Second Regional Training Course on Sampling Methods for Producing Core Data Items for Agricultural and Rural Statistics

9-20 November, 2015
Jakarta, Republic of Indonesia

COUNTRY REPORT

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Introduction:

Bangladesh is a unitary, independent and sovereign republic known as Peoples Republic of Bangladesh. She born out of the ashes of a fierce liberation war in 1971, is the ninth largest state of the world and occupies a third place in the Muslim world on the basis of population. She inherits a distinctive old civilization and cultural heritage. With ancient wisdom and dynamic traditions, Bangladesh is an attraction to the outsiders from time immemorial. Bangladesh emerged as an independent country on 26 March 1971. The war of liberation ended on 16 December 1971 in Victory of Bangladesh Forces and surrender of the Occupying Army.

Bangladesh is situated in the north-eastern part of South Asia, is bounded by India, Myanmar and the Bay of Bengal. Except for the hilly regions in the east and high lands in the north, the country is largely a low flat and fertile land washed by seven rivers and two hundred minor ones. Among the rivers the importance are the Padma, the Meghna, the Jamuna and the Brahmaputra. It lies between 20°34' and 26°38' north latitude and 88°01' and 92°41' east longitude. The climate is sub-tropical with temperatures ranging from a daytime low of 13°C in the cold season to a maximum of 37°C in the summer.

The total area of our land is 147,570 square kilometers. There were 32.1 million households in our country; total population was 149.77 million and population density 976 persons per square kilometer in Population & Housing Census 2011. About 76 % people live in the rural area. The sex ratio of our country is found to be 100. The growth rate of population is 1.37 per annum.

The state language and mother tongue is Bangla (Bengali). The country has a parliamentary form of Government. Dhaka, formerly Dacca, is the capital and the largest metropolitan city of the country. The national flag of the republic consists of circles colored red throughout its area, resting on a green rectangular background. The foreign policy of Bangladesh based on the principle-Friendship to all, Malice to none. It has a great prospect in foreign investment because of low wage of labour and vast labour power. Currency of the country is known as Taka (Tk.) divided in 100 paisas.

The citizens of Bangladesh are known as Bangladeshi.

The Organization: Bangladesh Bureau of Statistics (BBS)

The broad function of the BBS are to collect, compile, analysis and publish statistics on all sectors of the economy to meet the needs of development planning, research, policy and decision making. Apart from this, BBS is playing role in conducting different research activities, imparting training, organizing seminars, symposiums, workshops etc. for improving the standard of statistics as well as serving users through disseminating data after processing and analyzing by computers.

The BBS conducts its vital role in a national level decision making through eight functional wings and field offices.

- The wings are:
  - Agriculture Wing
  - Census Wing
  - Industry and Labour Wing
  - Demography and Health Wing
  - National Accounting Wing
  - Statistical Staff Training Institute (SSTI)
  - Computer Wing
  - Finance, Administration and MIS Wing

- The field offices are:

I) Divisional Statistical Office (7 Divisions);
II) District Statistical Office (64 Districts) and
III) Upazila Statistical Office (487 Upazila/sub-districts).

Among the wings Agriculture Wing is responsible for collecting and preparation of year round agricultural statistics of the country. Field offices are the main source to collect agricultural statistics of this wing. It collects about one hundred and twenty seven type of major and minor crops statistics, their cultivated land, production, yield rate etc. This wing prepares estimate of total land utilization, cost of production, monthly labour wage of the country. It also collects meteorological data and estimate damages of crops in natural disaster like flood, drought etc.

Agricultural Statistics:

Bangladesh is predominantly an agrarian country. The geographical condition of Bangladesh is favourable for growing more than one hundred crops and cash crops like rice, wheat, potato, jute, tea, maize, pulses, sugarcane, banana, mango, jackfruits, pineapple, guava, water-melon, lichi, papaya, brinjal, tomato and many other fruits and vegetables.

Agriculture is the single largest producing sector of the economy and contributes more than 17 % to gross domestic product (GDP) and almost 46% labour force of the country is engaged in this sector. Rice is the staple food for more than 145 million people in Bangladesh. In 2014-15 Bangladesh is the sixth largest rice producing country in the world.

Agricultural Data Collection:

Agriculture Statistics are mainly generated by BBS through Agriculture Census and Agriculture related surveys. For some cases administrative data from other sources are also used as official statistics.

The Objective Method is followed to provide annual estimates of six major crops such as three seasonal rice like Aus, Aman and Boro. Others are Wheat, Potato and Jute. Under this method, a total of 10,348 well-formed clusters throughout the country are used. On an average the size of a cluster is 2.02 hectares. The Sampling fraction is 1/ 520. Data collects four times a year from those clusters through direct observation and field experiments by the BBS field officials. In these clusters crop cutting experiments are done jointly with the field officials of BBS and Department of Agricultural Extension (DAE) under the Ministry of Agriculture.

The Subjective method, information are collected from the farmers through direct interview. This is mainly based on the subjective idea and previous experience of the farmer. Data obtained from this survey are the only source for 121 minor crops. But data of subjective source of six major crops are used for the purpose of validation.

Use of Satellite Imageries in Agriculture Statistics:

The satellite imageries obtained from remote sensing technology is used for the area estimation of Aman rice and Boro rice in Bangladesh. This data is also used for validation. The remote sensing technology is used by the Space Research and Remote Sensing Organization (SPARRSO) under the Ministry of Defense.

The sampling design recommended for rice yield estimation surveys is a stratified two-stage random sampling design with different districts in the country serving as the locations of study. Upazilas/sub-district is used as strata. The First Stage Units (FSUs) of the sampling design are the preselected clusters[1] of land. A Field in the cluster is the Second Stage Sampling Unit (SSU). A plot in the field, where the rice crop grown is selected for conducting the crop-cutting experiment. A circular plot of 20 square meter is demarcated randomly in the selected field.

The clusters in an Upazila may be designated as HYV, Hybrid variety or Local variety cluster depending on the dominant variety of paddy grown in that cluster. The three different categories of clusters may be treated as three second-stage strata.

Within an upazila, random samples of clusters are selected with Simple Random Sampling (equal probability for all units) without replacement sampling design. One field where rice crop is grown is randomly selected within the randomly selected cluster.

The total sample size is allocated to different strata on the basis of total rice area estimated in the previous years. The same principle should be followed for allocation of the sample to different varieties i.e. high yielding varieties, local varieties and hybrids within the strata. Estimates should be generated first at the stratum level and then in turn combined with appropriate weightage to produce the district and national level yield estimates.

[1] Over 10 thousand land segments (called clusters) were preselected as a master sampling frame for the crop estimation surveys. In order to maintain continuity with the past sampling design, these preselected clusters were taken as the First Stage Sampling Units.

Area Estimation formula:

Area for a crop for the district = Effective Area for the district × Area Ratio devoted to the crop for the district.

Where, Effective Area = (total land area of the district – urban area – government reserved forest area – big rivers area).

Area ratio devoted to the crop for the district = (sum of area devoted to the crop from plots within the clusters for the district) ÷ (sum of areas of corresponding clusters for the district)

Production Estimation (objective method) Formula:

District level production estimates are computed by the following formula:

Production (variety-wise) for the district = Area × Yield rate

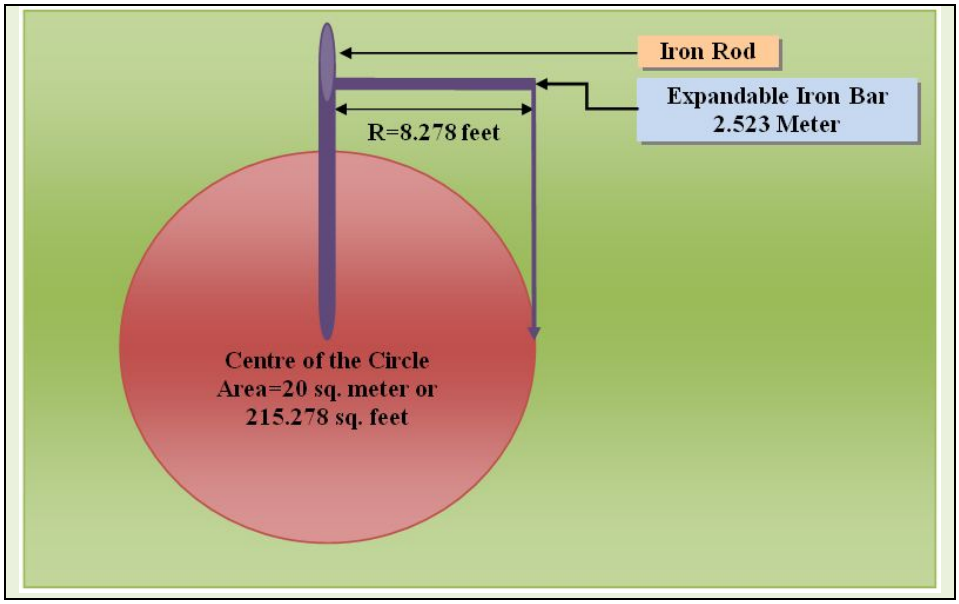
Crop Cutting (Objective Method):

Sample Crop Cutting Method of Rice (Aus, Aman and Boro):

The method followed is a circular cut of total area 20 square meter (215.278 sq. ft.) with a radius of 8.278 ft. In sample plot selected following statistical procedure, one random point is determined and keeping that point in the centre, the circles is delineated by means of an appliance with an arm of fixed length (8.278 ft) attached to it. A stylus is also attached for marking crop plants to be cut. Rice from the harvested sample plants is threshed and winnowed and green weights are recorded. For recording the moisture, moisture meter is used. In Bangladesh 14% moisture in the case of paddy is considered as standard after drying. The formula for conversion of produce of paddy in to rice followed in Bangladesh is given below:

$$\text{Rice} = \frac{2}{3} \times \text{Paddy}$$

Graph of Sample Crop (Rice) Cutting Instrument



Sample Crop Cutting Method of Wheat

The sample crop cutting is conducted in the selected plot in the selected cluster. The sample plot (area of crop cutting) is determined following statistical procedure. The method followed is a circular cut of total area 50 square feet (approximate) with a radius of 4 feet. Wheat from the harvested sample plants is threshed and winnowed and green weights and weight after drying is recorded. Thus, the weighted yield of wheat per area is obtained.

Sample Crop Cutting Method of Potato

To conduct sample crop cutting for potato, a field in the randomly selected cluster is randomly selected. As potato is planted in rows, two rows are randomly selected among total. Then the area under selected row is measured through adding the length in feet of each selected row multiplied by the average width per row in the field .Afterwards the Potato for selected two rows are harvested and cleaned. Then taking the harvested area and the weight of harvested Potato into consideration, the yield rate is estimated.

Sample Crop Cutting Method of Jute

The sample crop cutting is conducted in the selected plot of the selected cluster. The sample plot (area of crop cutting) is determined following statistical procedure. The method followed is a circular cut having total area of 50 square feet (approximate) with a radius of 4 feet. The bundle of Jute is kept under water for few days. After some days the rotten jute is separated from the stalks, peeling, washing, cleaned and dried. Then the weight is taken and the yield rate is estimated.

Supervision and Quality Control

Strong supervision and quality control measures were taken during data collection. Altogether 64 Deputy Directors of District Statistical offices were appointed to supervise field work. Moreover, 7 Joint Directors of Divisional Statistical offices were also engaged for overall supervision.

Sampling Methods for Production of Livestock Statistics:

Sampling Design

The Sampling design in this case is taken as a stratified two-stage cluster sampling method where in the first stage EAs (Enumeration Area) defined by the 2008 Agricultural Census are selected and within the selected EA, households are selected systematically.

(a) Stratification

Primarily the whole country is divided into 3 strata- (i) Metropolitan area consisting of municipalities of 6 Metropolitan cities, (ii) Urban area consisting of municipalities of other district towns, (iii) Rural area consisting of remaining areas of the country. A second band of stratification is made where six administrative divisions of the country are considered to be strata. This two way stratification will result in an ultimate nine strata.

For each stratum, sampling design is basically a two-stage cluster sampling with EAs being the first stage sampling units for each of the strata.

(b) Design of Survey Questionnaire, Field Manual and Pre-test

The questionnaire and a detailed field manual were developed for field operation of the survey. The questionnaire was tested at the field level before finalizing it.

(c) Training and Fields Operation

The survey was conducted during 14-20 May 2009. Before conducting the survey, an exclusive training programme (two-day long) for the master trainers was held at the BBS headquarters in Dhaka. The master trainers conducted two day's training programme for enumerators at regional offices.

(d) Supervision and Quality Control

Strong supervision and quality control measures were taken during data collection. Altogether 23 Regional Statistical officers and 15 Statistical officers were appointed to supervise field work. Moreover, 7 senior level officers from headquarters were engaged for overall supervision.

(e) Data Editing, Data Entry and Data Processing

After completion of the field work, the filled-in questionnaire was edited. An instruction manual for editing job was developed and subsequently data editors were trained. 'FoxPro' computer software was used for capturing and processing the survey data. Finally precision of the estimates were determined using SPSS.

Guidelines of International Organizations followed by BBS:

BBS follows the recommendations of United Nations Statistical Commission (UNSC). Bangladesh Bureau of Statistics conducts Agriculture Census and surveys related to agriculture following the guidelines of Food and Agriculture Organization of the United Nations (UNFAO).

FAO has given technical and financial contribution to Agriculture Census 2008 in Bangladesh. Now BBS is taking preparation for conducting Agriculture Census including crops, livestock and fisheries together. BBS is in the process of implementation of the Global Strategy to Improve Agricultural and Rural Statistics with the technical guidance of FAO.

A Crop Cutting Methodology for Yield Estimation of Rice has been recommended under the FAO supported project of BBS on Harmonization and Dissemination of Unified Agricultural Production Statistics which is being implemented in the field level. Large scale training for BBS and DAE field officials were imparted on the new methodology.

Consultation with Stakeholder:

BBS conducts consultation meeting for agriculture statistics regularly to identify the requirements of data of the stakeholders.

Approval and Dissemination of Agriculture Statistics:

BBS organizes consultation meeting and inter-ministerial meeting to assess the results of the agricultural survey. After some process of validation and consistency check, data are disseminated and published on prior approval of competent authority. Hard copies and soft copy of survey and census reports are also prepared and disseminated. It is also uploaded at BBS website (www.bbs.gov.bd).

Constraints:

In case of crop cutting sometimes farmers are unwilling to help. Sometimes due to unavoidable situation they completed their crop cut before the given/predetermined date. Crop diversification is also a factor. In some areas there are rapid changes in crop cultivation. Farmer move towards profitable crops based on their previous experience. In that case there is a chance for under estimation of a particular crop. In some cases it is found that within a domain the minimum required area is not cultivated. Due to natural calamities, sometime crops get damaged. It creates a problem in estimating yield. Farmers are found unwilling in co-operating the BBS staff in crop cutting. Some farmers desire that, BBS workers should grant them fertilizers, seeds, insecticides etc. which they obtain from the Department of Agriculture Extension.

Plans for Improvement:

Way forward for agriculture statistics:

- New Master sample frame will be developed on the basis of Agriculture Census 2018;
- On-line data entry from the field will be introduced for quick processing and dissemination;
- Use of remote sensing technology will be increased;
- New surveys will be conducted to find uses of agricultural products;
- New logistics will be engaged for data collection of agricultural statistics.

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Conclusion: Thus, BBS is committed to provide reliable agricultural statistics to the national and international users, researcher, academician for the long term development of broad sector and the welfare of the large scale population of the country upholding the slogan - "Statistics for Humanity".

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Questions:

1. What would be the criteria to determine the sample size for crop cutting for yield estimation?

2. To get estimation of cropped area how the number of respondent will be selected in case of changing pattern of cropping?

3. What can be done in getting more cooperation from the farmers?

4. How the yield of a certain crop can be estimated if cut is not possible due to insufficient area of coverage?