Food and Agriculture Organization of the United Nations

FAO Statistics and Data Quality Assurance Framework

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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Abbreviations and acronyms

BDQF	Big Data Quality Framework
CCSA	Committee for the Coordination of Statistical Activities
COP	[European Statistics] Code of Practice
DCG	Data Coordination Group
DCG-T	Technical Data Coordination Group
DQAF	Data Quality Assessment Framework
ECB	European Central Bank
ESCB	European System of Central Banks
FAO	Food and Agriculture Organization of the United Nations
GSBPM	Generic Statistical Business Process Model
ICT	information and communication technology
IMF	International Monetary Fund
ISO	International Organization for Standardization
IT	information technology
OECD	Organisation for Economic Co-operation and Development
QAPS	Quality Assessment and Planning Survey
QF	Quality Framework
SDQAF	Statistics and Data Quality Assurance Framework
SQAF	Statistics Quality Assurance Framework
SQF	Statistics Quality Framework
UNECE	United Nations Economic Commission for Europe

Introduction

High quality data and statistics on food and agriculture provide the foundation for evidence-based policymaking for both national governments and the international community. For the Food and Agriculture Organization of the United Nations (FAO), sound data and statistics play a critical role in designing and targeting policies to reduce hunger, malnutrition and rural poverty, improve food systems' productivity, sustainability and resilience, and combat climate change, biodiversity loss and inequality. They are also essential in monitoring progress towards national, regional and international development goals and targets. It is therefore imperative that the data and statistics produced by FAO are of the highest possible quality.

In 2014, FAO released its first Statistics Quality Assurance Framework (SQAF) with best practices to guarantee the quality of FAO's statistical outputs, processes and institutional environment. Several of the SQAF recommended best practices are now part of FAO's corporate culture and have been consolidated in statistical standards, policies and governance mechanisms.

Over the course of the past eight years, the environment of statistics has evolved. First, the demand for timely food and agricultural statistics have never been so great. The data needs of the 2030 Agenda for Sustainable Development are four times those of the Millennium Development Goals. In addition, recent events such as the global COVID-19 pandemic, desert locust outbreaks in the Greater Horn of Africa and Yemen, and the war in Ukraine have also increased pressures for the provision of timely and actionable insights to mitigate the impacts of such events on agrifood systems and food security. Second, over the past decade, new or alternative data sources, for example of big data, earth observation data and administrative data, have proliferated; such data can be used in the production of statistics alongside data obtained through traditional censuses and surveys. These alternative data sources, the technologies to use them and their related data science skills are becoming more accessible, offering new opportunities for the production of timelier statistics; however, this evolution comes with a number of risks, such as privacy and data security breaches, damage to reputation and loss of public trust, which must be managed.

In view of this changing environment, FAO has been introducing a number of changes to improve the integration of the Organization's data and statistics since 2020. Improvements were made to FAO's data and statistics governance mechanisms, including by appointing an executive data champion, creating a Data Coordination Group (DCG) and expanding the mandate of FAO's Technical Data Coordination Group (DCG-T) to include data and statistics. A data lab for statistical innovation was also created to develop FAO's capabilities in data science and further explore the use of non-traditional data sources in the production of statistics. In addition, the Organization promulgated policies on data protection and intellectual property rights in 2022–2023; these policies concern all sensitive and (strictly) confidential data processed by FAO, including data used in the production of statistics or data for statistics.

Thus, the revision of SQAF towards a harmonized quality assurance framework for data and statistics was a necessary step to ensure that alternative data sources are used properly to fill data gaps and that the resulting statistical products satisfy the highest quality standards. The resulting

new FAO Statistics and Data Quality Assurance Framework (SDQAF) will complement the efforts being made to promote coordination and improve the consistency of the Organization's overall statistical programme. It will also help ensure that sound and internationally accepted statistical concepts and definitions are adhered to, standard methodologies are adopted, and accurate, high-quality, timely and accessible data are produced by FAO.

This corporate quality assurance framework for data and statistics is particularly important within FAO's decentralized statistical system, where each technical department carries out its own statistical programme of work and maintains ownership of its data. In such a system, and without proper coordination mechanisms and an overall framework, common standards and methodologies are applied on an ad hoc basis, rather than consistently on a corporate scale.

As is the case for other international organizations, FAO's statistics are mainly based on data supplied by national statistical agencies, other international organizations or other trustworthy sources. Consequently, their quality depends on the quality of the inputs received. This document provides an overall framework to ensure the quality of FAO's statistical outputs and the soundness of the processes and governance mechanisms for their production. Quality elements specific to the different types of input data used by FAO are considered in additional specific corporate statistical standards.

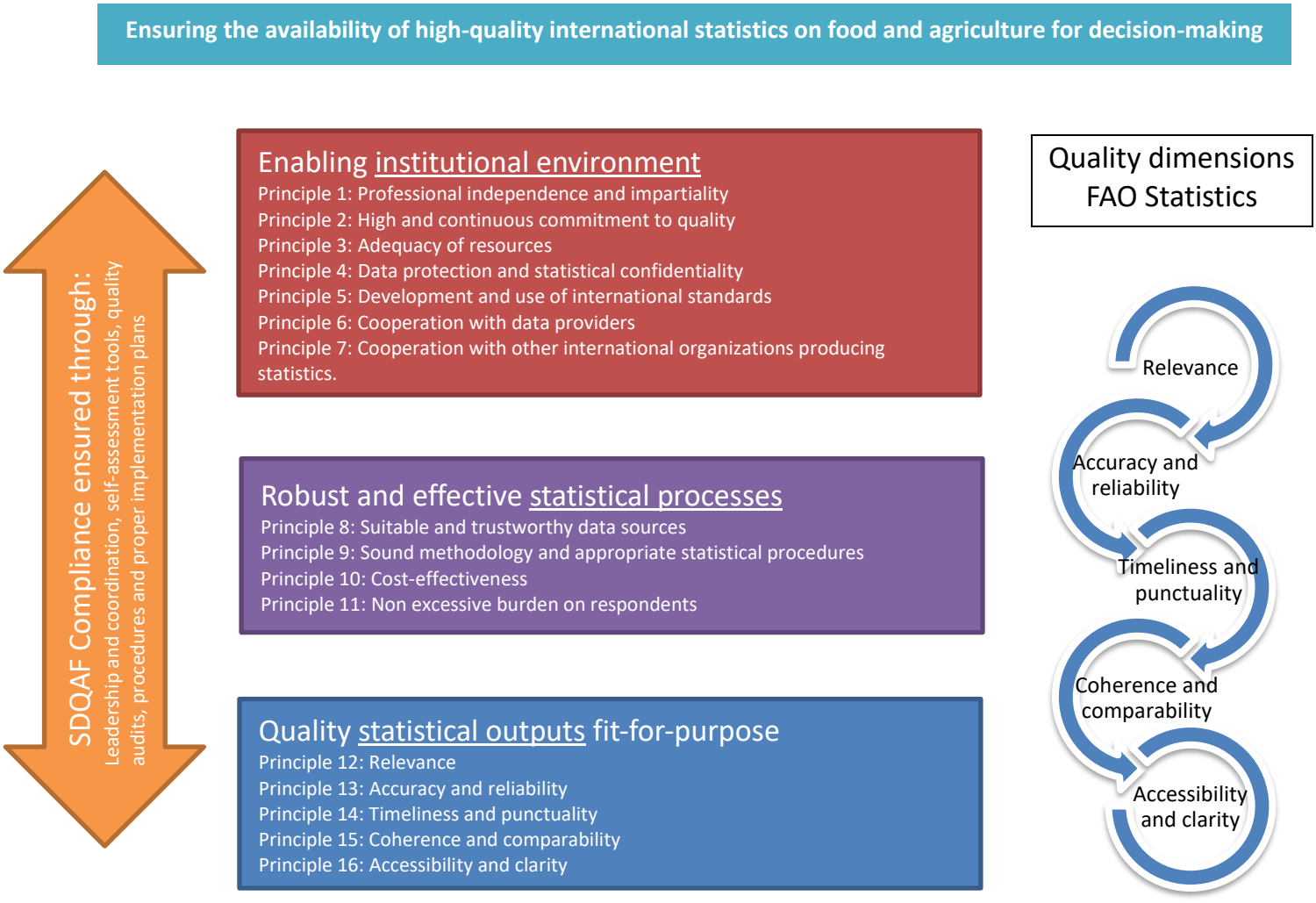
1. FAO's Statistics and Data Quality Assurance Framework

1.1 Background

The main objective of FAO's Statistics and Data Quality Assurance Framework (FAO SDQAF) is to guide the Organization in producing high-quality statistics on food and agriculture for decision-making. As shown in Figure 1, the framework consists of a series of principles concerning the institutional environment, statistical processes and statistical outputs that should be adhered to ensure the quality of the Organization's statistics. The quality of the statistics itself is defined in the framework, under various quality dimensions, to create a common understanding of what needs to be achieved.

Figure 1. FAO's Statistics and Data Quality Assurance Framework

Vision, principles, quality dimensions and compliance mechanisms



Source: authors' elaboration.

Each of the principles is accompanied by key implementation modalities that provide information on how FAO manages and achieves that principle. Finally, the framework describes the main mechanisms in place to ensure and monitor FAO's compliance with the SDQAF.

The FAO SDQAF principles encompass the Fundamental Principles of Official Statistics of the United Nations Statistical Commission,[1] as well as the Principles Governing International Statistical Activities endorsed by the Committee for the Coordination of Statistical Activities (CCSA).[2]

Annex 1 provides an overview of the correspondences between FAO SDQAF and the Principles Governing International Statistical Activities. While developing the new SDQAF, FAO also examined the quality assurance frameworks of other key international organizations (including the European Central Bank [ECB], Eurostat, the International Monetary Fund [IMF] and the Organisation for Economic Co-operation and Development [OECD]). Annex 2 documents the correspondences between FAO SDQAF and these organizations' principles. Finally, FAO SDQAF also takes into account the Suggested Framework for the Quality of Big data developed by the United Nations Economic Commission for Europe (UNECE) (see an overview of correspondences in Annex 3),[3] as well as CCSA's Recommended Practices on the Use of Non-Official Sources in International Statistics.[4]

The application of the principles and implementation modalities of SDQAF is crucial to strengthen and maintain FAO's reputation and credibility as a centre of excellence for the production of agricultural data and statistics.

[1] For more information, see http://unstats.un.org/unsd/methods/statorg/FP-english.htm.
[2] For more information, see https://unstats.un.org/unsd/methods/statorg/Principles_stat_activities/principles_stat_activities.asp.
[3] For more information, see https://cros-legacy.ec.europa.eu/system/files/Task%20Team%20Big%20Data%20Quality%20Framework_937_unblinded_v1.pdf.
[4] For more information, see https://unstats.un.org/unsd/ccsa/documents/practices.pdf.

1.2 Scope and typology

FAO SDQAF applies to all data and statistical activities undertaken by FAO employees, including the collection, production and release by FAO of data and statistics, for public purposes or to inform the development and implementation of the Organization's programmes.

The framework does not apply to data and statistics concerning the Organization's internal operations (the management of human resources, finances, and information and communication technology [ICT] infrastructure), as these do not fall under FAO's data production functions as laid out in Article I of its Constitution.[5] For the purposes of the framework, a statistical activity is an activity in which the primary focus is on acquiring, processing, storing, analysing and disseminating statistical data; this does not include the use of statistics. As for statistical development activities, they generally refer to the establishment and/or improvement of statistical methods, standards and procedures used in the production and dissemination of statistics.

As described in Section 2.3, quality in the context of statistics is ultimately measured in terms of the quality of the final statistical outputs – which requires proper quality management at the institutional and statistical process level. At the institutional level, this implies controlling the institutional and organizational factors that have a significant influence on the Organization's ability to ensure high-quality statistical processes and outputs. At the statistical process level, quality is managed throughout the production cycle of statistical outputs by ensuring that international standards, guidelines and best practices are applied, in a cost-effective matter, during the various stages of the planning, development, production and dissemination of statistical outputs.

In general, FAO's statistical processes follow the Generic Statistical Business Process Model (GSBPM) v5.1 of the UNECE High-Level Group for the Modernisation of Official Statistics.[6] However, the types of input data and statistical outputs greatly influence how the GSBPM statistical processes and subprocesses are applied. As shown in Figure 2, most FAO data sources are secondary data sources, which can be qualified as either statistical or non-statistical data sources. Statistical data sources include data that were produced for a statistical purpose (e.g. collected through surveys) or produced and validated as statistics by their data providers (e.g. official national statistical estimates). Non-statistical data sources (also referred to as non-traditional data sources) comprise data that were not primarily collected for statistical purposes, but may be used to compile official statistics (e.g. administrative data, big data such as remote sensing information).

[5] For more information, see https://www.fao.org/3/mp046e/mp046e.pdf.

[6] For more information, see https://cros-legacy.ec.europa.eu/system/files/Task%20Team%20Big%20Data%20Quality%20Framework_937_unblinded_v1.pdf.

Figure 2. Types of FAO input data and statistical outputs

FAO INPUT DATA

Statistical data sources	Non-statistical data sources
• **Official data from national recognized agencies or officially recognized focal points,*** collected through FAO questionnaires or obtained directly from official national statistical products, regardless of the data sources used at national level. • **Data from international organizations (official or estimated)**, obtained through data sharing agreements or directly from open-source statistical products, regardless of the data sources used by the international organizations. • **Primary statistical data (e.g. microdata),** collected by FAO through probabilistic and representative sample surveys or obtained through microdata sharing protocols with recognized national or international data producers.	• **Administrative data**, collected by FAO in the context of its operations or obtained through data sharing agreements with the data owner. • **Big data (raw data or pre-processed)**, obtained through cooperation with the data owner or accessed freely through web scraping (e.g. earth observation data, mobile phone data, data scraped from social media, etc.).

FAO STATISTICAL OUTPUTS

- **National estimates** (including disaggregated estimates), which may have been modified by the FAO statistical process.
- **New national estimates calculated by FAO** (derived variables, complex indicators calculated using different input variables, disaggregated estimates).
- **Aggregates of collected input data** (global and regional aggregates).
- **Aggregates related to new variables/indicators** produced by FAO (global and regional aggregates).
- Aggregates obtained directly by regional or international institutions.
- **Microdata files** (e.g. Food Insecurity Experience Scale) (after data treatment and confidentiality preservation procedures by FAO or by the agencies providing the data).

*Note: * Often referred to as secondary data. More detailed definitions are provided in Annex 4.*
Source: authors' elaboration.

When the official data provided by national governments or international organizations are of good quality and disseminated with minimal data manipulation and validation, the activities related to the design and creation of frames and samples, as well as data processing, are simplified. However, the use of secondary data increases the complexity of the data integration process (especially for non-statistical data sources) and makes the validation of outputs more difficult as FAO do not necessary have direct access to the primary data or respondents.

1.3 FAO SDQAF's definition of quality

Quality is a multifaceted and subjective concept. The International Organization for Standardization (ISO) 9000:2014 standard defines quality as "the degree to which a set of inherent characteristics of an object fulfils requirements".

The most important quality characteristics depend on user perspectives, needs and priorities, which vary across groups of users. For this reason, achieving a compromise between the needs of the various (current and potential) users of statistical outputs and the availability of resources is a major challenge.

Building upon the work of several international organizations (ECB, Eurostat, IMF and OECD) in this area,[7] the definition of quality in the context of statistical outputs, as tailored to FAO's framework, encompasses five quality dimensions. FAO defines quality in statistics as the degree to which its statistical outputs fulfil requirements, and the following quality dimensions are taken into account:

- **Relevance**
  - Relevance is the degree to which statistics meet the current and potential user needs.
- **Accuracy and reliability**
  - Accuracy refers to the closeness of estimates to the true values that the statistics were intended to measure.
  - Reliability refers to the closeness of initial estimates to subsequent or final estimates.
- **Timeliness and punctuality**
  - Timeliness is the speed of dissemination of statistical outputs i.e. the lapse of time between the end of a reference period (or a reference date) and the dissemination of the statistical outputs.
  - Punctuality refers to the possible time lag existing between the actual delivery date of statistical outputs and the target date when they should have been delivered, for instance with reference to dates announced in an official release calendar or previously agreed among partners.
- **Coherence and comparability**
  - Coherence is the adequacy of the statistical outputs to be meaningfully combined in different ways and for various uses.
  - Comparability refers to the extent to which differences between different geographical areas, non-geographical domains, or over time can be attributed to differences between the true values of the statistical characteristics.
- **Accessibility and clarity**
  - Accessibility is defined as the ease, the set of conditions and the modalities by which users can obtain data.
  - Clarity refers to the availability of adequate documentation: whether data are accompanied with appropriate metadata, illustrations such as graphs and maps, whether information on their quality are also available (including limitation in use), and the extent to which additional assistance is provided.

[7] Annex 2 provides an overview of the correspondences between FAO SDQAF principles and the principles of other organizations' quality assurance frameworks.

1.4 FAO SDQAF principles

The FAO SDQAF principles and their key implementation modalities are set out in three areas: institutional environment, statistical processes and statistical outputs.

The first priority of the FAO statistical system is to meet user needs by producing high-quality statistical outputs. Given that the level of quality of statistical outputs is determined by the soundness of the governance mechanisms and processes of statistical production, the principles related to the institutional environment are outlined first in FAO SDQAF. The second part of FAO SDQAF is devoted to the principles related to statistical processes, given that high-quality statistical outputs can only be produced through high-quality statistical processes. The third part of FAO SDQAF is dedicated to the principles relating to statistical outputs.

Institutional environment

Institutional and organizational factors have a significant influence on the Organization's ability to implement high-quality statistical processes and produce high-quality statistical outputs. Compliance with the principles listed below ensures that FAO statistics are produced in an environment that promotes and supports adherence to high quality standards in its processes and outputs.

FAO SDQAF Principle 1: Professional independence and impartiality

FAO statistics are produced and disseminated on the basis of scientific and professional independence fromother policymaking, regulatory or administrative departments and bodies, as well as from private sector operators.This is done in an objective, impartial, professional and transparent manner.

Key implementation modalities

1.1. The selection of data sources, as well as the collection, compilation and dissemination of FAO statistics are undertaken according to strictly scientific and professional statistical considerations, and on an objective and impartial basis.
1.2. Information on the sources, methods and procedures used in statistical processes is publicly available.
1.3. FAO publishes release calendars in advance, and publicly explains any delays.
1.4. Statistical releases are issued separately from political or policy statements.
1.5. Press releases on statistical outputs are objective, impartial and accessible to a wide range of audiences.
1.6. Criticism, erroneous interpretations and misuses of statistics are immediately and appropriately addressed. Errors in published statistics are corrected as quickly as possible and actions are taken to avoid the occurrence of similar errors.
1.7. Advance notice is given of major revisions or changes in methodologies.
1.8. Decisions about FAO statistical work programmes are made public through various channels, including through official reports presented to FAO governing bodies, FAO regional commissions on agriculture statistics and the United Nations Statistical Commission.
1.9. All documents for and reports of statistical meetings, statistical capacity building initiatives and technical assistance projects are publicly available on the FAO website.

FAO SDQAF Principle 2: Strong and continuous commitment to quality

FAO is highly committed to quality. The strengths and weaknesses of FAO statistics are systematically and regularly monitored to continuously improve the quality culture within the organization, as well as the quality of both processes and products.

Key implementation modalities

2.1. FAO's quality standards for statistical outputs are defined and publicly available. They are regularly updated to reflect the changing environment and new best practices.
2.2. All FAO staff members are responsible for the control and assurance of the quality of the data they process. The FAO Data Coordination Group, the technical task forces of the Data Coordination Group, FAO's chief statistician and FAO SDQAF with its methods, tools and implementation plan play a key role in quality management and leadership within the Organization.
2.3. Procedures are in place to regularly monitor the quality of statistical production processes, including the integration of data from multiple data sources, and identify best actions to address data quality challenges.
2.4. Product quality is regularly monitored, assessed with regard to possible trade-offs and reported according to FAO SDQAF.
2.5. There are regular and thorough reviews of FAO key statistical outputs, involving external experts and users where appropriate (e.g. through user consultations, peer reviews or external evaluations).
2.6. The FAO training programme includes training courses designed to support the implementation of its data quality framework.
2.7. FAO engages in capacity development activities targeting data providers, in particular national statistical agencies, to improve the quality of their data and statistics.
2.8. FAO has a corporate risk management tool that helps monitor, mitigate and manage the risks associated with the quality of its data and statistics.

FAO SDQAF Principle 3: Adequacy of resources

The resources available to FAO statistical programmes are sufficient to meet data and statistics requirements. The establishment of a corporate resources allocation and monitoring mechanism is an essential way of ensuring that human, financial and technical resources are adequate.

Key implementation modalities

3.1. FAO has a dedicated budget for FAO statistics, for both staff and non-staff resources, to implement its statistical processes; this budget reflects priorities in statistics needs.
3.2. When appropriate, FAO takes action to mobilize additional resources to respond to new data demands, from corporate or extra-budgetary sources, for statistical infrastructure enhancement projects, research and development, and capacity development programmes supporting national food and agriculture statistics systems.
3.3. Governance and procedures are in place to monitor, document and review the way in whichresources dedicated to statistics are used and prioritized, as well as to encourage collaboration and joint activities where appropriate.

FAO SDQAF Principle 4: Data protection and statistical confidentiality

Any data used or processed by FAO, or transferred to a third party by FAO, are processed correctly and consistently throughout the data lifecycle, from their initial collection to storage and deletion. All data of a confidential or sensitive nature (e.g. concerning people or legal entities, small aggregates or sensitive location data) are kept strictly confidential, used exclusively for statistical purposes and processed in line with FAO's data protection policy.

Key implementation modalities

4.1. FAO has developed confidentiality and protection policies for data and statistics which are made available to the public, and regularly monitors compliance of its data production processes with these policies.
4.2. Guidelines and instructions are provided to staff to assess the confidentiality level and associated risks of data, and adequately protect confidential and sensitive data used in statistical production and dissemination processes.
4.3. Physical, technological, methodological and organizational provisions are in place to protect the security and integrity of FAO statistical databases and underlying raw data, as appropriate.
4.4. FAO promotes the definition and adoption of formal agreements with data providers to support data exchange, to ensure that confidentiality is respected whilst also permitting proper data use and statistical analysis.
4.5. A framework describing methods and procedures for exchanging microdata with data providers is adopted, in line with the data protection policies of those third parties.
4.6. FAO applies the most advanced international standards and best practices in the treatment and dissemination of microdata or georeferenced statistics (which involve data anonymization and generalization, the use of statistical disclosure procedures and/or strict terms of use for microdata).
4.7. FAO requests the informed consent of respondents participating in surveys carried out by the Organization.
4.8. All FAO employees are bound by a duty of confidentiality, which does not cease upon their separation from service, and are required to comply with FAO's Data Protection Policy.
4.9. In case of a data breach, FAO has a process in place to take timely mitigation action.
4.10. FAO supports national data providers in complying with their legal commitments concerning data confidentiality.

FAO SDQAF Principle 5: Development and use of international standards

FAO contributes to and promotes the definition and implementation of international statistical standards in all fields of work within FAO's mandate. Standards for international statistics are developed on the basis of sound professional criteria, while also addressing issues of practical utility and feasibility.

Key implementation modalities

5.1. FAO systematically involves national statistical offices and other national, regional and international organizations for official statistics in the development and promulgation of methods, standards and good practices.
5.2. FAO systematically works with other organizations towards agreements on common statistical concepts, classifications, standards and methods.
5.3. FAO ensures that decisions on international standards on statistics are free from conflicts of interest and are perceived to be so.
5.4. FAO advises countries on implementation issues concerning international standards and monitors the implementation of agreed standards.

FAO SDQAF Principle 6: Cooperation with data providers

In order to produce high-quality statistics, FAO cooperates with its various data providers, including by undertaking capacity development initiatives aimed at improving the quality of statistics produced by its Member Nations.

Key implementation modalities

6.1. Formal data acquisition protocols and/or data sharing agreements are in place with Member Nations and other data providers for the provision of data and metadata to FAO. These protocols and agreements specify the role that the data play in the final statistical outputs, explain the data access and exchange procedures between the parties, and are compliant with FAO policies on data protection and intellectual property rights, where applicable.
6.2. FAO encourages national statistical agencies to strengthen the coordination of their national statistical system, in particular to help identify the authorities in charge of providing official data to FAO, facilitate data reporting and better coordinate statistical capacity development activities.
6.3. Effective collaboration mechanisms with data providers are established to discuss how the quality of input data and metadata, as well as of the arrangements under which data are shared with FAO, may be improved.
6.4. FAO advocates the application of the Fundamental Principles of Official Statistics when FAO input data are collected by national statistical agencies.
6.5. Relevant national official organizations are consulted as appropriate and to the extent possible when non-official data are used to fill gaps and missing values in official time series. In particular, discrepancies between official data and data produced by FAO using other sources should be investigated and discussed with the relevant national data providers.
6.6. FAO promotes bilateral and multilateral cooperation in knowledge sharing (e.g. supporting training, project and guideline development) with countries and regions to further develop national and regional statistical systems.

FAO SDQAF Principle 7: Coordination with other international organizations producing statistics

FAO coordinates with other statistical organizations for the development of international statistical programmes.

Key implementation modalities

7.1. FAO participates in international statistical meetings and bilateral and multilateral consultations for the development of international statistical programmes, whenever necessary.

7.2. There is a procedure in place to coordinate FAO's participation in international statistical meetings and its contribution to international working groups.

7.3. FAO promotes coordination with other statistical organizations in the development of coordinated international statistical programmes, in order to avoid overlaps and duplication of work.

7.4. FAO promotes bilateral and multilateral cooperation in sharing knowledge with international organizations to further develop national, regional and international statistical systems.

Statistical processes

The way statistical processes are conducted directly affects the quality of statistical outputs. FAO is committed to continuously improving the quality of its statistical processes, while guaranteeing their cost-effectiveness and ensuring that the burden on data providers remains at an acceptable level.

FAO SDQAF Principle 8: Suitable and trustworthy data sources

Data for statistical purposes may be drawn from all types of sources, including official statistics provided by Member Nations, international statistics produced by other organizations, data collected from statistical surveys or non-statistical data, such as big data.

FAO chooses its data sources according to strictly professional considerations. The availability of official data as well as the accuracy, the relevance, the independence, the stability and the expected availability over time of the input data are among the most important factors considered by FAO when selecting its data sources.

Key implementation modalities

8.1 FAO data sources are chosen using strictly professional considerations to ensure high-quality statistical outputs.

8.2 Official statistics are typically the best source of information for the compilation of FAO statistics; however, the Organization can refrain from publishing official data if there are reasonable doubts about their quality.

8.3 The use of non-official sources may be considered in cases where national official sources are not available or proven to be of poor quality.

8.4 When evaluating alternative data sources, priority is given to data produced by national statistical agencies or officially provided to other international organizations by these agencies. FAO uses non-official data sources to produce statistics only after a thorough quality assessment of the available official national and international statistics; alternative input data must go through a rigorous validation mechanism and the resulting statistical output must improve data quality.

8.5 A procedure is in place to assess the adequacy of non-official/non-statistical data sources, including of the data, underlying data-generation process, metadata and (where appropriate) the institutional and business environment of its data provider. This assessment is done considering the intended uses of the data source in FAO statistical production processes and its impact on the quality of the resulting statistical outputs.

8.6 Methodology and criteria for selecting and assessing the adequacy of non-official/non-statistical data sources are made publicly available and equally accessible to all users.

8.7 When using non-official/non-statistical sources to fill gaps or to improve data quality and the comparability of FAO statistics, FAO strictly follows internationally agreed recommended practices (where they exist).

FAO SDQAF Principle 9: Sound methodology and appropriate statistical procedures

In developing and compiling data and statistics, FAO uses sound methodologies and applies effective and efficient procedures throughout the data production cycle. FAO defines its methodological framework in accordance with established and internationally agreed scientific principles, and ensures its implementation across all its data production processes. FAO relies on highly competent staff to develop and successfully apply such sound methodology.

Key implementation modalities

9.1 The FAO methodological framework complies with international standards, guidelines and good practices, while constantly striving for innovation.

9.2 Procedures are in place to ensure that standard concepts, definitions, classifications and sound methodologies are consistently applied across FAO and its statistical processes.

9.3 Statistical methods are implemented using efficient, robust and standardized information technology (IT) systems.

9.4 FAO has endorsed the International Statistical Institute's Declaration on Professional Ethics and encourages all its staff members involved in statistical production to adopt high-standard professional values and ethics in statistics.[8]

9.5 The FAO statistical system recruits highly competent staff from relevant disciplines and with appropriate qualifications.

9.6 FAO staff participate in training courses, on-the-job capacity development activities, conferences and international meetings, and are encouraged to publish their work in peer-reviewed professional journals, to ensure that their methodological knowledge is up-to-date and shared globally, within the limitations set by budget constraints.

9.7 FAO cooperates with the scientific community to improve methods and standards related to official statistics in general, and food and agricultural statistics in particular.

9.8 Procedures are in place to decide whether a new statistical process should be implemented and how this process should be designed and applied.

9.9 The statistical procedures applied in data collection, processing, analysis, validation and dissemination are regularly documented, monitored, revised and disseminated.

9.10 Metadata related to statistical processes are managed throughout the statistical process and disseminated as appropriate.

9.11 Data collection forms and questionnaires used by FAO in its data collection processes follow corporate standards and are systematically tested prior to data collection.

9.12 Data revisions follow standard, well-established and transparent procedures.

9.13 When new non-traditional data sources are used for statistical purposes, their treatment and processing (deriving new variables, creating new data files, integrating data sources, etc.) follow appropriate specific procedures for controlling and assuring the quality of the output data based on internationally agreed recommended practices (where they exist).

9.14 Data transformation and analysis in FAO are based on theoretical principles and not dependent on the system that is used to conduct them. For example, the residuals of a regression should be the same regardless of the analytical system used to perform the regression.

[8] See https://www.isi-web.org/declaration-professional-ethics.

FAO SDQAF Principle 10: Cost-effectiveness

Efforts are made to continuously identify new and improved cost-effective approaches to carry out FAO statistical processes. The establishment of a corporate monitoring mechanism is an essential way of ensuring that the most cost-effective approaches are adopted at FAO.

Key implementation modalities

10.1 FAO promotes and implements standardized solutions that increase cost efficiency and cost-effectiveness.
10.2 Information and communication technology (ICT) tools are used to optimize the different phases of statistical processes, including the storage and processing of large non-traditional input data (e.g. big data and geospatial information).
10.3 Cost–benefit and risk analysis, including of the maintenance burden, is carried out before new, or substantially enhanced, statistical processes are developed and integrated into regular production.
10.4 Governance procedures are in place to monitor, document and review the way in which resources are used and to encourage collaboration and joint activities, where appropriate.

FAO SDQAF Principle 11: Non-excessive burdens on respondents

FAO adopts strategies to monitor, limit and reduce the reporting burden placed on respondents over time. The Organization chooses appropriate sources (including non-traditional data sources such as big data) and data collection methods to minimize the reporting burden for data providers. The challenge of meeting user needs is balanced with managing the burden placed on respondents.

Key implementation modalities

11.1 FAO's requests to data providers are limited to what is absolutely necessary.
11.2 Mechanisms are in place to assess the necessity of undertaking new data collection efforts.
11.3 Existing statistics are regularly monitored to ascertain whether the burden on respondents can be reduced further.
11.4 Data sharing and overall coordination within FAO is generalized to avoid the duplication of processes and to identify where the burden on data providers can be reduced.
11.5 FAO is committed to making the provision of data to or data sharing with FAO easier for countries or other constituencies.
11.6 FAO coordinates with other organizations for data sharing, applies open data principles and has a clear licensing policy to facilitate the use of its data by other organizations.
11.7 Where appropriate, FAO collects data directly from other international organizations, in order to reduce the response burden on national organizations.
11.8 Proactive efforts are made to improve the statistical potential of new emerging data sources and to limit the response burden on national data providers (countries).

Statistical outputs

With regard to its statistical outputs, FAO recognizes Principle 1 of CCSA's Principles Governing International Statistical Activities, which states that "high quality international statistics, accessible for all, are a fundamental element of global information systems". FAO SDQAF includes the following principles:

FAO SDQAF Principle 12: Relevance

FAO data and statistics meet user needs. In order to identify user needs and assess whether they are met, FAO has regular and ongoing dialogues with its data users, and the information collected through such dialogues is reflected in data and statistical activities.

Key implementation modalities

12.1 Procedures are in place to identify and consult the key internal and external users of FAO data and statistics, in order to identify new or emerging requirements, and to monitor the relevance and usefulness of existing statistics.
12.2 Key users are consulted by FAO when the development of new data products or the application of substantial changes to existing data are planned.
12.3 The FAO Statistical Programme of Work is periodically revised to take due account of changing user priorities.
12.4 User satisfaction is monitored regularly and follow-up actions take place.

FAO SDQAF Principle 13: Accuracy and reliability

FAO statistics accurately and reliably portray reality. FAO aims to minimize the variability and biases associated with its statistical outputs and estimates. In international statistics, a lack of accuracy is generally due to the limited validity of data sources and errors occurring during the final production process. The quality of data sources is a key feature assessed by FAO when using non-statistical data sources as inputs for the production of statistical outputs. When revisions are made, FAO has a policy specifying the number and planned timing of revisions, and revisions are systematically analysed to assess reliability.

Key implementation modalities

13.1 Source data, integrated data, intermediate results and statistical outputs are regularly assessed and validated.
13.2 Errors are measured and systematically documented. Statistical outputs based on the use of non-traditional data sources (such as big data) are accompanied by an assessment of selectivity and all other potential errors that can affect their accuracy.
13.3 Methods and tools for preventing and reducing errors have been developed and are being used.
13.4 FAO's revision policy is publicly available.
13.5 Revisions are regularly analysed in order to improve statistical processes.

FAO SDQAF Principle 14: Timeliness and punctuality

FAO statistics are timely and punctual. FAO strives to produce data and statistics that are as timely as possible, as non-timely statistical outputs can easily lose their relevance. In doing so, the trade-off between timeliness and accuracy is taken into account. FAO recognizes that punctuality provides added value for users.

Key implementation modalities

14.1 FAO strives to produce statistics that are as timely as possible, without unduly compromising other quality features, and systematically works on the improvement of the timeliness of its statistics.
14.2 The periodicity of statistics takes user requirements into account as much as possible.
14.3 FAO agrees on a reporting timetable for the submission of data with data providers, which enables the Organization to define a release calendar. FAO then monitors the compliance of data providers with the reporting timetable.
14.4 Preliminary results of acceptable aggregate accuracy and reliability can be released when considered useful.
14.5 The FAO statistics release calendar is publicly available, and FAO data releases are planned accordingly.
14.6 Delays in the dissemination time schedule are announced in advance, explained and communicated together with a new release date.

FAO SDQAF Principle 15: Coherence and comparability

FAO statistics are consistent internally and over time. FAO statistics are internationally comparable and canbe used in conjunction with statistics provided by other statistical organizations. As comparability is a key issue for international statistics, the adoption of common concepts and definitions is fundamental to achieve comparability. FAO fosters the development and implementation of international standards on food and agriculture statistics.

Key implementation modalities

15.1 FAO promotes cooperation and the exchange of knowledge between individual statistical programmes and domains to assure that its statistics are internally consistent.
15.2 FAO statistics are kept comparable over a reasonable period of time and between geographical areas. The effects of changes in input data sources or methodologies on final estimates are assessed and appropriate information is provided to users.
15.3 FAO statistics are based on internationally agreed concepts, definitions and methods, and allow international comparisons to be drawn. Conceptual differences, if any, are explained clearly to the public. Significant changes in the phenomena to be measured are reflected in appropriate changes to concepts, classifications, definitions and target populations.
15.4 Statistics from different data sources, and with different time periodicities, are compared and any differences are explained (and reconciled).

FAO SDQAF Principle 16: Accessibility and clarity

FAO statistics are easily accessible to all users on an impartial basis, presented in a clear and understandableformat, and accompanied by relevant supporting metadata. Ensuring that users are able to easily access statistical outputs is a fundamental part of FAO statistical processes. The Organization works to continuouslyimprove the accessibility of its data and statistics, taking into account users' needs, new possibilities offeredby IT developments and open data principles. Metadata accompanying data dissemination improve the clarity and interpretability of statistics.

Key implementation modalities

16.1 All users have equal and simultaneous access to statistical releases. Key statistical outputs are freely available for users, accessible in open data format and accompanied by clear terms of use.

16.2 On the basis of users' needs and preference, FAO statistics are disseminated in various forms (e.g. databases, tables, publications, data visualizations, etc.) and through appropriate channels (e.g. websites, social media, online fora, etc.), which can be accessed through a unique entry point on FAO's website.

16.3 FAO promotes dissemination-related applications and tools that allow users to generate and customize their own outputs (data, tables, graphical representations) according to their needs.

16.4 Access to microdata collected by FAO is allowed for research purposes, subject to specific rules and protocols.

16.5 Users' experiences and needs with regards to the accessibility of FAO statistical outputs are assessed regularly to improve FAO's dissemination practices.

16.6 FAO statistics are disseminated together with relevant metadata presented in a standard format that facilitates proper interpretation, meaningful comparisons and machine-processing in line with the open data format.

16.7 Concepts, definitions and classifications, as well as data sources, data acquisition, data collection and processing procedures used, and the quality assessments carried out, are properly documented, and this information is publicly accessible.

16.8 When using non-official data sources to produce statistical outputs, their associated metadata clearly document the divergences in concepts, definitions and data coverage of input data, the methods used to treat, process and obtain the final statistical outputs, as well as the limitations to the use of the statistical outputs caused by the complexity of the data sources.

16.9 When disseminating international statistics, FAO gives credit to the original source of the data and uses agreed quotation standards when reusing statistics originally collected by others.

1.5 FAO SDQAF compliance mechanisms

FAO has developed a series of tools and procedures to evaluate existing and new statistical processes and data sources, to ensure the compliance of statistical processes and their outputs with process and product quality principles. In addition, a set of institutional activities are being developed and promoted to ensure that FAO meets all principles relating to the institutional environment.

Procedures for evaluating existing statistical activities and data platforms

The procedure for evaluating existing statistical processes is twofold: it consists of a combination of quality-related self-assessment and auditing. Self-assessment is applied to most ongoing statistical activities and their outputs, while the use of audit procedures is limited to complex key corporate statistical processes and data platforms.

For the ***self-assessment,*** the officer responsible for the statistical process evaluates the adherence of the process and its outputs to the principles and implementation modalities of SDQAF and the best practices promoted by FAO's corporate statistical standards. The self-evaluation is completed through the FAO Quality Assessment and Planning Survey (QAPS), which is an internal survey conducted by the Chief Statistician on a biannual basis. QAPS relies on a questionnaire that concerns the quality-related aspects of statistical activities at all phases of the statistical production process, based on all the principles included in SDQAF. Self-assessment results are summarized in the QAPS final report, highlighting the strengths and weaknesses of statistical processes and outputs; this provides a basis to implement tailored improvement actions.

Auditing is carried out by a team of auditors (two or three internal or external experts, as needed) who study supporting documentation on the statistical activity and meet the officer responsible for the process to further investigate any issues identified. A checklist facilitates the completion of the task, the results of which are summarized in a final report with recommendations for improvement actions by the responsible officer.

Procedures for evaluating new data collection efforts

When new statistical activities involving new data collection efforts are planned, the assessment process evaluates whether the new process is set up considering relevance (user needs), burdens on respondents and overlaps with existing statistical activities. Therefore, information concerning relevance, data sources and the response burden must be collected, and basic information on how the new process would be carried out, as well as a cost–benefit analysis, are produced. These elements provide the foundation for the approval process. Where new statistical activities involve surveys or other types of interaction with data providers to obtain personal data, a privacy self-assessment and a data protection impact assessment should be carried out.

Procedures to evaluate the use of new non-statistical data sources to produce statistical outputs

The use of new non-traditional data sources to produce statistical outputs is also carefully examined by the Organization. The assessment process may include a due diligence screening of the data providers against a set of determined criteria (if the data source is not freely accessible)[9] and a thorough analysis of the relevance, validity, comparability, usability and interpretability of the input data and of the quality of the resulting statistical products. Based on the assessment results, the Organization approves (or not) the use of the non-traditional data source. Once approved, the resulting statistical outputs go through a well-established validation mechanism, in line with specific additional corporate statistical standards, prior to dissemination.

Leadership and coordination

All assessment activities related to new or existing processes and non-traditional data sources are supported and coordinated by a team of experts that reports to the Data Coordination Group (DCG), the technical task forces of the Data Coordination Group (DCG-T) and the Chief Statistician. The same team coordinates and promotes the implementation of improvement actions to ensure quality at the institutional level, in line with the priorities set by the DCG-T. They also coordinate regular dialogues with Member Nations and the broader international data and statistics community on issues related to the quality of data and statistics, including quality assurance practices.

Implementation plan

The implementation of the activities described above requires the prior development and regular review of a set of tools, including the checklist for self-assessment, methodological guidelines for audits, and an assessment tool and procedures for the use of non-traditional data sources. These activities are included in FAO's programme of work, with clear timelines and allocated resources. Their implementation is monitored regularly by the DCG and DCG-T and through the reporting mechanisms of FAO's Programme of Work and Budget.

[9] For more information, see https://www.fao.org/connect-private-sector/engagement-cycle/en/.

Annexes

Annex 1. Correspondences between the FAO SDQAF principles and the Principles Governing International Statistical Activities

Table 1. Correspondences between the FAO SDQAF principles and the Principles Governing International Statistical Activities

FAO Statistics and Data Quality Assurance Framework (SDQAF) Principles	Principles Governing International Statistical Activities of the Committee for the Coordination of Statistical Activities (CCSA)[1]
FAO SDQAF PRINCIPLE 1: **PROFESSIONAL INDEPENDENCE AND IMPARTIALITY**	**Principle 1** High-quality international statistics, which are accessible to all, are a fundamental element of global information systems. Good practices include: • Compiling and disseminating international statistics based on impartiality. **Principle 2** To maintain trust in international statistics, their production should be impartial and based on the highest professional standards. Good practices include: • Using strictly professional considerations for decisions regarding methodology, terminology and data presentation. • Developing and using professional codes of conduct. • In statistical publications, making a clear distinction between statistical andanalytical comments on the one hand, and policy-prescriptive and advocacy comments on the other. **Principle 3** The public has a right to be informed about organizations' mandates for carrying outstatistical work. Good practices include: • Making decisions about statistical work programmes publicly available. • Making documents for, and reports of, statistical meetings publicly available. **Principle 7** Instances of erroneous interpretation and misuse of statistics must be addressed immediately and appropriately. Good practices include: • Responding to instances of erroneous interpretation and misuse of statistics. • Enhancing the use of statistics by developing educational material for important user groups.
FAO SDQAF PRINCIPLE 2: **HIGH AND CONTINUOUS COMMITMENT TO QUALITY**	**Principle 1** High-quality international statistics that are accessible to all are a fundamental element of global information systems.
FAO SDQAF PRINCIPLE 3: **ADEQUACY OF RESOURCES**	

FAO Statistics and Data Quality Assurance Framework (SDQAF) Principles	Principles Governing International Statistical Activities of the Committee for the Coordination of Statistical Activities (CCSA)[1]
FAO SDQAF PRINCIPLE 4: **DATA PROTECTION AND STATISTICAL CONFIDENTIALITY**	**Principle 6** Individual data about people, legal entities or small aggregates that are subject to national confidentiality rules must be kept strictly confidential and must be used exclusively for statistical purposes or for purposes mandated by legislation. Good practices include: • Putting measures in place to prevent the direct or indirect disclosure of data about people, households, businesses and other individual respondents. • Developing a framework which sets out the methods and procedures for providing sets of anonymous micro-data for further analysis by bona fide researchers, whilst maintaining the confidentiality requirements.
FAO SDQAF PRINCIPLE 5: **DEVELOPMENT OF INTERNATIONAL STANDARDS**	**Principle 4** Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics meet professional scientific standards and are transparent for users. Good practices include: • Making officially agreed standards publicly available. **Principle 8** Standards for national and international statistics are developed on the basis of sound professional criteria, while also addressing issues of practical utility and feasibility. Good practices include: • Systematically involving national statistical offices and other national organizations for official statistics in the development of international statistical programmes, including the development and promulgation of methods, standards and best practices. • Ensuring that decisions on such standards are free from conflicts of interest and are perceived as such. • Advising countries on implementation issues concerning international standards. Monitoring the implementation of agreed standards.
FAO SDQAF PRINCIPLE 6: **COOPERATION WITH DATA PROVIDERS**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Ensuring that national statistical offices and other national organizations for official statistics are duly involved, and that they advocate the application of the Fundamental Principles of Official Statistics when data are collected in countries. **Principle 9** Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance of international statistics, and to avoid the duplication of work. Good practices include: • Coordinating technical cooperation activities in countries with resource partners and different organizations in the national statistical system, to avoid the duplication of efforts and to encourage complementarities and synergies. **Principle 10** Bilateral and multilateral cooperation in statistics contributes to the professional growth of the statisticians involved, and to the improvement of statistics within

FAO Statistics and Data Quality Assurance Framework (SDQAF) Principles	Principles Governing International Statistical Activities of the Committee for the Coordination of Statistical Activities (CCSA)[1]
	countries and the organizations involved. Good practices include: • Cooperating and sharing knowledge among international organizations and with countries and regions to further develop national and regional statistical systems. • Basing cooperation projects on user requirements, promoting the full participation of the main stakeholders, taking account of both local circumstances and the level of statistical development. • Empowering recipient national statistical systems and governments to take the lead. • Advocating the implementation of the Fundamental Principles of Official Statistics incountries. • Setting up cooperation projects within a balanced overall strategic framework for the development of national official statistics.
FAO SDQAF PRINCIPLE 7: **COORDINATION WITH OTHER INTERNATIONAL ORGANIZATIONS PRODUCING STATISTICS**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Contributing to an integrated presentation of statistical programmes, including data collection plans, thereby making gaps or overlaps clearly visible. **Principle 9** Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance of international statistics, and to avoid duplication of work. Good practices include: • Designating one or more statistical units to implement statistical programmes, including one unit that coordinates the statistical work of the organization and represents the organization in international statistical meetings. • Participating in international statistical meetings and bilateral and multilateral consultations whenever necessary. **Principle 10** Bilateral and multilateral cooperation in statistics contributes to the professional growth of the statisticians involved, and to the improvement of statistics within countries and organizations. Good practices include: Cooperating and sharing knowledge among international organizations and with countries and regions to further develop national and regional statistical systems.
FAO SDQAF PRINCIPLE 8: **SUITABLE AND TRUSTWORTHY DATA SOURCES**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Having mechanisms in place to promote the use of the most suitable methods and sources by national statistical offices and other national organizations. **Principle 2** To maintain trust in international statistics, their production is to be impartial and strictly based on the highest professional standards.

FAO Statistics and Data Quality Assurance Framework (SDQAF) Principles	Principles Governing International Statistical Activities of the Committee for the Coordination of Statistical Activities (CCSA)[1]
	Good practices include: • Using the best national data sources in compiling international statistics, be theyofficial or non-official sources, following the Recommended Practices on the Use of Non-Official Sources in International Statistics.[2]
FAO SDQAF PRINCIPLE 9: **SOUND METHODOLOGY AND APPROPRIATE STATISTICAL PROCEDURES**	**Principle 4** The concepts, definitions, classifications, sources, methods and procedures employedin the production of international statistics meet professional scientific standards, and are transparent for users. Good practices include: • Aiming to continuously introduce methodological improvements and systems to manage and improve the quality and transparency of statistics. • Enhancing the professional competencies of staff by encouraging them to attend training courses, to do analytical work, to publish scientific papers and to participate in seminars and conferences. • In the dissemination of international statistics, giving credit to the original source,and using agreed quotation standards when reusing statistics originally collected byothers. **Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers.
FAO SDQAF PRINCIPLE 10: **COST-EFFECTIVENESS**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers.
FAO SDQAF PRINCIPLE 11: **NON-EXCESSIVE BURDEN ON RESPONDENTS**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Facilitating the provision of data by countries. • Periodically reviewing statistical programmes to minimize the burden on data providers. Sharing collected data with other organizations and collecting data jointly where appropriate.
FAO SDQAF PRINCIPLE 12: **RELEVANCE**	**Principle 1** High-quality international statistics that are accessible to all are a fundamental element of global information systems. Good practices include: • Regular consultations with both internal and external key users to ascertain thattheir needs are being met. Periodic review of statistical programmes to ensure their relevance.

FAO Statistics and Data Quality Assurance Framework (SDQAF) Principles	Principles Governing International Statistical Activities of the Committee for the Coordination of Statistical Activities (CCSA)[1]
FAO SDQAF PRINCIPLE 13: **ACCURACY AND RELIABILITY**	**Principle 4** Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics meet professional scientific standards and are made transparent for users. Good practices include: • Documenting the concepts, definitions and classifications, as well as data collection and processing procedures used, and the quality assessments carried out, and making this information publicly accessible. • Documenting how data are collected, processed and disseminated, including information about editing mechanisms applied to country data.
FAO SDQAF PRINCIPLE 14: **TIMELINESS AND PUNCTUALITY**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Working systematically on improving the timeliness of international statistics.
FAO SDQAF PRINCIPLE 15: **COHERENCE AND COMPARABILITY**	**Principle 5** Sources and methods for data collection are appropriately chosen to ensure timeliness and other aspects of quality, to be cost-efficient and to minimize the reporting burden for data providers. Good practices include: • Having mechanisms in place to consult countries to address discrepancies between national and international statistics. **Principle 9** Coordination of international statistical programmes is essential to strengthen the quality, coherence and governance of international statistics, and to avoid duplication of work. Good practices include: • Working systematically towards agreements on common concepts, classifications, standards and methods. Working systematically towards agreement on which series should be considered as authoritative for each important set of statistics.
FAO SDQAF PRINCIPLE 16: **ACCESSIBILITY AND CLARITY**	**Principle 1** High-quality international statistics that are accessible to all are a fundamental element of global information systems. Good practices include: • Providing equal access to statistics for all users. • Ensuring free public access to key statistics originally collected by others. • Making officially agreed standards publicly available. **Principle 4** Concepts, definitions, classifications, sources, methods and procedures employed in the production of international statistics meet professional scientific standards, andare made transparent for users. Good practices include: • Documenting the concepts, definitions and classifications, as well as data collection and processing procedures used, and the quality assessments carried out, and making this information publicly accessible. In the dissemination of international statistics, giving credit to the original source, and using agreed quotation standards when reusing statistics.

Notes:

1 For more information on the Principles Governing International Statistical Activities of the CCSA, see http://unstats.un.org/unsd/methods/statorg/Principles_stat_activities/principles_stat_activities.htm.

2 For more information, see https://unstats.un.org/unsd/ccsa/documents/practices.pdf.

Annex 2. Correspondences between the FAO SDQAF principles and principles of quality assurance frameworks of other international organizations

Table 2. Correspondences between the FAO SDQAF principles and principles of quality assurance frameworks of other international organizations

FAO	European Central Bank (ECB)[1]	Eurostat[2]	International Monetary Fund (IMF)[3]	Organisation for Economic Co-operation and Development (OECD)[4]
SDQAF PRINCIPLE 1: **PROFESSIONAL INDEPENDENCE AND IMPARTIALITY**	**Statistics Quality Framework (SQF) 1:** Independence and accountability **SQF 3:** Impartiality and objectivity **SQF 10:** Accuracy and reliability (including stability) of the statistical output (4, 5)	**European Statistics Code of Practice (CoP) 1:** Professional independence **CoP 6:** Impartiality and objectivity	**Data Quality Assessment Framework (DQAF) 1.1:** Assurance of integrity – institutional integrity (1.1.1, 1.1.2, 1.1.3) **DQAF 1.2:** Assurance of integrity – transparency (1.2.1–1.2.4)	**Quality Framework (QF) (a), (d)**
SDQAF PRINCIPLE 2: **HIGH AND CONTINUOUS COMMITMENT TO QUALITY**	**SQF 7:** Sound methodology and appropriate statistical procedures (3) **SQF 9**: Relevance of the statistical output (4)	**CoP 4:** Commitment to quality	**DAQF 0.4:** Prerequisites for quality – other quality management (0.4.1, 0.4.2)	QF **(g)**
SDQAF PRINCIPLE 3: **ADEQUACY OF RESOURCES**	**SQF 6:** Resources and efficiency	**CoP 3:** Adequacy of resources	**DQAF 0.2:** Prerequisites for quality – resources	
SDQAF PRINCIPLE 4: **DATA PROTECTION AND STATISTICAL CONFIDENTIALITY**	**SQF 4:** Statistical confidentiality	**CoP 5:** Statistical confidentiality	**DQAF 0.1:** Prerequisites for quality – legal and institutional environment (0.1.3)	QF **(c), (s)**
SDQAF PRINCIPLE 5: **DEVELOPMENT AND USE OF INTERNATIONAL STANDARDS**	**SQF 7:** Sound methodology and appropriate statistical procedures (1, 2, 3, 4) **SQF 11:** Consistency (or coherence) and comparability of statistical outputs (5)	**CoP 7:** Sound methodology (7.1, 7.2) **CoP 14:** Coherence and comparability (14.3) **CoP 15:** Accessibility and clarity (15.5)	**DQAF 2:** Methodological soundness (2.1, 2.2, 2.3) **DQAF 3.1:** Accessibility and reliability – source data (3.1.2)	QF **(b), (n), (o)**

FAO	European Central Bank (ECB)[1]	Eurostat[2]	International Monetary Fund (IMF)[3]	Organisation for Economic Co-operation and Development (OECD)[4]
SDQAF PRINCIPLE 6: **COOPERATION WITH DATA PROVIDERS**	**SQF 1:** Independence and accountability (2, 3, 4) **SQF 2:** Mandate for data collection **SQF 5:** Coordination and cooperation among the members of the European System of Central Banks (ESCB) and with European and international organizations **SQF 6:** Resources and efficiency (1, 2)	**CoP 2:** Mandate for data collection **CoP 3:** Adequacy of resources (3.3, 3.4)	**DQAF 0.1:** Prerequisites for quality – legal and institutional environment (0.1.1, 0.1.2)	QF **(i)**
SDQAF PRINCIPLE 7: **COOPERATION WITH OTHER INTERNATIONAL ORGANIZATIONS PRODUCING STATISTICS**	**SQF 5:** Coordination and cooperation among the members of the ESCB and with European and international organizations	**CoP 1bis:** Coordination and cooperation (1bis.3)		QF **(h), (i)**
SDQAF PRINCIPLE 8: **SUITABLE AND TRUSTWORTHY DATA SOURCES**	**SQF 3:** Impartiality and objectivity (1, 2)	**CoP 2:** Mandate for data collection (2.1, 2.2, 2.4) **CoP 7:** Sound methodology (7.1)	**DQAF 3.1:** Accuracy and reliability – source data **DQAF 3.2:** Accuracy and reliability – assessment of source data	QF **(b), (n)**
SDQAF PRINCIPLE 9: **SOUND METHODOLOGY AND APPROPRIATE STATISTICAL PROCEDURES**	**SQF 7:** Sound methodology and appropriate statistical procedures (1, 2, 3)	**CoP 7:** Sound methodology **CoP 8:** Appropriate statistical procedures (8.2–8.6)	**DQAF 2:** Methodological soundness	QF **(n)**
SDQAF PRINCIPLE 10: **COST-EFFECTIVENESS**	**SQF 8:** Cost-effectiveness and non-excessive burden on reporting agents	**CoP 10:** Cost-effectiveness	**DQAF 0.2:** Prerequisites for quality — resources (0.2.2)	QF **(g), (j), (t), (u)**
SDQAF PRINCIPLE 11: **NON-EXCESSIVE BURDEN ON RESPONDENTS**	**SQF 8:** Cost-effectiveness and non-excessive burden on reporting agents (3)	**CoP 8:** Appropriate statistical procedures (8.7–8.9) **CoP 9:** Non-excessive burden on respondents	**DQAF 0.1:** Prerequisites for quality – legal and institutional environment (0.1.4)	QF **(i) (j), (l)**

FAO	European Central Bank (ECB)[1]	Eurostat[2]	International Monetary Fund (IMF)[3]	Organisation for Economic Co-operation and Development (OECD)[4]
SDQAF PRINCIPLE 12: **RELEVANCE**	**SQF 9:** Relevance of the statistical output	**CoP 11:** Relevance	**DQAF 0.3:** Prerequisites for quality – relevance (0.3.1)	QF **(g) (l)**
SDQAF PRINCIPLE 13: **ACCURACY AND RELIABILITY**	**SQF 10:** Accuracy and reliability (including stability) of the statistical output	**CoP 8:** Appropriate statistical procedures (8.2–8.6) **CoP 12:** Accuracy and reliability	**DQAF 3.2:** Accessibility and reliability – assessment of source data (3.2.1) **DQAF 3.4:** Accessibility and reliability – assessment and validation of intermediate data and statistical outputs **DQAF 3.5:** Accessibility and reliability – revision studies **DQAF 4.3:** Serviceability – revision policy and practices	QF **(g)**
SDQAF PRINCIPLE 14: **TIMELINESS AND PUNCTUALITY**	**SQF 12:** Timeliness (including punctuality) of the statistical output	**CoP 13:** Timeliness and punctuality	**DQAF 3.1:** Accessibility and reliability – source data (3.1.3) **DQAF 4.1:** Serviceability – periodicity and timeliness **DQAF 5.1:** Accessibility – data accessibility (5.1.3)	QF **(g)**
SDQAF PRINCIPLE 15: **COHERENCE AND COMPARABILITY**	**SQF 11:** Consistency (or coherence) and comparability of statistical output	**CoP 14:** Coherence and comparability	**DQAF 4.2:** Serviceability – consistency	QF **(g)**
SDQAF PRINCIPLE 16: **ACCESSIBILITY AND CLARITY**	**SQF 13:** Accessibility and clarity of the statistical output	**CoP 15:** Accessibility and clarity	**DQAF 5.1:** Accessibility – data accessibility **DQAF 5.2:** Accessibility – metadata accessibility **DQAF 5.3:** Accessibility – assistance to users (5.3.2)	QF **(g), (o), (q), (r), (t), (u)**

Notes:

[1] For more information on the ECB's Statistics Quality Framework, see https://www.ecb.europa.eu/pub/pdf/other/ecbstatisticsqualityframework200804en.pdf?a7dfa6c0d9310632f050e1e533fe9586.

[2] For more information on the Quality Assurance Framework of the European Statistical System, see https://ec.europa.eu/eurostat/documents/64157/4392716/ESS-QAF-V1-2final.pdf/bbf5970c-1adf-46c8-afc3-58ce177a0646.

[3] For more information on the Data Quality Assessment Framework of the IMF, see https://dsbb.imf.org/content/pdfs/dqrs_Genframework.pdf.

[4] For more information on the OECD's Quality Framework, see https://www.oecd.org/sdd/21687665.pdf.

Annex 3. Correspondences between FAO SDQAF and the Big Data Quality Framework of the United Nations Economic Commission for Europe

Existing quality frameworks focusing on the use of innovative and non-statistical data sources were used as references to review the 2014 FAO Statistics Quality Assurance Framework (SQAF) and transform it into the current Statistics and Data Quality Assurance Framework (SDQAF). Among these, the Big Data Quality Framework (BDQF) proposed by the Big Data Quality Task Team of the United Nations Economic Commission for Europe in 2014 played a prominent role in the adaptation of FAO's statistical quality principles.[1] Indeed, while the structure of the original SQAF was maintained, most of its principles were expanded in their scope, to better align with the quality dimensions envisaged in UNECE's BDQF. This annex provides an overview of the main correspondences between the new FAO SDQAF and UNECE's BDQF.

BDQF presents a view on quality structured around the three main phases of the statistical production process, namely:

1) **the input stage**, considering all decisions and actions for the acquisition or pre-acquisition analysis of big input data sources;
2) **the throughput stage**, dealing with data processing, transformation and analysis; and
3) **the output stage**, concerned with the production and dissemination of statistical outputs.

FAO SDQAF provides an overall framework to ensure the quality of FAO's statistical outputs and the soundness of the processes and governance mechanisms put in place to produce them. The quality elements specific to the different types of input data used by FAO are addressed in additional dedicated corporate statistical standards. These elements are summarized in FAO SDQAF under Principle 7 (suitable and trustworthy data sources, see Table A.3). With its key implementation modalities, Principle 7 ensures that all the quality dimensions of the UNECE's BDQF are addressed. Table A.3 maps the quality principles and dimensions for the throughput and output stages in BDQF and the principles of FAO SDQAF.

BDQF uses a hierarchical structure composed of three hyperdimensions with nested quality dimensions. The three hyperdimensions, which have been borrowed from the administrative data quality framework produced by Statistics Netherlands, are the source, the metadata and the data.

Irrespectively of the phase of the business process or the considered hyperdimension, the BDQF is governed by three overarching principles, which are reflected in the current FAO SDQAF:

1. **Fitness for use** i.e. whether the data source is appropriate for the intended purpose. This principle is also at the core of FAO SDQAF, which – in line with practices of the International Organization for Standardization (ISO) – defines quality as "the degree to which a set of inherent characteristics of an object fulfils requirements" (ISO No 9000:2014).

2. **Generic and flexible**, meaning that a quality framework should be broad enough to be applied in a wide variety of situations. This principle is well embraced by FAO SDQAF, which – instead of being prescriptive – outlines 16 broad and flexible principles that can be adapted to different data sources and scenarios, and then translated into best practices in specific corporate statistical standards.
3. **Efforts versus gain** i.e. whether the benefits gained from using a big data source are worth the efforts involved in obtaining and analysing it. This principle is reflected in FAO SDQAF Principle 7.3, which states that cost–benefit and risk analyses should be carried out before new, or substantially enhanced, statistical processes are integrated into regular production.

Note:

[1] **UNECE (United Nations Economic Commission for Europe).** 2014. *A suggested framework for the quality of big data. Deliverables of the UNECE Big Data Quality Task Team*. Geneva, Switzerland. https://cros-legacy.ec.europa.eu/system/files/Task%20Team%20Big%20Data%20Quality%20Framework_937_unblinded_v1.pdf

Table 3. Mapping of BDQF quality dimensions and FAO SDQAF principles

PHASE	HYPERDIMENSION	QUALITY DIMENSION	DESCRIPTION	LINK WITH FAO SDQAF
Input	Source	Institutional/business environment	At the input stage, the quality of the institutional/business environment of the organization providing the data is considered. Elements to be assessed are: sustainability of the entity/data provider, reliability status, transparency and interpretability.	**SDQAF Principle 8:** Suitable and trustworthy data sources
		Privacy and security	This is a prominent quality dimension when analysing big data sources. A key aspect to be considered at the input stage is that of consent for data acquisition, and whether the consent is active or passive. Consent may be obtained via an agreement to terms or in more explicit ways. An organization acquiring big data should pay attention to whether this consent is given and whether this is in line with its regulations. Elements to consider are: legislation related to data production, maintenance, access and secondary uses; restrictions in terms of privacy/confidentiality that would limit data use; and perception of the intended use.	**SDQAF Principle 8:** Suitable and trustworthy data sources **SDQAF Principle 6:** Cooperation with data providers
	Metadata	Complexity	Refers to the lack of simplicity and uniformity in the data. Complexity at the input stage can be assessed by looking at: technical constraints related to receiving, reading, processing and storing the files; data structure and format, referring tothe complexity of the structure and format in which data are stored; readability of data; and hierarchies and nesting.	**SDQAF Principle 8:** Suitable and trustworthy data sources Specific best practices to fulfil each quality dimensions are provided in Annex 3 of the corporate statistical standard on the acquisition and use of non-statistical data sources (including Big Data) for statistical purpose.
		Completeness	The extent to which metadata are available, interpretable and complete, for a proper understanding and use of the data. Aspects tobe clarified in the metadata are: the processes that led to the collection of the data, the processes related to data treatment and the description of the data themselves.	

PHASE	HYPERDIMENSION	QUALITY DIMENSION	DESCRIPTION	LINK WITH FAO SDQAF
		Usability	The extent to which the receiving organization will be able to work with and use the data. The assessment of this dimension entails evaluating the additional resources needed, and assessing the risk of having to make considerable investments (also in terms of skills) in order to use the big data.	**SDQAF Principle 3:** Adequacy of resources
		Time-related factors	Time-related factors include timeliness, punctuality, periodicity and changes over time.	**SDQAF Principle 14:** Timeliness and punctuality
		Coherence – linkability	Ease with which a big data source can be linked, where relevant, with other datasets. Aspects to be considered are the presence and the quality of linking variables at the necessary levels.	**SDQAF Principle 8:** Suitable and trustworthy data sources Specific best practices to fulfill each quality dimension are provided in Annex 3 of the corporate statistical standard on the acquisition and use of non-statistical data sources (including Big Data) for statistical purpose.
		Coherence – consistency	The extent to which a dataset complies with standard definitions and is consistent over time. At the input stage, the use of standardized concepts is mainly related to the use of standards for key variables.	
		Validity	The extent to which a dataset measures what the user is attempting to measure. This concept, which in standard quality frameworks is often included under the coherence dimension, is particularly relevant for big data. Validity can be assessed in terms of the transparency of methods and processes, and in terms of the soundness of adopted methods.	
	Data	**Accuracy and selectivity**	Degree to which the information correctly describes the phenomena it was designed to measure. When assessing the accuracy of a potential dataset to be used for statistical purposes, it is recommended to use a total survey error approach. At the input stage, this involves the consideration of the following elements: overcoverage, undercoverage, selectivity, missing data (non-observation and/or non-response), data adjustments and presence of anomalies.	
		Coherence – linkability	Quality of linking variables.	
		Coherence – consistency	Coherence of the metadata with the observed data.	
		Validity	Coherence between process and methods described in the metadata and the observed data values.	

PHASE	HYPERDIMENSION	QUALITY DIMENSION	DESCRIPTION	LINK WITH FAO SDQAF
Throughput	N.a.	System independence	Transformation and analysis should depend on the adopted theoretical principles and not on the specific software/hardware used.	**SDQAF Principle 2:** High and continuous commitment to quality **SDQAF Principle 8:** Suitable and trustworthy data sources **SDQAF Principle 9:** Sound methodology and appropriate statistical procedures
		Steady states	A steady state is a version of a dataset that has met certain quality criteria. Datasets can always be processed, analysed, transformed, etc., but they should transition from one steady state to another with proper versioning.	
		Quality gates	Quality gates are checkpoints in the business process cycle at which the quality of data is explicitly assessed. Measures and features of quality gates, as well as their position, need to be determined in advance.	
Output	Source	Institutional/business environment	At the output phase, the quality of the institutional environment of the institution disseminating the statistical output is considered. Elements to be looked at are: the nature of the input big data source (e.g. social media, satellite data, etc.); the arrangements under which data were transferred to the disseminating institution; quality assurance processes applied to the incoming data; and the role that the data played in the final product.	**SDQAF Principle 6:** Cooperation with data providers
				SDQAF Principle 8: Suitable and trustworthy data sources
		Privacy and security	This dimension should consider: the legislation related to data production, maintenance and access; restrictions limiting data use (privacy, security, confidentiality); and actions taken to improve stakeholders' potential negative perceptions on the use of the data.	**SDQAF Principle 4:** Data protection and statistical confidentiality
	Metadata	Complexity	Refers to the lack of simplicity and uniformity in the data. At the output phase, the following elements should be considered: data treatment (i.e. how the complexity of the input data was dealt with during the input and throughout stages regarding data structure, format and data hierarchies) and limitations to the use of statistical outputs caused by the complexity of the big data used as input.	**SDQAF Principle 9:** Sound methodology and appropriate statistical procedures
				SDQAF Principle 13: Accuracy and reliability
				SDQAF Principle 16: Accessibility and clarity

PHASE	HYPERDIMENSION	QUALITY DIMENSION	DESCRIPTION	LINK WITH FAO SDQAF
		Accessibility and clarity	Factors to be considered are: the accessibility of data and metadata; the presence of clear, unambiguous definitions, explanations and quality indicators; and conformity to metadata standards.	**SDQAF Principle 16:** Accessibility and clarity
		Relevance	The relevance of data is the extent to which the data measure the concepts meant to be measured for the intended use.	**SDQAF Principle 12:** Relevance
	Data	**Accuracy and selectivity**	At this stage, traditional measures of statistical accuracy should be considered, such as standard error, bias, etc. In addition, selectivity issues should be considered when big data are used as input to produce statistical outputs.	**SDQAF Principle 13:** Accuracy and reliability
		Validity	At the output stage, the following elements should be considered: convergent validity (i.e. how well the metric aligns with other similar metrics), conceptual utility (i.e. the extent to which the metric is able to provide insight into real-world phenomena) and methodological validity (i.e. the extent to which the methods underlying the metric are transparent and theoretically sound).	**SDQAF Principle 12:** Relevance **SDQAF Principle 13:** Accuracy and reliability **SDQAF Principle 15:** Coherence and comparability **SDQAF Principle 16:** Accessibility and clarity
		Coherence – linkability	Ease with which a statistical output can be linked, when relevant, with other databases.	**SDQAF Principle 15:** Coherence and comparability
		Coherence – consistency	The extent to which a statistical output complies with standard definitions and is consistent over time.	**SDQAF Principle 15:** Coherence and comparability
		Time-related factors	Time-related factors include: timeliness, punctuality, periodicity and changes over time.	**SDQAF Principle 14:** Timeliness and punctuality

Annex 4. Glossary

Administrative data sources: data sets created primarily for administrative purposes by government agencies or other entities working on behalf of the government. Administrative data sources include administrative registers of persons and legal entities and the records of ministries, departments and specialized agencies, such as tax returns, social services records and customs data, or data of regional or local administrations. Contrary to statistical data sources, administrative data sources are not created in response to a need for statistical data but as a part of a government function, such as the provision of social services or taxation. In some cases, statistical agencies participate in the design and/or collection of administrative data. In addition, statistical agencies may be involved at different stages of the production process of administrative data, with the aim of ensuring that the data will be usable for statistical purposes.

Big data: data generated by business or government, transactions, social media, phone logs, communication devices, web scraping, sensors, etc., characterized by high volume, velocity and variety.[1] Sources described as big data can be largely unstructured, meaning that they have no predefined data model and do not fit well into conventional relational databases. In addition, they often requirenew tools and methods to capture, curate, manage and process them in an efficient way.[2] The UNECE Task Team on Big Data proposes a classification of big data sources based on how there are generated:[3]

- *human-sourced* information available mostly from social networks, blogs, internet searches, etc. where data are loosely structured and often ungoverned;
- *process-mediated* data available from the information technology (IT) systems of organizations (private or public), wheredata are usually structured and stored in relational databases;
- *machine-generated* data captured by sensors and other machines used to measure and record events in the physical world.

Data: characteristics or information, usually numerical, that are collected through observation.[4] Indeed, these characteristics or information can be generated by traditional statistical surveys or derived from other sources. In the context of the SQDAF, data is used when referring to data sources (input phase) or during the statistics production process (throughout phase). The term data includes microdata, which, depending on the context, can also be a statistical output.

Data confidentiality: a property of data indicating whether they are subject to dissemination restrictions. The unauthorized disclosure of this type of data may be prejudicial or harmful to the interests of the source or other relevant parties. For instance, data allowing the identification of a physical or legal person, either directly or indirectly, may be characterized as confidential according to national or international legislation. The unauthorized disclosure of data that are restricted or confidential is not permitted, and legislative measures or other formal provisions may be used to prevent their disclosure. Often, there are procedures in place to prevent the disclosure of restricted or confidential data, including rules applying to staff, aggregation rules when disseminating data, provision of unit records, etc.

Data source: a specific data set, metadata set, database or metadata repository where data or metadata are available. Data sources can take the form of statistical surveys, administrative sources or other data sources, such as big data. For the purpose of this framework, two types of data sources are considered:

- **Statistical data sources:** data collections created primarily for official statistical purposes by government agencies or other entities working on behalf of the government. Statistical data sources include statistical sample surveys, censuses and statistical registers. There are different types of censuses, such as population and housing censuses, business censuses and agriculture censuses, among other types. Sample surveys and statistical registers can cover different units,

for example individuals, households and businesses. Statistical registers can be derived from different sources. For example, statistical business registers are often based on administrative data sources.

- **Non-statistical data sources (or non-traditional data sources):** all data sets that are not created primarily for official statistical purposes but rather for administrative, commercial or other private purposes. In general, non-statistical data sources include administrative data sources and big data that have not yet been processed and transformed into statistical outputs.

Metadata: data that define and describe other data and processes. Two types of metadata can be distinguished:

- **Structural metadata** define and accompany the data and consist of identifiers and descriptors that are essential for discovering, organizing, retrieving and processing a statistical data set (e.g. titles, subtitles, short descriptions, dimension names, variable names, etc.).
- **Reference metadata** are of a more general nature. They describe statistical concepts and methodologies used for the collection and generation of data, and provide information on data quality, thereby assisting users with the interpretation of the data. Contrary to structural metadata, reference metadata can be decoupled from the data (i.e. they can be generated, collected or disseminated separately from the statistics to which they refer).

Non-official data: data that are not officially reported or published by a national statistical agency (or any agency responsible for statistics).[5] They are produced by non-public national actors such as the private sector, non-governmental organizations, academic research bodies or data that are originally constructed by international organizations using different methods (imputation, estimation, construction of new indicators, etc.).

Non-traditional data sources: see *non-statistical data sources*.

Official data: in the context of international organizations, official data are **a set of national official statistics produced by recognized government agencies, members of the national statistical system, in compliance with the Fundamental Principles of Official Statistics of the United Nations Statistical Commission, national quality frameworks and other internationally agreed statistical standards and recommendations**. In many countries, official statistics are defined in statistical programmes and collected under specific legislation concerning statistics. Official data sources include data disseminated as official statistics by national statistical agencies or official national focal points, as well as data transmitted to FAO as official data (e.g. by other recognized international organizations). They can be the product of a statistical process based on statistical or non-statistical data sources or of the joint collection of data by national and international recognized agencies. When disseminating its statistics, FAO distinguishes data points originating from official sources from those produced based on non-official data.

Quality is a multifaceted and subjective concept. The International Organization for Standardization (ISO) defines quality as "the degree to which a set of inherent characteristics of an object fulfils requirements" (ISO No 9000:2014). Which quality characteristics are most important depends on user perspectives, needs and priorities, which vary from one group of users to the next (fitness for purpose). In the context of FAO SDQAF, the quality dimensions taken into consideration when assessing a statistical output are: relevance, accuracy and reliability, timeliness and punctuality, coherence and comparability, accessibility and clarity. FAO's quality assurance process aims at achieving the best compromise between satisfying the needs of various possible users (current and potential) with regard to these quality dimensions and the availability of resources.

Quality dimensions: the general definition of quality in statistics is operationalized by specifying a set of factors or dimensions that characterize the quality of the product. SDQAF identifies quality dimensions linked to statistical products in quality principles 11 to 15, covering the following dimensions (some principles cover two closely related dimensions):

- **Relevance:** quality dimension that measures the degree to which statistics meet the current and potential user needs.
- **Accuracy:** quality dimension that refers to the closeness of estimates to the true values that the statistics were intended to measure.
- **Reliability:** quality dimension that refers to the closeness of the initial estimates to the subsequent or final estimates.
- **Timeliness:** quality dimension that refers to the speed of dissemination of statistical outputs i.e. the lapse of time between the end of a reference period (or a reference date) and the dissemination of the statistical outputs.
- **Punctuality:** quality dimension that refers to the possible time lag existing between the actual delivery date of statistical outputs and the target date when they should have been delivered, for instance with reference to dates announced in an official release calendar or previously agreed among partners.
- **Coherence:** quality dimension that corresponds to the adequacy of the statistical outputs to be meaningfully combined in different ways and for various uses.
- **Comparability:** quality dimension that refers to the extent to which differences between different geographical areas, non-geographical domains, or over time, can be dimensioned to differences between the true values of the statistical characteristics.
- **Accessibility:** quality dimension that is defined as the ease, the set of conditions and the modalities by which users can obtain data.
- **Clarity:** quality dimension that refers to the availability of adequate documentation: whether data are accompanied with appropriate metadata, illustrations such as graphs and maps, whether information on their quality are also available (including limitation in use), and the extent to which additional assistance is provided.

Statistical output: see *statistics*.

Statistical process: set of procedures used to produce statistics, including to specify user needs, design activities, build the production solution, collect, process and analyse data, disseminate the final product(s) and evaluate the entire process.

Statistics (or statistical outputs): numerical information relating to an aggregate of data on units or observations. SDQAF generally uses the term statistics or statistical outputs when referring to the output of a statistics production process. While the terms "statistics" and "data" are sometimes used interchangeably in the literature, the term "statistics" is closely related to the concepts of representativeness and aggregation at the output stage, while the term "data" is used when referring to data sources or during the statistics production process (the term "data" includes microdata which, depending on the context, can be also a statistical output).

Notes:

[1] **United Nations.** 2021. *The handbook on management and organization of national statistical systems. 4th edition of the handbook of statistical organization*. New York, USA. https://unstats.un.org/capacity-development/handbook/UN%20Handbook%20beta%20v2.1.pdf

[2] **United Nations, Economic and Social Council.** 2014. *Report of the Global Working Group on Big Data for Official Statistics*. E/CN.3/2015/4. New York, USA. https://unstats.un.org/bigdata/documents/reports/GWG%20report%20-%202015-4-BigData-E.pdf

[3] **UNECE.** 2014. Classification of types of big data. In: *UNECE Statswiki*. [Cited 11 October 2023]. https://docplayer.net/1637653-A-suggested-framework-for-the-quality-of-big-data-deliverables-of-the-unece-big-data-quality-task-team-december-2014.html

[4] **OECD (Organisation for Economic Co-operation and Development).** 2008. *Glossary of statistical terms*. Paris. https://doi.org/10.1787/9789264055087-en

[5] **Upadhyaya, S.** 2014. *Use of non-official sources for transforming national data into an international statistical product – UNIDO's experience*. Vienna, United Nations Industrial Development Organization. https://www.q2014.at/fileadmin/user_upload/Upadhyaya_CCSA.pdf

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