

## **SAMPLE DESIGN FOR THE 1997 CWIQ MONITORING SURVEY**

### **A. 1 OBJECTIVES OF THE SAMPLE DESIGN**

The primary objective of the sample design was to provide estimates with acceptable precision for monitoring poverty and the effects of development policies, programmes and projects on living standards in the country. The CWIQ sample also aimed at providing data on timely basis for monitoring changes in the welfare status in various sub-groups of the population.

The population was surveyed by designing a sample of households and collecting information on all members of the household.

### **A.2 SAMPLING FRAME**

The Ghana Statistical Service (GSS) maintains a complete list of Censal Enumeration Areas (EAs) with population and household information derived from the 1984 Population Census. This list, comprising a total of 12,969 EAs together with their respective household sizes constituted the sampling frame for the survey.

### **A. 3 STRATIFICATION**

In order to improve the efficiency of the sample design, the sampling frame was classified into homogeneous strata. Specifically, tabulation of the survey results was done not only at the national level but also disaggregated by locality of residence (rural and urban). Each of the ten administrative regions also constituted a separate domain of estimation. Within these levels of stratification, the survey data was further disaggregated by poverty quintiles and socio-economic group of the head of household.

### **A. 4 SAMPLE SIZE**

It was noted that monitoring implies comparing. Monitoring in time implies comparing the data from one year with the next. For monitoring in space, we examine the difference between areas in the same year. The crucial feature is that when two samples are compared, each one has an error variance and these two variances need to be added together.

Roughly, this implies that for monitoring changes in welfare status in various sub-groups of the population, we need samples about twice as large as when we are simply reporting an isolated result.

Now the most recent GLSS (Third Round) was based on a sample of 4,500 households. Analysis for this survey was at the national and regional levels. Following the above reasoning, a total sample size of 10,000 households was considered adequate for indicators at the national and regional levels. While it is important to ensure that the sample size is manageable operationally so as to control the quality of all the survey

activities, it was considered that increasing these figures by roughly 50 percent would be a reasonable strategy and not excessively expensive using the CWIQ technology to improve the precision of the results. This would result in a total sample size of about 15,000 households.

### **A. 5 SAMPLE SELECTION**

Using the above sampling frame, the number of households to be selected per EA was based on the following reasoning. The Third Round of the Ghana Living Standards Survey used 10 households per EA in the rural sector and 15 in the urban sector. During the CWIQ Pilot Survey, 30 households were arbitrarily selected per EA to test the survey instruments. The overriding factor in the CWIQ is cost-effectiveness and simplicity and this favours a large take. However, the selection of 30 households per EA was considered too high. A sample size of 25 households per EA appeared more likely to be optimal.

Following the above parameters, the CWIQ survey was based on a two-stage, stratified, nationally representative cluster sample design.

Specifically, at the first stage, 588 Enumeration Areas (EAs) were selected using systematic sampling with probabilities proportional to size (PPS-method). The distribution of the selected EAs by region is as follows:

<b>REGION</b>	<b>NUMBER OF EAs</b>
<b>Western</b>	<b>63</b>
<b>Central</b>	<b>64</b>
<b>Greater Accra</b>	<b>85</b>
<b>Eastern</b>	<b>61</b>
<b>Volta</b>	<b>83</b>
<b>Ashanti</b>	<b>105</b>
<b>Brong Ahafo</b>	<b>57</b>
<b>Northern</b>	<b>32</b>
<b>Upper East</b>	<b>12</b>
<b>Upper West</b>	<b>26</b>
<b>Total</b>	<b>588</b>

A household listing exercise was carried out in the selected EAs. At the second stage, a systematic sample of 25 households per EA was selected. This sample design yielded a total sample of 14,700 households nationwide.

Mathematically, the selection procedure may be summarized as follows:

At the first stage, select 588 EAs with probability proportional to size (PPS), where the measure of size is the number of households in the 1984 census, i.e.:

$$P_{li} = (a * Mi) / \sum Mi$$

Where  $(a)$  is the total number of EAs selected i.e.  $(a) = 588$

$Mi$  is the number of census households in the  $i^{th}$  EA.

$\sum Mi$  is the total number of households in the country (from 1984 Census data).

$P_{li}$  is the first stage sampling probability for the  $i^{th}$  EA.

At the second stage, select 25 households by systematic sampling.

$$\text{i.e. } P_{2i} = b / Mi$$

Where  $Mi$  is the total number of households in the  $i^{th}$  EA (from Listing).

$P_{2i}$  is the sampling probability for households and

$b$  is the number of households selected per EA i.e.  $b = 25$

The final overall household probability of selection is given by the product of the first and second stage probabilities expressed as:

$$\int i = P_{li} * P_{2i}$$

$$= \frac{ab}{\sum Mi} \times \frac{Mi}{Mi}$$

The weighting factor for the  $i^{th}$  EA.  $Wi$  is the reciprocal of the overall probability of selection.

$$\text{Hence, } Wi = \frac{\sum Mi}{ab} \times \frac{Mi}{Mi}$$

## **REFERENCES**

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