographic shift.

The United Nations has forecasted that the contemporary century (2001-2100) should become the century of older persons, though each country will variedly embrace and evolve into the aged society in accordance with different circumstances which is inclusive of varied national elements, i.e., economic growth, medical evolution, nutrition, etc. The longer the people live, the more health risk factors become increasingly challenging. WHO, (2014) has established the Framework for Action to foster healthy ageing. The ageing is linked with numerous health concerns and the poor quality of sleep knowingly contributes to a number of health issues and reduce quality of life of older persons, in particular.

The relationship between aging and sleep appears to be fundamental in planning and caring for the overall health of older persons. Fontaine (1993) and Hodgson (1991) emphasized that human health is generally dependent on the balance between rest and activities and the best rest is sleep whose one third of human time is dedicated to sleep. Newsom (2020) underlines that mental and physical health conditions may interfere with sleep.   A number of biological and mental conditions, e. g. , depression, anxiety, heart disease, diabetes, arthritis, side effects of medicine and other causes of pain, etc. may affect sleep behavior in aged persons tend to have more than one health problems.   The chronic sleep issues tend to be possessed by aged people which interfere daily activities as well as compromise the quality of life.

Thailand has reached the stage of aged society whose population at age 60 and over is higher than 20% of the total population. According to the United Nations, Thailand is considered one of the world's rapidly aged society. TDRI (2019) commented that Thailand is ageing fast, faces multitude of challenges and stand at a crossroad. The average life expectancy of Thai people is 75 years which becomes a longevity society, though it should promote the older, the healthier simultaneously. Rama Channel (2017) reported that some 50% of older persons in Thailand have the problems of insomnia and it is required to give the utmost attention and importance of this sleep-related health problem.

Sleep is physically and mentally the physiological stage of full rest. Inadequate sleep causes fatigue and inefficiency in performing daily activities, etc. In the course of sleep, physiology is back to balance stage, e.g., heart beats and pulses, all types of hormones while daily data is compiled to store in the memory. Human mind is thus relaxing and physically overcomes a number of issues.

1.2 Objectives

The research places emphasis on the study of factors affecting sleep behavior in the elderly countrywide under the following objectives:

1. To examine the sleep quality in the elderly throughout the country.
2. To explore correlation between individual factors and sleep quality in the elderly

1.3 Significance

Sleep is a part of human behavior. Human sleep for some 3000 hours in a year or an estimation of 14 years in a lifetime. The sleep behavior is among the most interesting topics to be explored because one third of our life is spared for sleep as pointed out by Tanchaisawat (1993). Sleep problems affect physical health, e. g., fatigue, lack of enthusiasm, minimum tolerance to pain, increasing discomfort and unhappiness, decrease of immune system, etc. The complex problems of sleep disorders in the elderly render negative impacts to physical and mental health and disrupts the quality of life of the elderly.

Previous research relating to sleep complications in the elderly tended to focus on some specific groups, limited numbers of samplings and areas in Thailand which mostly

undertook the study to identify treatment solutions. This study explored the sleep quality in the elderly under the guidelines of Pittsburgh Sleep Quality Index (PSQI) in correlating with different dimensions of individual factors. The end results presented the outcome which could contribute to the national health policy relating to sleep quality and quality of life in the elderly in Thailand.

1.4 Research question

How do individual factors affect and correlate with sleep quality in the elderly in Thailand?

1.5 Hypothesis

It is hypothesized that sleep quality in the elderly correlates with individual factors which are inclusive of gender, age, marital status, income adequacy, physical diseases, physical exercises, smoking, drinking alcohol and caffeine, environmental factors and lodging as well as depression.

1.6 Anticipated usefulness

Research results constituted to establish the database reference at the national level relating to common individual factors impacting sleep quality in the elderly throughout the country. The findings identified dimensional characteristics of individual factors affecting core components of sleep quality in accordance with the international guidelines of PSQI.

As a matter of practicality, research results could be cross referenced for planning and developing guidelines and solutions in promoting awareness and preventive care of sleep quality in the elderly in any specific areas or groups in Thailand.

The results could also be used as an academic springboard to conduct further specific research in relating topics.

1.7 Specific research terminology

The specific term under the scope of this research is inclusive of the following key operational definitions:

Terminological words	Definition
Elderly/Older Persons	Male and Female aged 60 and over IOC Item Objective Congruene
Individual factors	It is referred to individual elements comprising age, gender, marital status, adequacy of income, physical diseases, physical exercises, drinking alcohol/caffeine
IOC	Item-Objective Congruence of the questionnaire
PSQI	PSQI stands for Pittsburgh Sleep Quality Index, a set of questionaire in assessing sleep quality developed by researchers of the University of Pittsburgh, PA., USA. It is used as a standardized sleep questionnaire for researchers and clinicians and serves to report/assess sleep problems simultaneously.
Sleep quality	It refers to how well one sleep. The good quality sleep may be determined that one falls asleep within 30 minutes or less, sleep soundly through the night. There should be no more than one wake up during the night.

1.8 Conceptual Framework

The research establishes and formulate the conceptual framework in order to guide and facilitate the research process as illustrated in Table 1.1.

Independent (X) Variables   **Dependent (Y) Variables**

Individual Factors	
Gender, Age	
Marital Status	
Adequacy of Income	
Medical Condition	
Physical Exercise	
Smoking	
Consuming	
alcohol/caffeine	
Environmental	
factor/lodging	
Depression	

Affecting →

Quality of Sleep

Component 1 Subjective Sleep Quality

Component 2 Sleep Latency

Component 3 Sleep Duration

Component 4 Habitual Sleep Efficiency

Component 5 Sleep Disturbances

Component 6 Use of Sleeping Medication

Component 7 Daytime Dysfunction

Figure 1.1   Conceptual Framework

The conceptual framework illustrates the correlation between the two groups of variables. The group of independent variables is the essential individual factors which are of personal particulars and characteristics.   This study examined the correlation between independent variables and dependent variables which are composed of established components of sleep quality.

Chapter 2

Theory/Concept and Literatures

The chapter introduces major concepts and theories applicable to frame and structure of the research in relation to aging and sleep quality affected by different dimensions of individual factors in the elderly.

The second part of this chapter presents selected literatures whose main contents and findings are essentially relating to this research. It indicates some research gaps which shall be complimented or bridged by the findings of this research.

2.1 Theory of Aging

The United Nations has declared that the 1st October 1990 is the International Day of Older Persons in standing against ageism and promoting hospitable society for older persons who continuously play vital role in society in many ways and simultaneously become vulnerable on poverty, disability and discrimination. The rapid increase in longevity, a global phenomenon has become a gravely global concern presenting multiple challenges. The age ranges of older persons are still variedly determined by each country. The United Nations and most Western countries have recognized the age ranges between 60-65. Physiopedia (2021) defines three age spans, i.e., 60-75 yrs = young old, 75-85 yrs = old and 85+ older population and so on.

There is yet no universally common definition of ageing. Harman (1956) defines that aging encompasses wear and tear of biological structure and functions which reach the peak during maturation. Strehler (1977) defines ageing in four postulates, i.e., universal, intrinsic, progressive and deleterious. This research introduces and refer to the following fundamental theories of aging.

a) Free Radical Theory of Aging by Harman (1954) who disclosed that free radicals are the primary cause of damage to macromolecules known as aging. It is the effect of free radicals which stimulates the biologically aging process.

b) Mitochondrial Theory of Aging was subsequently presented by Denham Harman (1972). The mitochondria plays a vital role in determining human lifespan. Though the mitochondria was also damaged by free radicals and exogenous antioxidants do not enter mitochondria which is logically led to determine human lifespan.

c) The Evolutionary Theory of Aging presented by Medawar (1952) explains why the mortality rises with age, health and functional declines.

Concepts and theories of aging have been broadening and encompassing in several dimensions. Stibich (2020) elaborates that aging is a complex process of genetics, chemistry, physiology and behaviour which simultaneously promotes other emerging theories explaining the human aging process which could be selectively summed up as follows :

a) Programmed Theories of Aging: Longevity, Endocrine and Immunology

b) Error Theories of Aging: Wear and tear, rate of living, cross-linking, free radicals, somatic DNA damage

c) Genetic Theory of Aging: Longevity, cell senescence, telomeres, stem cells

d) Biochemical Theory of Aging: Free radicals, protein cross-linking, DNA repair, heat shock proteins, hormones These theories are not exhaustive. Scholars, medical specialists, etc. continue to define and establish deviated theories in accordance with their specialized skills and expertise.

2.2 Concept of sleep

Sleep is a physiological process which is required by our body in maintaining proper relevant internal functions and overall health. Our body is programmed to sleep at night in order to restore our physiological functions and minds. There are two main types of sleep, i.e., rapid-eye-movement (REM) or active sleep and non-rapid-eye-movement (NREM) which is composed of 3 stages (N1, N2, N3).

The sleep study has been widely conducted in different dimensions, e.g., psychology, physiology, medical science as well as other fields. While sleeping, the body moves to the minimum and the level of consciousness is not stable. There is a physiological change and response to external stimulant in lesser degree. Guyton (1991) points out that sleep is the condition of losing consciousness, though able to be woke up by adequate stimulants. Hatheerat

(1991) indicates that sleepiness is an occasional suspension of physiology without unknowing. The stage of sleepiness encompasses the sleeping, silence, eyes close, snoring or other symptoms. It is further elaborated that sleepiness is a complex physiological process in conformity with circadian rhythm and physiological functions, Webster & Thompson (1986).

2.3 Theory of sleep

Sleep problems are considered one of health concerns affiliated with aging.   The Sleep Foundation of the United States underlines that health concerns and quality of life in older persons are affected by poor sleep quality.   One third of human lives are adhered to sleeping, therefore, relationship between aging and sleeping is inevitably intertwined. Sleep is perceived as a process along the line with rhythms of other physiological functions in the relaxation mode. Essentially when one sleeps, the consciousness and stimulant responses as well as physiological movement are at the minimum level or even in absence.   There is a sleep/wake cycle covering the period of 1 day or 24 hours which is known as circadian rhythm or biological clock.

Hereafter it is provided with some relating theories of sleep.

The Active Theory of Sleep established by Hodgson (1991) underlining that sleep is a functioning process of some groups of neuro-cells and further describes the stages of sleep, i.e., NREM, REM.

The Restorative Theory of Sleep presented by Ezenwanne (2006) explains that sleep served as a behavioral state of the body to save energy by lowering body metabolism. REM plays a vital role in memory retention and consolidation, removal of trivial or unwanted information, and storage of important data from memory which takes places during REM.

The Evolutionary of Sleep or Adaptive Theory of Sleep presented by the same author (Ezenwanne, 2006) emphasizes that periods of activity and inactivity are the process of energy conserving. The physiology adapts to sleep at the time of hazard for wakefulness.

There are some other theories relating to sleep which is briefly compiled for references, i.e., Sleep Disorders: B.F. Piper's Theoretical Framework: Integrated fatigue model; Symptom management Theory; Model of quality of life; Spielman's Three factor model; Adapted two-process Model of sleep regulation.

Sleep quality : definition and dimension

Human essentials to survival in daily routine are fundamentally food and water, though sleep is equally vital but underrecognized. Knowingly poor sleep could lead to worsening general physical health as well as cognitive and psychological functioning. Definition of sleep quality is still to be established and recognized, though there is a distinction between sleep quality and sleep hygiene. The Encyclopedia of Behavioral Medicine, Kline elaborates that sleep quality is a satisfaction of sleep experience, sleep maintenance, sleep quantity and refreshment upon awakening. Definition of sleep quality and sleep hygiene is indirectly determined by measurement research approach in varied research. Sleep quality is the measurement of how well sleep which is more complicated to measure than sleep quantity. Poor sleep quality has significant adverse health outcomes. The evolutionary concept of sleep quality is diverse and expansive, inclusive but not quite conclusive.

Barsocchi (2019) identified that there is yet no established definition of sleep quality, though widely used in sleep medicine. There appears to refer to quantitative sleep measures relating to sleep efficiency, total wake time while and another element of sleep quality during specific period in accordance with PSQI. Sleep quality is related to health, affect balance, satisfaction, etc. which he opined that sleep quality was better related to sleepiness than sleep quantity. Sleep quality, rather than sleep quantity is focused on the role of sleep in daily life. His research places focus on the age of target population in studying impact of sleep quality which is concluded that growing old affects characteristics of sleep habits inclusive of pattern, duration and quality of sleep. Elderly people experienced difficult of falling asleep, sleep fragmentation and maintaining sleep. Sleep problems among the elderly are considered an integral part of life.

There is yet the term of sleep hygiene which similarly sounds but the application appears to be different. Sleep hygiene is a term to describe good sleep habits which is associated with insomnia and relevant treatment and therapy approaches. CDC indicates that sleep hygiene is referred to good sleep habits which can improve sleep health. Peach (2015) applied the Sleep Hygiene Practice Scale (SHPS) measuring practices of daily life activities and sleep habits

impacting sleep in four areas, i.e., arousal behaviours, sleep scheduling and timing, eating/drinking behaviour and sleep environment. There is a scoring scale measuring the sleep hygiene. While sleep quality is measured by PSQI scoring scales. Peach conducted the research on sleep quality and sleep hygiene among target group of college students.

Sleep quality is made to widely recognize and measure sleep habits and characteristics of sleepers in accordance with the PSQI measuring scores and scales. Gellman (2013) elaborated that sleep quality is vitally defined by clinicians and researchers due to high prevalence of disturbed sleep and insomnia. Sleep quality have different meanings from person to the next. Sleep onset period determined sleep quality but restless sleep with frequent awakenings are considered sleep quality. There is no other measuring mechanism of sleep quality. In conclusion, the definition of sleep quality continues to be expansive in according to the research and clinical topics. Still it is ultimately referred to the research findings and clinical treatment of sleep disorders, sleep problems and relevant sleep elements.

2.4 Literature Review

This section captures presented literatures which are selectively relevant.

2.4.1 Literatures on aging

Changes of aging are referred to biological development, genetic defects, environment, diseases and the aging process. Harman (2001) states that aging is a universal process relating to deleterious changes caused by aging within cells and tissues which impact impaired functions and death. The analytical research focuses on the average life expectancy at birth (ALE-B) and the maximum life span (MLS). Harman applied the Free Radicals Theory in his research.

Human aging is inexorable and exposed to increased susceptibility and vulnerability to disease as a result of decreasing in physiological capacity and ability to respond to environmental stress. Troen (2003) discovered and disclosed that aging changes are manifested from molecular to the organismic level, environmental factors, etc. There is no one unifying theory to cover the entire aging process.

2.4.2 Literatures on sleep in the elderly

The term of sleep hygiene is understandably referred to a good sleep which is a behaviour or habits with consistent schedule and uninterrupted sleep. Suni (2020) underlines that healthy sleep is of critical to physical and mental health impacting the quality of life. To enhance sleep hygiene is inclusive of relaxing pre-bed habits, building healthy habits during the day which shall lead to ideal sleep hygiene. It is required to establish and maintain sustainable and beneficial routines contributing to healthy sleep behaviours.

It is known that sleep disorders in the elderly are not uncommon. Rodiguez (2014) underlines that sleep problems are not an inherent part of the aging process. There are still many older persons having good sleep quality throughout their lives. It is emphasized that sleep disorders do not derive from physiologic changes of sleep-wake patterns. The tendency of circadian rhythm shall also contribute to sleep-wake time of the elderly and require less sleep time. Simultaneously a number of elderly address their complaints about poor sleep and impairment of daytime functioning. Rodiguez (2014) undertook specific evaluation of two major sleep problems of sleep apnea and insomnia. The common sleep problems of the elderly are inclusive of difficulty falling asleep, less time spent in the deeper stages of sleep, early awakening and less total sleep time. Sleep diorders are found more among the elderly than the younger ones. The John Hopskin Sleep Disorder Center (by Neubauer, 1999) elaborates poor sleep habits of the elderly contribute to insomnia and other relevant sleep symptoms. The recommendation was made to evaluate sleep problems of the elderly by screening of poor sleep habits and critical factors which may contribute to sleep problems.

Ramsiri (2000) undertook the research on sleep problems of elderly in Loei province. Her study's focus is about the role of nurses in managing the sleep problems of the elderly whose research results shall be used for planning of health promotion in sleep quality for the elderly. The research tools are inclusive of demographic data record form, PSQI, disturbing factors and sleep management assessment forms approved by the expert panel. The findings provided baseline information to be used to guide planning for nursing intervention in promoting sleep quality by developing preventive and eliminating measures for sleep disturbing factors and promotion of effective sleep management among the elderly.

Panpanit（2020）examined the importance of sleep, causes and factors affecting the sleep and evaluation and nursing management in promoting sleep in the elderly. The findings identify some factors affecting the sleep of elderly which is inclusive of health, medicine, social mind, environment and behaviour. The main sleep problems are insomnia, apnea, abnormal sleep cycle and the nursing management in achieving the health objective, qualify of life and functional ability of nurses which is a qualitative research, no engagement with target sampling population.

Wolkove（2007）reveals that changes of sleep patterns are associated with the aging. Older people tend to go to bed early in the evening and wake up earlier in the morning. Many sleep disorders are prevalent and increased with age. The research describes selected pathological disorders among the older people. Mander（2017）indicates that sleep need is reduced in older people, though the actual need is not reduced but remain high. There is an impaired ability to register the unmet sleep need. The research applies the in-depth analysis of canonical changes in human sleep quantity and quality neurobiological mechanisms.

Disturbances in normal sleep cycles affect healthy aging as influenced by age related diseases as well as life changes. Zhong（2019）found that there are interconnections between aging and factors influencing sleep, the study elaborates the findings of the role of aging in sleep in cortical thinning, white matter degeneration, neurotransmitter dysregulation and circadian disorganization. It is confirmed the relationship between aging and sleep, though to be further examined in different perspectives.

The bad sleep quality in the elderly was recognized by the Institute of Geriatric Medicine, Department of Health Services which undertook the research and found the group solution for 11 elderly persons in Nonthaburi. The result of this research establishes the guideline in solving the bad sleep quality of the elderly by introducing the self-care group solution which became the pilot and guiding solution to be adopted and adhered by respective health entities in Thailand. This research is of experimental which targeted the small number of target group, though research results assumed that the findings are applicable to other elderly circumstances in Thailand.

Kumalesh.（2018）. revealed that the prevalence of sleep disorders is higher among older adults and the common symptom of sleep problems are loud snoring, apnea, restless legs,

etc. It is determined that other chronic healths are associated with sleep disturbances. Considered this research result, it is indicated that ageing is associated with increased incidences of sleep related ailments. On the other handa it is understood that sleep well can improve overall health. This research focuses on common symptoms related to sleep disorders of the elderly and aims at the guiding clinical treatment solutions.

Stepnowsky. (2019). undertook the study of normal and abnormal sleep cimcumstances of the elderly. It is underlined that various symptoms of sleep complaints increase and advance with ages. Insomnia and dementia as well as other chronic symptoms are the major profile of sleep problems of the elderly. Still the findings are focused on the characteristics of symptoms found in the elderly which reflects a dimensional perspective which simultaneously substantiates other research findings.

It is observed that the previous studies in Thailand mostly focused on specific groups of elderly, living area and research topics, though the research scope in other countries tend to focus in both specific topic and broader perspectives.

2.4.3 Literatures on sleep quality

There differs in practically defining sleep quality which is linked to the insomnia relating elements. Harvey (2008) clarified that insomnia and normal sleep group defined sleep quality by tiredness on waking and throughout the day, feeling rested and restored on waking and the number of awakening experienced during the night. Insomnia group requires more judging sleep to be of good quality. Good sleep quality is associated with a wide range of better health, less daytime sleepiness, greater well being and psychological functioning. Harvey's clarification is similar to the United States Sleep Foundation which has established key determinants of quality sleep inclusive of sleeping more time while in bed (at least 85 percent of the total time); falling asleep in 30 minutes or less; waking no more than once per night; being awake for 20 minutes or less after initially falling asleep. It is contrast to earlier practices which focus at negative outcomes of sleep, e.g., sleep dissatisfaction. Instead sleep health is applied to define sleep quality.

It is also in the same definition pathway guided by the National Sleep Foundation, i.e., Sleep quality is the measurement of how well you are sleeping. Guidelines of measurement of sleep quality are inclusive of sleep latency, how long it takes you to fall asleep, less then 30 minutes or less considers a quality of sleep, sleep waking, how often you wake up during the nights, frequent wake up disrupt your sleep cycle, your sleep quality is good, wakefulness, how many minutes spending awake after going to sleep, sleep efficiency, amount of time sleeping in bed. There is yet a consideration if these elements can assess your quality of sleep.

Launotti (2000) underlines that sleep quality matters much more than sleep quantity which is underlined how to boost sleep quality. Sleep quality is often represented by having consolidated sleep. Sleeping one big chung instead of having little pieces of sleep spread throughout the day or night. Sleep quality is directly linked to better health, satisfaction and overall happiness. Sleep quality often relies heavily on healthy sleep habits and hygiene.

Tel (2012) undertook the research of 187 elderly people in Turkey with the purpose of determining sleep quality and quality of life of the targeted elderly people. The main research tool is PSQI questionnaire and the Turkish version of quality of life scale. The elderly people tended to have poor sleep quality. There was a significant difference between gender, marital status, educational status, the person with whomthe elderly people lifed, presence of a physical disease, diagnosis of a disease and sleep quality and quality of life (p<0.05). In conclusion, a low sleep quality in the elderly is found and there is a close correlation between sleep quality and quality of life. It is concluded that sleep hygiene should be ensured to benefit the sleep quality and increase quality of life.

2.5 Research Gap

Extensive review of relevant research on sleep in the elderly indicates that other studies focus on particular themes and specific groups and locations of target research populations.

The scope of this research encompasses the entire population of the elderly in Thailand whose results render the conclusive macro perspectives of effects of individual factors and sleep quality in the elderly countrywide. It contributes to generalize the characteristics and pattern of sleep quality in the elderly which may become the fundamental research framework for planning and promoting health in the elderly at the national level as well as the basic data for further specific research.
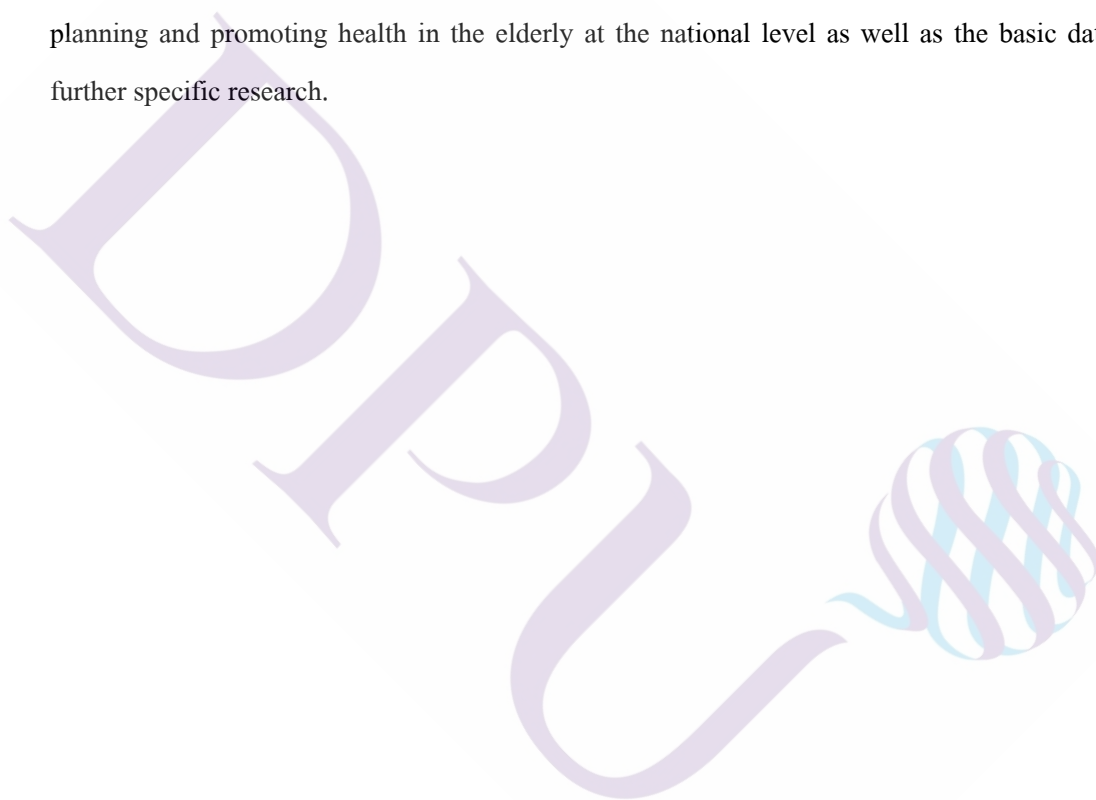
Chapter 3

Research Methodology

This quantitative research applied a descriptive statistical approach enabling to report basic features of study data and summarize samplings and measures with graphic analysis presenting the findings. Precisely this selective approach facilitates to reflect the findings and interpreting statistical correlations of determined factors and variables related to sleep quality in the elderly.

3.1 Population and Sample Size

The target population is based on the official total population published by the Department of Older Persons. It is reported that there are officially 11,136,059 older persons countrywide on the 31st December 2019. Older persons are inclusive and assimilated in almost every family and community of every province throughout the country. The total number of older persons is largely sizeable and spreading out at undetermined locations, if to embark on a census approach, it would become impractical, instead it was decided to apply a sampling approach.

Not only the location, but also other characteristics of research population, e. g. , gender, education, and other factors are of different dimensions. Therefore, it applied the Stratified Random Sampling whose target research population was planned and calculated as below:

    a)   Identify the total number of older persons aged 60 and above each province

    b)   Group the provinces into 4 regions : Middle, East, North, Northeast and South

    c)   Arrange and calculate the population of older persons by province and region

    d)   Categorize and select the provinces of each region in accordance with the population size, i.e., small, medium and large

e) Calculate the size of each province by applying the statistical Range which is calculated by applying the total number of older persons of the region and subtracted by the smallest number of older persons and divided by 3.

f) Define and calculate the population as follows :

Small province : Total population is in the first Range selected one province from each region.

Medium province : Total population is in the second Range selected one province from each region.

Large province : Total population is in the third Range selected one province from each region

The total number of older persons in Thailand is 11, 136,059 persons whose ages are 60 years and above in accordance with the national statistics issued by the Department of Older Persons on the 31st December 2019. The following table (Table 3.1) captures and present the research sample size which is organized, calculated and applied stratification and statistical range approaches.

Table 3.1 Sampling Location and Population Size determined by Stratified Random Sampling and Statistical Range

Region & Population of Older Persons	Province Size	Sampling Province	Provincial Population of older persons	Sample size
Central 3,215,175	Large	Bangkok	1,063,871	119
	Medium	Pathumthani	164,358	18
	Small	Nakhonayok	50,301	6
North 2,287,470	Large	Chiangmai	453,388	51
	Medium	Phetchabun	177,211	20
	Small	Uthaithani	65,041	7
Northeast 3,532,115	Large	Nakhonratchasima	453,388	51
	Medium	Udonthani	234,293	26
	Small	Mahasarakham	164,249	18
East 719,044	Large	Chonburi	205,021	23
	Medium	Chanthaburi	95,420	11
	Small	Trad	39,413	4

Table 3.1 (continue)

Region & Population of Older Persons	Province Size	Sampling Province	Provincial Population of older persons	Sample size
South 1,382,155	Large	Nakhonsithammarat	265,735	30
	Medium	Songkhla	219,472	25
	Small	Phuket	45,827	5
Total Regional Population = 11,136,059				**400**

Note: Calculation of these strata population data was based on the official statistics of old persons published by Department of Old Persons on the 31st December 2019.   Relevant statistical data and sources are referred to in Appendices.

Giving the stratified population data stipulated in the above table, the research population was calculated by using the formula of Taro Yamane (Yamane 1973) as follows:

$$n = \frac{N}{1 + NE^2} = \frac{11136059}{1 + (11136059 \times 0.05^2)} = 399.9 \approx 400$$

n   =   sample size required

N   =   people size

e   =   allowable error 5% (0.05)

3.2 Inclusion Criteria

The primary criteria of inclusion of target population is below described

a)   Male and female older persons aged 60 and above.

b)   Older persons who are registered residents, possess Thai nationality and reside in local communities.

c)   Older persons who are willing and volunteer to participate in the research.

d)   Older persons who are literate and can communicate during the process of data collection either by completing the questionnaire or being interviewed.

e)   The identification of target population incorporates any individual older persons who possess all types of gender preferences as well as faiths.

f)   Older persons who have no medical condition relating to dementia and mental health or are not in a position to answer questions relating to sleep habits during the past month.

3.3 Exclusion Criteria

In order to smoothen the data collection process, the criteria of exclusion is established to screen out individuals whose profiles may disrupt the process of data collection.

a)   Older persons who are volunteer and willing o participate in the survey but their ages are below 60.

b)   Older persons who are bed ridden and possess disability and certain health vulnerability and risks.

c)   The ones who fulfill the inclusion criteria but do not want to participate or decide to disrupt and discontinue their participation in this study.

d)   Older persons who are illiterate.

3.4 Research Tools

The primary research tool is the validated questionnaires based on the initial set of PSQI questionnaires as follows :

a)   Questions Part I relating to individual personal factors : The content of these questions is relating to age, gender, marital status, adequacy of income, drinking alcohol/caffeine, environmental factors, lodging, physical diseases, physical exercises and depression. These questions are basic and have been variedly applied in previous research in Thailand.

b)   Questions Part II relating to sleep quality elements under PSQI guidelines translated to Thai and validated by the professional experts.   The recognized PSQI Thai version was widely applied by a large number of research in Thailand. Tawanchai Chirapramukpitak and Waran Tanchaisawat（2017）undertook the process of translation and modification as well as

validation which was widely used in the research network in Thailand. The questionnaire is inclusive of 7 components relating to sleep quality, bedtime and sleep time, sleep duration each night, normal sleep efficiency, sleep disturbances, use of sleeping pills and impact to daytime activities. The PSQI questionnaiare has been translated into Thai version with high validity, reliability and accuracy (Methipisit et al, 2016). The questionnaire has been used for numerous studies relating to sleep problems of specific groups and locations in Thailand. The list of studies applied this form is established and shown in the Appendices.

The Pittsburgh Sleep Quality Index (PSQI) is a set of questionnaire which is applicable to assess the sleep quality during the past one month which was established by researchers at the University of Pittsburgh. It is a standardized questionnaire to be primarily used for clinicians and researchers, though it is primarily meant for assessing sleep quality relevant to psychiatric clinical practices. The PSQI scoring guidelines are hereunder elaborated:

a) There are 23 core questions and 9 sub-questions incorporating in the entire questionnaire set. In accordance with PSQI Guidelines, the scoring process and method are hereunder established:

1. The 19 questions are grouped into 7 components: Component 1 : Subjective sleep quality; Component 2 : Sleep latency; Component 3 : Sleep duration; Component 4 : Habitual sleep efficiency; Component 5 : Sleep disturbances; Component 6 : Use of sleep medicine and Component 7 : Daytime dysfunction. Each component incorporates one and more related questions stipulated in the questionnaire.

2. The results of scoring calculation to measure and determine sleep quality provided the scores of each question and component. The calculation process method is undertaken in two stages. Stage I : The scoring calculation method for each question and component is varied and differs subject to the characteristics of each question. Each question has a score range of 0-3. Stage II : The calculation of scores from 19 questions which provides the total global score with indicated scoring range of 0-21. The global score outcome justifies and present the outlook of sleep quality of the target population.

b) To apply the PSQI guidelines with the modified questionnaire applicable in this study is hereunder for reference :

Component 1 : Subjective Sleep Quality   : Question no. 1

Determined scoring :   Very good = 0 point

Good = 1 point

Fairly bad = 2 points

Very bad   = 3 points

Component 2 : Sleep latency : Question : 3 and 6.1

a) Question no. 3   : Scoring   Less than 15 minutes = 0 point

16-30 minutes   = 1 point

31-60 minutes = 2 points

60 minutes and over = 3 points

b) Question no. 6.1 : Scoring   No problem at all = 0 point

Problem less than 1 time in a week = 1 point

Problem of 1-2 times/week = 2 points

Problem of 3 times and more/week= 3 points

Component 3 : Sleep duration : Question : 5

Determined scoring :   7 hours and over = 0 point

7 hours = 1 point

5-6 hours = 2 points

Less than 3 hours = 3 points

Component 4 : Habitual sleep efficiency : Questions : 2, 4 and 5)

3. Calculation of actual hours of sleep (Q 5) divided by wake up time (Q4) and sub tract with sleep time (Q 2)

4.   Result : More than 85% = 0 point

84-75%   = 1 point

65-74%   = 2 points

Less than 65% = 3 points

Component 5 : Sleep disturbances   Question : 6.2-6.10)

    Result :   No problem at all = 0 point

        Problem with 1 time/week = 1 point

        Problem of 1-2 time/week = 2 points

        Problem more than 3 times/week = 3 points

Component 6 : Use of medicine : Question 10

    Result :   Never use   = 0 point

        Use it less than 1 time/week = 1 point

        Use 1-2 times/week = 2 point

        Use 3 times or more/week = 3 point

Component 7 : Daytime dysfunction : Question : 8 and 9

    5.   Calculation   : Effects on day time activities (eat, work, drive) (Q.8)

    6.   Result No symptom at all   = 0 point

        Less than 1 time/week = 1 point

        1-2 times/week = 2 points

        3 times or more/week = 3 points

    7.   Calculation   : Enthusiasm in daytime activities : Question 9

Result :   No problem at all = 0 point

        Small problem = 1 point

        Adequate problem = 2 point

        Many problems : 3 points

    8.   Calculation for total scoring of Questions 8 and 9

Result : 0   = 0 point

    1-2 = 1 point

    3-4 = 2 points

    5-6 = 3 points

Total scoring for 7 components is called a global score with score ranges of 0-21 points. The result with total score is less than 5 interpreting as a good sleep quality. If the total scoring exceeds 5 is interpreted a bad sleep quality.

3.5 Quality of Research Instrument

The Thai version of PSQI Questionnaire used by other studies in Thailand was presented to the Thesis Committee in the course of defending the thesis proposal. The Thesis Committee advised to modify some questions ensuring applicability and conformity to the objectives and hypothesis.

3.5.1 Validity

1. The Questionnaire structure is inclusive of

Part I : Questions relating to determined essential elements of individual factors comprising 13 questions

Part II : Questions relating to sleep elements under PSQI comprising 24 questions

2. The IOC evaluated the items/questions of the questionnaire in accordance with the score range from -1 to +1 (Congruent = +1, Questionable = 0 and Incongruent = -1).
The items that have score lower than 0.5 are to be revised. The items that gain the scores higher or equal to 0.5 are retained.

3. In this process advised by the Thesis Advisor, the Advisory/ Expert Committee comprising 3 experts with relevant experiences relating to sleep quality of the elderly. The composition of IOC experts comprises

Associate Professor Payong Wanikiat, Ph.D.

Associate Professor Nattinee Jantaratnotai., M.D., Ph.D.

Archarn Kanin Tripipatsiriwat, M.D.

4. The conclusion of assessment on validity of each question/ item by 3 experts is summarized as follows :

4.1 Standard Scores of validation and reliability

Score (each question) ranges of 0.5-1.0 = ACCEPTABLE

Score (each question) result under 0.5 = UNACCEPTABLE

Score calculation : 1+1+1 = 3 divided by 3 = 1

$$1+1+0 = 2 \text{ divided by } 3 = 0.67$$

4.2 Actual Scoring Results

Expert	Q.Part 1	Q.Part 2
1	Q.1-13 = 1 all	Q.1-24 = 1 all
2	Q.1-13 = 1 all	Q.1-24 = 1 all
3	Q.1-9 = 1 all Q.10 = 0.67 Q.11-13 = 1 all	Q.1-24 = 1 all

4.3   Summary of validation of the entire questionnaire by 3 experts

4.3.1   36 questions（12 questions of Part 1 and 24 questions of Part 2）are unanimously graded as 1 each by 3 experts. The score calculation of each question is resulted as 1.

4.3.2 1 question (question 10 of Part 1) is graded as 0 by 1 expert. The score calculation of this question is resulted as 0.67.

4.3.3 Taking into consideration of the score standard scale stipulated in paras. 3.1 a and b, all 37 questions are in the ranges of 0. 67-1. 0 which are correctly acceptable.

3.5.2   Reliability

1. It was ensured the Questionnaire reliability by conducting the test with 30 selected respondents whose ages are above 60.   The purpose of this testing is to prove that responses to questions of the Questionnaire are reliable and consistent. The value of reliability was calculated by using Cronbach's Alpha ensuring internal consistency within each question or item within the Questionnaire.   George and Mallery（2010) determines the value of Coefficient Cronbach's Alpha :

> 0.9=Excellent, > 0.8 Good, > 0.7 = Acceptable, >0.6 = Questionable, > 0.5 = Poor and < 0.5 = Unacceptable.   The reliable threshold of Coefficient Cronbach's Alpha has to be at least 0.7.

2 . As guided and advised by Thesis Advisor, the questionnaire was distributed to target groups and the test was conducted and concluded as below

The total number of questionnaire is 30 which was distributed to target group for testing purposes.

The composition of the target group is inclusive of Thai nationality, aging over 60 years, male and female, residents in Bangkok and provinces.

The questionnaire test was undertaken by direct in-depth interview to obtain responses to questions in the questionnaire. This exercise was directly conducted by the researcher and assistants. The target group is mostly acquaintances who are approachable and willing to participate in this exercise. The mode of interview is done by direct conversation either by person or by different modes of online media.

The interview questionnaire started around 15 April and the 30 the questionnaire was intensively completed on 28 April.

The data of each question is encoded and captured in the excel format (attached) which has been consequently transformed into SPSS program for analysis by Research Assistant. The Cronbach's Alpha embedded in SPSS is applied to measure the consistency and/or coefficient reliability of each question.

The questionnaire is divided into 2 parts. Part I encompasses all individual factors and sleep behaviour is incorporated in Part II. Most of questions are close ended, though there are some 8 questions (Part I 4,8 and Part II 2-5, 7.5) considered as open ended question.

The overall and average value of Cronbach's alpha is 0.812. The Cronbach's alpha values of 0.7 or higher indicate acceptable internal consistency or reliability of the questions (Keith S. Taber, the use of Cronbach's Alpha when developing and reporting research instruments in science education).

Therefore, the Cronbach's alpha value indicates the adequate acceptability and reliability of the designed questionnaire to be used for further study. The computed SPSS report is attached for information and reference.

3.5.3 Observation and recommendation

As remarked in para 3.5.1 (4), there are 8 open ended questions which are not verified through the Cronbach's Alpha computed process. Should these questions be modified into the close ended questions, the Cronbach's Alpha value should have been higher. As a matter of practicality, in the actual research process of survey and data collection, these 8 questions may

be modified to become a close end question, the essence and substance of each question remain intact and unchanged.   It shall then yield a much efficient computed SPSS process.   The results should become more precise, inclusive and effective.

3.6 Research Ethics and rights protection for research participants

The questionnaire validated by IOC was submitted and authorized by the Human Research Ethics Committee of Dhurakij Pundit University under the reference of COE no.125/64 dated 5 July 2021. The data and end result of the research was presented as the total result or the research overview.   There will be no disclosure of individual data or responses. Research participants or volunteers could withdraw from the research process at any time with no negative impact in any which way.

3.7 Data Collection

Given the COVID 19 pandemic impacted almost every community throughout the country, it was to modify the data collection plan ensured minimum impacts of the whole process. The initial plan was to conduct the survey at centers of older persons but it was inevitable to cancel it upon discussion with relevant personnel of several centers due imposed health regulations.   It was thus focused on the target survey groups at community levels whose coordination was made through local community leaders.   The data survey was conducted in the followings:

a)   Held working meetings and discussions with local leaders by explaining purpose and process of survey.

b)   Conducted the in-depth interview of older persons as guided and identified by local leaders.

c)   Applied the flexibility approach and health caution to the maximum extent in the course of in-depth interview. It was required to assign different teams to different areas subject to locally actual circumstances and health regulations.

d)   Reviewed data collection forms which took much more time on validity, reliability and accuracy as well as consistency prior to the process of data entry.

Despite exercising cautious approaches, members of survey teams were contracted and positively tested for Covid-19, it inevitably cased suspensions and lengthening the survey plan.

3.8 Data Analysis

The Statistical Product and Service Solutions (SPSS) is internationally recognized and applied by researchers in social science, health government and other entities. SPSS is therefore engaged and appropriately applicable for data analysis of this study. The analytical statistical modes are inclusive of frequency, percentage, mean, standard deviation, Chi-square, etc. in order to test the research hypothesis relating to varied independent variables.

Considered samplings characteristics of this study which is focused on the entire eligible older persons in Thailand as one sampling group at the national level, it was envisaged and determine to process, analyze and present conclusive results along the line with the statistical framework as follows :

a) Individual factors relating to essential elements of general and personal profile: Using statistical tool of frequency and percentage.

b) Factors affecting sleep quality under PSQI standards: Using statistical tool of frequency and percentage.

c) Essential elements of sleep problems under PSQI standards: Using statistical tool of frequency and percentage.

d) Reporting sleep problems by room partners under PSQI standards: Using statistical tool of frequency and percentage.

e) Impact of sleep problems under PSQI standards: Using statistical tool of frequency and percentage.

f) 7 components of sleep quality under PSQI standards: Using statistical tool of frequency and percentage

g) Conclusive summary of sleep quality under PSQI standards: Using statistical tool of frequency and percentage.

h) Hypothesis testing and findings the relationship between individual factors (independent variables) and sleep quality (dependent variables) : Using statistical tool of Chi-square.

The statistical analysis under the afore-mentioned structure was processed and operated under SPSS program tool based on data entry feeding from 400 questionnaires. The end result should be conclusive, validated, recognized and established as data reference for varied eventual uses. Table 3.2 provides the overview and substantive elements contributing to automated data analysis for simpler reference.

Table 3.2 Overview of analytical structure

Analytical Theme	Elements/Factors	Statistical Tools
1.Individual factors	Age, gender, marital status, medical condition, consumption of alcohol, caffeine, smoking, physical exercise, lodging, disturbing environment, mental/psychological condition, meditation	Frequency, percentage
2. Sleep factors in past one month 2.1Sleep habits 2.2 Sleep problems 2. 3 Sleep disturbances (having room partners)	Quality of sleep by and large, sleep time, time to fall asleep, wake up time, sleep duration Unable to sleep in 30 minutes, wake up at night, wake up to use bathroom, cough/ snore, too cold, too hot, bad dreams, pain, mental psychological feelings Snoring, breathing discomfort, jerking legs, confusion (wake, sit, sleep) , depression, daytime dysfunction, weak enthusiasm, using medicine to sleep	Frequency, percentage

Table 3.2 (continue)

Analytical Theme	Elements/Factors	Statistical Tools
3.PSQI Sleep quality 3.1 Sleep quality in 7 components 3.2 Conclusion of sleep quality	Subjective sleep quality, sleep duration, sleep , habitual sleep efficiency, sleep disturbances, use of medicine to sleep, daytime dysfunction Good sleep, bad sleep	Frequency, percentage
4.Hypothesis testing	Age, gender, marital status, medical condition, alcohol, caffeine, physical exercise, environmental disturbances, depression, prayer, meditation	Chi-square, significance value
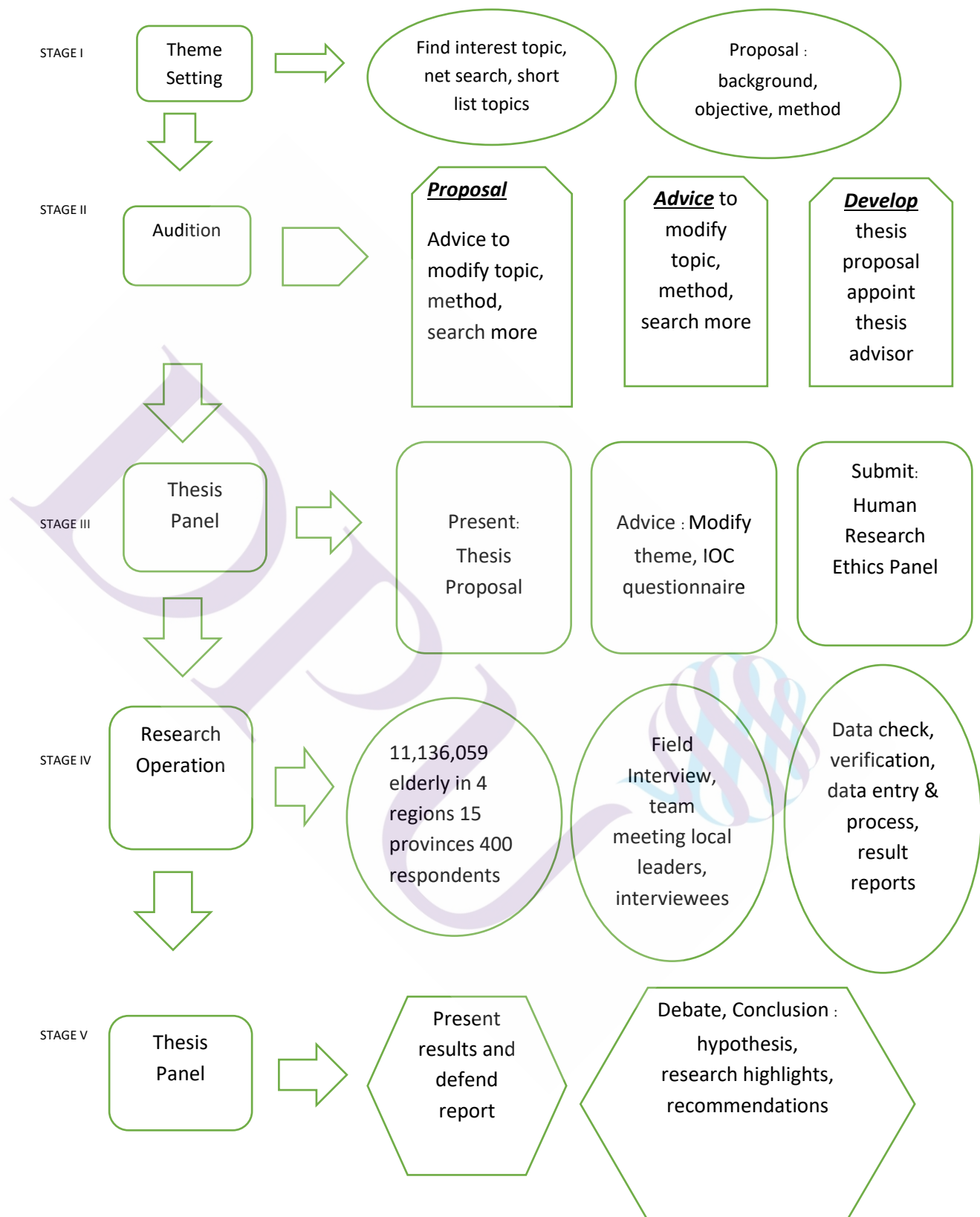
Figure 3.1 Flowchart of Research Process

3.9 Research sources

Research sources are primarily Google Scholar, Pubmed, Web of Science, Scopus, Springer Link, Science direct, Taylor & Francis, Wiley, Medline and other reliable sources which are mostly undertaken via internet searches as well as printed media, newsletter, newspapers, textbooks, journals, etc.   CMMU portal was utilized for retrieval of full text articles from different on line database sources.

3.10 Research Scope

The research covered the entire population of old persons in Thailand.   The population sampling is identified through the stratified process of calculation.   Upon the given authorization by the Human Research Ethics Committee of the Dhurakij Pundit University on 6th June 2021.   The field survey by in-depth interview was commenced in July 2021 and completed in early November 2021.

The research places emphasis on examination of correlation between individual personal factors, independent variables and sleep quality, dependent variables. The effects of relationship between two variables are not encompassed in this study.

Chapter 4

Analysis Results

The research survey with in-depth interview of the elderly samplings in every region of Thailand was conducted during July – November 2021. The data analysis of 400 responded samplings from 15 provinces was processed and digitally analyzed by SPSS whose analytical results are hereunder. The results are reported and responded to research objectives.

4.1 Part I : General individual profiles

The general individual profile of 400 samplings was compiled, processed and analyzed whose data results are shown in Table 4.1

Table 4.1 General individual profiles

General Profile	N	%
Age : Part I Question 1		
60-70 years	292	73.00
71-80 years	34	8.50
80 years and over	74	18.50
Gender : Part I : Question 2		
Male	277	69.30
Female	123	30.80

General Profile	N	%
Marital status : Part I : Question 3		
Single	17	4.20
Married	320	80.00
Widow	63	15.80
Do you have a medical condition? : Part I : Question 4		
Have	212	53.00
Not having	188	47.00
Do you consume alcoholic drinks? : Part I : Question 5		
Yes	9	2.20
No	391	97.80
Do you consume drinks with caffeine? : Part I : Question 6		
Yes	112	28.00
No	288	72.00
Do you smoke ? : Part I : Question 7		
Yes	1	0.30
No	399	99.80
Do you practice regular physical exercises? : Part I : Question 8		
No physical exercises	327	81.80
Perform regular physical exercise	73	18.20
Is your income adequate to make a living? : Part I : Question 9		
Adequate for saving	398	99.50
Adequate but not for saving	2	0.50
Status of your lodging : Part I : Question 10		
Self owning	392	98.00
Renting	8	2.00
How is environment impacting your sleep? : Part I : Question 11		
Noise pollution	198	49.50

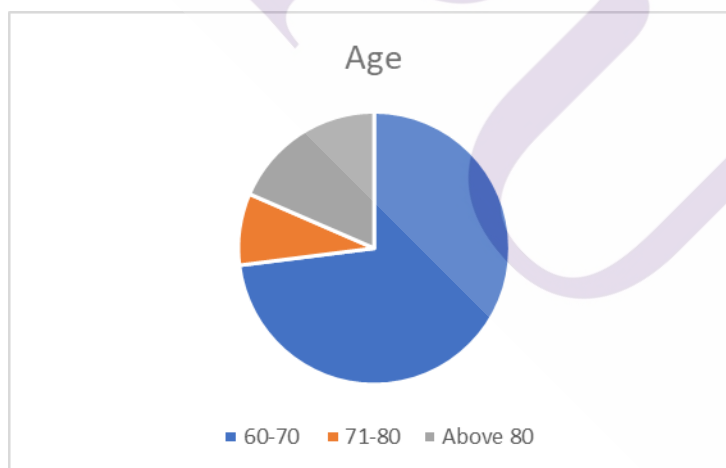| General Profile	N	%
Odour pollution	72	18.00
Disturbances by brightness and darkness	100	25.00
Disturbances by smokes and dusts	30	7.50
Do you feel depressed, discouraged and uneasy with known and unknown causes? : Part I : Question 12		
No	101	25.20
Yes, some days	299	74.80
Do you perform prayer or meditation before sleep ? : Part I : Question 13		
Every night	1	0.30
Not regularly	158	39.50
Not performing	241	60.20
Total	**400**	**100.00**

Figure 4.1   Statistic Bar Chart of General Profile of respondents

From Table 4.1, it depicts the data results of general profile of samples related to Part I of Questionnaire, question items are no. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

The majority of samplings who participated in this study are in the age range of 60-70 years representing some 73 % of the total samplings. It follows by the second group of age range of 81 years and over (18.30%) The minority age group is the age range of 71-80 years.   It appears that the majority group of 60-70 years, recent retirement ages who were more actively taking part in this study.   It could also imply that their response and input are considerably relevant, valid and precise.

It is of interesting to note that of which 69.30%and 30.80% of samplings are male and female respectively. Throughout the survey exercise, genders are of male and female without other different gender preferences. Therefore, it could also imply that study responses are of male characteristics. The majority of samplings with 80% and 15.80% are married and widow respectively. The input on sleep quality of this study also represents the married status. The minority with 4.20% are single. Given these individual profiles, responses to relevant questions on sleep quality should be dependent on and adhered to individual personal profiles.

In relation to individual health condition, it shows that the majority with 53% of samplings possess medical conditions and 47% do not possess medical conditions. It implies that the majority of samplings tending to have certain personal medical conditions. The elderly appears to be embedded with certain medical condition which may be correlated with the sleep quality. It could be implied that the more the ages is advance,d the more the elderly possess certain medical conditions. The vast majority of 97.80% do not drink alcohols and only 2.20% reported to consume alcohols. Under similar statistical indication, the majority with 72% do not consume caffeine and the absolute majority of 99.80% do not smoke. These individual habits sound healthy which is also interesting if and how it was related to the sleep quality which showed in the later part of this analysis result.

The resultsshow that 81.80% performed regular physical exercise and 99.50 % earn adequate income for a living and 2 % lived in a rental lodging. There is a point whether those living in a rental lodging may or may not have a better sleep quality, though they have more flexibility to change lodging places where more convenient and friendly to sleep. Those having own lodging perhaps had less flexibility in changing lodging places which may correlate with sleep quality.

Relating to environment factors influencing sleep quality in the elderly, 49.50% are disturbed by noise pollution, 25% by darkness and brightness, 18% by odour and 7.50% by smoke and dust respectively. In addiion, 74.80% were affected by depression on some days and 60.20% doidnot perform prayer, but only 0.30% performs it every night. These environmental and mental disturbing elements may directly correlat with sleep quality in the elderly whose results are shown in the later part of hypothesis testing .

4.2 Part II: Results of factors influencing sleep quality under PSQI guidelines

Table 4.2 Sleep habits in the past one month

Troubling Sleep Habits	N (n=400)	%
During the past month, how is generally your sleep quality? P.II/Q.1		
Very good	-	-
Good	68	17
Fairly bad	328	82
Very bad	4	1.0
During the past month, what time have you usually gone to bed at night? P.II/Q.2		
19.00 hrs	69	17.30
20.00 hrs	73	18.30
21.00 hrs	107	26.80

Troubling Sleep Habits	N (n=400)	%
22.00 hrs	47	11.80
23.00 hrs	95	23.50
24.00 hrs	9	2.30
During the past month, how long (in minutes) has it usually taken you to fall asleep each night? P.II/Q.3		
10minutes	1	0.30
15minutes	3	0.80
20minutes	8	2.00
30minutes	177	44.30
40minutes	77	19.30
50minutes	1	0.30
60minutes	133	33.33
During the past month, what time have you usually gotten up in the morning? P.II/Q.4		
04.00 hrs	7	1.80
05.00 hrs	255	63.70
06.00 hrs	92	23.00
07.00 hrs	46	11.50
During the past month, how many hours of actual sleep did you get at night? P.II/Q.5		
5hours	1	0.30
6hours	72	18.00
7hours	18	4.50
8hours	187	46.80
9hours	120	30.00
10 hours	2	0.50
Total	**400**	**100.00**

From Table 4.2, the data analysis results are related to the PSQI questions about sleep quality under questions1-5 as stipulated in Table 4.2. It was the assessment during the past one month, the majority of samplings regardless their individual profiles made self rated that generally 328 persons (82%) had fairly bad sleep quality. While there are 68 persons (17%) experienced good sleep, though only 4 persons (1%) reported very bad sleep quality. These results reflect overall self rating how each individual thinks or feels which the samplings did not seem to have overall sleep satisfaction. Still this self rating result should take into consideration with other factors of subsequent questions.

Another element of individual sleep habits showed that the majority of 107 persons (26.80 %) went to bed at 2100 hrs. The second group of 95 persons (23.50%) went to bed at 2300 hrs. The third group of 73 persons (18.30) went to bed at 2000 hrs. The fourth group of 69 persons (17.30%) went to bed at 1900 hrs. The fourth group with 47 persons (11.80) went to bed at 2200 hrs and the minority group of 9 persons (2.30%) went to bed at 2400 hrs. It is interesting to note that their sleep or bed time of the samplings tend to be obviously varied and the vast majority of them tend to go to bed during 2200-2300 hrs. which is quite late. This indication may contribute to their sleep quality.

The element of how long it took to fall asleep each night whose response showed 177 persons (44.30%) required 30 minutes to fall asleep. The second group of 133 persons/ (33.33%) required 60 minutes to fall asleep. The third group of 77 persons (19.30%) required 40 minutes. The fourth group of 8 persons (2.0) required 20 minutes to fall asleep. The fifth group of 3 persons (0.80) required 15 minutes to fall asleep. The minority group of 1 person (0.30%) required only 10 minutes to fall asleep. The two majority groups require 30-60 minutes to fall asleep. The minority group requires only 10 minutes to fall asleep which could imply that the samples took quite substantial time to actually fall asleep. This habit may correlate with the sleep quality and this response result seems to be in line with their self rating on the overall sleep quality.

Referring to the wake-up time in the morning, the majority of 255 persons (63.70%) woke up at 0500 hrs. The second group of 92 persons (23%) got up at 0600 hrs. The third group of 46 persons (11.50%) got up at 0700 hrs. The minority group of 7 persons (1.80%) got up at 0400 am. Despite their response of late bed time in the other question, the majority woke up early between 0500-0600 hrs. None woke up later than 0700 hrs. Their wake up time may take into consideration in parrarell with their bed time and other elements which may indicate their sleep quality or satisfaction.

The sleep duration each night of the majority of 187 persons (46.80%) is 8 hours. The second group of 120 persons (30%) reached 9 hours of sleep. The third group of 72 persons (18%) took 6 hours of sleep. The fourth group of 18 persons (4.50%) took 7 hours of sleep. The fifth group of 2 persons(0.50%) took more than 9 hours of sleep. The minority group of 1 person (0.10%) took 5 hours of sleep. The two majority groups managed to gain the total sleep hours between 8-9 hours and the minority managed to sleep up to 5 hours. The indication of total sleep hours may support the quality of sleep, though it is also required to take into consideration of other factors.

Table 4.3 Sleep problems/sleep latency in the past one month

Sleep problems in the past one month	Count	Percentage	Ordinal sequence
6.1 Cannot get to sleep within 30 minutes P.II/Q.6.1			
Not during the past one month	6	1.5	4
Less than one time in a week	153	38.3	2
1-2 times in a week	173	43.3	1
3 or more times in a week	68	17.0	3
6.2 Wake up in the middle of the night : P.II/Q.6.2			

Sleep problems in the past one month	Count	Percentage	Ordinal sequence
Not during the past one month			
Less than one time in a week	57	14.3	3
1-2 times in a week	272	68.0	1
3 or more times in a week	71	17.8	2
6.3 Get up to use the bathroom at night : P.II/Q.6.3			
Not during the past one month	-	-	
Less than one time in a week	21	5.3	3
1-2 times in a week	307	76.8	1
3 or more times in a week	72	18.0	2
6.4 Cannot breathe comfortably : P.II/Q.6.4			
Not during the past one month	267	66.8	1
Less than 1 time in a week	129	32.3	2
1-2 times in a week	2	0.5	3
3 or more times in a week	2	0.5	3
6.5 Cough or snore loudly : P.II/Q.6.5			
Not during the past one month	205	51.3	1

Sleep problems in the past one month	Count	Percentage	Ordinal sequence
Less than 1 time in a week	115	28.8	2
1-2 times in a week	11	2.8	4
3 or more times in a week	69	17.3	3
6.6 Feel too cold P.II/Q.6.6			
Not during the past one month			
Less than 1 time in a week	261	65.3	1
1-2 times in a week	11	2.8	3
3 or more times in a week	128	32.0	2
6.7 Feel too hot : P.II/Q.6.7			
Not during the past one month			
Less than 1 time in a week	260	65.0	1
1-2 times in a week	15	3.8	3
3 or more times in a week	125	31.3	2
6.8 Had bad dreams P.II/Q.6.8			
Not during the past one month			
Less than 1 time in a week	146	36.5	2
1-2 times in a week	106	26.5	3
3 or more times in a week	148	37	1
6.9 Have pain : P.II/Q.6.9			
Not during the past one month	12	3.0	4
Less than 1 time in a week	187	46.8	1
1-2 times in a week	95	23.8	3
3 or more times in a week	106	26.5	2

Sleep problems in the past one month	Count	Percentage	Ordinal sequence
6 . 1 0 Causes of mental health relating to loss and some feelings : P.II/Q.6.10			
Not during the past one month			
Less than 1 time in a week	174	43.5	1
1-2 times in a week	144	36.0	2
3 or more times in a week	82	20.5	3
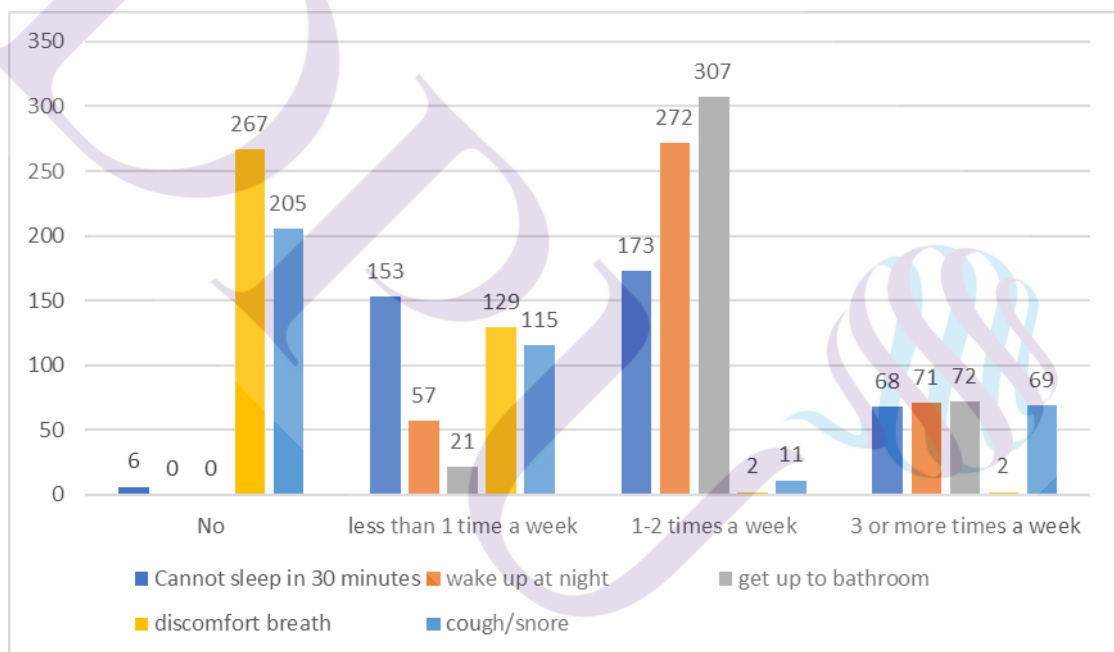
Figures 4.2 Statistical Bar Chart showing sleep latency profiles
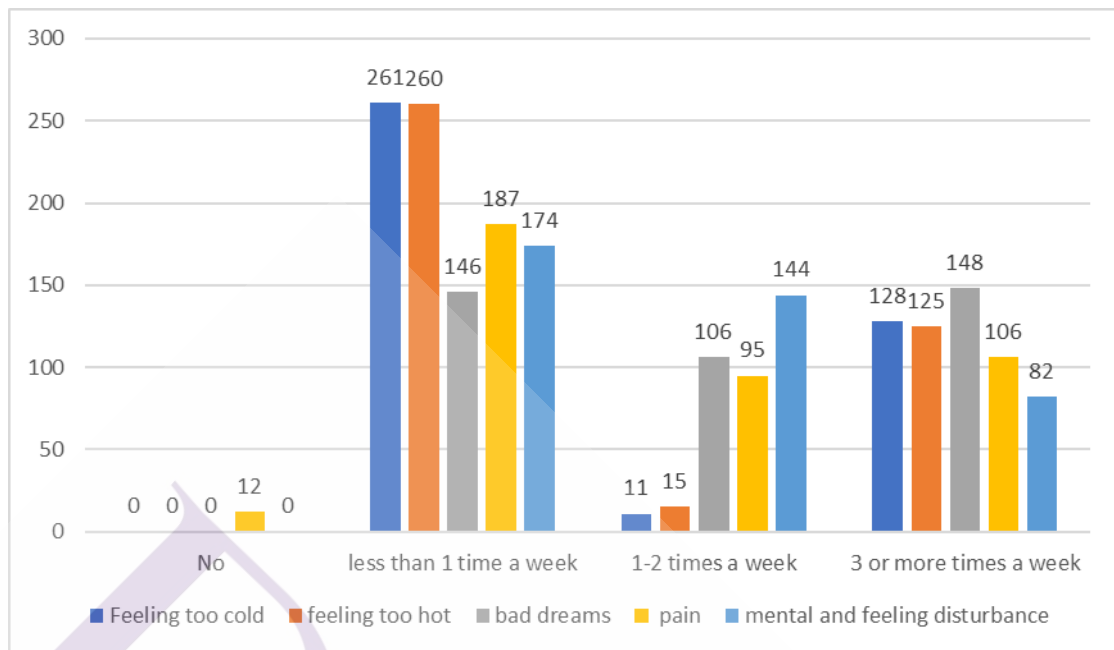
Figures 4.3 Statistical Bar Chart showing sleep latency profiles

From Table 4.3, it depicts several determined sleep problems occurred during the past one month as stipulated in Part II/Questions 6.1-6.10 whose responses are self-rated.

a) Cannot fall asleep within 30 minutes. The majority of samplings with 173 persons (43.3%) could not fall asleep within 30 minutes who experienced this problem 1-2 times in a week. The second group of 153 persons (38.3%) could not fall asleep within 30 minutes at least one time in a week. Another group of 68 persons (17%) could not fall asleep within 30 minutes 3 or more times in a week. The minority group of 6 persons (1.5%) could fall asleep within 30 minutes. Given this result, it reflects that the majority of samplings could not fall asleep within 30 minutes, though the result is contrary to the minority group. Therefore, it is obvious that unability to fall asleep within 30 minutes is a sleep problem correlating with sleep quality.

b) Wake up at night with frequency. None of samples slept through or never woke up at night. The majority of 272 persons (68%) woke up 1-2 times in a week. The seond group of 71 persons (17.8%) woke up 3 or more times in a week. The minority group of 57 persons (14.3 %) woke up less than one time in a week. The results indicate that the samplings appear to have a habit of waking up at night which is considered a sleep problem and compromises the

sleep quality. This individual factor of sleep habit in waking up at night is not uncommon in the elderly.

c) Get up to use bathroom. The habit of getting up to use bathroom at night appear to be one of sleep problem factors among the elderly. Results indicate that all samples got up to use bathroom at night. The majority with 307 persons (76.8%) got up to use bathroom 1-2 times in a week. The seond group of 72 persons (18%) got up for the same reason 3 or more times in a week. The minority of 21 persons (5.3%) got up to use bathroom less than 1 time in a week. None of samplings never woke up to use bathroom at night. This factor is evidently a cause of sleep problems and compromises sleep quality

d) Cannot breathe comfortably. The known factor of uncomfortable breathing while sleeping is one of sleep problems. The majority of 267 persons (66. 8%) did not have this breathing problem. The second group of 129 persons (32.3%) could not breathe comfortably less than 1 time in a week. Another group of 2 persons (0.5%) experienced the sleeping problem 1-2 times in a week. The minority of 2 persons(0.5%) had this problem 3 or more times in a week. The breathing discomfort persisted but the symptom experienced by the minority.

e) Cough or snore loudly. Cough or snore loudly during sleep is considered a factor of sleep problems experienced by the elderly. The majority of 205 persons (51.3%) did not cough or snore during sleep at night. The second group of 115 persons (28.8%) did cough and snore less than 1 time in a week. The third group of 69 persons (17.3%) experienced this problem 3 or more times in a week. The minority of 11 persons (2.8%) coughed and loudly snored 1-2 times in a week. Given the result, the majority did not experiencr this particular sleep problem element in the past one month.

f) Feel too cold. All samples feel too cold while sleeping at night, though frequency of experiences is different. 261 persons (65.3%) feel too cold less than 1 time in a week. 128 persons (32%) feel too cold 3 or more times in a week. The minority of 11 persons (2.8%) feel too cold 1-2 times in a week. Feeling too cold is considered a factor impacting sleep quality, though none of samplings never felt too cold in the past one month.

g) Feel too hot. All samplings never felt too hot in the past one month. The majority of 260 persons (65%) felt too hot less than 1 time in a week. The second group of 125 persons (31.3%) felt too hot 3 or more times in a week. The minority of 15 persons (3.8%) felt

too hot 1-2 times in a week.   Feeling too hot is also considered a factor impacting sleep quality, though none of samplings never felt too hot in the past one month.

h)   Bad dreams. All samples had bad dreams at different frequencies. The majority of 148 persons (37%) had bad dreams 3 or more times in a week. The second group of 36.5% or 146 persons (36.5%) had this experience less than 1 time in a week.   The minority of 106 persons (26.5%) had bad dreams 1-2 times in a week.   None of samplings never had bad dreams in the past one month.   Bad dream became a factor correlating with sleep quality.

i)   Pain. The majority of 187 persons (46.8%) had pain from different reasons less than 1 time in a week. The second group of 106 persons (26.5%) had pain 3 or more times in a week. The third group of 95 persons (23.8%) had bad dreams 1-2 times in a week.   The minority of 12 persons (3.0%) did not have pain at all in the past one month.   Pain became the individual factor contributing to sleep quality.

j)   Causes of mental health affecting sleep quality. All samplings experienced sleep problems due to mental health causes.   The majority of 174 persons (43.5%) experienced it less than 1 time in a week. The second group of 144 persons (36%) had this problem 1-2 times in a week. The minority of 82 persons (20.5%) experienced this problem 3 or more times in a week. None of samplings never had this symptom in the past one month.

Table 4.4 Troubling sleep habits as reported by room partners

Troubling Sleep Habits	N	%
Do you have a bed partner or room mate? P.II/Q.7		
Not having partner or roommate	66	16.50
Partner or roommate in other room	10	2.50
Partner in same room but not same bed	207	51.70
Partner in same bed	117	29.30
Loud snoring P.II/Q.7.1		
Not during the past month	4	1.00
Less than once a week	57	14.20
1-2 times per week	270	67.50

Troubling Sleep Habits	N	%
3 or more times a week	69	17.30
Long pauses between breaths while asleep P.II/Q.7.2		
Not during the past month	398	99.50
Less than once a week	2	0.50
Legs twitching or jerking while asleep P.II/Q.7.3		
Not during the past month	103	25.80
Less than once a week	120	30.00
1-2 times per week	109	27.30
3 times more per week	68	17.00
Episodes of disorientation or confusion during sleep P.II/Q7.4		
Not during the past month	262	65.50
Less than once a week	84	21.00
1-2 times per week	54	13.50
Other restlessness while asleep P.II/Q.7.5		
Not during the past month	117	29.30
Less than once a week	214	53.50
1-2 times per week	69	17.30
Total	400	100.00

From Table 4.4, it depicts troubling sleep habits of samplings as reported by partners. This part of response is not self rated but observed and reported by room/bed partners. These troubling sleep habits are established essential factors under Questions 7.1-7.5.

a)   Having bed partner or room mate

The majority of 207 persons (51.70%) has room partner but does not share the same bed. The second group of 117 persons (29.30%) has partners sharing the same bed. The third group of 66 persons (16.50%) has no partner or roommate. The minority of 10 persons (2.50%) has partners but does not share the same room.   The majority of samplings live with their bed partner or room partner who contribute to report the sleep habits in previous questions.

a) Loud snoring during sleep

The majority of 270 persons (67.50%) had loud snoring 1-2 times a week.   The second group of 69 persons o(17.30%) had it 3 or more times per week. The third group of 57 persons (14.20%) had it less than once a week.   The minority of 4 persons (1 %) did not have loud snoring. Loud snoring appears to be a common symptom or habit in the elderly samplings.

b) Long pauses between breaths while asleep

The majority of 398 persons (94.50%) did not have the long pauses between breath. The minority group of 2 persons (0.50%) had the long pauses between breaths. This troubling sleep habit of long pauses of breathing did not become the major causes of sleep problems.

c) Legs twitching or jerking while asleep

The majority of 120 persons (30%) had this habit less than once a week.   The second group of 109 persons (27.30) had this habit 1-2 times per week. The third group of 103 persons (25.80%) did not have this habit or symptom.   The minority group of 68 persons (17%) had the legs twitching or jerking 3 times per week.   This habit persisted and could contribute to sleep problem factors.

d) Having episodes or disorientation or confusion during sleep

The majority of 262 persons (65.50%) did not have this habit or experience. The second group of 84 persons (21%) had this habit less than once week.   The minority group of 54 persons (13.50%) had this habit 1-2 times per week. This troubling sleep habit appear as a sleep problem factor.

e) Restlessness while asleep

The majority of 214 persons (53.5%) had this habit less than once a week.   The second group of 117 persons (29.30) did not have this sleep habit.   The minority group of 69 persons (17.30%) had this restlessness habit 1-2 times per week. This troubling sleep habit contribute to subsequent elements of sleep problem factors.

Table 4.5 Daytime dysfunctions and use of medication : Part II/Q. 8,9, 10

Daytime dysfunction relating to sleep problems	Count (n=400)	Percentage	Ordinal sequence
During the past one month, how often have you had trouble staying awake while driving, eating meals, engaging in social activities?			
Not a problem at all	392	98.00	1
Less than 1 time in a week/Only a slight problem	7	1.80	2
1-2 times in a week/somewhat a problem	1	0.20	3
In the past one month, how much a problem has it been for you to keep up enough enthusiasm to get things done?			
Not a problem at all	286	71.50	1
Somewhat a problem	114	28.50	2
During the past one month, how often have you taken medicine (prescribed or over the counter) to help you sleep?			
Not during the past one month	355	88.80	1
Less than 1 time in a week	45	11.20	2

From Table 4.5, it depicts some elements of sleep problems affecting the daytime dysfunctions as stipulated in Questions 8, 9 and 10.

a) Staying awake while driving, eating meals and engaging social activities. The majority of 392 persons (98%) did not have a problem at all. 1.8% or 7 persons (.18%) had a

slight problem and the minority of 1 person (0.2%) had somewhat a problem.   By statistical results, this factor did not seem to impact or cause sleep problems.

b)   Keeping up enthusiasm to get things done. The majority of 286 persons (71.5%) had no problem at all. The minority of 114 persons (28.5%) had a slight problem. Though there is a wide margin between the majority and the minority groups, the factor of keeping up enthusiasm cannot be ignored as it could impact sleep problems.

c)   Taking sleep medicine.   The majority of 355 persons (88.88%) did not have a problem at all. The minority of 11.20% or 45 persons (11.20%) took sleep medicine less than 1 time in a week.   The use of sleep medicine was not the sleep solution chosen by the majority, though the minority group made use of sleep medicine.

4.3 Part III : Result of evaluation of 7 components of sleep quality under PSQI Guidelines

The result of data analysis stipulated in Tables 4.1-4.5 provide comprehensive details of each essential element of individual factors and troubling sleep habits in accordance with the complete response by 400 samples shown in according to the topic of questionnaire. The result of data analysis further focus on the evaluation of sleep quality in accordance with the PSQI guidelines comprising 7 components of sleep habits and relating effects.

Component 1 : Subjective Sleep Quality   : Part I/Q.1

The evaluation of sleep quality in the past one month by applying PSQI evaluation markers :

Very good 0 point

Good 1 point

Not quite good 2 points

Not good 3 points

Table 4.6 Subjective Sleep Quality

Subjective sleep quality	Count (n=400)	Percentage	Ordinal sequence
Very good (0 point)	-	-	
Good (1 point)	68	17.0	2
Fairly bad (2 points)	328	82.0	1
Very bad (3 points)	4	1.0	3

From Table 4.6, it presents the analytical result on the subjective sleep quality which was self rated by samplings and analized by SPSS under PSQI guidelines. The majority of 328 persons (82%) indicated that their sleep quality was very bad and scored 2 PSQI points. The second group of 68 persons (17%) reported their sleep quality as "good" and scored 1 PSQI point. The minorityof 4 persons (1%) reported the sleep quality as very bad and scored 3 PSQI points. Given this self rated response, the overall PSQI scores of sleep quality is 2 points or fairly bad. It indicated that the majority did not satisfy with their overall sleep quality.

Component 2 : Sleep latency : sleep duration from bed time to fall asleep : Part I : Q.3 and 6.1

The evaluation of sleep latency which is the sleep duration from bed time to fall asleep in accordance with Question no. 3 and 6.1.

Question no.3 : Duration from bed time to fall asleep : PSQI guidelines scoring markers

Less than 15 minutes   = 0 point

16-30 minutes = 1 point

31-60 minutes = 2 points

60 minutes over = 3 points

Question no. 6.1 : Unable to fall asleep within 30 minutes: PSQI scoring markers :

No problem at all   = 0 point

Problem less than 1 time in a week = 1 point

Problem 1-2 times in a week = 2 points

Problem of 3 times over in a week = 3 points

The total scores of Q.3 and Q.6.1 are

0 point   = 0 point

1-2 points   = 1 point

3-4 points   = 2 points

5-6 points   = 3 points

Table 4.7 Sleep latency (duration from bed time to fall asleep)

Sleep duration from bed time to fall asleep	Count (n=400)	Percentage	Ordinal sequence
0 (0 point)	-	-	
1-2 (1 point)	98	24.5	2
3-4 (2 points)	235	58.8	1
5-6 (3 points)	67	16.8	3

From Table 4.7 , it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines.   The majority of 235 samples (58.8%) gained the range of 3-4 points and made 2 PSQI points representing their experience of sleep problems 1-2 times in a week. The second group of 98 persons (24.5%) gained the score range of 1-2 points and made 1 PSQI point representing their experience of sleep problem less than 1 time in a week. The minority of 67 persons (16.8%) gained the score range of 5-6 points and made 3 PSQI points representing their sleep problem 3 times over in a week.   Therefore, the result of sleep latency of the majority samplings are 2 points which is referred to their sleep problem by taking 31-60 minutes to fall asleep which occurred 3-4 times in a week and made them earned 2 PSQI points.

Component 3 : Sleep duration : Part I/Q.5

The evaluation of total sleep duration in a night during the past one month in accordance with Question no. 5. PSQI scoring markers are

7 hours over = 0 point

7 hours = 1 point

5-6 hours = 2 points

Less than 3 hours = 3 points

Table 4.8 Sleep duration in total

Sleep duration	Count (n=400)	Percentage	Ordinal sequence
More than 7 hours (0 point)	309	77.3	1
7 hours (1 point)	18	4.5	3
5-6 hours (2 points)	73	18.3	2
Less than 5 hours (3 points)	-	-	-

From Table 4. 8, it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines. The majority of 309 persons (77.3%) maintained sleep duration of more than 7 hours which make PSQI 0 point. The second group of 73 persons (18.3%) maintained the total sleep duration of 5-6 hours which made PSQI 2 points. The minority of 18 persons (4.5%) maintained the sleep duration of 7 hours which make 1 PSQI point. Therefore, under component no. 3, the majority of sampling had the total sleep time more than 7 hours and earned 0 PSQI point.

Component 4 : Habitual sleep efficiency : Part I/Q.2,4 and 5

The evaluation of habitual sleep efficiency in the past one month in accordance with Questions no.2, 4 and 5. The calculation formula is

a) Total actual sleep hours in bed (Q.5) divided by the total sleep time in bed after

wake-up (Q.4) and *subtract* with the bed time (Q.2).

b) The scoring guidelines are   85% over   = 0 point

75-84%   = 1point

65-74%   = 2 points

Less than 65%   = 3 points

Table 4.9 Habitual sleep efficiency

Habitual sleep efficiency	Count (n=400)	Percentage	Ordinal sequence
More than 85% (0 point)	325	81.3	1
75-84% (1 point)	7	1.8	3
65-74% (2 points)	1	0.3	4
Less than 65% (3 points)	67	16.8	2

From Table 4.9, it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines. The majority of 325 persons (81.3%) had the habitual sleep efficiency more than 85% which made 0 PSQI point.   The second group had the habitual sleep efficiency less than 65% which made 3 PSQI point. The third group of 7 persons (1.8%) had the habitual sleep efficiency in the range of 75-84% which made 1 PSQI point. The minority of 1 person (0.3%) had   the habitual sleep efficiency in the range of 65-74% which made 2 PSQI points.   Therefore, the PSQI scores of Questions 2, 4, 5 resulted in the majority of sampling had the habitual sleep efficiency of 0 point or their sleep long than 7 hours, a good sleep quality.

Component 5 : Sleep disturbances : Part I/Q.6.2-6.10

   The evaluation of habitual sleep efficiency in the past one month in accordance with Questions no.6.2-6.10 which were essential elements of sleep disturbances as stipulated in PSQI questionnaire. The scoring guidelines are

  a) Scoring each question

   No problem at all   = 0 point

   Problem less and 1 time/week = 1 point

   Problem 1-2 times in a week = 2 points

   Problem 3 times over in a week = 3 points

  b) Adding the scores of Q.6.2-6.10 and resulting in the total scores

   0 Point = 0 Point

   1 -9 points = 1 point

   10-18 points = 2 points

   19-27 points = 3 points

Table 4.10 Sleep disturbances

Sleep disturbances	Count (n=400)	Percentage	Ordinal sequence
0) 0point)	-	-	
1-9 (1 point)	10	2.5	3
10-18 (2 points)	254	63.5	1
19-27 (3 points)	136	34.0	2

   From Table 4, it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines. The majority of 254 persons (63.5%) have the score range of 10-18 points which make 2 PSQI points in relation to sleep disturbance elements. The second group of

136 persons (34.0%) have the score range of 19-27 point which make 3 PSQI points in relation to sleep disturbance elements.   The minority group of 10 persons (2.5%) had the score range of 1-9 points which make 1 PSQI point in relation to sleep disturbance elements.   Therefore, the majority had 2 PSQI points which they experienced sleep disturbance elements of 1-2 times per week.

Component 6 : Use of medicine to sleep : Part I/Q.10

The evaluation of habitual sleep efficiency in the past one month in accordance with Question 10 which is related to the use of sleep medicine.   The scoring guideline is

Never used it   =   0 point

Less than 1 time in a week = 1 point

1-2 times in a week = 2 points

3 times over in a week = 3 points

Table 4.11 Use of medicine to sleep

Use of medicine to sleep	Count (n=400)	Percentage	Ordinal sequence
Not used (0point)	355	88.8	1
Use less than 1 time/week (1 point)	45	11.3	2
Use 1-2 time/week (2 points)	-	-	
Use 3 times or more/week (3 points)	-	-	

From Table 4.11, it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines.   The majority of 355 persons (88.8%) never used the sleep medicine which made 0 PSQI point.   The minority group used the sleep medicine less than 1 time in a week which made 1 PSQI point.   Therefore, the majority of samplings did not use sleep medicine in a week and earned only 0 PSQI point.

Component 7 : Impact on daytime activities (Daytime dysfunction) : Part I/Q.8,9

        The evaluation of impact on daytime activities or daytime dysfunction in the past one month in accordance with Questions 8 and 9.   The scoring guidelines are

      a) Symptoms of sleepiness while doing daytime activities : Q.8

        Never have such symptom = 0 point

        Less than 1 time in a week = 1 point

        1-2 times in a week =2 points

        3 times over in a week = 3 points.

      b) Enthusiasm in completing the work : Q.9

        No problem at all = 0 point

        Small problems = 1 point

        Quite problematic = 2 points

        Many problems = 3 points

      c) The total points of Q.8 and 9 are added up =

        0 point = 0 point

        1-2 point = 1 point

        3-4 point = 2 points

        5-6 points = 3 points

Table 4.12   Impact on daytime activities (Daytime dysfunction)

Impact on daytime activities	Count (n=400)	Percentage	Ordinal sequence
0 (0 point)	286	71.5	1
1-2 (1 point)	106	26.5	2
3-4 (2 points)	7	1.8	3
5-6 (3 points)	1	.3	4

From Table 4.12, it presents the analytical results which was self rated and analyzed by SPSS under PSQI guidelines. The majority of 286 persons (71.5%) had 0 point which made 0 PSQI point. The second group of 106 persons (26.5%) had the score range of 1-2 point which made 1 PSQI point. The third group of 7 persons (1.8%) had the score range of 3-4 which made 2 PSQI points. The minority group of 1 person (0.3%) had the score range of 5-6 which made 3 PSQI points. Therefore, the majority of samplings had no impact of daytime dysfunction at all in a week and scored 0 PSQI point.

Considered the result of 7-components sleep quality, after applying PSQI Guidelines, the results are hereunder indicative of good sleep and bad sleep among the 400 elderly engaged in this study.

Table 4.13 Scoring conclusion of sleep quality and sleep quality

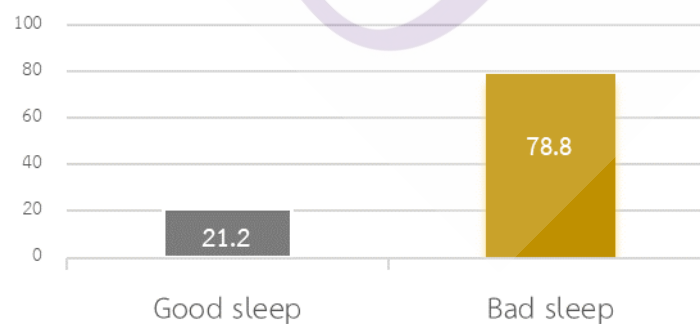| Sleep Quality	Count	Percentage
Good sleep	85	21.2
Bad sleep	315	78.8
Total	400	100.0

Figure 4.4 Statistical Bar Chart of conclusive sleep quality

From Table 4.13, it summarizes the total result of PSQI scoring of 7 components which draws the conclusion that the majority of 315 persons (78. 8%) of the samplings experienced bad sleep quality and the minority of 85 persons (21.2 %) had a good quality of sleep in accordance with the scoring guidelines of PSQI. This study focuses on the group of elderly samplings throughout Thailand, the result was evidently indicated that the majority did not have the good sleep quality.

4.4 Part IV : Testing of research hypothesis

The previous part of this chapter presents the result of data analysis in accordance with the themes of questionnaire as well as the PSQI guidelines. It is determined to further statistically analyze the relationship between individual factors and the sleep quality by applying the Chi-square statistical tool which enables to yield the output of statistical value which is set at 0.05. The end result of this analysis shall indicate the validity of established research hypothesis, i.e., "Individual factors (independent variables) affect the sleep quality of the elderly (dependent variables)" which is also in relation to the second point of the research objectives.

Table 4.14 Correlations between age and sleep quality

Age	Sleep quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
60-70	81	27.7	211	72.3	292	73.0
71-80	2	5.9	32	94.1	34	8.5
81over	2	2.7	72	97.3	74	18.5
Total	85	21.3	315	78.8	400	100.0
X^2=27.359 P=0.000*						

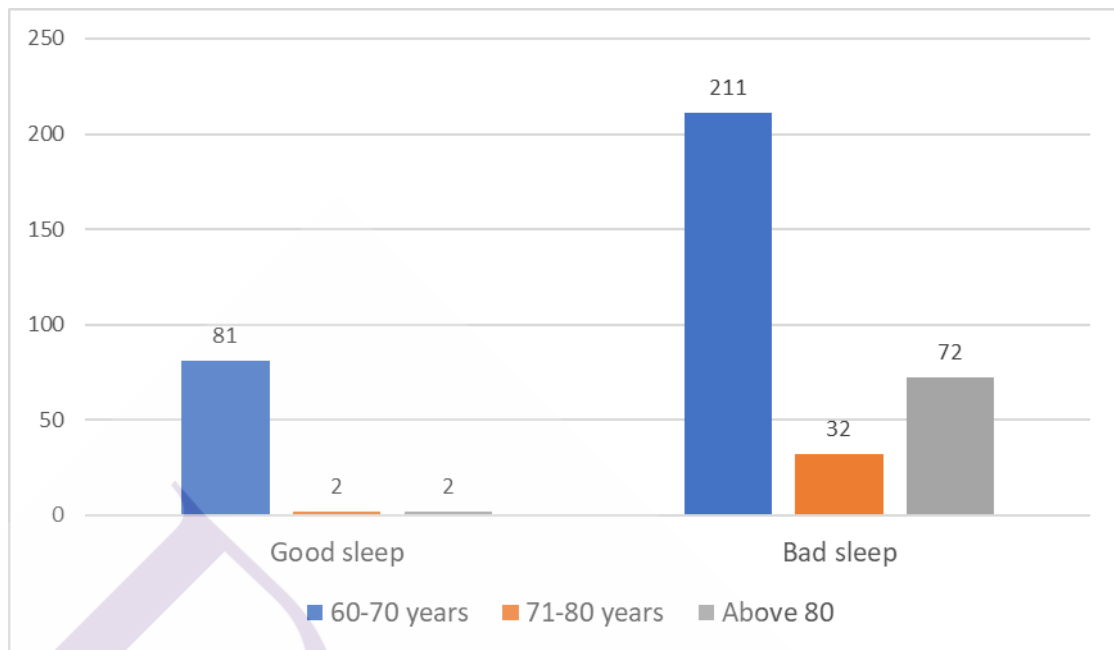**Note**.* Statistical Significance at05.0

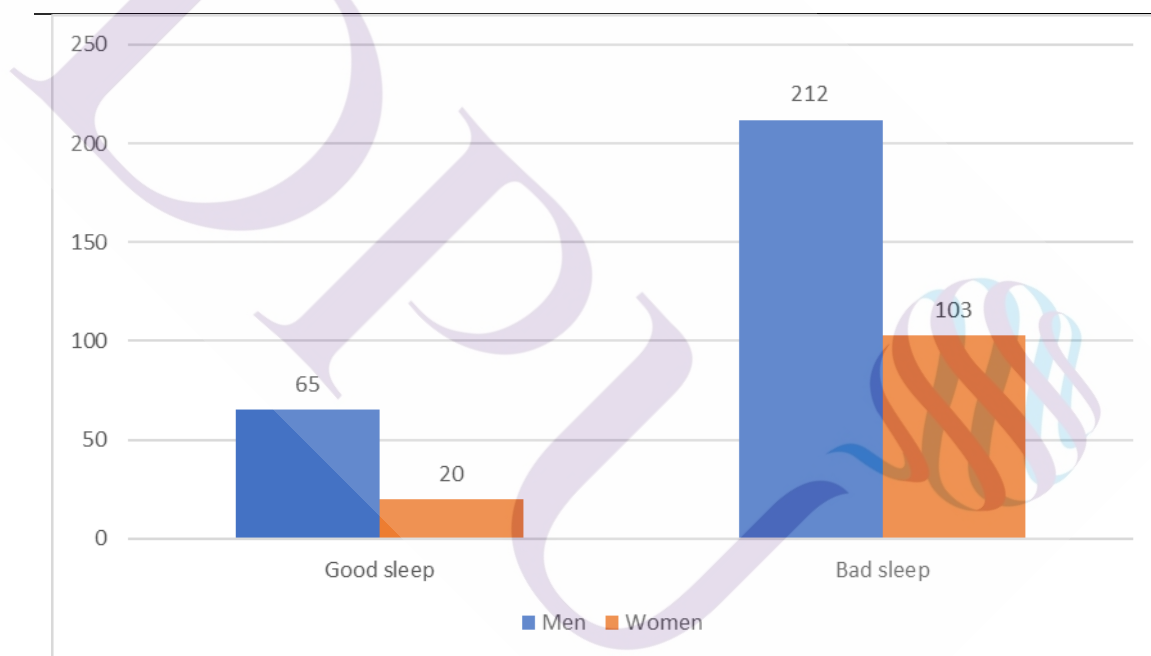**Figure 4.5** Statistical Bar Chart relating to age and sleep quality

From Table 4.14, result of testing of correlations between age and sleep quality of the elderly with Chi-square (X^2) found the relationship with statistical significance at the level of 0.05 ($X^2 = 27.359$, P= 0.000)   The majority of age ranges between 60-70 years has good and bad sleep quality at 27.7% and 72.3% respectively. The subsequent group of age ranges between 71-80 years possess good and bad sleep quality at 5.9% and 94.1% respectively. The other group of 81 years and over has good and bad sleep quality at 2.7% and 97.3% respectively.   By statistical proof, the higher the age is advanced, the more the bad sleep quality is experienced.

Table 4.15 Correlations between gender and sleep quality

Gender	Sleep Quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Male	65	23.5	212	76.5	277	69.3
Female	20	16.3	103	83.7	123	30.7
Total	85	21.2	315	78.8	400	100.0
X^2=2.643 P=0.104						

Figure 4.6 Statistical Bar Chart relating to gender and sleep quality

From Table 4.15, results of testing of correlations between gender and sleep quality of the elderly with Chi-square (X^2) found that there is no effect of correlation between the two factor vairables at 0.05 = (X^2 2.643 P=0.104). The male group has good and bad sleep quality at 23.5% and 76.5% respectively. The female group also has the good and bad sleep quality in the same

proportion of 16.3% and 83.7% respectively. Both male and female groups have the same

statistical proportions in term of good and bad sleep quality whose correlation is less relevant.

Table 4.16 Correlation between marital status and sleep quality

Marital status	Sleep Quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Single	0	0.0	17	100.00	17	4.3
Married	83	25.9	237	74.1	320	80.0
Divorce/widow	2	3.2	61	98.8	63	15.8
Total	85	21.3	315	78.8	400	100.0
X^2=21.089 P=0.000*						

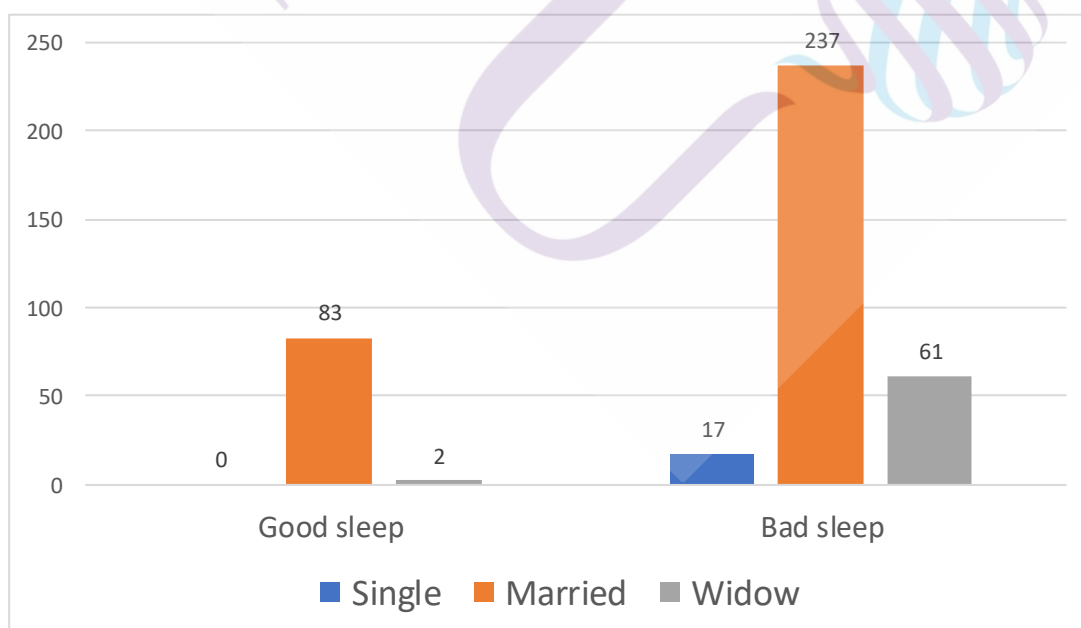**Note**.* Statistical Significance at05.0

Figure 4.7 Statistical Bar Chart relating to marital status and sleep quality

From Table 4.16, results of testing of correlations between marital status and sleep quality of the elderly with Chi-square (X^2) found that there exists statistical significance at 05.00 $X^2 = 21.089$ P= 0.000). The married group has good and bad sleep quality 25.9% and 74.1% respectively. The subsequent group of single has good and bad sleep quality at 0.00% and 100% respectively. The other group of divorce and widow does have good and bad sleep quality at 3.2% and 98.8% respectively.   Therefore, the married group seems to have the better good sleep quality and less bad sleep quality if compared to other groups. The single group has the bad sleep quality at 100%. This result proves the correlation between marital status and sleep quality which is underlined that the majority of samples are married whose partner life appears to enhance sleep quality.

Table 4.17 Correlation between medical condition and sleep quality

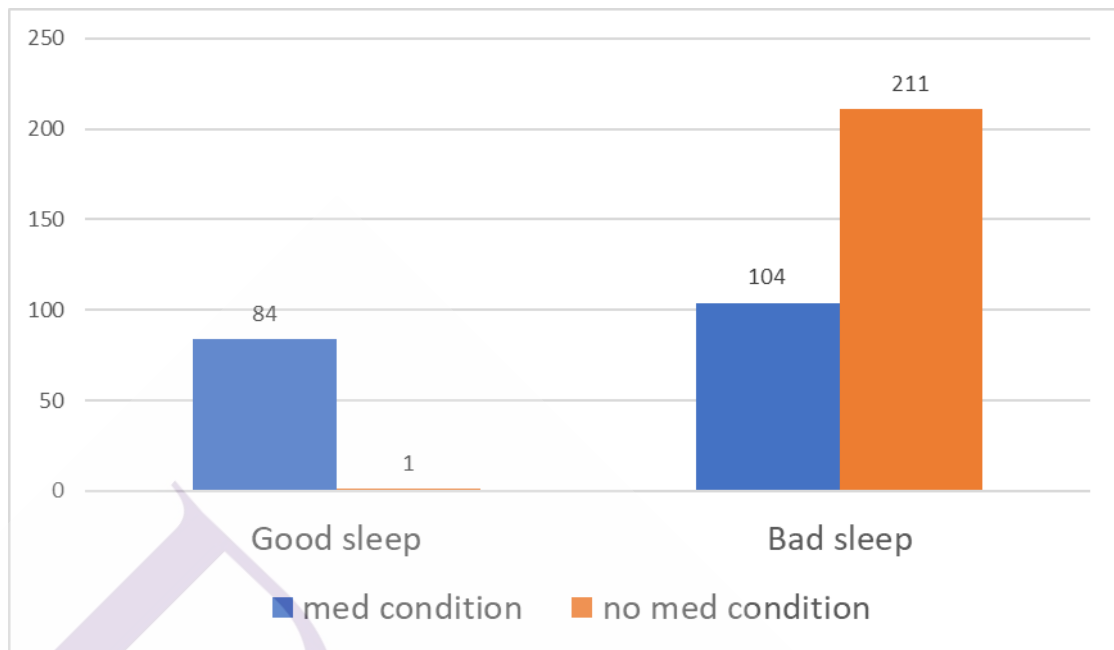| Medical condition	Sleep Quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
No Medical Condition	84	44.7	104	55.3	188	47.0
Medical condition	1	0.5	211	99.5	212	53.0
รวม	85	21.3	315	78.8	400	100.0
X^2=116.372 P=0.000*						

Note.*Statistical Significance at05.0

Figure 4.8 Statistical Bar Chart relating to medical condition and sleep quality
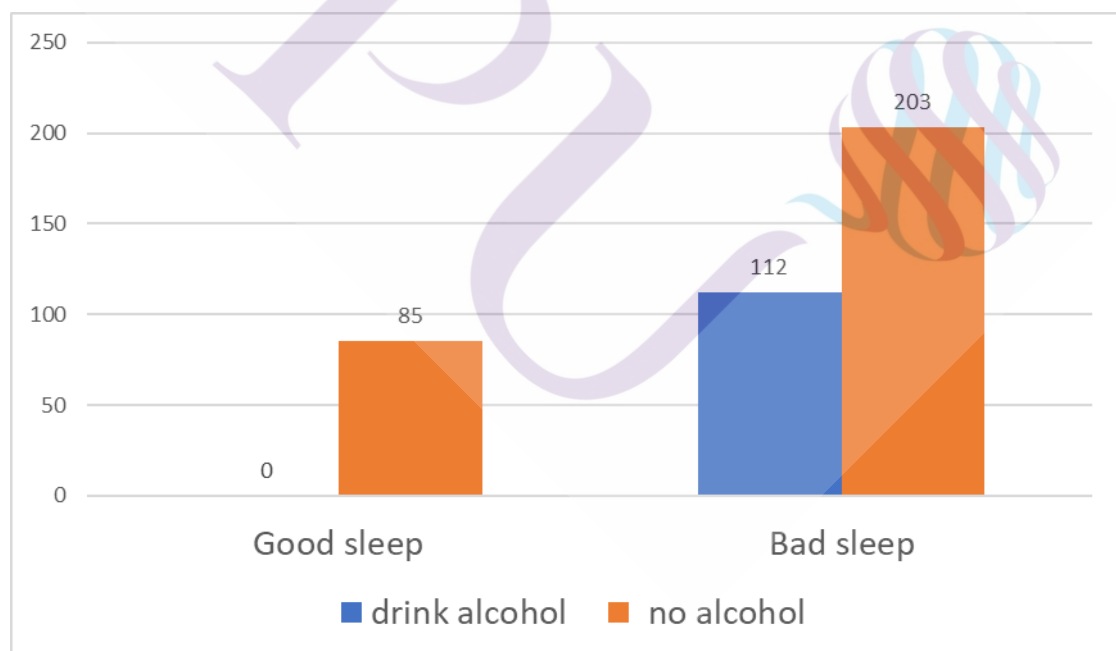
From Table 4.17, result of testing correlation between having medical condition and sleep quality of the elderly with Chi-square (X^2) discovers that there existed correlations with statistical significance at 0.05 (X^2 116.372 P=0.000). The group having medical conditions had good and bad sleep quality 0.5% and 99.5% respectively. The group having no medical conditions has good and bad sleep quality at 44.7% and 55.3% respectively. The group without medical conditions appears to have a better good sleep quality if compared to the group with medical condition. Therefore, the factor of medical conditions appears to be an affected factor and correlation with sleep quality.

Table 4.18 Correlation between drinking alcohol and sleep quality

Drink alcohol	Sleep quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Drink	0	0.00	112	100.0	112	28.0
No drink	85	29.5	203	70.5	288	72.0
Total	85	21.3	315	78.8	400	100.0
X^2=41.975 P=0.000*						

Note.* Statistical Significance at 0.05

Figure 4.9   Statistical Bar Chart relating to drinking alcohol and sleep quality

From Table 4.18, results of testing correlation between drinking alcohol and sleep quality with Chi-square (X^2) discovers that there exists relevant correlation of statistical significance at 0.05 ($X^2 = 41.975$ P=0.000). The group of no alcohol drinking has good and bad sleep quality at 29.5% and 70.5% respectively.   The subsequent group of alcohol drinking has good and bad sleep quality at 0% and 100% respectively.   By statistical results, drinking alcohol affect and enhance more bad sleep quality.

Table 4.19 Correlation between maintaining physical exercise and sleep quality

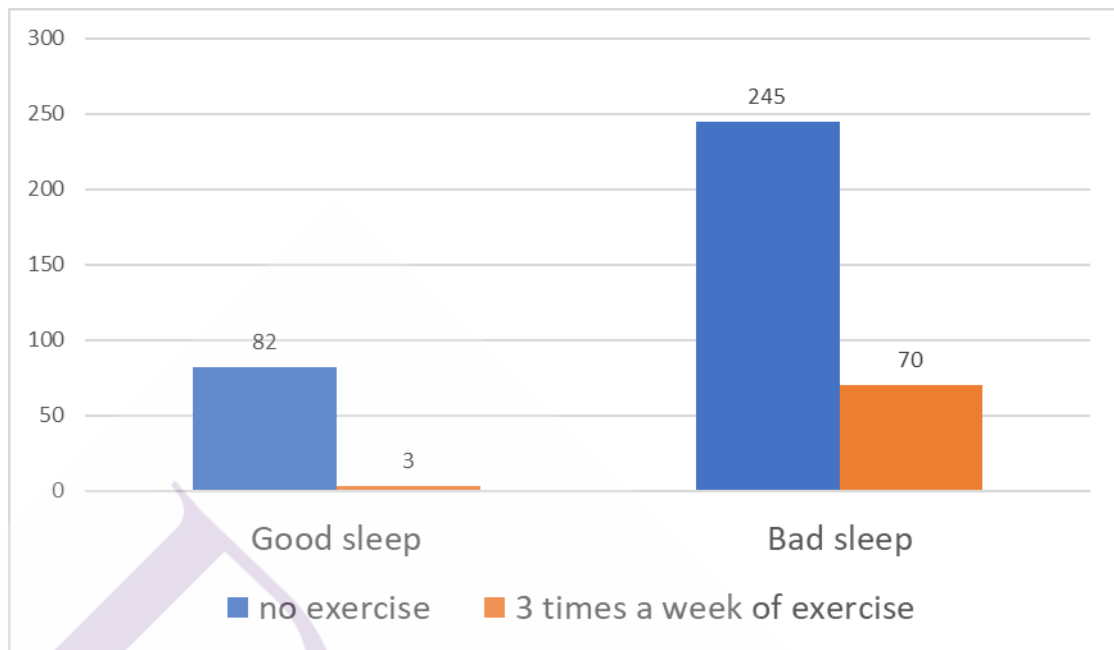| Physical exercise	Sleep quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Physical exercise 3 times/week	82	25.1	245	74.9	327	81.8
No physical exercise	3	4.1	70	95.9	73	18.2
Total	85	21.3	315	78.8	400	100.0
X^2=15.677 P=0.000*						

Note.*Statistical Significance at05.0

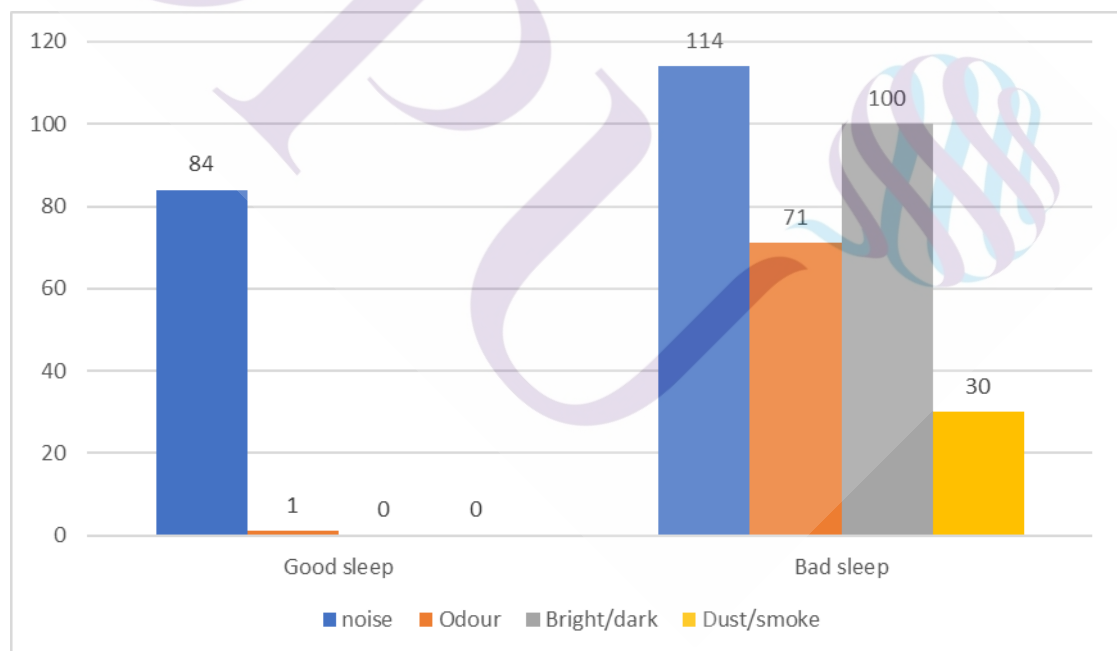**Figure 4.10** Statistical Bar Chart relating to practicing physical exercise and sleep quality

From Table 4.19, results of testing the correlation between maintaining physical exercise and sleep quality with Chi-square (X^2) found that there exists correlation at statistical significance 0.05 ($X^2 = 15.677$ P $= 0.000$). The group maintaining regular physical exercise has good and bad sleep quality 25.1% and 74.9% respectively. The subsequent group of maintaining no regular physical exercise has good and bad sleep quality at 4.1% and 95.9% respectively. Therefore, regular physical exercise appears to promote the better sleep quality among the elderly samples.

Table 4.20 Correlation between disturbing environment affecting sleep and sleep quality

| Environment | Sleep quality | | | | | |
| affecting sleep | Good sleep | | Bad sleep | | Total | |
	Count	Percentage	Count	Percentage	Count	Percentage
Noises	84	42.4	114	57.6	198	49.5
Odours	1	1.4	71	98.6	72	18.0
Bright/dark	0	0.0	100	100.0	100	25.0
Smoke/dust	0	0.0	30	100.0	30	7.5
Total	85	21.3	315	78.8	400	100.0
X^2=105.100 P=0.000*						

Note.* Statistical Significance at05.0

Figure 4.11 Statistical Bar Chart relating to environment effects and sleep quality

From Table 4.20, results of testing the correlation between Testing disturbing environment elements and sleep quality with Chi-square found that there exists correlation with statistical significance at 0.05 (X^2 105.100 P=0.000). The group living with disturbing noises has bad good sleep quality at 57.6% and good sleep quality at 42.4%.   The other groups exposing to odours, brightness and darkness, smoke/dust has bad sleep quality at 98.6% and 100% respectively and their good sleep quality is at 1.4% and 0.0% respectively.   It is underlined that disturbing environment elements indeed affect and correlate with their sleep quality.   Therefore, disturbing environment correlates and affect the sleep quality of the elderly.

Table 4.21 Correlations between symptom of depression, discouragement, unease with known and unknown factors and sleep quality

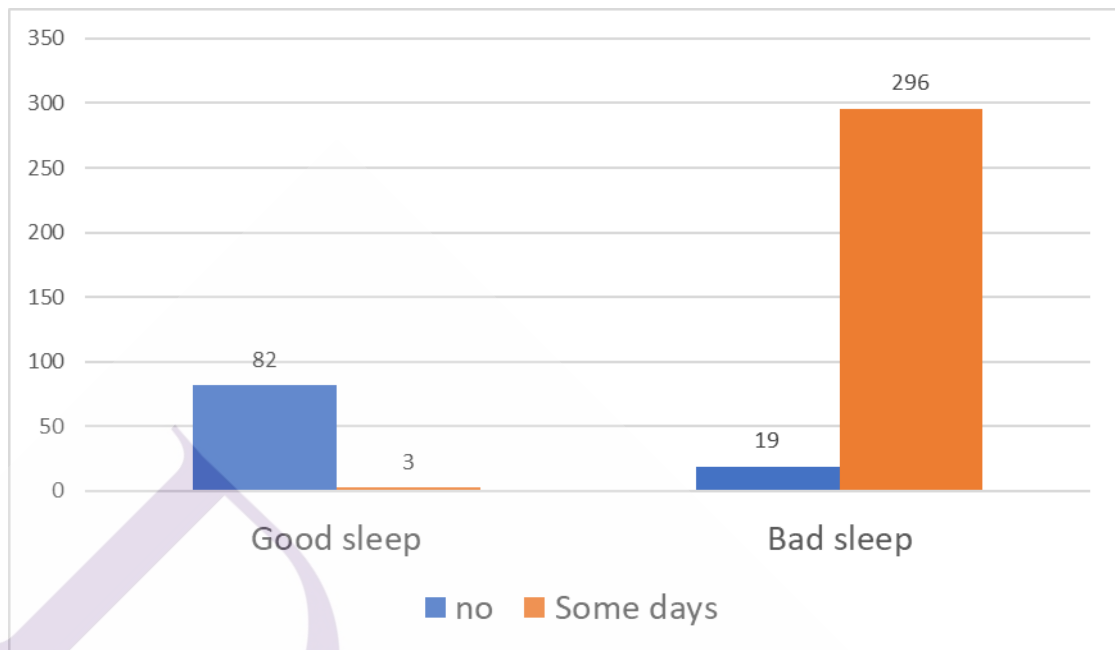| Depressed, discouraged, uneasy with known and unknown causes	Sleep quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
No	82	81.2	19	18.8	101	25.3
Yes/some days	3	1.0	296	99.0	299	74.8
รวม	85	21.3	315	78.8	400	100.0
X^2=290.073 P=0.000*						

Note.* Statistical Significance at 0.05

Figure 4.12 Statistical Bar Chart relating to symptoms of depression and others and sleep quality
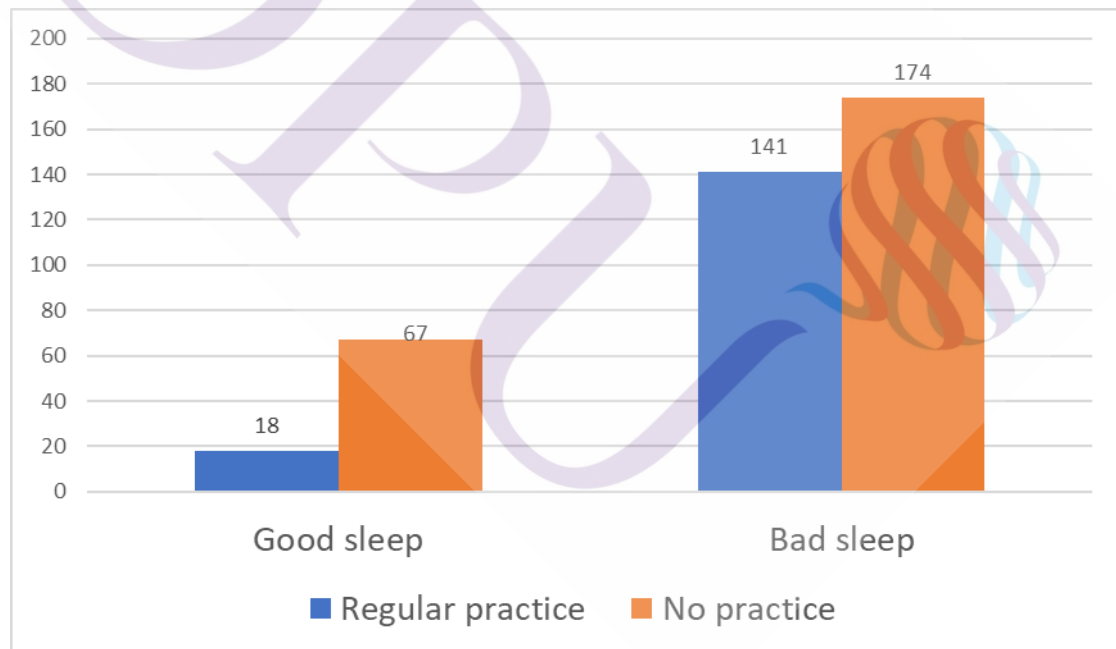
From Table 4.21, results of testing the correlation between symptom of depression, discouragement, unease with known and unknown causes discovers and sleep quality gound that there exists the correlation by statistical significance at 0.05 (290.073 P=0.000). The group with relevant symptoms in some days has bad sleep quality 99% and good sleep quality at 1%. The group without such symptoms has good sleep quality 81.2% and bad sleep quality at 18.8%. Therefore, overall their good sleep quality is affected by and correlated with such symptoms.

Table 4.22 Correlations between performing prayer or meditation before sleep and sleep quality

Prayer and meditation before sleep	Sleep quality					
	Good sleep		Bad sleep		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
Regular practices	54	33.96	105	66.04	159	39.75
No practices	67	27.8	174	72.2	241	60.25
Total	85	21.3	315	78.8	400	100.0
X^2=15.548 P=0.000*						

Note.*Statistical significance at 0.05

Figure 4.13 Statistical Bar Chart relating to prayer and meditation and sleep quality

From Table 4.22, results of testing the relationship between performing prayers or meditation before sleep and sleep quality with Chi-square found that there exists relevant

relationship with statistical significance at 0.05 (X^2 15.548 P= 0.000). The group performing regular practices of prayers and meditation has bad sleep quality at 66.04%. The subsequent group performing no regular practices has bad sleep quality at 72.2%. The good sleep quality result of both groups are 33.96% and 27.8% respectively. The performance of prayers and meditation correlates and appear to promote the better sleep quality among the elderly samples.

Noting that several independent variables possessing negligible numbers/ counts are considered insignificantly relevant for testing of relationship with dependent variables. The negligible number/count of several variables is reflected as follows

Individual factors	Comparative responded number/count	
	Yes	No
Drinking alcohol	9	391
Smoking	1	399
Adequate Income	398	2
Own lodging	392	8

Given these insignificant and negligible number/count responded by respondents, these individual factors are exempted from calculation for hypothesis testing.

To conclude and present the concise result of hypothesis testing, it is hereunder summarized the results for ease of reference.

Table 4.23   Summary of hypothesis testing results

Elements of individual factors	Good sleep %	Bad sleep %	X^2	p-value
Age 60-70 71-80 81 over	 27.7 5.9 2.7	 72.3 94.1 97.3	27.359	0.000*
Gender	Male 23.5 Female 16.3	Male 76.5 Female 83.7	2.643	0.104
Marital s.	Married 25.9 Divorce 3.2 Single 0.00	Married 74.1 Divorce 98.2 Single 100%	21.089	0.000*
Medical Condition	Yes 0.5 No 44.7%	Yes 99.5 No 55.3	116.372	0.000*
Alcohol Consumption	Yes 0 No 29.5	Yes 100 No 70.5	41.975	0.000*
Physical exercise	Yes 25.1 No 4.1	Yes 74.9 No 95.9	15.677	0.000*
Disturbing environment	Noise 42.4 Bright/Dark 0 Smoke/dust 0 Odour 1.4	Noise 57.6 Bright/Dark 100 Smoke/dust 100 Odour 98.6	105.100	0.000*
Symptom of negative feelings	Yes 1.0 No 81.2	Yes 99.0 No 18.8	290.073	0.000*
Prayer, meditation	Yes 33.96 No 27.8	Yes 66.04 No 72.2	15.548	0.000*

The findings found that the majority of the samplings possess bad quality of sleep of 78.8% while 21.2% represents the ones having a good sleep quality. Findings of correlation between sleep quality and individual factor discovered that there is a significant relationship with age, marital status, medical condition, consumption of alcohol drinks, performing physical exercise, depression, negative feelings with known and unknown causes and practice of prayer or meditation. The result of hypothesis testing substantiates that determined individual factors of this study empirically affect 7 components of sleep quality of the elderly in Thailand in accordance with the PSQI guidelines.

Chapter 5

Conclusion and Recommendation

The study is purposely established to explore effects and correlation of essential elements of individual factors and sleep quality of the entire elderly population in Thailand. The prevalence of sleep complaints among the elderly knowingly exists and appears to be underdiagnosed/recognized. The focus of previous studies in Thailand is largely aimed at specific study groups and locations for solutions of treatment and management. Most of the previous findings reached similar conclusion of existing varied sleep complaints by the elderly. Warut (2017)'s study found that the high prevalence of short duration sleep among the out patients at a tertiary hospital has been persisted likewise. After extensive in-depth interview of the samplings throughout Thailand, the findings relating to sleep quality of the elderly are of empirically conclusive.

5.1 Conclusion

The growth of elderly population is a global phenomenon reflecting progressive longevity of people. Human longevity logically contributes to vulnerable health of the elderly. Rodriquez (2015) pointed out that sleep problems are neither inherent nor physiological change of ageing process, though, sleep problems among the elderly are not uncommon symptoms. Noting that many elderly people still have a good sleep quality likewise. Meanwhile sleep problems among the elderly are the stemming causes of other health inferiority and complexity. For example, insomnia, frequent wake-up and apnea are among the most common complaints. Thailand has been in full-fledged society of aging, a variety of health risks and concerns are inevitable and as cited by the Department of Public Health, sleep problems are the root causes of

relevant health issues.　Most of research in Thailand has focused on specific elderly groups, e.g., local communities, patient wards in hospitals, etc.　Their research objectives found specific sleep problems and solution options for target groups of limited numbers.

This study explored individual factors influencing sleep quality of the elderly at the national scale in Thailand.　Research objectives were established to examine sleep quality and explore correlation between individual factors and sleep quality of the elderly throughout Thailand.　The research intent is to capture and set the entire perspective of essential factors affecting sleep quality of the elderly. The established research question is "How do individual factors affect sleep quality in the elderly in Thailand?"　The study was conducted by using the set of modified PSQI questionnaire and undertook the in-depth interview of elderly sampling groups throughout Thailand in accordance with the stratified sampling method.　The total number of 400 selected samplings in 15 provinces of 4 regions was conducted and completed in 5 months during the Covid-19 pandemic.　The research result is succinctly concluded in the followings:

5.1.1 General information of respondees

These 400 samplings are inclusive of residents in Bangkok and 14 provinces.　The majority are male and married whose age range is of 60-70 years, have adequate living income and mostly possess medical conditions.　They drank no alcohol, no caffeine and did not smoke, though the majority neither regularly practise physical exercise nor perform prayer and meditation regularly.　Noise pollution and negative feelings are the most disturbing factor affecting their sleep.　The statistical programme of Chi-square was employed in examining the relationship between variable factors.　The statistical significance is set at the level of 0.05.　Almost all individual factors statistically affect the sleep quality, i.e., age, marital status, medical condition, alcohol consumption, physical exercise, disturbing noises, etc.

5.1.2 Sleep quality

The sleep quality is evaluated under the context of 7 components according to the PSQI guidelines.

Component 1 : Subjective sleep quality

The majority score 2 PSQI points representing fairly bad sleep quality (2 points), the subsequent groups score 1 point representing a good sleep qualit and the minority scores 3 points representing very bad sleep quality respectively. It could be elaborated that 328 persons (82%) elderly samples experienced bad sleep quality as affected by relevant individual factors (independent variables). It is also noted that the group of 68 persons (17%) score 1 point experienced good sleep quality. The minority group of 4 persons (1%) score 3 points and experienced very bad sleep quality. The individual factors empirically and logically affect and correlate with the quality of sleep in the past one month among the 400 elderly samples across all regions in Thailand

Component 2 : Sleep latency

It is examined the timing required to fall asleep which the majority of 235 persons(58.8%) scores 3-4 (2 points), the subsequent group of 98 persons(24.5%) scores 1-2 (1 point) and the minority group of 67 persons (16.8%) scores 5-6 (3 points) respectively. It is interpreted that the majority required longer than 30 minutes to fall asleep, the subsequent group requires 60 minutes to fall asleep.

Component 3 : Sleep duration

The majority of 309 persons(77.3%) managed to sleep more than 7 hours and scores 0 point, the subsequent group of 73 persons(18.3%) sleeps up to 5-6 hours and scores 2 points and the minority group of 18 persons(4.5%) sleeps up to 7 hours and scores 1 point.

Component 4 : Habitual sleep efficiency

The majority of 325 persons(81.3%) scores 0 points (85%) experience a good habitual sleep efficiency and the subsequent group of 67 persons (16.8%) scores 3 points or less than 65% had a less habitual sleep efficiency.

Component 5 : Sleep disturbances

The majority scores 10-18 (2 points), the subsequent group scores 19-27 (3 points) and 1-9 (1 point) respectively which is referred to the effects of sleep disturbances.   The result indicates that the majority experienced sleep disturbances 1-2 times in a week.

Component 6 : Use of sleep medication

The majority does not use sleep medication and scores 0 point and the subsequent group scores 1 point because of using it less than 1 time per week.   The majority appears to sleep without using sleeping medicine.

Component 7 : Daytime dysfunction

The majority scores 0 point, the subsequent group scores 1 point, 2 and 3 points respectively. It is referred to the impact of sleep quality on daytime dysfunction which the majority experiences no consequences of daytime dysfunction.

When adding PSQI scores of 7 components, the majority of elderly does not have the good sleep quality as the total PSQI scores turn 6 points.   While the minority group has a good sleep quality as their PSQI scores are less than 5 points.

5.1.3 Hypothesis testing

The established hypothesis of this research is referred to individual factors affecting and correlating with sleep quality in the elderly.   By employing the statistical component of Chi-square test, the essence of findings are

a)   Ages correlate with sleep quality

b)   Gender is irrelevant to sleep quality

c)   Marital status correlates with sleep quality

d)   Medical condition correlates with sleep quality

e)   Consumption of alcohol correlates with sleep quality

f)   Physical exercise correlates with sleep quality

g)   Environment correlates with sleep quality

h)   Depression and negative feelings correlates with sleep quality

i) Prayer and meditation correlates with sleep quality.

5.2 Research findings

The objectives of this study are to examine the effects and correlation between determined essential elements of individual personal factors and sleep quality of the entire elderly in Thailand. Therefore, it logically differs from the purposes of previous research whose focus is of specific groups and locations. Their findings focused on the solutions and management of sleep problems among the elderly under their specific scope of study. Regarding the research methodology, the research tool of PSQI questionnaire is in common, though this study used the modified PSQI questionnaire. The findings found similar conclusion about individual profiles of samples as well as their common sleep complaints. The correlation between individual factors and sleep quality is proved and endorsed by the result of hypothesis testing which could be succinctly highlighted in the followings:

5.2.1 The marital status relates to sleep quality of the elderly. The majority of married samplings did not have a good sleep quality which conforms with the research of Oranid Nikom and Siriwan Buthin (2021) who examined the relationship of factors concerning sleep quality of the third quarter of pregnancy. The couple with good relationship has no impact to sleep quality and on the contrary, bad sleep quality exists in the case of couple having bad relationship.

5.2.2 Medical conditions are reasonably related to sleep quality of the samplings. Possessing medical conditiona or sickness caused biological changes in controlling the rhythm of sleep and wake up which impact the sleep of the samplings in particular those having chronic medical conditions. Chinavararak C., Tangwongchai S., Dumrongpiwat N. (2018) found that the sleep quality of the elderly in Prachanives Housing Estate in Bangkok were affected or impacted by medical conditions, e.g., hypertension, pain, muscles, etc.

5.2.3 Physical exercise is reportedly relating to sleep quality of the samplings. The samplings who did not practice regular physical exercise having no good sleep quality. On the

contrary, ease of sleep among the samplings is supported by practicing regular exercise. Thitima Narongsak, Chotimant Chinwararak and Thitima Sanguanwichaikul (2019) found that regular and consistent physical exercise promotes better sleep quality.

5.2.4 Environment with noise disturbs sleep quality of the samplings. Noise affects sleep quality of the samplings. Liwan Unnaphiraks and Passamon Kumtaweeri (1997) found that noise has a negative relationship to sleep quality and satisfactory sleep. It also conforms with the findings of other studies which concluded that temperature, light and sound or noise negatively affect sleep satisfaction.

5.2.5 Depression and negative feelings with causes and no causes relate to sleep quality of the samplings. The samplings having these mental symptoms does not have a good sleep quality. Thitma Narongsak, Chotimant Chinwararak and Thitima Sanguanwichaikul (2019) found that depression is relating to sleep quality and potentially indicates the bad sleep quality.

5.2.6 Prayer and meditation before sleep relate to sleep quality. The samplings who did not practice prayer and meditation has bad sleep quality. Patsamon Kumtaweeri, Puttawan Chucherd and Suchitra Suthipong (2016) found that prayers support mindfulness, wisdom, calm and gentleness which enhances relaxation and balance of body, mind and spirit. In turn, it enhances a good sleep quality.

The Sleep Foundation in USA underlines that quality of life and health concern in older persons are affected by poor sleep. The relationship between aging and sleep is intertwined. The John Hopskin Sleep Disorder Center determines that poor sleep habits contribute to apnea and several other health issues. Ramsiri (2000) conducted an extensive study on sleep problems of elderly in Loei province whose focus is on the role of nurses in managing the elderly sleep problems.

The findings of this research broaden the conclusion and establish the empirical data base on sleep quality of the elderly at the national scale. The in-depth interview of 400 samplings in Thailand under the PSQI guidelines constitutes the valid and reliable result and findings. The

issue of sleep quality of the samplings is oftentimes addressed and appeared to be under recognition or appreciation. All components of individual factors equally contribute and affect the sleep quality, though, gender of samplings is less relevant and had no impact to sleep quality.

5.3 Recommendation

As a preface to recommendations, sleep has a great significance in public health, though either direct or indirect impact may be under secondary recognition. This research result presents empirical data base reference and evidence that common complaints about habitual sleep addressed by the elderly are significantly relevant to factors implicating their health issues. It is trusted that the findings shall be generally beneficial to relevant health institutes and offices, for example, Division of Older Persons, Geriatric Medicine Offices and family of elderly. The results of this study should enhance the understandings and arrange for essential activities for the elderly in order to promote the good sleep quality among the elderly whose end results are of living longer and being healthier. The recommendation of this study is in the followings :

1. To further study the association of sleep problems among the elderly with more common comprehensive individual factors and various comorbidities which should be conducted at the national level.

2. To evaluate the impact on physical, psychological and social aspects relating to sleep quality of the elderly at the national scale.

3. To further examine other factors which affect the stress of the elderly which in turn negatively impacted the sleep quality.

4. To establish the guidelines on standard sleep quality markers and identify common essential individual factors which contribute to sleep quality among the elderly

The end result and recommendation of this study are not exhaustive but there is ample research opportunity to be broadened for further study at the national scale which may benefit the planning of public health for the elderly in Thailand.

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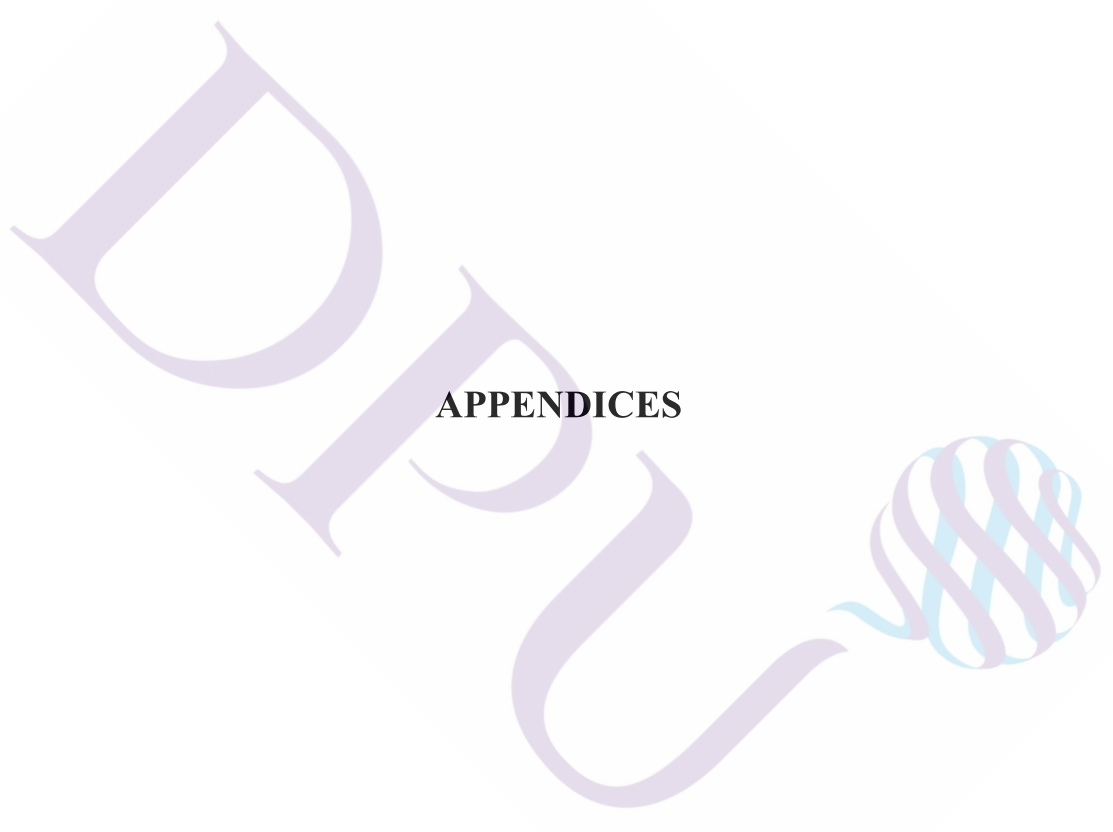
APPENDICES

APPENDICES

Table 1: Statistics of Older Persons in Thailand at 31 December 2019

Countrywide Totality = 11,136,059 persons

Region	Persons	**Province**	Persons	Top 5 Provinces
Middle	3,215,175	Bangkok	1,063,871	Bangkok = 1,063,871
		Nonthaburi	231,419	Nakhonratchasima = 453,388
		Samutprakarn	202,635	Chiangmai = 333,692
		Suphanburi	168,856	Khonkaen = 312,933
		Pathumthani	164,358	Ubonratchathani = 276,628
		Ratchaburi	160,323	
		Nakhonpathom	156,470	
		Ayudhaya	148,442	
		Lopburi	140,685	
		Kanchanaburi	131,129	
		Petchaburi	90,258	
		Prachuabkirikhan	88.793	
		Samutsakhon	86,663	
		Chainat	72,628	
		Angthong	60,046	
		Nakhonnayok	50,301	
		Singburi	48,135	
		Samutsongkram	43,019	
Northeast	3,532,115	Nakhonratchasima	453,388	
		Khonkaen	312,933	
		Ubonratchathanee	276,628	
		Buriram	251,206	
		Udonthani	234,293	

Region	Persons	Province	Persons	Top 5 Provinces
		Srisaket	232,607	
		Surin	224,364	
		Roi-et	224,131	
		Chaiyaphum	203,237	
		Mahasarakham	164,249	
		Sakhonnakhon	164,075	
		Kalasin	157,564	
		Loei	111,799	
		Nakhonpanom	104,903	
		Yasothon	91,078	
		Nongkhai	80,634	
		Nongbualamphu	76,723	
		Amnatcharoen	59,862	
		Buengkarn	57,892	
		Mukdaharn	50,549	
North	2,287,470	Chiangmai	333,692	
		Chiangrai	225,862	
		Nakhonsawan	209,688	
		Petchabun	177,211	
		Lampang	170,029	
		Phitsanulok	159,810	
		Kampaengphet	126,366	
		Sukhothai	119,088	
		Pichitr	109,225	
		Prae	100,880	
		Phayao	99,116	
		Nan	93,659	

Region	Persons	Province	Persons	Top 5 Provinces
		Lampoon	92,945	
		Tak	76,411	
		Uthaithani	65,041	
		Maehongson	33,067	
South	1,382,155	Nakhonsithamarat	265,735	
		Songkhla	219,472	
		Suratthani	157,480	
		Trang	100,531	
		Pattalung	95,933	
		Narathiwas	90,816	
		Chumporn	88,026	
		Pattani	86,050	
		Yala	63,488	
		Krabi	56,627	
		Phuket	45,827	
		Phangnga	44,316	
		Satun	40,896	
		Ranong	26,964	
East	719,044	Chonburi	205,021	
		Chachoengsao	121,318	
		Chanthaburi	95,420	
		Rayong	94,635	
		Srakaeo	82,392	
		Prachinburi	80,845	
		Trad	39,413	

Sources : Department of Older Persons at 31 December 2019

Table 2 : List of researches in Thai which applied the PSQI forms (Thai versions)

No	Research	Author	Year
1	คุณภาพการนอนหลับปัจจัยที่รบกวนและการจัดการกับปัญหาการนอนหลับของผู้สูงอายุ จังหวัดเลย	กุสุมาลย์ รามศิริ	2000
2	ปัญหาคุณภาพการนอนหลับของพยาบาลประจำการ โรงพยาบาลสงขลานครินทร์	ตะวันชัย จิรประมุขพิทักษ์	2017
3	รายงานเบื้องต้น ปัญหาในการนอนและปัจจัยที่เกี่ยวข้องของประชาชน เขตหนองจอก กรุงเทพ	จักรกฤษณ์ สุขยิ่ง	1997
4	พฤติกรรมการดูแลตนเองและคุณภาพชีวิตของผู้สูงอายุภาคตะวันออกเฉียงเหนือ	ฉัตรทอง อินทร์นอก	1997
5	คุณภาพการนอนหลับความเหนื่อยหล้าของพนักงานต้อนรับบนเครื่องบินบริษัทการบินไทยจำกัด	อณิตา เครือประยงค์	2017
6	คุณภาพการนอนหลับและสุขภาพจิตของพนักงานต้อนรับบนเครื่องบินบริษัทการบินไทยจำกัด	ณภัควรรต บัวทอง	2003
7	คุณภาพการนอนหลับของบุคคลากรทางสุขภาพในมหาวิทยาลัยมหิดล	ศิวาภรณ์ โกศล	1995
8	พฤติกรรมการดูแลตนเองแลคุณภาพชีวิตของผู้สูงอายุในจังหวัดชายแดนภาคใต้	ดวงใจ เปลี่ยนบำรุง	1997

Table 3 : Questionnaire used for in-depth interview approved by Human Research Ethics Committee, DPU

แบบสอบถามเพื่อใช้ในการศึกษา ปัจจัยที่มีอิทธิพลต่อการนอนหลับของผู้สูงอายุ

วิทยาลัยการแพทย์บูรณาการ มหาวิทยาลัยธุรกิจบัณฑิตย์

ข้อคำถาม

ตอนที่ 1 ข้อมูลเบื้องต้นของผู้ตอบแบบสอบถาม
1. ท่านมีอายุเท่าไร
☐ 1) 60-70 ปี ☐ 2) 71-80 ปี   ☐ 3) มากกว่า 80 ปีขึ้นไป
2. เพศ
☐ 1) ชาย   ☐ 2) หญิง
3. สถานะภาพของท่าน
☐ 1) โสด   ☐ 2)   แต่งงาน   ☐ 3) หย่าร้าง/หม้าย
4. ท่านมีโรคประจำตัวหรือไม่
☐ 1) ไม่มี   ☐ 2) มี ระบุ ....
5. ท่านดื่มเครื่องดื่มที่ผสมแอลกอฮอล์หรือไม่
☐ 1) ดื่ม   ☐ 2) ไม่ดื่ม
6. ท่านดื่มเครื่องดื่มที่มีคาเฟอีน (caffeine) หรือไม่
☐ 1) ดื่ม   ☐ 2) ไม่ดื่ม
7. ท่านสูบบุหรี่หรือไม่
☐ 1) สูบ   ☐ 2) ไม่สูบ
8. ท่านออกกำลังกายเป็นประจำหรือไม่
☐ 1) ไม่ได้ออกกำลังกาย   ☐ 2) ออกกำลังกาย ... ครั้ง/สัปดาห์
9. รายได้ของท่านเพียงพอต่อการดำรงชีพหรือไม่
☐ 1) เพียงพอเหลือเก็บ ☐ 2) เพียงพอไม่เหลือเก็บ   ☐ 3) ไม่เพียงพอ
10. ที่พักอาศัยของท่าน
☐ 1) บ้านของตนเอง   ☐ 2) บ้านเช่า
11. สภาพแวดล้อมซึ่งอาจมีอิทธิพลต่อการนอนหลับเป็นอย่างไร
☐ 1) เสียงรบกวน ☐ 2) กลิ่นรบกวน   ☐ 3) ความสว่างและมืดรบกวน
☐ 4) ควันและฝุ่นรบกวน

7.มีใครพักร่วมห้องกับท่านหรือไม่

□ 1) ไม่มี □ 2) นอนคนละห้อง □ 3) มีแต่นอนคนละเตียง □ 4) มีและนอนเตียงเดียวกัน

หากมีผู้พักอาศัยห้องเดียวกับท่าน กรุณาถามเขาว่าใน 1 เดือนที่ผ่านมาคุณมีอาการดังต่อไปนี้หรือไม่ อย่างไร

(กรุณาเลือกคำตอบที่ถูกต้องที่สุดเพียงคำตอบเดียว

7.1 กรนเสียงดัง

□ 1) ไม่มีเลย □ 2)มีน้อยกว่าสัปดาห์ละครั้ง □ 3)สัปดาห์ละ 1-2ครั้ง □ 4) สัปดาห์ละ 3ครั้งขึ้นไป

7.2 หยุดหายใจขณะหลับ

□ 1) ไม่มีเลย □ 2)มีน้อยกว่าสัปดาห์ละครั้ง □ 3)สัปดาห์ละ 1-2ครั้ง □ 4) สัปดาห์ละ 3ครั้งขึ้นไป

7.3 ขากระตุกขณะหลับ

□ 1) ไม่มีเลย □ 2)มีน้อยกว่าสัปดาห์ละครั้ง □ 3)สัปดาห์ละ 1-2ครั้ง □ 4) สัปดาห์ละ 3ครั้งขึ้นไป

7.4 อาการสับสนนอนไม่หลับ ลุกๆ นั่งๆ เพ้อ ภาพหลอน คิดอยู่ตลอดที่

□ 1) ไม่มีเลย □ 2)มีน้อยกว่าสัปดาห์ละครั้ง □ 3)สัปดาห์ละ 1-2ครั้ง □ 4) สัปดาห์ละ 3ครั้งขึ้นไป

7.5 อาการกระวนกระวายว่าวุ่นจิตใจระหว่างนอน (โปรดระบุ)............

□ 1) ไม่มีเลย □ 2)มีน้อยกว่าสัปดาห์ละครั้ง □ 3)สัปดาห์ละ 1-2ครั้ง □ 4) สัปดาห์ละ 3ครั้งขึ้นไป

8. ใน 1 เดือนที่ผ่านมาท่านมีอาการง่วงนอนขณะขับรถ ขณะรับประทานอาหารหรือขณะมีกิจกรรมทางสังคมอื่นๆ บ้างหรือไม่

□ 1) ไม่เคยเลย □)น้อยกว่า 1 ครั้งต่อสัปดาห์ □ 3)1-2ครั้งต่อสัปดาห์ □ 4) 3ครั้งหรือมากกว่า 3 ครั้งต่อ สัปดาห์

9. ใน 1 เดือนที่ผ่านมาท่านคิดว่ามีปัญหามากน้อยแค่ไหนจากการทำงานไม่สำเร็จเนื่องจากขาดความกระตือรือร้น

□ 1) ไม่เป็นปัญหาเลย □ 2)เป็นปัญหาบ้างเล็กน้อย □ 3)เป็นปัญหาพอควร □ 4)เป็นปัญหามาก

10. ใน 1 เดือนที่ผ่านมา ท่านต้องใช้ยานอนหลับ (ทั้งที่ซื้อเอง และ/หรือ ตามที่แพทย์สั่ง) เพื่อที่จะช่วยให้นอนหลับ บ้างหรือไม่

□ 1) ไม่เคยใช้เลย □ 2) น้อยกว่า 1ครั้งต่อสัปดาห์ □ 3) 1-2 ครั้งต่อสัปดาห์ □ 4) 3 ครั้งหรือมากกว่า 3 ครั้ง ต่อสัปดาห์

Human Research Ethics Office Dhurakij Pundit University

110/1-40 Prachachuen Road Laksi, Bangkok 10210, Thailand

Tel. 02-954-7300 Ext. 152   E-mail: ethics.dpu@dpu.ac.th   website: https://www.dpu.ac.th/human-research/

AF 10-04/01.1 : Edit 27-09-20

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COE No. 125/64

Certificate of Exemption

The Human Research Ethics Committee, Dhurakij Pundit University, Thailand, has exempted the following protocol based on Declaration of Helsinki, The Belmont Report, CIOMS Guideline and International Conference on Harmonization in Good Clinical Practice (ICH-GCP).

Protocol Title   : Factors affecting the sleep quality of the Elderly in Thailand

Protocol Number   : 026/63NA

Principal Investigator : Mr. BoonShan Sangfai

Institution   : College of Integrative Medicine, Dhurakij Pundit University

Co-Investigator   : -

Institution   : -

Date of Exemption   : 5 July 2021

Signature: Payong Wanikiat

(Associate Professor Dr.Payong Wanikiat)

Chairman

Signature: Nit Petcharaks

(Associate Professor Dr.Nit Petcharaks)

Vice President of Research & Development

and Innovation

Note: 1. No amendment, progress report, final report required

2. Any major approved exemption protocol modification, require new protocol submission

ข้อคำถาม

ตอนที่ 1 ข้อมูลเบื้องต้นของผู้ตอบแบบสอบถาม
1. ท่านมีอายุเท่าไร ☐ 1) 60-70 ปี   ☐ 2)   71-80 ปี ☐ 3) มากกว่า 80 ปีขึ้นไป
2. เพศ ☐ 1) ชาย   ☐ 2) หญิง
3. สถานะภาพของท่าน ☐ 1) โสด   ☐ 2)   แต่งงาน   ☐ 3) หย่าร้าง/หม้าย
4. ท่านมีโรคประจำตัวหรือไม่ ☐ 1) ไม่มี   ☐ 2) มี โรคมะเร็ง ☐ 3) มี โรคปวดข้อ/หลัง ☐ 4) มี โรคระบบประสาท ☐ 5) มี โรคอื่นๆ
5. ท่านดื่มเครื่องดื่มที่ผสมแอลกอฮอล์หรือไม่ ☐ 1) ดื่ม   ☐ 2) ไม่ดื่ม
6. ท่านดื่มเครื่องดื่มที่มีคาเฟอีน (caffeine) หรือไม่ ☐ 1) ดื่ม   ☐ 2) ไม่ดื่ม
7. ท่านสูบบุหรี่หรือไม่ ☐ 1) สูบ   ☐ 2) ไม่สูบ
8. ท่านออกกำลังกายเป็นประจำหรือไม่ ☐ 1) ไม่ได้ออกกำลังกาย ☐ 2) 3 ครั้ง/สัปดาห์ ☐ 3) 5 ครั้ง/สัปดาห์ ☐ 4) มากกว่า ถ ครั้ง/สัปดาห์
9. รายได้ของท่านเพียงพอต่อการดำรงชีพหรือไม่ ☐ 1)เพียงพอเหลือเก็บ ☐ 2) เพียงพอไม่เหลือเก็บ   ☐ 3) ไม่เพียงพอ
10. ที่พักอาศัยของท่าน ☐ 1) บ้านของตนเอง   ☐ 2) บ้านเช่า
11. สภาพแวดล้อมซึ่งอาจมีอิทธิพลต่อการนอนหลับเป็นอย่างไร ☐ 1)เสียงรบกวน ☐ 2) กลิ่นรบกวน   ☐ 3) ความสว่างและมืดรบกวน ☐ 4) ควันและฝุ่นรบกวน
12. ท่านมีอาการซึมเศร้า ท้อแท้ ไม่สบายใจ ทั้งมีสาเหตุและไม่มีสาเหตุ ☐ 1)ไม่มี ☐ 2) มีบางวัน   ☐ 3) มีทุกวัน
13. ท่านปฏิบัติสวดมนต์หรือทำสมาธิก่อนนอนหรือไม่ ☐ 1)ปฏิบัติทุกคืน ☐ 2) ปฏิบัติไม่สม่ำเสมอ   ☐ 3) ไม่ปฏิบัติ

คำแนะนำ: แบบสอบถามนี้ใช้ประเมินคุณสมบัติการนอนส่วนใหญ่ของท่านในช่วง 1 เดือนที่ผ่านมา กรุณาตอบคำถามเหล่านี้ให้ตรงกับความเป็นจริงและกรุณาตอบให้ครบทุกข้อ

1. ในช่วง 1 เดือนที่ผ่านมา ท่านคิดว่าคุณภาพการนอนโดยรวมของท่านเป็นอย่างไร

☐ 1) ดีมาก ☐ 2) ค่อนข้างดี ☐ 3) ค่อนข้างแย่ ☐ 4) แย่มาก

2. ใน 1 เดือนที่ผ่านมาส่วนใหญ่ท่านเข้านอนเวลาใด เวลาที่เข้านอนปกติ คือ

☐ 1) 1900 น ☐ 2) 2000 น ☐ 3) 2100 น และหลังจากนั้น ☐ 4) ไม่แน่นอน

3. ใน 1 เดือนที่ผ่านมา เมื่อท่านเริ่มเข้านอน ท่านใช้เวลากี่นาที ท่านถึงจะหลับจริง จำนวนนาที ☐ 1) ภายใน 30 นาที

☐ 2) ภายใน 60 นาที ☐ 3) มากกว่า 60 นาที

4. ใน 1 เดือนที่ผ่านมาท่านมักจะตื่นนอนเวลาใด เวลาตื่นนอนปกติคือ ☐ 1) ก่อน 0400 น ☐ 2) ระหว่าง 0400-0500 น .

☐ 3) ระหว่าง 0500-0700 น ☐ 4) หลัง 0700 น

5. ใน 1 เดือนที่ผ่านมา ส่วนใหญ่ท่านจะหลับได้จริง รวมได้กี่ชั่วโมง จำนวนชั่วโมงที่นอนหลับได้จริงต่อคืน ☐ 1) 4-5 ชั่วโมง ☐ 2) 5-6 ชั่วโมง ☐ 3) มากกว่า 6 ชั่วโมง

6. ใน 1 เดือนที่ผ่านมาท่านมีปัญหาในการนอนหลับบ่อยแค่ไหน	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
6.1 ไม่สามารถหลับได้ในภายใน 30 นาที				
6.2 ตื่นกลางดึกหรือตื่นมากกว่าปกติ				
6.3 ต้องตื่นมาเข้าห้องน้ำระหว่างการนอน				
6.4 หายใจไม่สะดวก				
6.5 ไอหรือกรนเสียงดัง				
6.6 รู้สึกหนาวหรือเย็นเกินไป				
6.7 รู้สึกร้อนเกินไป				
6.8 ฝันร้าย				
6.9 มีอาการปวด				
6.10 เหตุรบกวนด้านจิตใจเกี่ยวกับการสูญเสียและความรู้สึกต่างๆ และมีอาการที่ระบุบ่อยแค่ไหน				

7.มีใครพักร่วมห้องกับท่านหรือไม่
 	
☐ 1) ไม่มี ☐ 2) นอนคนละห้อง ☐ 3) มีแต่นอนคนละเตียง ☐ 4) มีและนอนเตียงเดียวกัน
 	
  หากมีผู้พักอาศัยห้องเดียวกับท่าน กรุณาถามเขาว่าใน 1 เดือนที่ผ่านมาคุณมีอาการดังต่อไปนี้หรือไม่ อย่างไร (กรุณา
 	
  เลือกคำตอบที่ถูกต้องที่สุดเพียงคำตอบเดียว

7.1 กรนเสียงดัง ☐ 1) ไม่มีเลย ☐ 2)มีน้อยกว่าสัปดาห์ละครั้ง ☐ 3)สัปดาห์ละ 1-2ครั้ง ☐ 4) สัปดาห์ละ 3ครั้งขึ้นไป
7.2 หยุดหายใจขณะหลับ ☐ 1) ไม่มีเลย ☐ 2)มีน้อยกว่าสัปดาห์ละครั้ง ☐ 3)สัปดาห์ละ 1-2ครั้ง ☐ 4) สัปดาห์ละ 3ครั้งขึ้นไป
7.3 ขากระตุกขณะหลับ ☐ 1) ไม่มีเลย ☐ 2)มีน้อยกว่าสัปดาห์ละครั้ง ☐ 3)สัปดาห์ละ 1-2ครั้ง ☐ 4) สัปดาห์ละ 3ครั้งขึ้นไป
7. 4 อาการสับสนนอน ไม่หลับ ลุกๆ นั่งๆ เพ้อ ภาพหลอน คิดอยู่ต่างที่ ☐ 1) ไม่มีเลย ☐ 2)มีน้อยกว่าสัปดาห์ละครั้ง ☐ 3)สัปดาห์ละ 1-2ครั้ง ☐ 4) สัปดาห์ละ 3ครั้งขึ้นไป
7.5 อาการกระวนกระวายว่าวุ่นจิตใจระหว่างนอน (โปรดระบุ)... ☐ 1) ไม่มีเลย ☐ 2)มีน้อยกว่าสัปดาห์ละครั้ง ☐ 3)สัปดาห์ละ 1-2ครั้ง ☐ 4) สัปดาห์ละ 3ครั้งขึ้นไป
8. ใน 1 เดือนที่ผ่านมาท่านมีอาการง่วงนอนขณะขับรถ ขณะรับประทานอาหารหรือขณะมีกิจกรรมทางสังคมอื่นๆ บ้าง หรือไม่ ☐ 1) ไม่เคยเลย ☐ 2)น้อยกว่า 1 ครั้งต่อสัปดาห์ ☐ 3)1-2ครั้งต่อสัปดาห์ ☐ 4) 3ครั้งหรือมากกว่า 3 ครั้งต่อสัปดาห์
9. ใน 1 เดือนที่ผ่านมาท่านคิดว่ามีปัญหามากน้อยแค่ไหนจากการทำงานไม่สำเร็จเนื่องจากขาดความกระตือรือร้น ☐ 1) ไม่เป็นปัญหาเลย ☐ 2)เป็นปัญหาบ้างเล็กน้อย ☐ 3)เป็นปัญหาพอควร ☐ 4)เป็นปัญหามาก
10. ใน 1 เดือนที่ผ่านมา ท่านต้องใช้ยานอนหลับ (ทั้งที่ซื้อเอง และ/หรือ ตามที่แพทย์สั่ง) เพื่อที่จะช่วยให้นอนหลับบ้าง หรือไม่ ☐ 1) ไม่เคยใช้เลย ☐ 2) น้อยกว่า 1ครั้งต่อสัปดาห์ ☐ 3) 1-2 ครั้งต่อสัปดาห์ ☐ 4) 3 ครั้งหรือมากกว่า 3 ครั้งต่อสัปดาห์

Table 4： PSQI Scoring Guidelines

SCORING INSTRUCTIONS FOR THE PITTSBURGH SLEEP QUALITY INDEX:

The Pittsburgh Sleep Quality Index (PSQI) contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven "component" scores, each of which has a range of 0-3 points. In all cases, a score of "0" indicates no difficulty, while a score of "3" indicates severe difficulty. The seven component scores are then added to yield one "global" score, with a range of 0-21 points, "0" indicating no difficulty and "21 " indicating severe difficulties in all areas.

Scoring proceeds as follows:

Component 1: Subjective sleep quality

Examine question #6, and assign scores as follows:

Response	Component 1 score
"Very good"	0
"Fairly good"	1
"Fairly bad"	2
"Very bad"	3

Component 1 score: _____

Component 2: Sleep latency

1. Examine question #2, and assign scores as follows:

Respo\nse	Score
≤15 minutes	0
16-30 minutes	1
31-60 minutes	2
> 60 minutes	3

Question #2 score: _____

2. Examine question #5a, and assign scores as follows:

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 #5a score: _____

3. Add #2 score and #5a score

Sum of #2 and #5a: _____

4. Assign component 2 score as follows:

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

PSQI Page 3

Component 2 score: _____

Component 3: Sleep duration

Examine question #4, and assign scores as follows:

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

Component 3 score:_____

Component 4: Habitual sleep efficiency

1. Write the number of hours slept (question #4) here:_____

2. Calculate the number of hours spent in bed:

   Getting up time (question #3):_____

   Bedtime (question #1):_____

   _____

   Number of hours spent in bed:_____

3. Calculate habitual sleep efficiency as follows:

   (Number of hours slept/Number of hours spent in bed) X 100 = Habitual sleep efficiency (%)

   (_____ / _____) X 100 = %

4. Assign component 4 score as follows:

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

Component 4 score:_____

Component 5: Step disturbances

1. Examine questions #5b-5j, and assign scores for each question as follows:

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

5b score: _____

5c score: _____

5d score: _____

5e score: _____

5f score: _____

5g score: _____

5h score: _____

5i score: _____

5j score: _____

2. Add the scores for questions #5b-5j:

Sum of #5b-5j: _____

3. Assign component 5 score as follows:

Sum of #5b-5j	Component 5 score
0	0
1-9	1
10-18-4	2
19-27	3

Component 5 score: _____

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 6 score: _____

Component 7: Daytime dysfunction

1. Examine question #8, and assign scores as follows:

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

Question#8 score: _____

2. Examine question #9, and assign scores as follows:

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

Question #9 score: _____

3. Add the scores for question #8 and #9:

Sum of #8 and #9: _____

4. Assign component 7 score as follows:

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

Component 7 score: _____

Global PSQI Score

Add the seven component scores together:

Global PSOI Score: _____

Biography

Name-Surname	Boonshan Sangfai
Education	1973 Bachelor degree in International Relations, Political Science, Ramkhamhaeng University.
	2019 Master Degree in International Relations, Political Science, Thammasat University
Current position and place of work	United Nations Retiree
	Work experiences : Former staff member of the United Nations High Commissioner for Refugees in Switzerland, Hungary, Bangladesh, Timor Leste, Iraq, Albania, Ethiopia, Serbia and Thailand.