

## **CHAPTER 2**

### **METHODOLOGY**

#### **2.1 Sample Design**

A Stratified Two - Stage Sampling was adopted for the survey. Bangkok Metropolis and region were constituted strata. The primary and secondary sampling units were blocks for municipal areas / villages for non - municipal areas and private households / persons in the special households

#### **Stratification**

Bangkok Metropolis and region namely Central(Excluding Bangkok Metropolis) North, Northeast and South were constituted 5 strata. Each stratum was divided into two parts according to the type of local administration, namely municipal areas and non - municipal areas.

#### **Selection of Primary Sampling Unit**

The sample selection of blocks / villages were performed separately and independently in each part by using probability proportional to size - total number of households. The total sample blocks / villages was 2,050 from 109,966 blocks / villages.

The total number of sample blocks / villages selected for enumeration by region and type of local administration was as follows :

<b>Region / Stratum</b>	<b>Total</b>	<b>Municipal Areas</b>	<b>Non - Municipal Areas</b>
Bangkok Metropolis	450	450	-
Central (Excluding Bangkok Metropolis)	400	200	200
North	400	200	200
Northeast	400	200	200
South	400	200	200
<b>Total</b>	<b>2,050</b>	<b>1,250</b>	<b>800</b>

## Selection of Secondary Sampling Unit

### 1.) Private households

In each sample blocks/villages, the private households were divided 3 groups as follows:

**Group 1:** Private households with infants aged of less than one, or with members aged of 80 and over, or with pregnant women;

**Group 2:** Private households with children aged of 1-5 or with members aged of 60-79; and

**Group 3:** Private households with members aged of 6-59, or no listing private households, or vacant houses.

In each sample block/village the sample private households selection were performed separately and independently.

#### 1.1) Sample size in each group

Let

- $N_A$  was the total private households in group 1 in each sample block/village
- $n_A$  was the total sample private households in group 1 in sample block/village
- $N_B$  was the total private households in group 2 in each sample block/village
- $n_B$  was the total sample private households in group 2 in sample block/village
- $N_C$  was the total private households in group 3 in each sample block/village
- $n_C$  was the total sample private households in group 3 in sample block/village

where

$$N = N_A + N_B + N_C \quad \text{and} \quad n = n_A + n_B + n_C$$

A number of sample private households of each group within each sample block / village was as follows :

Case no.	Number of sample private households		
	Group 1 ( $n_A$ )	Group 2 ( $n_B$ )	Group 3 ( $n_C$ )
1) $N_A \leq 30$	$n_A = N_A$	1) If $N_B < \frac{1}{2}(40 - n_A)$ then $n_B = N_B$  2) If $N_B \geq \frac{1}{2}(40 - n_A)$ then $n_B = \frac{1}{2}(40 - n_A)$	$n_C = 40 - (n_A + n_B)$
The total number of sample private households : $n = n_A + n_B + n_C = 40$			
2) $30 < N_A \leq 40$	$n_A = N_A$	1) If $N_B \geq 5$ then $n_B = 5$  2) If $N_B < 5$ then $n_B = N_B$	1) If $N_C \geq 5$ then $n_C = 5$  2) If $N_C < 5$ then $n_C = N_C$
The total number of sample private households: $n = n_A + n_B + n_C > 30$ but not more than 50			
3) $N_A > 40$	$n_A = 40$	1) If $N_B \geq 5$ then $n_B = 5$  2) If $N_B < 5$ then $n_B = N_B$	1) If $N_C \geq 5$ then $n_C = 5$  2) If $N_C < 5$ then $n_C = N_C$
The total number of sample private households: $n = n_A + n_B + n_C > 40$ but not more than 50			

## 1.2) Selection of sample private households in each group

### a) Case 1 and Case 2

- **Group 1** : All sample private households in group 1 were sample.
- **Group 2 and 3**: The sample private households in each group 2 were selected systematically

### b) Case 3

- The sample private households in each group were selected systematically.

## Special households

All special households in sample block / village were sample.

The total number of sample households selected for enumeration by region , type of local administration and group was as follows :

Region / Stratum	Group			
	Total	1	2	3
<b>1. Bangkok Metropolis</b>	67,593	3,711	13,820	50,062
Municipal areas	67,593	3,711	13,820	50,062
Non-Municipal areas	-	-	-	-
<b>2. Central (Excluding Bangkok Metropolis)</b>	76,022	5,297	19,074	51,651
Municipal areas	33,692	1,901	6,596	25,195
Non-Municipal areas	42,330	3,396	12,478	26,456
<b>3. North</b>	72,099	5,385	23,284	43,430
Municipal areas	30,967	2,039	8,931	19,997
Non-Municipal areas	41,132	3,346	14,353	23,433
<b>4. Northeast</b>	63,561	5,403	21,348	36,810
Municipal areas	30,907	2,211	8,774	19,992
Non-Municipal areas	32,654	3,192	12,574	16,888
<b>5. South</b>	75,403	6,801	22,218	46,384
Municipal areas	31,945	2,122	7,355	22,468
Non-Municipal areas	43,458	4,679	14,863	23,916
<b>Total</b>	<b>354,678</b>	<b>26,597</b>	<b>99,744</b>	<b>228,337</b>
<b>Municipal areas</b>	<b>195,104</b>	<b>11,984</b>	<b>45,476</b>	<b>137,644</b>
<b>Non-Municipal areas</b>	<b>159,574</b>	<b>14,613</b>	<b>54,268</b>	<b>90,693</b>

## 2.2 Method of Estimation

The survey results were presented separately 2 parts. Part 1 were presented information of persons and part 2 were presented information for households.

The survey results were presented separately for the Bangkok Metropolis and the remaining 75 provinces were classified by region, and further classified by municipal areas and non-municipal areas.

- Let
- h = 1, 2, 3, 4, 5 ( region )
  - i = 1, 2 ( type of local administration )
  - j = 1, 2, 3, ...,  $m_{hi}$  ( sample block / village )
  - k = 1, 2, 3 ( household group )

### PART 1 : INFORMATION OF PERSONS

#### Estimation of the total number of persons with characteristic X

1.1 Estimate of the total number of persons with characteristic X for the  $i^{\text{th}}$  area,  $h^{\text{th}}$  region was based on the formula :

$$\hat{X}'_{1hi} = \frac{x'_{1hi}}{y_{1hi}} Y_{1hi} \dots\dots\dots (1)$$

where  $x'_{1hi} = x'_{11hi} + x'_{12hi}$

- Private households

$$x'_{11hi} = \sum_{j=1}^{m_{hi}} \sum_{k=1}^3 \frac{N_{1hijk}}{n_{1hijk}} x_{11hijk}$$

- Special households

$$x'_{12hi} = \sum_{j=1}^{m_{hi}} \frac{N_{2hij}}{n_{2hij}} x_{12hij}$$

$x_{11hijk}$  is the ordinary estimate of the total number of persons with characteristic X from sample private households in the  $k^{\text{th}}$  household group,  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$x_{12hij}$  is the ordinary estimate of the total number of persons with characteristic  $X$  from sample special households in the  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$N_{1hijk}$  is the total number of listing private households in the  $k^{\text{th}}$  household group,  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$N_{2hij}$  is the total number of listing persons in special households in the  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$n_{1hijk}$  is the total number of sample private households in the  $k^{\text{th}}$  household group,  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$n_{2hij}$  is the total number of sample persons in special households in  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$m_{hi}$  is the total number of sample blocks / villages in the  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$$y'_{1hi} = y'_{11hi} + y'_{12hi}$$

- Private households

$$y'_{11hi} = \sum_{j=1}^{m_{hi}} \sum_{k=1}^3 \frac{N_{1hijk}}{n_{1hijk}} y_{11hijk}$$

- Special households

$$y'_{12hi} = \sum_{j=1}^{m_{hi}} \frac{N_{2hij}}{n_{2hij}} y_{12hij}$$

$y_{11hijk}$  is the total number of the population enumerated from sample private households in the  $k^{\text{th}}$  household group,  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$y_{12hij}$  is the total number of the population enumerated from sample special households in the  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$Y_{1hi}$  is the total population, based on the population projection of the total population in the  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

1.2 Estimate of the total number of persons with characteristic X for the h<sup>th</sup> region was based on the formula :

$$\hat{X}_{1h} = \sum_{i=1}^2 \hat{X}_{1hi} \dots\dots\dots (2)$$

1.3 Estimate of the total number of persons with characteristic X for the i<sup>th</sup> area was based on the c formula :

$$\hat{X}_{1i} = \sum_{h=1}^5 \hat{X}_{1hi} \dots\dots\dots (3)$$

1.4 Estimate of the total number of persons with characteristic X for the whole kingdom was based on the formula :

$$\hat{X}_1 = \sum_{h=1}^5 \hat{X}_{1h} = \sum_{i=1}^2 \hat{X}_{1i} \dots\dots\dots (4)$$

**PART 2 : INFORMATION OF HOUSEHOLDS**

**Estimate of the total number of households with characteristic X**

2.1 Estimate of the total number of households with characteristic X for the i<sup>th</sup> area, h<sup>th</sup> region was based on the formula :

$$\hat{X}_{2hi} = \frac{x'_{2hi}}{y'_{2hi}} Y_{2hi} \dots\dots\dots (5)$$

where  $x'_{2hi} = x'_{21hi} + x'_{22hi}$

- Private households

$$x'_{21hi} = \sum_{j=1}^{m_{hi}} \sum_{k=1}^3 \frac{N_{1hijk}}{n_{1hijk}} x_{21hijk}$$

- Special households

$$x'_{22hi} = \sum_{j=1}^{m_{hi}} x_{22hij}$$



$x_{21hijk}$  is the ordinary estimate of the total number of private households with characteristic X in the  $k^{\text{th}}$  household group,  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$x_{22hij}$  is the ordinary estimate of the total number of special households with characteristic X in the  $j^{\text{th}}$  sample block / village,  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

$$y'_{2hi} = y'_{21hi} + y'_{22hi}$$

- Private households

$$y'_{21hi} = \sum_{j=1}^{m_{hi}} \sum_{k=1}^3 N_{1hijk}$$

- Special households

$$y'_{22hi} = \sum_{j=1}^{m_{hi}} y_{22hij}$$

$y_{22hij}$  is the total number of the enumerated special households in the  $j^{\text{th}}$  area,  $h^{\text{th}}$  region.

$Y_{2hi}$  is the total number of households, based on the population projection of the total population in the  $i^{\text{th}}$  area,  $h^{\text{th}}$  region.

2.2 Estimate of the total number of households with characteristic X for the  $h^{\text{th}}$  region was based on the formula :

$$\hat{X}_{2h} = \sum_{i=1}^2 \hat{X}_{2hi} \dots\dots\dots (6)$$

2.3 Estimate of the total number of households with characteristic X for the  $i^{\text{th}}$  area was based on the formula :

$$\hat{X}_{2i} = \sum_{h=1}^5 \hat{X}_{2hi} \dots\dots\dots (7)$$

2.4 Estimate of the total number of households with characteristic X for the whole kingdom was based on the formula :

$$\hat{X}_2 = \sum_{h=1}^5 \hat{X}_{2h} = \sum_{i=1}^2 \hat{X}_{2i} \dots\dots\dots (8)$$

### **2.3 Comparison of Sample Designs**

The sample design used in the 2005-2006 survey of population change was different from the previous surveys, in that, there was more distribution/coverage of sample blocks/villages than that of the 1995-1996 survey. In the 2005-2006 survey, thousand and fifty blocks/villages were selected. Then, forty private households were selected from each blocks/villages. In the 1995-1996 survey, six hundred blocks/villages were selected. Then, all private households in the selected blocks/villages were interviewed.

In addition, the forty private households were divided into 3 groups: Group 1 included private households with infants aged of less than one, or with members aged of 80 and over, or with pregnant women; Group 2 comprised private households with children aged of 1-5 or with members aged of 60-79; and Group 3 consisted of private households with members aged of 6-59, or no listing private households, or vacant houses.

Since the survey focused on high samples of birth and death, the selection of private households in Group I was purposive. Then, the rest of private households was divided into halves. The private households of Group II and Group III were then selected from each half in order to obtain the total private households sample size of 40 in each block/village.

## **2.4 Data Collection**

The 2005-2006 survey of population change was carried out in a period of one year. Eighty-two thousand households in the selected blocks/villages were listed. Then, sample households were selected. All members in each sample household were interviewed by staff of Provincial Statistical Offices. The first round enumeration started in July 2005, and follow-up interviews of the same sample households were carried out in the 2<sup>nd</sup> – 5<sup>th</sup> rounds, with a 3 month interval between each round.

## **2.5 Data Processing**

Manual editing and coding was carried out at provincial statistical offices (PSOs) in all provinces in Thailand. Then, the questionnaires were sent to the Central Office for data capture for the first round data collection. An Intelligent Character Recognition (ICR) solution was adopted for data capture. Data processing, including tabulation and analysis, was carried out at the central office. Data in the first round was present on population characteristics. After data collection in round 2-5 data entry on microcomputer by using FTP program carried out at provincial statistical offices in all provinces in Thailand. The data files were transferred to the central office for tabulation, analysis and report writing on the survey of population change.

## **2.6 In Round Figures**

In the statistical tables, all absolute figures are independently round: hence the group total may not always be equal to the sum of the individual figures.

## **2.7 Data Presentation**

The data in the summary results, on number of births, deaths, including various rates, were adjusted to take into account the results of the post enumeration survey (PES) thus they are not equal to those presented in the statistical table.