# Census Testing and Pilots

## Introduction

Census testing, including pre-tests, pilot and post-pilot testing, is a major activity conducted during the pre-enumeration phase. All aspects of census preparedness need to be comprehensively tested, ranging from administrative, logistical, technical, and technological infrastructure. In addition, the interface between enumeration, processing, analysis, and dissemination systems needs to be tested to resolve any outstanding problems.

In a digital census, various tests must be conducted before and after the pilot census. It is essential for countries to prioritize undertaking adequate tests of the various aspects of a census plan. The initial tests carried out during census preparations include testing of tools and instruments often referred to as census pretest and these can be several and on a small scale for different purposes. For instance, a good questionnaire test should iteratively first evaluate the performance of a questionnaire before changes are made; then make any changes to improve its performance; and finally, evaluate the questionnaire after changes are made to find out if its performance has improved.

The advantage of carrying out a pilot census is that it provides an opportunity to perfect the census preparedness as a whole, and address any issues prior to the census, as well as revise the costing estimates. To obtain accurate costing estimates from the pilot, all the aspects of the census need to be finalized at this stage after testing. Given the significantly smaller volume of data and field staff being used for the pilot, bear in mind when evaluating the pilot and noting small problems, that although these may be dealt with quickly in the pilot, they may be significantly more troublesome in the main event. Additionally, there should be plans after the pilot and before the main operations to stress test the ICT systems with realistic volumes of (artificial) data.

### Census testing and pilots during the non-digital vs digital era

During the non-digital census era (paper questionnaire), testing focused mainly on testing the quality of the Enumeration Area (EA) maps, assessment of the enumerator’s workload and enumeration duration, overall administrative and logistics arrangements, terrain, and understanding of the questionnaire.

In a digital census there are many additional areas to be tested due to the various interfaces between systems and people. These include testing of the data collection application, its design and architecture, the internet, the equipment (handheld devices, servers etc.), the data transmission mechanisms; the readiness of the census data center, the data integrity and data security, the data quality monitoring system/dashboard including quality of the EA maps as well as the underlying circumstances necessary to avoid equipment malfunctioning or unexpected problems in programming processes. It is also important to stress test digital systems such as e-recruitment systems and data transmission systems to ensure that they can handle the large volumes of data traffic that will be expected during the census.

All digital components such as e-recruitment platforms, enumerator payment systems, CAPI application, data management system, monitoring dashboard and so on, should be thoroughly tested prior to the census pilot. After each test, if any changes are made, this necessitates testing again. Sufficient time and budget should be reserved for this retesting process. By the time of the pilot, all systems should be ready as if this were the census. The pilot is thus an opportunity to test how everything works together and at scale. The pilot will undoubtably highlight some issues which can be addressed prior to the census. Components that are changed after the pilot need to be tested again to ensure that everything is working according to plan by the time of the census.

### Considerations for a digital pilot census

The main objective of a digital pilot census is to test all the aspects of the census including the ICT infrastructure for the census. Therefore, the following key considerations should be made for a successful pilot census.

* The census project schedule should include several field test exercises to be undertaken prior to the formal pilot census using the selected or developed devices and systems to test the reliability in the different circumstances presented in the field. As well as allowing adequate time to make any necessary improvements prior to deployment of the technologies in the field.
* A pilot census should set clear objectives for the main areas to be tested, including the relevant evaluation criteria, and identify data/information requirements to inform the assessment. This may impact on how your pilot is designed. Evaluation of the pilot should be done in a timely manner as the results may necessitate an overhaul of the infrastructure and significant revisions to the PHC business process. This overhaul will call for pretesting of the revised approach at an extra cost.
* When developing a pilot census plan, consideration should be made on how the pilot sample is constituted to ensure that the selected areas provide a sufficient test of the setout objectives. Therefore, the sample should be purposively selected to include rural/urban, areas with poor or no internet connectivity, other challenging areas, special and hard-to-count populations within a country’s context.
* A pilot census should be conducted in conditions that are as close to the conditions that would be present during the actual enumeration as possible. For this reason, it is often recommended to be undertaken exactly one year before the planned census enumeration to conform to the expected seasonal patterns of climate and activity.
* The questionnaire design should be final with no or minimal changes expected, at the time of the pilot census. This includes translations into other languages. Therefore, the questionnaire should be extensively tested prior to the pilot. Any changes made after the pilot should be tested.
* Unanticipated circumstances often arise during pilot census enumeration. Priority should be given to each detail for debriefing and making informed review of the various components being tested. Therefore, each issue identified during the pilot should be documented in a lessons-learnt document to be considered and resolved before the census. A checklist of the tests scheduled, and the recommendation should be tracked, and responsible officers assigned to fast track. Any omission or disregard of issues that look minor during the tests and pilot, may have significant effect during the actual census enumeration. Debriefing sessions should be properly structured, and documentation carried out systematically.
* After the pilot census, the implemented recommendations resulting from the pilot census process should be tested. It is desirable that these tests target all stages of the census, including enumeration, data processing and evaluation of results to give a clear picture of the adequacy of the entire census plan and organization.

## Key areas to be piloted in digital census

### Quality of Enumeration Area maps

EAs maps should be digitized and produced with the ideal measure of size (MOS) usually 80–150 households. The census pilot therefore tests the completeness and accuracy of the EA maps especially boundaries, integration of the maps with the CAPI application, inclusion of accurate structure identifiers and addresses. Additionally, this helps to address challenges of using low resolution maps on tablets that are not sufficient to allow for resizing and zooming without alteration by enumerators. Testing the quality of EA maps at the same time informs the finalization of the tablet specifications to handle all aspects of the digital census. See more about [pilot mapping](#_3.2_Pilot_mapping).

### Efficiency of Device Preparation

The pilot census should test the equipment preparedness to ensure efficiency in blocking the unnecessary applications and Web sites (e.g., entertainment); prevention of supervisors and enumerators from installing applications; administrator access to bypass user-created passwords. As well as testing the correct use of Bluetooth and Wi-Fi on all tablets; battery timeout vis-a-vis the specifications. In case the tablet battery time out is not satisfactory, NSOs should make provisions for frequent charging in the field (e.g., power banks, battery packs or solar chargers). This key area also includes testing the readiness and adequacy of the census data centre and related IT infrastructure like servers to ensure data security.

### Effectiveness of CAPI data collection application, data transfer mechanisms, data processing

The pilot census can be used to test the final questionnaire in the way that it should be implemented on the devices for consistency in the flow of the questions, skip patterns, proper implementation of changes from the pretests etc. In terms of data transfer, focus is put on connectivity and communication issues to test the internet network infrastructure and ensure that interviewers and supervisors are familiar with data transfer procedures. This evaluation area is also aimed to ensure that all supervisors can provide the necessary support to their teams in the event of a technical failure in the field. For data processing, test the data coding, tabulation and analysis plans using the data collected from the pilot.

### Evaluate the data quality monitoring system and dashboard

A digital census utilizes electronic data quality assurance and monitoring mechanisms; therefore, the pilot census should test and evaluate their effectiveness. If the census monitoring dashboard is to be used, it needs to be in place and tested during the pilot census. The quality assurance mechanisms should also be tested, for example the supervisors’ re-interview module, field observations/monitoring mechanisms. See more about the census [monitoring dashboard](#_9.2.2_Census_and).

### Census methodology and field operations

The pilot census should test the overall census methodology (including a census night and enumeration reference period). During the pilot census, an assessment of the adequacy of the planned duration of enumeration is done to ensure that adequate number of days are set aside for the exercise. There should be an assessment of the average duration that enumerators take to administer questionnaires to the different kinds of households and EAs to estimate the enumeration period, required human and financial resources. Field operations to assess may include EA opening and closing procedures, interactions between the supervisors and enumerators, engagement with the local administration, effectiveness of the publicity and advocacy activities. If a post-enumeration survey (PES) is planned as part of the census methodology, then a pilot PES should also be carried out. More about [PES](#_CHAPTER_ELEVEN:_Post-Enumeration).

### Adequacy of recruitment and training approach

It is critical to evaluate the caliber of personnel recruited to implement a digital census and the recruitment criteria must be piloted to avoid compromising data quality during enumeration. The pilot census should test and evaluate the recruitment approach to be deployed, the performance of the recruited personnel by cadre, the effectiveness of the training approach and adequacy of the training agenda. In addition, assess training venues on availability of IT infrastructure including adequate audio, video, and non-electronic tools (e.g., furniture) to facilitate presentation.

### Evaluate the overall census administrative, financial, and other general logistics structure

This entails an assessment of the various administrative structures like flow of information, transport arrangements, packaging of the census tools and equipment (tablets), issuance of the tablets and collection mechanisms, warehousing, flow and management of funds, documentation of the field processes, replacement of tablets. This should also include an assessment of the risk mitigation strategy and updating it based on the evaluation of the pilot census findings as well as preparedness of regional offices for contingencies such as power outages, theft, or damage of IT equipment, procurement and other logistics like transport and storage.

### Test the census monitoring and evaluation plan

Do the dashboards provide census headquarters with the information that they need to keep stakeholders informed and to address issues e.g., if reallocation of workloads is required? Does the built-in error checking and routing on the CAPI devices work as expected? If a [post-enumeration survey pilot](#_PES_pilot) is carried out then attempting to match the pilot census and pilot PES data is a great way to uncover systematic error in the data which may have been caused by issues with the questionnaire, the enumerator training or the transmission of data.

## Selected Country experiences

In **Kenya**, the census preparation involved multiple field tests and a pilot census conducted a year before the actual census date. These activities aimed to evaluate the questionnaire's content, flow, and technical aspects such as consistency checks and skip patterns. Two additional pre-tests followed the pilot to address gaps, including testing newly added questions and the supervisor module, which had not been included earlier. The pilot and pre-tests were conducted in a wide range of environments, including urban slums, high-end residential areas, border counties with connectivity issues, and regions with nomadic populations. Despite these efforts, some lessons from the pre-tests were not fully integrated into the pilot, such as the need for more comprehensive training on specific topics like disability and labour. The pilot also revealed practical issues, such as tablet failure rates and the spread of fake job advertisements, which led to adjustments in equipment allocation and recruitment strategies for the main census.

**Ethiopia** conducted three pilot censuses between 2016 and 2018, but the main census enumeration did not occur during the 2020 round. The first two pilots tested both paper-based and digital enumeration methods, while the third was fully digital with paper backups. Several challenges emerged, including the recruitment of fieldworkers who were physically unfit, unfamiliar with digital tools, or unable to speak local languages. These issues were compounded by poor communication regarding fieldworker entitlements, leading to disruptions during training. Additionally, the pilot was conducted before finalizing data collection tools, resulting in problems like inconsistent translations and faulty skip patterns. Technical shortcomings, such as inadequate power banks and poor network coverage, led to a revision of IT equipment specifications and a new budget. Training was also affected by the lack of suitable facilities, prompting the inclusion of specific requirements for training centers in future plans.

In **Namibia**, the pilot census was conducted from September to October 2021 and provided valuable insights into field organization, supervisory structures, training programs, and data processing plans. Preliminary tests helped refine the batch editing program and monitoring dashboard. The sampling design was purposive, targeting diverse population groups and living environments, including nomadic communities in Kunene and Tsumkwe, holiday homes along the coast, commercial and resettlement farms, gated communities, and various urban settings. These efforts aimed to ensure that the actual census would be well-informed and effectively executed.

LINK to case studies below in separate section

**Kenya**

Kenya conducted several field tests before the pilot census to test the content and flow of the questionnaires as well as consistency checks and skip patterns. The pilot census was conducted exactly a year to the census date, thereafter, two pre-tests were undertaken.

* The first pretest aimed to: test the census data collection; assess the suitability of the uploaded Enumeration Area (EA) maps; test the pre-enumeration household listing; and test the flow of the questionnaire with the newly added questions that were not tested during pilot census.
* The second pre-test aimed to test the recommendations made from the first pre-test regarding data collection application, uploaded EA maps, pre-enumeration household listing system as well as test the supervisor module that had not been included in the pilot census.

Pilot census and testing activities were carried out in purposively selected areas to include: densely populated rural and urban areas; urban slums; high class residential areas in urban setting; border counties with internet connectivity issues; outdoor sleepers; travelers; hotels and lodges; rough terrain (hilly areas); areas with arid and semi-arid land; plantation regions; sparsely populated rural area; and Nomads/ Pastoralists community.

Within the resources budgeted for the pilot census, two extra pretests had to be undertaken after the pilot census because it was not comprehensive enough to include testing of the supervisor module, additionally, the questionnaire was not yet final given that the NSO was still accepting to take on new questions.

* The pilot census revealed several issues that informed the main census such as during the training, it was noted that time allocated for training on disability, labour, definition of concepts and map reading was not adequate, and this helped in revision of the training programme for the main census, among others.
* This finding shows that the lessons from the pretests done before the pilot were not taken into consideration, for instance, the need to adjust the training timetable should have been seen and handled earlier during the pretests so that the pilot only identifies major issues. Such as the failure rate of the tablets that was used to decide on the number of spare tablets to allocate per supervisory area and the emergence of fake job advertisements that informed the change in recruitment strategy for the main census.

**Ethiopia**

Ethiopia conducted three pilot censuses in November 2016, March 2017 and June 2018 and the main census enumeration did not take place in 2020 round. The first and second pilots were conducted to test both enumeration methods: paper and tablet while the third one was purely digital with backup paper questionnaires for emergencies such as tablet failure and power shortage. After the completion of the first pilot lessons have been documented to inform subsequent census activities as outlined in this document.

* Recruitment guidelines were not followed leading to appointment of fieldworkers who were physically unfit, some were not familiar with digital technology while, others could not speak the local language, this negatively affected the pilot census operations. This was coupled with lack or poor communication about field worker entitlements that led to discontent and disruption of the training.
* The pilot census was done before a thorough review and finalization of the data collection tools was completed, pretests should have been done earlier to address issues found such as inconsistencies in the translated questionnaires, inappropriate and non-functional skip patterns/rules in the data capture application.
* The pilot census led to an overhaul in some of the IT equipment specifications indicating that there may have been limited prior research or non-adherence to recommendations. This lesson is drawn from the failure of power banks to charge the mobile devices due to low capacity, low battery time for the tablets, poor network coverage that necessitated modification of the specifications for the equipment hence a fresh budget.
* Lack of preparedness on the part of the trainers and field operations office to ensure availability of appropriate training centres with LCD projectors to present video lessons affected the training in some centres and this can compromise on the data quality. This therefore necessitated the inclusion of specifications for an ideal training centre for a digital census as part of the training plan.

***Namibia***

Namibia conducted the Census Pilot Enumeration in September to October 2021 that provided important information on the adequacy of the field organization, supervisory areas, training program, extent of respondent burden, the data processing plan and other important aspects of the census that would better inform the actual census. Prior to the census pilot implementation, tests were done, and the data generated was used to review the batch editing program and test the monitoring dashboard.

The sampling design was purposive and included: special populations such as the Nomadic people in Opuwo that are based in Kunene region and Tsumkwe, holiday homes in Walvis/Swakop (coastal areas of Namibia); EAs in: commercial farms, resettlement farms, gated communities, communal settlements and urban (high class society, middle Class, low / informal).

## Challenges and Lessons Learnt

* All Africa countries that undertook a digital census in the 2020 round of PHC conducted a pilot census including multiple testing exercises. It is noted that the pilot helped countries to revise their initial census plans especially, with regards to recruitment criteria, training agenda, publicity and advocacy strategy, selection of trainers, adjustment of the questionnaires and data collection application among others.
* Although it is recommended that pilot censuses should be conducted exactly a year to the actual census, some countries were not able to meet these timelines due to COVID-19, delay in approval of budgets, inadequate funding, among others.
* Some countries had not factored in budgets for carrying out further tests after issues were identified and remedied in the first tests. This led to constraints of resources and scaling down of the tests. It is advisable that during planning, tests need to be allocated adequate resources as they are key in implementation of a digital census.
* Carrying out the pilot census before the questionnaire and CAPI application and other systems and processes have been finalized means that the pilot is inadequate. Pre-testing of the questionnaire and all applications and systems prior to the pilot should be carried out so that the pilot is a test of the proposed final methodology.
* Carrying out the pilot using a small sample of households rather than by entire enumeration areas meant that in some countries systems were not properly stress tested. For example, processes for transmitting or uploading data may work for a few households at a time, but can data from the entire EA be transmitted either from enumerator to supervisor or from supervisor to headquarters without issues?
* All the tools and instruments to be tested need to be ready in time for the pilot (and should already have been tested as part of pre-tests). However, in many countries this was not the case, for example the census server may not be ready until just a few weeks before the census. There needs to be recognition that digital testing, including volumetrics and stress-testing is a complex subject, and will require an expert. Security testing is also important and requires an expert. Such experts need to be brought in to properly scope out what and how digital systems should be tested.

## Recommendations

Based on the selected country experiences and the lessons learned during implementation of a digital pilot census, the following recommendations are made to inform future PHCs:

* Adequate budgeting and resourcing for a pilot census and other testing activities should be taken into consideration to avoid budgetary constraints as was the case in Kenya that budgeted for one pilot exercise. There is a need to provide adequate resources to undertake the pilot census, questionnaire pretests and the subsequent post pilot testing exercises. Effective planning and resourcing for the pilot and pretests needs to be carefully done as this is normally overlooked during the planning process. See more on [budgeting](#_2.2￼Development_of_census).
* A comprehensive proposal on census testing implementation should be developed. This should include all aspects to be tested at each stage - before, during and after the pilot. For each aspect to be tested, the methodology for testing, the measurement and use of the testing, the budget, and the workplan should all be described.
* The purposively selected EAs for the pilot census should be exhaustive within the country’s context including EAs which are challenging in terms of internet connectivity. This will enable testing of contingency plans for when the internet fails.
* Prior to the census pilot implementation, all digital data collection tools including all application menus should be tested and the data generated should be used to make reviews such as on the batch editing program, the monitoring dashboard etc. Avoid conducting a pilot census when all is not set including the questionnaire content.
* It is important to ensure that all the aspects of the digital PHC are tested before the actual census. After each modification, a test should be done to ensure that the updated data capture and monitoring system is working properly.
* Staff recruitment and training procedures should be prepared in advance and be part of the pilot census test, they should also take language issues and renumeration into account. It is ideal to recruit enumerators from within or around the EAs to avoid the experience of Ethiopia. However, the pilot experience enabled strict adherence to the recruitment guidelines for the main PHC to ensure appropriate personnel are recruited. It is important to place the advert for fieldworkers in media communications at least 2 to 3 months prior to the recruitment period, to allow enough time for the verification process i.e. whether field staff meet the necessary requirements for recruitment etc. (Namibia). Countries also recommended that an independent e-recruitment system customized to the recruitment needs of the agency may be used. See more on [recruitment](#_6.1_Recruitment).

## References

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