

Implementation of the New Features of the World Programme for Census of Agriculture 2010

Review of the implementation of WCA2010 in selected countries: successes, issues, challenges

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1. IMPORTANCE OF THE CENSUS OF AGRICULTURE

A census of agriculture is a statistical operation for collecting, processing and disseminating data on the structure of agriculture, covering the whole or a significant part of the country. Typical structural data collected in a census of agriculture are size of holding, land tenure, land use, crop area harvested, irrigation, livestock numbers, labour and other agricultural inputs. In an agricultural census, data are collected directly from agricultural holdings, but some community-level data may also be collected. A census of agriculture normally involves collecting key structural data by complete enumeration of all agricultural holdings, in combination with more detailed structural data using sampling methods [FAO, 2005].

The agricultural census data is useful for a variety of economic and social fields including monitoring progress towards the Millennium Development Goals, and in analyzing poverty, food security and gender issues. Other uses of agricultural census data include planning and policy-making and improving current agricultural statistics.

The main objectives of the census of agriculture are: (a) To provide data on the structure of agriculture, especially for small administrative units, and to enable detailed cross-tabulations; (b) To provide data to use as benchmarks for current agricultural statistics; (c) To provide frames for agricultural sample surveys; (d) To provide data to help monitor progress towards global development targets, in particular the MDGs [FAO, 2005].

2. NEW FEATURES OF THE WORLD PROGRAMME FOR CENSUS OF AGRICULTURE

FAO recommends to countries to conduct a census of agriculture at least once every ten years. The Organization prepares decennial programmes with guidelines on concepts, definitions, classifications and methodology to help countries in planning and carrying out their censuses. The World Programme for Census of Agriculture 2010 (WCA2010) is the eighth such programme and covers the agricultural censuses and related surveys undertaken in the period 2006-2015. WCA2010 includes new features aimed at making the programme cost-effective and more relevant to emerging development and other policy issues.

New approach recommended by FAO in WCA2010

The new features recommended by FAO in WCA2010 include, integration of the census operation into a comprehensive programme of censuses and surveys, linkages with population census, modular approach with collection of core module of key items by complete enumeration and more detailed thematic modules by sampling. In recent years, increasing efforts have been made towards greater integration of statistical activities, ie to ensure that each statistical collection is

carried out, not in isolation, but as part of a coherent set of data collection within the national statistics system (NSS).

In order to help countries meet the need for a wider range of data from the agricultural census, while minimizing the cost of census-taking, WCA2010 recommends a modular approach with:

- A **core census module**, to be conducted on a complete enumeration basis to provide a limited range of key structural items of importance for national policy-making, making international comparisons, constructing sampling frames, and analyzing data at detailed geographic or other levels. A list of 16 items is recommended for the core module as a minimum set of data for the agricultural census: (1) identification and location of agricultural holding, (2) legal status of agricultural holder, (3) sex of agricultural holder, (4) age of agricultural holder, (5) household size, (6) main purpose of production, (7) area of holding according to land use types, (8) total area, (9) land tenure types, (10) presence of irrigation, (11) types of temporary crops, (12) types of permanent crops on the holding, (13) animal numbers by livestock type, (14) presence of aquaculture, (15) presence of forest and other wooded land, (16) other economic production activities. Countries may include more core items to meet additional data needs or for use in creating sampling frames for the census supplementary modules or the programme of agricultural surveys.
- One or more **census supplementary modules**, to be conducted on a sample basis at the same time as, or immediately after, the core census module to provide more detailed structural data or data not required at lower administrative levels. The sample for the census supplementary modules will be selected based on sampling frames from the core census module. A list of 89 items is provided that could be considered by countries for inclusion in the census supplementary modules. These 89 items are grouped under twelve census supplementary modules: (1) land, (2) irrigation and water management, (3) crops, (4) livestock, (5) agricultural practices, (6) agricultural services, (7) demographic and social characteristics, (8) farm labour, (9) household food security, (10) aquaculture, (11) forestry and (12) management of the holding. Countries are not expected to carry out all agricultural census supplementary modules or collect all 89 census supplementary items. Instead, each country will conduct one or more supplementary modules according to their requirements. For example, if irrigation and livestock are important to a country, it would carry out the core census module plus two supplementary modules on irrigation and livestock.

The items will be considered according to their suitability for inclusion in the agricultural census core module, in the agricultural census supplementary modules, or in the programme of agricultural surveys. Taking irrigation as an example, the following approach is proposed:

Recommended for AGRICULTURAL CENSUS	
<p>Core module (complete enumeration)</p> <ul style="list-style-type: none"> ● presence of irrigation on the holding 	<p>Supplementary module (sampling)</p> <ul style="list-style-type: none"> ● area of land irrigated according to land use type ● area irrigated according to method of irrigation ● area irrigated for each crop type ● sources of irrigation water ● payment terms of irrigation water ● other types of water management practices ● presence of drainage equipment
<p>Possible topics for programme of AGRICULTURAL SURVEYS (sampling)</p> <ul style="list-style-type: none"> ● area, yield and production of irrigated crops ● quantity and value of sales of irrigated crops ● cost of production of irrigated crops ● integration with aquaculture etc. 	

As well as holding level data, provision is also made for the collection of infrastructure data at the community level, an important need in many countries. Emphasis is also given to integrating the

agricultural and population censuses, not only through the use of standard concepts and definitions and sharing field materials, but also coordinating the two data collection activities, adding agriculture-related questions to the population census, and linking of data from the two sources.

Changes from earlier agricultural census programmes

As well as changes in the approach, broader changes to statistical units, data content, concepts and definitions, and classifications are summarized below:

Statistical unit: The statistical unit for the agricultural census and the agricultural holding remains the same as used in previous programmes. The concept of an aquaculture holding has been introduced as the unit of aquaculture production in the aquaculture census. Two new concepts – the sub-holding and the sub-holder – have been introduced to better measure the role of household members in the management of the holding, especially women.

Data content

A **shorter list is recommended for core items** in WCA2010 than the list of “essential” items from the 2000 programme. However, under the modular approach, a greater range of in-depth data can be collected in the supplementary modules using sampling methods.

New data items in WCA2010: a number of items in the supplementary modules are included in the agricultural census programme for the first time: *Land:* land clearance; soil degradation ; *Water:* irrigation according to land use type; method of irrigation; area of specific crops irrigated; source of water; payment terms for irrigation; other water management; *Crops:* end-use of crops; crop production; net cropped area; fertilizer use for each crop type; source of seed; type of seed; area of nurseries; *Livestock:* use of veterinary services; milking animals; livestock population dynamics; type of feed; *Agricultural practices:* use of agricultural chemicals ;good agricultural practices; organic farming; genetically modified crops; sales of agricultural produce; *Agricultural services:* credit; source of agricultural information; extension services; access to food markets ; *Demographic and social characteristics:* national/ethnic group; household structure ; *Farm labour:* activity status of household members, status in employment of household members; time worked by household members in main job and on the holding; form of payment for employees; use of agricultural service establishments; *Household food security:* an entirely new agricultural census theme; *Aquaculture:* type of site; production facility; type of water; sources of water; type of organism; *Forestry:* purpose of forest; agro-forestry; *Management of the holding:* a new theme altogether.

Data items omitted: Several non-essential items which were included in the 2000 programme have been omitted from WCA2010: *presence of a hired manager, area with irrigation potential, soil type/colour/depth* and *value of forestry/fishery sales.*

Other changes relate to some concepts and definitions such as agricultural holder, forest and other wooded land, employment, concept of “legal” and “non-legal” introduced in land tenure to address land tenure surety issues etc as well as land use classification. WCA2010 provides a details description of the changes as well as the rationale.

3. OVERVIEW OF THE IMPLEMENTATION OF WCA 2010 IN VARIOUS REGIONS

In order to promote the implementation of these new recommendations by countries, FAO and other partners organize a series of round table technical meeting in all regions to present and discuss with senior national agricultural censuses experts. FAO provides also technical support to a large number of countries in conducting their censuses through field projects.

Several countries have implemented their census of agriculture for the 2010 round and a growing number are adopting the new features recommended. A review of the implementation of agricultural census at mid term of 2010 round (2006-2010), according to information available from

FAO, shows that at the end of 2010, out of a total of 192 FAO member countries. 54 countries had already conducted an agricultural census and more than 40 countries are conducting or planning to carry out an agricultural census during the rest of the period.

The pace of implementation by countries of their censuses during 2010 round is globally in line with past trends: the number of countries conducting the census during the 10 years of each round since 1960 is between 90 and 114 countries and 54 countries have carried out their census for 2010 after 5 years. However, there are regional variations with Europe leading (already 24 countries have conducted their census of agriculture) while Africa and Asia are implementing censuses at slower pace with only 8 countries having conducted their census at end of 2010. The table below gives an overview of the implementation of agricultural census during various rounds in all regions.

Region	Round					
	1960	1970	1980	1990	2000	2010 (Census conducted until 2010)
Total number of FAO members as the end of each round	109	132	154	173	189	192
Total number of participating countries to the census round	100	111	103	90	114	54
Africa	28	25	23	20	25	8
North & Central America	19	23	18	16	14	8
South America	11	10	7	7	8	6
Asia	19	19	21	14	29	8
Europe	17	24	22	20	29	24
Oceania	6	10	12	13	9	8

FAO is compiling the information on the methodologies used during the countries for their agricultural censuses, including the use of the new features recommended in WCA2010. It appears that several countries are using many of the recommended features. Examples include:

Censo Agropecuario 2009-2010 Mozambique: agricultural module of population census used to build a sampling frame for the agricultural census and to collect 10 out of the 16 data items of the core agricultural census module, use of census supplementary modules by sampling. **Censo Agropecuario 2006 Brazil:** several census supplementary modules included in the agricultural census such as: structural aspects of crops and livestock, information on the management of water, genetically modified organism and the use of alternative practices in farming, agricultural practices, the management of the holding (role of the woman ahead of farming). **Census of Agriculture 2007 Saint Lucia:** The Census adopted the basic concepts and definitions contained in WCA2010. Data from the 2001 Population and Housing Census along with records from other sources (agricultural extension officers, farmer associations, etc) served as census frame and the cartography of the Agricultural Census was the same used for the 2001 Population and Housing Census. The same enumeration districts were also used. The land use classification recommended in WCA2010 was also adopted.

As indicated, the implementation of WCA2010 round is still on going and it is too early to present a complete account of the adoption and application of the new features by countries. A more detailed review of selected country experiences in implementing some features of WCA2010 is presented below in order to identify successes, issues and challenges.

4. APPLICATION OF THE NEW FEATURES OF WCA2010 IN SELECTED COUNTRIES

In fact several features recommended in WCA2010 were applied by many countries in previous agricultural census rounds. Countries such as Canada, Uganda and many Pacific countries have established closer relationship between Population Census and Agricultural Census (from few agriculture related questions in population census to complete integration of the two censuses).

As in the past rounds, it is expected that countries will adapt the recommendations to meet national needs and specific country context. The following country experiences in applying the new features are discussed: *Burkina Faso, Niger, Fiji, and Pakistan*.

CASE OF BURKINA FASO

In Burkina Faso, the programme of all major national censuses/surveys and other statistical activities of the public institutions in charge of statistics production are included in a National Strategy for the Development of Statistics (NSDS). The General Population and Housing Census (GPHC) carried out in December 2006 and the General Census of Agriculture (GCA) carried out in 2007/2008 were included in the NSDS 2005-2009 [KEITA N. and al, 2010].

The general objective of the GCA 2007/2008 was to obtain detailed and up-to-date data on the entire primary sector, as compared to the data of the first census of agriculture carried out in 1994.

WCA2010 features applied

Burkina Faso adopted several new features recommended in WCA2010, including linking agricultural census with population census and adopting a modular approach.

1. Linkage with the population census

The GCA was conducted in two phase with phase 1 aimed at integrating an agricultural module into the population census and phase 2 for collecting data related to specific modules through sample surveys. The linkage and synchronization of phase 1 of the GCA and the GPHC with integration of an agricultural module aimed to:

- **Reduction of cost:** through the collection of data for the two censuses by a single team during single displacements, allowing significant reduction of the cost of the two censuses through optimum use of resources (human resources, training, equipment, sensitization);
- **Harmonized concepts and definitions** used for the two operations for data comparability and integration;
- **Produce data needed to build an updated and effective frame for agricultural census:** use of the data from GPHC to obtain the list of the agricultural holdings and drawing the sample to be used during GCA phase 2 surveys;
- **Reduce the scope of agricultural census** (socio-demographic variables are reduced since they are available in the population census) and allow for cross tabulations and **detailed analysis**.

The following data items were included in the agricultural module of the Population census (GPHC 2006):

- Identification and complete enumeration of the agricultural households in the country.
- For each agricultural household, the following information were collected: *Types of annual crops by season; Types of horticultural crops by season; Number of fruit trees of different types; Whether the household practises sylviculture; Whether the household is engaged in fisheries; Number of livestock by type; Number of draught animals by type; Number of items of machinery owned.*

This is consistent with the list of items recommended by FAO for the agricultural census core module, and provides a good basis for constructing frames for the agricultural census supplementary modules. Data from the agricultural module can also be linked to population census data.

2. Modular approach

In order to meet the objectives of the census and in line with the modular approach recommended in WCA2011, the GCA, the second phase was conducted as a set of dedicated sample surveys on thematic modules using the sampling frames obtained during the first phase.

The modules of phase 2 were:

- basic module: detailed data on rain-fed crop, livestock and arboriculture;
- irrigated crops module: detailed data irrigated crops (rice growing, vegetables farming, other irrigated crops);
- fishery module: data on fisheries;
- modern agricultural holding module: a complete enumeration of modern agricultural holdings.

Successes, issues and challenge

Sampling frame: The data obtained from the agricultural module of phase 1 was used to develop sampling frames for the modules survey in phase 2. Also the data on variables from phase 1 allowed for stratification of agricultural households and primary sampling units.

The sample design adopted for phase 2 surveys was two stages sampling with the selection of primary sampling units (villages) in first stage with Probabilities Proportional to Size (PPS). The data collected in the agricultural module of the GPHC allowed for:

- determination of size of the villages as primary sampling units in terms of number of agricultural households, for PPS selection;
- sample allocation: using the size of the provinces in term of number of agricultural households;
- information on characteristics of the agricultural households (size, number of fruit trees, animals owning, agricultural equipment owning) which was used for stratification at a second stage by classification of the agricultural households using a discriminating function established with data from previous surveys.

In addition to availability of the sampling frame for the phase 2 surveys, data from the agricultural module of the population census provided a detailed typology of crops grown and livestock systems and for the first time in Burkina Faso basic statistics on arboriculture and fishery. The statistics on the agricultural households are available for the lowest administrative level of the country, i.e. the village..

Good coordination mechanisms were established between the Ministry of Agriculture (MoA) and the Bureau of Population and Housing Census which allowed a very good monitoring of agricultural module during data collection. The centralization of the agricultural module in the GPHC was also successfully organized. The questionnaire of the agricultural module was planned to be detached from the census questionnaire and sent to the agricultural statistical units of the Ministry of Agriculture for final checking and processing.

In order to facilitate the enumeration of the agricultural households after the selection of the sample of villages for phase 2 of the GCA, a card containing the identification of the households (region, province, commune, village, EA, name and GPHC code of household) was prepared during the phase 1 and given to the head of the household for carefully preserving for future reference.

Overall, the operation was a success and data collected in the agricultural module of the GPHC considerably improved the agricultural census operation with wider coverage, good frame and reduced cost. However, implementing the features recommended in WCA2010 to the specific context of Burkina Faso was not without difficulties. Some of the difficulties are highlighted below.

Agricultural module of population census: The addition of an agricultural module to the population census questionnaire resulted in the following difficulties:

- The average time of interview of the Population census was relatively long due to the addition of the very comprehensive agricultural module with a large number of questions and the complexity of some of the questions which was sometimes challenging for households to understand;
- Also the level of detail on the crops in the agricultural module raised difficulties of proper identification by the enumerators and their translation in local languages was a challenge. Given the diversity of the languages, handbooks with pictures would have avoided the confusion of the crops;
- Some enumerators forgot to deposit the visit card with households.

Recognition of Enumeration Areas boundaries in the field : MoA was not associated with the cartographic work for the population census which would have allowed MoA staff to acquire experience in the identification of EA boundaries, for future agricultural surveys. There was also the problem of poor delimitation of EA such as a part of village taken as a whole village, etc.

Identification of the agricultural household : For the GCA, the definition of agricultural household adopted was "any household which declared during the GPHC 2006 as having engaged in at least one of the following activities: temporary crops (rain-fed crops, horticulture), livestock or arboriculture". On the other hand, for the GPHC, another operational definition of the household was adopted: "a demographic household consists of a couple with their unmarried children living in the same home". There was a one to one correspondence between agricultural households and demographic household in the rural areas in most cases. However sometimes, an agricultural holding can be operated by several demographic households.

In order to prepare the list of the agricultural households, the demographic households were grouped to form one "agricultural household" using a subsidiary code added in the questionnaire. The head of the demographic household ensuring the coordination of the agricultural activities of the group in the same home is the head of the agricultural household.

CASE OF NIGER

Niger conducted its second census of agriculture and livestock in 2005/06 and 2006/07, more than 25 years after the first census of agriculture conducted in 1980 which did not include all livestock systems (particularly nomadic and semi-nomadic livestock).

WCA2010 features applied: Modular approach

Niger was among the first countries to apply the modular approach recommended in WCA2010 with the general census of agriculture and livestock (GCAL) conducted as part of a comprehensive census and survey programme. The modules were covered in two phases during the two consecutive agricultural years 2005/06 and 2006/07.

The General Census of Population and Housing conducted in 2001 (GCPH2001) provided the number of agricultural households as well as that of the population by Enumeration Areas (EA). The GCPH2001 identified a total of 8034 EAs out of which 7465 Agricultural EAs were formed with a total of 1189828 agricultural households used as frame for the agricultural census and a primary sample of 700 EAs was selected. Given the time difference between the population census (2001) and the agricultural census (2005/06), a "pre-census" activity was conducted to update the list of agricultural households in these 700 EAs which served as sampling frame for the selection of secondary sampling units (SSU) composed of agricultural households. [PROJET GCP/NER/041/EC, 2008]

This sample was used for collection of crop related data and sedentary livestock data. However, a mixed livestock system exists in Niger with both sedentary livestock system and a large nomadic and semi-nomadic livestock system. This later system raises specific challenges given the mobility of animals and populations which required an innovative methodology for the enumeration of nomadic and semi-nomadic livestock. The methodology included the identification and geo-referencing of all water points used by nomadic and semi-nomadic livestock and population as well as identification of nomadic routes followed. The methodology involved also a stratification of water points and specific data collection methods with a pair of enumerators double counting the animals and comparing their results.

Given the priority data requirements in Niger, the following modules were included in the census and survey programme.

Modules of phase 1

- Module 1: Listing of agricultural households in selected Enumeration Areas.
- Module 2 : Survey on crop sector.
- Module 3 : Enumeration of water points for livestock
- Module 4 : Enumeration of livestock, including nomadic and semi nomadic livestock
- Module 5 : Survey of horticulture sector

Modules of phase 2

- Module 6 : Food Security.
- Module 7 : Productivity of agricultural holdings
- Module 8 : Farmers organizations
- Module 9 : Livestock productivity.
- Module 10 : Marketing of livestock products

Successes, issues and challenges

The Census of agriculture and livestock of Niger was one of the most comprehensive censuses in Africa. It provided a wide range of data on most of the agricultural and rural development issues. In particular, for the first time reliable data on the entire livestock sector (including nomadic and semi-nomadic) was produced which resulted in a complete revision of past time series which were considerably underestimating the livestock numbers (up to 30% in some cases).

The innovative method used for enumeration of nomadic livestock is considered as one of the best practices in this domain and is used as a reference for several African countries having the same type of livestock system.

However, it should be noted that the weak coordination between the Population Census and the Agricultural Census with five years time gap resulted in the need for a “pre-census” operation to partially update the sampling frame for the agricultural census.

The modality of implementation of the modular approach needed to be adapted to the conditions in the country since WCA2010 does not provide specific guidance on this aspect.

CASE OF FIJI

Fiji consists of a large number of islands. These islands are split into 4 Divisions with 15 Provinces that are divided into 86 Districts. Some provinces include small island districts and some districts also include small islands.

Linking population and agricultural censuses

The agricultural census was carried out in Fiji starting in October 2009 but data collection was interrupted by two cyclones and the census was not completed until March 2010. The objective was to prepare estimates at district level. The 2009 census of agriculture was conducted using a Multiple Sampling Frame (MSF) approach for estimates at district level while earlier censuses and national surveys had used the Area Sampling Frame (ASF) for estimation at Provincial and National levels.

The MSF combines an Area Sampling Frame (ASF) with an expanded List Sampling Frame (LSF) of large farms. The addition of a comprehensive List Sampling Frame (LSF) (with complete enumeration) was expected to provide better estimates with fewer ASF segments. All land areas were stratified by intensity of cropland.

The Enumeration Areas (EAs), used by the Fiji Island Bureau of Statistics (FIBOS) for the Population Census 2007, were the basis for land use stratification, but these areas were adjusted depending on the uniformity of the land use. The segment size for the ASF was targeted at 1 km² (100 hectares) for all strata. Since some of the smaller districts consisted of only a few segments, it was decided that a complete enumeration of all households in these districts that would provide complete farm information, with a minimum additional expenditure. These districts became part of the Small Island Strategy (SIS).

A three-part methodology was therefore adopted. The LSF and SIS farms were covered by complete enumeration. These areas were removed from the “national land areas” and the remainder of the area was stratified according to estimated agricultural intensity in the FIBOS Enumeration Areas (EAs) used in the Population Census of 2007. It was noted that these EAs were not homogeneous in agricultural land use. The initial assignment of a stratum to each EA was reviewed after considering the Population Census data by EA for numbers of individuals with occupation codes that classified them as farmers (crops and livestock codes). Since the Government of Fiji had given protected status to some planted forest areas, these areas were assigned to a special stratum.

The special forest stratum, urban and peri-urban strata and the non-agricultural stratum were assumed to have no agriculture and excluded from the sampling process. These areas were also subtracted from the agricultural land use areas. Maps and aerial photos (1994) from earlier surveys were the basis for the numbering of the grids and identification of EA and stratum boundaries.

Since the estimates were targeted for District levels, many of the strata consisted of a small number of EAs. The count of the map grids (1:50 000) in a stratum became difficult with a large number of incomplete grids, in many cases, exceeding the number of whole grids. This required adjustments in the processing of area to take into account these incomplete grids.

The preliminary results of the census show significant reductions in agricultural land areas, although the distinction between agricultural forest areas and non-agricultural forest areas may not have been clear in all cases and may account for part of the difference. The use of more current photography and satellite imagery would enable better stratification of the land with identifiable boundaries that did not limit them to EA boundaries.

Fiji successfully conducted its census of agriculture using a non traditional methodology based on Multiple Sampling Frame approach which best suits its situation. Even in this case, information collected during the population census was critical in designing the agricultural census and a more coordinated planning of the two censuses would have provided more useful data for optimizing the design.

CASE OF PAKISTAN

Pakistan has undertaken many agricultural censuses: the first was in 1960, the second in 1972, the third in 1980; the fourth in 1990, the fifth in 2000, and the sixth in 2010. In Pakistan, there is also a livestock census five years after each agricultural census. The country has thus developed considerable expertise in conducting agricultural censuses. For the 2010 agricultural census, an in-depth study was undertaken to take into account the new approaches recommended in the World Programme for the Census of Agriculture 2010.

WCA2010 features applied in the country

1. Modular approach

The modular approach is not new for agricultural censuses in Pakistan. It is already used for livestock items which are collected in livestock census and follow-up surveys on milk production, animal slaughtering and commercial poultry. This was continued in the 2010 agricultural census.

2. Community-level data

The mouza censuses are undertaken every five years to collect community-level data. They are used for frame construction in agricultural and livestock censuses and for compiling mouza data. A wide range of data have been collected; they are considered very useful.

3. Coordination between population and agricultural censuses

The coordination of the population and agricultural censuses has been limited to the field systems. However no agricultural items have been included in previous population census. While the modular approach is already used for agricultural census in Pakistan, which might facilitate the inclusion of some agricultural aspects in the future, this could not be done for the benefits of the 2010 agricultural census as the population census has been postponed to a later date.

Successes, issues and challenge

The modular approach continues to be adopted in agricultural/livestock census in Pakistan. The community-level data will also continue to be collected in mouza censuses. No problem has been encountered in these respects.

During the in-depth study for the preparation of the 2010 agricultural census, it was felt that gender should be an element of the agricultural census but there were major operational difficulties in collecting these data in Pakistan. For this latter reason no change will be made to the current practice in the near future.

5. SOME LESSONS LEARNED ON METHODOLOGICAL AND OPERATIONAL LEVEL

This brief review confirms that the new features recommended in WCA2010 can be successfully implemented and are being applied by countries.

The **coordination of Population Census with Agriculture Census** promoted in WCA2010 and also recommended in the newly established Global Strategy to Improve Agriculture and Rural Statistics can be a very cost-effective way of conducting these two comprehensive data collection operations and integrating agriculture into the national statistics system. The construction of effective master sample frame for agriculture can be facilitated by adequately planning and coordinating population and agriculture census as an integrated census programme. The example from Fiji shows

that even in the case of a Multiple Frame Approach, appropriate agricultural data collected during the population census can improve the design of the agricultural census.

This approach is being adopted by a growing number of countries where household based agriculture is the main feature of the sector. FAO together with other partners is about to publish guidelines to support this linkage of population census with agricultural census.

The examples of Burkina Faso, Niger and Pakistan demonstrate that a large number of data items can be covered in a cost-effective way using a well designed the **modular approach**.

This review also reveals that there are remaining challenges for operationalising the new features recommended in WCA2010. The modular approach requires a more intensive use of sampling. Therefore, a dedicated handbook on the design and conduct of sample surveys for collecting data on census supplementary modules and thematic surveys will provide a useful technical reference to countries.

Another challenge is the need for better coordination, timing and synchronization of the two census operations as shown in the example of Burkina Faso. In order to optimize the efficiency of the national statistics programmes, the population and housing census and the agriculture census should be planned at the same time. However, in linking population and household census, complex questions should be avoided and care should be taken not to overburden the population census questionnaire.

The Governments and donors may find it easier to fund an integrated survey plan than two separate plans.

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