

Trinidad and Tobago - Multiple Indicator Cluster Survey 2011

**Ministry of Social Development and Family Services, Central Statistical Office,
United Nations Children's Fund**

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Sampling

Sampling Procedure

A multi-stage, stratified cluster sampling approach was used for the selection of the survey sample.

SAMPLE SIZE AND SAMPLE ALLOCATION

The sample size for the Trinidad and Tobago 2011 MICS was calculated as 6,600 households. For the calculation of the sample size, the key indicator used was DPT (diphtheria, pertussis and tetanus) immunization coverage.

For each of the five regions, namely, North West, North Central, South West, East and Tobago, the calculation of n was based on r (DPT coverage) that was assumed to be 72.9 percent, 70.3 percent, 87 percent, 94.5 percent and 77.8 percent respectively, based on the values found in Trinidad and Tobago 2006 MICS.

The choice of the DPT immunization rate as the key indicator for estimating sample size was made after examining the likely sample sizes that would be needed for this and other possible key variables such as those relating to HIV.

To calculate n (the required sample size) the r values for DPT for each region were used, p (percentage of children age 18-29 months in the total population) was taken as 3 percent, average household size was taken as 3.4 persons, and the expected response rate was assumed to be 90%. The standard MICS default value of 1.5 was used for the design effect $deff$, since there was some doubt about the credibility of the very low $deff$ values obtained for DPT in Trinidad and Tobago 2006 MICS.

Given uncertainties that prevailed with respect to the required sample size, the sampling consultant recommended a sample size of 6,600 households for Trinidad and Tobago 2011 MICS, which is slightly larger than the sample size used in Trinidad and Tobago 2006 MICS.

A number of possible allocation principles were considered for determining the number of sampling units to be enumerated in each of the five regions. These included proportional allocation, square root allocation, cube root allocation and equal allocation. Because Trinidad and Tobago 2006 MICS had relied on proportional allocation resulting in sample sizes that were too small to yield reliable estimates in the Eastern region and in Tobago, 2011 MICS relied on disproportionate allocation based on the three alternative allocation principles - a square root allocation, a cube root allocation and an equal allocation.

SAMPLING FRAME AND SELECTION OF CLUSTERS

The survey team examined the possible sampling frames at CSO. One option was a sampling frame based on the old administrative regions consisting of counties and wards, and a table of equivalence that links the former structure to a new set of administrative regions consisting primarily of regional corporations, two cities, three boroughs and the island of Tobago with its seven parishes. The survey team also discussed about using a sampling frame that was developed to undertake work done for the Pan- American Health Organization (PAHO) and which was based on an automatic system for sample selection. It was prepared in December 2009 and consisted of a listing of all the EDs by region, along with their size estimates. The PAHO frame was considered ideal for Trinidad and Tobago 2011 MICS and was used for the selection of clusters.

Separate lists of enumeration districts have been prepared for Trinidad and for Tobago. The lists for Trinidad had to be disaggregated to reflect the four health regions on the island. The lists had to be cleaned as a number of EDs had no measure of size to the extent that it was appropriate to insert the latest available figure, from either the 2000 census or some more recent survey. A few EDs were extremely small and had to be combined with neighboring EDs before the sample was drawn. In contrast, some other EDs were very large, and had to be segmented, either in the frame before drawing the sample or in the field if a large ED was selected.

The enumeration districts were defined as primary sampling units (PSUs), and were selected from each of the sampling strata by using systematic pps (probability proportional to size) sampling procedures, based on the number of households in each enumeration district. The first stage of sampling was thus completed by selecting the required number of enumeration districts from each of the five regions.

LISTING ACTIVITIES AND SELECTION OF HOUSEHOLDS

Lists of households were prepared by the listing teams in the field for each enumeration district. The households were then sequentially numbered at the Central Statistical Office from 1 to the total number of households in each ED, and a selection of 15 households in each ED was carried out using random systematic selection procedures.

Response Rate

- Household response rate 92.6
- Women's overall response rate 86.3
- Under-5's overall response rate 90.7

Weighting

The Trinidad and Tobago MICS sample is not self-weighting, since different sampling fractions (based on a cube root allocation) were used for each region. For this reason, sample weights were calculated and these were used in the subsequent analyses of the survey data.

The major component of the weight is the reciprocal of the sampling fraction employed in selecting the number of sample households in that particular sampling stratum (h) and PSU (i).

Since the estimated number of households in each ED (PSU) in the sampling frame used for the first stage selection and the updated number of households in the ED from the listing were different, individual sampling fractions for households in each sample enumeration area (cluster) were calculated. The second stage probability in this formula refers to the proportion of the sample ED that is listed, in the case of a large sample ED that is segmented; for the remaining sample EDs this probability is 1. The sampling fractions for households in each enumeration district (cluster) therefore included the first stage probability of selection of the ED in that particular sampling stratum, any second stage probability, and the last stage probability of selection of a household in the sampled ED (cluster).

A second component in the calculation of sample weights takes into account the level of non-response for the household and individual interviews. The adjustment for household non-response is equal to the inverse value of:

$$RR_h = \text{Number of interviewed households in stratum } h / \text{Number of occupied households listed in stratum } h$$

After the completion of the fieldwork, response rates were calculated for each sampling stratum. These were used to adjust the sample weights calculated for each cluster within the stratum.

Similarly, the adjustment for non-response at the individual level (women and under-5 children) for each stratum is equal to the inverse value of:

$$RR_{hi} = \text{Completed women's (or under-5's) questionnaires in stratum } h / \text{Eligible women (or under-5s) in stratum } h$$

The non-response adjustment factors for women's and under-5's questionnaires were applied to the adjusted household weights. Numbers of eligible women and under-5 children were obtained from the roster of household members in the Household Questionnaire for households where interviews were completed.

The design weights for the households were calculated by multiplying the above factors for each ED. These weights were then standardized (or normalized), one purpose of which is to make the weighted sum of the interviewed sample units equal the total sample size at the national level. Normalization is achieved by dividing the full sample weights (adjusted for nonresponse) by the average of these weights across all households at the national level. This is performed by multiplying the sample weights by a constant factor equal to the unweighted number of households at the national level divided by the weighted total number of households (using the full sample weights adjusted for nonresponse). A similar standardization procedure was followed in obtaining standardized weights for the women's and under-5's questionnaires.

Normalized sample weights were appended to all data sets and analyses were performed by weighting each household, woman or under-5 with these sample weights.

Questionnaires

Overview

Three sets of questionnaires were used in the survey: 1) a household questionnaire which was used to collect information on all de jure household members (usual residents), the household, and the dwelling; 2) a women's questionnaire administered in each household to all women age 15-49 years; and 3) an under-5 questionnaire, administered to mothers (or caretakers) for all children under 5 living in the household.

The Questionnaire for Children Under Five was administered to mothers (or caretakers) of children under 5 years of age¹ living in households where interviews were conducted. Normally, the questionnaire was administered to mothers of under-5 children; in cases when the mother was not listed in the household roster, a primary caretaker for the child was identified and interviewed.

The questionnaires are based on the MICS4 model questionnaire. From the MICS4 model English version, the questionnaires were customized and pretested during the third quarter of 2011. Based on the results of the pre-test, modifications were made to the wording of the questionnaires.

In addition to the administration of questionnaires, fieldwork teams tested the salt used for cooking in the households for iodine content, observed the place for handwashing, and measured the weights and heights of children age under 5 years.

Data Collection

Data Collection Dates

Start	End	Cycle
2011-11	2011-12	N/A

Data Collection Mode

Face-to-face [f2f]

DATA COLLECTION NOTES

Training for the fieldwork was conducted for 10 days between October 24th and November 4th, 2011. Training included lectures on interviewing techniques and the contents of the questionnaires, and mock interviews between trainees to gain practice in asking questions. Towards the end of the training period, trainees spent 5 days in practice interviewing in the following locations: Four Roads Tamana, Cedros, Point Fortin, Barrack pore, San Fernando, St. Augustine, Petit Bourg, California, Cocoyea, Princes Town, Mayaro and Edinburgh.

The data were collected by 12 teams; each consisting of 4 interviewers, one editor and a supervisor. There was a field-co-ordinator overseeing the field work activities and reporting to a survey co-ordinator. Twenty-six nurses were separately trained to perform the anthropometric measurements. The anthropometry training took place on December 1st, 2011. Given that some nurses dropped-out before the field work, some regions and teams were left without a trained measurer and had to rely on supervisors and other team members who were trained during the pre-test. Due to the challenges with recruiting the nurses, the anthropometry module was not completed at the same time as the other modules of the questionnaire. This resulted in a back log which continued to increase due to the shortage of nurses in some regions. This situation could not continue and the survey team had to temporarily stop the fieldwork and focus on reducing the number of children to be measured. Fieldwork began in November 2011 and concluded in December 2011.

Data Processing

Data Editing

Data were entered using the CSPro software. The data were entered on 10 microcomputers and carried out by 10 data entry operators. There were also a data processing supervisor, a data entry supervisor and 3 secondary editors to reinforce quality control standards. All questionnaires were double-entered and internal consistency checks were performed. Procedures and standard programs developed under the global MICS4 programme and adapted to the Trinidad and Tobago questionnaire were used throughout. Data processing began simultaneously with data collection on November 14th, 2011 and was completed in June 2012. According to the original schedule of activities, the completion date for data processing was January 13th, 2012. The delays in completion were mainly due to: incomplete questionnaires, discrepancies in the data, slow pace of some data entry operators, and non-adherence to the data processing process. Data were analysed using the Statistical Package for Social Sciences (SPSS) software program, Version 18. Model syntax and tabulation plans developed by UNICEF were customized and used for this purpose.

Data Appraisal

Estimates of Sampling Error

The sample of respondents selected in the 2011 Trinidad and Tobago Multiple Indicator Cluster Survey is only one of the samples that could have been selected from the same population, using the same design and size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability between the estimates from all possible samples. The extent of variability is not known exactly, but can be estimated statistically from the survey data.

The following sampling error measures are presented in this appendix for each of the selected indicators:

- Standard error (se): Standard error is the square root of the variance of the estimate. For survey indicators that are means, proportions or ratios, the Taylor series linearization method is used for the estimation of standard errors. For more complex statistics, such as fertility and mortality rates, the Jackknife repeated replication method is used for standard error estimation.
- Coefficient of variation (se/r) is the ratio of the standard error to the value (r) of the indicator, and is a measure of the relative sampling error.
- Design effect (deff) is the ratio of the actual variance of an indicator, under the sampling method used in the survey, to the variance calculated under the assumption of simple random sampling based on the same sample size.
- The square root of the design effect (deft) is used to show the efficiency of the sample design in relation to the precision. A deft value of 1.0 indicates that the sample design of the survey is as efficient as a simple random sample for a particular indicator, while a deft value above 1.0 indicates an increase in the standard error due to the use of a more complex sample design.
- Confidence limits are calculated to show the interval within which the true value for the population can be reasonably assumed to fall, with a specified level of confidence. For any given statistic calculated from the survey, the value of that statistic will fall within a range of plus or minus two times the standard error ($r + 2.se$ or $r - 2.se$) of the statistic in 95 percent of all possible samples of identical size and design.

For the calculation of sampling errors from MICS data, programs developed in CPro and SPSS Version 18 Complex Samples module have been used.

Related Materials

Questionnaires

Trinidad and Tobago - Multiple Indicator Cluster Survey 2011: Questionnaire

Title Trinidad and Tobago - Multiple Indicator Cluster Survey 2011: Questionnaire
 Filename Questionnaire.pdf

Reports

Trinidad and Tobago - Multiple Indicator Cluster Survey 2011: Key Findings & Tables

Title Trinidad and Tobago - Multiple Indicator Cluster Survey 2011: Key Findings & Tables
 Country Trinidad and Tobago
 Language English
 Filename Trinidad and Tobago 2011 MICS_English.pdf

Technical documents

MICS4 Survey Planning Tools

Title MICS4 Survey Planning Tools
 Filename <http://mics.unicef.org/tools?round=mics4>

MICS4 Sampling Tools

Title MICS4 Sampling Tools
 Filename <http://mics.unicef.org/tools?round=mics4>

MICS4 Indicator List

Title MICS4 Indicator List
 Filename <http://mics.unicef.org/tools?round=mics4>
