CHAPTER 3

METHODOLOGY

This chapter describes the study design, eligibility criteria, sample size estimation and sampling method, instrumentation and instrument quality evaluation. In addition, explanations are provided to describe the steps taken to assure and to protect human rights. Finally, the processes in data collection and statistical analyses of data are presented.

Design of the study

A descriptive cross-sectional study was designed and implemented to assess the potential risk factors for insomnia per specification of the Spielman's model and the prevalence of insomnia among northern Thai people. In addition, the characteristics of insomnia and its perceived impact and representations were evaluated. Finally, the coping procedures with insomnia were assessed in this population.

Population and sample

A sample of the population in northern provinces of Thailand was recruited to participate in the study. The eligibility criteria were: 1) age of 18 years and older, 2) ability to communicate verbally in Thai language and to provide the necessary

information, 3) physical and mental competency, and 4) willingness to participate in the study.

Sample size

The Cochran formula which is based on the simple random assumption was employed to calculate the total number of study participants (Cochran, 1977).

$$n = \frac{z^2 pq}{d^2}$$

Where, z = value that contains the area under the normal curve

p = estimated proportion of an attribute that is presented in the population

q = 1-p

d = desired level of precision

The conventional z value of 1.96 at the 0.05 level of significance and the precision level of 5% were used in this study. The level of precision is the amount of sampling error that can be tolerated but it will still permit for adequate statistical power (Hernon, 1994). Also, the estimated prevalence of the population with insomnia was at 30%, which is based on the previously published data from the adult population, residing in Bangkok (Sukying and Nilchaikovit, 1997). Although the definition of insomnia in the study by Sukying and Nilachaigovit was different from the present study, the application 0.3 prevalence to estimate the sample size was justified because it was the only one study of insomnia conducted in adult population living in the community. The calculation yielded a total of 323 study participants.

An adjustment of the estimated sample size was necessary because of the

multi-stage design of the sampling technique that was used in this study. The multi-stage sampling or clustering reduces the precision of the sample. The loss in precision is due to an increase in the sampling error for a given sample size, meaning that people in the same area tend to be homogeneous with respect to the survey variables (Fowler, 1988). It is recommended that if another sampling method apart from the simple random sampling is used, then a larger sample size should be considered because of the design effect (Lwanga & Lemeshow, 1991). The design effect is the ratio of the sampling variance of the design to the sampling variance of simple random sampling (Henry, 1990). Fowler recommened that the value of design effect is approximately 1.6 for the multi-stage sampling design. Therefore, the calculated sample size for the present study was multiplied by 1.6, which yielded total 516 subjects.

The calculated sample size was inflated by 10% to adjust for potential missing or incomplete data. Thus, a total sample was 573 individuals. After calculated the number of study participants per village and the number had to be rounded up which increased the final sample size to total 602 subjects.

Sampling

The multi-stage sampling with probabilities proportionate to the size (PPS) was used in this study. Due to variations in the size of the population in each province, district, sub-district, and village, a relative large sampling variance is predicted if the units are to be selected at random. It is desirable to recruit approximately equal samples from each unit, except the largest one. The sampling

with probabilities proportionate to the size method leads to a self-weighing sample in that all respondents have the equal probability of selection. Therefore, the selection of unit must take into account for differences in sizes (Sudman, 1976).

The following procedures were taken to select the units:

1. Classification of the northern provinces into four groups according to the Office of the National Economic and Social Development (1997).

Group 1: Chiang Mai, Lamphun, Lampang, Mae Hong Son

Group 2: Chiang Rai, Phrae, Nan, Phayao, Uttaradit

Group 3: Nakhon Sawan, Tak, Uthai Thani, Kamphaeng Phet

Group 4: Phitsanulok, Sukhothai, Phichit, Phetchabun

2. Selection of one province per group using the simple random sampling technique.

Group1: Chiang Mai

Group 2: Nan

Group 3: Kamphaeng Phet

Group 4: Phitsanulok

3. Selection of districts in each province using PPS method.

Before utilizing the PPS method to select districts, it should be considered that the largest district in each province is Muang district and it had to be certainly selected, thus it did not include in the list. Muang district was called a certainty sampling unit while other districts were called uncertainly sampling units. Because of accessibility limitations, some of districts were excluded.

The PPS method was implemented following these steps:

3.1 Random ordering of districts within each province.

3.2 Cumulative summation of the size measures or the population in each district.

3.3 Calculation of the sampling interval(s).

The sampling interval (s) was determined by dividing the total sum of the sample size by the number of districts to be surveyed. A ratio of one to four was employed to determine the number of districts in each province. Six districts were selected for Chiang Mai province and three districts for other provinces.

3.4 Selection of a random number (r) starting between 1 and s.

The subsequent numbers were found using the algorithm of r, r+s, r+2s, r+3s.....

3.5 Selection of a district based on the assignment number.

A district was chosen if the selected number fail into its sequence of the random numbers that were selected as described in step 3.4 until the total number of districts were met.

4. Selection of sub-districts.

Two sub-districts in each district were selected except in Muang area of Nan province because the total sample sizes for Muang district was very small. Therefore, only one sub-district was selected. Selection of the sub-districts followed the same procedure for selection of districts (PPS method).

5. Selection of villages.

Two villages per sub-districts were selected. Selection of the villages followed the same procedure for selection districts and sub-districts (PPS method).

6. Development of sampling frame.

A sampling frame was needed before selecting households in each village.

The sampling frame constituted a list of the total households in villages to be surveyed. Such lists were available from the health centers located in the villages. In case of unavailability of such list, the list of voters was used.

7. Selection of households using the systematic sampling.

Systematic sampling was used to select households. The following formula was used to calculate the expected households per village. Moreover, within each village, five additional households were selected as potential substitutes.

$$\textit{Expected households (cases) per village} = \frac{n}{m1m2m3}$$

Where, n = desired total sample size

$m1$ = desired number of districts

$m2$ = desired number of sub-districts

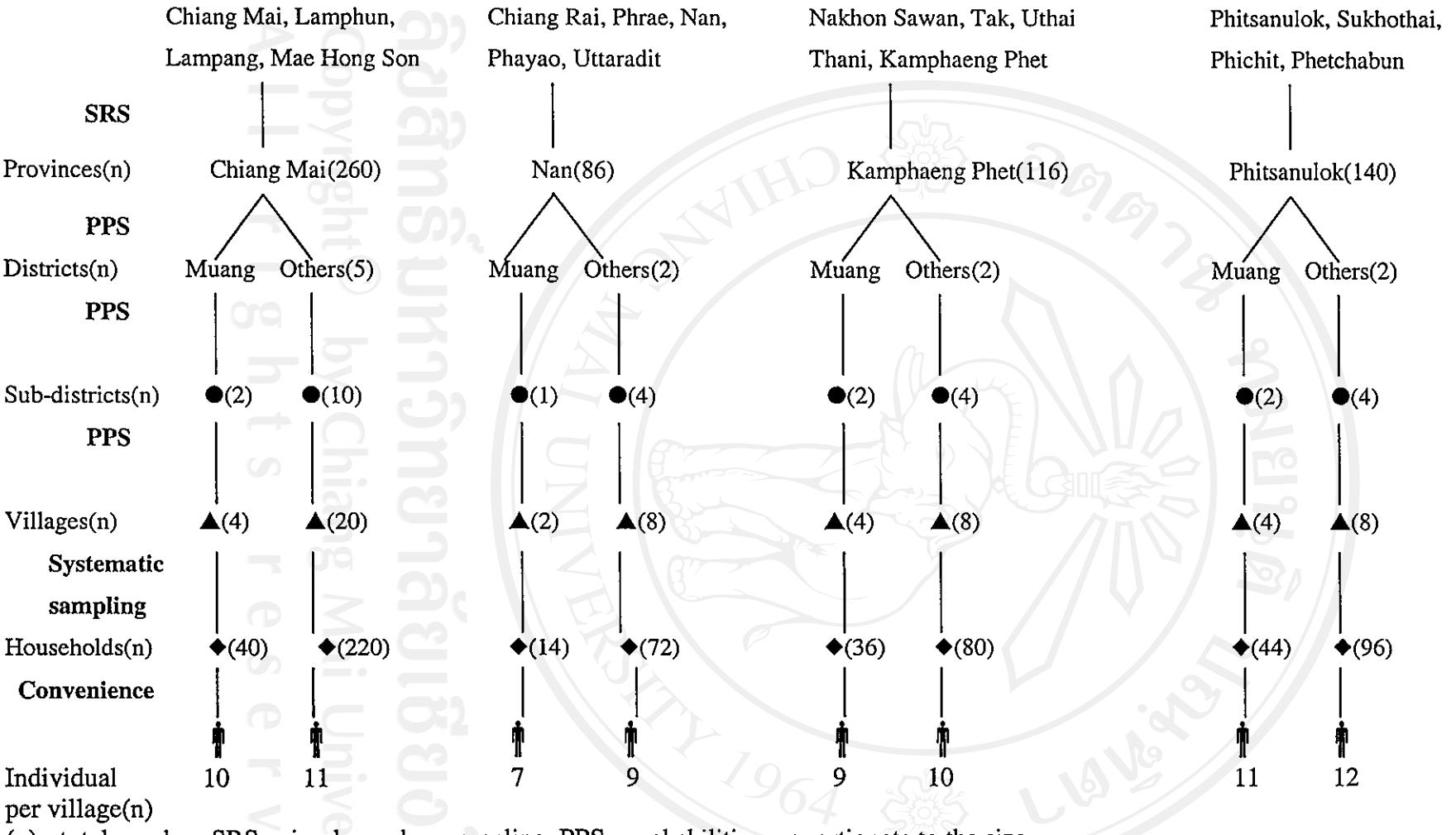
$m3$ = desired number of villages

After calculation, the total number of respondents per village was estimated between 7 and 12 individuals.

8. Selection of study participants.

The convenience sampling method was applied for selection of study participants from each household. One participant was selected per household. If no one was at home at the time of contact or the potential respondent was ineligible, then substitute households were contacted.

The sampling technique is summarized in Figure 2.



(n)= total number, SRS= simple random sampling, PPS= probabilities proportionate to the size

Figure 2. Sampling Technique of the Study

Instrumentation

Seven questionnaires were used in this study. Three questionnaires were developed by the researcher whereas four existing instruments were also used. The details of each instrument are as follows.

The Demographic Data Recording Form. This instrument was developed for the study to collect data on personal characteristics, including age, gender, educational level, marital status, occupation, household income per month, and perceived income adequacy. This form also included self-reported of the presence of physical health problems. The data were used to describe the sample and served as the potential risk factors for insomnia. The copy of the questionnaire is provided in Appendix A.

The Insomnia and Risk Factors Questionnaire. This questionnaire was developed by the researcher based on the literature review. It aimed at measuring the occurrence of insomnia and its potential risk factors. The instruments comprised of the questions regarding insomnia symptoms and daytime impairments within the past one month. It also included risk factors for insomnia, maladaptive sleep habits and sleep environments. The questionnaire was structured so that the respondents could report on the following symptoms: difficulty initiating sleep, difficulty maintaining sleep, early morning awakening, and non-restorative sleep. Severity of symptoms was ranked on a 4-point scale, ranging from never to at least three nights per week. The instrument was structured such that if one of the symptoms of insomnia to be checked, then the duration of the symptoms either in month or in year also had to be indicated.

The instrument contained a section about daytime impairments, which was attributed to insomnia such as fatigue, daytime sleepiness, and an unrefreshed feeling. The other sections were maladaptive sleep habits and sleep environments. Maladaptive sleep habits were measured on a 4-point scale ranging from never to always. For the variable, "daytime napping", questions about time and duration of napping were also listed. For "sleep environments", the responses to these questions ranked from not-at-all to all-the-time. A copy of the instrument is provided in Appendix B.

The Thai Hospital Anxiety and Depression Scale (HADS). The HADS, originally developed by Zigmond and Snaith (1983), is a self-reported mood scale designed for use in non-psychiatric units. It focuses on measuring the most common mood disorders such as depression and anxiety. The HADS is a brief questionnaire containing 14 items with a 4-point likert scale relating to the frequency of symptoms such as from "not at all" to "very often" or from "hardly at all" to "definitely as much".

Items numbered 1, 3, 5, 7, 9, 11 and 13 measure the anxiety level, while even numbers (2, 4, 6, 8, 10, 12, 14) measure depression. The HADS is evaluated by summing the ratings for the 14 items. Anxiety and depression can separately be assessed by summing the rating for the seven items of each subscale. For items 1, 3, 5, 8, 9, 10, 11, and 13, the response of "not at all" is scored as zero while "very often or all the time" is scored as three. The remaining items, the score of zero is for "very often" while the score of three is for "not at all". Therefore, the total score of each subscale is 21. The score of seven or lower is classified a person with no anxiety and

depression, while scores of 8-10 suggest potential cases of anxiety and depression and finally score of 11 or more are definite cases.

The HADS was translated into Thai by Nilchaikovit et al. (1996). The validity and reliability of the Thai version of HADS was tested. A total of 60 cancer patients participated in the pilot project. Responses from the Thai HADS were evaluated against the semi-structured clinical review, which was considered as the gold standard. The results demonstrated that the Thai version HADS had a good validity and reliability for both anxiety and depression subscales. Factor analysis and principal components were used to test the construct validity of the Thai version of HADS. The factor analysis revealed that there were two factors that included most of the items about anxiety and depression sub-scales. The internal consistency for both of the sub-scales reported by Cronbach's coefficients alpha was 0.86 for anxiety and 0.83 for depression subscales. It was concluded that this instrument was a reliable and valid instrument for the screening of anxiety and depression. Use of this instrument for other conditions and other settings has been recommended. A copy of the instrument is provided in Appendix C.

The Stressful Life Events Checklists. This instrument was modified from the Life Experiences Survey (LES) developed by Sarason et al. (1978). The LES items were based on an existing life stress instrument, especially Social Readjustment Rating Scale by Holmes and Rahe (1967) but some items were made more specific. The LES is a self-reported questionnaire, containing 57 items about life events with having a probability for occurrence within a one period in the life of the general public. It also contains a list of 10 items that targets events pertaining to students.

Respondents were asked to indicate the events that they had experienced within the past year (0-6 months or 7-12 months) and whether they viewed the events as negative or positive. They were asked to rank the relative impact of these events on a 7-point scale ranging from extremely negative (-3) to extremely positive (+3). Positive and negative scores were derived by summing the reported ratings for the events. Summing the negative and positive scores yielded the total score for the change in life post the event.

The quality of this instrument was documented. Test-retest reliability was conducted. The calculated Pearson's product moment coefficients for the positive score were 0.53, for the negative score was 0.88, and 0.64 for the total score, respectively (Sarason et al., 1978). The authors claimed that the LES was a moderately reliable instrument. They also suggested that underestimated of test-retest reliability was possible due to the longer time interval of five to six weeks in that subjects may experience a variety of events.

The Stressful Life Events Checklists, a modified version of LES, was developed after obtaining permission from the developers of the instrument. In the modified version, the events that were related to symptoms such as changing of sleep habits and eating habits were excluded. The items pertaining to changes of church activities, type and amount of recreations were also excluded. Finally, the three items relating to financial status were collapsed in to one. The time duration of events was limited to the past six months. The range of responses was decreased to a 3-point from the 7-point scale because this reduction made the choices of responses easier for the potential respondents.

The instrument first questioned about the occurrence of an event during the past six months. If a respondent provided an answer that the events occurred, then he/she was required to provide the perceive impact of the event on a 3-point likert scale, ranging from a positive impact, no impact, to a negative impact. The score for no impact is scaled at 1, for positive impact at 2, and 3 for the negative impact. Thus, a high score indicates a greater perceived impact of stressful life events. A copy of the instrument is provided in Appendix D.

Dysfunctional Beliefs and Attitudes about Sleep Scale-10 version (DBAS-10 version). The DBAS-10 version was developed by Espie et al. (2000). It is a brief version of the full DBAS, which was developed by Morin (1993). This instrument is used to measure dysfunctional beliefs and attitudes about sleep. It consists of items related to beliefs about the immediate negative consequences of insomnia (items 1, 2, 6, 7, and 9), beliefs about long term negative consequences of insomnia (items 3, 5, and 8), and beliefs about the need for control over insomnia (items 4 and 10).

The brief version contains 10 items, which evaluates the significant post cognitive behavioral treatment and follow up changes relative to the baseline. Such items are recognized as valid because they represented a durable, treatment-related shift in attitudes and beliefs. Questions are responded by marking on horizontal line ranging from "strongly agree" to "strongly disagree". For the purpose of the present study, numeric values ranging from 0 to 10 were listed so that it would be easier for the potential respondents. The sum scores of all 10 items were used. The higher score indicates the more dysfunctional of beliefs and attitudes about sleep.

The quality of the instrument was reported. The internal consistency of the total items was reported by Cronbach alpha coefficient as 0.69. Moreover, the DABS-10 total score demonstrated a high correlation (r =0.826) with the original DBAS total scores (Espie et al., 2000). In another study, Edinger and Wohlgemuth (2001) found that the analysis produced three factors and the internal consistency of the total score was acceptable (Cronbach alpha = 0.70). A copy of the questionnaire is provided in Appendix E.

The Insomnia Representations Questionnaire. This instrument was a modified from the Revised Illness Perception Questionnaire (IPQ-R), developed by Moss-Morris et al. (2002). This instrument measures the cognitive and emotional representations of illness based on the common sense model of illness that was introduced by Leventhal and colleagues. The IPQ-R is composed of six attributes of cognitive and one emotional representation. The attributes of cognitive representation are identity (label or symptoms related to illness), timeline of acute/chronic and cyclical episodes (time frame of illness), causes (the etiology of illness) that was classified into psychological cause, risk factors, and immunity, consequences (the impact of illness), controllability (whether illness can be cured or controlled) that divided into personal control and treatment control, and illness coherence (understanding of the illnesses). It is noted that illness coherence is not mentioned in the common sense model. The illness coherence dimension is developed by the investigator in the revised version of IPQ to represent an overriding dimension of how much people understand or comprehend their illness.

Moss-Morris et al. (2002) reported about instrument quality and validity. The IPQ-R was administered to a sample of 711 patients who experienced different illnesses grouped into eight categories. The principal component was conducted and the results provided the confirmation of the theoretically derived factors. The internal consistency was reported with Cronbach alpha for each of subscales, 0.79 for the timeline cyclical, 0.89 for timeline acute or chronic, 0.80 for treatment control, 0.81 for personal control, 0.84 for consequences, 0.87 for illness coherence, and 0.88 for emotional representations. For causal dimension, the Cronbach alpha was reported as 0.86 for psychological cause, 0.77 for risk factors, and 0.67 for immunity. The authors concluded that the IPQ-R demonstrated sound validity and reliability.

In the present study, a modified form of IPQ-R was developed after the permission of the developers. First, the term "illness" was replaced by "insomnia". Second, the illness coherence dimension was excluded because of its relative irrelevancy to the objectives of this study. Third, the identity included symptoms, which were particularly salient for insomnia. Forth, the items were added into the consequence attribute section. A total of 10 items classified the consequences of insomnia into four domains: physical and emotional, working, economic, and social. This attribute was also used to measure the perceived impact of insomnia. The acute or chronic timeline attribute was composed of five items. Translation of the instrument in to the Thai language revealed that there was redundancy of two items and therefore, only one item was maintained. Three items were remained in the timeline cyclical dimension. One item was excluded because of its redundancy in meaning. The personal and treatment control attributes were combined into one dimension called cure or control of insomnia, which consisted nine items. This

approach was justified since medical care for insomnia is rarely sought by Thai insomniacs. The emotional representation was composed of five items. One was excluded because of redundancy. The total number of items of these attributes was 33 items.

The casual dimension was modified in order to be relevant to the context of causes of insomnia. These causes were divided into five categories: psychological, physiological, and environmental factors, substances, and own behaviors. The total items were nine items.

For the identity dimension, respondents were asked to provide answers about experiencing symptoms by choosing "yes" or "no" and then respond if they believed the symptoms to be specifically related to their insomnia using the same format. The sum of the yes-related items on the second rating constituted the illness identity score. Other dimensions, items were coded; one for strongly disagree to five for strongly agree except appropriate items that needed to reverse the score. In general, the higher scores represent the stronger beliefs in that dimension. Therefore, higher scores on identity, consequences, and timeline reflect the more negative beliefs about the number of symptoms related to insomnia, the severity of the consequences of insomnia, and the chronicity of insomnia. Higher scores for control dimension reflect the more positive beliefs about the ability to control insomnia. Higher scores of emotional representations indicated a stronger negative emotional response to insomnia. A copy of the instrument is provided in Appendix F.

The Coping Procedures of Insomnia Questionnaire. This questionnaire developed by the researcher based on the existing literature. It aimed at measuring

the procedures that Thai insomniacs used to manage their symptoms of insomnia. The questionnaire consisted of a list of procedures used to cope with insomnia from simple to complex behaviors. These procedures were classified into eight categories, physical management, relaxation, home remedies, use of drugs and other substances, try hard, environmental management, changing behaviors, and consulting with health care professionals. Respondents were asked to answer if any of the listed procedures had been used for coping with insomnia. Answers were provided by checking "yes" or "no". The copy of the instrument is provided in Appendix G.

Quality of the instruments

Translation process. The three instruments, the Life Experiences Survey, the Dysfunctional Beliefs and Attitudes about Sleep, and the Revised Illness Perception Questionnaire were originally developed in English. These instruments had to be translated into Thai language in order to be implemented in the field. The process of translation from English to Thai was employed following back translation method by Brislin (1970). The instruments were translated into the Thai language by the researcher. Then the instruments were translated back into the English language by two independent individuals with competency in Thai and English languages. The items with obvious discrepancies between the two languages were then evaluated and proper semantic adjustments were made. The process was repeated until the researcher and the two translators were in full agreement.

Validity assessment. The content validity index of new instruments and the modified instrument was evaluated. The Insomnia and Risk Factors Questionnaire, the Thai version of Stressful Life Events Checklists, the Thai version of Dysfunctional Beliefs and Attitudes about Sleep Scale 10 version, and the Coping Procedures of Insomnia Questionnaire were validated by two psychiatrists with expertise in the field of sleep, two nursing instructors whose research activities focuses on sleep and one expert in the filed of survey development. The Thai version of Insomnia Representations Questionnaire contents were validated against the comments of one general psychiatrist, two psychiatrists with expertise in the field of sleep and two nursing instructors.

Experts rated each item for its relevancy in representing the topic of interest on a 4-point scale, with 1 indicating not relevant, 2 somewhat relevant, 3 quite relevant and 4 highly relevant. They also provided comments and suggestions about the items and potential alternatives. All questionnaires were also reviewed for face validity, clarity of meaning, the format of the questionnaire, and the readily understandable terms by the panel of experts. The instrument's content validity index was calculated by dividing the total number of items that were ranked 3 or 4 by both raters and then divided by the total number of items. The value as 0.8 generally is considered as acceptable for content validity for a new instrument (Davis, 1992).

Next, the interrater agreement was calculated; the total questions rated as either 1 or 2 by both raters and questions rated as 3 or 4 were added and then divided by the total number of items. The value of interrater agreement greater than 0.7 is generally considered as acceptable (Davis, 1992).

In this study, the content validity index and the interrater agreements for the four questionnaires were calculated. The values for content validity index ranged from 0.85 for Insomnia and Risk Factors Questionnaire to the high of 1.00 for Coping Procedures of Insomnia Questionnaire. The interrater agreements ranged from 0.87 to the high of 1.00. The steps involved in calculations and the calculated values for content validity and interrater agreements are presented in Appendices K, L, M and N.

Reliability assessment. A pilot study was conducted to assess the reliability of the instruments. A total of 30 individuals age 18 years and older residing in urban and rural settings of Chiang Mai province participated in the study. The study participants completed each instrument and provided comments about the clarity of the items, time commitment for completion of each questionnaire and flagged the ambiguous questions. The internal consistencies for the instruments were calculated using the Cronbach alpha statistics. The reported Cronbach alpha values for the characteristics of insomnia part and daytime impairment part of Insomnia and Risk Factors Questionnaire were 0.83 and 0.84, respectively. For DBAS-10 version, the Cronbach alpha was reported as 0.74. The Cronbach alpha values for the anxiety subscale and depression subscale of the Thai version of HADS were obtained as 0.84 and 0.72, respectively. The coefficient values for internal consistencies for each attribute of insomnia representations were presented, 0.85 for identity, 0.80 for acute/chronic timeline, 0.72 for cure/control, 0.89 for consequences, 0.71 for cyclical timeline, and 0.92 for emotional representations. For causal attributes, the coefficient value for the internal consistency of psychological causes has been reported as 0.71 and for the substance subscale of causal dimension as 0.79. The other three subscales

had one or two items; consequently, the Cronbach alpha was not computed.

The maladaptive sleep habits part of the Insomnia and Risk Factors Questionnaire, the Stressful Life Events Checklists, and the Coping Procedures of Insomnia Questionnaire were assessed by using two-week test-retest reliability. The calculated reliability coefficient was 0.71, 0.91, and 0.82, respectively.

Human rights protection

This study was approved by the Research Ethical Committee of the Faculty of Nursing, Chiang Mai University. A permission letters asking approval for data collection in the village was sent to each Head of the Provincial Public Health Office and the Mayor of Muang district of each province. The study was implemented after obtaining approvals and permission.

The researcher informed the prospective subjects about the purposes, significance of the study, method of data collection, and the time of data collection. The prospective subjects were asked to participate in the study and also were informed that participation in the study was on a voluntary basis. They could refuse to participate or withdraw from the study at anytime without being penalized or losing any benefit to themselves and their families. Each prospective subject who agreed to participate in the study was asked to sign a consent form (Appendix H). The researcher assured of confidentiality and that no identity would be revealed in research reports and scientific publications.

Data collection

Research assistant preparation

This study was implemented in four provinces in the northern region of Thailand. Research assistants from each province were trained. The total number of research assistants was nine persons. Six research assistants were nurses who had master's degree in nursing and had experiences conducting research for their master thesis. One research assistant was a master's student in nursing, one was a nurse who had a baccalaureate degree in nursing and had an experience of conducting research, and another was a nurse who had master's degree in health promotion.

The researcher formally trained the research assistants. The information regarding the objectives of study, the inclusion criteria of the potential respondent, the information of questionnaire, and the informed consent were provided and discussed. During the training sessions, questions and concerns from the research assistants were clarified.

The percentage of agreement was conducted between the researcher and the research assistants. Ten respondents who had the same characteristics as the potential respondents were interviewed and both the researcher and the research assistants marked in the questionnaires at the same time. For Nan and Phitsanulok provinces, the percentages of agreements between the researcher and the research assistants were 1.00. For Chiang Mai and Kamphaeng Phet provinces, the percentages of agreements were 0.97 and 0.95, respectively. The percentages of agreements did not reach 1.00 because the researcher assistants may not familiar with the questionnaire. Therefore,

the researcher discussed and gave further explanations for clarification of items with disagreements in answers.

Data collection procedure

1. Obtaining the permission.

The researcher submitted a letter asking for permission to collect data in the villages to the Heads of the Provincial Public Health Office of each selected province. A letter asking for permission to collect data in the municipal area was sent to the Mayor of selected Muang districts in each province.

2. Recruiting volunteers.

After getting permissions, the researcher contacted the head of the health centers of each village, made appointment, and asked for help to recruit volunteers. The volunteers assisted with accompanying the researcher to different household in their villages.

3. Contacting the potential study participants.

Only one member of the household was invited to participate in the study. If the prospective participant did not meet the eligibility criteria or was absent at the time that the researcher made the visit, then a substitute was invited to participate.

4. Obtaining informed consent.

After a brief introduction, the researcher clearly explained the objectives of the study. The researcher invited the respondent to participate in the study and informed them that they could withdraw from the study at anytime without any effect to themselves and their families. Individuals who verbally agreed to participate were

requested to sign an informed consent form.

5. Completion of the questionnaires.

Study participants were given verbal instructions on how to complete each survey instrument. Individuals who were classified as insomniacs were then asked to complete the Insomnia Representations Questionnaire and Coping Procedures of Insomnia Questionnaire. For individuals with limited literacy or comprehension, the researcher or research assistants orally administered the questionnaires and let the study participant chose answers by themselves without any additional clarifications.

6. Evaluation of questionnaires for completion.

After completion of each questionnaire, either the researcher or research assistants reviewed each questionnaire for completion.

Data analysis

Data were coded and entered to the statistical package for analysis. Descriptive statistics were used to check and clean data. The statistics used in this study included as discussed below:

1. Assessment of the distribution of demographic variables.

Frequency, percentage, mean and standard deviation of each demographic characteristic were conducted to assess the distribution of these variables among the respondents.

2. Assessment of the prevalence of insomnia.

The prevalence of insomnia was determined by the number of cases (subjects who meet the operational criteria of insomnia in this study) divided by the total

number of subjects in the study and then multiplied by 100.

3. Assessment of the association between the potential risk factors for insomnia and insomnia.

3.1 Univariate logistic regression was conducted to identify the association between each risk factor and insomnia independently from other risk factors. The level of significance was established at the standard level of 95% confidence intervals and p-value and odds ratios were also obtained. An odds ratio (OR) is defined as the probability of occurrence over the probability of nonoccurrence. It determines how much more likely or unlikely it is for the outcome to be presented in a given condition (Munro, 2001).

3.2 Multiple logistic regression was conducted to evaluate the impact of each potential risk factor in presence of all potential risk factors to the outcome/insomnia. The p-value was set as .05 and the confidence intervals surrounding OR was reported.

Before performing the univariate analysis, the question of the appropriate categories for continuous variables was addressed. The continuous variables in this study were age, DBAS and stressful life events. The assumption of linearity in the logit was evaluated for these variables (Hosmer & Lemeshow, 1989). The procedure began with categorizing age, DBAS and stressful life events into tertiles. Next, the univariate was performed to explore the odds ratios trend for each variable. If the odds ratios demonstrated a gradual ascending or descending trend, then the linearity assumption was accepted (Appendix Q). The results showed a linear trend for all variables. Although, these variables could have been included in the model as continuous variables, they were categorized for the sake of more meaningful interpretation of the results. The variable age was categorized following

developmental stage whereas DBAS and stressful life events were dichotomized into high and low scores at the median value.

Another important consideration was the assessment of effect modification of the variable age. It was suspected that the age modified the relative influence of the potential risk factors for insomnia, particularly for the two age groups, adults and the elderly. The univariate logistic regression was conducted to explore whether or not age was an effect modifier. The risk factors and the odds ratio for each variable was compared for the two groups of adults and the elderly. The differences between risk factors for insomnia between two groups suggested that age was not an effect modifier. Importantly, the magnitudes and directions of odds ratios for each risk factor in the two groups were identical (Appendix R). Only anxiety and depression revealed differences in odds ratios between two groups. Further explanation is provided in the section discussion. In conclusion, it was found that age was not an effect modifier in this study; consequently, the analysis was performed for the total age group.

The univariate logistic regression was performed to examine the association between insomnia and independent variables. The variables were categorized into predisposing, precipitating, and perpetuating factors. Predisposing factors were composed of demographic characteristics. Precipitating factors consisted of physical health problems, anxiety, depression, sleep environments, and stressful life events. Perpetuating factors comprised of maladaptive sleep habits and DBAS. Furthermore, the univariate analysis was aimed to identify the variables before developing the multivariate logistic regression.

Variables in each factor were categorized as follows. For demographic

characteristics, age was categorized following developmental stage into four group, early adulthood, middle adulthood, late adulthood, and older adulthood. Occupation was classified into following categories, employed, unemployed and student. House wives and retired were grouped into unemployed and students were categorized as students. Monthly income was dichotomized into "poor" and "not-poor", using the poverty line as the threshold. According to the Thailand Development Research Institute (1999), the poverty line for northern Thais is 831.05 Baht per month per person. In this study, household income and family size were taken into the consideration for dichotomization of income level. The average family size per household in northern region is 3.5 persons (Chiang Mai Provincial Statistical Office, 2000). Therefore, approximately monthly income per household is 2,908 Baht per month. In this study, the threshold for being categorized into the "poor" group was set at 3,000 Baht per month.

As for precipitating factors, the variable "anxiety and depression" were dichotomized at score value of 8. Study participants with score value of less than 8 were grouped in the "normal or no anxiety/depression group", while individuals with score value of $\geq$ 8 were classified as "having anxiety/depression". For sleep environments, responses of "disturb sometimes" or "disturb all time" were classified as "disturb" while other answers were as "not disturb". Stressful life events were dichotomized at the median value. The scores above the median value were classified as "high" and scores less than or equal median were classified as "low".

With regards to perpetuating factors, maladaptive sleep habits were dichotomized for the purpose of statistical analyses. Responses of "never" or "rarely" were classified as "no", while answers "sometimes" or "always" were classified as

"yes". For DBAS, it was dichotomized at the median value. The scores above the median value were classified as "high" and scores less than or equal median were classified as "low".

4. Assessment of perceived impact of insomnia and representations of insomnia.

Descriptive statistics were used to describe perceived impact of insomnia and the representations of insomnia.

5. Assessment of coping procedures of insomnia.

The frequency and percentage statistics were used to describe coping procedures of insomnia.