

The agriculture censuses in the 21st century and link with population census with use of new technology: the case of Ethiopia

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Given the significant contribution of agriculture to Ethiopian economy and society, the agriculture data is of paramount importance for the proper planning of the sector and development of the country. The agriculture census is a major source of data on the structure of agriculture, particularly data at lower administrative level. Given its high cost, the agriculture census conducted in most African countries is a large sample agriculture census. Adequate sampling frame is required for designing and conducting efficiently the sample agriculture census. This frame usually comes from the population and housing census and its efficiency depends on how best the Population and Housing Census is prepared and conducted in view of serving as basis for the agricultural census.

Ethiopia has conducted the first agriculture census in 2001. Through an agricultural questions included in the Population and Housing Census (PHC), a frame was developed for subsequent agriculture census. The Agricultural Census was a large sample agriculture census with major results produced at district level. The primary sampling units were enumeration areas while the households were considered as secondary sampling units. The agriculture census was then used to build a master sample frame for annual agricultural sample surveys conducted then after.

The country is in the process of preparing and conducting the fourth population and housing census in 2017. This population census is expected to be the first ever fully digital census in the country. The cartographic work is underway using tablets and remote sensing images. GPS readings for the major features in the enumeration area including households are taken during the cartographic work. Data for the actual population census will also be collected using tablets. Drawing lessons from the past, the Population and Housing Census and the Agricultural Census are planned as an integrated census programme with the agricultural census conducted soon after the PHC. Using the FAO recommendations, data for providing a sampling frame for agriculture census will be collected in PHC process. The use of digital and geo-referencing devices will facilitate effective development of the sampling frame and implementation of the agricultural census planned to be conducted in 2018.

This paper summarizes the past experience of Ethiopia in linking PHC and Agricultural census and how the next population and housing census is planned to better serve as a good basis for the next agricultural census, including use of innovative approaches and technology

Key words: *Agriculture census, population census, digital and geo-referencing device, sampling frame.*

1. Introduction

Ethiopia has designed a five year development plan, the Growth and Transformation Plan (GTP). The second growth and transformation plan (GTPII) has set out an objective to achieve an annual average GDP growth rate of 11 percent per annum within a stable macroeconomic environment. The plan envisions transforming the Ethiopian economy in to a lower middle income category by 2025 through increasing the productivity, quality and competitiveness of the productive sectors; enhancing the capacity, participation and equitable benefit of citizens and there by realizing developmental political economy through strengthening democratic developmental state. In tandem with the national development policies, strategies and programs and the lessons drawn from the implementation of the first Growth and Transformation Plan (GTP I), the globally agreed agenda 2030 for sustainable development and agenda 2063 have been taken as the base for the formulation of GTP II.

Agriculture is the base for Ethiopia's economy. In 2014/15 the share of agriculture to the GDP was 38.5%. In five years from 2010 to 2014, the economy grew by 10.1 % on an average and agriculture grew by 6.6 %. Given the significant contribution of agriculture to Ethiopian economy and society, the agriculture data is of paramount importance for the proper planning of the sector and development of the country.

Planning, monitoring and evaluation of the country's development plan requires quality statistics. The major sources of data to be used for such purposes are censuses, surveys and administrative records. The quality of administrative records is questionable in most developing countries. Thus it is very essential to conduct population and housing census and complement with household and other surveys.

The agriculture census is a major source of data on the structure of agriculture, particularly data at lower administrative level. Given its high cost, the agriculture census conducted in most African countries is a large sample agriculture census. Adequate sampling frame is required for designing and conducting efficiently the sample agriculture census. This frame usually comes from the population census and its efficiency depend on how best the Population and Housing Census (PHC) is prepared and conducted in view of serving as basis for the agricultural census.

The population census gives a complete and comprehensive picture of the size, composition and distribution of the population, which is a basis for evidence based development planning, decision making and good governance. It also provides basic data for demographic, social and economic analysis of the population including population estimates and projection. The census provides detailed statistics for small areas and small population groups for efficient governance at all levels. Another important use of population and housing census is that it provides a sampling frame for household surveys in the intercensal period.

2. Ethiopia's experience in linking Population and Housing Census and Agriculture Census

Ethiopia has conducted three national population and housing censuses in 1984, 1994 and 2007. In the first two censuses; data were entered manually in to computers using key board.

Figure1. Manual Data Entry



During the 1984 Census; Data capture was done on manual keyboard based entry using mainframe computer. It took more than 2 years to capture the data for about 42 million people. In the case of the 1994 Census; Data capture was again done on manual keyboard entry basis using PC's. It took about 18 months to capture the data for the population of about 53 million. The entry work was done on 2-shift basis with 180 data entry clerks and around 90 PC's. Manual data entry using key board was time consuming and Subject to additional non-sampling errors due to manual keying.

In the 3rd population and Housing Census which was conducted in 2007, the Scanning Technology was used. The global Positioning System (GPS) technology was used for cartography work in delineation of enumeration areas. This helped to get timely data.

Figure 2 DRS Photo Scribe Series PS900 scanner



Printing the questionnaire for data collection which fits to the scanner was one serious challenge in using scanning for data capturing. The data cleaning by using the scanning technology also took long time. The other major challenge in using scanning is that it was difficult to use the machine for other surveys due to the problem in the knowledge transfer.

The central statistical agency of Ethiopia has been conducting annual agricultural surveys for more than three decades through its integrated Household Program. The frame for the annual agricultural survey was prepared during population and housing census. The households were classified into agricultural and non agricultural households during the population and housing census. The screening question to classify a household as agricultural household was by checking if there is an agricultural operator in the household. An agricultural operator is a person involved either in crop production or livestock rearing or both. The annual agricultural survey conducted by CSA usually collects agricultural data on area and production, land utilization, crop utilization and agricultural practices.

The first agricultural census was conducted in 2001. This agriculture census was a large sample census which provided data at lower district level. The primary sampling units were Enumeration areas while households were considered as secondary sampling units. The master frame developed from the previous population and housing census was used as a frame for the first agriculture census. Then the agriculture

census was used as a master sample frame for annual agricultural survey conducted in the intercensal period.

A listing questionnaire was designed to collect data to be used for master frame development and the data was collected at pre enumeration phase at the beginning of the population and housing census. The questionnaire was filled at household level and summarized at EA level. The questionnaire was also filled during cartographic work which took more than a year to complete before the census work was started. The major variables summarized from the questionnaires were number of agricultural, non agricultural and total households. These data was collected at household level by checking if there is an agricultural operator in the household.

3. The 2017 population and housing census and the link to the upcoming agriculture census

CSA will conduct the 4th population and housing census in November, 2017. This population census is expected to be the first ever fully digital census in the country. The population and housing census data will be collected using tablets.

Figure 3. Tablets to be used for Census Data Capturing



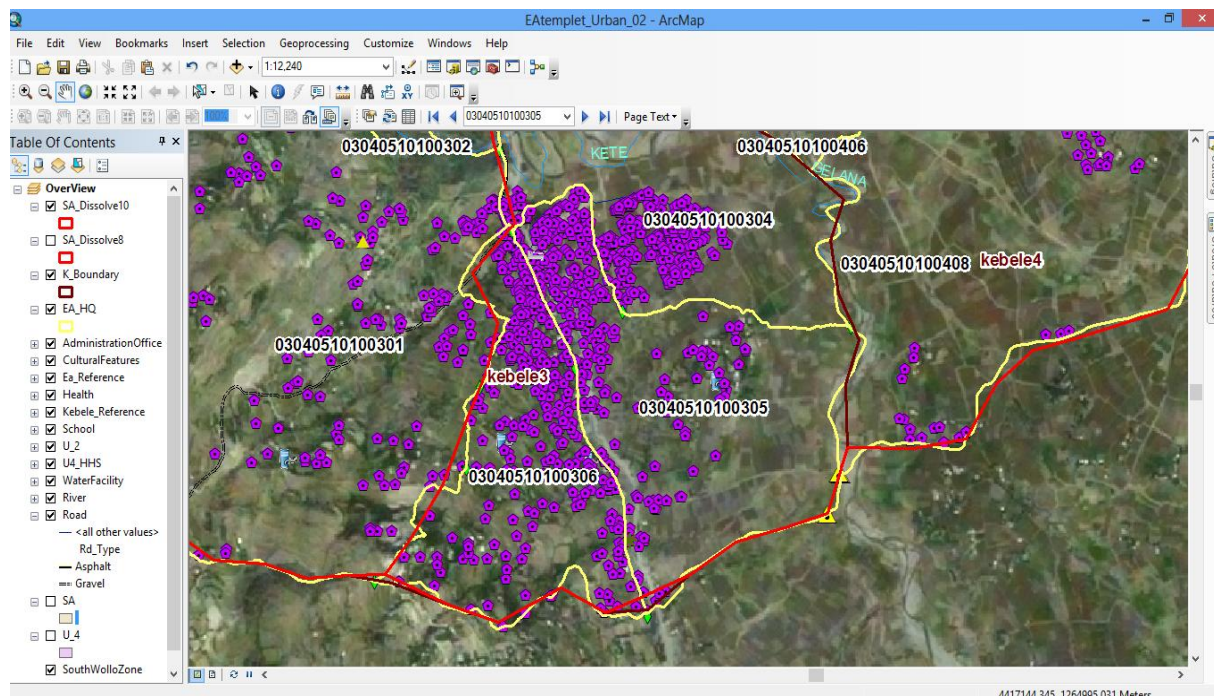
The digital data collection is expected to improve data quality and timeliness. Digital enumeration also facilitates the integration of data with other information. This digital data collection for the population and housing census will facilitate integration to the agriculture census data by using the coordinates. It will also facilitate GIS data analysis at household level. In addition the digital data collection minimizes the logistics complexity related to the paper questionnaire.

The 2017 population and housing census cartographic work is underway and expected to be finalized in June, 2017. In this cartographic work a transition from semi digital maps in 2007 census to fully digital maps using mobile GIS technology is implemented. Location data for major features and each household is taken and geo referenced data base created. This will enable CSA to have electronic copy of the enumeration area maps and also get GPS readings for each household. This avoids scanning and digitization. By doing this, the quality and timeliness of the cartographic work improved and hence the quality of the frame is expected to improve.

Figure 4. The mobile devises used for Census Cartographic work



Figure 5. Sample Enumeration area map in 2017 census Cartographic work



In the 2017 population and housing census cartographic work, listing form is prepared to list households living in the Enumeration Area. In the listing form, screening questions which will help to identify agricultural households are included. The head of the household is asked whether there is agricultural holder in the household. If there is an agricultural holder in the household, then the type of agriculture that the holder is involved in will be requested. The four categories to be chosen are crop production, livestock, both crop and livestock and other agriculture.



This information from the listing of households in cartographic work will help to prepare a frame for the coming agriculture census and also for subsequent annual agricultural surveys. The listing form for the actual population and housing census is also expected to include the same information to be used for constructing the frame for agriculture census and surveys.

The second agricultural census is planned to be conducted in 2018. The first agriculture census which was conducted in 2001 used the frame which was compiled from 1994 population and housing census. This created some difficulty in sample selection for the agriculture census as the frame from the population census was old. Some updating of enumeration areas were done before the agriculture census to accommodate the changes. Drawing lessons from the past, the population and housing census and agriculture census are planned as an integrated census program with the agriculture census conducted soon after the population census. This will help to use a fresh and up-to-date frame for agriculture census. The digital technology used and the geo referenced data will facilitate effective development of the sampling frame and implementation of the agriculture census planned in 2018.

4. Conclusion

Population census is a bench mark for all surveys including agriculture census. Digitizing cartographic work and actual census will provide quality data and also facilitate the development of master sample frame. Integrating population and housing census with agriculture census will improve the quality of data from agriculture census and result in informed planning and decision making in the sector.

Transforming the data collection to digital will provide timely data. The quality of the data will also improve as the system facilitates effective data quality checks. The data link and GIS analysis will also be facilitated through the coordinates taken for households. It is also advisable for countries to conduct agriculture census soon after population census to have a fresh and quality frame.

5 References

Federal Democratic Republic of Ethiopia, National Planning commission (July 2016). Growth and Transformation Plan II (GTP II)

Central Statistical Agency of Ethiopia. 4th round population and housing census manual (July 2015)

Central Statistical Agency of Ethiopia, 2007 population and housing census of Ethiopia administrative report (April 2012)

Application of GIS technology for the 4th round census mapping and census taking in Ethiopia, (March 2017), AbiyWogderese

2017 population and housing census of Ethiopia, data capturing and processing methodology, (March 2017), kefleGebre

2017 Ethiopian Population and Housing Census, Data Capturing and processing implementation Strategy, (November, 2016), Tabit Ahmed