Chapter 4

Sampling Strategy

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Chapter 4

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1. Introduction

This chapter summarises the sampling strategies adopted for each city examined in this research. Therefore, it describes the approaches adopted to identify the respondents to avoid sampling bias, which would compromise the validity of generalising the WTP results to the entire population surveyed (the cities for this research). The sampling strategy depends on the available data to the researchers. Hence, differences exist between cities. The design was such that all households would have the closest possible probability to be identified as respondents for the survey, hence avoiding sampling bias as much as possible. The preferable method was to count with a comprehensive sampling frame from which direct random sampling can be realised. However, this was only possible for Ho Chi Minh City. The research teams in each of the three cities adopted a multi-stage stratified sampling. It is a common approach in WTP studies where an adequate sampling frame is not available. Table 4.1 summarises the sampling approaches adopted for each city and the different levels considered for the multi-stage stratified sampling.

Table 4.1: Summary of Sampling Strategies

City (Country)	Sampling approach	Stratification
Bangkok (Thailand)	Multi-stage stratified	Administrative zones -> District -> Sub-district
Ho Chi Minh City (Viet Nam)	Simple random	-
Manila (Philippines)	Multi-stage stratified	District -> City
Kuala Nerus, Kuala Terengganu (Malaysia)	Multi-stage stratified	District

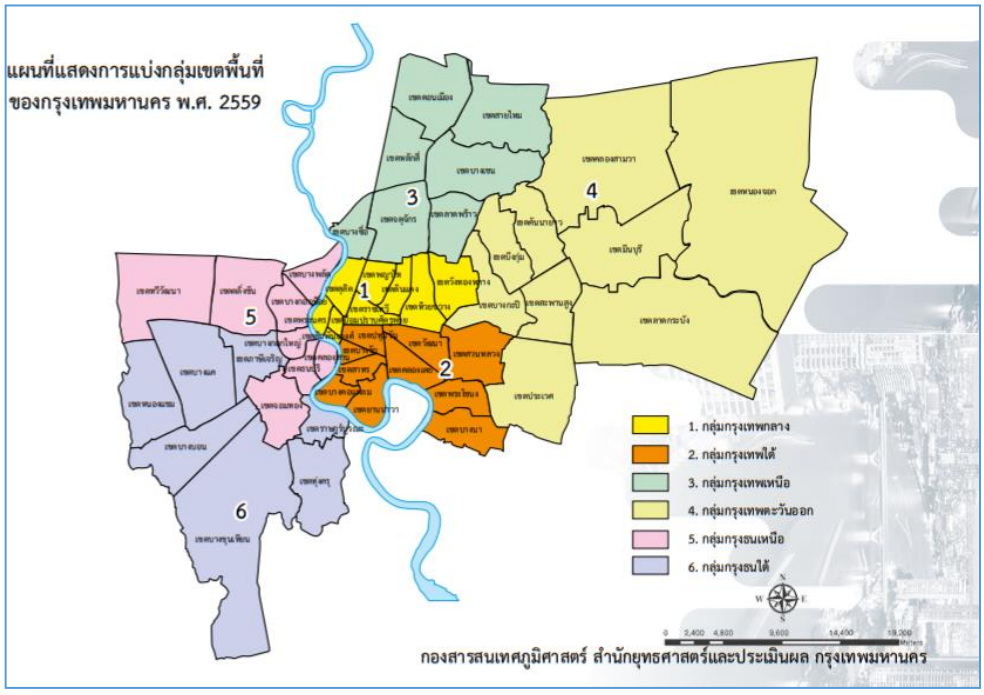
Source: Authors.

The rest of the chapter provides further details for each city and the sampling approaches from the research teams.

2. Thailand — Bangkok

The city of Bangkok has an area of 1,569 square kilometres ($km^{2)}$, a population of 5.6 million, and 2.8 million registered households. Bangkok has 50 districts; the Chao Phraya River divides Bangkok and Thonburi. The Bangkok Metropolitan Administration is organised per the Bangkok Metropolitan Administration Act 1985 and is responsible for managing Bangkok. The Bangkok Metropolitan Administration divides the city into six administrative zones: Central Bangkok, South Bangkok, North Bangkok, East Bangkok, North Thonburi, and South Thonburi (Figure 4.1).

Figure 0.1: Administrative Zones of the Bangkok Metropolitan Area



Notes: Central Bangkok (CB): yellow, comprises nine districts, South Bangkok (SB): orange, comprises 10 districts, North Bangkok (NB): light blue, comprises seven districts, East Bangkok (EB): light brown, comprises nine districts, North Thonburi (NT): pink, comprises eight districts, South Thonburi (ST): purple, comprises seven districts.

Source: Bangkok Metropolitan Administration (2020).

Multi-stage sampling was applied to the study to ensure the random selection of districts and sub-districts as follows (Table 4.1):

- Stage 1: Division into six administrative zones: Central Bangkok, South Bangkok, North Bangkok, East Bangkok, North Thonburi, and South Thonburi
- Stage 2: Random selection of two districts from each zone
- Stage 3: Random selection of two sub-districts from each district
- Stage 4: Random selection of two communities from each sub-district
- Stage 5: Simple random sampling and area-based sampling for households

Table 4.2: Overview of Randomly Selected Sub-districts

Zone	District	Sub-district	No. of Households	Character
Central Bangkok	Ratchathewi	Thanon Phyathai	11,621	CBD
		Thanon Petchaburi	11,607	CBD
	Din Daeng	Din Daeng	37,059	Residential
		Ratchadaphisek	24,151	CBD
South Bangkok	Wattana	Klong Toei Nue	17,301	CBD
		Klong Tan Nue	38,668	CBD
	Bang Na	Bang Na Nue	33,350	Residential
		Bang Na Tai	37,060	Residential
North Bangkok	Laksi	Tung Song Hong	39,641	Residential
		Talad Bangkhen	17,742	Residential
	Bangkhen	Anusawari	59,025	Residential
		Tha Reang	53,589	Residential
East Bangkok	Lad Krabang	Klong Songtonnoon	32,784	Industrial and residential
		Thab Yao	17,825	Industrial and residential
	Prawet	Prawet	35,922	Suburban and residential
		Nong Bon	23,813	Suburban and residential
North Thonburi	Thawee Wattana	Thawee Wattana	8,973	Suburban and agriculture
		Salathamm	24,922	Suburban new residential
	Taling Chan	Taling Chan	11,351	Suburban and agriculture
		Chim Plee	9,516	Suburban and agriculture
South Thonburi	Bang Khae	Bang Phai	14,597	Suburban and agriculture
		Lak Song	24,661	Suburban and agriculture
	Nong Khem	Nong Khem	30,333	Suburban and new residential
		Nong Khang Plu	31,549	Suburban and new residential

CBD = central business district.

Source: Authors.

Sampled households were randomly selected on the allocated target main road in each of the selected sub-districts (Table 4.3). The selection steps were as follows.

- Step 1: The enumerator goes to the designated main roads and randomly chooses the first household.
- Step 2: The enumerator introduces themselves to the respondent and invites the respondent to participate in the survey.
- Step 3: The enumerator provides the consent information in the questionnaire to the respondent.
- Step 4: The enumerator asks to look and take a photo of the latest electricity bill.
- Step 5: When the interview ends, the enumerator provides an incentive to the respondent, asks permission to take a photo, and goes to the next household randomly, which may be at least three houses away from the previous house.

If a respondent refused to respond at any steps mentioned earlier, the enumerator moved randomly to the next household.

Table 4.3: Multi-stage Stratified Sampling in Bangkok

Zone	District	Sub-district	No. of Households	No. of Samples	Main Road
Central Bangkok	Ratchathewi	Thanon Phyathai	11,621	9	Phyathai
		Thanon Petchaburi	11,607	9	Petchaburi
	Din Daeng	Din Daeng	37,059	12	Asoke-Din Daeng
		Ratchadaphisek	24,151	10	Ratchadaphisek
South Bangkok	Wattana	Klong Toei Nue	17,301	9	Asoke Montri
		Klong Tan Nue	38,668	12	Sukhumvit
	Bang Na	Bang Na Nue	33,350	11	Sukhumvit
		Bang Na Tai	37,060	12	Bang Na Trad
North Bangkok	Laksi	Tung song hong	39,641	12	Ngam Wong Wan
		Talad Bangkhen	17,742	9	Chaeng Wattana
	Bangkhen	Anusawari	59,025	14	Ram Indra
		Tha Reang	53,589	14	Ram Indra
East Bangkok	Lad Krabang	Klong Songtonnoon	32,784	11	Sri-Nakharin Romklao
		Thab Yao	17,825	9	Pracha Pattana
	Prawet	Prawet	35,922	11	Pattanakarn
		Nong Bon	23,813	10	Sri-Nakharin

North Thonburi	Thawee Wattana	Thawee Wattana	8,973	8	Putthamonton sai 3
		Salathamm	24,922	10	Putthamonton sai 2
	Taling Chan	Taling Chan	11,351	9	Ratchapruk
		Chim Plee	9,516	8	Putthamonton sai 1
South Thonburi	Bang Khae	Bang Phai	14,597	9	Putthamonton sai 2
		Lak Song	24,661	10	Petchkasem 69
	Nong Khem	Nong Khem	30,333	11	Liab Klong Phasi Charoen
		Nong Khang Plu	31,549	11	Putthamonton sai 3

Source: Authors.

3. Malaysia – Kuala Nerus and Kuala Terengganu

In Malaysia, the sampling area included the districts of Kuala Nerus and Kuala Terengganu within the Terengganu State in West Malaysia. The distribution of respondents between the two districts was decided based on the number of households residing in each (Table 4.4). For ease of computation, the number of samples in Kuala Terengganu District was set at 60% of the total samples surveyed (180), and the number of samples in the Kuala Nerus District was 40% (120). The choice sets were grouped into blocks, and each block was equally allocated. Blocks 9 and 11 were the exception since there are only seven choice sets rather than eight (Table 4.5). Further, two households with business operations in each block were interviewed in each district. Respondents were convenient-sampled.

Table 4.4: Overview of the Sampling Area

District	Number of Households	Share of Total	Number of Samples
Kuala Terengganu	51,778	63	190
Kuala Nerus	30,397	37	110
Total	**82,175**	**100**	**300**

Source: Department of Statistics (2020).

Table 4.5: Number of Samples in Each District

Block	Choice Set	Choice Set Number	Kuala Terengannu District	Kuala Nerus District	Total
1	8	1, 2, …, 8	16	10	26
2	8	1, 2, …, 8	16	10	26
3	8	1, 2, …, 8	16	10	26
4	8	1, 2, …, 8	16	10	26
5	8	1, 2, …, 8	16	10	26
6	8	1, 2, …, 8	16	10	26
7	8	1, 2, …, 8	16	10	26
8	8	1, 2, …, 8	16	10	26
9	7	1, 2, …, 7	18	15	33
10	8	1, 2, …, 8	16	10	26
11	7	1, 2, …, 7	18	15	33
		Total	**180**	**120**	**300**

Source: Authors.

4. The Philippines – Manila

Metropolitan Manila (MM), officially the National Capital Region in the Philippines, is one of 17 regions in the Philippines. MM is the political, economic, social, and cultural centre of the Philippines. It is one of the more modern metropolises in Southeast Asia and is amongst the world's 30 most populous metropolitan areas. Covering an area of 620 km^2, MM is the smallest of the country's 17 regions. It is, however, the second-most populous (12.9 million in 2015, 13% of the entire Philippine population) and the most densely populated (20,784 per km^2 in 2015). MM is composed of 16 highly urbanised cities and one municipality. It is divided into four geographic areas called districts: Capitol District, Eastern Manila District, Northern Manila District, and Southern Manila District. Table 4.6 shows the cities comprising the four districts. Only the Capitol District comprises just a city — Manila.

Table 0.1: Administrative Division of Metropolitan Manila

District/Cities	Area (km^2)	Population	Share in Metro Manila Population (%)	Population Density
Capitol District	**42.88**	**1,780,148**	**13.8**	**41,515**
Manila	42.88	1,780,148	13.8	41,515
Eastern District	**236.36**	**4,650,613**	**36.1**	**19,676**
Mandaluyong	11.06	386,276	3.0	34,925
Marikina	22.64	450,741	3.5	19,909
Pasig	31.46	755,300	5.9	24,008
Quezon City	165.33	2,936,116	22.8	17,759
San Juan	5.87	122,180	0.9	20,814
Northern District	**126.42**	**2,819,388**	**21.9**	**22,302**
Caloocan	53.33	1,583,978	12.3	29,701
Malabon	15.96	365,525	2.8	22,903
Navotas	11.51	249,463	1.9	21,674
Valenzuela	45.75	620,422	4.8	13,561
Southern District	**208.28**	**3,627,104**	**28.2**	**17,415**
Las Pinas	32.02	588,894	4.6	18,391
Makati	27.36	582,602	4.5	21,294
Muntinlupa	41.67	505,509	3.9	12,131
Paranaque	47.28	664,822	5.2	14,061
Pasay	18.64	416,522	3.2	22,346
Pateros	1.76	63,840	0.5	36,273
Taguig	45.18	804,915	6.3	17,816
Metro Manila	**619.57**	**12,877,253**	**100.0**	**20,784**

km^2 = square kilometre.

Sources: Philippine Statistics Authority (2015); Philippine Institute of Volcanology and Seismology (2013).

The Philippine survey employed a multi-staged stratified sampling procedure (Table 4.7). The four districts of Metro Manila comprise the first-stage stratification of the population. Each district (first-stage stratum) was then stratified into its cities (second-stage strata). For each district, a representative city was selected from which the district sample is drawn. For the Capitol District, it was Manila (the sole city in the district); for the Eastern District, Quezon City; for the Northern District, Caloocan City; and for the Southern District,

Makati City. All four cities are the principal cities in their respective districts, with mixed residential, commercial, and industrial areas. Except for Makati, all have the highest population in their respective districts. Quezon City, Manila, and Caloocan are also the three largest cities in Metro Manila regarding population and area. The number of respondents in each of the four cities is proportional to the share of the city in the region's population.

Table 4.7: Summary of Surveyed Districts and Distribution of Respondents

District	City	Population	Share	No. of respondents
Capitol	Manila	1,780,148	25.86	64
Eastern	Quezon City	2,936,116	42.66	107
Northern	Caloocan City	1,583,978	23.01	58
Southern	Makati	582,602	8.46	21
Total		**6,880,844**	**100**	**250**

Source: Authors.

Respondents for this survey were gathered from predominantly residential barangays in the cities, selecting only households with metered connections to the local power utility, Manila Electric Railroad and Light Company (MERALCO). Sample households were drawn from barangays, the smallest administrative units in the Philippines, that comprise a mix of low-, middle-, high-income household residents. Respondents from each barangay were chosen using systematic sampling (Palanca-Tan, 2017). The barangay's office provided support to conduct the survey. These provided maps that were employed to identify the starting points for the sampling. Enumerators were instructed to approach the first household encountered around the starting point. In the case that one potential refuse to participate, the nearest house was approached. Every succeeding respondent approached must be at least the 20th house from the last responding household. When required, the surveys were conducted via face-to-face online communication because of mobility restrictions (respondents could see the enumerator but in an online environment).