CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

This research was a cross-sectional analytical study, which studied socio-demographic characteristics, pesticide use behaviors, self-protection behaviors, and their relationship to pesticide-related symptoms in rice farmers.

3.2 Study Population and Sample

The target population of this research was all rice farmers who lived in Kongkrailat district, Sukhothai province.

3.3 Sampling technique and sample selection

The selection criteria were rice farmers who were at least 15 years old. Multi-stage random sampling was implemented for selecting subjects, as described below.

Stage1: Sampling of the sub-districts (Tambon)

There are 11 sub-districts in Kongkrailat District. Sampling sub-district used five sub-districts. They were randomly selected from 11 sub districts.

Stage 2: Sampling of the Villages (Moo Ban)

The simple random sampling of villages was drawn from the number of villages in sub-district sample. A total of 15 villages was selected from 5 sub-districts (from overall total of 62 villages).

Stage 3: sampling of the Households

The random sampling of households was drawn from administrative/census lists from each of the 15 villages. A total of 420 subjects was selected, one subject per household (see sample size calculations in section 3.4. In each village, the researcher selected a number of households that was proportional to the total number of households in that village, divided by the total number of households (1,554 households) in all 15 selected villages. Samples were selected 27.06% of households in each village. The sampling stages are shown in figure 2.

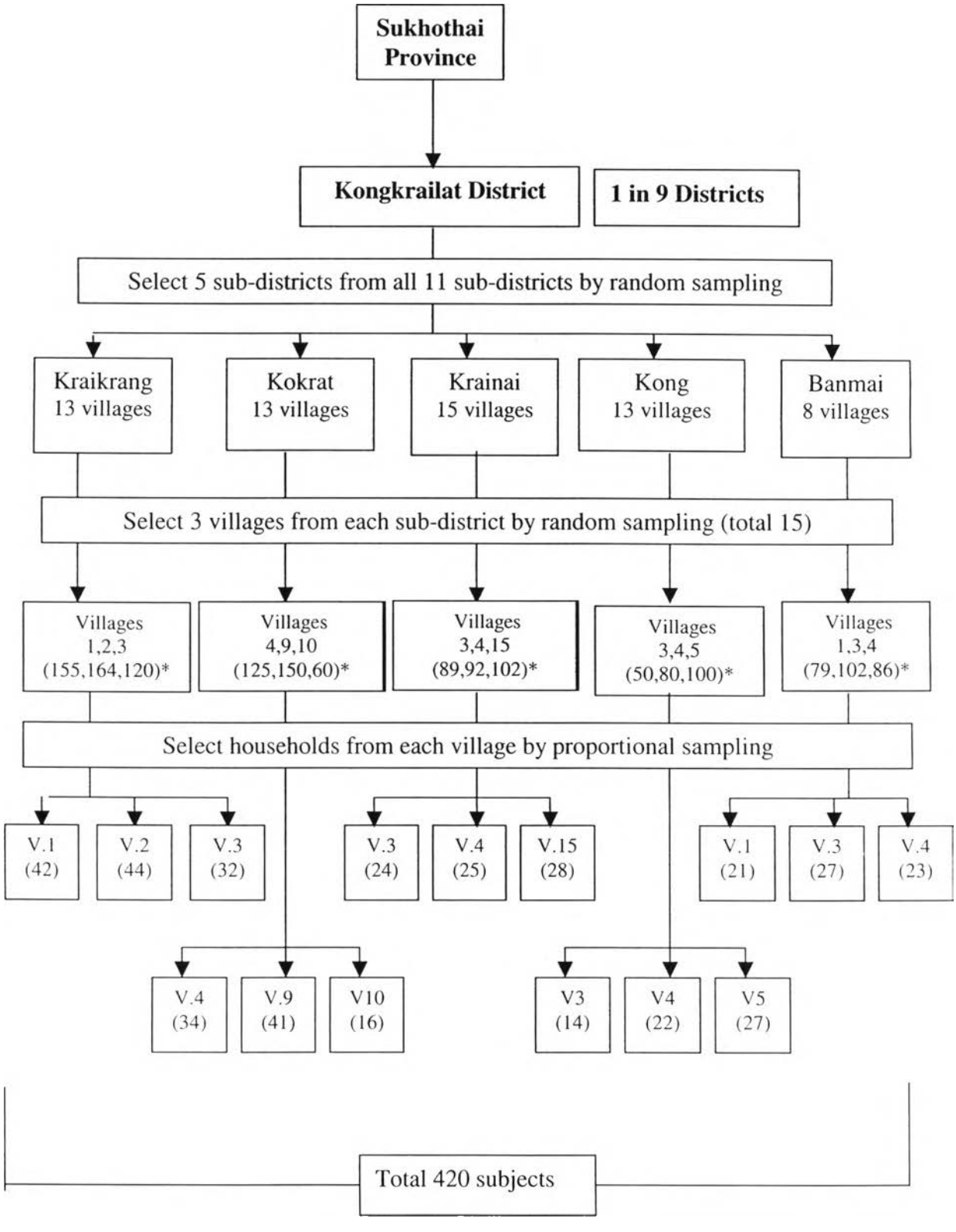

Figure 2. Diagram of sampling technique. (*Total numbers of households in selected villages are given in parentheses.)

3.4 The sample size calculation

3.4.1 Sources of background data for calculation of sample size

Previous studies were used to provide a basis for sample size calculation for this study. I summarized reported rates of illness and symptoms, in relation to different exposure levels, as observed in these studies. Then calculated sample sizes that were necessary to detect the observed differences, at alpha = 0.05 and power=.80, using Epi Info, Statcalc. Specific sources of background data were tables 10, 11, 12, and 13 in Sorat Warisara. 2004 (338 subjects), and tables 9 and 10 in Yassin et al., 2002, (185 subjects). They were as follows:

Table 3: Relationship between safety behaviors and acute poisoning

(From table 10 in Sorat Warisara. 2004, 338 subjects)

Symptoms	Observed Prevalence (%)		Sample size needed to detect observed difference (Epi Info)		
	Worse Behavior	Better Behavior	Lower Exposure	Higher exposure	Total
Neurological symptom	92	75	85	85	170
Respiratory symptoms	66	58	601	601	1202
Digestive symptom	56	83	52	52	104
Eye symptoms	37	67	49	49	98
Skin symptoms	46	75	50	50	100

Table 4: Relationship between frequency of pesticide use and acute poisoning

(From table 11 in Sorat Warisara. 2004, 338 subjects)

Symptoms	Observed Prevalence (%)		Sample size needed to detect observed difference (Epi Info)		
	Lower Frequency	Higher Frequency	Lower Exposure	Higher Exposure	Total
Neurological symptoms	68	85	108	108	216
Respiratory symptoms	57	73	151	151	302
Digestive symptoms	45	71	63	63	126
Eye symptoms*	34	43	480	480	960
Skin symptoms	39	58	118	118	236

* This difference would not be detected with 392 subjects

Table 5: Relationship between concentration of pesticide use and acute poisoning

(From table 13 in Sorat Warisara. 2004, 338 subjects)

Symptoms	Observed Prevalence (%)		Sample size needed to detect observed difference (Epi Info)		
	Lower Exposure	Higher Exposure	Lower Exposure	Higher Exposure	Total
Neurological symptoms	69	89	74	74	148
Respiratory symptoms	57	81	65	65	130
Digestive symptoms*	56	61	1563	1563	3126
Eye symptoms	30	51	94	94	188
Skin symptoms*	47	50	4422	4422	8844

* This difference would not be detected with 392 subjects

Table 6: Relationship between exposure variables and pesticide toxicity symptoms

(From table 9 and 10 in Yassin et al., 2002, 185 subjects)

Variables	Observed Prevalence (%)		Sample size needed to detect observed difference (Epi Info)		
	Lower Exposure	Higher Exposure	Lower Exposure	Higher Exposure	Total
*Duration of using pesticide (years)	82	92	196	196	392
Concentrations	75	91	97	97	194
Mixing	59	86	49	49	98

* Used as basis for sample size calculation.

3.4.2 Sample size calculation

Sample size requirements varied from 98 to 8844 subjects for different specific items in relevant previous studies. For specific calculation, data from Yassin et al. (2002) was used as a basis. Calculation was made using Epi Info 2000, Statcalc, Sample size and Power, Cohort Cross-sectional (Confidence = 95%, Power = 80%), 82% and 92% symptom prevalence with lower and higher exposure, respectively. This gave a sample size requirement of 392 subjects. As mentioned above, 420 subjects were sufficient to detect most of the pesticide exposure-related differences in symptoms and illness that had been observed in previous studies, so I settled on a sample size of 420.

3.5 Research instrument for data collection

The instrument of this research was standardized questionnaire, which consisted of 4 parts as follows:

3.5.1 Socio-demographic factors (independent variables)

Age: it was calculated in years. The values were categorized into four groups as 15 -34, 35 – 44, 45 – 54, and equal or more than 55.

Gender: male and female

Marital status: this variable was categorized into three groups as single, married, and divorced/separated/widowed

Education level: this variable was categorized into 3 groups as illiteracy/primary school (grade 1-6), secondary school (grade 7-9), and high school (grade 10-12) or more than high school.

Member of household: there were four groups as 1-2 persons, 3 persons, 4 persons, and 5 or more persons.

Family' monthly income: this variable was categorized into 3 groups as 1,250 – 5,000 baht, 5,001 – 10,000 baht, and > 10,000 baht.

Trained in safe use of pesticides: this variable was categorized into 2 groups as never, and ever been trained.

3.5.2 Pesticide use factors (independent variables)

Duration of using pesticides as rice farmers: it was calculated in years. The values were categorized into three groups as 1 -9, 10 – 19, 20 – 54.

Duration of using pesticide as rice farmer: it was calculated in years. The values were categorized into three groups as 1 – 9, 10 – 19, and >=20.

Frequency of pesticide use last year: it was calculated in days. The values were categorized into three groups as 1 – 7, 8 – 14, and >=15

The concentration of pesticide use: The values were categorized into 2 groups as less than or same as recommended, and more than recommended.

Duration of each pesticide applying: it was calculated in hour. The values were categorized into four groups as 1 -2, 3, 4, and >=5 hours per session.

Duration since most recent use of pesticide: it was calculated in day. The values were categorized into four groups as 1 - 7 (1 week or less), 8-30 (1 week to 1 month), 31-180 (1-6 months), and 181-240 (>6 months). (This variable was not analyzed directly in relation to reported symptoms. Rather it was used as a basis of calculation of rates of symptoms that persisted after most recent pesticide use. Please see details below.)

Method of pesticide use: The values were categorized into four groups as spraying, scattering, fogging, and other application method.

The number of pesticide mixed for applying: The values were categorized into two groups as one or two kinds, and three kinds or more.

Duty in handling pesticides: The values were categorized into four groups as mixing only, applying only, both mixing and applying, and other responsibility.

3.5.3 Self-protection behavior (independent variables)

Self-protection behavior among rice farmers were divided into four parts and comprised of total 29 questions concerning with their practicing in term of frequency to perform it. The target group had to choose only one choice and received points as follows:

	Appropriate behavior	Inappropriate behavior
Always or often	3 points	0 points
Sometimes	2 points	1 points
Rarely	1 point	2 point
Never	0 points	3 points

The levels of performing self-protection behaviors were categorized based on median as cut point value as follow:

High level: got scores equal or more than median of all scores

Low level: got scores less than median of all scores

3.5.4 Pesticide-Related Symptoms (dependent variables)

There were 32 symptoms specified in the questionnaire. These were categorized into 5 groups by organ system as follows:

Neuromuscular (15 symptoms): dizziness, headache, twitching eyelids, blurred vision, insomnia, staggering gait, seizure, shaky heart (irregular rhythm), exhaustion, sweating, muscle weakness, tremor, muscle cramps, excessive salivation, and numbness

Respiratory (8 symptoms): burning nose, nose bleed, runny nose, dry throat, sore throat, cough, chest pain (tightness or burning), and wheezing

Digestives (3 symptoms): nausea, diarrhea, and stomach cramps

Eyes (3 symptoms): burning-stinging- itchy eyes, red eyes, and excessive tearing

Skin/nails (3 symptoms): skin rash, itchy skin, and malformed-discolored-loss of nails

3.6 Pre-test of Questionnaire

Before going to the process of data collection, the researcher submitted the draft questionnaire to thesis advisors in order to check its content validity. Then, the questionnaires were adjusted in according to comments and suggestions of thesis advisor. The questionnaires were pre-tested 30 farmers in Dongdeay sub-district in Kongkrailat district that was not chosen in my first stage of sampling.

The results were then analyzed for its reliability. For the part of self-protection factors by using Cronbach's alpha method, alpha value was 0.7412 (more details are shown in the Appendix, part C). Pilot test was used for clarity of questionnaires, if pilot subjects did not understand some words or difficult to answer, researcher would change them for clarity. However, some questionnaires that were difficult to understand such as frequency of pesticide use last year and symptom history, were clarified for the final version.

3.7 Data collection

Data collection process of this research has the details as described below:

3.7.1 Researcher brought the letters to explain the objective of research from the Collage of Public Health, Chulalongkorn University to the District Health Office, Kongkrailat District, Sukhothai Province.

3.7.2 At a one-day conference, three research assistants were hired and trained to administer the questionnaires (conduct questionnaire interviews).

3.7.3 In Dongdeay Sub-district (not included in the full-scale study), the questionnaire was pilot tested with 30 rice farmers who had similar characteristics to the full-scale study subjects as 30 samples in Dongdeay Sub-district. These

questionnaires were examined and tested for reliability as well as adjusted before applied to the selected sample. A combination of self-administered and interviewer administered was used for full-scale questionnaires.

3.8 Data analysis

Data collected are analyzed by the computer program as follows:

3.8.1 Descriptive statistics including frequencies and percentage are used for socio-demographic factors, pesticide use behaviors, self-protective behaviors, and pesticide-related symptoms. Mean, Median, and Standard deviation (S.D.) of score were calculated in the socio-demographic, pesticide use behavior, self-protective behaviors, and pesticide-related symptoms.

3.8.2 Analysis. The researcher analyzed the data to assess relationships between personal factors, pesticide use behaviors, and self-protective behaviors (independent variables), and pesticide-related symptoms (dependent variables). Chi-square was used to find relationship between independent variables and dependent variables. For all of statistical test used in this study, the statistically significant level was set at alpha = 0.05 (that is, p-values < 0.05 were considered statistically significant. p-values between 0.05 and 0.10 were considered marginally significant.