



CHAPTER III

METHODS

3.1 Subject and Setting

A cross-sectional survey was conducted in Kiriratnikom District, Surat Thani Province. This survey is intended to measure diabetes prevalence (descriptive portion), and to evaluate associations of risk factors with diabetes prevalence (analytical portion). This survey was conducted on 500 adults aged 40 years and over in 8 sub-districts in Kiriratnikom. There are 8 sub-districts in Kiriratnikom with a population of 12,058 aged 40 years and over. A 9.6% prevalence of diabetes is supposed in the population aged 40 years and over and it is calculated that at least 359 people should be included in the study for a 95% confidence level.

Sample size calculation for descriptive portion

The sample size = $n / [1 + (n/\text{population})]$

$$n = Z * Z [P (1 - P)] / (D * D) \quad \text{Reference: Kish (1695)}$$

(Calculated using EpiInfo)

$$Z * Z = 1.96 \text{ (two tail)}$$

$$P = \text{the prevalence of diabetes in Thailand} = 0.096$$

$$D = \text{acceptable error} = 0.03$$

The calculated sample size requirement = 359

Sample size calculation for analytical portion

According to the purpose of the study, diabetes risk factors were assessed, with special attention to overweight/obesity and hypertension. The required sample size is calculated as shown below.

$$\text{Formula: } m' = \frac{\text{Sq}\{c(a/2) \cdot \text{sqrt}[(r+1) \cdot PQ] - c(1-b) \cdot \text{sqrt}[r \cdot P_1Q_1 + P_2Q_2]\}}{r \cdot \text{sq}[P_2 - P_1]}$$

Reference : Fleiss , “Statistical Methods for Rates and Proportions”, 2nd Ed. Wiley, 1981, pp. 38 – 45 (Calculation made using EpiInfo)

The expected prevalence of diabetes in normal group (BMI <25 kg/m²) and overweight/obesity are 0.9% and 11%, respectively and the relative risk is 12.22. The expected ratio of subjects of normal weight to overweight/obese subjects is 5:1. (Hwang et al., 2006) In this situation, the calculated sample size, calculation made using EpiInfo, for a 95% confidence level and 80% power, should be at least 282 subjects.

The expected incidence rates of diabetes in people with hypertension and without hypertension are 29.1 and 12.0 per 1000 person-years, respectively, and a relative risk of 2.43 in the subjects with hypertension. The expected ratio of normal to hypertensive subjects is 2:1. (Gress et al., 2000) So, the calculated simple size from EpiInfo software will be at least 210 subjects for a 95% confidence level.

Conceivably, the actual prevalence will differ substantially from 9.6%. Therefore, a larger sample size than 359 would be desirable. In order to ensure a sufficient sample size, this study includes 500 subjects. This should be sufficient for both the descriptive and analytical portions of the study

3.2 Procedures

There are 12,058 people who are in the 40 years and above age group in Kiriratnikom District. From this population, 500 people were chosen at stratified random sampling with proportional to size for each sub-district (table 1). The systematic sampling procedure was carried out for each individual sub-districts. The names of people aged 40 years and over were arranged by identification number in each sub-district. The sampling interval is 24. Then, the 500 samples were selected from 8 sub-districts.

Table1: The samples were chosen from each sub-district in Kiriratnikom District

Sub – districts	Number of people aged 40 years and over	Number of sample
Thakanorn	2,106	87
Bantumneab	2,651	110
Banyang	1,261	52
Kapaw	1,055	44
Thakradan	993	41
Namhak	1,099	46
Yanyaw	1,449	60
Thumsingkhorn	1,444	60
Total	12,058	500

3.3 Measurement

Descriptive portion

In this study, the prevalence of diabetes and pre-diabetes were defined. The Fasting Plasma Glucose (FPG) Test is the preferred test for diagnosis of diabetes in this study. Result and their meaning are shown in Table 2

Table 2: Fasting Plasma Glucose Test

Plasma Glucose Result (mg/dl)	Diagnosis
99 and below	Normal
100 to 125	Pre-diabetes (impaired fasting glucose)

*Confirmed by repeating the test on a different day.

Analytical portion

According to this study, the dependent variables are 2 categories of fasting blood sugar, non-diabetes and diabetes. The independent variables and the expected levels of measurement are shown below.

1. Personal characteristics

- | | |
|------------------------|--|
| 1.1 Gender | <i>Nominal Scale</i> (male, female) |
| 1.2 Age | <i>Interval Scale</i> (40-49, 50-59, 60-69, 70-79, and over 80 years) |
| 1.3 Marital Status | <i>Nominal Scale</i> (single, married, divorced) |
| 1.4 Educational Status | <i>Ordinal scale</i> (no education, Prathom 4, Prathom6, Mathayom 3, Mathayom 6, bachelor's degree, master degree) |
| 1.5 Income | <i>Ordinal scale</i> ($\leq 10,000$ baht per year, 10,000-30,000 baht per year, 30,000-50,000 baht per year, $\geq 50,000$ baht per year) |

2. Body Mass Index (BMI is body weight (Kg)/ height (M)²)

Ordinal variable constructed from ratio scale data

- | | |
|-----------------|-------------|
| BMI < 18.5 | Underweight |
| BMI = 18.5-24.9 | Normal |

BMI \geq 25.0 Overweight/Obesity

3. Blood Pressure (base on systolic blood pressure)

Nominal scale (HT, no HT) *from ratio-scale data*

Blood pressure < 140/90 mm Hg No hypertension

Blood pressure \geq 140/90 mm Hg Hypertension

4. History of diabetes among first degree relatives

Nominal scale (yes, no)

5. History of GDM or delivery of baby over 9 lbs

Nominal scale (yes, no)

6. Lifestyle Factors

Diet *Nominal scale* (sweet taste diet, no sweet taste diet)

Smoking *Nominal scale* (smoking, non- smoking)

Alcohol consumption *Ordinal scale* (mild, moderate, severe)

Physical Activity *Ordinal scale* (mild, moderate, severe)

Questionnaire was used for collecting data about diabetes-related symptoms, personal characteristics, and health behaviors, history of GDM and history of diabetes among first degree relatives. Physical examination was used for body mass index (BMI) and blood pressure.

3.4 Data Collection

The working group was set up composing of family doctor, general nurses, health workers, and health volunteers. Prospective subjects, selected by the sampling method described above, were visited at home by the health worker or health volunteer, invited to the nearby health center and told to come to health centers following fasting

since the evening before. The people coming to the health center were examined by the physicians and their blood glucose was measured with glucometers. They were given a questionnaire consisting a series of questions by the trained interviewers and their blood pressure, weigh and height measurement were taken.

3.5 Data Analysis

Descriptive statistics on the prevalence of diabetes was computed. Diabetes prevalence at different levels of categorical independent variables (e.g., male and female gender) was calculated and compared by use of chi-square test. Multiple logistic regressions was applied to identify diabetes risk factors, and to compare their relative importance. Statistical significance was set at $\alpha=0.05$ (P-value ≤ 0.05). SPSS statistical software was used for all statistical calculations.