



# ITU Asia-Pacific Regional Workshop on ICT Indicators

## Ha Noi, Viet Nam

### 2-4 October 2019

## Talking to the NSO



ICT Data and Statistics Division  
Telecommunication Development Bureau  
International Telecommunication Union



# Engaging the NSO

- The NSO is a major stakeholder in the production and use of ICT statistics.
- Research into your country's NSO
  - Statistical Legislation
  - Surveys conducted on a regular basis
    - Household
    - Enterprise / Establishment
    - Macro-economic indicators : National accounts etc
  - Website
  - Publications
  - NSDS (National Strategy for the Development of Statistics)
  - 5 year plans etc



# Engaging the NSO

- Hold discussions within your own organisation on your ICT data needs.
  - Survey rationale
  - Data to collect plus definitions
    - Globally harmonised data
    - Specific data for national needs
  - Domains of estimation
  - Confidence levels
  - Accuracy
  - Frequency of repeat surveys
  - \$\$\$



# Engaging the NSO

- Coordination with the NSO in terms of ICT household survey does not mean passing the message then leaving everything to them.
- The regulator / ministry has no less an important role to play.
- Learn the basic “survey-speak” in order to coordinate effectively with the NSO in the conduct of ICT household survey.

# Engaging the NSO

## Some survey-speak

- Primary (1<sup>o</sup>) data vs secondary (2<sup>o</sup>) data / admin records
- Census vs sample survey

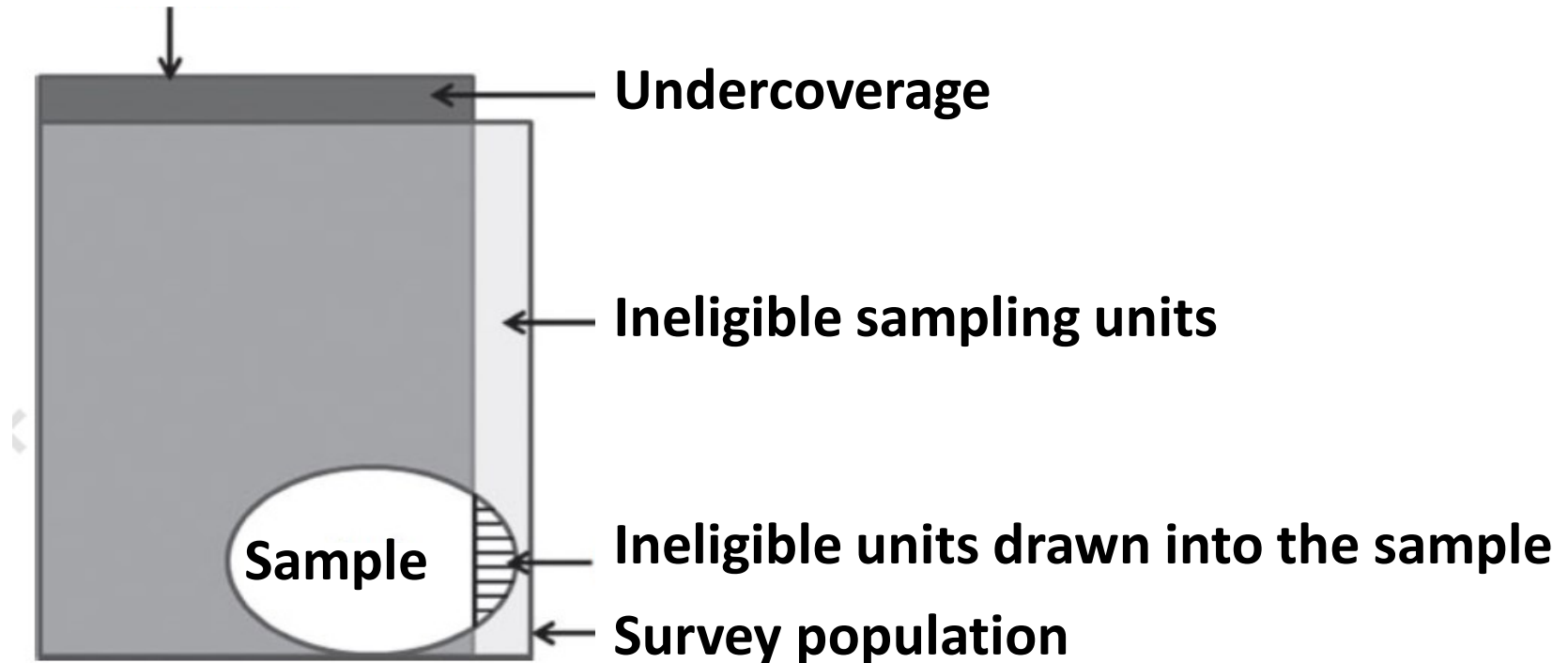


# Engaging the NSO

Some survey-speak

- **Target population vs survey population**

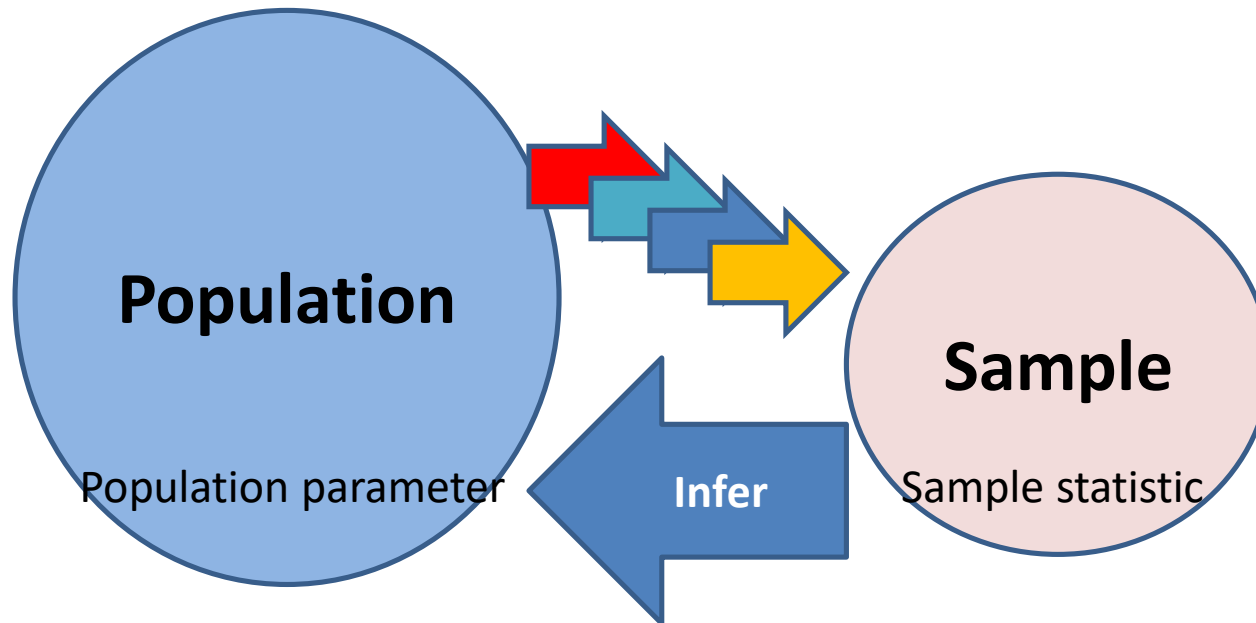
Target population



# Engaging the NSO

## Some survey-speak

- Sample statistic
- Population parameter





# Engaging the NSO

Some survey-speak

## Sampling

- Simple Random Sampling (SRS)
  - Each statistical unit has the same chance of selection
- Complex sampling
  - Primary sampling Units
  - Strata (eg urban /rural)
  - Cluster
- Sample size and allocation





# Engaging the NSO

Some survey-speak

- Response rate or non-response rate
- Confidence level
- Confidence interval
- Margin of error
- Sample size

# Engaging the NSO

Some survey-speak

Sample size formula

$$n = \frac{(z^2)(r)(1-r)}{(e^2)}$$



$$n_h = \frac{(z^2)(r)(1-r)(f)}{(p)(\tilde{n})(e^2)(k)}$$

where  $n_h$  is the sample size in terms of number of **households** to be selected.

- The above formula is for sample size to estimate proportions in one statistical domain.
- Different formula for sample size to estimate means.



# Engaging the NSO

## Some survey-speak

$$n_h = \frac{(z^2)(r)(1-r)(f)}{(p)(\tilde{n})(e^2)(k)}$$

- $z$  is a number that defines the level of confidence desired. (95%:1.96; 90%:1.645; 99%: 2.58)
- $r$  is an estimate of a key indicator to be measured by the survey.
- $f$  is the sample design effect (deff).



# Engaging the NSO

## Some survey-speak

$$n_h = \frac{(z^2)(r)(1-r)(f)}{(p)(\tilde{n})(e^2)(k)}$$

- $p$  is the proportion of the total population accounted for by the target population and upon which,  $r$ , is based.
- $\tilde{n}$  is the **average household size**.
- $e$  is the margin of error to be attained.
- $k$  is the response rate (as opposed to non-response rate).

Designing Household Survey Samples: Practical Guidelines, UN, 2005 (with modifications)  
WHO STEPS sample\_size\_calculator.xls (with modifications)



# Engaging the NSO

## Some survey-speak

### Finite population correction or fpc

- Finite population correction must be applied when the calculated sample size turns out to be a large percentage of the population size ( $>10\%$ ).
- Rarely needed in large –scale national household surveys of the type considered here.



# Engaging the NSO

## Some survey-speak

$$\text{new } n = \frac{n_h}{1 + \frac{n_h}{\text{population}}}$$

- Where "population" refers to the target population for a given estimate, not the entire target population.

# Engaging the NSO

## Some survey-speak

- Sampling variation / Sampling errors
- Dedicated surveys vs riders


We'd like you to carry these 4 questions in your survey, tabulate them according to our specifications, estimate the population totals, means and proportions and calculate the standard errors for us.



# Engaging the NSO

## Some survey-speak

- Data collection methods
  - Direct observation
  - Postal
  - F2F
  - Telephone
  - CATI
  - CAPI
  - CAWI
  - Online

A large blue thought bubble with a smaller one below it, containing the text 'Let's move on to good practices'.

Let's move on to  
good practices





# Engaging the NSO

## Some items for discussion

- *ITU Manual for Measuring ICT Access and Use by Households and Individuals* in particular model questionnaire plus updates from EGH
- Additional data to be collected for national interest
- Statistical domains
- Confidence level and precision
- Tabulation
- When the data is required as well as ITU reporting cycle.
- How to report data to ITU.
- Register NFP / update contact details with ITU
- Documentation and report writing.
- Offer to be there during training
- \$\$\$



# Good practices

- Surveys usually done by the NSO and assumed as such in this presentation.
- Legal backing to collect data, usually the Statistics Law or Act or some other law that provides for compliance and confidentiality.
- Survey methodology must be scientific and based on probabilistic sampling. The skill to do this is with the statisticians in the NSO.



# Planning of surveys

- Objectives
  - A clear statistical statement on the desired information, giving a clear description of the population and geographical coverage. How the results are going to be used. Budget. Stakeholders.
- Survey universe
  - Geographical areas ,Target population, exact population sampled to be identified, first stage units, second stage units, comprehensive and mutually exclusive frames for every stage of selection.



## Planning of surveys

- Information to be collected
  - List of questions requiring statistical answers, availability of some required data in existing sources, include supplementary items that are correlated with main items, tabulation plan, tabulation plan to be circulated for comments and improvement
- Survey budget
  - Cost estimates as detailed as possible, every survey step exacts a cost, Survey budget will depend largely on survey design, precision required, geographical coverage, judicious cost control, accountability enhances credibility.



# Survey Costing

	Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
<b>I. Planning and preparatory activities</b>			
<b>A. Initial planning and subsequent monitoring</b> (senior staff)			
<b>B. Selection and specification of subject matter</b>			
<b>1. Subject-matter planning</b>			
<b>2. Preparation of tabulation plans</b>			
<b>3. Secretarial and other services</b>			
<b>C. Development of survey design</b>			
<b>1. Initial design planning: survey structure, population coverage, sampling procedures, data-collection methods, etc.</b> (professional staff)			
<b>2. Development of sampling materials:</b>			
a) Cartographic materials (assumes census materials available): Personnel costs Maps and supplies			
b) Field household listings (2,000 enumeration areas): Personnel costs (mainly interviewers) Travel costs			
c) Sample selection and preparation from field lists			



## SURVEY COSTING

Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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### D. Design and printing of questionnaires and other forms

1. Professional staff

2. Secretarial and other services

3. Printing costs (after pretests)

### E. Pretesting

1. Professional staff planning:

a) Initial preparations

b) Analysis of results and revision of materials

2. Field supervisor:

a) Personnel costs

b) Travel costs

3. Interviewers:

a) Personnel costs

b) Travel costs



## SURVEY COSTING

Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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**F. Preparation of instructional and training materials for field use**

1. Professional staff
2. Secretarial and other services
3. Reproduction costs

**G. Miscellaneous planning activities**  
(for example, public relations and publicity)

**H. Subtotal components**

1. Senior staff
2. Professional staff
3. Technical staff
4. Service staff
5. Travel
6. Printing
7. Cartography and miscellaneous

**Subtotal**



## SURVEY COSTING

Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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### II. Field operations

#### A. Training of field supervisors

1. Personnel costs
2. Lodging and meals
3. Travel costs

#### B. Training of interviewers

1. Supervisor costs
2. Interviewer costs:
  - (a) Personnel costs
  - (b) Travel costs

#### C. Data collection (including quality control)

1. Supervisor costs
2. Interviewer costs:
  - (a) Personnel costs
  - (b) Travel costs

#### D. Field administration

1. Field direction
2. Travel
3. Other costs  
(for example, control and shipment of materials)





## SURVEY COSTING

Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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### E. Subtotal components

1. Professional staff
2. Technical staff
3. Service staff
4. Travel
5. Travel subsistence
6. Interviewing
7. Miscellaneous

**Subtotal**



## SURVEY COSTING

Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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### III. Data processing

#### A. Systems planning

#### B. Computer programming

#### C. Clerical coding

##### 1. Initial coding

##### 2. Quality control

##### 3. Supervision

#### D. Key-to-disk operations

##### 1. Initial keying

##### 2. Quality control

##### 3. Supervision

#### E. Computer time (including operator and maintenance costs)

#### F. Miscellaneous processing costs (supplies, etc.)

#### G. Subtotal components

##### 1. Professional staff

##### 2. Technical staff

##### 3. Quality control staff

##### 4. Service staff

##### 5. Computing

##### 6. Miscellaneous

### Subtotal

## SURVEY COSTING

	Estimated units of work (person-months except where otherwise indicated)	Unit cost (relevant unit of currency per person-month, except where otherwise indicated)	Estimated total cost (relevant unit of currency)
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<b>IV. Data review and publication</b>			
<b>A. Professional time</b>			
<b>B. Publication costs</b>			
<b>V. Survey direction and coordination</b> (continuing oversight over all activities)			
<b>VI. Subtotal</b>			
<b>VII. Evaluation studies and methodological research</b> (may be estimated at 10 per cent of cumulative total)			
<b>VIII. General overhead</b> (may be estimated at 15 per cent of cumulative total for administrative costs, space rental, general supplies and the like)			
<b>IX. Total</b>			

Source: United Nations (1984).



## Timeframe for survey steps

1	Meeting with stakeholders (users and producers)	1 month
2	Preparatory activities	3 months
3	Initial questionnaire design	2 months
4	Send questionnaires to user committee members	1 month
5	Include in questionnaire agreed suggestions	1 month
6	Draft interviewer's and supervisor's manuals	2 months
7	Print questionnaires and manuals (coding questionnaire into CAPI)	1 month



## Timeframe for survey steps

8	Make plans for pretest	1 month
9	Train interviewers and supervisors	2 months
10	Conduct the pretest	1 month
11	Revise questionnaire (if need be)	1 month
12	Revise manuals (if need be)	1 month
13	Sample design	1 month
14	Design and test data entry programme (s)	1 month
15	Design and test data cleaning programme (s)	1 month
16	Data collection	3 months



## Timeframe for survey steps

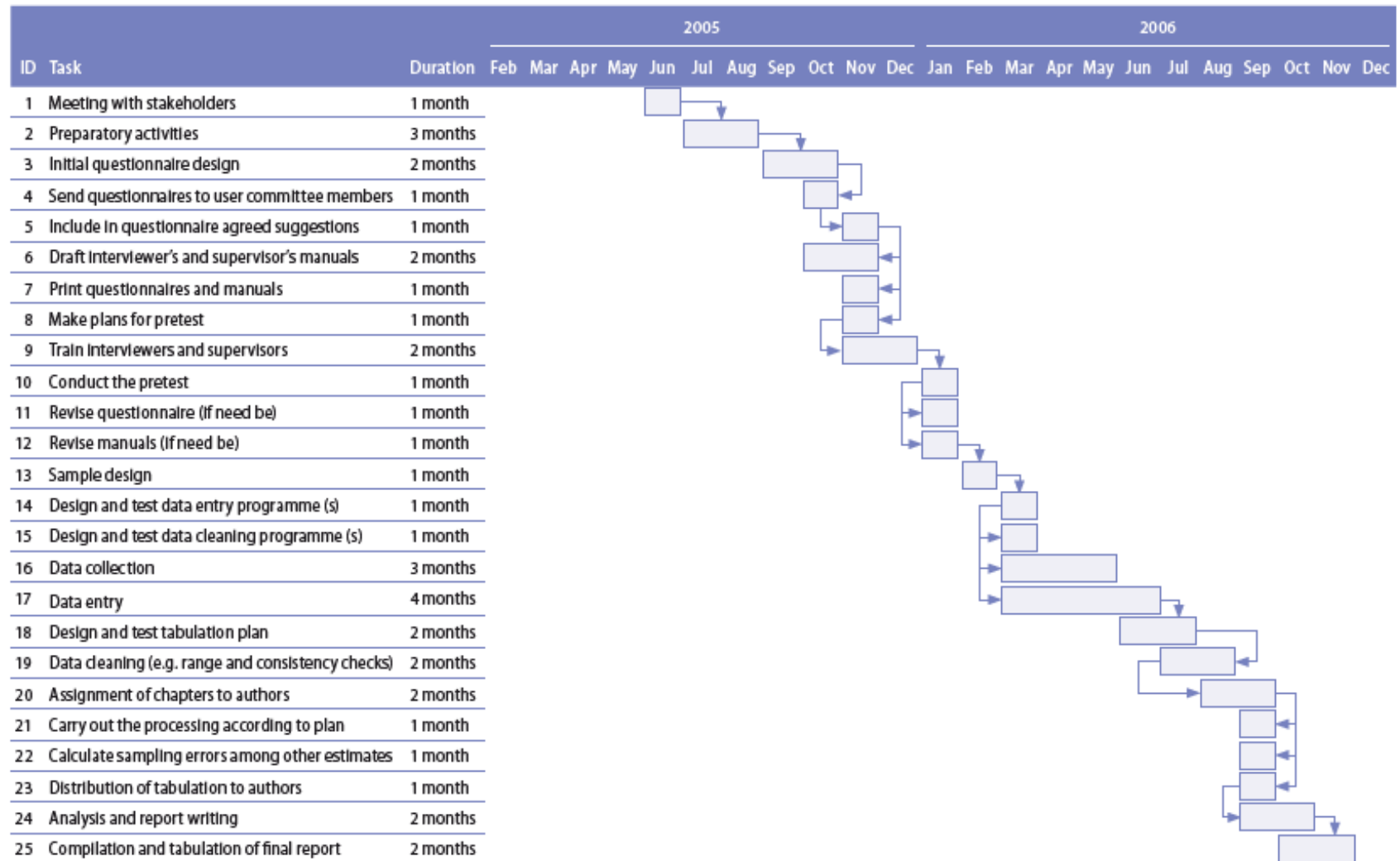
17 Data entry	4 months
18 Design and test tabulation plan	2 months
19 Data cleaning (e.g. range and consistency checks)	2 months
20 Assignment of chapters to authors	2 months
21 Carry out the processing according to plan	1 month
22 Calculate sampling errors among other estimates	1 month

## Timeframe for survey steps

23 Distribution of tabulation to authors	1 month
24 Analysis and report writing	2 months
25 Compilation and tabulation of final report	2 months

# Timeframe for survey steps

Time-table of household survey activities for country X







# Execution of surveys

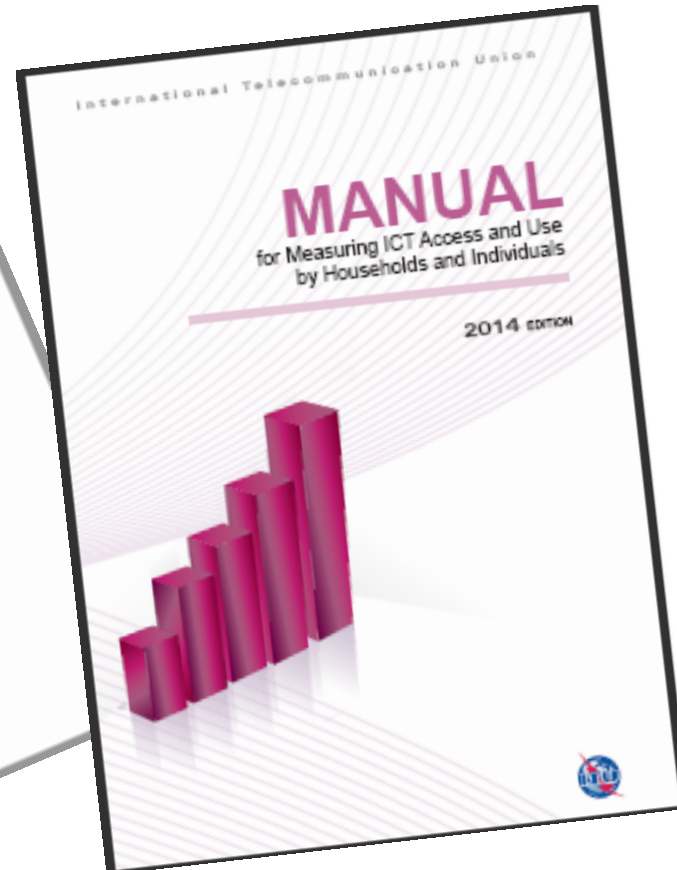
- Data collection methods
  - Direct observation and measurement, mail, personal interview (incl telephone, CATI, CAPI ) online including web and CAWI
  - Response rate
- Questionnaire design
  - Size and format, suited to data collection mode, questions grouped in relevant sections, proper sequencing, easy reading, clear instructions, definitions, operational equivalents pre-testing (pilot)
  - For ICT access and Use by Households and Individuals, use globally accepted standard such as the model questions contained in ***Manual for Measuring ICT Access and Use by Households and Individuals.***
  - Translation into local language must be done by an expert and tested on the ground



# Execution of surveys

- Tabulation and analysis plan
  - Tabulation plans, dummy tables, titles, stubs and captions, substantive variables, background variables, population groups, categories of classification
- Implementation of fieldwork
  - Need for a well-organised and effective field organisation
  - Equipment and materials
  - Management of survey operations, clear well defined line of command
  - Publicity
  - Selection of interviewers
  - Training of interviewers
  - Field supervisors
  - Follow-up of non-respondents
  - Reducing non-response

# 2 mainstays





# **International Standard Classifications used in Core Questionnaire**

- COICOP- Classification of Individual Consumption According to Purpose by UNSD
- ISCED - International Standard Classification of Education by UNESCO
- ICSE-93 – International Classification of Status in Employment by ILO
- ISCO – International Standard Classification of Occupations by ILO



- Age classes: under 5, 5-9, 10-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75 and over



# Documentation

“Documentation and evaluation of sample designs in particular and survey methodology in general are too often neglected in the rush to release survey findings. This is especially true in countries with little prior experience in conducting household surveys...”

*-UNSD*



# Documentation

## **A record of how it went**

- Keep careful records of the survey and sampling procedures as they are being carried out operationally in the survey process
- Sample plan, adaptations at various stages of field work
- To make sure the implementation is faithful to the design / record all departures
- For adjustments to be made in analysis
- Indispensable for planning future surveys



# Documentation

## Technical reports

- Fairly brief , user-friendly description of survey methodology, sample plan and implementation
- Limitations
- Comprise the technical section of the various substantive reports on findings

- Stand alone more detailed description of survey methodology
- Intended for professional researchers, social scientists and statisticians rather than policy maker / public
- Publish in statistical journal / Present at WTIS

- Special office to handle documentation





# References

- Designing Household Survey Samples: Practical Guidelines, UNSD, 2005
- Manual for Measuring ICT Access and Use by Households and Individuals, ITU, 2014
- Complex Survey Data Analysis with SAS, Lewis, 2017

Thank you



For more information  
<http://www.itu.int/ict>  
and  
[indicators@itu.int](mailto:indicators@itu.int)



# Planning a household survey

- Constantly review the purpose for which the eventual results will be used and what types of public policy or other decisions will rely on the results
- Good planning includes considering
  - Mechanisms for cooperating with policy-makers and other data users.
  - Establishment of a management and planning structure, for example, using an interdisciplinary survey team.

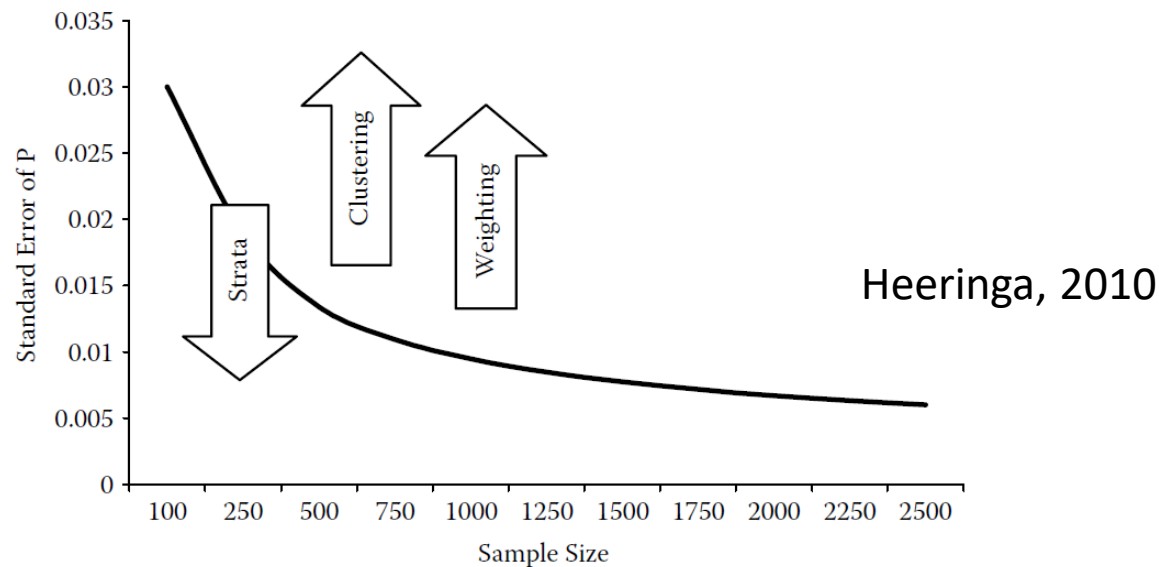


# Planning a household survey

- Purpose and data content of the survey
  - Availability of alternative sources of data
  - Possibility of riding on an existing survey
  - Estimation of resources required
- From the above considerations, a business case may be made out to seek approval and funding.

# Planning a household survey

- Survey scope
- Classification schemes
- **Survey design**





# Planning a household survey

- Adopt the model questions set out in the *ITU Manual for Measuring ICT Access and Use by Households and Individuals, 2014*
- Staff selection and training
- Staff supervision and monitoring
- Publicity
- Pilot
- Survey implementation
- Post-survey processes
- Further considerations are as follows:
- Available survey vehicle
- Adherence to existing statistical standards (eg core list of ICT household indicators, model questionnaire and tabulation scheme for ICT HH surveys)
- Timetable (From start to finish, 18 months, UNSD)
- Legal and related issues



# Sample documentation

1. Target population
2. Expected sample size
3. Main indicators
4. Report domains
5. Sampling frame
6. 1<sup>o</sup> and 2<sup>o</sup> sampling units
7. Stratification
8. Sample allocation
9. Sampling procedure
10. Selection probability
11. Sampling weights



# Sample documentation

12. Household listing results: number of households listed; number of households selected; segmentation information for each of the selected clusters
13. Results of survey implementation: number of eligible sampling units selected; the number interviewed; household and individual response rate
14. Sampling errors: for selected indicators in an appendix





# An extended lexicon

- Accuracy
- Consistency
- Efficiency
- Precision
- Reliability
- Robustness
- **Robust statistics** are **statistics** with good performance for data drawn from a wide range of probability distributions, especially for distributions that are not normal. **Robust statistical** methods have been developed for many common problems, such as estimating location, scale, and regression parameters.
- Unbiasedness

