DATA QUALITY REVIEW

Module 3

Site assessment of data quality: data verification and system assessment

VERSION UPDATE - DECEMBER 2020

World Health Organization

Gavi The Vaccine Alliance

The Global Fund

JSI

MEASURE Evaluation

USAID FROM THE AMERICAN PEOPLE

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Data quality review: a toolkit for facility data quality assessment. Module 3. Site assessment of data quality and system capabilities

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Contents

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Kavitha Viswanathan oversaw the technical development of the toolkit, with overall guidance provided by Kathryn O'Neill and with technical input from Ties Boerma, David Boone, Hong Anh Chu, Robert Pond, Olav Poppe, Claire Preaud, Ashley Sheffel, Amani Siyam, Marina Takane and Wendy Venter.

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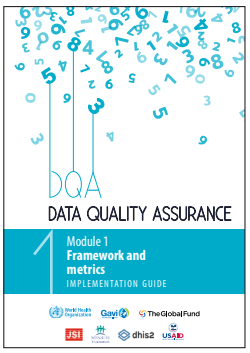
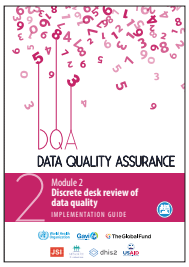
Content of the toolkit

The DQR toolkit includes guidelines, tools and other resources for countries to implement and institutionalize a system for assuring quality of their health facility data. The following schema shows the different resources available and are further described within the document. These resources are also available for download at the following link:[1]

Overall framework and implementation



Desk review of data quality

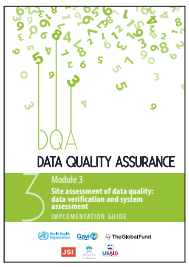


Training materials for desk review of data quality

WHO Desk review tool in MS Excel (with user guide)

dhis2
DQ app (with user guide)

Site assessment of data quality



Training materials for data verification and system assessments

MS Excel analysis tool for facility/district data verification and system assessment (with user guides)

Data collection tool for discrete site assessment in (MS-Word and CSPro) with a user manual for CSPro application

Supervisory checklists in MS Excel (with user guide)

[1] To download, see: https://www.who.int/healthinfo/tools_data_analysis/en/ (accessed 5 November 2020).

Abbreviations

ANC	Antenatal care
ANC1	First antenatal care visit
ART	Antiretroviral therapy
BCG	Bacillus Calmette–Guérin vaccine
CSPro	Census and survey processing system
DHIS 2	Web-based, open source software used by countries chiefly as their health information system for data management and monitoring of health programmes
DQR	Data quality review
DTP	Diphtheria-tetanus-pertussis
DTP3	Diphtheria-tetanus-pertussis three-dose vaccine
DV	Data verification
Gavi	Gavi, the Vaccine Alliance
HHFA	Harmonized Health Facility Assessment
HIV	Human immunodeficiency virus
HMIS	Health management information system
IPT3	Third dose of intermittent preventive therapy
IPTp	Intermittent preventive therapy in pregnancy
MCV	Measles-containing vaccine
MDR-TB	Multidrug resistant tuberculosis
MFL	Master facility list
MOH	Ministry of Health
MR1/MR2	Measles-rubella (two-dose) vaccine
OI	Opportunistic infection
OPD	Outpatient department
OPV	Oral polio vaccine
PCV	Pneumococcal conjugate vaccine
Penta	Pentavalent vaccine
PMTCT	Prevention of mother-to-child transmission
PNC	Postnatal care
RDT	Rapid diagnostic test
RR	Rifampicin-resistant
SA	system assessment
SARA	Service availability and readiness assessment
SOP	Standard operating procedure
TB	Tuberculosis
The Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
TT	Tetanus toxoid vaccine
USAID	United States Agency for International Development
VF	Verification factor
WHO	World Health Organization

Chapter 1. Overview

Sound decisions are based on sound data; therefore, it is essential to ensure that the data are of good quality. Health-facility data constitute a primary data source for assessing the performance of the health sector. Poor-quality data affect different levels of the health systems in different ways. For health-care providers at the facility level, patient care can be affected if the information on the patient is incomplete or inconsistent. For programme managers, poor-quality data can lead to incorrect decisions that can be detrimental to the overall running of the programme, and ultimately to the health of the population. At the planning level, poor-quality data can undermine evidence of progress towards health sector objectives and may hinder annual planning processes by providing misleading results. Furthermore, when determining investments in the health sector, poor-quality data can lead to poor targeting of resources.

Background

The data quality review (DQR) is designed to assess the quality of data generated by information system(s) in health facilities. The objectives of the DQR are:

- to institutionalize a system for assessing the quality of data, including routine monitoring of data, discrete data quality reviews (conducted annually) and periodic in-depth assessments of priority health programmes;
- to identify weaknesses in the data management system and interventions for system strengthening; and
- to monitor the performance of data quality over time and the capacity to produce good-quality data.

Scope of the DQR toolkit

The scope of the DQR toolkit is to provide the framework and structure to support routine, annual or periodic assurance, assessment and improvement of facility-reported data. The periodicity of reviews depends on the focus of the review – i.e. whether to make routine course correction to data, whether to look at common cross-cutting data quality issues that must be addressed when preparing annual health analytical reports, or whether to look in greater depth at a specific health or disease programme in advance of a programme review. More specifically, this multipronged approach includes the following:

- Routine and regular reviews of data quality – or data quality assurance. These should be regular (e.g. monthly) reviews of data quality built into a system of checks of the health

management information system (HMIS) or other programme reporting systems as part of a feedback cycle that identifies errors in near real-time so they can be corrected as they occur. This routine examination of data can be more holistic and either cross-cutting or programme-specific, and can be conducted by different users of data (e.g. HMIS managers, programme managers, etc.).

- Discrete cross-sectional assessments. These are needed to look at the quality of health facility data being used both to measure the performance of the health sector and also for policy and planning purposes. While it is recommended that these assessments have an element of independence during implementation, it is very important that they are closely coordinated and managed by the Ministry of Health. Oversight from the Ministry of Health is critical for the ultimate use of these results to improve data quality. These assessments should be carried out before a planning cycle, such as in advance of an annual health-sector review (periodicity is country-specific).
- Periodic in-depth programme-specific reviews of data quality. These should focus on a single disease or programme area and should be timed to meet the planning needs of the specific programmes (e.g. prior to programme reviews).

Chapter 2. DQR Methodology and resources

The DQR methodology comprises two separate processes (Figure 1), namely:

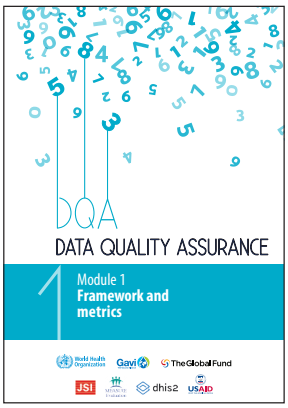
- **Desk review** – a review of the quality of existing aggregated reported data using standardized data quality metrics. This can be done as part of routine and regular data quality checks or as a discrete/cross-sectional assessment. This section is covered in the present document, *Module 2: Desk review of data quality.*
- **Site assessment** – an assessment of data quality that requires visits to health facilities and district offices and includes verification of source data and an assessment of system capabilities to produce quality data. The site assessment can be part of a routine data quality assurance cycle that includes supervision or it may be conducted as a discrete/cross-sectional assessment.

The DQR toolkit includes guidelines and tools that lay the basis for a common understanding of data quality so that a regular mechanism for data quality assurance and review can be institutionalized. The toolkit enables countries to use appropriate guidance and tools to conduct a data quality review. This module – Module 2 – is focused on the desk review of data quality. The resources included below are relevant to the use of this module.

Overall framework and implementation

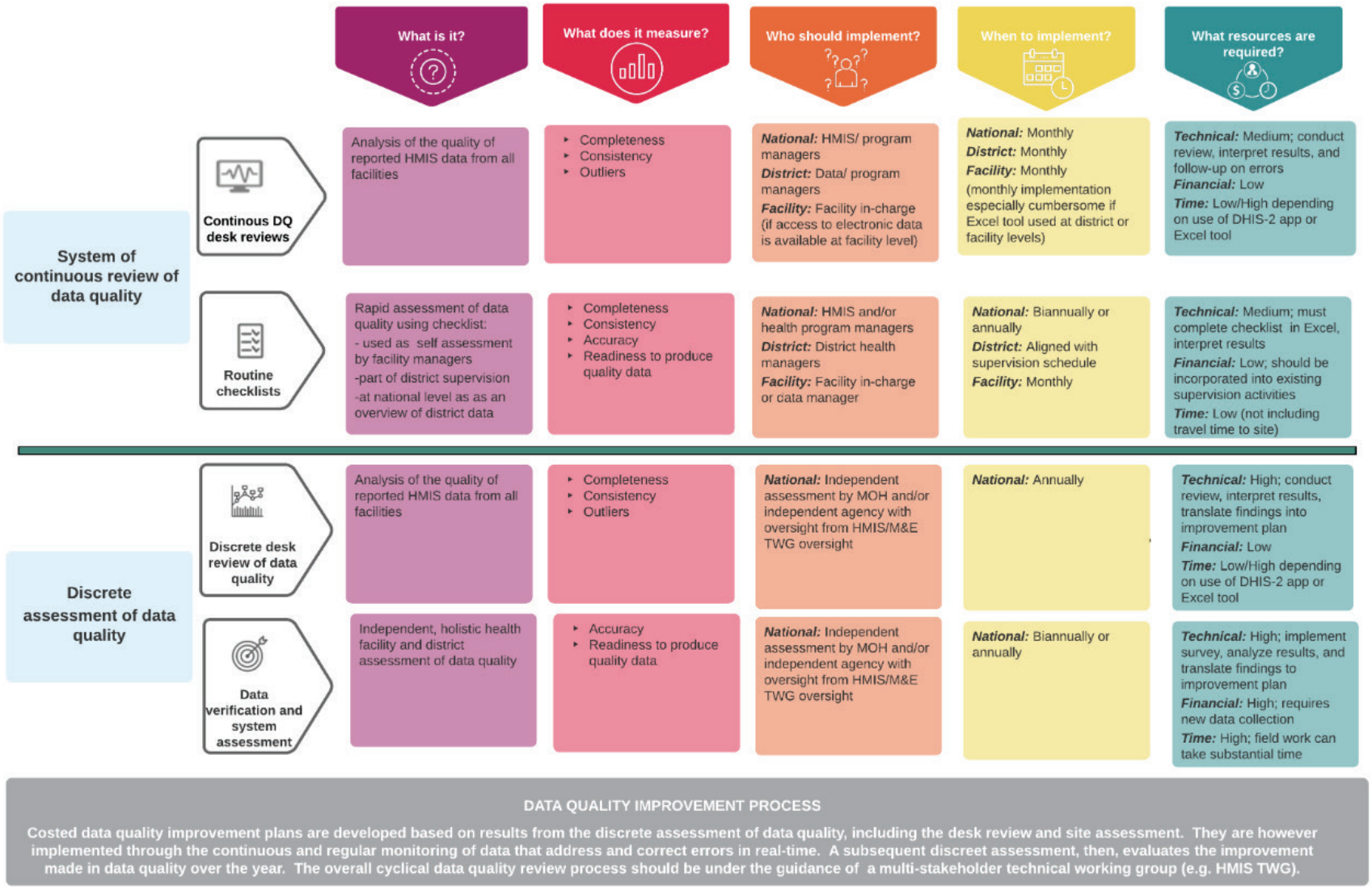
The two documents listed here give overviews of the DQR framework and toolkit, as well as details of their implementation.[1]

- The overall DQR framework is described in Module 1. This lays out the overarching framework of the DQR and introduces the methodology, metrics and the contents of the toolkit.
- The implementation guide focuses primarily on the discrete assessment components of data quality (both the desk review and the site assessment)[2] and the development of a data quality implementation plan.



[1] To download, see: https://www.who.int/healthinfo/tools_data_analysis/en/ (accessed 28 October 2020).
[2] The implementation of continuous and routine monitoring of data quality is not covered in this document as it is assumed that this is part of the standard operating procedures (SOPs) of a country's routine health information system and that the processes are adequately covered there. Nevertheless, some of the implementation steps for the discrete desk review can be applied to the continuous and routine review process.

Figure 3.1. The DQR methodology



Skill levels:
Low = Results are presented for easy interpretation. Does not require programming, data management or analysis and synthesis skills; **Medium** = requiring progrramming/data management skills abut minimal critical thinking and synthesis skills; **High** = Requires programming and data management skills as well high level of critical thinking and synthesis skills

Site assessment of data quality

The site assessment of data quality involves conducting an assessment of data quality at health facilities and districts. While conducting a desk review, a reviewer can examine the completeness and consistency of data from health facilities. However, to determine the accuracy of the health data, an assessment of data at the facility itself is required. There are two processes through which a site assessment can be conducted:

- as a discrete/cross-sectional sample survey of facilities and districts;
- by using checklists conducted by facility staff and district supervisors as part of a routine system of data quality assurance.

Discrete site assessment at facilities and districts – data verification and system assessment

The discrete cross-cutting site assessment of data quality at facility and district levels includes two different components: 1) verification of source data and completeness of reporting for specific reporting periods, as sent from the facility to the next reporting level; and 2) a system assessment by which the capacity of the system to produce quality data is measured. These two components are presented below and are discussed in detail in this module.

Some key characteristics of the discrete site assessment are:

- It uses a core set of **tracer indicators** (usually 4–5) selected across programme areas (cross-cutting) for completeness and verification of source data.
- It follows a sound probability-based sampling methodology so that the results of the data verification are representative of all the units in that entity (e.g. health facilities).
- A nationally representative assessment of health facilities usually has a sample of more than 100 health facilities, which constitutes a sufficient sample for verification of data quality.
- Primary data collection can be conducted as part of a larger health-facility assessment (e.g. to measure service availability and readiness) or as a discrete event.
- The assessment should be harmonized with overall survey plans in countries.
- The assessment should be conducted in tandem with the discrete desk review of data quality. Without the desk review of data quality, the information gained on data accuracy from the site assessment is less informative. In summary, the discrete site assessment should be conducted with the discrete desk review in order to gather the most comprehensive information for developing a data quality improvement plan.

Data verification

The objective of data verification is to measure the extent to which the information in the source documents has been accurately summarized and reported to the next level of reporting; the verification applies to each level of the reporting hierarchy (from the health-facility level to the national level). This allows errors that occur in the reporting of data to be identified and, for specific indicators, gives an estimate of the degree of over-reporting or under-reporting in the system at national level.

For data verification, data from source documents (e.g. registers, tally sheets, patient files etc.) are compared to data that is reported through the HMIS in order to determine the proportion of reported results that can be verified from the source documents. The values for selected indicators from specific reporting periods are recounted using the relevant source documents at the facility and are then compared to the values reported by the facility for the same reporting period.

In addition to verifying the consistency between source data and what has been reported, the independent assessment at facility and district levels also collects information on the completeness of reporting. This information can be used for comparison with the reporting completeness found through the desk review.

System assessment

The system assessment measures the capacity of the system to produce good-quality data and evaluates the extent to which critical elements of the reporting system adhere to a set of minimally acceptable standards. This is the second part of the discrete site assessment component of data quality. Because the system assessment provides information on potential determinants of data quality problems, it is recommended that the assessment be implemented with the data verification module which measures data quality at the site.
As noted above, both components of the site assessment can be included as part of a broader health-facility assessment or they can be conducted as an independent activity. The elements of the reporting system that are evaluated in the system assessment are:

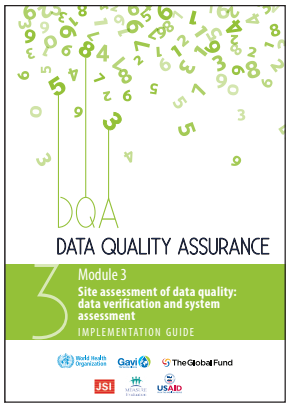
- trained staff;
- guidelines;
- stock-outs of tools and reporting forms;
- supervision and feedback;
- analysis and use of data.

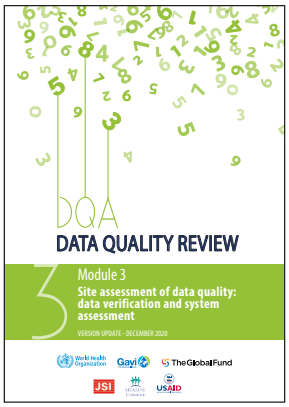
Resources to support discrete cross-cutting site assessment of data quality

The following resources are available to support implementation of a site assessment of data quality and can be accessed online:[3]

[3] To download, see: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 28 October 2020).

- Module 3: Site assessment of data quality – this guidance discusses both the discrete site assessment and the supervisory checklists and metrics that can be calculated from the site assessment. This document is accompanied by an Implementation Guide
- Data collection instruments in MS Word and electronic data collection forms in CSPro[4] for discrete assessment of data quality at facility and district levels. These instruments include both the data verification and system assessment modules. There is also a user's manual on setting up and using CSPro for the discrete site assessment.
- MS-Excel tools to automate analysis of the data collected during the discrete assessment at facility and district levels that include data verification and system assessment (with user guides), including:
  - facility DV/SA;
  - district DV/SA; and
  - additional DV analyses for countries with electronic HMIS systems.
- Training materials with presentations, a facilitator's guide, a participants' manual, and exercises on how to conduct the discrete site assessment at facilities and districts, including data verification and system assessment. This training does not pertain to the supervisory checklists.





Data collection tool for discrete site assessment in (MS-Word and CSPro) with a user manual for CSPro application

MS Excel analysis tool for facility/district data verification and system assessment (with user guides)

Training materials for data verification and system assessments

Routine data quality assurance – checklists

Routine checklists are part of a system of routine (i.e. monthly) reviews of data quality of the HMIS or other programme reporting systems. Checklists are part of a feedback cycle that identifies and rectifies errors in near real-time. This routine system of data quality checks has two components, namely: 1) monthly self-assessment of HMIS data conducted by health-facility staff; 2) a periodic (ideally quarterly) assessment of health-facility data by district level staff during supervisory visits to the health facility; and 3) periodic review of aggregate results from

[4] For information about the Census and Survey Processing System (CSPro), including free download, see: https://www.census.gov/data/software/cspro.html (accessed 22 April 2020).

supervisory visits to detect systematic problems of data quality across health facilities (at district and higher levels). Some key attributes for these checklists include:

- use of a core set of **tracer indicators** (recommended 3 indicators) selected across programme areas (cross-cutting) for checking data quality;
- implementation using a standard data quality checklist;
- capability to examine different dimensions of data quality, including completeness, internal consistency and accuracy, and external comparisons (cross-checks);
- a type of system assessment conducted by checking that best practices are in place to support production of good quality data;

Monthly self-assessment of HMIS data by health facility staff

If the facility has a dedicated staff member for data management this person would be the appropriate staff member to conduct the data quality checks. Alternatively, the checklist should be applied by the staff person responsible for compiling and submitting the monthly report. The checklists can be implemented on paper or in MS-Excel. The Excel version can automatically calculate quality metrics. The data are automatically extracted to a flat file which can be exported to an aggregate file to combine the data with results for the same facility at different time periods. The checklist should be implemented as often as is necessary to achieve good-quality data, or at least once a month prior to compilation and submission of the monthly report. This self-assessment examines data quality in terms of:

- **completeness** – examining data element completeness and source document completeness;
- **internal consistency** – accuracy is examined by recounting the source data and checking against the value to be reported; consistency over time is examined by comparing the value of a data element to the value of the same data element at earlier time periods;
- **external consistency** - including cross-checks between different data sources with the same/similar information; and
- a short checklist of data management best practices – a "modified system-assessment".

Periodic assessment by district-level staff

The routine checklists are intended to be used during regular supervisory visits to health facilities conducted by the district level HMIS (or health programme management staff). These checklists can be implemented on paper or in MS-Excel. The Excel version can automatically calculate quality metrics. The data are automatically extracted to a flat file which can be exported to an aggregate file to combine the data with results for the same facility at different time periods or with results from different facilities. The following data quality dimensions are examined:

- **completeness** – including monthly reporting completeness, data element completeness and source document completeness;

- **internal consistency** – accuracy is examined by recounting source data and checking against the value to be reported; consistency over time is examined by comparing the value of a data element to the value of the same data element from earlier time periods;
- external consistency – (including cross-checks between different data sources with the same/similar information); and
- a qualitative section of best practices which should be conducted in the facility to promote good data quality.

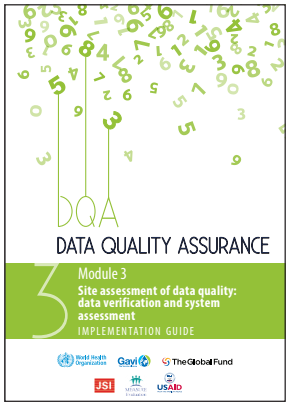
Periodic review of aggregate results from supervisory visits

The periodic review of aggregate results of data quality checks during supervision is important in order to detect systematic problems of data quality across health facilities (at district and higher levels). While the checklists are developed to be implemented on paper, a version in Excel will calculate quality checks automatically. The data are automatically extracted to a flat file which can be exported to an aggregate file to be combined with results from the same facility at different time periods, or with results from different facilities. Both a district supervisor checklist and a facility data manager checklist are available in Excel.

Resources to support routine site assessment of data quality

The following resources are available to support implementation of routine site assessments of data quality:[5]

- *Module 3: Site assessment of data quality* discusses both the discrete site assessment and the routine checklists, as well as the metrics that can be calculated from the site assessment.
- Routine checklists in MS Excel are part of the routine data quality assurance and feedback cycle with a user guide.



Supervisory checklists in MS Excel (with user guide)

[5] To download, see: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 26 October 2020).

Core indicators

The core indicators proposed for the desk review are also proposed for the discrete site assessment. Ideally, metrics calculated from the discrete site assessment and the desk review will provide holistic information on data quality and system issues and will allow for robust improvement mechanisms to be put in place. These core indicators are presented in Table 3.1.

While it is recommended that countries should select indicators from the core list, they may select other indicators or expand the set of indicators on the basis of their needs and the resources available. A full set of core and additional indicators is available in Annex 1. These core and additional indicators can also be used for routine supervisory checks.

Table 3.1. Recommended core indicators for the DQR

Recommended DQR indicators		
Programme	**Indicator name**	**Full Indicator**
Maternal health	Antenatal care 1st visit (ANC1) coverage	Number and % of pregnant women who received antenatal care at least once during pregnancy
Immunization	DTP3/Penta3 coverage	Number and % of children < 1 year receiving three doses of DTP/ Penta vaccine
HIV	New on ART	Number of people living with HIV who initiate ART
TB	TB notification rate	Number of new and relapse cases of TB that are notified per 100 000 population
Malaria	Confirmed malaria cases[6]	Confirmed malaria cases (microscopy or RDT) per 1000 persons per year

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP3 = diphtheria-tetanus-pertussis three-dose vaccine; Penta = pentavalent vaccine; RDT = rapid diagnostic test; TB = tuberculosis.

Dimensions of data quality

Not all data quality metrics and dimensions are collected through the site assessment of data quality (whether through the discrete assessment or through routine data quality assurance). The dimensions and metrics that can be measured through the discrete site assessment and routine data quality assurance are covered in subsequent sections.
As presented in *Module 1: Framework and metrics*, there are four overall data quality dimensions in the DQR, namely:

- Dimension 1: completeness and timeliness of data;
- Dimension 2: internal consistency of reported data;
- Dimension 3: external comparison/cross-checks (with other data sources) – i.e. agreement with other sources of data such as surveys;

[6] If the number of confirmed malaria cases is not collected, total malaria cases can be substituted.

- Dimension 4: consistency of comparisons of population data (a review of denominator data used to calculate rates for performance indicators).

Completeness and timeliness

The completeness of the data is assessed by measuring whether all the entities that are supposed to report actually do so. This applies to health facility reporting to districts and to district reporting to the regional or provincial levels. Timeliness of data is assessed by measuring whether the entities which submitted reports did so before a predefined deadline. The metrics for completeness and timeliness in the DQR include the following:

- **Completeness and timeliness of district reporting:** These metrics measure district performance on completeness and timeliness of reporting.
- **Completeness and timeliness of facility reporting:** These metrics measure facility performance on completeness and timeliness of reporting.
- **Completeness of indicator data (data element):** This indicator measures the extent to which facilities that are supposed to report data on the selected core indicators are in fact doing so. This is different from overall reporting completeness in that it looks at completeness of specific data elements and not only at the receipt of the monthly reporting form.
- **Consistency of reporting completeness:** This indicator examines trends in reporting completeness.

Internal consistency of reported data

Internal consistency of the data relates to the coherence of the data being evaluated. Internal consistency metrics examine: 1) coherence between the same data items at different points in time; 2) coherence between related data items; and 3) comparison of data in source documents and in aggregated reports. Four metrics of internal consistency are included in the DQR. These are:

- **Presence of outliers:** This examines whether a data value in a series of values is extreme in relation to the other values in the series.
- **Consistency over time:** The plausibility of reported results for selected programme indicators is examined in terms of the history of reporting of the indicators. Trends are evaluated to determine whether reported values are extreme in relation to other values that are reported during the year or over several years.
- **Consistency between indicators:** Programme indicators which have a predictable relationship are examined to determine whether the expected relationship exists between those indicators. In other words, this process examines whether the observed relationship between the indicators, as shown in the reported data, is that which is expected.

- **Consistency of reported data and original records:** This involves an assessment of the reporting accuracy of selected indicators through the review of source documents in health facilities and district offices. This element of internal consistency is measured by a data verification exercise which requires a record review to be conducted in a sample of health facilities and at district offices. It is the only dimension of data quality that requires additional collection of primary data.

External comparison/cross-checks (with other data sources)

The level of agreement between two sources of data measuring the same health indicator is assessed. The two sources of data that are usually compared are data flowing through the HMIS or the programme-specific information system and a periodic population-based survey. The HMIS data can also be compared to pharmacy records or other types of data to ensure that the two sources fall within a similar range.

External consistency of population data

This involves determining the adequacy of the population data used in evaluating the performance of health indicators. Population data serve as the denominator in the calculation of a rate or proportion and provide important information on coverage. This data quality measurement looks at consistency of population trends and compares two different sources of population estimates (for which the values are calculated differently) in order to ascertain the level of congruence between the two. If the two population estimates are discrepant, the coverage estimates for a given indicator can be very different even though the programmatic result (i.e. the number of events) is the same. The higher the level of consistency between denominators from different sources, the more likely it is that the values represent the true population value.

Chapter 3. Discrete site assessment at facilities and districts – data verification and system assessment

Measuring data quality through a survey conducted in health facilities and districts provides a unique opportunity to verify the quality of data on a randomly selected sample of facilities and districts. The results can be compared with the results of the desk review component of the DQR. The data quality metrics, preparation and implementation of guidance, analysis and recommended outputs of the data quality indicators collected through the site assessment are presented below.

Data quality metrics collected from surveys

While the DQR framework includes four dimensions of data quality (Section 3.2) not all dimensions can be measured through a discrete site assessment. For a complete discrete DQR, the results of the discrete desk review should be compared with the results from discrete site assessment, both for a holistic picture of data quality as well as for verification and validation of what is available through routine reports. The following dimensions can be measured through the discrete site assessment:

Dimension 1: completeness and timeliness of data;

Dimension 2: internal consistency of reported data.

In addition to the data quality metrics, a key component of the survey is a system assessment which examines the readiness of the health system to collect high-quality routine data.

The data quality metrics calculated through the discrete site assessment need to be appropriately weighted in order to calculate a nationally representative estimate. While unweighted estimates can be informative, they cannot be used as nationally representative estimates of data quality. Additional information on sampling and weighting can be found in Annex 5.

Completeness and timeliness

The completeness of the data is assessed by measuring whether all the entities that are supposed to report actually do so and whether they do so in a timely manner. The measures

of completeness and timeliness included in the facility survey portion of the DQR include the following:

- **Completeness and timeliness of facility reporting:** These metrics measure whether the health facilities of the representative sample in the survey have submitted their monthly reporting forms and submitted them on time.
- **Completeness of indicator data:** This metric measures whether the health facilities of the representative sample in the survey have included information on each of the selected indicators in their monthly reporting form (if they offer the service).
- **Completeness of TB data elements in the source documents:** As part of TB standards and benchmarks B1.4[1], data for a minimum set of variables should be available for ≥ 95% of the total number of reported TB cases in the health care facility. As erroneous conclusions may be made if the BMU data are inaccurate or incomplete, the proportion of TB cases with at least one of six variables missing (i.e. year of registration, sex, age, disease classification, type of patient, bacteriological results) is ascertained from the TB register.

Internal consistency of reported data

Internal consistency of the data is the coherence of the data being evaluated. Internal consistency metrics examine coherence between the same data items at different points in time, between related data items, and between data in source documents and aggregated reports.

The measure of internal consistency that is evaluated during the discrete site assessment is the comparison of data in source documents with data in aggregated reports, as follows:

- Verification of reporting consistency involves the review of source documents in health facilities in order to assess the reporting accuracy for selected indicators. This element of internal consistency is measured through a data verification exercise which requires a record review to be conducted in a sample of health facilities. Data verification compares 1) the total number of service outputs recorded in source documents at the health facility with 2) the total number of service outputs reported in monthly reports. If an electronic HMIS system is in place, the service outputs recorded in source documents can also be compared with the service outputs recorded for the facility in the national database of selected indicators. Values of selected indicators for a given reporting period are recalculated using the primary sources of data for the indicators. The recalculated value is then compared to the value that was initially reported through the system for the given reporting period. The ratio of the recounted value to the reported value is called the "verification factor" and constitutes a measure of accuracy of the indicator. This exercise should be conducted at the facility level and again at the district and provincial levels. A verification ratio should be calculated for each level.

[1] Standards and benchmarks for tuberculosis surveillance and vital registration systems: checklist and user guide. Document WHO/HTM/TB/2014.02. Geneva: World Health Organization; 2014

Preparation and implementation of the discrete site assessment component of the DQR

Conducting a discrete site assessment to assess data quality requires significant preparation before fieldwork can begin, data can be collected and results can be analysed. The time needed to complete a discrete site assessment depends on the size of the country and scope of the assessment. From the initial country adaptation of the assessment tool to the dissemination of data and production of country reports, the entire process generally takes from three to six months. This section presents an overview of some of the key activities that must be undertaken when preparing and implementing a discrete site assessment.

Requirements for data verification and system assessment

The discrete site assessment requires a review of source documents and aggregate reports. Source documents used at health facilities may differ across countries and health systems. A list of recommended source documents to be used for data verification is available in Annex 4. Before survey implementation, all source documents and aggregate reports that will be assessed should be identified in-country and copies of both blank and completed forms should be obtained. These forms are required in order to ensure proper customization of the data collection instruments and are also used for training data collection teams in the discrete site assessment methodology.

Calculating a sample size

The sample size for the site assessment will depend on the desired precision of the key estimates of interest of the health-facility survey (including data accuracy) and the acceptable margin of error. Other considerations include the availability of resources and the desired level of application of the estimates (N.B. provincial-level estimates require a greater sample size than estimates for the national level). The DQR coordinating group will need to work with a survey statistician and the organizers of the health-facility survey in order to determine the appropriate sample size for the health-facility survey on the basis of the country's priorities with regard to level of application of the estimates, available resources and the precision desired for the estimates. As the data verification factor is a measure of "agreement" between recounts from source documents and those data found in aggregate reports, the minimum sample size should aim to support a robust measure of agreement (in this instant termed "kappa") beyond what is expected by chance alone.

Annex 5 provides detailed guidance on key considerations necessary to calculate sample size for a data verification exercise, including a sample-size formula and selective sample-size calculations with a range of prevalence values, percentage agreements and corresponding kappa values.

Sampling of health facilities and districts

A sampling frame must be established in order to employ principles of probability sampling to compile a selection of facilities for inclusion in the assessment. A "master facility list" (MFL) – or a list of health facilities with attribute data (e.g. management authority, facility type, location in terms of region and district) – is a prerequisite for implementing the data verification (DV) and system assessment (SA) components of the DQR since the MFL serves as the sampling frame. A complete list frame includes all health facilities as well as the key attributes for each facility – such as location/administrative units, facility type, managing authority and services offered. It is very important to know specifically what services are offered at facilities and to account for this in the sampling. All guidance for sampling assumes that all facilities in the sample provide all services under review. However, this is often not the case for services such as HIV and TB which are offered at a subset of facilities. In these cases, the sampling needs to be adjusted to account for the variability in service availability across facilities. In addition, the sampling frame for the discrete site assessment should be limited to those facilities that report data to the Ministry of Health. Depending on the country context, this may or may not include private facilities and certain facility types. (NB: If the site assessment is being conducted in parallel with a health facility assessment such as the Service Availability and Readiness Assessment [SARA] or the Harmonized Health Facility Assessment [HHFA], this may mean that the sampling frames for the two assessments are different and this factor will need to be accounted for when selecting the sample of facilities for the site assessment.)

A representative sample of health facilities should be selected for data verification and for administration of the system assessment module. Once the objectives of the DV/SA are determined, the sampling methodology can be developed. For instance, health facility assessments such as SARA typically employ list and/or area sampling, while other data quality assessments have used a modified two-stage cluster sampling methodology. If regional estimates of data accuracy or estimates specific to certain types of health facilities (e.g. management authority or type of facility) are required, the sampling methodology must take these requirements into account. Specialty services (e.g. TB diagnosis and treatment, HIV testing and treatment) are not offered at all facilities so the sample may need to be adjusted if indicators from these programme areas are to be assessed.

By selecting a sample of facilities and weighting the observations obtained during the survey, it is possible to calculate a nationwide average value of the data quality metrics (for the selected programme indicators) that is representative of all health facilities in the country. It is important to keep in mind, however, that such averages may mask variations in survey estimates due to health-facility attributes – such as managing authority (e.g. public versus private for-profit), type (e.g. hospital versus health centre versus dispensary) and geographical region. For this reason, it may be necessary to perform stratified (i.e. disaggregated) analysis in order to calculate an estimate for each important category of the attribute (i.e. stratum). The proposed strata include facility type, managing authority and geographical region, although not all will necessarily be

relevant to each survey. Stratification of the sample also has the effect of increasing the sample size.

The technical requirements of drawing up the sample and deriving estimates from the resulting data are considerable. Care should be taken when developing the sampling methodology according to individual country requirements. A statistician should be consulted to ensure that the sample is drawn up appropriately. Annex 5 provides more information on the sampling of health facilities and districts for both the DV and SA components of the DQR.

Identifying, adapting and reproducing survey tools (paper and/or electronic)

Standardized tools have been developed for data verification and for the system assessment to assist countries to implement the DV/SA at health-facility and district levels. The facility and district-level questionnaires are available from WHO:[2]

These tools can also be used in conjunction with surveys such as HHFA and SARA.

The tools should be adapted to the country context prior to implementation (e.g. by specifying programme areas, indicators and source documents). If data are to be captured electronically (e.g. on a tablet computer) an electronic data collection tool should be developed to facilitate data entry. Sampled health facilities should be prepopulated in the tool, and facility/district records should be made available on the tablets used in the field. Data verification and system assessment modules have been developed using CSPro software.[3] As with the paper version of the survey tools, the electronic data collection tools should be adapted to the country context prior to DQR implementation. A manual for utilizing the CSPro site assessment tools can also be accessed along with the CSPro data collection applications.

Organizing the training of fieldworkers (enumerators)

Fieldworkers conducting the health-facility survey should be trained in methods of data verification and in administration of the system assessment. Data verification across programme areas requires familiarity with different data collection tools (registers, patient records, tally sheets etc.) in accordance with the indicators and programme areas. Enumerators should ideally have experience both of recording public health data and of the data collection tools used in the field. Training of enumerators should include practice in compiling indicators for each programme area using the tools they are likely to have in the field.

[2] To download, see under the data collection section at: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 28 October 2020).
[3] To download, see under the data collection section at: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 28 October 2020).

Notifying sites and subnational authorities

Several weeks prior to implementation, the health facilities and districts that are selected for the DV/SA should be notified of the date of the visit of the assessment teams. The relevant data management staff and their supervisors should be present at the facility on the day of the visit in order to facilitate access to the relevant records, to provide responses to the system assessment, and to assist with completion of the survey at the facility. Similarly, subnational HMIS management authorities, such as HMIS managers at district and/or regional levels, should also be informed both to satisfy administrative protocols and to enlist their support/cooperation in completing the survey.

Conducting the survey at the health facility

Survey teams should work in pairs to maximize efficiency and to control for quality during visits to health facilities. Up to five indicators (one per programme area) are recommended for data verification. The teams should plan to spend one complete day at each facility if combining the DV/SA components with an existing health-facility assessment such as SARA. If conducting a stand-alone DV/SA survey, at least one half-day should be allocated for data collection – though more time may be needed to complete the survey, particularly in sites with high client volume (a large number of records to recount) and poor quality and organization of data (difficulty in retrieval and recount). The system assessment should require no more than one hour at the health facility. The ideal respondent for the system assessment is the facility data manager (or the person responsible for compiling and reporting data).

Conducting the survey at the district level

The DV/SA is also implemented at district HMIS management units involved in the data flow from the sampled health facilities. At the district level the survey team will re-aggregate the district value of the selected indicators, using the values submitted on the monthly reporting forms from all facilities in the district (and not only the facilities in the sample). The team will also determine the completeness and timeliness of reporting at this level. The module on district-level system assessment should be completed in an interview with the data manager or programme manager. Survey teams should plan to spend about half a day at the district HMIS management unit.

Oversight and quality control of the survey

Survey teams should be supervised in the field by dedicated staff. Supervisors should cover a predetermined geographical area and a specified number of survey teams. The supervisor's role is to assist the teams to complete the surveys (where necessary), to collect and review the completed questionnaires, and to troubleshoot problems if they arise. Supervisors should revisit health facilities and verify the survey results for a small sample of facilities (e.g. 10%) to ensure that results are recorded accurately. If possible, independent monitors from national stakeholders (e.g. donors) can play a role in monitoring the implementation of the survey.

Compiling results

The supervisors of survey teams should deliver the completed surveys to the designated DQR data management staff at national level. A small team should be assembled from available staff from the Ministry of Health and/or from stakeholder organizations to review submitted survey forms, correct errors and enter the data into the electronic data collection tool (e.g. CSPro) to facilitate analysis. Depending on the number of facilities and districts sampled and the number of indicators verified, it may take up to one week for team of 4–5 data managers to clean and finalize all the data.

Analysis and interpretation

This section recommends tables that are useful for presenting and interpreting indicators of data quality collected by the discrete site assessment component of the DQR. As the discrete site assessment is based on a representative sample of health facilities and a purposive selection of districts to which these facilities report, appropriate weighting should be applied to obtain the correct estimates. Details on weighting are included in Annex 5.

A number of tools are available to facilitate the analysis of the site assessment data. These tools include:

- Facility DV/SA chartbook + handout – produces the standard facility DV/SA tabulations for the core indicators.
- District DV/SA chartbook + handout – produces the standard district DV/SA tabulations for the core indicators.
- Additional DV chartbook for countries with electronic HMIS systems + handout – for countries where facility-level data are entered directly into an electronic HMIS system. The district assessment will include only the systems assessment (i.e. no recounting at the district office). Instead of the district-level recount, this chartbook facilitates calculation of the DV factor comparing source document values and monthly report values to values in the HMIS.

All tools are available from WHO.[4]

Analysis of general facility information

This section includes tables that describe the sample and provide context for interpreting the data quality metrics.

[4] To download, see under the data collection section at: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 28 October 2020).

Availability of services and status of reporting data

The percentage of facilities in the sample providing the specific health services, and those facilities reporting data to an HMIS or other Ministry of Health reporting system, should be included in the presentation of results. This will provide information on the number of facilities on which the subsequent data verification results are based. Tables 3.2 and 3.3 show examples of how the data may be presented.

Table 3.2. Percentage of facilities in the sample providing each health service, by stratum, by indicator

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.3, Percentage of facilities providing services that report data to a Ministry of Health reporting system, by stratum, by indicator

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Availability of source documents and monthly reports

If a facility offers a specific service, it should also have the source documents (registers, tally sheets etc.) and the monthly reports of the three-month verification period available for review on the day of the data verification survey. The selected programme indicators (and their related services) should have standard Ministry of Health registers, tally sheets or other documents which health facilities are expected to use to record daily activities. While it is possible that health facilities may use multiple documents to record the services provided, it is important to

identify whether there is a main source document from which data are compiled for monthly reporting. Table 3.4 shows the percentage availability of these documents for all of the three months. The following equation shows the percentage availability of source documents and monthly reports of facilities providing a specific service:

$$\%\ \text{availability of source documents } \textbf{and} \text{ monthly reports for each facility} = \frac{\sum_{i=1}^{n} \text{Available month } 1_i + \text{Available month } 2_i + \text{Available month } 3_i}{3n} \quad X\ 100$$

where *n* is the total number of facilities providing a specific service.

Table 3.4. Percentage of facility-months (for facilities providing a specific service) for which all required source documents, as well as the monthly report, were located by the survey team, by stratum

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Match between source documents and monthly reports

The number of events recounted from the main source document should match exactly the number reported in the monthly reporting form. Table 3.5 shows the percentage match between the service outputs reported in monthly reports and the service outputs recounted in source documents for all of the three months.

$$\%\ \text{match between reported and recounted service outputs} = \frac{\sum_{i=1}^{n} (\#\ \text{Facilities with exact match month\_1} + \#\ \text{Facilities with exact match month\_2} + \#\ \text{Facilities with exact match month\_3})}{3n} \times 100$$

where *n* is the total number of facilities providing a specific service.

Table 3.5. Percentage of facility-months (for facilities providing a specific service) for which the sum of the source data is exactly equal to the reported data, by stratum

	Overall	Stratum 1 (facility type)			Stratum 2 (managing authority)	
		Hospitals	Health centre	Dispensary	Government	Private for- profit
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Analysis of data quality metrics

Facility reporting completeness

This indicator measures the percentage of monthly reports received by the district office for the facilities sampled in the health-facility survey. The number of monthly reporting forms varies by country. Some countries have only one form in which all key indicators are reported while other countries have forms for different services or programme areas. The discrete site assessment is able to measure reporting completeness for multiple monthly reporting forms.

Ideally, the completeness of facility reporting is measured by the receipt of monthly reports at the district office. Irrespective of whether a country's health information system is electronic or paper-based, it is recommended to measure the completeness of facility reporting at the district level by enquiring about the receipt of monthly reports for the facilities in the survey. If, exceptionally, the district office cannot be visited, a proxy reporting completeness variable can be calculated through the availability of monthly reports at the health facility. Table 3.6 shows an example of how to present the data.

Table 3.6. Percentage of facility-months (for the sampled months, for facilities visited which provide the specific service) with monthly reports received by the district office that include the following indicators, by stratum

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Timeliness of facility reporting

Managers rely on timely information. This indicator is collected at the district level to assess whether the facilities in the survey sent their reports to the district office on time (i.e. by the receipt date specified in the standard operating procedures for data management). Table 3.7 shows how to present the data.

Table 3.7. Percentage of facility-months (for the sampled months, for facilities visited which provide the specific service) with monthly reports received by the district office by the reporting deadline, by stratum

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Timeliness of reporting by districts

Timeliness of reporting at the district level is measured at the destination of the district-level reporting – i.e. usually the national level. Concerns about timeliness may arise both in district-level reporting and at higher aggregation levels. A chain effect can occur where incomplete/delayed reporting by facilities affects district-level reporting and reporting by other aggregation levels. Table 3.8 presents the timeliness of reporting by a higher aggregation unit (e.g. the district office). This indicator will not be calculated in countries where data are transferred only in electronic form between the district and national levels.

Table 3.8. Percentage of district monthly reports (for the selected three months, including information on the following indicators) submitted on time by the district office

	Overall	Stratum (region)		
		Region 1	Region 2	Region 3
ANC1 (n =)				
DTP3/Penta3 (n =)				
Malaria cases (n =)				
Notified cases of TB (n =)				
Currently on ART (n =)				

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Data element completeness

While high levels of completeness of facility reporting are very important, it is also important to ensure that a facility that is supposed to report on an indicator has included the relevant information in its monthly reports. This indicator measures the level of data element completeness for the facilities in the sample. Table 3.9 is shown as an example of how to present the data.

Table 3.9. Percentage of facility-months (for facilities visited and providing a specific service and reporting data) that include data for the following indicators in their monthly reports, by stratum

	Overall	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Completeness of information on a minimum set of variables for TB

TB surveillance systems require data to be reported on a minimum set of variables in order for TB incidence and trends to be assessed adequately. This minimum set should include, for all cases, data on age, sex, year, bacteriological results (i.e. laboratory versus clinically confirmed results), history of previous treatment (i.e. new versus previously treated) and anatomical site of disease (e.g. pulmonary versus extra-pulmonary). Completeness of data on these minimum variables is assessed to determine whether standards B1.5, B1.6, and B1.7 are met,[5] as shown in Table 3.10.

[5] Standards and benchmarks for tuberculosis surveillance and vital registration systems: checklist and user guide. Document WHO/HTM/TB/2014.02. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/112673/1/9789241506724_eng.pdf?ua=1, accessed 11 June 2015).

Table 3.10. Frequency of missing data for selected variables in TB registers

	n	%
Total number of facilities with cases missing data		
Cases with missing data for selected variables		
Year of registration		
Sex		
Age		
Disease classification (pulmonary versus extra-pulmonary)		
Type of patient (new versus previously treated)		
Bacteriological results		
Number of cases missing data for at least one of the following variables: year of registration, sex, age, disease classification, type of patient, or bacteriological results		

Verification factor (VF)

Even if the reported and recounted numbers do not match exactly, it is useful to take account of the degree of disparity between the two.

The facility VF for a given indicator can be calculated in two ways. For a paper-based reporting system at the facility and district levels, the VF is a comparison of the recounted number of events from source documents divided by the service count for the same indicator submitted in the monthly report. In a reporting system that is paper-based at the facility level but electronic from the district level (such as the DHIS 2), the VF can be calculated in several ways. One is a comparison of the recounted number of events from source documents divided by the service count for the same indicator submitted in the monthly report. Alternatively, the VF can be calculated by comparing the recounted information in the source documents and/or the monthly reports to what has been entered for that facility in the electronic database.

$$\textit{Verification factor} = \frac{\text{Recounted number of events from source documents}}{\text{Reported number of events in monthly reports or in national database.}}$$

A VF higher than 1 implies that there is under-reporting of events for the verification period. If the VF is less than 1, this implies that there is over-reporting of events for the period chosen for the analyses. When calculating the VF for a given tracer indicator, data from facilities which do not provide the specific service are excluded. It should also be noted that recounted values may exceed reported values if some reports are missing; similarly, reported values may exceed recounted values if some source documents are missing. For this reason, the VF is calculated only

for the health facilities that have both the source documents and the monthly reports; it is not calculated for facilities that have the source data or one or more monthly reports missing. This distinguishes the assessment of the accuracy of reporting from the assessment of completeness of record-keeping and archiving.

Tables 3.11 and 3.12 present the overall national VFs calculated at the facility level by strata, and the percentage of facilities that over-report or under-report. The VF is a weighted average. Like any average, it may mask the underlying distribution of VFs of individual health facilities – some of which may have a much lower VF (greater over-reporting than is suggested by the average) and some of which may have a much higher VF (more under-reporting than is suggested by the average). It is possible that the assessment may find that certain categories of health facilities (e.g. government facilities) over-report while other categories of health facilities (e.g. private-for-profit facilities) under-report. It is also worthwhile to review the distribution of VFs of individual health facilities: the percentage of facilities which over-reported by more than 10% (i.e. VF < 0.90), the % of facilities which under-reported by more than 10% (i.e. VF > 1.10) and the percentage of facilities for which source data exactly match reported data. If the sample size permits, comparisons should also be made between subnational units (i.e. regions) to determine where resources should be targeted for strengthening the health system.

The weighted estimates of the VFs for the assessed indicators should be compared to findings from previous data quality assessments in order to determine trends in accuracy.

Table 3.11. Facility-level verification factor for selected indicators, by strata

	National verification factor	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
ANC1 (n =)						
DTP3/Penta3 (n =)						
Malaria cases (n =)						
Notified cases of TB (n =)						
Currently on ART (n =)						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.12. Facility-level metrics relevant for data verification

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities providing the service and reporting data that have all required source records and reports					
% of facilities for which source data exactly match reported data					
% of facilities that over-report by more than 10% (VF < 0.90)					
% of facilities that under-report by more than 10% (VF > 1.10)					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Verification factor for higher-level aggregating units

The data verification exercise should be conducted at all levels where health information is physically aggregated (e.g. health facility → district → province → national). In a country with an electronic health information system into which districts input all health-facility data directly, the data verification exercise will be conducted at the health facility and district levels. In other countries, where there are multiple levels of aggregation, the data verification exercise must be carried out at all levels. The example in Table 3.13 presents a tabular analysis of district-level verification information. A similar exercise should be carried out for other aggregation levels where required.

In countries where facility-level data are entered directly into an electronic HMIS system, the district assessment will include only the systems assessment (i.e. no recounting at the district office). Where there is no recount at the district level, an Excel chartbook is available to facilitate calculation of the DV factor that compares source document values and monthly report values to values in the HMIS. This tool requires the user to import the source document and monthly report values from the Facility DV/SA data collection as well as the HMIS values for the same facilities visited for the Facility DV/SA data collection activity. The tool then calculates the DV factor comparing source document to HMIS value and monthly report to HMIS value. The decision to omit the district-level recount should be made by the DQR coordinating group prior to data collection and must be applied across all facilities and districts. However, this decision can vary by indicator (i.e. ANC can skip the recount while immunization implements the recount). In addition, the CSPro data entry application must be adjusted to take account of this decision (see the CSPro manual for detailed instructions).

Table 3.13 shows that the VF at the district level is calculated by re-aggregating the value of the selected indicators from the health facilities that report to the district on monthly summary

report forms. The re-aggregated value is divided by the value that is reported by the district for the reporting period in question in order to derive a district VF. The district VF is an independent assessment of the accuracy of reporting for the district HMIS or programme office; it is not factored into the composite VF derived from the full sample of health facilities.

Tables 3.14 and 3.15 show the additional VFs for countries in which facility-level data are directly entered into an electronic HMIS system. In this scenario, two VFs are calculated:

- the data verification factor comparing facility source documents to HMIS values; and
- the data verification factor comparing facility monthly reports to HMIS values.

These VFs are calculated only for facilities which have all data present – i.e. all source documents are present and have been recounted for three months, all monthly reports are present and values have been recorded for three months, and three months of HMIS data are available.

Table 3.13. District-level metrics relevant for data verification

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities providing the service and reporting data that have all required source records and reports					
National district-level VF factor					
Number and list of districts with VF < 0.90					
Number and list of districts with VF > 1.10					
% of districts that over-report (VF < 0.90)					
% of districts that under-report (VF > 1.10)					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.14. Data verification factor comparing facility source documents to HMIS values

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities providing the service and reporting data that have all required source records and reports					
National VF factor					
% of facilities for which source data exactly match reported data					
% of facilities that over-report by more than 10% (VF < 0.90)					
% of facilities that under-report by more than 10% (VF > 1.10)					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.15. Data verification factor comparing facility monthly reports to HMIS values

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities providing the service and reporting data that have all required source records and reports					
National VF factor					
% of facilities for which source data exactly match reported data					
% of facilities that over-report by more than 10% (VF < 0.90)					
% of facilities that under-report by more than 10% (VF > 1.10)					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Reasons why data submitted in monthly reports does not match source documents

Facility level

Table 3.16 shows reasons for discrepancy between the recounted data from source documents and data reported in monthly reports. Table 3.17 examines reasons for the unavailability of monthly reports, if one or more of the monthly reports are missing. It is valuable to examine each programme separately because the results can show whether problems are systemic or perhaps programme-specific. Additional analyses can be conducted by facility type or ownership.

Table 3.16. Reasons for discrepancy between source data and reported data at facility level, by programme area

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities with no discrepancy					
% of facilities with arithmetical errors					
% of facilities with transcription errors					
% of facilities where some documents were missing during report preparation					
% of facilities where some documents were missing during survey implementation					
Other reasons					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.17. Reasons for missing monthly reports, by programme area

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of facilities with all three-monthly reports					
% of facilities that submitted a report but cannot locate it now					
% of facilities that do not have trained staff members to report					
% of facilities where no reporting form was available					
% of facilities where there was some interruption in service delivery in one or more of the selected months					
Other reasons					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

District or higher aggregation levels

Table 3.18 presents information on whether the district office that handles monthly reports – which include information for the selected programme indicators – has a system for monitoring completeness and timeliness of the monthly reports received from health facilities. It is possible that more than one district office is involved, especially when parallel programme reporting systems exist. In this case, this question will be asked at the programme level. However, if only one district office controls the flow of information (such as the HMIS office), the tracking of completeness and timeliness will be requested only once.

Note: depending on the sampling strategy used for the facility survey, if the district is not the primary sampling unit it will not be possible to make inferences about all districts in the country with this information. However, it is hoped that the information collected is illustrative and that it can be used to guide country-level discussions on district-level problems with data management. This caveat applies to all the district analyses.

Table 3.18. Availability of system for tracking completeness and timeliness, at district level

	Overall	Data elements				
		ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
% of districts with a system for tracking timeliness						
% of districts with a system for tracking completeness						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.19 identifies reasons for discrepancy between the aggregated data from monthly reports from all health facilities and the report submitted from the district office to the next reporting level. This table disaggregates this information by programme area. If multiple district offices are involved in the data verification process, district-level analysis may show variation in the accuracy of different programme data. Even if only one district officer compiles the data, there may be relevant programme-specific information. Tables 3.20 and 3.21 examine from a district officer's perspective why health facilities in a district have not submitted the appropriate report or have not submitted it in a timely manner. It is valuable to examine each programme separately because the results can show whether discrepancies are systemic or more programme-specific. Additional analyses can be conducted by facility type or ownership.

Table 3.19 Reasons given for discrepancy between source data and reported data at district level, by programme area

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
No discrepancy					
Arithmetical or data-entry errors					
Additional facility reports received after district reporting					
Some facility reports missing after district reporting					
Other reasons					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.20. Reported cause of incompleteness of reporting, by programme

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
100% reporting completeness					
Lack of trained staff in facilities					
Lack of reporting forms in facilities					
Difficulties with transport/communication					
Some facilities no longer provide the service					
Some facilities do not follow guidelines					
District has an inadequate system for tracking completeness					
Other reasons					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.21. Reported cause of late reporting, by programme area

	Data elements				
	ANC1 (n =)	DTP3/ Penta3 (n =)	Malaria cases (n =)	Notified cases of TB (n =)	New on ART (n =)
100% reporting timeliness					
Difficulties with transport/communication					
Some facilities delay completion					
District has an inadequate system for tracking timeliness					
Other reasons					

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

System assessment

The system assessment measures the capacity of the reporting system to produce good-quality data. It evaluates the extent to which critical elements of the reporting system adhere to a minimum set of acceptable standards. A set of system domains that examine the availability of guidelines, trained staff and data collection tools, as well as supervision and feedback on data quality, are evaluated. Annex 3 provides details as to how each system domain is defined and how the domain score is calculated. Table 3.22 displays a method for presenting the findings on the system domains. A similar presentation is recommended for the district level. Conditional colour formatting shows variation in performance for each item in the different strata. Note that these numbers and estimates are purely illustrative. Additional simple analyses can examine a significant association (such as with a chi-square test of independence) between these items (both individually and as an index) on data quality (i.e. the VF).

The overall score is the percentage of facilities reporting to any Ministry of Health reporting system and multiplied by its mean score. Note: ANC = antenatal care; MOH = Ministry of Health; TB = tuberculosis.

Table 3.23 presents an example of a tabulation between the availability of a single item – i.e. receipt of training by staff who enter/compile data – on the data VF and stocks. Similar tables can be constructed for other items. This kind of analysis, while not indicating causation, is helpful in prioritizing the next steps for improving the status of some of these physical attributes. Other analyses, such as regressions, can be conducted to assess the relationship between the availability of the system assessment indicators and data quality (i.e. data VF).

Table 3.23. Differences in average data verification factor based on training for staff who compile/enter data, both overall and by strata

	Overall average verification factor	Stratum 1 (e.g. facility type)			Stratum 2 (e.g. managing authority)	
		Type 1	Type 2	Type 3	Type 1	Type 2
Yes- stock-outs						
No - stock-outs						

Note: ANC = antenatal care; DTP3 = Diphtheria-tetanus-pertussis vaccination; TB = tuberculosis; ART = antiretroviral therapy.

Table 3.22. Percentage of facilities that reported health data to a Ministry of Health reporting system and had the following data management system domain scores, by strata

	Overall	Data elements			Ownership		Location	
		Hospital	Health centre	Health post	Public	Private	Urban	Urban
	n =231	n = 85	n = 86	n = 60	n =173	n = 58	n =88	n =143
Facilities reporting service statistics to Ministry of Health (%)								
Of those offering ANC services, % of facilities reporting to an MOH reporting system	89	40	92	94	92	81	81	93
Of those offering immunization services, % of facilities reporting to an MOH reporting system	89	39	90	97	94	75	78	95
Of those offering HIV care services, % of facilities reporting to an MOH reporting system	59	91	68	22	55	71	73	52
Of those offering TB care services, % of facilities reporting to an MOH reporting system	57	86	62	35	55	64	61	55
Of those offering malaria treatment services, % of facilities reporting to an MOH reporting system	100	96	100	100	100	99	99	100
Data management system domain scores (%)								
	n = 231	n = 82	n = 86	n = 60	n = 171	n = 58	n = 88	n = 143
Availability of guidelines	57	66	63	36	54	61	69	54
Availability of trained staff	42	49	47	26	41	45	56	39
No stock-out of tally sheets, registers and reporting forms in the last 6 months	73	88	77	57	73	73	73	73
Receipt of supervision and written feedback, including on data quality	16	48	20	2	14	20	22	15
Analysis and use of data	37	45	43	20	38	47	56	33
Met all criteria	2	17	3	0	2	4	4	2
Mean of items	46	65	49	33	44	50	54	44
Overall score	35	30	44	17	37	32	38	34

The overall score is the percentage of facilities reporting to any Ministry of Health reporting system and multiplied by its mean score. Note: ANC = antenatal care; MOH = Ministry of Health; TB = tuberculosis.

Chapter 4. Routine data quality assurance – checklists

Routine checklists are part of a system of routine (i.e. monthly) reviews of data quality of the HMIS or other programme reporting systems. Checklists are part of a feedback cycle that identifies and rectifies errors in near real-time. This routine system of data quality checks has two components: 1) monthly self-assessment of HMIS data conducted by health-facility staff, and 2) a periodic (ideally quarterly) assessment of health-facility data by district-level staff during supervisory visits to the health facility.

Data quality metrics collected from checklists

Not all dimensions of data quality can be evaluated through routine supervisory checks. The following dimensions can be measured through these checks, though it will be important to note that the definitions given in *Module 1: Framework and metrics* will need slight adaption for data collected through routine site visits.

Dimension 1: completeness and timeliness of data;

Dimension 2: internal consistency of reported data (including data verification);

Dimension 3: external comparison/cross-check (with other data sources).

Completeness and timeliness

The completeness of the data is assessed by measuring whether all the entities which are supposed to report actually do report and whether they do so in a timely manner. The measures of completeness and timeliness included in the facility survey portion of the DQR include:

- **Timeliness of facility reporting:** This metric measures whether the health facilities that are visited (or that are self- assessing) have submitted their monthly reporting forms on time.
- **Completeness of indicator data:** This metric measures whether the health facilities that are visited (or that are self- assessing) have completed and included information on each of the selected indicators[1] in their monthly reporting form, if they are offering the service.
- **Completeness of required data elements in the source documents:** This metric measures whether the health facilities that are visited include a minimum set of data elements in source documents for the selected programme area/indicators.

[1] Whatever indicators have been selected from the core list or additional list or other indicators.

Internal consistency of reported data

Internal consistency of the data is the coherence of the data being evaluated. Internal consistency metrics examine coherence between the same data items at different points in time, between related data items, and between data in source documents and aggregated reports.

Consistency over time: Overall, this metric measures the plausibility of current selected indicators when compared to historical precedents. Specifically, it compares:

- indicator values from the current month to the same month one year ago; and
- indicator values from the current month to the average value of these same indicators from the three preceding months.

Verification of reporting consistency: This involves the review of source documents in health facilities in order to assess the accuracy of reporting for selected indicators. This element of internal consistency is measured through a data verification exercise which requires a record review to be conducted in a sample of health facilities. Data verification compares, for selected indicators, the total number of service outputs recorded in source documents at the health facility with the total number of service outputs reported through the reporting system (either the HMIS or programme-specific reporting system). Values of selected indicators for a given reporting period are recalculated using the primary sources of data for the indicators. The recalculated value is then compared to the value that was initially reported through the system for the given reporting period. The ratio of the recounted value to the reported value is called the "verification factor" and constitutes a measure of accuracy of the indicator. This exercise should be conducted at the facility level and again at the district and provincial levels, and a verification ratio should be calculated for each level.

External comparison/cross-checks (with other data sources)

The level of agreement between two sources of data measuring the same, or similar, health indicator is assessed.

Cross-checks are techniques to corroborate results found in one data source with data from a different data source.

Preparation and implementation of the discrete site assessment component of the DQR

The use of checklists should be incorporated into routine supervision visits. The overall guidance on routine processes for data quality should be part of a country's standard operating procedures (SOPs) on data quality assurance. The DQR coordinating group (see: *Module 1: Framework and metrics*) should be involved in the process of development of the SOPs and in overall oversight of the use of data that are collected during these routine supervisory visits.

The MS-Word version of the checklists and instructions on the use of the checklists are included in Annex 6 and Annex 7. In addition, the Excel version of the checklists is available online from WHO.[2]

Analysis and interpretation

Figures 2–5 in the following sections present different parts of the checklists. The full checklists are included in Annex 6. The MS-Excel version of the checklist for supervisors includes automated charts. Results of multiple facilities can be aggregated to look at the different data quality metrics within a district, region or country. The self-assessment checklist for facility managers currently exists only in MS-Word; there is no Excel version of these and the results cannot be aggregated over time.

Analysis of general facility information

The checklists look at the completeness of source documents. Table 3.24 shows a list of source documents to be evaluated for completeness. The actual list of available source documents may be different according to the type of health facility. There may also be some country-specific source documents that will need to be examined.

For each source document on the list, determine whether the source is:

- *Available* — the data source is available if it is present at the facility on the day of the visit and the supervisor can locate and review it.
- *Up to date* — the data source is up-to-date if there are entries up until the present day.
- *Standard* – the data source is standard if it is the tool designed and distributed by the HMIS or health programme. It is the source that is intended to be used for the purpose of data collection and reporting and is not an improvised tool.

[2] To download, see: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 27 October 2020).

Table 3.24. Recommended source documents by programme area for completeness check

No.	HMIS (cross-cuting)	Maternal health	Immunization	HIV/AIDS	TB	Malaria
1	**Client encounter form**	ANC register	Immunization register	ART register	TB register	Malaria case register
2	**OPD register**	Monthly report	Tally sheets	Monthly report	Laboratory register	Monthly report
3	**Monthly report**	Postnatal care register	Monthly report	Laboratory register	Pharmacy dispensation register	Laboratory register
4	**Laboratory register**	Labour and delivery register	Vaccine stock registry	Pharmacy dispensation register	TB drugs stock management logs	Pharmacy dispensation log
5	**Pharmacy dispensing log**	Tetanus toxoid stock log	Refrigerator temperature log	ART stock management logs		ACT stock management log
6	**Vaccine stock management log**	IPTp-SP stock log	Child heath cards			Malaria surveillance reports
7	**ANC register**	Mebendazole stock log	Defaulter register			
8	**Family planning register**					

Note: ANC = antenatal care; ART = antiretroviral therapy; IPTp-SP = intermittent preventive therapy in pregnancy with sulfadoxine

Analysis of data quality metrics

This following section explains how the data quality metrics are defined and calculated using the routine checklists. Information on the use of the checklists is provided in Annex 7 and relevant parts of the checklists are included within the sections discussed below (see Figures 2, 3, 4, 5 and 6). The complete checklists are included in Annex 6.

Completeness and timeliness

One measure of timeliness and two measures of completeness are evaluated and are described below. The checklist section on completeness and timelines is shown in Figure 2.

Timeliness of facility reporting: Review the last three monthly reports (based on the date of supervision). Were the reports submitted by the deadline of reporting? A check may need to be made against the district-level database to verify the dates of submission of the facility monthly reports. The percentage of reports submitted by the deadline is then calculated and posted to the dashboard.

Completeness of indicator data: The completeness of the monthly report sent by the health facility to the next level of reporting is calculated by first determining the number of cells expected to be complete and the number of cells actually complete (i.e. filled in). Expected cells are calculated by counting the number of cells (data elements) on the report and subtracting those that the health facility is not obliged to complete. For instance, if a given service is not offered by the facility then the facility would not be expected to report on the service and would

leave the cells blank on the report. The number of completed cells divided by the number of cells expected to be complete gives the percentage of completeness for the monthly report.

Completeness of required data elements in the source documents: For each data element in the list, review the source document for the period in question and count the number of entries for which the data element is missing (i.e. incomplete). For a register, begin on the page representing the first day of the period (and first entry for the period) and count down through the entries until the last day of the reporting period (and final entry), noting the number of missing elements for each element on the list. Divide by the total number of entries for the period to obtain the percentage complete for each data element.

Calculate the number of entries with complete information (for the priority fields) by counting all entries with at least one field that is missing data and then dividing by the total number of entries. Subtract this percentage from 100% to calculate the percentage complete for the register.

The list of data elements in Table 3.25 can be substituted as necessary, depending on the needs of the programme. However, some data elements should remain consistent in order to evaluate the data element completeness over time.

Table 3.25. Recommended data elements by program area for completeness check

No.	HMIS (cross-cuting)	Maternal health	Immunization	HIV/AIDS	TB	Malaria
1	**Unique ID**	Unique ID	Unique ID	ART initiation date	Year of registration	Unique ID
2	**Visit date**	Visit date	Registration date	Sex	Sex	Visit date
3	**Client's name**	Mother's name	Child's name	Age	Age	Client name
4	**Age**	Age	Sex	ART regimen	Disease classification/ anatomical site	Age
5	**Diagnosis (any type)**	Visit number	Birthdate (age)	TB testing	Type of patient	Diagnosis (any type)
6	**Treatment given**	Estimated delivery date	Name and address of parent (caretaker)	Prophylaxis for OIs	Type of patient	Treatment with ACT

Note: ANC = antenatal care; ART = antiretroviral therapy; IPTp-SP = intermittent preventive therapy in pregnancy with sulfadoxine

Figure 3.2. Evaluation of completeness on supervisor checklists

I. Completeness & timeliness								
A. Completeness of HMIS monthly report Select the most recently completed and submitted monthly HMIS facility report. Calculate the number of cells expected to be complete on the monthly report (exclude cells for services not offered by the facility). Count the number of cells that are complete (blank, not zero) and calculate the percentage completeness for the monthly report.						Expected cells	Completed cells	% complete
								–
B. Timeliness of submission of monthly report Review the monthly reports from the past three months at the facility and in the HMIS database. Determine if the reports were submitted by the deadline for reporting				**Monthly report:**	–	–	–	
				Submitted by the deadline? (Y/N)				0%
C. Data element completeness Missing data: ask to see the Outpatient Department (OPD) register. Count the number of clients in the quarter (month 1 to month 3) with missing information for each of the following columns in the unit malaria case register.				**D. Source document completeness** Review the following data sources and determine if they are available, up-to-date (values up to the current day/period) and standard (the form prepared and distributed by the programme). (Y/N)				
HMIS data elements		**Number of cases (rows) with missing data**	**%**	**HMIS source documents:**		**Available**	**Up-to-date**	**Standard form**
1.	Unique ID		–	Client encounter form				
2.	Visit date		–	OPD register				
3.	Client name		–	Monthly report				
4.	Age		–	Laboratory register				
5.	Diagnosis (any type)		–	Pharmacy dispensing log				
6.	Treatment given		–	Vaccine stock management log				
7.	Number of entries with missing data in at least 1 of the 6 columns listed above		–	ANC register				
8.	Total number of entries for the period			**% Complete**		–	–	–

Internal consistency of reported data

Data are compared from different time periods to evaluate the plausibility of current results as compared to historical precedents. Three metrics are examined: two metrics of consistency over time and one metric on data verification/data accuracy.

A. **Comparison of the indicator value from the current month to the same month one year ago.** Unless there have been large demographic changes in the facility catchment area these values should be similar. A difference of greater than 20% (i.e. a ratio greater than 1.2 or less than 0.8) would indicate a potential data quality problem and should be

investigated. Changes in service delivery patterns – such as intensification campaigns or stock-outs of commodities – can also produce big differences, so attention should be paid to the causes of discrepant values before concluding that a data quality problem exists.

B. **Comparison of the current month to the average of the three preceding months.** Month-to-month the value of the indicator should remain fairly consistent. Again, a difference of 20% between the current month value and the average of the three preceding months would be indicative of a potential problem.

Note: Consistency checks are included only in the district checklist since it is important to identify inconsistencies prior to reporting. These checks can also be conducted by the facility data management staff if desired, but the priority should be to check for complete and accurate data compilation and reporting.

Figure 3.3. Evaluation of reporting consistency over time on supervisor checklists

IV. Internal consistency of reported data: consistency of data elements over time		**Program area ->**		**Maternal health**		
IV.a Annual consistency – select the indicator on the "Indicators" tab.		Indicator ->		**Tetanous toxoid 1st dose**		
1. What is the current month's value?						
2. What was the value of the indicator for the current month one year ago?						
Consistency ratio: Divide the value of the current month by the value from the same month last year. If the value is more than 20% different (i.e. < 0.8 or > 1.2) this could indicate a data quality problem.						–
IV.b Month-to-month consistency Enter values for the selected indicator for the current month, and for the three preceding months. Calculate consistency: Current month/average of Months 1–3. If the value is more than 20% different (i.e. < 0.8 or > 1.2) this could indicate a data quality problem.		Month 1	Month 2	Month 3	Last month	Consistency ratio
	month	–	–	–	–	
	value					
Reasons for discrepancy (enter code at right):						
a) no discrepancy, b) arithmetical errors, c) transcription errors, d) vaccine stock management forms not up to date, e) some documents are missing, f) vaccine/drugs stock-out, g) other (specify)						

C. **Data verification** – Section II of the checklist is a standard reporting accuracy check which compares a validated value for selected indicators and the reporting period to the value reported by the site for the identified reporting period. The validated value of the indicator is determined by recounting the indicator using the appropriate source document and data aggregation protocol. The recounted (i.e. validated) value is divided by the reported value (from the monthly report) to derive the "verification factor" (or VF). If there are discrepancies between the validated and reported values, determine the cause and record the appropriate code on the form.

$$\text{Verification factor (VF)} = \frac{\text{Validated (recounted) value}}{\text{Reported value}} \times 100\%$$

Values of the VF of less than 0.9 (90%) or greater than 1.1 (110%) are indicative of data quality problems and should be investigated. Values should be tracked over time to determine the trend in reporting accuracy for the different indicators.

Figure 3.4. Evaluation of reporting accuracy on supervisor checklist

II. Internal consistency: verification of reporting consistency						
Recount the value of indicators from the malaria case register and compare the value to the one reported by the facility for the selected months						
	Indicator		Month 1	Month 2	Month 3	3-month total
			–	–	–	
1.	**Select indicator type:**	HMIS				
	Select indicator:	Outpatient visits				
	Source document recount					0
	HMIS monthly report value					0
	DHIS 2 monthly value					0
	Monthly report verification factor (VF)		–	–	–	–
	DHIS 2 verification factor (VF)		–	–	–	–
	Reasons for discrepancy (use code below – mark all that apply)					
	Other reason (specify)					
2.	**Select indicator type:**	HMIS				
	Select indicator:	Institutional deliveries				
	Source document recount					0
	HMIS monthly report value					0
	DHIS 2 monthly value					0
	Monthly report verification factor (VF)		–	–	–	–
	DHIS 2 verification factor (VF)		–	–	–	–
	Reasons for discrepancy (use code below – mark all that apply)					
	Other reason (specify)					
3.	**Select indicator type:**	HMIS				
	Select indicator:	Institutional deliveries				
	Source document recount					0
	HMIS monthly report value					0
	DHIS 2 monthly value					0
	Monthly report verification factor (VF)		–	–	–	–
	DHIS 2 verification factor (VF)		–	–	–	–
	Reasons for discrepancy (use code below – mark all that apply)					
	Other reason (specify)					
Reasons for discrepancy:						
a) no discrepancy, b) arithmetical errors, c) transcription errors, d) some documents were missing when the report was prepared, e) some documents are now missing, f) other (specify)						

External comparison/cross-checks (with other data sources)

Data sources are compared to determine the level of consistency and reliability between data sources with the same or similar information. Cross-checks are techniques for corroborating results found in one data source with data from a different data source. Several general types of cross-checks are used in the checklists.

A. **Comparison of data elements between a client service delivery register and another register for a service delivery support unit, such as the pharmacy or laboratory.** The rationale for this comparison is to ensure that information in the support unit registers is being updated correctly in the primary service delivery register for the programme area or indicator, and that the information is the same in the two registers. Select priority data elements to compare such as those pertaining to diagnosis and treatment (e.g. test dates and results, regimens prescribed and dates filled, etc.). Demographic characteristics (age and gender) can also be compared, as well as unique identifiers. Decide ahead of time the standard for matching – consider whether all data elements need to match exactly in order for the comparison to be judged acceptable.

B. **Comparison of data elements between different client service delivery data sources, such as a register and a medical record or client-held card.** For many treatment programmes (e.g. HIV/AIDS, TB) the primary source document is the patient card (or treatment card) which is usually a component of a larger medical record of the patient. A summary of the information in the patient card is kept as a register to facilitate the aggregation of data for the purposes of reporting. The rationale is to ensure that data are accurately transcribed from the primary source document to the secondary source.

Typically, a small sample of records will be selected for the cross-check since it would be impractical to compare all records for all patients. The number of records should be a manageable quantity (say 10–20) since the goal is to determine if problems exist and not to quantify precisely the extent of the problem for which a larger sample would probably be needed.[3] (See Box 3.1).

After sampling the records, those from the two data sources should be compared according to a set of predetermined criteria. The aim is to calculate the percentage of the sample that has: 1) a matching record in the secondary data source; and 2) matching information for priority data fields. The number of matching data fields, and the data elements to compare, are decided by the supervision team (or health-facility staff) prior to conducting the cross-check. A standard should ideally be established by the HMIS or health programme management.

[3] Lot Quality Assurance Sampling (LQAS) can be used to draw statistically valid conclusions as to the completeness and quality of a group of records in a facility. See MEASURE Evaluation publication *Measuring the Quality of HIV/AIDS Client-Level Data Using Lot Quality Assurance Sampling (LQAS)*: https://www.measureevaluation.org/resources/publications/ms-19-176

The resulting statistic is the number of matching records over the number of records compared (i.e. sampled), which is a percentage. Values of 90% or better can be considered acceptable data quality.

Recommended data elements are as follows:

a. HMIS:
   - Unique ID, visit date, client name, age, diagnosis (any type), treatment given.

b. Maternal health:
   - Unique ID, visit date, visit number, mother's name, age, estimated delivery date.

c. Immunization:
   - Unique ID, registration date, child's name, sex, birthdate (age), name and address of parent (caretaker), vaccination dates for different antigens (e.g. BCG, DTP1, OPV1, DPT3, MR1, MR2, etc.).

d. HIV/AIDS:
   - Patient status (e.g. alive on ART, died, stopped ART [with clinician's knowledge], transferred to another ART clinic, lost to follow-up).
   - Secondary outcomes for patients alive on ART include: 1) ART regimen, 2) drug adherence, 3) ART side-effects, and 4) current tuberculosis status.

e. Tuberculosis:
   - Date of registration, site of disease, type of patient, sputum smear microscopy result.

f. Malaria:
   - Visit date, type and result of diagnosis; date and type of treatment.

To ensure an adequate number of clients for comparisons of facility-based data sources and client-held data sources, the cross-check should be scheduled on a day when clients will be coming to the facility to receive services. Clients should be selected as randomly as possible.

BOX 3.1. DRAWING A SYSTEMATIC RANDOM SAMPLE OF PATIENT RECORDS

Many cross-checks are conducted on a sample of files or records. As far as possible, files and records should be sampled as randomly as possible to ensure generalizability of the results to the files and records not selected.

To sample files and records optimally for a cross-check, select a *systematic random sample.* To draw a systematic random sample of records, first calculate a sampling interval (i.e. the total number of available records divided by the desired sample size). For instance, if there are 1000 records, and you want to randomly select 20, divide 1000 by 20 to obtain 50.

Within the first 50 ordered records, randomly select one record (e.g. by using a random number table). For instance, if you selected record number 31, this is your first record.

Add the sampling interval to the number of the first record selected (e.g. 31 + 50 = 81. Thus, record number 81 becomes your second record. Then add the sampling interval to 81 to find the third facility and continue in this manner until you have selected 20 records.

Facility records can provide an idea of client volume for a particular service and day of the week. Knowing the approximate number of patients to expect and the desired sample size enables a systematic random sample of clients to be selected (e.g. by selecting every third client to walk in the door). If the client does not happen to have the client-held card on that visit, go to the next client. Then compare the information in the client card to that in the facility-based data source according to the predetermined criteria.

C. **Comparison of the service delivery volume between the service delivery information system** (HMIS or health programmes) **and the commodities-tracking information system for indicators that utilize commodities**, such as drugs or test kits (e.g. the logistics management information system). This comparison requires the following inputs:
   - number of doses in stock at the site at the beginning of the reporting period (initial in stock) (A);
   - number of doses received by the site during the reporting period (B);
   - number of doses in stock at the site at the end of the reporting period (closing in stock) (C);
   - number of doses given to pregnant women by the site during the reporting period (D).

A verification ratio is calculated by dividing the value of service delivery reported through the HMIS or programme reporting system by the value derived from the stock management system. For example,

$$\frac{\text{number of children vaccinated with measles-containing vaccine (MCV)}}{\text{number of MCV doses used}}$$

where the "number of MCV doses used" is derived by adding the number of doses received by the site during the reporting period (B) to the number of doses initially in stock (A) and subtracting the number of doses in stock at the site at the end of the reporting period (C). Commodities tracking information can be obtained from stock system bin cards for the different commodities, and from programme-specific daily activity logs.

The resulting statistic is a ratio for which values greater than 1.0 indicate possible over-counting of service delivery, while values less than 1.0 indicate possible under-counting. Caution should be used in the interpretation of results since, for certain commodities, there is an expected level of wastage (e.g. vaccination) and thus service delivery and commodities consumption may not correspond one-to-one.

For each programme area, 2–3 cross-checks are recommended. While each cross-check need not be completed on each visit, some cross-checks should be attempted. Other cross-checks can be substituted or added as needed, depending on programme or data-specific concerns.

Figure 3.5. Cross-checks with alternative data sources on supervisor checklists

III. External comparison/cross-checks (with other data sources)		
A: OPD register: laboratory register		
Randomly select 10 patients who have been treated in the period at the facility from the OPD register		
1. Number of cases sampled from the OPD register		
2. How many of the patients selected had a corresponding entry with matching information among the patients in the laboratory register?		
Laboratory register reliability rate:		–
B: OPD register: pharmacy dispensing log		
Randomly select 10 cases who have been treated in the period at the facility from the OPD register		
1. Number of cases sampled from the OPD register		
2. How many of the patients selected had a corresponding entry with matching information among the patients in the pharmacy dispensing log?		
Pharmacy dispensing log reliability rate:		–
C: ANC register: vaccine stock management log		
Number of units (e.g. doses of medication/vaccine, other commodities) in stock at the site at the beginning of the reporting period (initial in stock)	a.	
Number of units received by the site during the reporting period	b.	
Number of units in stock at the site at the end of the reporting period (closing in stock)	c.	
Number of units used (e.g. given to patients) by the site during the reporting period	d.	
Verification ratio: (d/[a+b-c]):		–
Reasons for discrepancy (enter code at right):		
a) no discrepancy, b) arithmetical errors, c) transcription errors, d) drugs stock management forms not up to date, e) some documents are missing, f) stock-out of treatment drugs,		
g) other (specify)		

Results of the cross-checks are typically percentages or ratios. The results should be recorded and archived so that comparisons can be made over time to understand the trends in data quality.

System assessment

A programme-specific checklist of best practices for producing good quality data is included to remind data managers what to check periodically to ensure data quality. The checklist prompts the supervisor (or data manager) to note "yes" or "no" as to whether the specific practice is in evidence at the facility. The list of practices is programme-specific, so it is not sufficient to complete the checklist for just one programme area. Each programme area should be assessed with the system assessment. The responses should be recorded and archived for comparison over time.

Figure 3.6. Qualitative list of best practices to ensure data quality on supervisor checklists

I. System assessment – respond "Yes" or "No" to the following questions:		
IV.1	Is there a designated person who enters data and compiles reports?	
IV.2	Is there a designated person who reviews the quality of compiled data prior to submission to the next level?	
IV.3	Does the health facility have written guidelines on data collection and reporting for HMIS?	
IV.4	Does the health facility have a reserve stock of blank registers or reporting forms?	
IV.5	Has this health facility experienced any stock-out of registers or reporting forms (since the last visit)?	
IV.6	Is a standardized OPD register (not improvised forms) being used to record information on patients seeking treatment?	
IV.7	Can a patient's diagnosis and treatment history be found easily in the facility records?	
IV.8	Are data archives properly maintained with historical patient-level (registers) and aggregate (monthly report) results?	
IV.9	Does the facility maintain accurate demographic information on the catchment area (i.e. a current record of the population and the number of births and deaths)?	
IV.10	Does the facility have established targets for monitoring progress towards goals and objectives for prevention and treatment?	
IV.11	Does the facility have an up-to-date display (e.g. a chart on the wall) of the number of cases diagnosed and treated per reporting period for the year?	
IV.12	Is a chart of disease incidence by month displayed at the facility?	

Annex 1: Recommended indicators

Core indicators

Recommended DQR indicators		
Programme area	**Indicator name**	**Full indicator**
Maternal health	Antenatal care 1st visit (ANC1) coverage	Number (%) of pregnant women who received antenatal care at least once during their pregnancy
Immunization	DTP3/Penta3 coverage	Number (%) of children < 1 year receiving three doses of DTP/Penta vaccine
HIV	Currently on ART	Number and % of people living with HIV who are currently receiving ART
TB	TB notification rate	Number of new and relapse cases of TB that are notified per 100 000 population
Malaria	Total confirmed malaria cases[1]	Confirmed malaria cases (microscopy or RDT) per 1000 persons per year

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP3 = diphtheria-tetanus-pertussis three-dose vaccine; Penta = pentavalent vaccine; RDT = rapid diagnostic test.

Additional indicators

Additional DQR indicators		
Programme area	**Indicator name**	**Full indicator**
General	Service utilization	Number of outpatient department visits per person per year
Maternal health	Antenatal care 4th visit (ANC4)	Number (%) of women aged 15–49 years with a live birth in a given time period who received antenatal care four times or more
	Institutional delivery coverage	Number (%) of deliveries which took place in a health facility
	Postpartum care coverage	Number (%) of mothers and babies who received postpartum care within two days of childbirth (regardless of place of delivery)
	Tetanus toxoid 1st dose coverage	Number (%) of pregnant women who received the 1st dose of tetanus-toxoid vaccine
Immunization	DTP1-3/Penta1–3 coverage	Number (%) of children < 1 year receiving 1st dose, 2nd dose and 3rd dose of DTP/Penta vaccines
	MCV1 coverage	Number (%) of infants who have received at least one dose of measles-containing vaccine (MCV) by age 1 year
	PCV 1-3[2] coverage	Number (%) of children < 1 year receiving 1st dose, 2nd dose and 3rd dose of pneumococcal vaccines

[1] If the number of confirmed malaria cases is not collected, total malaria cases can be substituted.
[2] If this vaccine is not used in the country, substitute it with another vaccine used in the national programme.

Additional indicators, continued

Recommended DQR indicators		
Programme area	**Indicator name**	**Full indicator**
HIV	People living with HIV who have been diagnosed	Number (%) of people living with HIV who have been diagnosed
	HIV care coverage	Number (%) of people living with HIV who are receiving HIV care (including ART)
	PMTCT ART coverage	Number (%) of HIV-positive pregnant women who received ART during pregnancy
	ART retention	Number (%) of people living with HIV and on ART who are retained on ART 12 months after initiation (and at 24, 36, 48 and 60 months)
	Viral suppression	Number (%) of people on ART who have suppressed viral load
TB	Notified cases of all forms of TB	Number of new and relapse cases of TB that are notified per 100 000 population – Assess if quarterly case notification report blocks 1 and 2[3] are correct as per standards and benchmarks (B1.4) for paper-based systems[4]
	TB treatment success rate	Number (%) of TB cases successfully treated (cured plus treatment completed) among TB cases notified to the national health authorities during a specified period – Assess if quarterly treatment outcome report block 1 is correct as per standards and benchmarks (B.14) for paper-based systems
	Second-line TB treatment success rate	Number (%) of TB cases successfully treated (cured plus treatment completed) among all confirmed RR-TB/MDR-TB cases started on second-line treatment during the period of assessment
TB-HIV	Proportion of registered new and relapse TB patients with documented HIV status	Number of new and relapse TB patients who had an HIV test result recorded in the TB register, expressed as a percentage of the number registered during the reporting period
	Proportion of HIV-positive new and relapse TB patients on ART during TB treatment	Number of HIV-positive new and relapse TB patients who received ART during TB treatment expressed as a percentage of those registered during the reporting period
Malaria	Malaria diagnostic testing rate	Number (%) of all suspected malaria cases that received a parasitological test [= Number tested / (number tested + number presumed)]
	Confirmed malaria cases receiving treatment	Number (%) of confirmed malaria cases treated that received first- line antimalarial treatment according to national policy at public- sector facilities
	Malaria cases (presumed and confirmed) receiving treatment	Number (%) of malaria cases (presumed and confirmed) that received first-line antimalarial treatment
	IPTp3	Number (%) of pregnant women attending antenatal clinics who received three or more doses of intermittent preventive treatment for malaria

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP = diphtheria-tetanus-pertussis; MCV = measles-containing vaccine; MDR-TB = multidrug-resistant tuberculosis; PCV = pneumococcal conjugate vaccine; PMTCT = Prevention of mother-to-child transmission; RR = rifampicin-resistant; TB = tuberculosis.

[3] Definitions and reporting framework for tuberculosis – 2013 revision. Geneva: World Health Organization; 2013 (WHO/HTM/TB/2013.2; https://apps.who.int/iris/bitstream/handle/10665/79199/9789241505345_eng.pdf?sequence=1, accessed 20 July 2020).

[4] Standards and benchmarks for tuberculosis surveillance and vital registration systems: checklist and user guide. Document WHO/HTM/TB/2014.02. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/112673/1/9789241506724_eng.pdf?ua=1, accessed 11 June 2015).

Annex 2: Calculation of data quality metrics from the health facility survey

Table A2.1. Data quality metrics from health facility survey

Data quality metric	Analysis description for facility level	Analysis description for district level
(a) Facility reporting completeness % of expected reports archived (for the three selected months) for the facilities in the survey sample DVD_124a=1 – Report *observed* for Month 1 for ANC DVD_125a=1 – Report *observed* for Month 2 for ANC DVD_126a=1 – Report *observed* for Month 3 for ANC	**Example for ANC** *Overall score for all facility-months:* $\frac{\sum_{i=1}^{n} DVD\_124a_i + DVD\_125a_i + DVD\_126a_i}{3n} X\ 100$ [1] *where n is the total number of facilities in the sample expected to report ANC (DVD_122=1 and DVD_123=1)* The same logic applies tofor measuring reporting completeness for other indicators. If a country information system collects all indicators in one reporting form, the reporting completeness will be same for all indicators. However, if indicator information is collected on different reporting forms, the reporting completeness will vary by indicator.	**N/A**
(b) Timeliness of reporting % of facility reports archived that were received on time (for the three selected months) for the facilities in the survey sample DVD_124b=1, DVD_125b=1, DVD_126b=1 – Reports *received* on time for Month 1, 2, 3, respectively, for ANC DVD_133 = Number of reports *submitted* on time *by* the district	**Example for ANC** $\frac{\sum_{i=1}^{n} DVD\_124b_i + DVD\_125b_i + DVD\_126b_i}{3n} X\ 100$ [2] *where n is the total number of facilities in sample expected to report ANC (DVD_122=1 and DVD_123=1)* The same logic applies tofor measuring timeliness of reporting for other programme indicators.	**Example for ANC** $\frac{\sum_{i=1}^{n} DVD\_133_i}{n * 12} X\ 1$ *where n is the total number of districts*
(c) Data element completeness % of expected monthly reports archived that contain information on the programme indicator of interest (for the three selected months) for the facilities in the survey sample DVD_124c=ANC service outputs reported for Month 1 DVD_125c=ANC service outputs reported for Month 2 DVD_126c=ANC service outputs reported for Month 3	**Example for ANC** [Count(DVD_124c≠missing + DVD125c≠missing + DVD126c≠missing) / 3n] × 100 where n is the total number of facilities in sample expected to report ANC (DVD_122=1 and DVD_123=1) The same logic applies to measuring data element completeness of reporting for other programme indicators.	

[1] Assuming that these variables have a value of 1 if the archived report is observed by the survey team and a value of 0 if it is not observed

[2] Assuming that: a) the variables in the denominator have a value of 1 if the archived report is observed by the survey team and a value of 0 if it is not observed; and the variables in the numerator have a value of 1 if the report was on time and a value of 0 if the report was not on time.

(d) Completeness of information on TB minimum set of variables • % of facilities that have missing information on any of the variables in the minimum variable set[3] for the selected quarter DV_406_07 = Number of cases missing data on any of the variables in the minimum variable set DV_405 = Total number of TB cases in the source document minus the transferred-in cases • % of cases that have missing information on a specific required data element for the selected quarter DV_406_01 = Number of cases with missing information for year or registration • % of cases that have missing information on at least one required data element for the selected quarter	Where n = the number of facilities expected to report TB (DV_400 =1 and DV_401 = 1) [Count(DV_406_07≠0)/ n] × 100 % of cases with missing data on a specific required data element (e.g. year of registration) $\frac{\sum_{i=1}^{n} DV\_406\_01_i}{\sum_{i=1}^{n} DV\_405_i} X\ 100$ **Note:** The same logic applies tofor measuring data element completeness of reporting for other required data elements (sex, age, disease classification, history of TB, bacteriological result). % of cases with missing information on at least one required data element: $\frac{\sum_{i=1}^{n} DV\_406\_07_i}{\sum_{i=1}^{n} DV\_405_i} X\ 100$	
(e) Data verification % of agreement between data in sampled facility records and national records for the same facilities DV_103_01_B, DV_103_02_B, DV_103_03_B = Recount of ANC in the source document for months **1**, 2, 3, respectively DV_104_01_B, DV_104_02_B, DV_104_03_B = Reported ANC in monthly report for months 1, 2, 3, respectively DVD_127_a, DVD_127_b, DVD_127_c = Sum of reported ANC visits to district office for Month 1, 2, 3, respectively DVD_128_a, DVD_128_b, DVD_128_c = ANC visits reported from district office to higher level	**Example for ANC** $\frac{\sum_{i=1}^{n} DV\_103\_01\_B_i + DV\_103\_02\_B_i + DV\_103\_03\_B_i}{\sum_{i=1}^{n} DV\_104\_01\_B_i + DV\_104\_02\_B_i + DV\_104\_03\_B_i} X\ 100$[4] *where n is the total number of facilities in the sample with all required source documents and all required reports (DV_103_01_A = 1 and DV_103_02_A = 1 and DV_103_03_A = 1 and DV_104_01_A = 1 and DV_104_02_A = 1 and DV_104_03_A = 1)*	**Example for ANC** ((DVD_127_a + DVD_127_b + DVD_127_c) / (DVD_128_a + DVD_128_b + DVD_128_c))

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP3 = diphtheria-tetanus-pertussis three-dose vaccine; Penta = pentavalent vaccine; RDT = rapid diagnostic test.

[3] Variables = 1. Age or age group; 2. sex; 3. year of registration; 4. bacteriological results; 5. history of previous treatment; 6. anatomical site of disease.
[4] Assuming that these variables have a value of 1 if the archived report is observed by the survey team and a value of 0 if it is not observed

Annex 3: Calculation of system assessment metrics from the health facility survey

Table A3.1. Calculation of data management system domain scores[1,2]

Domain and tracer items	Analysis description for facility level	Analysis description for district level
Availability of trained staff		
Availability of designated staff for data entry/ compilation: DV_600=1 – facility DVD_103=1 – district Availability of designated staff for reviewing data quality prior to submission: DV_601=1 – facility DVD_104=1 – district Receipt of training for staff on data entry/ compilation: DV_602=1 – facility DVD_105=1 – district Receipt of training for staff on data review and control: DV_603=1 – facility DVD_106=1 – district	Domain score per **facility** for trained staff = mean score of items as a percentage *Overall score for all facilities:* $\frac{\sum_{i=1}^{n} DV\_600_i + \_601_i + \_602_i + \_603_i}{4n} X\ 100$ *where n is the total number of facilities in the sample that report health data (DV_599 = 1)*	Domain score per district for trained staff = mean score of items as percentage *Overall score for all districts:* $\frac{\sum_{i=1}^{n} DVD\_103_i + \_104_i + \_105_i + \_106_i}{4n} X\ 100$ *where n is the total number of districts in the sample* If multiple district offices are visited, this calculation will need to be done for each district office and the question numbers will need to be adjusted accordingly
Availability of guidelines		
Availability of guidelines at facility level: DV_604=1 Availability of guidelines for data entry/ compilation at district level: DVD_107 Availability of guidelines for data review and control at district level: DVD_108=1 Availability of guidelines on RHIS information display and feedback at district level: DVD_109=1	Domain score per **facility** for availability of guidelines = score as percentage *Overall score for all facilities:* $\frac{\sum_{i=1}^{n} DV\_604_i}{n} X\ 100$ *where n is the total number of facilities in the sample that report health data (DV_599 = 1)*	Domain score per **district** for trained staff = mean score of items as percentage Overall score for all facilities: $\frac{\sum_{i=1}^{n} DVD\_107_i + DVD\_108_i + DVD\_109_i}{3n} X\ 100$ where n is the total number of districts in the sample If multiple district offices are visited, this calculation will need to be done for each district office and the question numbers will need to be adjusted accordingly

[1] Domain scores should be calculated for each stratum (type of facility, managing authority +/- geographical region).
[2] Calculations assume that the variables have a score of 1 if Yes observed, and 0 otherwise.

Stock-outs		
No stock-out of tally sheets, registers and reporting forms in the last 6 months: DV_605=2 – facility DVD_111=2 – district	$\frac{\sum_{i=1}^{n} DV\_605_i}{n} X\ 100$ *where n is the total number of facilities in the sample that report health data (DV_599 = 1)* To calculate the score for this domain, the values of DV_605 are replaced so that DV_605 = 1 if there has been no stock-out and DV_605 = 0 if there has been a stock-out	$\frac{\sum_{i=1}^{n} DVD\_111_i}{n} X\ 100$ *where n is the total number of districts in the sample which supply health facilities with tally sheets, registers and forms (DVD_110 = 1)* To calculate the score for this domain, the values of DVD_111 are replaced so that DVD_111 = 1 if there has been no stock-out and DVD_111 = 0 if there has been a stock-out If multiple district offices are visited, this calculation will need to be done for each district office and the question numbers will need to be adjusted accordingly
Supervision and feedback		
Any supervisory visit in last 3 months: DV_606≠6 Written feedback received on data quality: DV_607=1 – facility Written feedback provided on data quality DVD_113=1 – district Written feedback provided on service performance DVD_114=1 – district	$\frac{\sum_{i=1}^{n} DV\_606_i + DV\_607_i}{2n} X\ 100$ *where n is the total number of facilities in the sample that report health data (DV_599 = 1)*	$\frac{\sum_{i=1}^{n} DVD\_113_i + DVD\_114_i}{2n} X\ 100$ *where n is the total number of districts in the sample* To calculate the score for this domain, the values of DVD_113 and DVD_114 are replaced to give them a value of 1 if the relevant type of written feedback was observed and a value of 0 if it was not observed. If multiple district offices are visited, this calculation will need to be done for each district office and the question numbers will need to be adjusted accordingly
Analysis and use of data		
Having any visuals (paper or electronic) available in facility: DV_608=1 Having data visualizations in addition to immunization: DV_609 = 1 if (DV_609_03=1 & (DV_609_01=1 or DV_609_02=1 or DV_609_04=1 or DV609_05=1)) Use of data for performance review: DV_610=1 Use of data for planning: DV_611=1 Having any visuals (paper or electronic) available in facility: DVD_115=1 Production of report/bulletin based on RHIS data: DVD_116=1 Documented example of follow-up action: DVD_117 Use of data for performance review: DVD_118=1 Use of data for planning: DVD_119=1	Domain score per **facility** for data use = mean score of items as percentage $\frac{\sum_{i=1}^{n} DV\_608_i + DV\_609_i + DV\_610_i + DV\_611_i}{4n} X\ 100$ *where n is the total number of facilities in the sample that report health data (DV_599 = 1)* To calculate the score for this domain, the values of *DV_608, DV_609, DV_110 and DV_111* are replaced to give them a value of 1 if the relevant evidence of data analysis and is observed and a value of 0 if it was not observed.	Domain score per district for data use = mean score of items as percentage $\frac{\sum_{i=1}^{n} DVD\_115_i + \_116_i + \_117_i + \_118_i + \_119_i}{5n} X\ 100$ *where n is the total number of districts in the sample* If multiple district offices are visited, this calculation will need to be done for each district office and the question numbers will need to be adjusted accordingly

Other items of interest		
System for tracking timeliness of reporting DVD_102=1		$\frac{\sum_{i=1}^{n} \text{DVD\_102}_i}{n} \text{ X } 100$ *where n is the total number of districts in the sample* If multiple district offices are visited, this calculation will need to be done for each district office
Summary scores		
% with all tracer items	Count if (DV_600=1 and _601=1 and _602=1 and _603=1 and _604=1 and _605=1 and _606=1 and _607=1 and _608=1 and _609=1 and _610=1 and _611=1)*100/n where n is the total number of facilities in sample that report health data (DV_599 = 1) DV_609 = 1 if (DV_609_03=1 & (DV_609_01=1 or DV_609_02=1 or DV_609_04=1 or DV609_05=1))	Count if (DVD_102=1 and _103=1 and _104=1 and _105=1 and _106=1 and _107=1 and _108=1 and _109=1 and _110=1 and _111=1 and _112=1 and _113=1 and _114=1 and _115=1 and _116=1 and _117=1 and _118=1 and _119=1)*100/n where n is the total number of districts in sample
Mean of tracer items	Average (DV_600, _601, _602, _603, _604, _605, _606, _607, _608, _609, _610, _611)*100 where the value of each tracer = 1 if present and observed, and = 0 if not	Average (DVD_102, _103, _104, _105, _106, _107, _108, _109, _110, _111, _112, _113, _114, _115, _116, _117, _118, _119)*100 where the value of each tracer = 1 if present and observed, and = 0 if not.
Overall score	$\frac{\sum_{i=1}^{n} DV\_599_i}{n} X$ mean of tracer items	

Annex 4: Recommended source documents and cross-checks/spot-checks for data verification

Table A4.1 below shows key data sources for core and additional indicators as well as notes on what can be done for cross-checks and spots-checks for these indicators. It is recommended that cross-checks and spot-checks be conducted during in-depth data quality reviews or during routine supervision activities.

Table A4.1 Cross-checks and spot-checks for verification of data

Programme	Indicator	Data source	Cross-checks and spot-checks
General service statistics	• Service utilization	• OPD register	
Maternal health	• ANC 1st visit • ANC 4th visit • Institutional deliveries • PNC1 • TT1	• Labour and delivery facility register • ANC register • PNC register	• ANC/PNC registers can be cross-checked with the patient cards if those are kept at the health facility. • Speak with patients at the facility at the time of data verification and ask about the services they received. Check against the relevant register to see whether the services and treatments given have been captured correctly.
Immunization	• DTP1–3 /Penta 1–3 • MCV1 • PCV 1–3[1]	• Tally sheets	• Immunization registers can be cross-checked with the number of doses of vaccine used (keeping in mind that some vaccines come in batches of 10-dose vials and one batch may be used for fewer than 10 children). • Records of vaccination on a sample of child vaccination cards can be verified against the immunization register for children in the health facility
HIV[2]	• Currently on ART • HIV coverage • PMTCT ART coverage • ART retention • Viral suppression	• Programme records (ART register, ART patient cards) • Facility-based ART registers • Health-facility data aggregated from patient monitoring system	• ART registers can be cross-checked against pharmacy records. • Patient files can be cross-checked against the information in the patient database (if a database exists at the facility). • Spot-checks: patients at the facility at the time of verification can be asked about the services they received. Confidentiality should be paramount; if the confidentiality of the patient cannot be guaranteed, the spot-check should not be conducted.

[1] If this vaccine is not used in the country, substitute it with another vaccine used in the national programme.
[2] Sampling of health facilities requires stratification by facility type in order to ensure an adequate number of facilities providing HIV/AIDS services.

Programme	Indicator	Data source	Cross-checks and spot-checks
TB[3]	• Notified cases of **all** forms of TB • TB treatment success rate • Second-line TB treatment success • Proportion of registered new and relapse TB patients with documented HIV status • Proportion of HIV-positive new and relapse TB patients on ART	• TB unit registers	Cross-check: TB cases detected (from laboratory registers) checked against TB cases notified (initial defaulters) • The TB unit register can be cross-checked against the TB treatment cards. • The TB unit register can be cross-checked against the laboratory register to verify that those diagnosed are actually reported (if diagnosis is being conducted at the facility). • The TB unit register can be cross-checked against the pharmacy records.
Malaria	• Total confirmed malaria cases • Malaria diagnostic testing rate • Confirmed malaria cases receiving treatment • Malaria cases (presumed and confirmed) receiving treatment • IPTp3	• Facility register • Facility laboratory register	• The facility register can be cross-checked against the laboratory register (for microscopy and RDT) for suspected cases receiving a parasitological test. • The facility register can be cross-checked against the pharmacy records for treatments given. • The ANC register can be cross-checked against patient cards for IPT if the patient cards are kept at the health facility. • The HMIS report can be cross-checked against the malaria programme report if data are reported through these separate reports.

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP = diphtheria-tetanus-pertussis; IPTp = intermittent preventive treatment in pregnancy; MCV = measles-containing vaccine; OPD = Outpatient visit; TB = tuberculosis; PCV = pneumococcal conjugate vaccine; PMTCT = Prevention of mother-to-child transmission; PNC = postnatal care; RDT = rapid diagnostic test; TT = tetanus toxoid vaccine.

[3] Sampling of health facilities requires stratification by facility type to ensure an adequate number of facilities providing TB services.

Annex 5: Sampling methods and concerns

Sample size calculation

The sample size will depend on the desired precision of the key estimates of interest in the health facility survey (including data accuracy) and the acceptable margin of error. Other considerations include the availability of resources and the desired level of application of the estimates (Note: provincial-level estimates require a greater sample size than estimates for the national level). The DQR coordinating group will need to work with a survey statistician and the health-facility survey organizers to determine the appropriate sample size for the health-facility survey on the basis of the country's priorities with regard to the level of application of the estimates, available resources and the precision desired for the estimates.

Provided below is brief guidance on key considerations necessary to calculate sample sizes for either a stand-alone data verification exercise or for conducting a data verification with another health-facility survey. The aim is to determine the sample size that can achieve statistical power or precision of estimation, which means deciding on the minimum number of facilities necessary to obtain a statistically significant result or a confidence interval with a fine enough width to judge the level of agreement.

Most of the estimates described in this guidance involve "agreement" between recounts from source documents and those found in monthly reports. Here agreement is a product of: 1) a marginal prevalence (i.e. the chance of finding both the source document and monthly report); and 2) the expected proportion of agreement in the counts for the key service outputs being verified (e.g. Penta3, ANC1, confirmed malaria cases, etc.) from the source document and monthly reports. Hence, it is imperative to ensure a minimum sample size to support a robust measure of agreement (in this instant termed "kappa") beyond what is expected by chance alone. Kappa (ranging from 0 to 1) is a measure of the chance-corrected agreement calculated from the overall percentage agreement and the expected agreement by chance.[1] Table A5.1 provides a selection of sample sizes calculated relative to three scenarios of the marginal prevalence and the **permissible** range of the necessary two levels of percentage agreement (minimum acceptable agreement [$\mathbf{P_0}$] versus the expected agreement by the study [$\mathbf{P_A}$]), and their corresponding adjusted kappa values.

[1] Hong H, Choi Y, Hahn S, Park SK, Park B-J. Nomogram for sample size calculation on a straightforward basis for the kappa statistic. Ann Epidemiol. 2014;24:673–80.

In scenario A, the DQR coordinating group may not have enough knowledge of the situation regarding the availability of both source documents and monthly report documents. Thus it is appropriate to consider the marginal prevalence value of 0.3 (i.e. a 30% chance of finding both documents) . Similarly, the team requires an indication of the minimum acceptable agreement level between the two document counts, which advisably needs to be at least 70%. Hence, with 70% minimum agreement (i.e. $\mathbf{P_0}$ = 0.70) and a conservative better-than-expected agreement level of 80% (i.e. $\mathbf{P_A}$ = 0.80), the minimum national sample size of n = 144 facilities is needed to provide 80% power and 95% C.I. for all key estimates based on the sample as necessary. In addition, the sample provides inter-observer reliability (given recounts using source documents versus counts reported in monthly reports) and a fair measure of agreement (kappa is between 0.29 and 0.52) that is beyond chance alone.

In scenario B, the DQR coordinating group may have a fair knowledge of the chances of finding both source documents and monthly report documents. In this case, it is appropriate to consider the marginal prevalence value of 0.5 (i.e. a 50% chance of both documents being available). Then the team needs to discuss and choose the minimum acceptable agreement level between the two counts presented in the documents – e.g. 80% (i.e. $\mathbf{P_0}$ = 0.80) and a better-than-expected agreement level of 90% (i.e. $\mathbf{P_A}$ = 0.90). With those considerations, a minimum national sample size of n = 126 facilities that also provides inter-observer reliability and a substantial measure of agreement (kappa is between 0.60 and 0.80) is needed that is beyond chance alone. If the DQR coordinating group lacks the knowledge to assert the minimum acceptable agreement level, then the lowest advisable value to consider is 70% (i.e. $\mathbf{P_0}$ = 0.70), as indicated in Table A5.1, with a conservative better-than-expected agreement level of 80% (i.e. $\mathbf{P_A}$ = 0.8) and thus a minimum national sample size of n = 165 facilities that also guarantees a moderate kappa estimate between 0.4 and 0.6.

In scenario C, the DQR coordinating group may have substantial knowledge of the possibility of finding both source docuemnts and monthly report documents. If so, it is appropriate to consider the marginal prevalence value of 0.80. Equivalently, if the DQR coordinating group anticipates a high degree of agreement between counts in source and monthly documents, the minimum acceptable agreement level can be 80% (i.e. $\mathbf{P_0}$ = 0.80) and a better-than-expected agreement level could be 90% (i.e. $\mathbf{P_A}$ = 0.90). With those considerations, a minimum national sample size of n = 100 facilities is sufficient (with a close-to-moderate estimate of kappa between 0.38 and 0.53).

Finally, taking a closer look at Table A5.1, two extra points are worth mentioning:

- The sample size increases when the difference between the minimum acceptable level of agreement and that expected from the study is smaller (e.g. when the marginal prevalence is 50% [or 0.5] choosing $\mathbf{P_0}$ = 0.80 and $\mathbf{P_A}$ = 0.85, the difference is 5% and requires a sample size of n = 502, compared to when $\mathbf{P_A}$ = 0.90, the difference is 10% and requires a sample size of n = 126).
- The sample size calculation can also be applied in settings where a subnational-level representation of the DQR sample is necessary. For instance, in a country where considerable interregional variability may exist in the expected availability of source documents and monthly reports, the DQR coordinating group can choose a conservative marginal prevalence of 30%, a minimum acceptable level of agreement of 75% ($\mathbf{P_0}$ = 0.75) to a wider expected agreement level ($\mathbf{P_A}$ = 0.95) and in this case a minimum sample size of n =37 facilities per region is suitable.
- For all scenarios, the following sample size formula was used to generate sample size estimates:

The sample size formula is $N=\frac{\lambda}{(P_A-P_0)^2\left\{\frac{P_0}{(P_0+2\pi-1)(P_0-2\pi+1)}+\frac{1}{1-P_0}\right\}}$,

where:

- λ can take values of the following table according to α and β:

α	power=1-β	λ
0.05	0.8	7.849
0.05	0.9	10.507

- π is the marginal prevalence.

The Kappa formula is: $K_0=\frac{1-P_0}{2\pi(1-\pi)}$ and $K_A=\frac{1-P_A}{2\pi(1-\pi)}$

- If the facility DV/SA is implemented in conjunction with another health-facility survey such as a SARA and a separate sample size calculation has been calculated for each survey, evaluate both sample sizes and apply the larger sample size to both survey modules.

Table A5.1. Selective sample size calculations with a range of marginal prevalence values, percentage agreement and corresponding kappa values

Scenario	Marginal prevalence	Percentage agreement		Kappa*	Location	N**
		P_0	P_A	Under the minimum agreement P_0	Under the expected agreement P_A	
A	0.3	0.90	0.95	0.76	0.88	276
	0.3	0.85	0.95	0.64	0.88	96
	0.3	0.80	0.90	0.52	0.76	118
	0.3	0.80	0.85	0.52	0.64	471
	0.3	0.75	0.95	0.40	0.88	33
	0.3	0.75	0.85	0.40	0.64	134
	0.3	0.75	0.80	0.40	0.52	535
	0.3	0.70	0.80	0.29	0.52	144
B	0.5	0.90	0.95	0.80	0.90	283
	0.5	0.80	0.90	0.60	0.80	126
	0.5	0.80	0.85	0.60	0.70	502
	0.5	0.75	0.95	0.50	0.90	37
	0.5	0.75	0.85	0.50	0.70	147
	0.5	0.75	0.80	0.50	0.60	589
	0.5	0.70	0.80	0.40	0.60	165
C	0.8	0.90	0.95	0.69	0.84	262
	0.8	0.85	0.90	0.53	0.69	348
	0.8	0.80	0.90	0.38	0.69	100
	0.8	0.80	0.85	0.38	0.53	400
	0.8	0.75	0.80	0.22	0.38	408
	0.8	0.75	0.85	0.22	0.53	102
	0.8	0.75	0.95	0.22	0.84	25

* Kappa statistic: 0.21–0.40: fair; 0.41–0.60: moderate; 0.61–0.80: substantial.
** Sample size calculated for positive kappa value (type 1 error = 5%; power = 80%).

Sample selection

Facility

Once the sampling frame has been established, probability sampling principles are used to draw a selection of facilities for inclusion in the assessment. Usually, a multistage or stratified sampling plan is followed to ensure representation across various domains of the eligible facilities. In stratified random sampling, the sampling frame (or the population) is partitioned into strata (or subpopulations), which are then independently sampled (usually a simple or systematic random sample within each stratum). The results from the different strata are then combined to form estimates for the entire population.

There are a number of reasons why it is better to use a stratified sample rather than a simple random sample of all facilities. First, a stratified sample guarantees that a prescribed number of facilities from each stratum (or subpopulation) will be assessed, whereas taking a simple random sample of all facilities might result in under-representation of certain types of facilities. Also, the number of hospitals in a country is generally small compared with the number of primary care facilities, and thus a simple random sample of all facilities in a country is likely to include only a very small number of hospitals or might miss them altogether. By stratifying the sample by facility type, the number of hospitals and primary care facilities can be controlled to ensure that sufficient hospitals are included in the sample. Second, more precise estimates can be obtained in cases where facilities within each stratum are relatively homogeneous and the variation between strata is relatively large. The recommended sampling methodology for SARA is to select all tertiary-level facilities or hospitals in a country plus a simple random sample of the lower-level facilities stratified by a combination of region, facility type, managing authority and urban-rural distribution. If the facility DV/SA is implemented in conjunction with a SARA survey, the sample sampling methodology can be applied. If disproportionate allocation is used, sample weights need to be applied when analysing the data in order to calibrate for national representation.

It is often desirable to have separate estimates by region, facility type or other groupings of facilities called domains. Domains are the analytical groupings, whether geographical or categorical, for which separate estimates are wanted when analysing the results (e.g. primary care facilities versus hospitals; urban areas versus rural areas; public-sector facilities versus private-sector facilities; different regions). Domains and strata are often synonymous, but this is not always the case, as the former is determined by analytical considerations while the latter serves to improve sampling efficiency. The greater the number of domains, the larger the sample size is required to obtain good estimates.

In general, the sample size for domains when equal reliability is wanted for each necessitates multiplying the calculated sample size needed for a domain by the number of categories in the domain. Thus, if equally reliable estimates were wanted for, say, five regions, the sample size would be about five times the value calculated using the equation above. The survey budget would probably preclude such a large sample, so certain compromises would have to be made. One such compromise is to relax the confidence interval criterion for the domain estimates. Another possibility is to select the most important domains for the stricter reliability and allow the others to be measured with whatever reliability a proportionately allocated sample would yield.

The sample size calculation presented above assumes that all facilities visited will offer all services being assessed. However, some services such as HIV and TB are offered only at designated facilities. If a complete master facility list (MFL) is available which includes information about the distribution of facilities by services offered, facilities offering HIV and TB should be oversampled in order to ensure they are adequately represented in the sample. However, if information is not available on which services are offered at each facility, it will not

be possible to purposely oversample facilities. In this case, assess the level of coverage and non-response once the survey is complete. If either is at or above 1.3, it is recommended to present an un-weighted analysis.

District

Ideally, all districts in a country would be included in the district DV/SA assessment. However, if resources do not permit a census of district offices, an alternative is to select district offices based on the facilities sampled in the facility DV/SA. In this approach, district offices would only be included in the district DV/SA if a health facility within that district was selected for the facility DV/SA (i.e. a team would be already travelling to that district). With this approach it is important to note that the comparison will be restricted to districts that have been implicitly selected by the facility sample.

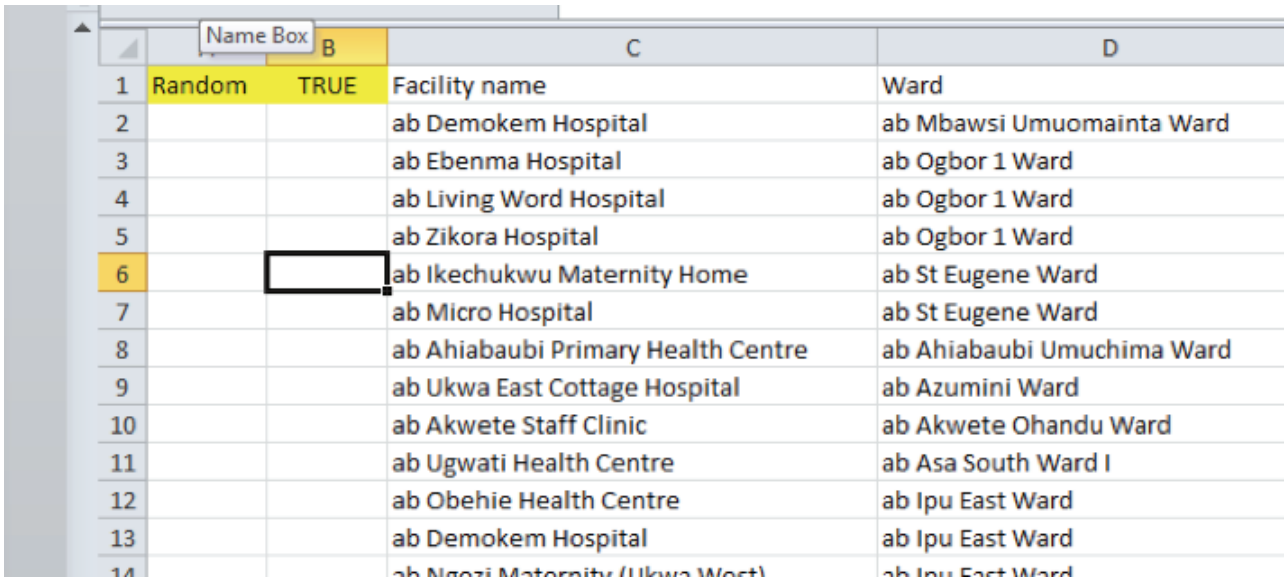
Probability sampling using MS-Excel

Once the sampling fractions for each stratum have been determined, the facilities from each stratum should be selected using a probability sampling method. An example of how to do sample selection is shown in MS-Excel; however, a user can use any software package of choice for the selection. The list frame should be partitioned according to the chosen stratification and also within each stratum (e.g. a list of hospitals in Region 1). The facilities to be included in the sample should be selected by simple random sampling or systematic sampling. Replacement facilities for those facilities that are closed or otherwise cannot be accessed can be selected using the same method. Alternatively, to facilitate logistics, the closest facility of the same type in the same geographical area can be selected.

First, select the facilities to be included in the sample from the MFL. The MFL should be divided according to the categories selected to determine the sample. If the MFL is in a Microsoft Excel workbook, copy and paste each stratum of facilities into a new worksheet within the workbook.

On each sheet add a column called Random. Type "Random" into the first cell. In the column to the right of the column called Random, type the word "TRUE" in the first cell, as illustrated by the yellow fields in Figure A5.1.

Figure A5.1. Sampling facilities in MS-Excel



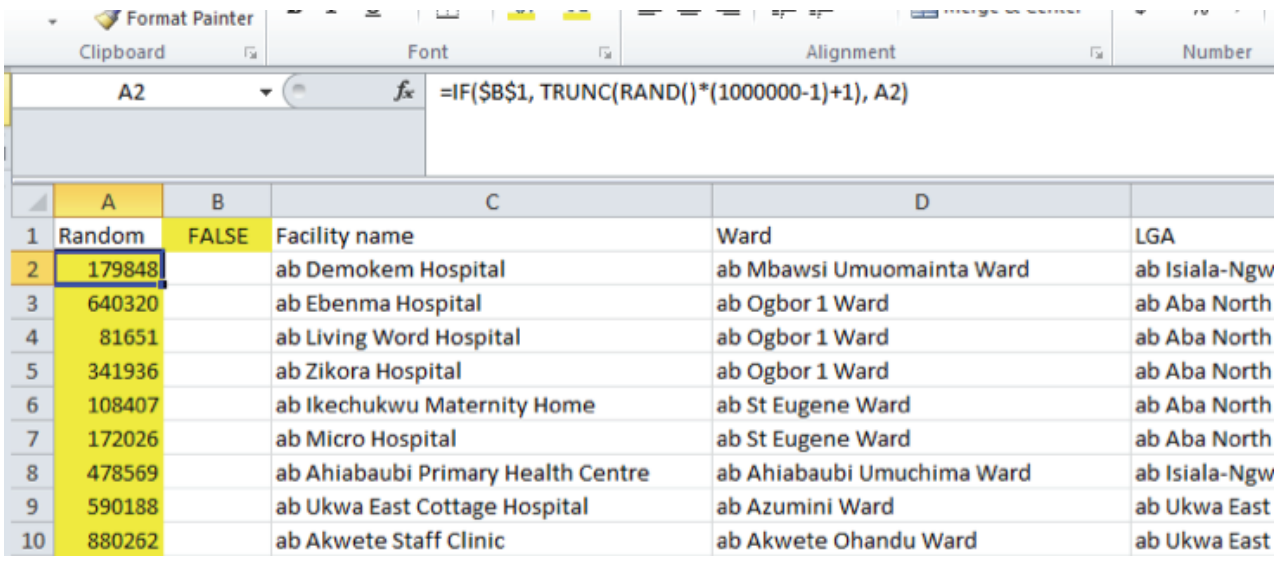
	B	C	D
1	Random TRUE	Facility name	Ward
2		ab Demokem Hospital	ab Mbawsi Umuomainta Ward
3		ab Ebenma Hospital	ab Ogbor 1 Ward
4		ab Living Word Hospital	ab Ogbor 1 Ward
5		ab Zikora Hospital	ab Ogbor 1 Ward
6		ab Ikechukwu Maternity Home	ab St Eugene Ward
7		ab Micro Hospital	ab St Eugene Ward
8		ab Ahiabaubi Primary Health Centre	ab Ahiabaubi Umuchima Ward
9		ab Ukwa East Cottage Hospital	ab Azumini Ward
10		ab Akwete Staff Clinic	ab Akwete Ohandu Ward
11		ab Ugwati Health Centre	ab Asa South Ward I
12		ab Obehie Health Centre	ab Ipu East Ward
13		ab Demokem Hospital	ab Ipu East Ward

Use the following formula to assign a random unique number to each facility.

=IF(B1, TRUNC(RAND()*(1000000-1)+1), A2)

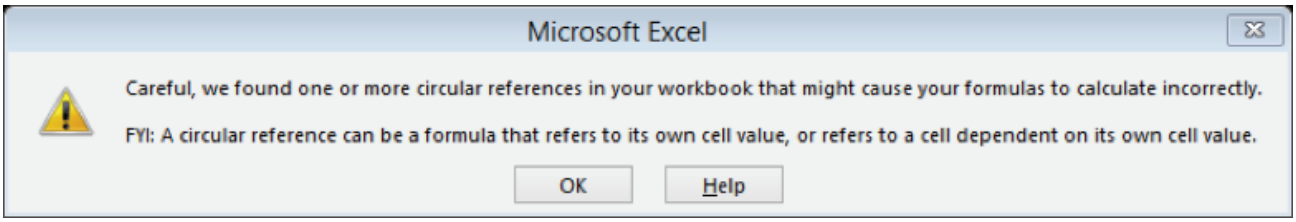
Copy and paste the formula into the first cell of the column called Random. Place the cursor at the lower right corner of the cell with the formula and pull it downwards. If the columns named "Random" and "TRUE" are not in the first two columns (A and B), change A to the letter of the "Random" column and B to the letter of the "TRUE" column in the formula. A random number will be assigned to each of the facilities. Then change the word TRUE to FALSE (Figure A5.2). This will freeze the random numbers so that they do not regenerate new random numbers.

Figure A5.2. Assigning random numbers to facilities



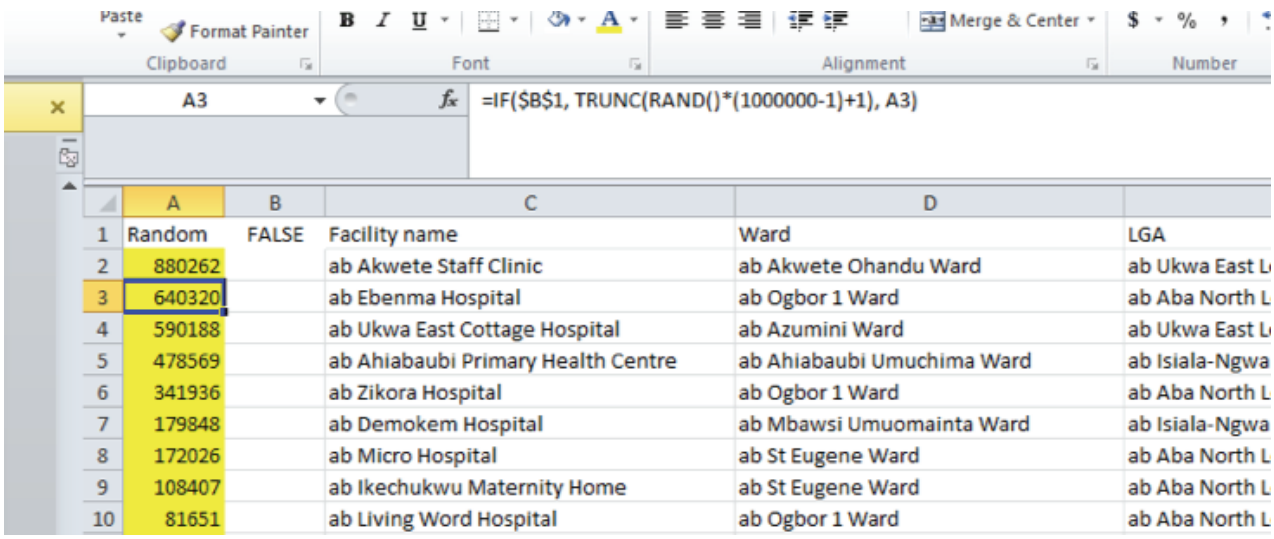
	A	B	C	D	
1	Random	FALSE	Facility name	Ward	LGA
2	179848		ab Demokem Hospital	ab Mbawsi Umuomainta Ward	ab Isiala-Ngw
3	640320		ab Ebenma Hospital	ab Ogbor 1 Ward	ab Aba North
4	81651		ab Living Word Hospital	ab Ogbor 1 Ward	ab Aba North
5	341936		ab Zikora Hospital	ab Ogbor 1 Ward	ab Aba North
6	108407		ab Ikechukwu Maternity Home	ab St Eugene Ward	ab Aba North
7	172026		ab Micro Hospital	ab St Eugene Ward	ab Aba North
8	478569		ab Ahiabaubi Primary Health Centre	ab Ahiabaubi Umuchima Ward	ab Isiala-Ngw
9	590188		ab Ukwa East Cottage Hospital	ab Azumini Ward	ab Ukwa East
10	880262		ab Akwete Staff Clinic	ab Akwete Ohandu Ward	ab Ukwa East

A warning box may appear similar to the following:



Click on OK. Then filter the data so that the column Random is in descending order, from the largest to the smallest (Figure A5.3).

Figure A5.3. Organizing the facilities in MS-Excel



	A	B	C	D	
1	Random	FALSE	Facility name	Ward	LGA
2	880262		ab Akwete Staff Clinic	ab Akwete Ohandu Ward	ab Ukwa East L
3	640320		ab Ebenma Hospital	ab Ogbor 1 Ward	ab Aba North L
4	590188		ab Ukwa East Cottage Hospital	ab Azumini Ward	ab Ukwa East L
5	478569		ab Ahiabaubi Primary Health Centre	ab Ahiabaubi Umuchima Ward	ab Isiala-Ngwa
6	341936		ab Zikora Hospital	ab Ogbor 1 Ward	ab Aba North L
7	179848		ab Demokem Hospital	ab Mbawsi Umuomainta Ward	ab Isiala-Ngwa
8	172026		ab Micro Hospital	ab St Eugene Ward	ab Aba North L
9	108407		ab Ikechukwu Maternity Home	ab St Eugene Ward	ab Aba North L
10	81651		ab Living Word Hospital	ab Ogbor 1 Ward	ab Aba North L

Determine how many facilities in the stratum should be selected on the basis of your sample size calculation. Highlight starting from the first facility in the list through the total number of facilities needed for the sample in that stratum. These facilities will be included in the survey sample. Repeat for each of the strata identified above. Then select the next 10 facilities in each worksheet as replacement facilities.

Weighting of data verification estimates

Data verification estimates based on the sample of health facilities must be weighted to adjust for discrepancies between the sample and the sample frame in the distribution of the number of health interventions of interest (e.g. births attended by skilled health personnel). If the sample is stratified, the stratum-specific estimates of data accuracy should be weighted. In general, the weights for each stratum for a given indicator are computed as the number of events in the stratum in the population divided by the number of events in the stratum in the sample. Since

the number of events measured for the sample and in the population (i.e. in the HMIS) will be different for each indicator reviewed, the weighting of the estimates will need to be conducted separately for each indicator.

This is a form of post-stratification weighting. Consider, for example, a setting where not all facilities in the sample provide immunization services and, among those who do provide the service not all are currently reporting or have provided a monthly report to the HMIS. In this situation, two corrections are necessary – namely for non-coverage and for non-response – which affect the overall national estimate of each indicator of interest.

Table A5.2a details a hypothetical example of Country A, where the total number of facilities is N = 900 distributed among four strata (facility types). In each stratum a sample of about 35% was drawn for national representation. **Column C** displays a varying count of facilities providing the vaccination services across strata and, among those, **Column D** gives the count of facilities for which both source documents and reports are available in Month X. **Column F** summarizes the sampling weight for each facility by stratum type, and **Column G** and **Column H** are the necessary correction factors for non-coverage and non-response, respectively, by stratum. For example, for the stratum "General Hospitals" the correction factor adjustment for non-coverage = 1.12 (i.e. 65/48) and for non-response = 1.208 (i.e. 58/48). It is important to note that, in the cases of both non-coverage and non-response, the information missing or unmeasurable is assumed to be randomly missing and non-informative missing.

In some settings, it might be more representative to a**djust national estimates by service outputs** (i.e. where outputs are typically higher in some stratum types than in others (e.g. hospitals versus health centres). **This is a form of analytical weighting.**

NOTE: The DQR coordinating group may encounter a situation during the data verification exercise where, for certain metrics or indicators, the service in question is available only in a subset of facilities within the sample (e.g. tuberculosis services). In this situation, the expected service coverage falls below 80%. Thus the **Column F** adjustment factor in Table 5.2a will be greater than 1.20. Another situation might be that fewer than expected facilities providing a certain service have responded to the HMIS reporting in Month X, causing the response rate from facilities to fall below 80% (i.e. the **Column G** adjustment factor in Table 5.2a will be greater than 1.20). If either or both of these situations occur, the DQR team is advised:

- to use the crude verification factor, as calculated by the actual numbers recounted and reported (i.e. do not use the weights);
- and, if required, to further adjust the crude verification by the analytical weighting, using the nationally reported service outputs to the HMIS.

Depending on the type of sampling used to select facilities for the survey component of the DQR, district values may or may not have sampling weights. Currently, the most common

method for conducting the facility survey component of the DQR is to do so with another health facility assessment, such as the SARA. The SARA most commonly uses a stratified sampling method for selecting health facilities where the primary sampling unit is the facility and not the district. Consequently, the district estimates presented are unweighted.

If a two-stage cluster sampling method is employed to select health facilities, the cluster-specific (usually district) verification factor is weighted on the volume of service in the cluster. An adjustment factor is applied to each cluster – i.e. the ratio of the district value found in the district office and the value for the district found at national level. A weighted average of the adjusted cluster-specific verification factor is then calculated to obtain the national-level estimate of accuracy on the basis of the sample.

Supplementary Word and Excel documents are available to facilitate calculation of facility DV/SA survey weights using the example in Table A5.2a.[2]

Regardless of the sampling approach used for the district DV/SA (census or sample of district offices), the district DV/SA results are unweighted.

Table A5.2a. Tabular summary of a representative sample survey of facilities (n = 310)

Marginal prevalence	Facilities in the country (A)	Facilities in the survey sample (B)	Facilities in the sample providing immunization services (C)	Facilities in the sample providing immunization services and responding to the HMIS (both source and monthly report are available in Month X) (D)	Probability of sampling each facility by facility type (E = n/N or B/A)	Sampling weight of each facility by facility type (F = 1/E)	Non-coverage weight of each facility by facility type (G = B/C)	Non-response weight of each facility by facility type (H = C/D)	Total weight I = (G*H*I)
General hospitals	185	65	58	48	0.351	2.846	1.121	1.208	3.854
Reference health centres	175	65	56	52	0.371	2.692	1.161	1.077	3.365
Health centres	400	130	120	100	0.325	3.077	1.083	1.200	4.000
Health posts	140	50	50	45	0.357	2.800	1.000	1.111	3.111
Total	900	310	284	245					

[2] To download, see under the data analysis section at: https://www.who.int/healthinfo/tools_data_analysis/dqr_data_verification/en/ (accessed 4 November 2020).

Annex 6: Checklists

District supervisor checklist – HMIS

Data Quality Review (DQR) — District Supervisor Checklist						WHO - 2018
Routine Supervision Data Quality Checklist – HMIS						
District:		**Health facility name:**				
Date of visit:		**Reporting period verified:**				
Supervisor :		**Staff interviewed:**				
Does the facility provide maternal health services (Y/N)?						
Does the facility report maternal health services to a reporting system (Y/N)?						
I. Completeness						**Comments**
A. Completeness of maternal health monthly report: Select the most recently completed and submitted maternal health monthly facility report – or the HMIS monthly report for integrated reporting systems. Calculate the number of cells expected to be complete on the monthly report (exclude cells for services not offered by the facility). (If the report has integrated reporting, count only cells in the maternal health section of the report.) Count the number of cells that are complete (blank, not zero) and calculate the percentage completeness for the monthly report.			**Expected cells**	**Completed cells**	**Percentage complete**	
B. Data element completeness: If data are missing, ask to see the ANC register. Count the number of pregnant women in the quarter (month 1 to month 3) with missing information for each of the following columns in the unit ANC register.		**C. Source document completeness:** Review the following data sources and determine if they are available, up-to-date (values up to the current day/period) and standard (the form prepared and distributed by the programme). (Y/N)				
Data element (column)	**Number of cases (rows) with missing data**	**Source:**	**Available**	**Up-to-date**	**Standard**	
1. Unique ID		1. Client encounter form				
2. Visit date		2. OPD register				
3. Client name		3. Monthly report				
4. Age		4. Laboratory register				
5. Diagnosis (any type)		5. Pharmacy dispensing log				
6. Treatment given		6. Vaccine stock management log				
7. Number of entries missing data in at least 1 of the 6 columns listed above		7. ANC register				
II. Data accuracy						
Recount the value of indicators from the ANC register and compare the value to the one reported by the facility for the selected months						**Comments**
	Indicator	**Month 1**	**Month 2**	**Month 3**	**3-month total**	

A.	**ANC 1st visit**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					
B.	**ANC 4th visit**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					
C.	**Tetanus toxoid 1st dose**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					

Reasons for discrepancy: a) no discrepancy, b) arithmetical errors, c) transcription errors, d) some documents were missing when the report was prepared, e) some documents are now missing, f) other (specify)			
III. Cross-checks			
A: OPD register: laboratory register			
Randomly select 10 patients who have been treated in the period at the facility from the OPD register			
1. Number of cases sampled from the OPD register			
2. How many of the patients selected had a corresponding entry with matching information among the patients in the laboratory register?			
Laboratory register reliability rate:	–		
B: OPD register: pharmacy dispensing log			
Randomly select 10 cases who have been treated in the period at the facility from the OPD register			
1. Number of cases sampled from the OPD register			
2. How many of the patients selected had a corresponding entry with matching information among the patients in the pharmacy dispensing log?			
Pharmacy dispensing log reliability rate:	–		
C: ANC register: vaccine stock management log			
Number of units (e.g. doses of medication/vaccine, other commodities) in stock at the site at the beginning of the reporting period (initial in stock)	a.		
Number of units received by the site during the reporting period	b.		
Number of units in stock at the site at the end of the reporting period (closing in stock)	c.		
Number of units used (e.g. given to patients) by the site during the reporting period	d.		
Verification ratio (d/[a+b-c]):	–		

Reasons for discrepancy (enter code at right):						
a) no discrepancy, b) arithmetical errors, c) transcription errors, d) drugs stock management forms not up to date, e) some documents are missing, f) stock-out of treatment drugs,						
g) other (specify)						
I. Consistency checks					**Indicator**	
IV.a Annual consistency (select a different indicator each month and record the indicator name at right)						
1) What is the current month value?						
2) What was the value of the indicator for the current month one year ago?						
Consistency ratio: Divide the value of the current month by the value from the same month last year. If the value is more than 10% different (i.e. < 0.8 or > 1.2), this could indicate a data quality problem.						
IV.b Month-to-month consistency:						
Enter values for the selected indicator for the current month, and for the three preceding months. Calculate consistency: Current month/average of months 1–3. If the value is more than 10% different (i.e. < 0.8 or > 1.2), this could indicate a data quality problem	**Month 1**	**Month 2**	**Month 3**	**Current month**	**Consistency** (Current month/ ((m1+m2+m3)/3))	
Reasons for discrepancy in month-to-month trend (enter code at right): a) no discrepancy, b) a change in service delivery intensity, c) seasonal change, d) a data quality problem,						
e) other (specify)						
Does the trend in the indicator conform to expectations? (Y/N)						
IV. System assessment: Respond "Yes" or "No" to the following questions					**Y/N**	**Comments**
IV.1	Is there a designated person who enters data and compiles reports?					
IV.2	Is there a designated person who reviews the quality of compiled data prior to submission to the next level?					
IV.3	Does the health facility have written guidelines on data collection and reporting for HMIS?					
IV.4	Does the health facility have a reserve stock of blank registers or reporting forms?					
IV.5	Has this health facility experienced any stock-out of registers or reporting forms (since the last visit)?					
IV.6	Is a standardized OPD register (not improvised forms) being used to record information on patients seeking treatment?					
IV.7	Can a patient's diagnosis and treatment history be found easily in the facility records?					
IV.8	Are data archives properly maintained with historical patient level (registers) and aggregate (monthly report) results?					
IV.9	Does the facility maintain accurate demographic information on the catchment area (i.e. a current record of the population and the number of births and deaths)?					
IV.10	Does the facility have established targets to monitor progress towards goals and objectives for prevention and treatment?					
IV.11	Does the facility have an up-to-date display (e.g. a chart on the wall) of the number of cases diagnosed and treated per reporting period for the year?					
IV.12	Is a chart of disease incidence by month displayed at the facility?					

Facility data manager checklist – HMIS

Data Quality Review (DQR) — District Supervisor Checklist						WHO - 2018
Routine Supervision Data Quality Checklist – HMIS						
District:		**Health facility name:**				
Date of visit:		**Reporting period verified:**				
Does the facility provide maternal health services (Y/N)?						
Does the facility report maternal health services to a reporting system (Y/N)?						
V. Completeness						**Comments**
A. Completeness of maternal health monthly report: Select the most recently completed and submitted maternal health monthly facility report – or the HMIS monthly report for integrated reporting systems. Calculate the number of cells expected to be complete on the monthly report (exclude cells for services not offered by the facility). (If the report has integrated reporting, count only cells in the maternal health section of the report.) Count the number of cells that are complete (blank, not zero) and calculate the percentage completeness for the monthly report.			**Expected cells**	**Completed cells**	**Percentage complete**	
B. Data element completeness: If data are missing, ask to see the ANC register. Count the number of pregnant women in the quarter (month 1 to month 3) with missing information for each of the following columns in the unit ANC register.		**C. Source document completeness:** Review the following data sources and determine if they are available, up-to-date (values up to the current day/period) and standard (the form prepared and distributed by the programme). (Y/N)				
Data element (column)	**Number of cases (rows) with missing data**	**Source:**	**Available**	**Up-to-date**	**Standard**	
1. Unique ID		1. Client encounter form				
2. Visit date		2. OPD register				
3. Client name		3. Monthly report				
4. Age		4. Laboratory register				
5. Diagnosis (any type)		5. Pharmacy dispensing log				
6. Treatment given		6. Vaccine stock management log				
7. Number of entries missing data in at least 1 of the 6 columns listed above		7. ANC register				
IVI. Data accuracy						
Recount value of indicators from the source document and compare the value to the one reported for the selected months (VF = recounted/reported)						**Comments**

	Indicator	**Month 1**	**Month 2**	**Month 3**	**3-month total**	
A.	**ANC 1st visit**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					

B.	**ANC 4th visit**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					
C.	**Tetanus toxoid 1st dose**					
	ANC register count					
	Maternal health or HMIS monthly report value					
	Monthly report verification factor (VF)					
	DHIS 2 verification factor (VF)					
	Reasons for discrepancy (use code below)					
	Other reason (specify)					

Reasons for discrepancy: a) no discrepancy, b) arithmetical errors, c) transcription errors, d) some documents were missing when the report was prepared, e) some documents are now missing, f) other (specify)			
III. Cross-checks			
A: OPD register: laboratory register			
Randomly select 10 patients who have been treated in the period at the facility from the OPD register			
1. Number of cases sampled from the OPD register			
2. How many of the patients selected had a corresponding entry with matching information among the patients in the laboratory register?			
Laboratory register reliability rate:	–		
B: OPD register: pharmacy dispensing log			
Randomly select 10 cases who have been treated in the period at the facility from the OPD register			
1. Number of cases sampled from the OPD register			
2. How many of the patients selected had a corresponding entry with matching information among the patients in the pharmacy dispensing log?			
Pharmacy dispensing log reliability rate:	–		
C: ANC register: vaccine stock management log			
Number of units (e.g. doses of medication/vaccine, other commodities) in stock at the site at the beginning of the reporting period (initial in stock)	a.		
Number of units received by the site during the reporting period	b.		
Number of units in stock at the site at the end of the reporting period (closing in stock)	c.		
Number of units used (e.g. given to patients) by the site during the reporting period	d.		
Verification ratio (d/[a+b-c]):	–		
Reasons for discrepancy (enter code at right):			
a) no discrepancy, b) arithmetical errors, c) transcription errors, d) drugs stock management forms not up to date, e) some documents are missing, f) stock-out of treatment drugs,			
g) other (specify)			

IV. System assessment: Respond "Yes" or "No" to the following questions		**Y/N**	**Comments**
IV.1	Is there a designated person who enters data and compiles reports?		
IV.2	Is there a designated person who reviews the quality of compiled data prior to submission to the next level?		
IV.3	Does the health facility have written guidelines on data collection and reporting for HMIS?		
IV.4	Does the health facility have a reserve stock of blank registers or reporting forms?		
IV.5	Has this health facility experienced any stock-out of registers or reporting forms (since the last visit)?		
IV.6	Is a standardized OPD register (not improvised forms) being used to record information on patients seeking treatment?		
IV.7	Can a patient's diagnosis and treatment history be found easily in the facility records?		
IV.8	Are data archives properly maintained with historical patient level (registers) and aggregate (monthly report) results?		
IV.9	Does the facility maintain accurate demographic information on the catchment area (i.e. a current record of the population and the number of births and deaths)?		
IV.10	Does the facility have established targets to monitor progress towards goals and objectives for prevention and treatment?		
IV.11	Does the facility have an up-to-date display (e.g. a chart on the wall) of the number of cases diagnosed and treated per reporting period for the year?		
IV.12	Is a chart of disease incidence by month displayed at the facility?		

Annex 7: Using the checklists

District supervisor checklist

The district supervisor checklists are intended to be used during regular supervisory visits to health facilities conducted by the district-level HMIS and health programme management staff. The checklists can be used together or separately to track data quality. Results of the data quality checks should be recorded and reviewed over time to determine trends in data quality. The Excel version of the checklists can be used to store and aggregate results over time for the same health facility (to monitor trends) or to compare across facilities within the same district.

Completeness and timeliness

The evaluation of data completeness on the district supervisor checklist has three components:

- Monthly report completeness: comparison of expected completed cells versus actual completed cells.
- Data element completeness: six different priority data elements are evaluated by counting missing values on the register for a selected reporting period. The percentage completed is calculated for each data element as well as for the register as a whole.
- Source document completeness: other allied source documents are evaluated qualitatively to determine if the sources are available, up-to-date, and standard issue. The percentage of source documents for each measure is calculated for the programme area.

Internal consistency of reported data

Consistency over time: Indicators for consistency checks should be chosen by the District Health Management Team for all facilities for a given round of supervisory visits. The recommended priority indicators for consistency checks in the district checklist are as follows:

1. Cross-cutting assessment
   - OPD visits;
   - institutional deliveries;
   - diphtheria-tetanus-pertussis containing vaccine – 3rd dose (DTP3/Penta3);
   - ANC 1st visit.
2. Other indicators that can be used for a cross-cutting or programme-specific assessment are:
   a) maternal Health: ANC 1st visit;
   b) immunization: diphtheria-tetanus-pertussis containing vaccine – 3rd dose (DTP3/Penta3);

c) HIV/AIDS: newly initiated on ART;
d) tuberculosis: TB cases notified;
e) malaria: confirmed malaria cases.

Data verification/reporting accuracy: The district supervisor checklist prompts for recounts of three separate indicators (as recommended by the DQR Framework documents). However, the indicators can be changed depending on the need. While it is a good idea to perform data quality checks on a variety of indicators over time, repeated checks on high-priority indicators will permit the evaluation of trends in data accuracy. Enter the recounted value and the reported value and calculate the verification factor. A verification factor of less than 0.9 or greater than 1.1 is indicative of a data quality problem. If possible, determine the causes of any discrepancies and note the causes on the checklist.

While conducting the recount, determine the procedure used by the facility to compile the indicator value at the end of the month. Is this the same procedure that is defined by the programme according to the indicator definition? If it is different, determine what effect that has had on the resulting totals.

Recommended indicators for accuracy checks by district supervisors are as follows:

1. Cross-cutting:
   - HMIS: outpatient visits, ANC1, ANC4, DTP1, DTP3, institutional deliveries, live births, postnatal consultations, family planning first-time users.
2. Other indicators that can be used for a cross-cutting or programme-specific assessment:
   - maternal health: ANC 1st visit, ANC 4th visit, tetanus toxoid (TT) 1st dose;
   - immunization: diphtheria-tetanus-pertussis containing vaccine – 3rd dose (DTP3/ Penta3), measles containing vaccine 1st dose (MCV1), pneumococcal conjugate vaccine 1st dose (PCV1);
   - HIV/AIDS: current on ART (Tx_curr), newly initiated on ART (Tx_new), ART patients tested for TB (TB/HIV);
   - tuberculosis: TB cases notified, TB cases successfully treated, TB patients (new and relapse) receiving HIV test;
   - malaria: confirmed malaria cases, confirmed malaria cases treated, suspected malaria cases tested.

External comparison/cross-checks (with other data sources)

The district checklist recommends 2–3 cross-checks per programme area, although others may also be possible.

1. Cross-cutting assessment:
   - cases diagnosed – from OPD register to laboratory register;
   - cases treated – from OPD register to pharmacy register;

- comparison of service delivery records to inventory control systems
  - number of cases treated for malaria from malaria (or OPD) register: number of doses of ACT used from inventory control system,
  - number of clients vaccinated for DTP from immunization register (or tally sheets): number of doses of vaccine used from inventory control system.

2. Other indicators that can be used for a cross-cutting or programme-specific assessment:
   - Maternal health
     - vaccine/prophylaxis given – from ANC register to drug stock management system, e.g.
       - tetanus toxoid vaccine,
       - sulfadoxine-pyrimethamine (SP) for intermittent preventive treatment in pregnancy (IPTp) for malaria prophylaxis,
       - mebendazole therapy to reduce the prevalence of anaemia by treating parasitic infections; vaccine/prophylaxis given – ANC register to client-held card (if applicable),
     - ANC register to client health card (e.g. mother's health passport) for pregnant women attending ANC on the day of the supervision visit for priority data elements (e.g. unique ID, visit date, mother's name, age, visit number, estimated delivery date etc.).
   - Immunization
     - vaccines given – vaccine stock management system: immunization register to vaccine stocks management systems, e.g.
       - diphtheria-tetanus-pertussis vaccine (DTP),
       - measles containing vaccine (MCV),
       - pneumococcal conjugate vaccine (PCV);
     - vaccines given – immunization register to client-held card: for children attending static post vaccination clinics on the day of the supervisory visit.
   - HIV/AIDS
     - ART register to ART patient cards (and patient cards to ART register): sample ART patient cards for patients initiating treatment in the past year. Verify the patient's status (alive on ART, died, stopped ART [with clinician's knowledge], transferred to another ART clinic, or lost to follow-up) and secondary outcomes for patients alive on ART, including: 1) ART regimen; 2) drug adherence; 3) ART side-effects; and 4) current tuberculosis status;
     - ART register to pharmacy dispensation register: sample a small number of ART patients from the ART register and compare the information on regimen ordered and date filled in the pharmacy dispensation register. Determine the level of congruence between the two data sources;
     - doses given: drug stock management system – compare the number of patients currently on ART from the ART register to the drug stock management system. Can also be conducted for other commodities such as co-trimoxazole (CTX), and/or isoniazid (INH).

- Tuberculosis
  - TB register to TB treatment cards: randomly select a small number of TB patient cards for patients who have initiated treatment in the facility and compare with the entries in the TB register. Data elements to verify include date of registration, site of disease, type of patient and sputum smear microscopy result.
  - TB register – TB laboratory register: randomly select a small number of TB patients from the TB laboratory register and compare with the entries in the TB register for the date, type and result of the TB test.
  - TB treatment drugs from the quarterly order form for TB drugs to the district TB register: determine the number of tablets given during a specified period from the TB drug quarterly order form (4FDC tablets [R150/H75/Z400/E275]) and compare with the number derived from the number of patients reported as treated by the site for the period.
    Multiply the number of new TB cases (sputum smear microscopy positive + sputum smear microscopy negative + extra-pulmonary + smear microscopy not done) registered by the site during the assessed quarter from the TB district register, including transfers in and excluding transfers out, by 168 tablets of 4FDC.
    Multiply the number of previously-treated TB cases (relapse, after failure, after default, and other previously treated registered by the site during the assessed quarter from the TB district register, including transfers in and excluding transfers out by 252 tablets of 4FDC).
    Adding both operations together, how many tablets of 4FDC were prescribed during the quarterly reporting period assessed?
- Malaria
  - Malaria case register – pharmacy dispensation register: randomly select a small number of entries for dispensation of ACT from pharmacy records and compare with the malaria case register to ensure a corresponding entry for the case and matching information for ACTs dispensed (e.g. date filled).
  - Malaria case register – laboratory register: randomly select a small number of positive malaria tests from the TB laboratory register and compare with the entries in the malaria case register for the date, type and result of the malaria test.
  - Malaria cases treated – ACT stock management system: compare the number of confirmed malaria cases treated from the malaria case register to the number derived from the ACT stock management system.

System assessment

The district supervisor checklist also includes a qualitative section of best practices which should be conducted in the facility to promote good data quality. Record the responses each time the facility is visited to enable comparisons over time.

Facility data manager checklist

The facility data manager checklist is intended for use in self-assessment by facility staff. If the facility has a dedicated staff person for data management, this person would be the appropriate staff member to conduct the data quality checks. Alternatively, the checklist should be applied by the staff member responsible for compiling and submitting the monthly report. The checklist should be implemented as often as is needed to achieve good-quality data, or at least once a month prior to compilation and submission of the monthly report. If the data are deemed to be of good enough quality by the district supervisory staff, the facility checklist can be applied less frequently – perhaps once every three months.

The facility data manager checklist follows a similar logic to that of the district supervisor checklist but is less detailed. However, the facility checklist contains an additional verification – a consistency check – which is not included in the district checklist.

Completeness and timeliness

Data completeness on the facility checklist is similar to that on the district checklist but does not include the assessment of completeness of the monthly report.

1. **Data element completeness:** For each data element in the list, review the source document for the period in question and count the number of entries for which the data element is missing (i.e. incomplete). For a register, start on the page representing the first day of the period (and the first entry for the period) and count down through the entries until the last day of the reporting period (and final entry), noting the number of missing elements for each element on the list. Divide by the total number of entries for the period to derive the percentage complete for each data element.
   Calculate the number of entries with complete information (for the priority fields) by counting all entries with at least one field that is missing data and then dividing by the total number of entries. Subtract this percentage from 100% to calculate the percentage complete for the register. The Excel tool will automatically provide the percentage complete for each data element and for the register by the relevant figures for missing or incomplete data elements.

2. **Source document completeness:** For each data source on the list, determine whether the source is:
   - Available — the data source is available if it is present at the facility on the day of the visit and the supervisor can locate it and review it.
   - Up-to-date — the data source is up-to-date if it has entries up until the present day.
   - Standard forms – the data source is standard if it is the tool designed and distributed by the HMIS or health programme. It is the source that is intended to be used for the purpose and is not improvised.

In the Excel tool, the percentage available, up-to-date and standard can be automatically calculated for the programme area across data sources by responding "Yes" or "No" to the prompts.

Internal consistency of reported data

Data accuracy on the facility checklist is assessed in the same manner as on the district checklist. However, only one indicator is verified. More indicators can be assessed, if required, by using separate copies of the checklist. The indicator selected for review should be indicative of data quality for all indicators in the programme area – i.e. neither the most difficult, nor the easiest to compile and report. To monitor accuracy over time, the same high-profile indicator should be selected often (but not necessarily always). Facility data managers should maintain records of data quality checks to show which indicators should be evaluated and when, and to track progress towards improving data quality.

Accuracy is measured by comparing a validated (i.e. recounted) value for the selected indicator and reporting period, with the value reported by the site for the identified reporting period. In the Excel workbook for the facility checklist, the resulting verification factor is calculated automatically.

Although indicators in the checklist are chosen by the staff conducting the quality check, the recommended priority indicators for the facility checklist are as follows:

1. Maternal health: ANC 1st visit;
2. Immunization: diphtheria-tetanus-pertussis containing vaccine – 3rd dose (DTP3/Penta3);
3. HIV/AIDS: current on ART (Tx_curr);
4. Tuberculosis: TB cases notified;
5. Malaria: confirmed malaria cases.

External comparison/cross-checks (with other data sources)

Cross-checks for the facility checklist are similar to those for the district checklist, but fewer. Although only one or two cross-checks are recommended in the checklist, more can be conducted by using additional copies of the checklist. Specific cross-checks for the facility checklist are as follows:

1. HMIS — vaccines / prophylaxis given – vaccines / drugs stock management system;
2. Maternal health — vaccines / prophylaxis given – vaccines / drugs stock management system;
3. Immunization — vaccines given – vaccine stock management system;

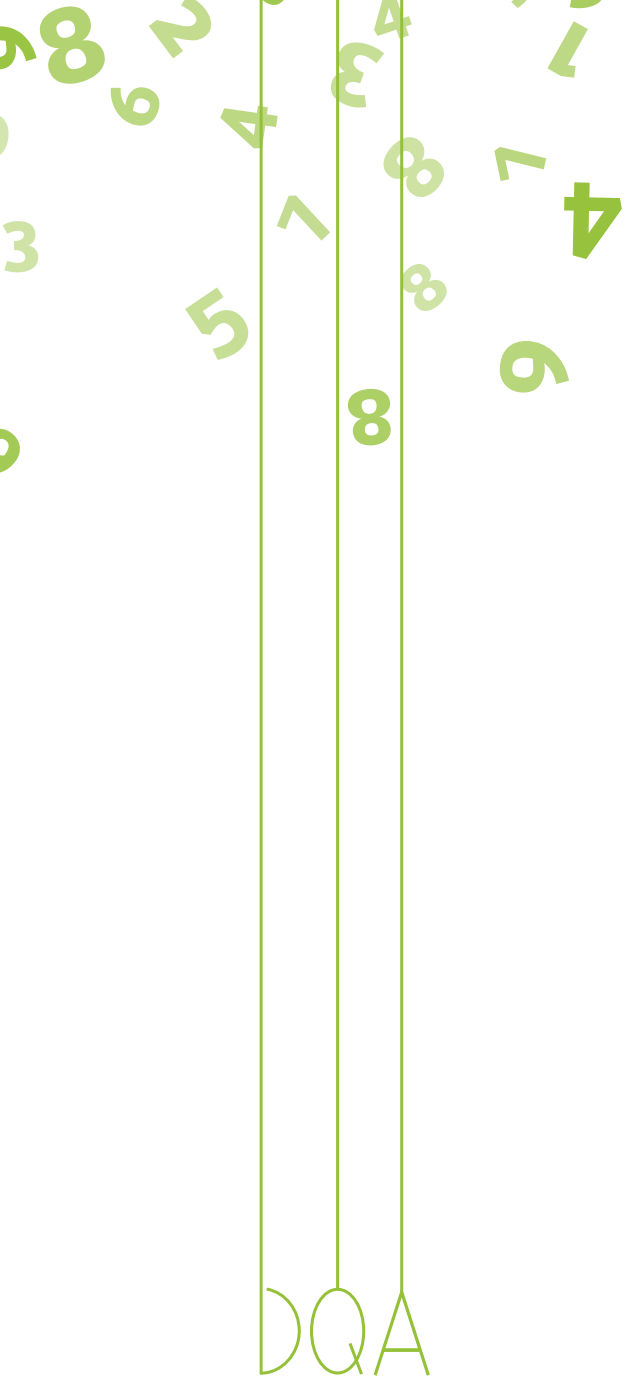
4. HIV/AIDS — 1) ART register – ART patient cards; 2) medication given – drugs stock management system;
5. Tuberculosis — 1) TB register – TB patient cards; 2) medication given – drugs stock management system;
6. Malaria — 1) malaria case register – laboratory register; 2) medication given – drugs stock management system.

System assessment

The system assessment on the facility checklist is less of an assessment and more a reminder to data management staff to conduct the various checks and updates to programme documentation. The data manager should review the list each month and put a tick mark next to the item once it has been accomplished.

Notes

Notes



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