Pacific Training on Sampling Methods for Producing Core Data Items for Agricultural and Rural Statistics

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Module 2: Review of Basics of Sampling Methods
Session 2.1: Terminology, Concepts and Definitions

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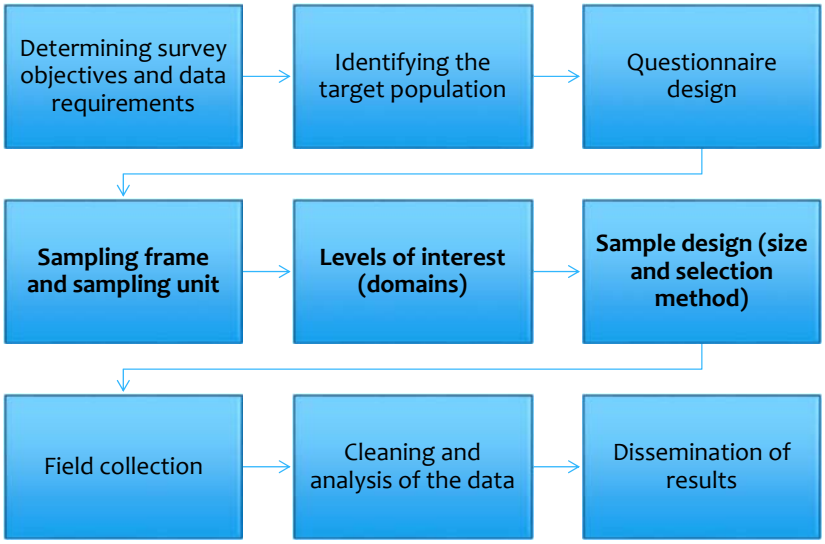
Topics Covered

* Steps to Survey Design
* Survey Objectives
* Population of interest
* Target v Sample Population
* Survey Outputs
* Survey Units
* Methods of measurement
* Levels of Interest – domains
* Sample Size

Statistical Survey Design – Steps involved



Survey Objectives

- The starting point of any survey, whether it be a census or sample survey, is to determine the objectives
  - All objectives
  - Not just the main ones
- There are generally numerous objectives associated with a survey
  - Eg, HIES
    - Re-base CPI
    - Provide inputs into National Accounts
    - Poverty Analysis
    - Analyze the importance of Agriculture and Fisheries to Household Income

Survey Objectives (cont)

* How do we achieve this?
  * Need to undertake discussions with key users
* Who are the key users?
  * They're the people pushing for the survey to take place
* The process may involve numerous discussions over a period of time
  * BUT IT'S IMPORTANT TO GET IT RIGHT!!

Survey Objectives (cont)

* It's often the role of the Survey Statistician to assist the key users with determining survey objectives
* Why?
  * Often key users aren't exactly sure what they want or can get from the survey
  * The Survey Statistician is often in a better position to know what is feasible (experience)
  * Costs and Timing are often important factors
    * An area of the Survey Statistician's experience

Target Population v Sample Population

The key first stage of any survey design is knowing the population you wish to make statements about. The population could be anything:

* Small businesses (50 or less employees)
* All households in the urban population of a country
* Households involved in Fishing activities in rural communities

Population of Interest (cont)

* There are different types of populations
  * Target population
  * Sample population
* Target population
  * The set of units we want to collect information from - Scope
* Survey population
  * The set of units we can collect information from – Coverage
* Ideally we want Target population = Survey population

Target Population v Sample Population

Examples of differences

* Remote islands with very small populations not covered
* Homeless people not included in a household Labour Force Survey

Survey Outputs

* Once the Survey Objectives & Population of interest have been determined, the desirable survey outputs should be drafted
* These outputs may be in the form of:
  * Tables
  * Graphs
  * Summary Statistics
* The outputs should relate directly to ALL the objectives of the survey

Survey Outputs

* Outputs should be drafted up to meet all the survey objectives
* If an output is produced which doesn't relate to the survey objectives then either:
  * Add it to the survey objectives if it is required

    or
  * Delete the output

The survey units

* There are different types of survey units:
  * Selection Unit
  * Reporting Unit
  * Tabulation Unit
* Usually these units are the same but not always

The survey units

* Selection Unit: The unit in the sample that is selected
* Reporting Unit: The unit that responds to the survey
* Tabulation Unit: The unit for which results are presented

Example of different units for a survey (HIES)

* Select Dwellings in the survey
* Individuals & Households Report to the survey
* Tabulate Household results

Method of measurement

* The are numerous ways to collect the information
* Some common methods are:
  * Face-to-face interview
  * Self enumeration
  * Mail out survey form
  * Phone interview
  * Administrative records

Method of measurement

- The choice of measurement depends on:
  - The most effective way to get accurate results
  - Cost constraints
  - Time constraints
  - Confidentiality issues
- Many surveys conducted outside the Government (in particular the NSO), ignore the first point and produce unreliable results

Levels of interest (Domains)

- Who do you want to produce results for?
- Is it Agricultural Farmers as a whole, or is it more important to produce results for sub-populations for comparative reasons. For example:
  - By geographical region
    - Urban/Rural, Province, Village, etc
  - By size of farm
  - By type of produce
- The more sub-populations you wish to produce information for the larger the sample size would be.
  - The smaller the sub-population that you have, the larger the sample fraction you are required to select.

Sample Size

Factors which impact on sample size

* Population Size
* Accuracy requirements
* Sample selection methodology
* Domains of interest
* Degree of variation in data being collected

Determining the Sample Size

* In theory, the correct way to determine the sample size for a survey is:
  * Identify the key variables in the survey
  * Determine the accuracy requirements for these variables
  * Select a sample large enough to meet these requirements

NB: the sample selection methodology also impacts on the size of the sample required

Determining the Sample Size

For a simple random sample the formula is:

$$n \geq \frac{1}{\left(\frac{1}{N} + \frac{RSE(\hat{\bar{Y}})^2 \times \hat{\bar{Y}}^2}{s^2} \right)}$$

n = Sample size

N = Population size

$\hat{\bar{Y}}$ = Estimate of mean of variable Y

s^2 = Measure of spread of variable Y

$RSE(\hat{\bar{Y}})$ = Accuracy requirement of variable Y

Determining the Sample Size

- In reality, you generally don't have previous survey data of sufficient quality in which to undertake the necessary calculations
- So what happens?
  - The finances available for the survey generally control the sample size (within reason)
  - You make an educated guess to some degree as to what an appropriate sample size will be