

รายงานวิจัยฉบับสมบูรณ์

โครงการ
ความชุกของการเกิดปัญหาเกี่ยวกับการนอนหลับ
ในประชากรชาวไทย
ที่อาศัยอยู่ในกรุงเทพมหานคร

โดย ดร.ปัทมทริกา สุวรรณประเทศ
และคณะ



มกราคม 2553

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สนับสนุนโดยสำนักงานคณะกรรมการการอุดมศึกษาและสำนักงานกองทุนสนับสนุนการวิจัย
(ความเห็นในรายงานนี้เป็นของผู้วิจัย สกอ. และ สกว. ไม่จำเป็นต้องเห็นด้วยเสมอไป)

SUMMARY OF FINDINGS



Siriraj Sleep Clinic

Faculty of Medicine Siriraj Hospital
Mahidol University
Thailand

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PREFACE

It is widely accepted that sleep is essential to a personal's health, in that it contributes to one's well-being in a variety of ways. However, many people suffering from various sleep disorders which can impact health as well as quality of life issues such as decreasing workplace productivity and impairing social activity.

In general, the results of this survey demonstrate the need to educate more Thai people about the importance of sleep in living a happy and healthy life. Since many people are currently undiagnosed and untreated, this clearly represents a major public health threat.

Among specific sleep disorders, the most serious in terms of morbidity and mortality is sleep-disordered breathing (SDB). This disorder is characterized by recurrent episodes of cessation of respiratory airflow during sleep, caused by the collapse of the upper airway. Complete airway collapse during sleep is usually preceded by years of narrowing that produces snoring. In the past, snoring was more a subject for humor than one of the scientific investigation. Thus, by the time patients come to medical attention, they have a long history of snoring.

Though the awareness of this condition in Thailand is slow to develop and diagnosed SDB is rare in Thailand. Given the potentially serious consequences of SDB, and the lack of concern in the Thai population, the basic epidemiological data about this disorder needs to be established. The original idea of this study was formulated in 2005. However, it was delayed due to technical and financial issues. After a year of preparation and adjusting the protocol, the proposal was submitted for a grant from the Thailand Research Fund (TRF) and was approved. This study benefited from Stanford University's expertise in sleep research through our mutual collaboration and networking. With technical support from National Statistical Office (NSO), the study was carried out during April to June of 2007.

PREFACE (continued)

In addition to the original idea of focusing on SDB, we expanded to include collecting data on other sleep disorders, e.g. insomnia, restless leg syndrome (RLS), parasomnia, narcolepsy, etc. However, we presented only the most significant parts of our data in this report.

This report is divided into 2 parts;

Part 1: Public information

This part presents our finding in lay person format which is easy to understand. The idea is to give the big picture about the population studied, including demographic data, sleep habits, and sleep problems or disorders.

Part 2: Scientific paper

This part focuses on SDB in particular. It was written in scientific format and has been offered for publication in the Sleep Medicine Journal.

The study was accepted for a poster presentation at the SLEEP 2008 22nd Annual Meeting of the Associated Professional Sleep Societies (APSS), June 7-12, in Baltimore, Maryland, USA.

It was also presented as the invitational oral presentation at the Sleep International Meeting: the 9th World Congress on Sleep Apnea (WCSA 2009) which was held in COEX Seoul, Korea from March 25 - 28, 2009.



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Part 1

Public Information

OBJECTIVES

METHODOLOGY

SLEEP HABIT

SLEEP QUALITY

SLEEP PROBLEMS /
DISORDERS

APPENDIX A

OBJECTIVES

The Thai Sleep Cohort 2007 project was formulated and conducted by the committee members of Siriraj Sleep Center, Faculty of Medicine, Siriraj Hospital, Mahidol University.

This project was granted by Thailand Research Fund (TRF)

The survey was a random sample of 4,680 adults 16 to over 65 years of age living in the Bangkok Metropolitan area. This project was conducted between April 1, 2007 and June 30, 2007.

The primary objectives of this study were to answer the following questions:

1. What are the sleep habits of Thai adults?
2. How many adults experience various types of sleep problems/disorders?
3. How often do adults experience sleep problems/disorders?
4. How do sleep problems/disorders affect their life?

METHODS

In order to collect the information, face-to-face interviews were performed. The interviews averaged 20 minutes in length. In order to qualify for this study, participants had to be:

- Community-dwelling residents ;
- Between the age of 16 and over 65 years; and
- Living within Bangkok Metropolitan area.

Most of the interviewing was conducted on weekdays between 8:00 a.m. and 6:00 p.m., and Saturdays and Sundays between 10:00 a.m. and 4:00 p.m., by professional interviewers volunteering from the National Statistics Office of Thailand (NSO).

A representative sample of the Bangkok population was pre-selected by NSO based on results of the 2000 Census (population 6,320,174). A total of 4,680 participants underwent face-to-face interviews.



CHARACTERISTICS OF RESPONDENTS

Key characteristics of the population surveys in the THAI Sleep Cohort 2007 include the following:

- Proportions of respondents: men (45.3%) and women (54.7%). This reflects the proportion of the Bangkok population from Census 2000 (men:women, 46.9%:53.1%)
- Sex ratio is 83 men vs. 100 women (which was 88 in Census 2000).
- 57% are married, 8% are divorced, separated, or widowed, 35% are single.
- The mean age of the respondents is 37 years (men vs. women: 36.6 vs. 37.2 years).
- 12% are students, 40% are employed full time. 26% are employer or business owners, 18% are not employed and 3% are not specified.

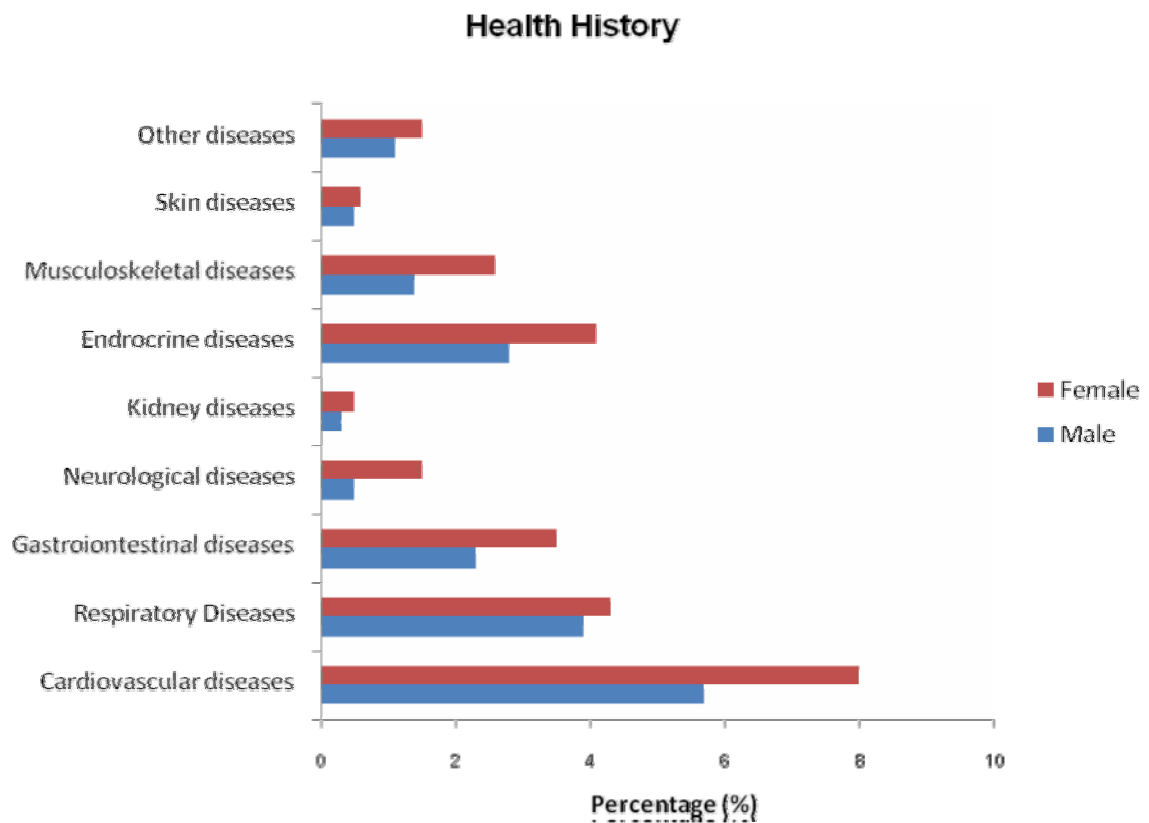
- 38% finished primary education, 37% finished secondary education, 7.4% have a diploma degree, 13% have a bachelor degree, 1.5% have a master's or PhD degree, and 3% have no education.

CHARACTERISTICS OF RESPONDENTS (continued)

Differences in responses were analyzed by these demographic characteristics. The most notable differences are mentioned as follows:

- 43% of respondents have normal BMI, 13% are underweight, 30% are overweight and 14% are obese.
 - Women are more likely than men to be over weight (52% women vs. 48.3% men), and obese (61% women vs. 39% men).
 - The mean weight of men is 64 kilograms while it is 57 kilograms for women.
 - The mean height of men is 167 centimeters while it is 159 centimeters in women.
 - The mean neck circumference of men is 34 inches while it is 31 inches in women.
 - The mean waist circumference of men is 81 inches while it is 78 inches in women.
-
- More than half (52%) of respondents drink tea or coffee. Women are more likely to drink tea or coffee than men (53% women vs. 47% men).
 - 20% of respondents are smokers. Among those, 9 in 10 are men. Average number of cigarettes smoked per day is 10 in males and 8 in women.
 - 5% of respondents are heavy alcohol drinkers. Among those, 9 in 10 are men. 35% are light or social drinkers, and 60% don't drink alcohol.
 - 55% of respondents drink soft drinks. Women are more likely to drink soft drinks than men (56% women vs. 44% men)

- 13% of respondents think that they have a sleep problems. Women report more about their sleep problems (58% women vs. 42% men).
- Percentage report (in each gender) of health history is shown in the following graph.



SLEEP HABIT

The Thai Sleep Cohort indicates that, on average, adults in Thailand are sleeping 7.8 hours a night on weekdays and 8.2 hours a night on weekends. Men have slightly longer sleep hours than women both on weekdays and weekends (men:women, weekdays; 7.9 hrs:7.7 hrs and weekends; 8.3 hrs:8.1 hrs).

The table below (Table 1) gives percentages of respondents reporting the number of hours slept on weekdays and weekends.

Number of hours Slept	on Weekdays; percent report (%)	on Weekends; percent report (%)
Less than 6 hours	7.0	6.0
6 to 6.9 hours	13.5	11.0
7 to 8 hours	49.7	43.2
More than 8 hours	29.7	39.7

- A significant proportion of respondents (20.5%) report getting less than seven hours of sleep on weekdays. In fact, 7% are getting less than 6 hours of sleep on weekdays.
- Some of the people are increasing their sleep time on the weekends, as about 40% are getting more than eight hours of sleep on the weekends (compared to 30% on weekdays). Over all, people tend to sleep more during the weekends.

When respondents were classified into age-groups, the mean of sleep hours on weekdays and weeknights in each age groups are shown in the following table (Table 2).

SLEEP HABIT (continued)

Age groups	Sleep time on weekdays (mean $\pm$ SD)	Sleep time on weekends (mean $\pm$ SD)	Sleep time required, if possible (mean $\pm$ SD)
16 to 24 years	8.4 $\pm$ 1.6	9.0 $\pm$ 2.1	9.1 $\pm$ 1.6
25 to 34 years	7.9 $\pm$ 1.5	8.3 $\pm$ 1.9	8.6 $\pm$ 1.4
35 to 44 years	7.5 $\pm$ 1.4	7.8 $\pm$ 1.7	8.3 $\pm$ 1.3
45 to 54 years	7.3 $\pm$ 1.6	7.5 $\pm$ 2.0	8.2 $\pm$ 1.3
55 to 64 years	7.4 $\pm$ 1.6	7.5 $\pm$ 1.7	8.0 $\pm$ 1.2
More than 64 years	7.5 $\pm$ 1.6	8.2 $\pm$ 1.6	7.5 $\pm$ 1.2

- Respondents who tend to sleep more during the week are more likely to be those who are between the ages of 16-24 (7.9 hrs) and 25-34 (7.9 hrs) vs. those who are 35 or older (7.3 hrs to 7.5 hrs).

The following graph compares the percentage of report of sleep hours per night on weekdays in each age group.

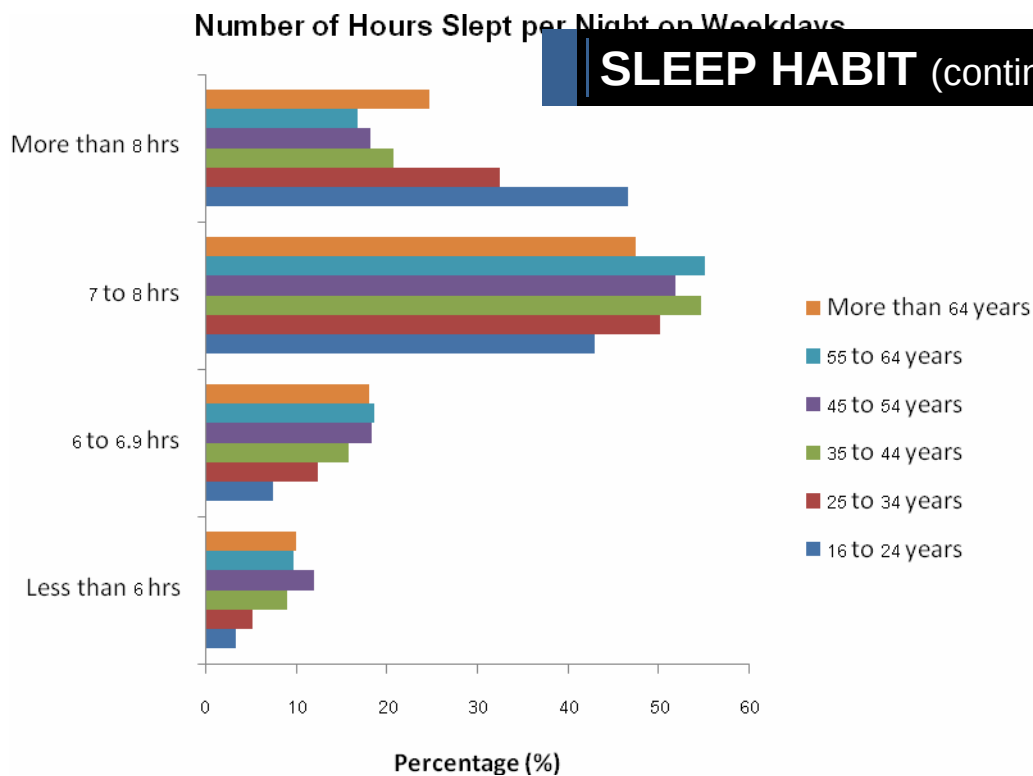
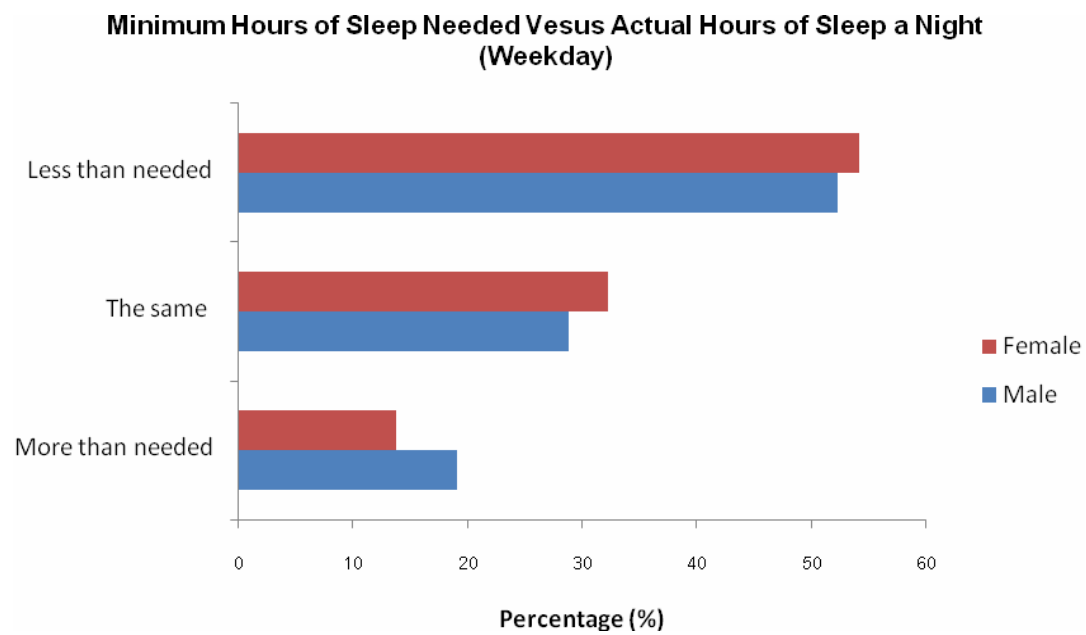


Table 2 also shows the number of hours that they need to sleep a night in order to function at their best during the day. In general, men report needing more sleep (8.6 hours) than women (8.5 hours). More than 80 percentage of both men and women (86% vs 87%) report needing eight or more hours of sleep a night.

The minimum number of hours of sleep respondents report needing to function at their best during the day was compared to the number of hours they sleep a night on weekdays to determine whether each respondent is getting less sleep, the same amount of sleep, or more sleep than they say they need.

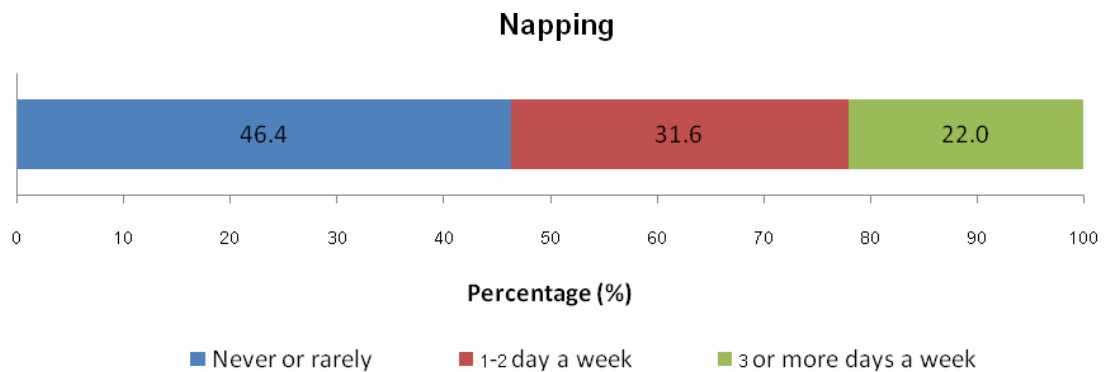
- About one-third of respondents (30%) report that they get the same amount they need on a typical weeknight, while 16% report getting more than they need.
- More than 50% of respondents report getting less sleep than they say they need to function at their best.



SLEEP HABIT (continued)

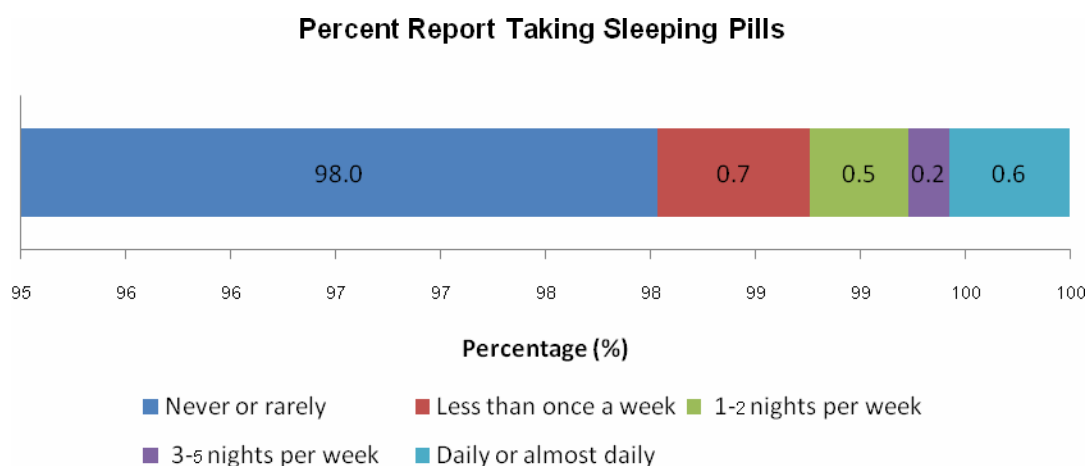
Napping

More than half (53.6%) of respondents take a nap at least once a week. In fact, 12% say they take a nap every day or almost every day.



Sleep-Aids

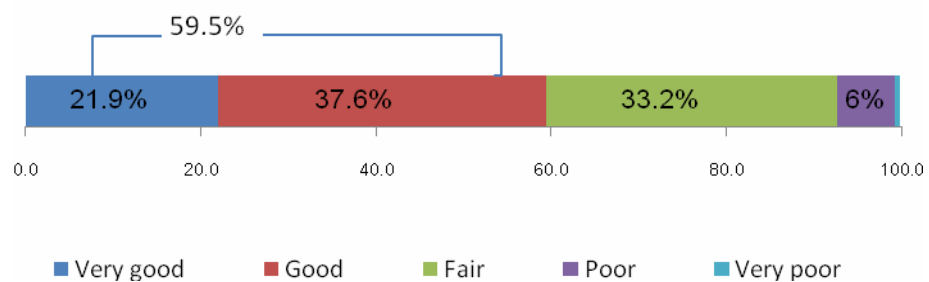
Two percent of respondents report using either a prescription sleep medication and/or an over-the-counter (OTC) sleep aid to help them sleep at least few nights a month. In fact, 0.6% report that they have been using a sleep-aid nightly or almost every night.



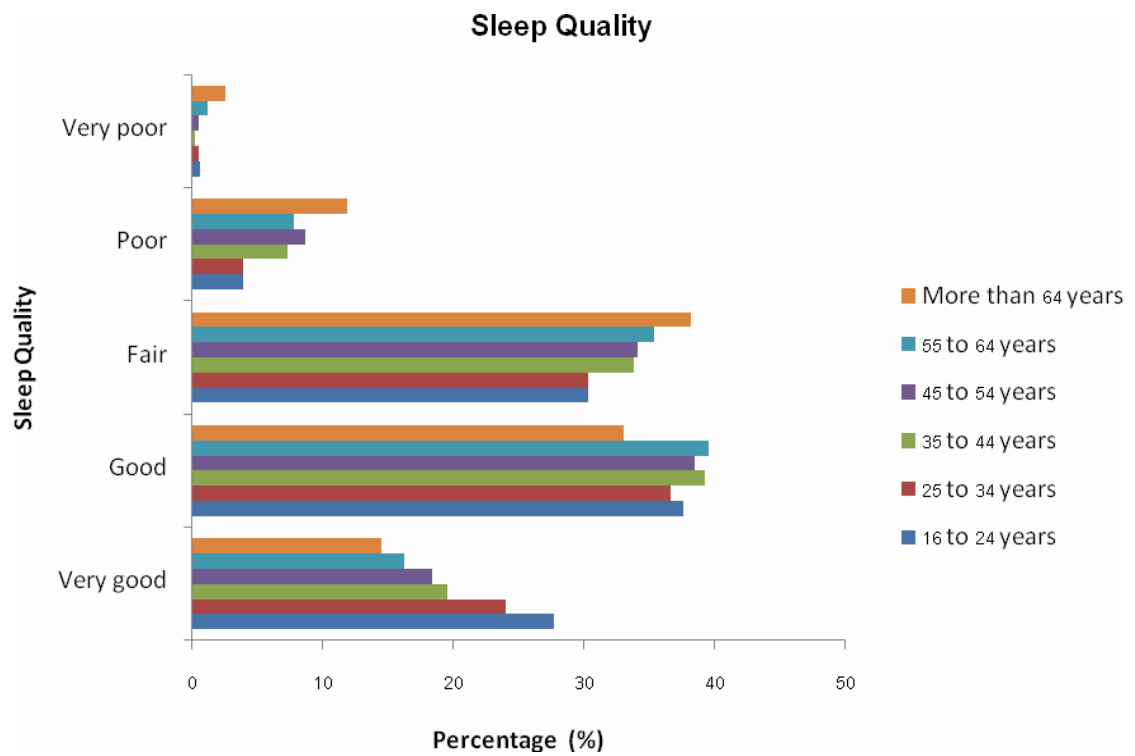
SLEEP QUALITY

The majority of respondents (60%) rate the quality of sleep as being good and very good. In contrast, only the minority (7%) categorized their sleep as poor or very poor. About one-third (33%) feel that their sleep quality is neither good or poor.

Percent Reporting Their Quality of Sleep

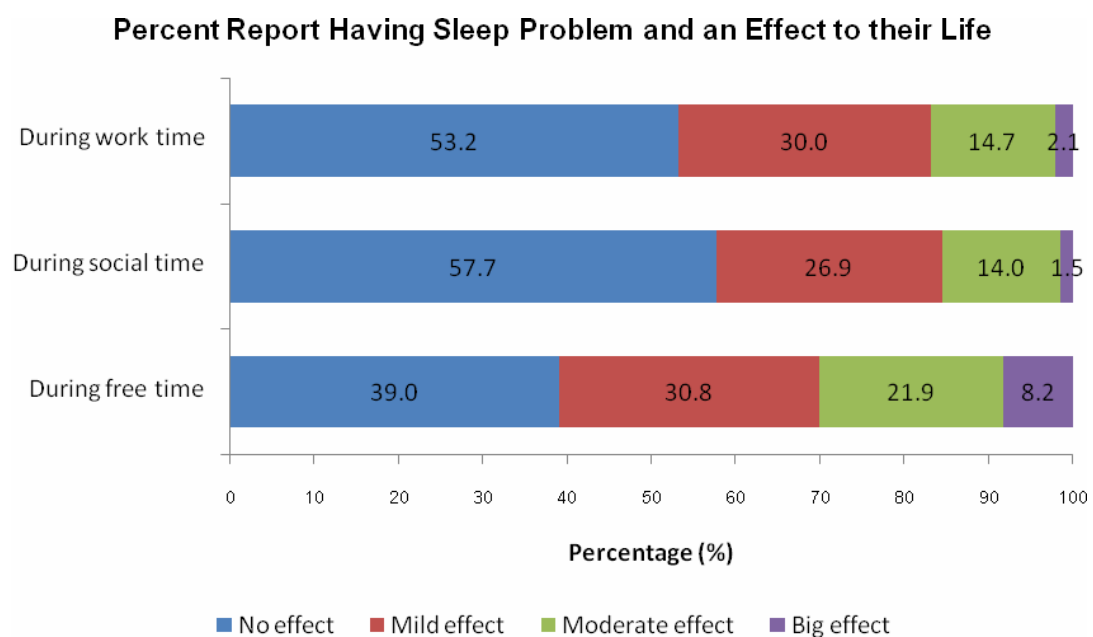


The following graph shows “Sleep quality” rated by different age groups. A majority of respondents who are 16 to 24 years of age (65%) rates their sleep as either good or very good. While respondents who are older than 64 years have a larger number of people (14.5%) who have either poor or very poor sleep quality.



SLEEP QUALITY (continued)

In response to the question, “Do you think you have sleep problem?”, 607 people or 13% of respondents (men vs. women; 12% vs. 14%) think they have sleep problems. Among these people, some claim that their sleep problem has an effect in their life, as shown in the following graph.



SLEEP PROBLEMS / DISORDERS

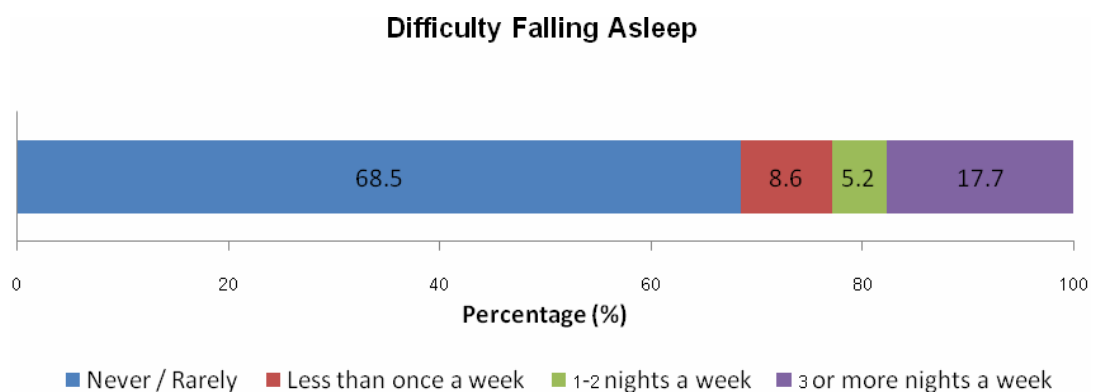
Insomnia

Respondents who are at risk for insomnia is defined as having any of the following symptoms: difficulty falling asleep, waking frequently during the night, waking up too early and not being able to get back to sleep; and waking up feeling unrefreshed. The frequency of the symptoms that happen 3 or more nights a week is classified as clinically significant.

Difficulty falling asleep

Almost one-fourth of the respondents (23%) report that they can not get to sleep within 30 minutes at least one or two nights a week. In fact, 13% say they experienced having difficulty falling asleep daily or almost daily.

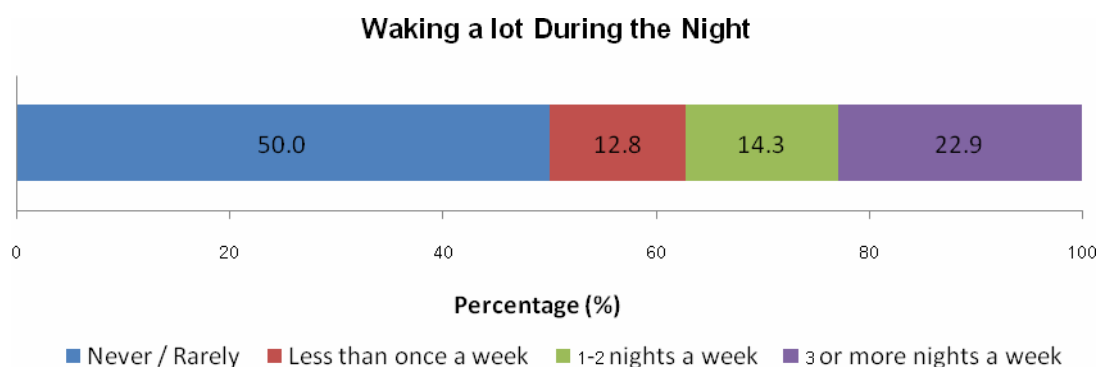
Among the respondents who have this experience 3 or more nights a week, one-fourth of them are more than 64 years old. The percentage is less in other age groups (between 16% to 18%). Compared by gender, women have a slightly higher number than men (52% vs. 48%).



SLEEP PROBLEMS (continued)

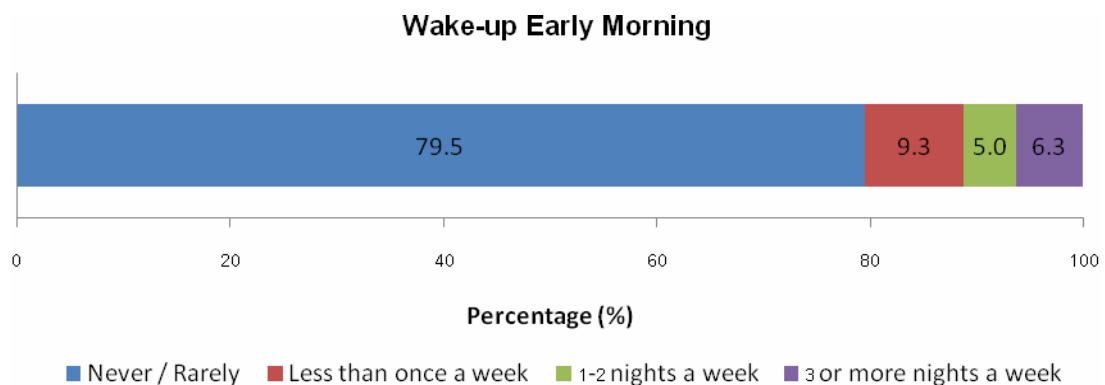
Waking frequently during the night

Almost 40% (39.2%) report that they wake up a few times during the night at least one or two nights a week. In fact, 18% say they have this experience daily or almost daily. This group is comprised of women twice as much as men.



Waking up too early and not being able to get back to sleep

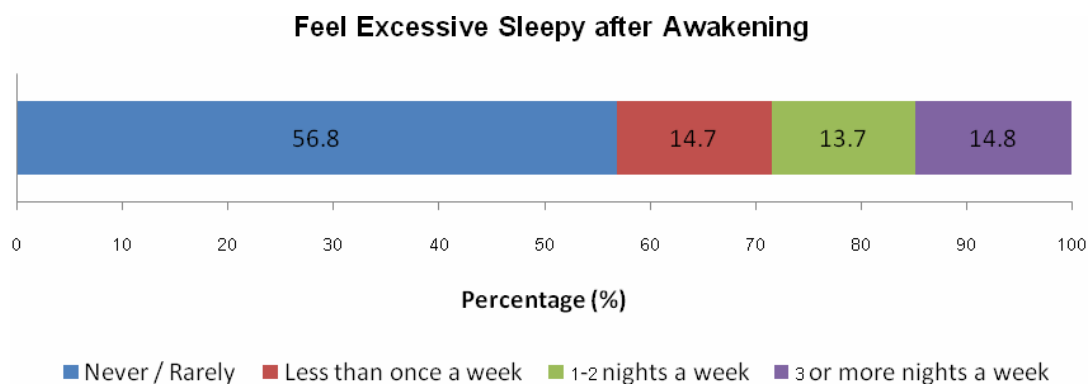
By comparison, there is a small percentage of this symptom compared with the experience of having difficulty falling asleep and waking often during the night. About 21% report waking up too early and not being able to get back to sleep at least one or more nights a week. Only 3% have this experience daily or almost daily.



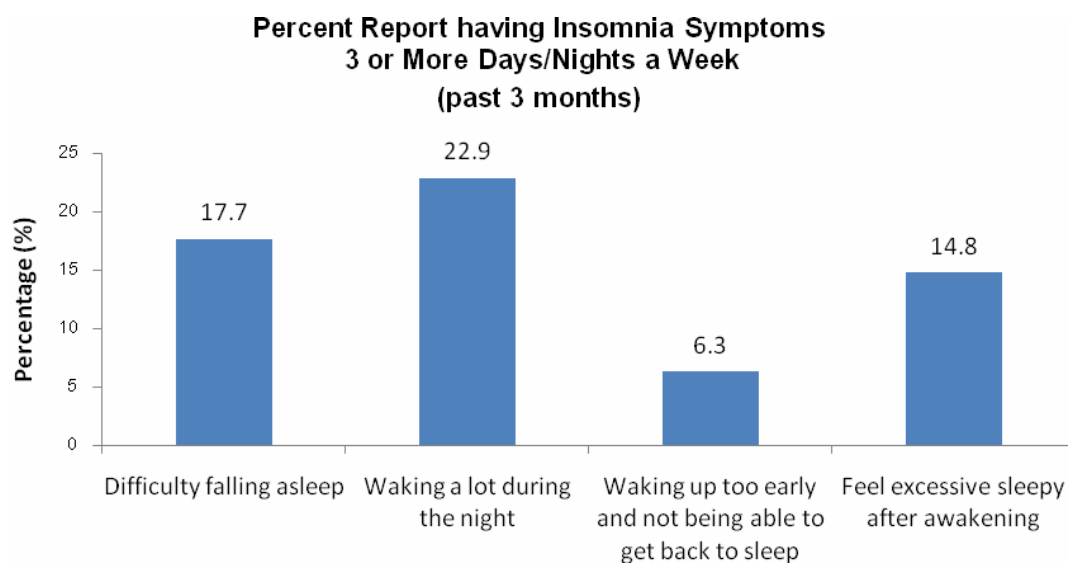
SLEEP PROBLEMS (continued)

Feel excessive sleepy after awakening

More than one-fourth (28.5%) report that they feel sleepy after waking up a few times at least one or two nights a week. In fact, 11% say they have this experience daily or almost daily.

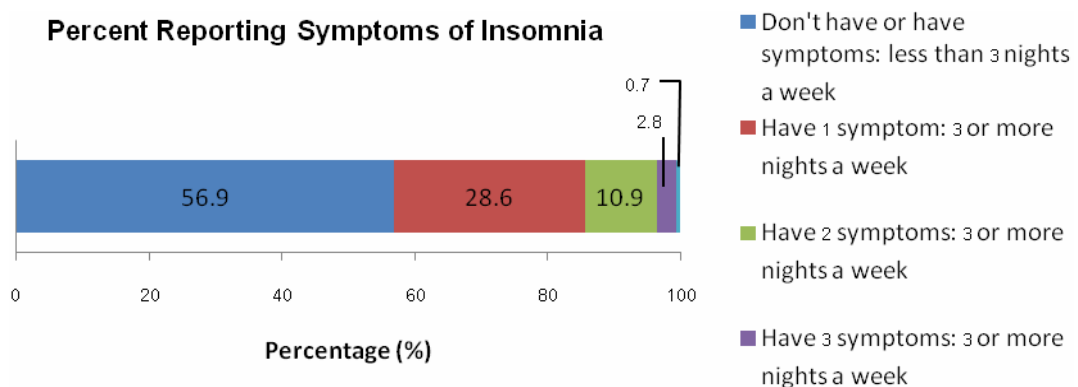


The symptoms which happen 3 or more nights/days a week are classified as clinically significant. The percentage who report having insomnia symptoms 3 or more nights a week is as follows.



SLEEP PROBLEMS (continued)

Four in ten of respondents (43%) report experiencing at least one of the four symptoms of insomnia 3 or more nights a week. Only 0.7% of respondents have all 4 symptoms of insomnia 3 or more nights a week.



Among those (43%, N=2016) who report having at least one of the four symptoms of insomnia 3 or more nights a week. They report that it impact their daily activities (irresistible tendency to fall asleep either or both at work and during free time at least 3 or more days a week). That is 17% (N=345). For the study population (N=4680), those who are classified as at risk for insomnia is 7.4%.

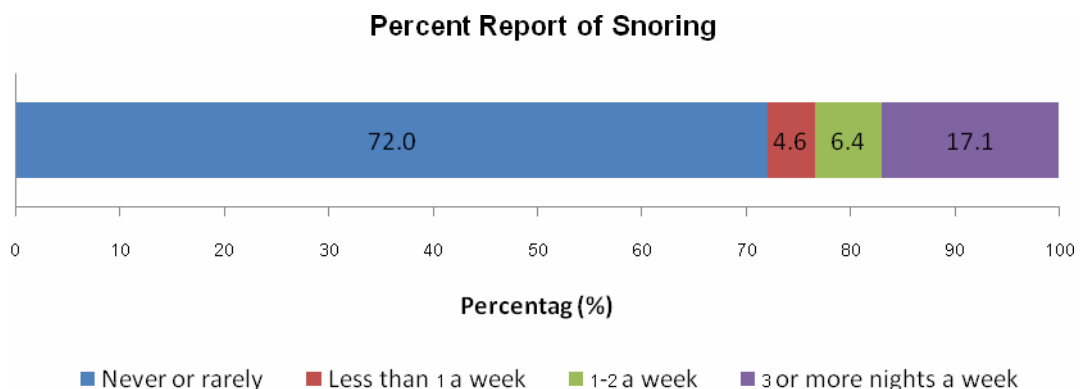
SLEEP PROBLEMS (continued)

Obstructive Sleep Apnea (OSA)

Respondents who are at risk for OSA is defined as any of the following symptoms: snore and have excessive daytime sleepiness. The frequency of the symptoms that happen 3 or more nights a week is classified as clinically significant.

Snoring

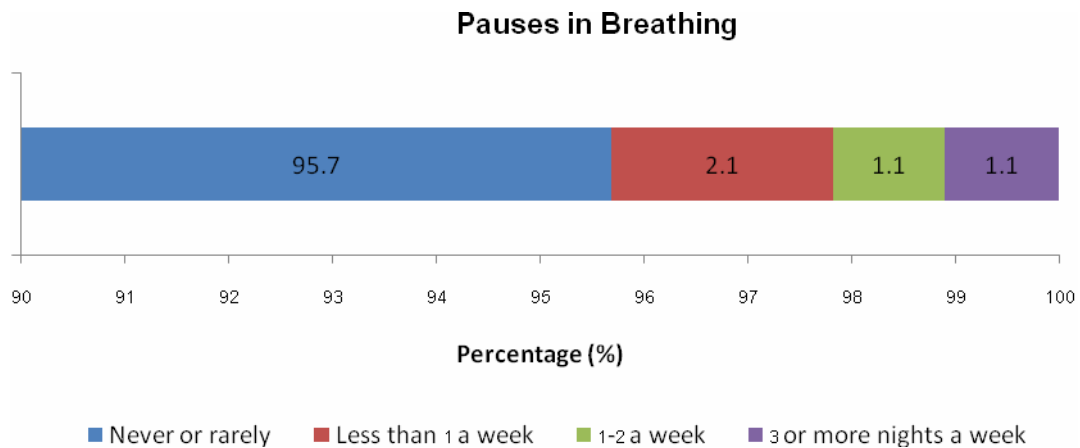
About three in ten (28%) report that, according to their own experiences or as others tell them, they snore. Almost one-fourth (23.5%) of respondents report that they have snored at least a few nights a week. In fact, 13% say they snore every night or almost every night. In this group, men are more likely than women to report snoring (63% vs. 37%).



Pausing of breathing

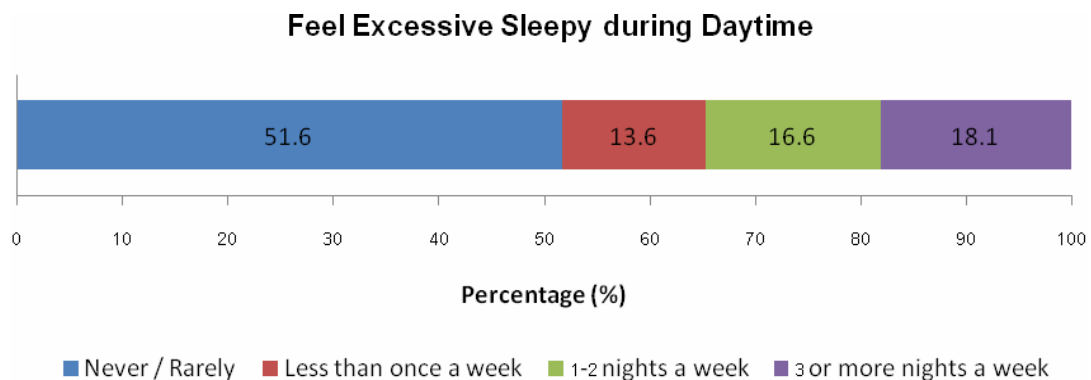
Only 2.2% report they experience pauses in breathing at least one night a week, with 1.1% saying they experience this every night or almost every night. Men are more likely than women to say that they experience these symptoms (67% vs. 33%).

SLEEP PROBLEMS (continued)



Feel excessive sleepy during daytime

One-fourth (24.7%) report that they feel sleepy during day time at least one or two nights a week. In fact, 13% say they have this experience daily or almost daily.



Among those (18.1%, N=850) who report snoring 3 or more nights a week and report having excessive daytime sleepiness at least 3 or more days a week is 23.8% (N=202). For the study population (N=4680), those who are classified as at risk for OSA is 4.3%.

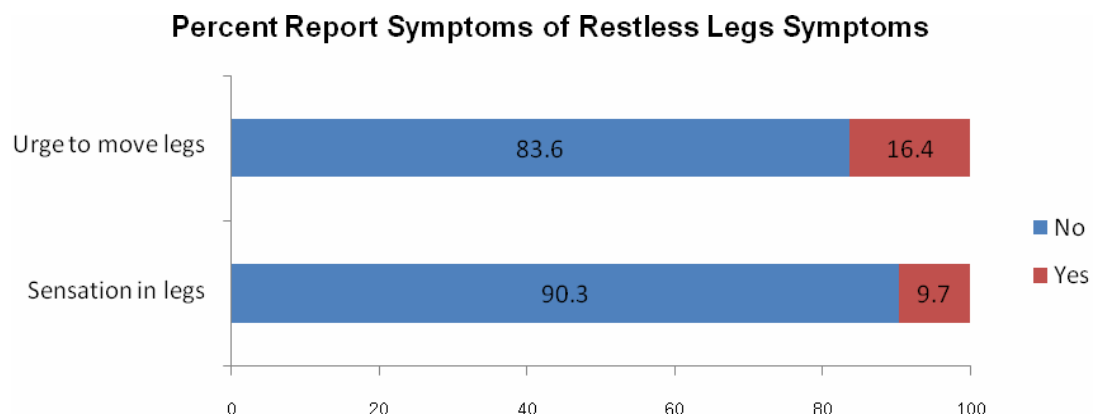
SLEEP PROBLEMS (continued)

Restless Leg Syndrome (RLS)

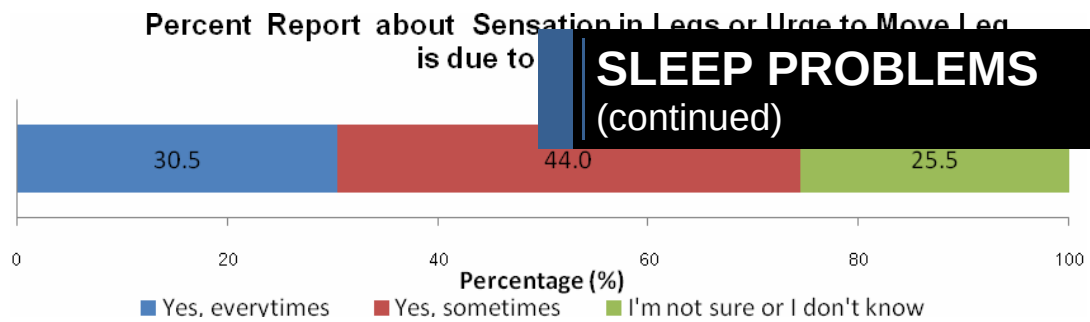
Respondents who are at risk for RLS are who have sensation, unpleasant or tingling feeling in their legs and feel the urge to move their legs

Have sensation, unpleasant or tingling feeling in their legs and feel the urge to move their legs

Almost 10% report that they experience having sensation, unpleasant or tingling feeling in their legs, with higher percentage, 16.4% saying that they feel the urge to move their legs.

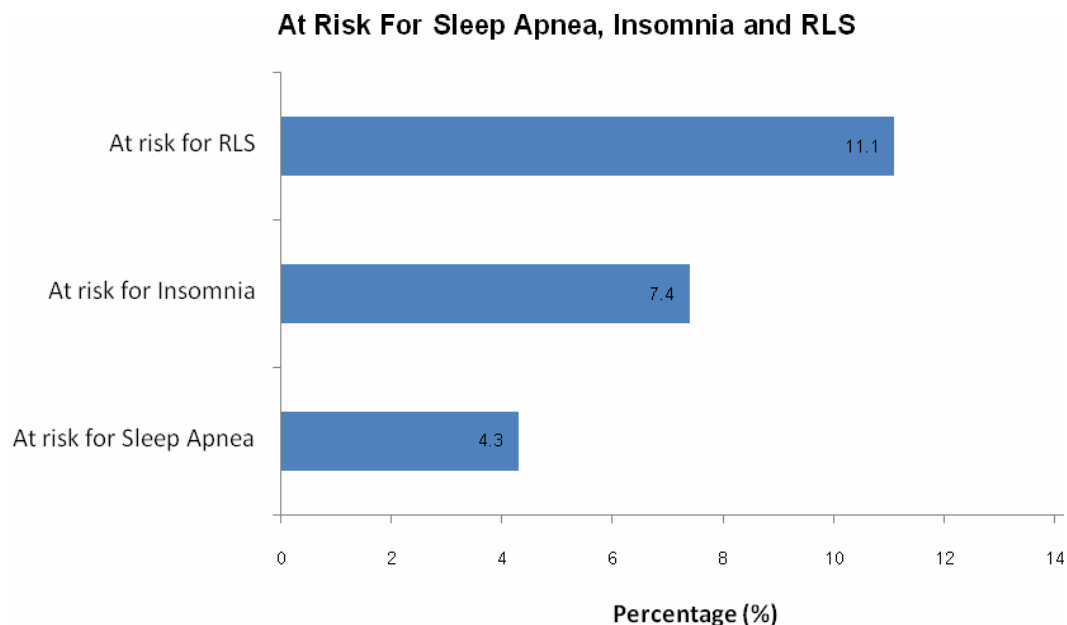


For those who report having these symptoms, the following question was asked whether or not it is due to muscle cramps. One-third report that these symptoms are due to muscle cramps while two-third of respondents say these symptoms sometimes are due muscle cramps or reasons they can not identify. Since RLS is unlikely to relate to muscle cramps, the data from respondents who reported muscle cramps as the cause of their symptoms was discarded.



In those who have RLS symptoms unrelated to muscle cramps (N=597), 9 out of 10 (86.8%, N=518) report feeling better while they keep moving. For the study population (N=4680), those who are classified as at risk for RLS is 11.1%.

The following graph indicates the percentage of people who are at risk of OSA, insomnia and RLS.

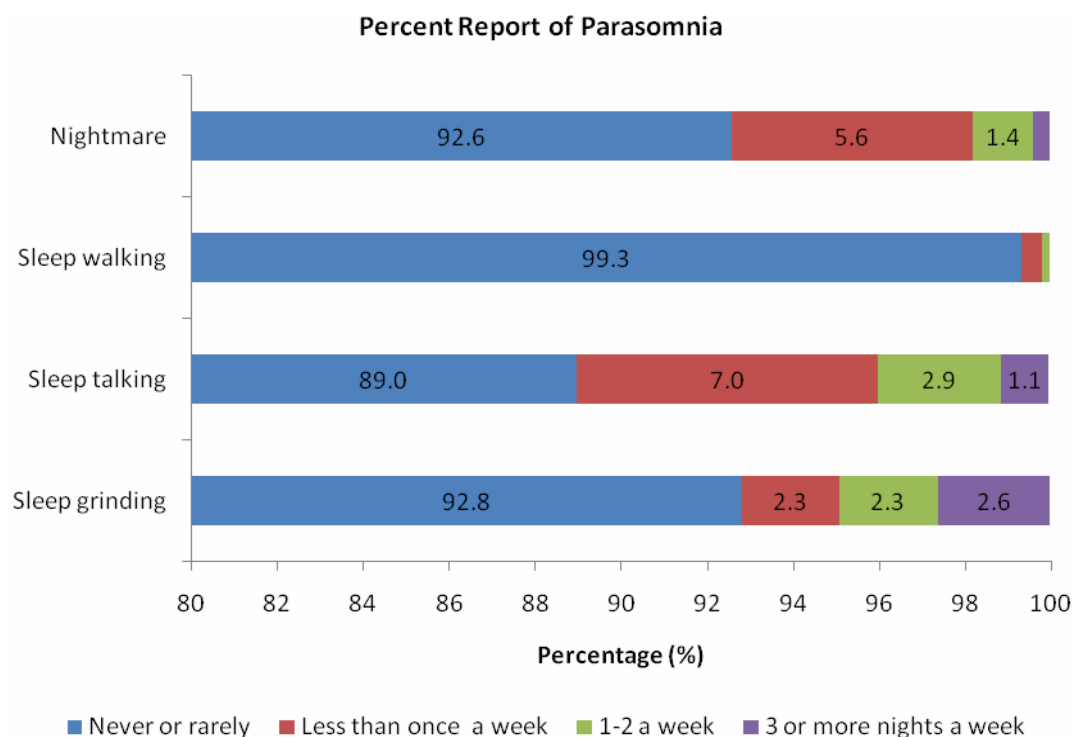


SLEEP PROBLEMS (continued)

Parasomnia

Parasomnia is a sleep disorder characterized by abnormal sleep behaviors, such as nightmare, sleepwalking, sleep eating, sleep talking, rapid eye movement (REM) behavior disorder (RBD), or any number of potential behaviors that occur while the person remains asleep.

5% report that they have sleep grinding at least few nights a week. 4% saying that they have or as others tell them, they have sleeptalking at least few nights a week. Small group (1.8%) report that they have nightmare at least few nights a week. Sleepwalking is a rare case.



APPENDIX A

Note on reading this report:

1. **BMI Scoring:** Body Mass Index or BMI is a tool for indicating weight status in adults. It is a measure of an adults weight in relation to his or her height. A BMI Score is determined by the following formula.

$$\text{BMI} = \text{weight in kilograms} / (\text{height in meters}) \times (\text{height in meters})$$

Classification are as followed:

BMI (Kg/m ²)	Classification
Less than 18.5	underweight
18.5 to 23	average
23.1 to 27.5	overweight
More than 27.5	obese

2. **Obstructive Sleep Apnea (OSA):** Respondents were asked the following questions to determine if they are at risk for OSA: Do you snore or has anyone noticed that you snore? If you snore, how often do you snore? And Do you have excessive daytime sleepiness? Those who report snore and have excessive daytime sleepiness at least 3 nights a week are classified as at risk for OSA.
3. **Insomnia:** Respondents were asked the following questions to determine if they are at risk for insomnia: How often do you have difficulty falling asleep? How often do you wake a lot during the night? How often do you wake too early and are not able to go back to bed? How often do you wake up feeling unrefreshed? They were also asked how much of a high impact their sleep

APPENDIX A (continued)

problems have on their daily activities. Those who report at least one of the four symptoms at least 3 nights a week and say it impacts their daily activities are classified as at risk for insomnia.

4. **Restless Legs Syndrome (RLS):** Respondents were asked the following questions to determine if they are at risk for RLS: How often do you have unpleasant feelings in your legs like creepy, crawly, or tingly feelings at night with an urge to move when you lie down to sleep? Do these feelings get better while you keep moving? Are these feelings worse, the same, or better at night? Those who have unpleasant feelings in their legs at least 3 nights a week and say these feelings are worse at night and get better while you keep moving are classified as at risk for RLS.

Part 2

Scientific Publication

COVER PAGE

ABSTRACT

BACKGROUND

METHODS

RESULTS

DISCUSSION

CONCLUSION

REFERENCES

APPENDIX B

COVER PAGE**Epidemiology of Sleep-Related Complaints Associated with Sleep-Disordered Breathing in Bangkok (Thailand)**

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ABSTRACT**Epidemiology of Sleep-Related Complaints Associated with Sleep-Disordered Breathing in Bangkok (Thailand)**

Background. To assess the prevalence of, and risk factors for sleep disordered breathing (SDB) in Bangkok, Thailand.

Methods. A representative sample of the Bangkok population was selected by the National Statistics Office of Thailand based on results of the 2000 Census. A total of 4680 participants underwent face-to-face interview with a 49-question sleep inventory. SDB was defined as habitual snoring (at least 3 nights/week) accompanied by excessive daytime sleepiness (more than 3 days/week) for at least last 3 months.

Results. Four percent of the total sampled had SDB: 5.3% of men, and 3.5% of women. SDB subjects were significantly ($p < 0.0001$) older (41.4 vs 36.7 yrs), had greater BMI (26.0 vs 22.8 kgm²), larger necks (34.7 vs 32.5 cms), and waist circumference (88.0 vs 78.7 cms). SDB subjects reported significantly shorter nocturnal sleep time, greater frequency of sleep disturbance and awakening, unrefreshing sleep, choking during sleep, night sweats, nocturia, bruxism, cardiovascular disease and endocrine disease. Multivariate analysis showed that male gender, BMI, and waist size were significant predictors of SDB as were the complaints of witnessed apneas, unrefreshing sleep and nightsweats. Age and neck circumference were not predictive of SDB.

Conclusion. This is the first epidemiological study performed on a representative sample of the Thai population. This population has been characterized as having a more brachiocephalic craniofacial presentation compared to Caucasians, which may alter the likelihood and characteristics of SDB. We found similar factors predicted SDB in this population, except neck circumference which had no predictive relationship with SDB.

Keywords: epidemiology, Thailand, habitual snoring, excessive daytime sleepiness

BACKGROUND

The prevalence of sleep-disordered breathing (SDB) is well described in Caucasians [1-15], however, few epidemiologic studies exist which address the prevalence of and risk factors related to SDB in Asian populations [16-22].

In the Caucasian population, it is estimated that more than 60% of adults occasionally snore [23] and 40% regularly snore [24]. SDB, as defined by an apnea-hypopnea index (AHI) greater than 5 events per hour, occurs in approximately 10% of female and 25% of males, of whom only 2 and 4% respectively have sleepiness associated with SDB [4,6]. When present, excessive daytime sleepiness (EDS) imposed a substantial burden on quality of life, morbidity and mortality in patients with SDB [25] because it is a known risk factor for motor vehicle [26,27] and work-related accidents, and can result in significant psychological and cognitive deficits [28,29].

Snoring has been shown to be associated with excessive sleepiness [4,30]. Gotlieb and colleagues [31] showed an increased Epworth Sleepiness Scale (ESS) score in snoring men and women regardless of apnea-hypopnea frequency and that snoring is associated with excessive sleepiness independent of the effect of an abnormal respiratory disturbance index (RDI). They found a dose response in the relationship between snoring and sleepiness, with increasing sleepiness associated with increasing frequency and intensity of snoring. This association between snoring and sleepiness was seen in both men and women. The magnitude of the relationship between snoring and sleepiness in this study suggested that snoring-related sleepiness may have an important public impact. This observation suggested that even the mildest form of abnormal sleep-related breathing, that is, snoring without elevated RDI, may cause sleepiness. This finding is consistent with the findings of Young and colleagues [4] that snorers with $RDI < 5$ were substantially more likely to report excessive daytime sleepiness or awakening unrefreshed than were nonsnorers with $RDI < 5$.

This epidemiologic study investigates the prevalence of sleep related complaints clinically suspicious of sleep-disordered breathing (SDB) in individuals living in Bangkok, aged 16 years and older, and identifies important clinical and demographic predictors of these complaints. This study looks primarily at snoring and

METHODS

EDS since there is evidence to suggest that snoring-related sleepiness, whether or not related to SDB, may have an imported impact on public health.

Study Subjects

The National Statistical Office of Thailand (NSOT) selected individuals based on results of the year 2000 census, selected individuals matched for age, gender, education and professional activities (and potential replacements if first choice interviewees were not available) as a representative sample of the Bangkok population, which consists of 5,216,100 individuals aged 16 years and older. The study was performed between May and July 2007.

A stratified three-stage sampling was adopted. The primary and secondary sampling units were enumeration districts and households respectively. The total sample enumeration districts were 312 from 16,717 enumeration districts. Fifteen households from each of the 312 enumeration districts were sampled. The total number of households was 4,680. One individual, aged 16 years or older, was sampled from each household.

Questionnaire

The questionnaire (Sleep Inventory) was composed of questions previously well tested from the Nordic Sleep Questionnaire [32], the Berlin Sleep Questionnaire [33], the Ullanlinna Narcolepsy Scale [34], and the Sleep Disorder Questionnaire [35]. The questions were checked for comprehensibility. The number of questionnaire items was limited a priori during the planning stages, in order to promote accurate and complete collection of information. The inventory collected demographic information (age, gender, professional activities, education level, familial situation, etc.) as well as health information such as illnesses and medication, alcohol and caffeine intake, cigarette smoking, and specific questions on sleep/wake cycles and sleep-related complaints. It was reviewed by sleep specialists as well as by epidemiologists. The questions were piloted and validated among a smaller group of subjects with varied ages and educational levels.

METHODS (continued)

The study protocol was reviewed by the National statistics and epidemiology office of Thailand and the study was performed following the principle enumerated in the Helsinki Declaration of 1975.

Pollsters

Individuals were interviewed in the home by professional pollsters in face-to-face interviews. Pollsters were professionally trained to administer the questionnaire and the response scales utilized (yes/no responses, 5 point Likert scale). They received specific training on how to perform neck, and waist measurements.

All responses were transcribed anonymously on a flow sheet with each subject identified by a number unrelated to any identifier. Only one investigator had access to the initial data, and reviewed transcribed data information for accuracy. All data was collected anonymously on transcribed anonymous information data entry computerized forms.

Statistical Analysis

Analyses were performed using SAS computerized software (version 13). Descriptive statistics were employed to summarize subject characteristics and responses. Comparison between groups was performed using Student's *t* tests (two-sided) for continuous variables and χ^2 tests for discrete variables. A *p*-value < 0.01 was considered statistically significant. Risk factors for sleep-related complaints were analyzed by multiple logistic regression. The adjusted odds ratios (OR) of each significant factor are reported.

RESULTS

Demographics

The total sample population consisted of 4680 subjects. The male-to-female ratio of respondents was 83:100, compared to 88:100 in the Bangkok population. There were no significant differences in age distribution, education, marital status, and employment status between males and females (Table 1).

Table 1: Demographic data of study sample (n = 4680) and Bangkok population of age 16 years and older. (Population data from: Population and Housing Census 2000)

	Study sample	Bangkok population
Total	4680	5,216,100
Gender	% (#)	% (#)
Male	45.3 (2118)	46.9 (2,445,300)
Female	54.7 (2562)	53.1 (2,770, 800)
Sex ratio	83	88
Age	% (#)	%
16-24 yrs	24.4 (1144)	24.35
25-34 yrs	26.4 (1236)	26.47
35-44 yrs	21.2 (994)	21.16
45-54 yrs	14.1 (660)	13.95
55-64 yrs	7.1 (334)	7.52
> 64 yrs	6.7 (312)	6.55
Median age. yrs	34.0	29.7
Marital status	% (#)	%
Single	34.9 (1636)	41.72
Married	57.1 (2669)	51.68
Widowed	4.1 (194)	3.59
Divorced	2.5 (116)	0.89
Separated	1.4 (65)	1.32
Unknown	-	0.44
Monks and unknown status	-	0.37
Education	% (#)	%
No education	2.7 (128)	5.18
Primary education	38.2 (1788)	34.76
Secondary education	36.7 (1719)	35.33
Higher education	22.3 (1045)	22.69
Religion	-	1.62
Unknown	-	0.42
Occupation	% (#)	%
Government officer	3.2 (132)	10.15
Government enterprise	1.2 (51)	4.09
Government / Private employee	41.3 (1695)	2,25 + 51.26 = 53.51

RESULTS (continued)

Employer + Business owner	29.7 (1219)	5.19 + 18.49 = 23.68
House wife or husband	20.7 (851)	-
Others	3.8 (155)	-
Unknown	-	8.57

Prevalence

Among the 4680 subjects, 202 (4.3 %) had SDB. SDB was significantly more common in men (112/2118; 5.3%) compared to women (90/2562; 3.5%). When subjects were divided into age categories of less than or greater than 45 years of age, the prevalence of SDB for men was similar in the younger and older age groups (5.0% vs. 6.1%; ns). However, the prevalence of SDB for women in the younger age group was significantly less than that of the older age group (2.5% vs. 6.1%; $p < 0.01$). Within the younger age group, men were also more likely than women to have SDB (5.0% vs. 2.5%; $p < 0.01$). There was no sex difference in SDB prevalence in the older age group (6.1% vs. 6.1%; ns) (Figure 1). No information on menopausal status was collected in this study.

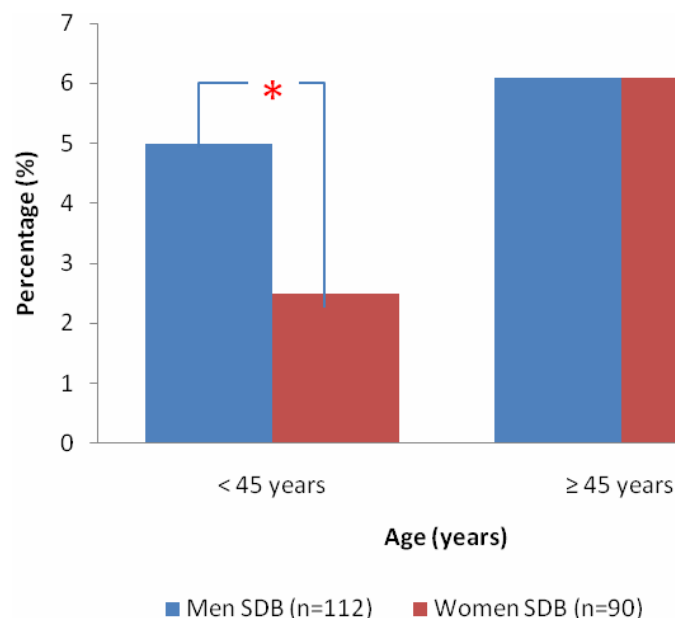


Figure 1: Gender differences in SDB prevalence

RESULTS (continued)

Physical Characteristics

In general, SDB subjects were older and heavier, and had larger neck and waist circumferences (Table 2). These relationships held true for men and women separately, although the mean age difference between men with and without SDB did not differ statistically. Mean age for women with SDB was greater than that of men with SDB, but again this did not reach a statistical difference of $p < 0.01$ ($p = 0.02$).

Table 2: Physical characteristics of men and women with and without SDB.

Characteristics	Male		Female		Total	
	non-SDB (n = 2006)	SDB (n = 112)	non-SDB (n = 2472)	SDB (n = 90)	non-SDB (n = 4478)	SDB (n = 202)
Age , yrs, mean (SD)	36.43 (15.45)	39.12 (15.33)	36.99 (15.06)	44.30 (16.92) *	36.74 (15.24)	41.42 (16.22) *
BMI , kg/m ² , mean (SD)	22.67 (3.85)	25.43 (4.89) *	22.85 (4.49)	26.79 (6.22) *	22.77 (4.22)	26.03 (5.55) *
Neck circumference, cm, mean (SD)	34.06 (3.80)	36.14 (3.97) *	31.24 (3.42)	32.81 (3.61) *	32.50 (3.86)	34.66 (4.15) *
Waist circumference cm, mean (SD)	80.74 (10.79)	88.04 (12.47) *	77.08 (11.28)	87.94 (14.79) *	78.71 (11.21)	88.00 (13.52) *

* p -value < 0.01 for comparison between SDB and non-SDB groups

Multivariate analysis revealed BMI, male gender, and waist size to be significant predictors of SDB (Table 3). The odds of women having SDB were 32% less than that of men, after adjusting for BMI, age, neck and waist size. Furthermore, each centimeter increase in waist size conferred a 3% increase in the adjusted odds of having SDB. Age and neck size, on the other hand, were not found to be significantly associated with SDB in this sample.

RESULTS (continued)

Table 3: Adjusted odds ratio of anthropometric features in surveyed population

	Adjusted OR	95% CI
Age	1.01	0.99, 1.02
Male	1.48 *	1.07, 2.05
BNI	1.08 *	1.03, 1.12
Neck size	1.01	0.96, 1.05
Sleeptalking	1.03 *	1.02, 1.05

* $p < 0.01$ **Sleep Related Complaints**

Subjects complaining of habitual snoring and EDS also complained significantly more of insomnia (6.8% vs. 3.7%, $p < 0.0001$), awakening from sleep (5.0% vs. 3.2%, $p < 0.01$), choking during sleep (13.0% vs. 4.2%, $p < 0.0001$), observed apneas during sleep (15.8% vs. 3.8%, $p < 0.0001$), night sweats (14.4% vs. 4.0%, $p < 0.0001$), nocturia (6.3% vs. 3.6%, $p < 0.0001$), shortness of breath (12.9% vs. 4.2%, $p < 0.0001$), bruxism (8.7% vs. 4.1%, $p < 0.001$), shorter nocturnal sleep time (7.0 hrs vs. 7.67 hrs, $p < 0.0001$), and more unrefreshing sleep (12.7% vs. 2.9%, $p < 0.0001$). Multivariate analysis showed that the complaints of witnessed apneas, unrefreshing sleep and night sweats were significant predictors of habitual snoring and EDS. (Table 4).

RESULTS (continued)

Table 4: Adjusted odds ratio of sleep related complaints for having SDB (total sample).

	Adjusted OR	95% CI
Awakening	0.99	0.68, 1.46
Witnessed apnea	2.95 *	1.90, 4.60
Nocturia	1.33	0.93, 1.90
Shortness of breath	1.67	0.78, 3.58
Nightsweats	2.33 *	1.32, 4.13
Unrefreshing sleep	5.28 *	3.80, 7.33
Bruxism	1.79 *	1.03, 3.09
Sleeptalking	1.10	0.58, 2.06

Odds ratio was adjusted for sex, BMI, age, use of alcohol, and complaints of pain.

* $p < 0.01$

When comparing women and men with snoring and EDS, women did not differ from men in reporting of insomnia, choking at night, night sweats, or bruxism independent of age group. Women did report significantly less alcohol intake (4.4% vs 19.6%, $p < 0.0001$), less observed apneas (7.8% vs 22.3%, $p < 0.0001$), and more nocturia (48.9% vs 32.1%, $p < 0.0001$).

Men and women had unrefreshing sleep in common as a strong predictor of snoring and EDS, with an adjusted odds ratio (OR) of greater than 5. In addition, complaints of nightsweats, bruxisms and witnessed apneas were predictive of snoring and EDS for men. For women, however, none of these were significant complaints (Table 5).

RESULTS (continued)

Table 5: Adjusted odds ratio of sleep related complaints for having SDB in men and women.

	Men		Women	
	Adjusted OR	95% CI	Adjusted OR	95% CI
Insomnia	1.31	0.82, 2.09	1.09	0.66, 1.80
Awakening	1.06	0.64, 1.74	0.95	0.52, 1.73
Witnessed apnea	4.15 *	2.41, 7.14	1.72	0.73, 4.03
Nocturia	1.25	0.75, 2.09	1.48	0.89, 2.46
Shortness of breath	1.24	0.34, 4.44	2.15	0.82, 5.65
Night sweats	2.56 *	1.13, 5.82	1.89	0.83, 4.32
Unrefreshing sleep	5.23 *	3.33, 8.21	5.32 *	3.27, 8.65
Bruxism	2.17 *	1.12, 4.20	1.27	0.46, 3.53
Sleeptalking	0.97	0.43, 2.20	1.51	0.54, 4.23

* $p < 0.01$

Comorbidities

Subjects with snoring and EDS reported greater frequency of cardiovascular disease (11.7% vs 3.8%; $p < 0.0001$) and endocrine disease (10.9% vs 4.1%, $p < 0.0001$), while there were no differences in the occurrence of respiratory, gastrointestinal, renal, neurological, musculoskeletal, and skin diseases. Cardiovascular disease was more prevalent in Thai women than in Thai men (8.0% vs 5.7%, $p < 0.0001$). Multivariate analysis revealed age, sex, BMI, and snoring with EDS were significant predictors of cardiovascular disease, amongst which SDB was most significant with an adjusted odds ratio of 2.3 (95% confidence interval 1.5 to 3.5) (Table 6).

RESULTS (continued)

Table 6: Adjusted odds ratio of cardiovascular diseases in the total sample.

	Adjusted OR	95% CI
Age	1.08 *	1.07, 1.09
Sex: Male	1.40 *	1.09, 1.81
BMI	1.11 *	1.08, 1.14
SDB	2.30 *	1.50, 3.53

* $p < 0.01$

DISCUSSION

This is the first epidemiological study performed on sleep and its disorders in the Thai population. This study demonstrates a high prevalence of sleep-related complaints associated with sleep-disordered breathing, consistent with those reported in many other countries [1-19]. Risk factors and symptomology overlap with those found in Caucasian populations, but important differences were found as well.

According to recent international recommendations [36], normal BMI in East Asians has an upper limit of 23.6 kg/m², and this definition was taken into account when performing data analysis.

Obesity is much less prevalent in the Thai population, yet the prevalence of habitual snoring and EDS were similar to that of the Western population. This may be indicative of differing etiologies in sleep pathology in the Eastern and Western populations. East Asians have a tendency to be more bradycephalic with a shorter anterior cranial fossa that establishes a wider but antero-posteriorly shorter upper and midface region, and a shorter middle cranial fossa which leads to a shorter horizontal pharyngeal dimension compared to Caucasians.[37] Craniofacial anatomy is known to play an important role in the development of SDB [37-41]; as such, we hypothesized that unique craniofacial features might influence the prevalence and risk factors of sleep-disordered breathing complaints in the Asian population.

One should consider that the United States has an obesity epidemic and that such an epidemic is not yet a prominent feature of many East Asian countries. This distinction is very important, as many health issues associated with SDB are also associated independently with obesity. In a population where SDB and obesity are tightly intertwined, health detriments related to an upper airway problem are difficult to isolate. Abdominal obesity induces a restrictive chest breathing problem prominent during sleep and the combination of obesity and obstructive sleep apnea (OSA) lead to what has been labelled “co-morbid-OSA”. In these cases, the combine role of abnormal adipocyte activity, restrictive breathing during sleep and presence of small upper airway is responsible for the clinical presentation and the reported detrimental health associations, and claims that OSA per se is responsible for findings are unjustified. In our study population, however, the obesity epidemic does not play as prominent role and therefore the associations we found at least between complaints

DISCUSSION (continued)

of habitual snoring and EDS are more clearly attributed to possible SDB. While obesity was not as important a player in habitual snoring and EDS, BMI and waist circumference remained important predictors of snoring and EDS even in the Thai population. Therefore, even though obesity may not be as dramatic, weight and weight distribution seems to play a clear role in the pathogenesis of clinically suspicious SDB in our population.

Habitual snoring and EDS are clinically suspicious for sleep-disordered breathing, but are not diagnostic of SDB. It is likely these sleep-related complaints overestimate the true population of SDB in the general population [4, 6]. With this limitation in mind, it is encouraging that we found results similar to some other surveys in which polysomnograms were used to detect SDB including those obtained on the Wisconsin Sleep Cohort over 15 years ago [4].

Our study agrees with previously described gender differences, and finds new differences that are either novel to the Thai population or have yet to be described in other populations. In the Thai population, men are again found to more likely snore and complain of EDS, and women over the age of 45 more likely than younger woman to manifest these symptoms. While we did not have menopause data for our sample, we divided our sample into two groups by the age cut-off of 45 years based on the fact that the median age of menopause in Thai women is 49.5 years [42].

Menopausal status was shown to be less important than other factors such as age and BMI in determining risk for SDB in women in one study [43], while the Wisconsin sleep cohort study [50] found a significant association between menopausal transition and an increased likelihood of having sleep-disordered breathing. The question of direct role of hormonal changes associated with menopause in increase risk for SDB is thus incompletely resolved. The fact that apneas are observed less in women with snoring and EDS may suggest women are more likely to have hypopneas or upper airway resistance than frank apneas, or that their bed partner is less likely to witness or report apneas. The former indicates a physiologic difference between genders, while the latter implicates a cultural difference. Both are important to recognize and address as they impact the diagnosis of SDB in women.

DISCUSSION (continued)

The findings of bruxism greater in men with snoring and EDS is also interesting and novel, and require further investigation. Bruxism has been linked to SDB in the United Kingdom, however, a gender difference in this association has not been described [29]. The fact that women are less likely to demonstrate “classic” symptoms of SDB makes them more likely to escape detection, and therefore more likely to suffer the negative health consequences of untreated SDB.

Therefore, it is imperative these gender differences in sleep complaints be recognized in clinical and epidemiologic studies of SDB. A follow-up study correlating polysomnography results with these complaints would be revealing of further gender differences in sleep-related complaints and their predictive strength for SDB in this unique population.

Of interest is the finding that neck size has no relationship with habitual snoring and EDS in our studied sample. Neck circumference has been repeatedly proven to be a strong predictor of snoring and SDB in the Caucasian population. [2,45] This suggests either an important anatomical difference in the etiology of snoring or a more complicated role of weight gain and fat distribution, or both. The human brain position is responsible for the development of the anterior cranial fossae, and the naso-maxillary complex relates specifically to the anterior cranial fossa. The posterior boundary of the anterior cranial fossa is the exact posterior boundary of the naso-maxillary complex. The size of the middle cranial fossa determines the horizontal dimension of the pharyngeal space. Therefore, the shape of the brain is a key fixture and determinant of the shape of the face.

East Asians have a tendency to be more “bradycephalic” (round brain, large skull and retrusive maxilla) than Caucasians which are more “dolichocephalic” (narrow brain, with flat cranial base, protrusive maxilla) [46]. This gives a shorter anterior cranial fossa that establishes a wider but antero-posteriorly shorter upper and midface region and a shorter middle cranial fossa which gives a shorter horizontal pharyngeal region [19]. Most Thais are related to South of China tribal migrations. Investigation of the prevalence of sleep disordered breathing (SDB) in this population is important as it reveals information on the frequency of this syndrome in an East

DISCUSSION (continued)

Asian group, with its very specific cranial facial development. The anatomical differences may explain why neck circumference, while a powerful predictor of SDB in the Caucasian population, has little value in the pathogenesis of SDB in the Thai population. For these reasons, it is important to elucidate the occurrence of sleep-disordered breathing in this unique population. The first step, as we have done, is to assess the frequency of sleep-related complaints. The next logical step would be to investigate polysomnographic data and correlated it to these subjective findings to investigate whether the symptoms that prompt the Western population to suspect and formally evaluate potential sleep-disordered breathing patients is similarly applicable to the Eastern population.

CONCLUSION

The association between cardiovascular and endocrine disease to snoring and EDS complaints in our population is remarkably consistent with other epidemiologic studies of SDB and these co-morbidities from various populations [47-51]. Unlike Caucasian populations, we found a greater prevalence of cardiovascular disease in the general female population. This is consistent with an epidemiologic study describing greater prevalence of coronary heart disease in Thai women compared to Thai men [52]. This is interesting if we can determine whether SDB, without the confounding issue of obesity, is independently associated with cardiovascular or endocrine disease.

SDB is an important problem in Thailand-an East Asian country, with more risk of having the syndrome conferred by naso-maxillary anatomical features leading to small upper airway compared to Caucasians. Comparison of findings may help piece out the different factors involved in development of the syndrome.

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APPENDIX B

Sample of the questionnaires is as follows (next page).



โครงการวิจัยเรื่อง

ความชุกของการเกิดปัญหาเกี่ยวกับการนอนหลับ
กรุงเทพมหานคร พ.ศ. 2550



1. เขต:	2. แขวง:	AMP TMB <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> 1-4						
3. บ้านเลขที่: ถนน: ตรอก:	5. ลำดับที่ชุมนุมอาคาร:	BLK <table border="1"><tr><td></td><td></td></tr></table> PSU_NO <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> 5-10						
4. Block:	6. ลำดับที่ครัวเรือนส่วนบุคคล:	HH_NO <table border="1"><tr><td></td><td></td></tr></table> 11-12						
7. จำนวนสมาชิกทั้งหมด:คน	8. เป็นสมาชิกลำดับที่:	MEMB <table border="1"><tr><td></td><td></td></tr></table> NO <table border="1"><tr><td></td><td></td></tr></table> 13-16						
9. ลำดับที่แบบสอบถาม:	10. รหัสพนักงานสัมภาษณ์:	Ques-NO Interv-NO <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> 17-20						
แจ้งนับวันที่: ☐ มี.ค. ☐ เม.ย. ☐ พ.ค. ☐ มิ.ย.		ชื่อ-สกุล:(พนักงานแจ้งนับ)						
ตรวจแบบวันที่: ☐ มี.ค. ☐ เม.ย. ☐ พ.ค. ☐ มิ.ย.		ชื่อ-สกุล:(ผู้ตรวจแบบ)						

SQ48-49_174-175

48. คุณเต็มใจที่จะบอกชื่อคุณ หรือไม่ ?	☐ 1. ไม่เต็มใจ																								
49. ในกรณีที่ผู้วิจัยพบหรือสงสัยว่า... คุณอาจมีปัญหาเกี่ยวกับการนอนหลับ คุณอนุญาตให้ผู้วิจัยติดต่อกลับมาได้หรือไม่ ? (เพื่อการซักถามรายละเอียดเพิ่มเติม และ / หรือ เพื่อเรียนเชิญคุณมารับการตรวจวินิจฉัยปัญหาการนอน ที่โรงพยาบาลศิริราช)	☐ 2. เต็มใจ ชื่อ ☐ 1. ไม่อนุญาต ☐ 2. อนุญาต ที่อยู่ <table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> (บ้าน) <table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> (ที่ทำงาน) <table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> (มือถือ) ลายเซ็นต์: ชื่อ-สกุล ผู้ให้ข้อมูล:																								

ผู้รับผิดชอบโครงการ: ดร.ปฐนทริกา สุวรรณประเทศ

สถาบัน: ศูนย์รณรงค์การนอนหลับ คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

เบอร์โทรศัพท์: 02-419-7574

ทุนวิจัย: สำนักงานกองทุนสนับสนุนการวิจัย (สกว.)

ตอนที่ 1: ข้อมูลส่วนบุคคล

1. เพศ	☐ 1. ชาย ☐ 2. หญิง SEX 21
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3. น้ำหนัก	กิโลกรัม WT 24-26
4. ส่วนสูง	เซนติเมตร HT 27-29
5. เส้นรอบคอ	เซนติเมตร NECK 30-32
6. เส้นรอบเอว	เซนติเมตร WAIST 33-35
7. วุฒิการศึกษา	☐ 1. ไม่เคยเรียน ☐ 2. ประถมศึกษา ☐ 3. มัธยมศึกษา ☐ 4. อนุปริญญา ☐ 5. ปริญญาตรี ☐ 6. ปริญญาโท / เอก EDU 36
7. ศาสนา	☐ 1. พุทธ ☐ 2. คริสต์ ☐ 3. อิสลาม ☐ 4. ฮินดู ☐ 5. ขงจื้อ ☐ 6. ไม่มีศาสนา ☐ 7. อื่นๆ (ระบุ) RELIG 37
8. อาชีพ	☐ 1. นักเรียน/นักศึกษา ☐ 2. ข้าราชการ ☐ 3. พนักงานรัฐวิสาหกิจ ☐ 4. ลูกจ้าง/พนักงานบริษัท ☐ 5. ธุรกิจส่วนตัว ☐ 6. พ่อบ้าน/แม่บ้าน ☐ 7. อื่นๆ (ระบุ) CAREER 38
9. สถานภาพ	☐ 1. โสด ☐ 2. โสด และกำลังตั้งครรรภ์ ☐ 3. สมรส ☐ 4. สมรส และกำลังตั้งครรรภ์ ☐ 5. แยกกันอยู่ ☐ 6. แยกกันอยู่ และกำลังตั้งครรรภ์ ☐ 7. ม่าย ☐ 8. ม่าย และกำลังตั้งครรรภ์ ☐ 9. หย่า ☐ 10. หย่า และกำลังตั้งครรรภ์ STATUS 39
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13. ประวัติการดื่มเครื่องดื่มไม่มีแอลกอฮอล์	☐ 1. ชา / กาแฟ แก้ว / วัน ☐ 2. โกโก้ แก้ว / วัน ☐ 3. น้ำอัดลม (เฉพาะโค้ก เป๊ปซี่) แก้ว / วัน NON-ALC 60-63
14. ประวัติการเจ็บป่วย 14.1 โรคระบบหัวใจและหลอดเลือด (ระบุ)..... 14.2 โรคระบบทางเดินหายใจ (ระบุ)' 14.3 โรคระบบทางเดินอาหาร (ระบุ) 14.4 โรคระบบประสาท (ระบุ) 14.5 โรคระบบปัสสาวะ (ระบุ) 14.6 โรคระบบต่อมไร้ท่อ (ระบุ) 14.7 โรคระบบกระดูกและกล้ามเนื้อ (ระบุ) 14.8 โรคระบบผิวหนัง (ระบุ) 14.9 โรคอื่น ๆ (ระบุ)	☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) ☐ 1. ไม่มี ☐ 2. มี ยา (ระบุ) DIS_HIST 64-72
15. ประวัติเกี่ยวกับน้ำหนักตัว 15.1 (ถ้าอายุ < หรือ = 20 ปี) คุณหนักประมาณเท่าไร ? 15.2 (ถ้าอายุระหว่าง 20-30 ปี) คุณหนักประมาณเท่าไร ? 15.3 (ถ้าอายุ > 30 ปี) คุณหนักประมาณเท่าไร ?	ช่วงอายุ 15 ปี กก ช่วงอายุ 15 ปี กก ช่วงอายุ 20 ปี กก ช่วงอายุ 20 ปี กก ช่วงอายุ 30 ปี กก WT_HIST 73-87

ตอนที่ 2: ข้อมูลเกี่ยวกับการนอนหลับของท่าน

1. คุณใช้เวลาโดยประมาณกี่นาทิตนที่นอน กว่า คุณจะหลับ 1.1 ระหว่างสัปดาห์ของการทำงาน 1.2 ระหว่างวันหยุด	ใช้เวลาโดยประมาณ นาที ใช้เวลาโดยประมาณ นาที SQ1_88-91
2. ในแต่ละคืน โดยเฉลี่ยคุณนอนประมาณกี่ชั่วโมง?	ประมาณ ชั่วโมง นาที SQ2_92-95

3. คุณเข้านอนเวลาประมาณกี่นาฬิกา ? 3.1 ระหว่างสัปดาห์ของการทำงาน 3.2 ระหว่างวันหยุด	เวลาประมาณ : นาฬิกา เวลาประมาณ : นาฬิกา
4. คุณตื่นนอนเวลาประมาณกี่นาฬิกา ? 4.1 ระหว่างสัปดาห์ของการทำงาน 4.2 ระหว่างวันหยุด	เวลาประมาณ : นาฬิกา เวลาประมาณ : นาฬิกา

SQ3_96-103

SQ4_104-111

SQ5-9_112-124

ในช่วง 3 เดือนที่ผ่านมา	ไม่มี หรือ นานๆ ครั้ง (น้อยกว่า 1 ครั้งต่อเดือน) (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	3-5 ครั้ง ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
5. คุณไม่สามารถหลับได้ ภายในเวลา 30 นาที หลังจากเอนตัวลงนอน					
6. คุณตื่นขึ้นมาในระหว่างกลางดึกบ่อยแค่ไหน ?					
7. คุณมีอาการ หรือ พฤติกรรมดังต่อไปนี้ บ่อยแค่ไหน ?					
7.1 ตื่นขึ้นมาในตอนกลางคืน หรือเข้ามิด (หรือก่อนเวลา ตื่นปกติ) และไม่สามารถนอนหลับต่อได้อีก					
7.2 ตื่นขึ้นมาในตอนกลางคืน เพื่อเข้าห้องน้ำ					
7.3 หายใจไม่สะดวก					
7.4 ไอ หรือ กรนเสียงดัง					
7.5 รู้สึกหนาวเกินไป					
7.6 รู้สึกร้อนเกินไป					
7.7 ตื่นเพราะฝันร้าย					
7.8 รู้สึกเจ็บปวด					
7.9 สาเหตุอื่น (ระบุ)					
8. ถ้าคุณตื่นขึ้นมาในระหว่างกลางดึก โดยเฉลี่ยใน 1 คืน คุณตื่นกี่ครั้ง ?	ไม่ตื่น (0)	1 ครั้ง (1)	2 ครั้ง (2)	3-4 ครั้ง (3)	อย่างน้อย 5 (4)
9. คุณคิดว่า คุณภาพการนอนของคุณเป็นอย่างไร ?	ดีมาก (0)	ค่อนข้างดี (1)	ธรรมดา (2)	ไม่ค่อยดี (3)	ไม่ดี (4)

SQ10-16_125-131

ในช่วง 3 เดือนที่ผ่านมา	ไม่มี หรือ นานๆ ครั้ง (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	3-5 ครั้ง ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
10. คุณรับประทานยานอนหลับ (แพทย์สั่งให้ หรือ ซื้อเองจากร้านขายยา) หรือไม่ ? ชื่อยา (ระบุ)					

11. คุณรู้สึกง่วงนอน และอยากนอนต่อหลังจากตื่นนอนในตอนเช้าหรือไม่ ?					
12. คุณรู้สึกง่วงนอน ในตอนกลางวันหรือไม่ ?					
13. คุณต้องฝืนหรือต่อต้านความรู้สึกง่วงนอน <u>ในระหว่างการทำงานหรือไม่ ?</u>					
14. คุณต้องฝืนหรือต่อต้านความรู้สึกง่วงนอน <u>ในเวลาว่าง (เวลาพักผ่อน) หรือไม่ ?</u>					
15. คุณรู้สึกขาดแรงจูงใจ ในการทำงานหรือการทำภาระกิจประจำวันหรือไม่ ?					
16. คุณรู้สึกเครียด หรือไม่ ? (เครียด คือ ความรู้สึกที่เคร่งเครียด, ตึงเครียด, หนักใจ, วุ่นวายใจ, วิตก, กังวล ซึ่งอาจทำให้นอนไม่หลับ)					

SQ17-20_132-138

*** (ถ้าคุณไม่แน่ใจ กรุณาถามภรรยา/สามี หรือคนใกล้ชิด)	ไม่เคย หรือ นานๆ ครั้ง (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	3-5 ครั้ง ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
17. คุณนอนกรนหรือไม่ ?					
18. เสียงกรนของคุณเป็นอย่างไร ?	ไม่กรน (0)	เสียงเบา จืดหะ สม่ำเสมอ (1)	เสียงดัง จืดหะ สม่ำเสมอ (2)	เสียงดังมาก จืดหะ สม่ำเสมอ (3)	เสียงดังมาก แต่จืดหะไม่ สม่ำเสมอ (มีการหยุด การหายใจ สลับ เสียงกรน) (4)
19. คุณเคยหยุดหายใจเป็นช่วงๆ ในขณะที่นอนหลับหรือไม่ ? (หรือ คนใกล้ชิดเคยสังเกตว่าท่านเคยหยุดหายใจในขณะที่นอนหลับ)	ไม่มี หรือ นานๆ ครั้ง (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	3-5 ครั้ง ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
20. เป็นเวลาที่ปีที่คุณนอนกรนอย่างน้อย 1-2 ครั้งต่อสัปดาห์ ? 20.1 เป็นเวลานาน 20.2 เริ่มกรนเมื่ออายุ	ประมาณ ปี ประมาณ ปี				

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21. คุณมีความรู้สึกทางสัมผัสแปลกๆ (คล้ายกับมีแมลงไต่) บริเวณแขนหรือขา ในขณะที่นั่งหรือนอนเล่นหรือไม่ ?	☐ 1. มี ☐ 2. ไม่มี
22. คุณมีความรู้สึกหรือความต้องการในการขยับแขนหรือขา บ่อยครั้งในขณะที่นั่งหรือนอนเล่นหรือไม่ ?	☐ 1. มี ☐ 2. ไม่มี

ถ้าตอบ **มี** ในข้อ 21 และ/หรือ 22 ตามคำถามข้อต่อไป

ถ้าตอบ **ไม่มี** ในข้อ 21 และ 22 ข้ามไปถามคำถาม ข้อ 29

23. ความรู้สึกดังกล่าวนในข้อ 21 และ/หรือ 22 มีสาเหตุมาจากการเป็นตะคริว หรือจากการที่กล้ามเนื้อหดเกร็ง หรือไม่ ?	☐ 1. ใช่ ทุกครั้ง (...ให้ข้ามไปถามคำถาม ข้อ 29) ☐ 2. ใช่ บางครั้ง ☐ 3. ไม่ทราบ หรือ ไม่แน่ใจ
24. เมื่อมีอาการดังกล่าวนในข้อ 21 และ/หรือ 22 ถ้าคุณลุกเดิน หรือ ขยับแขนขา จะช่วยให้มีอาการดังกล่าวบรรเทาหรือหายไป ได้หรือไม่ ?	☐ 1. ใช่ ☐ 2. ไม่ใช่
25. ความรู้สึกดังกล่าวนในข้อ 21 และ/หรือ 22 มักจะเกิดขึ้นในช่วงใด ?	☐ 1. ตอนเช้า (7:00–11:00 น.) ☐ 2. ตอนกลางวัน (11:00–14:00 น.) ☐ 3. ตอนบ่าย (14:00–18:00 น.) ☐ 4. ตอนเย็น (18:00–22:00 น.) ☐ 5. ตอนกลางคืน (22:00–7:00 น.)
26. คุณเริ่มมีความรู้สึกดังกล่าวน เมื่ออายุประมาณกี่ปี ?	ประมาณ ปี
27. ในช่วง 12 เดือน ที่ผ่านมา คุณมีความรู้สึกดังกล่าวนบ่อยแค่ไหน ?	☐ 1. ไม่เคย หรือ นานๆ ครั้ง (น้อยกว่า 1 ครั้งต่อเดือน) ☐ 2. น้อยกว่า 1 ครั้งต่อสัปดาห์ ☐ 3. 1-2 ครั้งต่อสัปดาห์ ☐ 4. 3-5 ครั้งต่อสัปดาห์ ☐ 5. ทุกวัน หรือ เกือบทุกวัน
28. ความรู้สึกดังกล่าวนทำให้คุณรู้สึกรำคาญแค่ไหน ?	☐ 1. ไม่รู้สึกรำคาญ ☐ 2. รำคาญเล็กน้อย ☐ 3. รำคาญปานกลาง ☐ 4. รำคาญมาก

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ในระหว่างการนอนหลับ คุณมีพฤติกรรมดังต่อไปนี้หรือไม่ ? ถ้ามี พฤติกรรมดังกล่าวเกิดบ่อยไหน ? *** (ถ้าคุณไม่แน่ใจ กรุณาถามภรรยา /สามี หรือคนใกล้ชิด)	ไม่เคย หรือ นานๆ ครั้ง (น้อยกว่า 1 ครั้งต่อเดือน) (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	3-5 ครั้ง ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
29. กัดฟัน					
30. นอนละเมอ (พูด หรือ เพ้อ)					
31. ละเมอลุกออกจากเตียง					
32. ละเมอทำร้ายตัวเอง หรือ ภรรยา / สามี (เช่น ตะ ต่อย...)					
33. ฝันร้าย					
34. พฤติกรรมอื่น ๆ (ระบุ)					

	ไม่เคย (0)	1-2 วัน ต่อสัปดาห์ (1)	3 วัน ต่อสัปดาห์ (2)	4 วัน ต่อสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
35. คุณงีบหลับในเวลากลางวัน กี่วันต่อสัปดาห์ กรณีที่ที่คุณงีบหลับ โดยเฉลี่ยนานประมาณเท่าไร ? ชั่วโมง นาที					
เมื่อคุณหัวเราะ รู้สึกดีใจ รู้สึกโกรธ หรือรู้สึกตื่นเต้น คุณมีอาการต่างๆ เหล่านี้ (ข้อ 36-39) ตามมาหรือไม่ ? และอาการเหล่านี้เกิดขึ้นบ่อยแค่ไหน ?	ไม่เคย (0)	1 – 5 ครั้ง ตั้งแต่เกิด (1)	ทุกเดือน (2)	ทุกสัปดาห์ (3)	ทุกวัน หรือ เกือบทุกวัน (4)
36. เข้าอ่อน หรือ เข้าตก (ทรงตัวไม่ได้)					
37. อ้าปากค้าง					
38. คอตก					
39. ล้มลงกับพื้น					
คุณมักจะงีบหลับ ในระหว่างการทำกิจกรรมใดบ้าง ? และบ่อยแค่ไหน ? (ข้อ 40-44)	ไม่เคย (0)	น้อยกว่า 1 ครั้ง ต่อสัปดาห์ (1)	1-2 ครั้ง ต่อสัปดาห์ (2)	ทุกวัน หรือ เกือบทุกวัน (3)	ทุกวัน วันละ หลายๆ ครั้ง (4)
40. ขณะอ่านหนังสือ					
41. ระหว่างการเดินทาง (เป็นผู้โดยสาร)					
42. ขณะยืน					
43. ระหว่างการรับประทานอาหาร					
44. ระหว่างทำกิจกรรมอื่น ๆ (ระบุ)					

45. ถ้าคุณมีเวลาไม่จำกัด คุณต้องการเวลาในการนอนกี่ชั่วโมงต่อคืน ?	ประมาณ ชั่วโมง นาที
46. คุณคิดว่า คุณมีปัญหาเกี่ยวกับการนอนหรือไม่ ?	☐ 1. ไม่มี ☐ 2. มี ถ้าคุณคิดว่า คุณมีปัญหาเกี่ยวกับการนอน ปัญหาที่สำคัญของคุณคือ
47. ในกรณีที่คุณมีปัญหาเกี่ยวกับการนอน ปัญหาดังกล่าวส่งผลกระทบต่อการใช้ชีวิตของคุณหรือไม่ ?	
47.1 ขณะพักผ่อน	☐ 1. ไม่ ☐ 2. เล็กน้อย ☐ 3. ปานกลาง ☐ 4. มาก
47.2 ขณะเข้าสังคม	☐ 1. ไม่ ☐ 2. เล็กน้อย ☐ 3. ปานกลาง ☐ 4. มาก
47.3 ขณะทำงาน	☐ 1. ไม่ ☐ 2. เล็กน้อย ☐ 3. ปานกลาง ☐ 4. มาก