# Quality Assurance, Monitoring, Evaluation, and Risk Management

## Introduction

Quality assurance is not a separate phase but an ongoing commitment to monitor, evaluate and assure data quality throughout the census lifecycle. In a digital census, technology provides sophisticated tools for real-time monitoring, rigorous evaluation, and proactive risk management. Census processes should show methodological soundness and adherence to professional and internationally agreed standards and efficiency, relevance of data, completeness, accuracy of data, timeliness of information, accessibility, data coherence, and comparisons across space which include data validation against other sources, and basic demographic analysis based on the knowledge of an area.

The UN handbook on census management emphasizes integrating risk planning into every phase of the census cycle.

A well-executed digital census combines technology with proven quality assurance methods to ensure accurate, reliable, and secure data collection. This chapter outlines a comprehensive approach to quality assurance, monitoring, evaluation and risk management emphasizing the integration of digital methodologies.

### Comparison of quality assurance, monitoring, evaluation and risk management during the non-digital versus the digital era

As part of a digital census, technology offers powerful tools for enhancing quality assurance and validation throughout the census process. Electronic devices and other technologies impact the census process positively by making the enumeration faster and easier to monitor for quality and allowing for use of multiple data collection approaches to save costs.

Digital systems can be programmed to automatically detect various types of errors or inconsistencies in responses e.g., discrepancy between age and marital status; outliers and unusual values such as extremely high or low income; or duplicate entries i.e., multiple entries for the same person. Data validation rules can be defined within the CAPI application to prevent errors at the point of data collection. Data processing software may be applied to flag errors during data cleaning stages.

Machine learning algorithms can be used to enhance data quality. For example, anomaly detection models can identify complex patterns and anomalies in the data that may not be apparent through traditional methods. Such algorithms can predict potential errors and target quality assurance efforts more effectively. Classification models can be used to predict the likelihood of errors based on respondent characteristics and can also be used to improve the accuracy of imputation for missing data by estimating plausible values.

In a digital census, digital dashboards can be used to provide real-time data quality monitoring. Digital dashboards enable census officials to view data quality indicators and thereby:

* Track error rates and identify areas where data quality may be compromised.
* Monitor enumerator performance and identify potential training needs.
* Assess the impact of interventions and quality improvement efforts.

Furthermore, digital systems automatically generate para-data which was not available in a non-digital era. Para-data is data about the census process itself. Para-data includes timestamps of data collection events e.g., start and end times of interviews, enumerator behavior such as time spent on specific questions and patterns of skipping questions, and device usage patterns such as battery life and connectivity. Analyzing para-data can provide valuable insights into potential quality issues and inform process improvements such as by identifying enumerators who may need additional training, detecting potential fraud or falsification of data, or optimization of the data collection process for efficiency and accuracy.

Risks and their impact to a digital census are different and can be more costly if not mitigated compared to a non-digital census.

### Considerations for quality assurance, monitoring, evaluation and risk management for a digital census

To ensure comprehensive quality assurance, monitoring, evaluation and risk management, the following key considerations must be in place:

* The quality assurance and improvement system should be developed at the planning stage as part of the overall census programme and integrated with all other census phase plans, schedules, and procedures.
* There should be good well documented internal quality monitoring mechanisms.
* For monitoring and evaluation in a digital census, real-time dashboards must be adopted. Use electronic dashboards to track data collection progress and identify anomalies. For evaluation, conduct follow-up surveys (post enumeration surveys) to assess data accuracy and coverage.
* Key data quality indicators should be agreed upon at the start, Examples of quality indicators that may be displayed by the dashboard include error rates (e.g., percentage of questionnaires with inconsistencies), inconsistency rates (e.g., percentage of conflicting responses for key variables); the distribution of responses for specific questions; the number of edits/flags raised per enumerator/area; completion rates (e.g., percentage of households enumerated), and time taken per interview.
* Determine and test the software or technologies to be used at the start. Here are some examples:
  + Statistical software packages (e.g., Stata, R, SPSS) for calculating and visualizing quality indicators.
  + Database management systems (e.g., PostgreSQL) for storing and querying data.
* Despite digital advancements, physical field supervision remains crucial to address unforeseen issues and must be factored into the quality assurance and improvement plan.
* There are inherent risks in digital platforms, therefore a comprehensive risk management plan based on assessments done to identify potential risks must be developed in the pre-enumeration phase for each of the census components.
* In conducting a risk assessment, evaluate the likelihood and impact of each identified potential risk using tools like risk matrices and scenario planning to prioritize them.
* Put in place a risk monitoring and review system by setting up a governance structure to regularly review and update risk strategies and establish a risk register to track identified risks and mitigation actions.

Detailed guidance on emergency preparedness, risk management and contingency planning in the UN P&R rev 4 para 2.125 to 2.157.

## Key implementation areas of quality and risk management in a digital census

Risk and quality management is a continuous and integrated theme and should be woven into every stage of the census, ensuring that quality considerations guide all activities.

### Planning and Design

Quality should be built into the census from the outset through:

* Careful design of questionnaires and data collection instruments, adhering to international standards and best practices.
* During pre-enumeration testing phase, conduct thorough testing of the questionnaire design, data collection software (CAPI application), and mapping systems including usability testing and error detection capabilities.
* Establishment of clear data quality standards and procedures, aligned with the overall census objectives.

The potential risks during the planning and design stage may be categorized as:

* Operational risks arising from delays in procurement, recruitment, or training. These risks could be due to challenges like pandemics, climatic conditions etc.
* Technological risks arising from failures in digital tools, data loss, or cyberattacks.
* Political and legal risks arising from changes in government priorities or legal challenges, and social risks arising from public mistrust, misinformation, or resistance to participation.

Risk mitigation strategies include:

* Building public trust and using transparency to address concerns about data privacy and ensure public confidence in the census process.
* Developing backup plans for critical systems and processes.
* Ensuring clear mandates and data protection laws are in place.
* Testing and piloting all digital tools and infrastructure adequately before full deployment.
* Monitoring the entire census processes to ensure cost effectiveness and the quality of overall census operations crucial.

See also [project planning and management](#_Project_Planning_and).

### Training

Comprehensive training of census personnel is essential for data quality assurance by:

* Ensuring enumerators and supervisors receive comprehensive training to promote consistent application of enumeration procedures and data definitions.
* Minimizing errors in data collection and entry through hands-on practice and real-world scenarios.
* Promoting understanding of data confidentiality and ethical considerations, emphasizing the importance of accurate and unbiased data collection.

The US Census Bureau emphasizes that training is a high-risk phase in census operations due to its scale and time sensitivity. Proactive risk management ensures that training builds confidence and competence rather than confusion. Some training-related risks may include devices or software malfunction, inadequate internet access can disrupt virtual sessions, trainees may struggle with new tools or platforms and the risk of unauthorized access to training materials or personal data. To mitigate these risks:

* Run small-scale trials (pilots) to test content delivery, tech platforms, and participant engagement.
* Combine in-person and online training to accommodate varying tech access and skills.
* Provide real-time technical support during training through help desks & support teams.
* Train staff on secure login practices, password management, and data handling through clear cyber hygiene protocols.
* For contingency planning, prepare printed manuals or offline training kits as backup devices and materials. Have alternative platforms or secondary tools ready in case the primary system fails.

For monitoring and evaluation during training, the following techniques can be adopted:

* Use tests and quizzes to assess understanding and identify gaps and ensure to have a feedback Loop to the trainees.
* Track attendance, completion rates, and technical issues in real time through performance dashboards.
* Evaluate trainers’ effectiveness and adjust methods accordingly through trainer assessments.

See also [recruitment and training](#_Recruitment_and_Training).

### Data Collection

Digital tools enable quality management by providing:

* Real-time data validation to identify and correct errors during enumeration, reducing the need for post-enumeration editing. Validation rules can be used to check for:
  + Completeness (ensuring all required fields are filled).
  + Consistency (checking for logical inconsistencies between responses).
  + Accuracy (verifying data against predefined ranges or lists).
  + Examples of validation checks include:
    - Age within a reasonable range.
    - Consistency between age and education level.
* Monitoring data collection progress and coverage using dashboards and geospatial tools in real-time.
* Supervisory checks through digital platforms to monitor enumerator performance and identify potential issues. For example, supervisor field case management should encompass the methods by which interviewers receive assignments and manage questionnaire completeness. Field supervisors should oversee the completeness and quality of interviewer outputs, upload it for management and administrative review. The higher-level field managers should be able to track the progress of survey operations.

In terms of census monitoring, the use of independent monitors drawn from development partners, donors, Civil Society Organizations, National Statistical Offices in Africa and beyond, academia and other government agencies to monitor enumeration should be considered as an additional quality assurance activity. Independent monitoring in representatively selected enumeration areas can:

* Objectively evaluate the census against international standards and national legislation and provide regular feedback to the NSO during and after the census activities.
* Document the census process, lessons learnt and good practices for building capacity in future censuses.

Further information on independent census monitoring can be found in the Guidelines for Independent Census Monitoring in Africa 2030 Round of Population and Housing Censuses.

To manage risk during data collection, prepare backup systems and alternative data collection methods in case of technical failures as a contingency plan.

See also [Enumeration and Logistics](#_Enumeration_and_Logistics)

### Data Processing

The quality of the data and thus outputs from the data is enhanced through:

* Automated data cleaning and editing procedures to remove inconsistencies and errors.
* Rigorous data validation and consistency checks using statistical software and algorithms.
* Documentation of the processing steps for transparency and reproducibility, ensuring that data transformations are well-defined and auditable.

Risk management during data processing in digital census is crucial to ensure accuracy, security, and efficiency. Potential risks may include data corruption due to errors in transmission or storage leading to inaccurate results; cybersecurity threats from unauthorized access, hacking, or data breaches; system overloads or software failures and automated processing errors from algorithm bias in the data editing script affecting data integrity. As a risk mitigation strategy:

* Adopt cybersecurity measures to protect census data from cyber threats through encryption, access controls, and regular security audits.
* Regularly audit data editing algorithms for fairness and accuracy.
* Maintain backup servers and alternative processing methods or centers by establishing secondary locations for data handling. It can be in another government entity.
* Plan for system failures with a documented disaster recovery plan.

For monitoring and evaluation during data processing, the following techniques can be adopted:

* Use dashboards to monitor processing errors for real-time error tracking.
* Maintain audit trails or logs of data modifications for accountability.
* Conduct external/independent reviews and audits to verify data integrity.

See also [Data Processing](#_Data_Processing)

### Assessment of data quality

Post enumeration, the quality of the enumeration can be assessed through various activities including:

* Comparison of overall responses from the target population with population projections or administrative data.
* Evaluating consistency and completeness at the question level.
* Measuring the quality of any coding undertaken by field staff e.g., occupation coding
* Identifying and resolving duplicate responses
* Conducing a post-enumeration survey (PES) to gauge the level of under enumeration or over enumeration of people and dwellings.
* Reviewing feedback from field staff.
* Conducting an independent observation of the enumeration.

With the increasing shift to digital methodologies, the risk landscape for these surveys has evolved, introducing new challenges alongside traditional ones. Effective risk management throughout the lifecycle of a digital PES is paramount to ensuring the validity of its results and, consequently, the quality of the census data. A digital PES can be broken down into several key stages, each with its own set of potential risks and each addressed accordingly.

See also [Post-Enumeration Survey](#_Post-Enumeration_Survey).

### Data Dissemination

Quality management extends to how data is presented and used by:

* Ensuring data accuracy and reliability through rigorous quality control throughout the process.
* Providing clear metadata and documentation to facilitate proper interpretation and use of the data.
* Promoting data literacy and appropriate use through training and user support.

Risk management in digital data dissemination is crucial to ensure data integrity, security, and accessibility. Potential risks include unauthorized access and data breaches, wrong information and misinterpretation of results, system downtime or data loss, and non-adherence to data protection laws. In addition to quality management aspects, validating data accuracy before dissemination, secure data against cyber threats through access controls, and ensure users understand the data correctly through clear communication protocols.

See also [Census Analysis, Products, Dissemination and Archiving](#_Census_Analysis,_Products,).

## Selected Country Experiences

In **Kenya**, the 2019 census was monitored by a diverse team of independent observers from UN agencies, civil society organizations, African national statistical offices, academic institutions, and the National Gender and Equality Commission. These observers were trained using standardized tools and methodologies and were deployed across all regions. Their responsibilities included assessing storage facilities, evaluating the clarity of enumeration area (EA) boundaries, reviewing pre-enumeration household listings, and observing the use of materials and the proficiency of enumerators. Their real-time feedback was submitted to the Kenya National Bureau of Statistics (KNBS). Additionally, Kenya integrated a supervisor module into its CAPI (Computer-Assisted Personal Interviewing) system, allowing supervisors to randomly re-interview households and address any inconsistencies. This was complemented by a team of coordinators from various census committees who conducted further monitoring and oversight.

The digital census in Kenya used over 164,000 mobile devices and while successful, it encountered issues with device and network reliability in remote areas and with public trust. Kenya’s experience underscores the importance of proactive risk management and transparency.

The data quality assurance adopted by **The Gambia** and several other countries in Africa was multi-faceted and included: digitization of maps and compound imageries to be used to track progress of work and performance of enumerators in EAs, use of supervisors for CAPI validation of collected and shared data information, use of inbuilt consistency checks (filtering questions, skip patterns), use of data quality monitors, use of regional field monitors/regional census officers and their deputies, use of enumeration coverage dashboard, use of a Call Centre.

To ensure data quality, **Ghana** implemented a multi-faceted approach that included the use of CAPI with built-in validation, real-time data monitoring, and independent monitoring by international experts. Ghana also established District Data Quality Management Teams to monitor data collection in real-time and resolve issues as they arise. These teams were crucial for ensuring data accuracy and completeness at the local level.

**Zambia** implemented a multi-tiered supervision system during its census. Supervisors managed about six enumerators each, conducted re-interviews, and reviewed performance using a digital dashboard. This dashboard, developed with UNECA support, provided real-time tracking of key indicators like interview duration and population coverage. National Data Quality Monitors used this data to guide field visits and provide feedback. GIS tools were employed to verify enumeration area (EA) coverage before certifying completion, ensuring thoroughness and accuracy.

**Tanzania** emphasized quality control throughout its census process. Supervisors and coordinators were trained extensively, and pre-enumeration planning included well-designed questionnaires and GPS-supported mapping. The census application was developed using detailed specifications and underwent rigorous testing in three phases: in-house, pre-testing, and pilot. During enumeration, supervisors conducted spot checks and used tablet-based quality check programs. Data sent to headquarters was validated using edit specifications, and hard checks in the CAPI system helped minimize content errors.

**Namibia** focused on layered quality assurance through regional and national supervisors. Monitoring teams were deployed at the start of fieldwork to ensure adherence to procedures. They observed enumerators, especially in translating questions into local languages, and took corrective actions when needed. A real-time monitoring dashboard enabled supervisors to track data quality. If errors were found, records were returned to mappers for correction, ensuring high data integrity.

For **Nigeria** in its first planned digital census feared the immense challenge of managing data security and logistics for Africa's most populous nation. Mitigating risks requires a robust cloud infrastructure and extensive training for a massive number of enumerators, all within a complex security environment.

**Ghana** in its 2021 digital census like several other countries had to contend with internet connectivity issues, forcing the use of offline data collection methods in certain areas. This created additional logistical challenges and data synchronization risks that had to be carefully managed.

**South Africa** experienced a census undercount, even with the use of digital systems. This points to the fact that technology alone cannot solve underlying challenges like respondent fatigue and reaching hard-to-count populations, indicating that risk mitigation must also focus on these persistent social issues.

LINK to case studies below in separate section

**Zambia**

The first level of supervision was provided by the supervisors. The supervisors were responsible for closely monitoring the work of the teams to ensure that all households were visited, all respondents were contacted, and all procedures were accurately implemented. Each supervisor had about 6 enumerators and conducted re-interviews of 5 selected households in each Enumeration Area assigned to them. Further, the supervisor reviewed the questionnaires after receiving the work from their enumerators using the review report on the supervisor menu. The report showed the name of the enumerator, EA number assigned to them, average interview time, total population enumerated, number of completed and non-contacts households among other key performance indicators. The supervisors provided feedback to the enumerators based on the reports.

At national and subnational level, the census monitoring dashboard was key in monitoring the data collection. The dashboard was a web-based information management tool used to display key performance indicators for real time tracking of fieldwork progress. Developed with technical assistance from UNECA’s African Centre for Statistics (ACS), The dashboard presented key indicators in interactive charts and graphs to allow users for a quick review and analysis. Access was given to selected census technical and administrative staff for them to view progress in their respective regions and be able to prioritize where to monitor. National Data Quality Monitors who operated at HQ provided feedback to the Provincial Census Officers as well as the District Census Coordinators. Population projections were included in the dashboard for benchmarking the progress of enumeration. Further, National Data Quality officers conducted field visits to their assigned region to provide feedback to the enumerators. The census dashboard helped to target certain areas which had low performance indicators.

For enumerators that reported to have completed enumeration, the GIS were checking the coverage of the EA before certifying the completion of work.  Feedback was given to the enumerators on structures observed without markers.

**Tanzania**

Quality control is an essential component of the Census undertaking. Quality control standards and procedures were developed and observed throughout all steps of the census undertaking to ensure collection of quality data. All supervisors and coordinators were trained on quality control standards and procedures during training sessions of the census.   
At Pre-Enumeration Stage, planning was well organized; there were well designed census questionnaires and other related documents (manuals, control forms etc.). Also, on census mapping, supervisors assessed the work done by Field Assistants on delineation. In order to increase the quality and Quality control is an essential component of the Census undertaking. Quality control standards and procedures were developed and observed throughout all steps of the census undertaking to ensure collection of quality data. All supervisors and coordinators were trained on quality control standards and procedures during training sessions of the census.

At Pre-Enumeration Stage, planning was well organized; there were well designed census questionnaires and other related documents (manuals, control forms etc.). Also, on census mapping, supervisors assessed the work done by Field Assistants on delineation. In order to increase the quality and the accuracy of the maps, Global Positioning Systems (GPSs) were used.

During the designing of the application, programmers used the specifications developed by the subject matter specialists. The specifications contained all instructions for the programmers to program the code form the questionnaire into CAPI including response options, skip patterns, instructions to the interviewer, data validations, error messages and output data format. For validation purposes the subject matter developed validation checks, which include range checks, inconsistency checks and data completeness checks.

In order to ensure the quality of data collected, the electronic questionnaire was tested several times specifically in three stages: In-house testing, pre-testing and pilot.

During enumeration, quality control supervisors visited the households for spot checking and conducted back checks for selected households to ensure the quality of data collected. There was also the quality check program in the supervisor’s tablet, when enumerators sent data to the supervisor, the program runs a quality check to detect some issues.

Once the enumerators send the data IT personnel situated at headquarter were able to check the data through the server. Data quality checks was done by using an edit specification document prepared by the subject matter specialists for majority of the questions to reduce content errors. Hard checks in CAPI were designed to reduce content errors.

These procedures were used to limit the number of errors during the whole process of the census exercise.

**Namibia**

In Namibia, to ensure the collection of reliable, quality, and timely data, a series of quality assurance activities were undertaken at different levels of monitoring. This was done by regional supervisors, National Supervisors and Managers. The monitoring teams were sent to regions at the beginning of the fieldwork to ensure that fieldwork started off as planned and that all data collection procedures were followed as prescribed.

Monitoring teams followed randomly selected teams just to observe and ensure that they are introducing the objectives of the Census Mapping Projectproperly and questions are asked as trained including the translation of questions from English to vernacular languages. In doing so, remedial actions were undertaken to improve the quality of the data. Furthermore, a monitoring dashboard was also used by the regional and national supervisors to monitor real-time data as it comes in and provide quality assurance on the data. During data quality assurance, if the data collected was wrongly entered or not as prescribed, that respective record was sent back to the mapper to fix the issues identified.

**Kenya**

A team of independent monitors/observers drawn from the United Nations (UN) Agencies, Civil Societies, National Statistical Offices (NSOs) in Africa, Academic Institutions, as well as National Gender and Equality Commission (NGEC) conducted an independent monitoring/observation of the census enumeration exercise between 21st and 31st August 2019. They monitored, reviewed, and gave feedback to KNBS in real time about the census process. The monitors/observers were neutral witnesses of the enumeration process and did not interfere with the enumeration process in any way.

The monitors/observers were provided with unified observation tools and trained on the same methodology to properly appraise and report on several elements of data collection. They were distributed in all regions and covered the following aspects of the census:

* Storage facilities in county statistics offices, advocacy materials, accessibility of EAs in the sub counties.
* Identification of EA boundaries with focus on clarity of boundaries using EA maps and support from the village elders and assistant chiefs.
* Pre-enumeration Household listing.
* Enumeration materials and equipment, enumerator’s proficiency in data collection skills, and local languages.

After enumeration, the monitors prepared reports which were presented to the KNBS management.

Additionally, as part of quality assurance, supervisor module was included in the CAPI application in which the supervisors were able to select a few households randomly, conduct re-interview and generate a report. Any variations were addressed by the enumerators in discussion with the supervisors. A team of coordinators drawn from the various census committees were also deployed to undertake monitoring and observations of the enumeration process.

## Challenges and Lessons Learnt

A digital census introduces a unique and complex set of challenges for quality assurance, particularly within the diverse contexts of African nations. Below are some challenges experienced:

* Kenya used a three-tier supervision structure to support real-time response to issues and ensure data quality. However, concerns were raised about the collection of personal identifiable information and the potential for data misuse. These concerns can also impact participation and data quality.
* The 2022 digital census of South Africa faced significant criticism regarding data quality, with an undercount and questions about the accuracy of the population estimates. This case underscores that technology alone does not guarantee a quality census.
* While digital censuses promise faster results, there can be a trade-off between timeliness and quality. Rushing the data processing and analysis to meet deadlines can compromise the thoroughness of quality checks. Uganda disseminated a report with quality concerns and had to withdraw it. This compromises public trust in the results and may affect its use.
* In Zambia, the census dashboard was not tested due to delay in procuring the server at the time of the final pretest. More human resources to ensure streamlined roles so that data quality staff focus on working on the census dashboard to provide feedback timely.

Some of the potential risks in digital census undertakings may be difficult to fully mitigate, for instance dependency on foreign technology. Many African countries rely on foreign companies for network equipment and other digital infrastructure. This dependency raises concerns about digital sovereignty and the long-term sustainability of these systems.

Mitigating the risks inherent in a digital census is a complex task globally, but in the African context, these challenges are often compounded by a unique set of deeply rooted issues. The following are significant hurdles to successful risk mitigation in Africa:

* + - Systemic problems that can undermine even the best-laid plans. The inadequacy of foundational infrastructure makes risk mitigation a constant struggle. The scarcity of high-quality, secure data centers within many African nations poses a significant challenge to mitigating data security risks. This raises concerns about data sovereignty, as many countries may have to store sensitive census data on less secure local options or store sensitive citizen data with foreign cloud providers or even outside the country if none exists in the country.
    - The capacity of national institutions to manage large-scale, technologically advanced projects is often a limiting factor in terms of insufficient and uncertain funding, limited technical capacity and "brain drain" in crucial areas like cybersecurity, lengthy and bureaucratic procurement processes can delay the acquisition of essential technology and services, impact on timelines and forcing last-minute, often riskier, decisions.
    - Public perception and the political environment can create significant challenges that are difficult to mitigate. In many regions, there is a deep-seated mistrust of government data collection, which is often exacerbated when new technologies are introduced.
    - The legal frameworks needed to support and govern a digital census often lag behind technology. The absence of comprehensive data protection and privacy laws in many countries creates a risky environment for handling sensitive census data.

## Recommendations

* Digital technologies offer more choice on how to conduct a census but introduce new complexity. Therefore, it is important to carefully consider how the tools and the subsequent design will deliver the requirements of users to sufficient quality while upholding statistical standards.
* Integrate monitoring, evaluation, quality and risk management into all phases of the digital census, from planning to dissemination.
* Leverage digital tools for real-time data validation, automated error detection, and continuous monitoring.
* Invest in training and capacity building to ensure that census staff can effectively use digital quality assurance tools and interpret their results.
* Establish clear protocols for risk and data quality assessment, reporting, and corrective action, ensuring that risk and quality issues are addressed promptly and effectively.
* Evaluate and adapt quality assurance and risk mitigation strategies based on lessons learned and technological advancements, continuously improving the effectiveness of risk and quality management practices.
* Independent monitoring by international observers should be embraced as it promotes credibility of the entire census process and provides a lesson learnt for countries planning a census exercise.
* Develop a comprehensive risk management strategy that addresses a wide array of challenges, from the foundational issues of infrastructure and security to the more nuanced socio-cultural and governance factors. Endeavour to build capacity to execute that plan in a challenging environment.

## References

* + - 1. U.S. Census Bureau, USAID, UNFPA. Assessing the Quality of Fieldwork in a Census. Select Topics in International Censuses. Released September 2023. <https://www.census.gov/content/dam/Census/programs-surveys/international-programs/stic/assessing-quality-fieldwork.pdf>
      2. United Nations. Principles and Recommendations for Population and Housing Censuses, Revision 4 (Draft) [Internet]. DRAFT – VERSION 31 JANUARY 2025. Fifty-sixth session Statistical Commission, New York; [cited 2025 Apr 19]. 439 p. Available from: <https://unstats.un.org/UNSDWebsite/statcom/session_56/documents/BG-3b-Draft_P&R_4th_Rev-E.pdf>
      3. United Nations Statistics Division, “Handbook on the Management of Population and Housing Censuses,” Revision 2, United Nations Publications, New York, 2021.
      4. Handbook on Census Management for Population and Housing Censuses, Studies in Methods No. 83 (United Nations publication, Sales No. 00.XVII/Rev.1), chapter 1C.
      5. UNSD presentation at Regional Workshop on the 2020 World Programme on Population and Housing Censuses: International standards and contemporary technologies. Ankara, Turkey, 12-15 March 2019.
      6. UNSD presentation at Regional Workshop on the 2020 World Programme on Population and Housing Censuses: International standards and contemporary technologies. Colombo, Srilanka, 8 -11 May 2018.
      7. Statistics Botswana. 2021 Population & Housing Census project document.
      8. Statistics Canada. A Guide to Risk Management in a Census Context. May 2022
      9. Guidelines for Independent Census Monitoring in Africa 2030 Round of Population and Housing Censuses