DQA
DATA QUALITY ASSURANCE

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Module 2
Discrete desk review of data quality
IMPLEMENTATION GUIDE

World Health Organization

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Module 2
Discrete desk review of data quality

IMPLEMENTATION GUIDE

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Chapter 1. Overview and methods

Background

The (DQA) is a methodology for rapid evaluation of the quality and adequacy of health data used for planning. The DQA aims to institutionalize data quality assessment as a systematic and routine aspect of health-sector and programme planning and to provide a minimum standard of quality for routine health data. It is intended to be applied across programme areas to provide a holistic picture of country data quality from health facility-based information systems, and to identify areas in need of strengthening. The methodology and indicators for the DQA have been developed in consultation with international health programme experts from leading donor and technical assistance agencies such as the World Health Organization (WHO), Gavi, the Vaccine Alliance (GAVI) and The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) and constitutes consensus on a minimum standard for data quality.

The DQA examines data within four domains; 1) completeness and timeliness of data, 2) internal consistency of reported data, 3) external comparison with other data sources, and 4) consistency of population data used in the calculation of rates for monitoring programme coverage. Within these domains priority indicators are examined to find anomalous or extreme values, quantify missing or zero values, and evaluate reporting consistency over time. The output of the DQA is intended to highlight potential data quality problems and stimulate discussion about their causes. Implementation of the DQA should result in action plans to fill gaps, correct errors and strengthen health-sector planning data.

Implementation of the DQA can help build confidence in the data for both national and external stakeholders. Knowing the data and their limitations can improve decision-making during planning exercises and provides reassurance to donors and other key stakeholders that the evidence base for planning has undergone a known minimum level of scrutiny that adheres to international standards.

The DQA is a cross-cutting tool for all health-facility administrative data which can be supplemented by in-depth programme-specific assessment on a periodic basis. It is intended to harmonize with, or work alongside, existing programme-specific tools with similar aims. It should be implemented with an element of independence in order to promote transparency in the data and the health-sector planning process.

The DQA is a suite of tools and guidelines, including electronic tools to facilitate data collection and analysis. These guidelines provide instructions for collecting the data, preparing the data for analysis, conducting data verifications, analysing and interpreting the results, as well as guidance

on how and when to apply the methods. The electronic tools facilitate data analysis and presentation as well as the identification of problematic data points and subnational reporting units.

Objectives

The DQA is designed to assess the quality of data generated by information systems based in health facilities. The objectives of the DQA are:

▷ to institutionalize a system for assessing the quality of data, including routine monitoring of data, discrete Data Quality Assurances (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.

Methodology

The DQA is envisioned as a suite of regularly implemented tools coordinated to provide an evidence base for data quality in advance of health-sector planning. The suite of tools has a variety of components, each with recommended periodicity. The tools and methods include:

▷ Site assessment of data quality and system capabilities
  • Discrete site assessment at facilities and districts – data verification and system assessment (DV/SA) on a nationally representative sample of health facilities to provide information on the accuracy of reporting for priority indicators that are generalizable to all health facilities providing the service. Ideally conducted annually, the site assessment should be implemented as often as is feasible with country resources and should feature prominently in the health sector's five-year planning cycle.
  • Routine data quality assurance checklists – a system of routine and regular (i.e. monthly) reviews of data quality of the health management information system (HMIS) or other programme reporting systems as part of a feedback cycle that identifies and rectifies errors in near real-time. The routine reviews are conducted as a part of regularly scheduled supervisory visits to health facilities using a standard data quality checklist. This routine system of data quality checks has two components: monthly self-assessment of HMIS data conducted by health facility staff, and a periodic (ideally quarterly) assessment of health facility data by district-level staff during supervisory visits to the health facility.

> ⇨ Data quality desk review – an analysis of aggregate reported data in the HMIS to look for gaps, outliers and inconsistencies for priority indicators across health and disease programmes.
>   - Discrete assessment – An ad hoc desk review of data quality usually conducted at national level and scheduled to coincide with a discrete site assessment of data quality and system capabilities, an annual planning event, or used to investigate suspicious reporting patterns.
>   - Continuous desk review of data quality – routine (e.g. monthly) analysis of standard metrics to determine completeness and consistency of reported data from health facilities. This should ideally be conducted at the district level for facilities in the district so that errors are found and corrected as they are reported. The review can also be applied at the national level and for specific health and disease programmes.

The DQA framework documents describe the methodology (how it is conducted) and metrics (what is assessed) used in the DQA and provide guidance on the use of all these tools. This *Implementation guide* is specific to the discrete site assessment of data quality and system capabilities and addresses requirements for conducting a health facility assessment on a sample of health facilities. A sister document – the *DQA Implementation guide for discrete desk review* – is also available.

The DQA framework documents can be accessed here: URL

The *DQA Implementation guide for site assessment of data quality: data verification and system assessment* can be accessed here: URL

Discrete desk review

The DQA Desk Review assesses data quality through four domains:

1. Completeness and timeliness of reporting.

2. Internal consistency of reporting – an evaluation of trends, and the identification of gaps, inconsistencies and outliers.

3. External consistency – a comparison of routine data values to external data sources, such as population-based surveys.

4. Population estimates – a review of denominator data used to calculate coverage rates.

The Desk Review incorporates findings (e.g. accuracy of reporting) from the DV/SA, which is considered a measure of internal consistency. The findings of the DQA are used to develop a Data Quality Improvement Plan.

The Desk Review plays an essential part in assessing the data in countries' routine health information systems in order to understand its strengths and limitations in advance of use of the data for monitoring, evaluation and planning. While the site assessment examines data at the source, the Desk Review examines data that are already aggregated and reported up through the information system. Once errors become aggregated into the country-level data they become harder to find. The desk review methods are designed to uncover these errors so that they can be corrected and the data improved for its various uses. While the Desk Review can, and should, be conducted routinely, it is an important complement to the site assessment since it adds to a comprehensive snapshot of data quality at a particular point in time.

Automated tools have been developed to facilitate the Desk Review analysis. Countries utilizing the District Health Information System Version 2 (DHIS2) can obtain results for Desk Review metrics by installing an application (i.e. app) on the local instance of DHIS2. Alternatively, a Desk Review analysis tool has been developed in MS Excel to facilitate the analysis in countries that do not have DHIS2. Data managers need only to extract the relevant data from the HMIS or programme databases and paste those data into the Excel tool. These guidelines will cover both these approaches to the Desk Review.

Indicators

The DQA is designed to assess data quality for routine health information systems holistically. It uses tracer indicators from up to five programme areas to judge data quality for the whole system. Tracer indicators are those that are indicative of data quality for all indicators in the health programme. WHO recommends the indicators and programmes in Table 1.

Table 1. Core indicators

Programme area	Indicator	Definition
Maternal health	Antenatal care 1st visit (ANC1) coverage	Number and % of pregnant women who attended at least once during their pregnancy
Immunization	DTP3/Penta3 coverage	Number and % 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	Confirmed malaria cases*	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.
*If the number of confirmed malaria cases is not collected, total malaria cases can be substituted.

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While it is recommended that countries should assess the indicators from the core list, they may select other indicators or expand the set of indicators according to current needs and available resources. A full set of core and supplementary indicators is available in Annex 1 of the DQA framework document *Module 3 – Site assessment of data quality: data verification and system assessment*.[1]

Tracer indicators these should be indicators that are indicative of data quality for the entire health programme. As such, they should not be the most difficult to collect and compile, nor the easiest. The selection of priority indicators is also often determined by suspicions of data quality problems, or the level of investment made to collect and report the data. All these factors should be weighed when selecting the appropriate indicator for each programme area.

Cross-cutting versus in-depth

The DQA provides information on up to five programme areas to give an overall view of data quality for the health system. For the DQA to remain practical as a facility assessment, the information requirements need kept to a manageable minimum for each heath programme. Not all information on data quality can be collected for all health programmes. In reality, health programmes often need more detail on data quality for programme management and planning than can be obtained by the cross-cutting DQA. In such cases, the DQA can be adapted to focus periodically on the broader information needs of a particular health programme. Such application of the DQA is referred to as "in-depth DQA" and is anticipated by the DQA framework. An in-depth DQA would be likely to feature 4–5 indicators from a given health programme, such as vaccinations for priority antigens with data on commodities tracking for the immunization programme, or the testing and treatment cascade for HIV/AIDS. In-depth assessments can be included every few years for a given health programme, depending on in-country needs.

See the DQA toolkit *Module 3 – Site assessment of data quality: data verification and system assessment* for more information on in-depth application of the DQA, and the table "Additional indicators" in Annex 1 of this document for a list of suggested additional indicators by programme area.

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[1] Health statistics and information systems. Geneva: World Health Organization (website) (https://www.who.int/healthinfo/tools_data_analysis/en/, accessed 20 September 2020).

Chapter 2. Planning and coordination

Roles and responsibilities

The survey is usually undertaken under the overall leadership of the Ministry of Health. The following section briefly outlines the roles and responsibilities of the key parties involved in the implementation of the DQA and data quality activities.

Ministry of Health

The Ministry of Health will have overall responsibility for the coordination of this process. It will coordinate and provide support to obtain permission to conduct data collection activities, and will help with the coordination of analysis and results dissemination meetings by inviting all appropriate governmental departments and key nongovernmental and development partners. The Ministry of Health will also promote the use of these data for policy and planning.

Implementation agency

The implementation agency will be responsible for conducting field data collection for the DQA and the data verification component of the Data Quality Assurance. The implementation agency is often a unit within the Ministry of Health (e.g. Health Information Management Unit, Statistics Bureau, etc.) or a nongovernmental organization (NGO) with survey research experience.

Agency providing quality assurance and technical support

It is recommended that an independent party should be involved in the implementation process. This support can be provided by a separate national institute or independent consultant. He/she will be responsible for: providing support to the implementation team on planning and implementing DQA; providing a quality assurance role to ensure due processes are followed during training, data collection, cleaning and analyses (including validation visits in 5–10% of the facilities); and providing assistance and oversight to the implementing team on the production of the DQA and data quality assessment report.

DQA Coordinating Committee

Bringing country stakeholders together is a critical first step towards successful implementation of the DQA. One of the first activities is to identify and establish a group of core stakeholders at country level to oversee, coordinate and facilitate the planning and implementation of the DQA and the dissemination and use of the DQA findings.

The group should comprise technical focal points among health-sector stakeholders from government (including the different programme stakeholders), development partners and multinational organizations such as WHO, GAVI and the Global Fund. Monitoring and evaluation (M&E) technical working groups or health information system governance boards, which already exist in many countries, can serve as the DQA Coordinating Committee. Development and technical partners can greatly contribute to the success of efforts to improve data quality and should agree on a standardized set of data quality indicators.

The role of the DQA Coordinating Committee is:

> to develop a harmonized plan for data quality assessments;

> to identify technical support requirements for implementation and quality assurance;

> to identify funding sources;

> to oversee the selection of core indicators and the establishment of benchmarks;

> to monitor implementation of the DQA;

> to ensure promotion and dissemination of the findings.

Partners

The Measurement and Accountability for Results in Health (MA4H) 5-point call to action recommends that partner investments in health information be fully aligned with a single country platform for information and accountability. Thus, development partners will probably be stakeholders in the DQA implementation and results. It is important to ensure that in-country partners are included in the decision-making process for planning and implementing the DQA. Additionally, partners can be a valuable source of technical assistance and other resources for survey implementation.

Other elements

Indicator selection

Indicators should be selected with care. Each programme indicator should be indicative of data quality for the whole programme since we are judging data quality for the programme on the basis of the results of the selected tracer indicator. As such, the indicator selected should not be the most difficult to compile and report monthly, or the easiest. Suspicions of data quality problems, or the level of investment in terms of time and resources for certain indicators, will often ultimately determine the selection of priority indicators for the assessment. Ensure that

all stakeholders have had a chance to give their views on the selection of indicators and that consensus is reached before finalizing the selection.

Timeline

The DQA is ideally conducted in advance of health-sector planning so that the results are available prior to the planning event. From planning to results dissemination, the total time required to conduct the full DQA (site assessment and the Desk Review) could be as long as six months. For the Desk Review, depending on the electronic data management platform in use in the country, the time required is only a few weeks. However, if technical assistance is required, consultants should be identified and the contractual details worked out well in advance. Anticipate delays and have plans, staff and resources in place to address problems quickly as they arise and resolve them.

In general, a time frame of about 1.5–2 weeks (8–10 person-days) is required for the acquisition and preparation of the data, and a further 1–1.5 weeks for the analysis and reporting. In total, about 20 person-days are required for the desk review. The level of effort may be more or less, depending on the number of indicators selected for review and the source and organization of the data.

Budget

A detailed budget should be developed well in advance of survey implementation. Identify funding sources early in the planning process and determine which aspects of the desk review will be funded by which organization so that problems do not arise during implementation. Budgets should be developed jointly with partners through a transparent process. Ensure compliance with local policies regarding the payment of stipends and/or per diem for survey implementers. Work out ahead of time how expenses should be reconciled against the budget. Involve, and budget for, finance personnel so that adequate accounting procedures are in place and are adhered to. A sample budget template can be found in Annex 2.

Independence

If feasible, the desk review should be conducted by an independent entity such as a national institute or consultant to help ensure unbiased evaluation of data quality. The desk review requires compilation of aggregate routine service delivery data for the relevant indicators in a specified format. This requires obtaining data from the HMIS and/or health programmes for the selected indicators. The national institute or consultant tasked with the desk review should work with the Ministry of Health focal points to acquire and prepare the data for the selected indicators.

Select the tool

The desk review is supported by automated tools to facilitate the analysis. For countries using DHIS2 there is an app that can be downloaded from the DHIS2 app store (WHO Data Quality Tool). For countries that do not use DHIS2 there is an MS Excel version of the tool. The pre-programmed analyses and outputs are the same in each tool; the principal difference is that data must be input into the Excel version, whereas the DHIS2 version accesses data tables that are already populated within the DHIS2 data structure. Another limitation to the Excel tool is that the granularity of the analysis is limited to the level for which data are input into the tool. For instance, if aggregate district-level data are input into the tool it is not then possible to "drill down" to facility-level results. This limitation is also true of the DHIS2 version in that the analyses are limited to the level for which data are entered; however, if the facility-level detail is entered into DHIS2 those details are available for drill-down even if the district is selected as the level of analysis. This is not the case in the Excel version - if facility-level detail is required, these data need to be input into the tool.

Gather the data

As the main purpose of the DQA is to examine the quality of health-facility data being used for planning, the data that should be analysed are the input data that are generally used for planning efforts (e.g. health sector reviews). In many countries health-facility data on key programme areas come mainly from the HMIS. In other countries, due to weak HMIS, there are parallel reporting systems for specific health programmes (e.g. immunization, HIV/AIDS, TB, etc.). Even in countries with strong HMIS, certain programmes persist in maintaining separate systems. The principal criterion for the selection of a particular data source is whether the data are used for planning purposes – i.e. which data source is used to measure progress towards objectives? For example, if the immunization programme does not rely on the HMIS data and uses only data collected and reported within the programme, the data for immunization indicators included in the DQA should come from the immunization programme.

If the HMIS data are what is used generally for planning and the DHIS2 platform is in use, the data need not be gathered since data are already available within the DHIS2. However, there are often multiple sources of data for each data element or indicator and the appropriate choice of data source must be made in order to show the results of the different data quality metrics most accurately. A knowledgeable HMIS staff member at national level should be consulted on the most appropriate data sources (i.e. data tables) for the desk review analysis.

Data requirements

The desk review requires monthly values by district (or other level of analysis chosen) for the most recent complete year for tracer indicators selected for the review. Annual aggregate values for the last three years are also required for these same indicators for the level selected. Other

data needs include denominator data for calculating coverage rates for these indicators and survey results from the most recent population-based survey such as the Multiple Indicator Cluster Survey (MICS), Demographic Health Surveys (DHS) and immunization coverage surveys. Denominator data include total number of expected pregnancies, total number of expected deliveries, total number of surviving infants, and total population. Information on completeness and timeliness of reporting is also required, either from HMIS if reporting is integrated, or from specific health programmes if reporting is programme-specific (e.g. number of reports received by district as against the number of reports expected, the number of these reports submitted by the deadline of reporting, etc.).

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Chapter 3. Configuring the tools for use

Installing and configuring the Desk Review DHIS2 Tool

From the DHIS2 home page for the local instance of DHIS2, navigate to the app store and select the WHO Data Quality tool. Once the app has downloaded a yellow "up arrow" will appear next to the app in the app manager. Click to "install" the app on the local instance. Once installed, the app should be available in the apps section of DHIS2 (Figure 1).

Figure 1. WHO Data Quality tool (DQA) app available in the apps repository of DHIS2
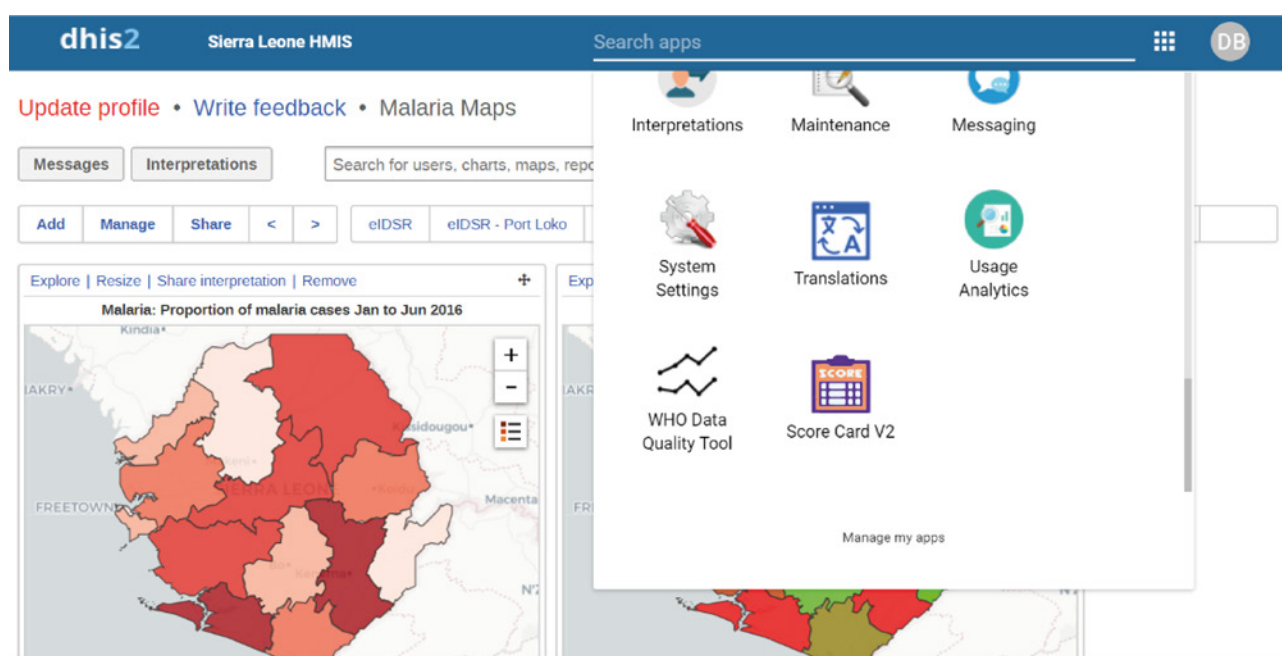
After the DQA app is installed it must be configured for the analysis. Configuration involves selecting the appropriate indicators for the various analyses, setting quality benchmarks, and selecting the different types of comparisons that will be made (Figure 2). A dashboard can also be set up to display automatically the results of analyses configured during the setup process. See the *WHO DQ App configuration guide* [1] for a detailed discussion on how to configure the DHIS2 Data Quality app.

Configuring the DHIS2 DQA app requires detailed knowledge of the data structure for the local instance of DHIS2 in the country. There are often several data tables with information that can inform the data quality metrics – some more complete or appropriate than others. Indicators in the DHIS2 may be disaggregated by other variables (e.g. gender and age) and new indicators

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[1] WHO Data Quality Tool for DHIS2. Geneva: World Health Organization (online) (https://www.dhis2.org/who-dq, accessed 20 September 2020).

may need to be created in order to evaluate the indicator holistically. Ensure that sufficient expertise is available to configure the DHIS2 DQA app sufficiently in advance of conducting the analysis to permit adequate time for the configuration.

Once the tool and dashboards are configured, they can be updated periodically with current data to show the changes in data quality over time. In fact, different users can configure their own dashboards for whatever level or region they desire. The tool can serve as a powerful source of routine information on data quality for programme and data managers throughout the health sector and at different levels.

Figure 2. Configure the WHO Data Quality tool for analysis – administration page

Configuring the Desk Review Excel tool

Configure Tool tab

On the **Configure Tool** tab, indicate the number of primary indicators for which you will enter and analyse data (1–6 indicators). The appropriate number of data entry tabs will then be made available (Figure 3).

Indicate which domains and metrics you will use in your analysis by using the drop-down menus to select "yes" or "no".

Click on the **Configure Tool** button at the bottom of the page to update the workbook using macros. The tool should now reflect the content you selected.

Figure 3. Desk Review Excel tool – Configure Tool tab

Configure the Desk Review Excel Tool for Use
(Select the elements you plan to use for the analysis.)

Indicate the number of primary indicators to evaluate
Number of indicators: | 3 |

Indicate which domains and metrics to evaluate

Domain 1: Completeness and Consistency of Reporting/Indicator Data | Yes |

    1 - Completeness and Timliness of Reporting from Health Facilities and Aggregation Levels: District | Yes |

    1b - Completeness of Indicator Reporting: % of data elements that are non-zero values; % of data elements that are non-missing values | Yes |

    1c - Consistency of reporting completeness: | Yes |

Domain 2: Internal consistency of reported data | Yes |

    2a1: Exreme outliers relative to the mean (+/- 3 SD) | Yes |

    2a2: Moderate outliers relative to the mean (+/- 2-3 SD) | Yes |

    2a3: Outliers relative to the median | Yes |

    2b - Consistency over time: | Yes |

    2c - Consistency between related indicators | Yes |

Domain 3: External comparison | Yes |

Domain 4: Consistency of population data | Yes |

    4a - Consistency of population projections | Yes |

    4b - Consistency of population estimates from different sources of population data (e.g.. NBS and Health Programs) | Yes |

Click here to configure the tool after making selections   -----------> | Configure |

Input Basic Info tab

On the tab **Input_basic_info**, provide the basic assessment information requested using the drop-down lists provided (Figure 4). The information informs the tool about the parameters of the analysis, such as the year, country, data flow model and periodicity of reporting. The information required includes:

Step 1. Select Country: The country selected will automatically be included in dashboards of results, as well as being used to calculate the United Nations population projection for live births.

Step 2. Select Year: This is the year of analysis, the year for which data will be obtained and analysed.

Step 3. Complete the data flow model for the Country HMIS (or Programme, depending on the scope of the DQA). Include all levels of the reporting system where data are collected, aggregated and forwarded to the next higher level. The last box should indicate the national level.

Step 4. Select the level of the reporting system for which you are conducting your analysis – i.e. the level for which metrics are calculated and compared. This is usually the level for which data are input, such as the district level.

Figure 4. Configuring the Desk Review Excel tool – Input Basic Info tab

Step 5. Select the periodicity (i.e. how often the data are reported) for the level of analysis selected. This selection will configure the indicator data entry pages for the periodicity selected. Remember to select the first period of the reporting year (input 10). The selection of the periodicity of reporting for the level of analysis will populate the drop down list in input 10.

Step 6. Input the periodicity of reporting from health facilities. This is used in the evaluation of reporting performance from facilities (Domain 1 – Completeness and timeliness of reporting).

Step 7. Input the periodicity of reporting from the first level of aggregation (usually the district). This is used in the evaluation of reporting performance from the first level of aggregation (Domain 1 – Completeness and timeliness of reporting).

Step 8. Input the level of the reporting system for which you are inputting data on service output. These are the indicator values by month or quarter. These data can be for facility level (only rarely in the event that facility-level data are entered into the computer), or district level or regional level, depending on what aggregate level data are available at national level.

Step 9. Input the level of the most recent population-based survey. In Domain 3 – External comparison – routinely reported data values will be compared with survey values. The routine data will need to be aggregated to the level of the survey (typically the regional level) so that the values are comparable.

Step 10. Enter the first period of the year of analysis. Depending on the periodicity of reporting from the level selected for analysis (in Step 5 above) the drop-down list will provide the range of options. Select the first period (e.g. 1st quarter, the month of January etc.) from the drop-down list.

Step 11. Enter the nature of facility reporting, either integrated (e.g. on the monthly form of HMIS) or programme-specific. Integrated reporting means the results from different health programmes are all reported on the same form, and only that form is forwarded to the next level to satisfy reporting requirements for all health programmes. Programme-specific reporting means that health programmes report to the next level separately, each programme using its own set of reporting forms.

If reporting from health facilities is only partially integrated, selecting the type of reporting on the **Input_basic_info** tab will only hide or reveal the areas of programme-specific reporting data entry and results. The integrated reporting tab and result areas will always be available for information to be entered for HMIS reporting in general.

Select Program Areas and Indicators

The DQA has a standard set of indicators that are intended to provide a cross-cutting assessment of data quality across programme areas (Figure 5). However, the DQA is designed to accommodate any programme areas and indicators. On the **Program Areas and Indicators** tab, select programme areas and their associated indicators using the drop-down lists provided. One primary indicator should be selected for each programme area. The primary indicator is listed as #1 in the two spaces provided for each program area. The secondary indicator (#2) is used only for the Internal Consistency metric "Comparison between related indicators".

Figure 5. Configuring the Desk Review Excel tool – Selecting Program Areas and Indicators

Drop-down lists for programme areas and indicators include the standard indicators for the recommended implementation of the DQA as well as a supplementary list of alternative indicators for each programme area. Information on the core and alternative indicators can be found in the *DQA Technical guide* (Module 3: Review of data quality through a health facility survey; Annex 1 – Recommended indicators).

It is also possible to include user-defined programme areas and indicators by selecting "Other_ specify" from the drop-down list. Another field will appear in which the user-defined programme area and/or indicator can be entered. Once entered, the programme area and indicator names auto-populate the dashboards of results in the DQA.

Finally, a section is included for selecting the indicator type – either cumulative or current. A cumulative indicator is one for which monthly values are added to the previous month's value to derive a running total (e.g. number counselled and tested for HIV). A current indictor is one where the current month's value updates or replaces the previous month's value (e.g. current on ART where "lost", "stopped", "transferred out" or "died" are all subtracted from the total, new

patients are added, and those counted this month were most likely also counted last month). The default value is cumulative since most indicators are cumulative.

Review and/or edit Data Quality Thresholds

To judge the quality of data using the metrics in the DQA, it is necessary to define benchmarks of quality with which to compare the results. WHO has recommended thresholds for each metric which can be found on the **Quality Thresholds** tab (Figure 6). Global standards are often not relevant in a given country if the information system is immature or is undergoing reform. In cases where the recommended thresholds are inappropriate, user-defined thresholds can be supplied by entering the values in column 2 of the **Quality Thresholds** tab which will override the recommended thresholds.

Figure 6. Configuring the Desk Review Excel tool – set Data Quality thresholds

Quality Thresholds: 'Quality thresholds' are the values that set the limits of acceptable error in data reporting. The analyses in the DQR compare results to these thresholds to judge the quality of the data. Recommended values are included for each metric in column 1. User-defined thresholds can be input into col 2 which will take precedence over the values in col 1.	**Threshold**	
	Recommended	**User-defined**
Domain 1: Completeness and Consistency of Reporting/Indicator Data	Col 1	Col 2
Metrics		
1 *Completeness and Timliness of Reporting from Health Facilities and Aggregation Levels: District*		
1a1a Completeness of District Level Reporting	90%	
1a1b Timeliness of District Level Reporting	90%	
1a2a Completeness of Health Facility Level Reporting	90%	
1a2b Timeliness of Health Facility Level Reporting	90%	
1b *Completeness of Indicator Reporting:* *% of data elements that are non-zero values; % of data elements that are non-missing values*		
Program Area 1: Maternal_Health		
1b1 Indicator 1: ANC 1st Visit	90%	
Program Area 2: Immunization		
1b2 Indicator 1: 3rd dose DPT-containing vaccine	90%	
Program Area 3: HIV_AIDS		
1b3 Indicator 1: HIV Coverage	90%	
1c *Consistency of reporting completeness:*		
1c1 Consistency of Facility reporting completeness	10%	
1c2 Consistency of District reporting completeness	10%	

Inputting data into the Excel tool

Completeness and timeliness of reporting

Input data on reporting completeness (integrated reporting)

On the **Input_reports_received** tab, enter the information required on completeness and timeliness of reporting from subnational units (Figure 7). Depending on the data-flow model input in the **Basic Information** tab, you will need to enter data on the number of reports received for each level, and historically (3 previous years). Also required is information on the number of reports received by the deadline for reporting for the year of analysis. Ensure that you select the appropriate periodicity of reporting on the **Basic Information** tab for facility reporting and from the next higher level (#7) so that the DQA tool will know the number of expected reports in the calculation of completeness of reporting.

Figure 7. Inputting data into the Excel tool – information on completeness and timeliness of reporting

Input data on reporting completeness (programme-specific reporting)

If **Program-specific** is selected in question #11 on the **Input_basic_info** tab, a different tab appears for entering information on programme-specific reporting (**Input_reports_program specific**). Specifications for the data flow model, frequency of reporting and data quality thresholds must be entered in the appropriate cells for each health programme under review (Figures 8 and 9).

Figure 8. Programme-specific data flow and frequency or reporting

Program Area	Data Flow by Progam Area				Frequncy of reporting by Program Area and Level		
	1st level of aggregation	2nd level of aggregation	3rd level of aggregation		Facility to 1st level of aggregation	1st to 2nd level of aggregation	2nd to 3rd level of aggregation
Maternal_Health	District				Monthly		
Immunization	District				Monthly		
HIV_AIDS	District				Monthly		
Malaria	District				Monthly		
TB	Region				Quarterly		
Multi-program	District				Monthly		

Figure 9. Programme-specific quality thresholds for completeness and timeliness of reporting

Quality Thresholds (enter % value)	Facility to 1st level of aggregation		1st to 2nd level of aggregation			Quality Thresholds (enter % value)	Facility to 1st level of aggregation		1st to 2nd level of aggregation	
Completeness	Default	User defined	Default	User defined		Timeliness	Default	User defined	Default	User defined
Maternal_Health	90%		90%			Maternal_Health	90%		90%	
Immunization	90%	100%	90%			Immunization	90%		90%	
HIV_AIDS	90%		90%			HIV_AIDS	90%		90%	
-	90%		90%			-	90%		90%	
-	90%		90%			-	90%		90%	
-	90%		90%			-	90%		90%	

Input population data

The desk review evaluates the adequacy of population data (i.e. denominators) used to calculate coverage rates for performance monitoring in Domain 4 – Consistency of population data. Denominator data are also required to compute rates for comparisons of routine data to population-based survey data (Domain 3 – External consistency). There are two tabs in which input of population data is required, one for each domain. On the tab **Input_Standard_Populations** (Figure 10), enter the populations from a primary source of population data (e.g. official source of government statistics, such as the National Statistics Bureau) by the level selected for analysis (e.g. district) for live births, expected pregnancies, and children < 1 year of age (columns F–H). These denominators will be compared to the same populations used by an alternative source of population data (e.g. health programmes). Enter the values of the alternative source of population data by the level selected for analysis into the appropriate cells (columns I–K).

Figure 10. Inputting data into the Excel tool – standard populations (Domain 4 comparisons)

Standard Population Estimates by Administrative Unit

Table 9: This worksheet requires you to type/paste population estimates from two different data sources for the year of analysis. Please use "Paste special" and paste only values when you are copying and pasting information. Columns 1 and 2 are automatically populated for you based on information you entered in previous worksheets. Data can only be typed/pasted into columns that are in green. Columns in white are write-protected.

Nº	District	National	Denominators for Domain 4 Evaluation (select using dropdown lists)					
			Population Data Source 1 (e.g., National Bureau of Statistics [NBS] estimates)			Population Data Source 2 (e.g., health program estimates)		
			NBS			Maternal and Child Health		
			Live births	Expected pregnancies	Children < 1 yr	Live births	Expected pregnancies	Children < 1 yr
			2017	2017	2017	2017	2017	2017
	Overall Total		1,529,616	1,528,273	1,464,633	1,598,039	1,602,954	1,359,815
1	District 1	Region 1	25,029	25,029	24,178	25,029	25,029	18,778
2	District 2	Region 1	33,483	33,483	32,344	33,483	33,483	23,798
3	District 3	Region 2	59,852	59,852	57,458	80,000	59,852	56,001
4	District 4	Region 2	31,930	31,930	30,653	31,930	60,000	28,139
5	District 5	Region 1	17,825	17,825	17,219	17,825	17,825	14,810
6	District 6	Region 3	14,708	14,708	14,178	14,708	14,708	13,244
7	District 7	Region 4	25,532	24,188	22,173	25,532	50,000	19,303
8	District 8	Region 5	45,131	45,131	42,874	45,131	45,131	39,387
9	District 9	Region 3	5,108	5,108	4,925	5,108	5,108	6,030
10	District 10	Region 1	32,141	32,141	31,048	32,141	32,141	29,340

For comparing routine reporting results to the results of population-based surveys (or other external data sources evaluating coverage using population-based rates), enter the standard populations by level selected for analysis on the tab **Input_Indicator_Populations**. These are the populations used to calculate rates for routine values that will be compared to survey values. As such, these values should be specific to the indicator and the year of the analogous survey value (Figure 11).

Figure 11. Inputting data into the Excel tool – indicator populations (Domain 3 comparisons)

Population estimates for calculating coverage from routine data

Table 9: This worksheet requires you to type/paste indicator-appropriate denominators for the year of analysis. Please use "Paste special" and paste only values when you are copying and pasting information. Columns 1 and 2 are automatically populated for you based on information you entered in previous worksheets. Data can only be typed/pasted into columns that are in green. Columns in white are write-protected.

Nº	District	Region	Program Area 1	Program Area 2	Program Area 3
			Maternal_Health	Immunization	HIV_AIDS
			ANC 1st Visit	3rd dose DPT-containing vaccine	HIV Coverage
			Choose survey year below:	Choose survey year below:	Choose survey year below:
			2019	2019	2019
	Overall Total		1,408,049	1,348,426	1,251,594
1	District 1	Region 1	22,510	21,745	16,888
2	District 2	Region 1	30,941	29,889	21,992
3	District 3	Region 2	56,821	54,548	53,165
4	District 4	Region 2	30,313	29,100	26,714
5	District 5	Region 1	16,011	15,467	13,303
6	District 6	Region 3	14,264	13,750	12,844
7	District 7	Region 4	22,551	19,584	17,050
8	District 8	Region 5	42,264	40,151	36,886
9	District 9	Region 3	4,953	4,775	5,847
10	District 10	Region 1	28,870	27,889	26,355
11	District 11	Region 2	66,964	64,286	62,617
12	District 12	Region 1	29,087	28,098	21,980

Input data on trends

To evaluate "Internal consistency – Consistency of indicator data over time2 (Domain 2), enter annual values for the level selected for analysis for the DQA primary indicators (selected on the **Program Areas and Indicators** tab). Annual values for the indicators are required for the three years prior to the analysis year. The annual values for the previous years should be pasted into the appropriate columns for each of the indicators, while the values for the year of analysis are aggregated automatically by the DQA tool once the monthly values have been input into the indicator data tabs (e.g. **Input_PA1_Ind1**) (Figure 12).

Figure 12. Inputting data into the Excel tool – input annual data values to evaluate trends

Input indicator data

Paste monthly (or quarterly) data by the level selected for analysis into the indicator data tabs (Figure 13). The indicator names should appear automatically at the top of each of the indicator data tabs once the indicators are selected on the **Program Areas and Indicators** tab. The indicator data tabs are named according to the following logic: PA1 is **Program Area #1**, while Ind1 is the primary indicator for the program area. Each programme area selected on the Program Areas and Indicators tab has two indicators – a primary and a secondary indicator. The primary indicator is the indicator for which DQA metrics are calculated. The secondary indicator is only used for the **Domain 2 – Internal consistency** evaluation of the consistency between related indicators. Furthermore, PA2 is **Program Area #2**, which has Ind1 and Ind2, and so on.

Figure 13. Inputting data into the Excel tool – input indicator data

It is important to ensure that the periodicity of reporting for the level of analysis is indicated in #5 on the **Basic Information** tab. This selection will configure the Indicator Data tabs for 12 columns for monthly reporting, and four columns for quarterly reporting.

In Domain 2 – Internal consistency of reported data – extreme and moderate subnational unit values are identified for monthly (or quarterly) reporting. These values are highlighted on the **Input Indicator Data** tabs by colour coding as follows: outliers are noted by a stippled pattern, with grey shading for moderate outliers and pink shading for extreme outliers (Figure 14). These values are summarized and the subnational units where they occur are identified in the summary tabs for Domain 2.

Figure 14. Colour coding of outliers on data input tabs

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Chapter 4. Conducting the desk review analysis

Overview of analysis with DHIS2 data quality app

Dashboards

After the DQ tool is launched, you will see the five tabs at the top of the page. These are used to select between different functionalities. Notice that the word "Dashboard" is highlighted and the dashboard function is selected by default (Figure 15). The dashboard has its own set of four tabs. The Completeness tab is selected by default.

Figure 15. DHIS2 Data Quality App – menus
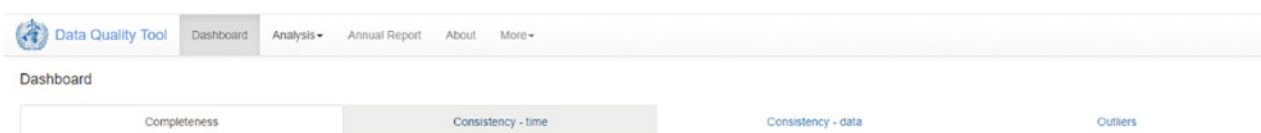
Other tabs include:

⟩ Analysis – allows you to perform ad hoc analyses for any indicators in the DHIS2.

⟩ Annual Report – provides a snapshot of all desk review metrics at a given point in time.

⟩ About – provides information about the app.

⟩ More – takes you to the:
  • Administration page – allows you to configure priority indicators for the dashboard.
  • User Guide – provides a link to the User Guide from DHIS2.
  • Feedback – sends you to a page where you can email DHIS2 developers and provide feedback on the use of the tool.
  • Data Export for Excel tool – a tool for downloading data from the DHIS2 by period and subnational unit for inputting into the Desk Review Excel tool.

Completeness and timeliness of reporting

On the **Completeness and Timeliness** dashboard (Figure 16), the graphs on the left show, for each priority data set (designated as such in the **Administration** tab), the completeness and timeliness by month for each of the last 12 months. The graphs on the right show, for each dataset, the completeness by region for the last month of the period being analysed.

Completeness for the most recent month is another way to look at the timeliness of reporting. It is often also revealing to show completeness for the month prior to the last. Click on the menu icon in the upper right of the screen to show a menu on the right of the screen.

Figure 16. WHO Data Quality tool dashboard
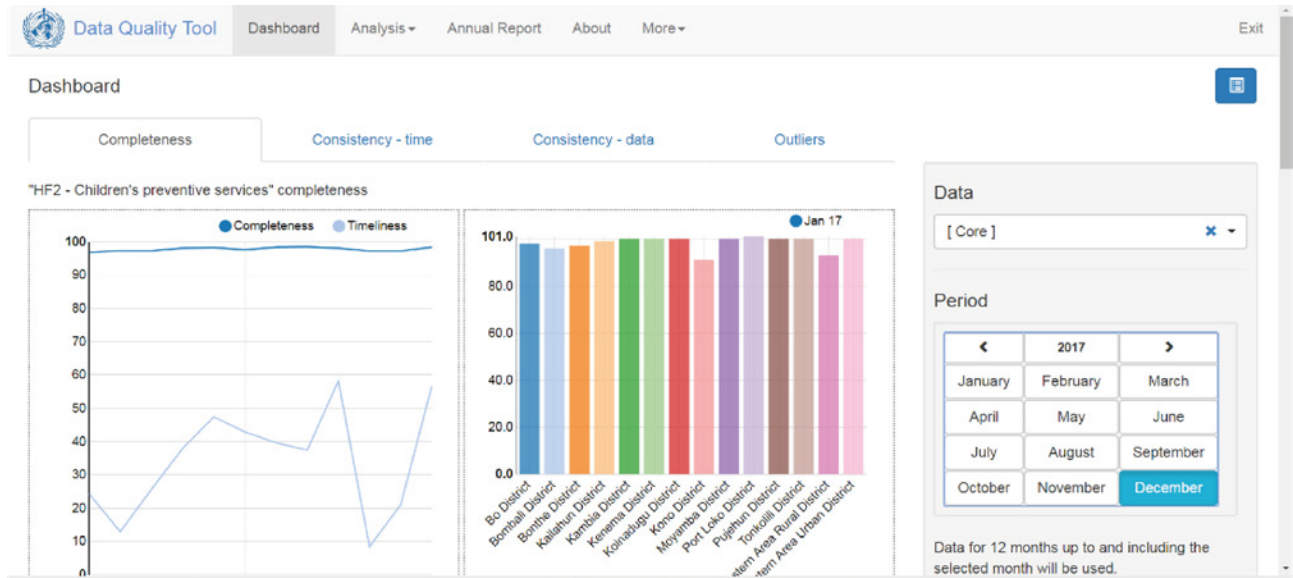
The reporting period that is charted can be changed by clicking on a different month. By default, the DQ tool analyses all data nationwide, disaggregated by region. In the "Organisation unit" section of the menu at the right, "National" is highlighted. The DQ tool can also be used at district level with data disaggregated by individual health facility.

In the "Organisaton unit" section of the menu, you can click on and select different districts within regions (Figure 17). The graphs on the left side of the Completeness page will change to show the 12-month trend in the reporting completeness of the selected district.

By default, the graphs on the right side of the Completeness page show results disaggregated for one level below. If the district is selected, the bars on the graphs would then represent facilities.

Figure 17. Selecting districts

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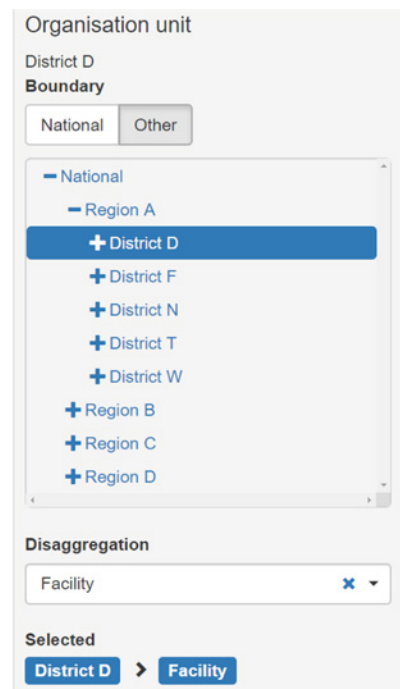
Consistency over time

The **Consistency over time** dashboard (Figure 18) shows (on the left side) the trend in data elements (configured and selected as "core" data elements in the **Administration** tab) over the course of the selected year and the two previous years. Each of the three years is depicted as a trend line. Each graph on the right is an example of a scatterplot. When the tool is set to "Disaggregated by district", each dot represents the value for a single district. On this chart, the position of the dot on the vertical axis represents the value of the numerator for the month selected. The position of the dot on the horizontal axis is the average value in the same district over the 11 previous months. Dots that appear below the lower grey line or above the upper grey line are districts which surpass the pre-set value for quality – i.e. they represent departures from consistency for the data element and constitute a potential data quality problem.

Figure 18. DHIS2 Data Quality tool – Consistency over time
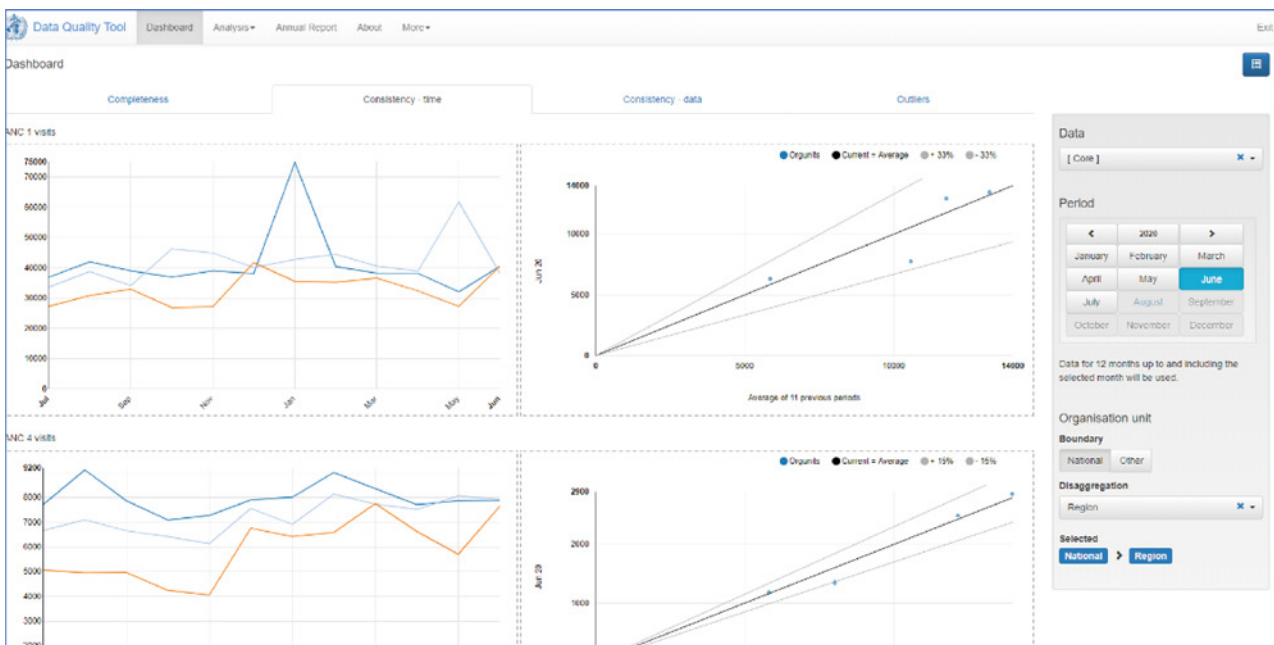
To change data elements, organizational units, or the period using the menu on the right-hand side, click on the triangles in the scatterplot to obtain the values of the ratio of the current month to the average of the preceding eleven months for the subnational unit selected. The cursor can also be used to select the trend lines on the graphic on the left in order to view values for the data element at different times during the year, and for all three years.

Consistency between related indicators

Indicators which have a predictable relationship are examined to determine whether, in fact, the expected relationship exists between those indicators. In other words, the consistency process examines whether the observed relationship between indicators, as depicted in the reported data, is that which is expected.

The **Consistency – Data** tab on the DHIS2 Data Quality tool dashboard (Figure 19) shows different graphics for different types of relationships. For a relationship in which the indicator values are expected to be more or less the same (e.g. malaria cases treated and malaria positive tests) a scatterplot depicts the relationship. In fact, for most indicator relationships (equal, or one larger or smaller than the other) a scatterplot is used. For the special case of a drop-out rate, a negative bar chart is used. A negative bar chart is a chart that can range positive or negative in relation to zero on the y-axis. The drop-out rate measures the percentage of people who started a public health service without finishing it. That is, it measures the loss of clients over time for a process such as immunization with an antigen given in a series (e.g. DTP 1–3). A drop-out rate should never be less than zero (although it sometimes is) and is indicative of a data quality problem. In the DTP example, a negative drop-out rate would mean that more children were immunized with the third dose of DTP than with the first dose.

These "numerator relations" are configured using the **Administration–Numerator** relations in the **More** section of the Data Quality tool. Each dot on the scatterplot represents the total values over the last 12 months for one district. Districts with values that fall outside the grey threshold lines are represented by a diamond shape. The placement on the graph of the district values of the ratio are relative to the result at national level. The national ratio shown by the solid grey line. If the ratio of the district value to the national value exceeds a predetermined threshold, the district should be reviewed further to determine whether data quality problems are to blame.

Again, one can change data elements, organizational units, or the period for using the menu on the right-hand side. Click on the triangles in the scatterplot to obtain the values of the ratio for individual subnational units. The cursor can also be used to select the bars on the drop-out rate bar chart in order to view values for the subnational unit depicted.

Figure 19. DHIS2 Data Quality tool – consistency data

Consistency – outliers

The dashboard also contains a section to help identify outliers for core indicators configured in the **More—>Administration** tab. Outliers are identified by comparing monthly values for an administrative unit to the mean of values for the year for the same administrative unit. Monthly values that are more than three standard deviations from the mean are labelled "extreme" outliers. Those between two and three standard deviations from the mean are "moderate" outliers. Those values labelled as outliers are shaded in the grid of values displayed by the Data Quality tool (Figure 20).

The values are ranked by severity on the basis of a weight calculated for the outlier (shown on the right-hand side of the page). The weight is based on the size of the outlier relative to: 1) the other monthly values for the year for the unit and 2) the contribution of the value to the total of all administrative units and months taken together. Thus, a large outlier in a large health facility (e.g. a hospital with a larger service volume) would have a greater weight than a large outlier from a small health post. The largest outliers are listed at the top, and other outliers are listed in decreasing value of weight.

The shaded values are indicative of data quality problems. To find the source we need to drill down to examine where and why the value is so extreme in relation to the values around it. To drill down, click on the small black square at the far right of the grid. Clicking on the square produces a menu with the following options:

1) *Visualize* – produces a bar chart of the monthly values for the indicator for the administrative unit.

2) *Drill down* – shows the monthly values for the year for the indicator for the subnational units below the original administrative unit. For instance, if you started with a grid showing outliers by region, drilling down would then show the values by districts within the region in which you are drilling down (the administrative units depicted will depend on the configuration of DHIS2 in country).

3) *Contact* – enables the user to send an email to the unit or facility in question to enquire about the extreme value, providing that contact information has been previously been entered into the DHIS2.

Figure 20. DHIS2 Data Quality tool – outliers
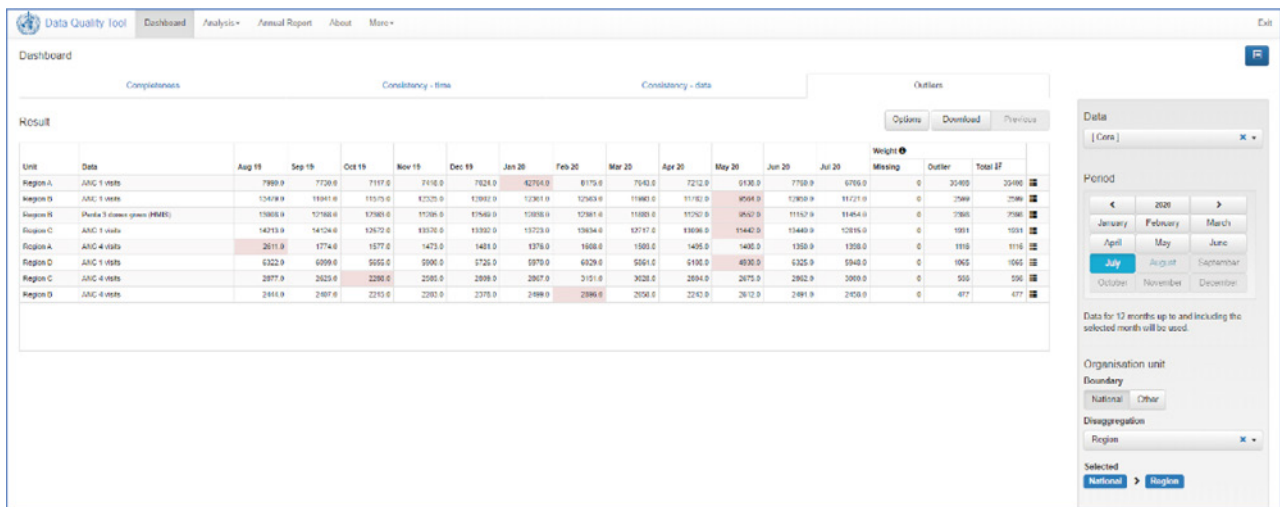
Analysis tab

The **Analysis** tab allows you to go beyond what has been configured into the core data set and analyse any indicator or data element that is contained in the local instance of the DHIS2. There are two options within Analysis, namely: 1) Outliers and missing data, and 2) Consistency.

Outliers and Missing Data

The **Outliers and Missing Data** option produces a similar grid of outliers ranked by severity as in the dashboard. The principal difference between the outliers identified in the **Analysis** tab and the dashboard is that the **Analysis** tab gives the ability to select any existing indicator or data element in the DHIS2, plus some enhanced options for the type of outlier identified.

First, select the data element/indicator of interest (Figure 21):

> Select one of the following:
> * Data set, and a data element
> * Data element group, and a data element
> * Indicator group, and an indicator.

The choice will depend on the needs for the analysis and on the way in which the data are configured in DHIS2. For example, data element groups need to be established by the user prior to their selection in the menu. Also, indicators need to be calculated on the basis of data elements, and this also needs to be done (in DHIS2) prior to their selection in the menu.

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Figure 21. DHIS2 WHO Data Quality tool – Analysis tab, select data

Select the period:

▷ "Recent" provides the most recent number of periods (i.e. monthly, weekly) specified on the drop-down lists (e.g. the last 12 months).

▷ "Year" allows you to choose the year and the periods within the year.

▷ "Custom" gives the opportunity to select any date range by selecting a start date and end date from the menu (Figure 22).

Figure 22. DHIS2 WHO Data Quality tool – selecting the period for analysis
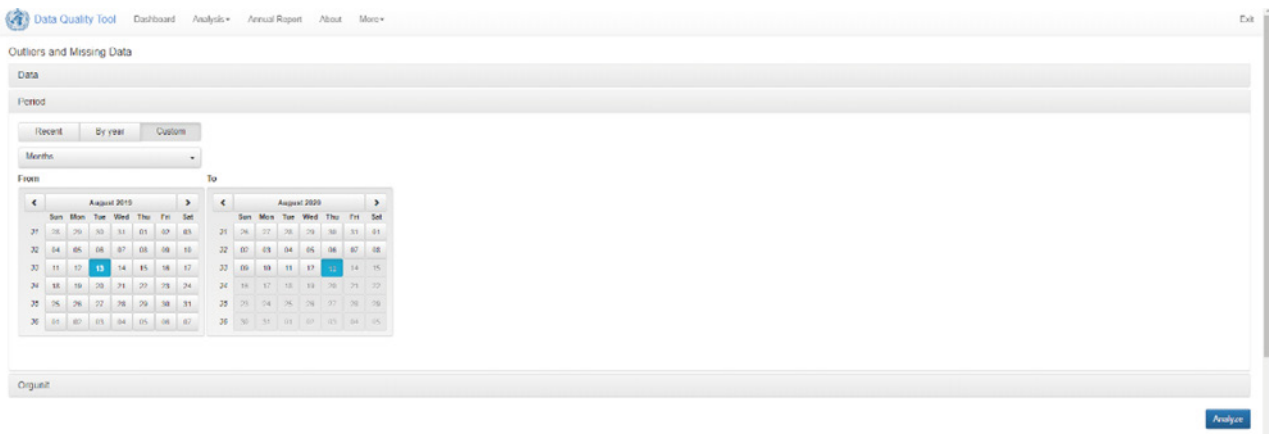
Select the boundaries:

⟩ Select "National" to view the results for the whole country, and a level for disaggregation (depending on the organizational units configured in the DHIS2).

⟩ Select "Other" to select specific subnational units (Figure 23).

Figure 23. DHIS2 WHO Data Quality tool – select boundaries for analysis

Click "Analyze" to view the results.

The submenu under the Analyze button provides further options for the analysis.
Click "Options" (Figure 24):

⟩ "Display columns" allows you to specify which output you want to see – all, or only missing data, or only outliers.

⟩ "Outlier filter", when activated by selecting either Standard Score or Modified Z Score, allows you to toggle between outliers in relation to the mean or the median. Select "Moderate" and "Extreme" to toggle between extreme outliers (> 3 SDs from the mean) or moderate outliers (2–3 SDs from the mean).

⟩ The "Download" button (next to the "Options" button) allows you to download the table of data you are viewing to a .csv file.

⟩ The "Previous" button allows you to go back to the previous view (prior to the most recent change in options).

Figure 24. DHIS2 WHO Data Quality tool – select different options for the analysis
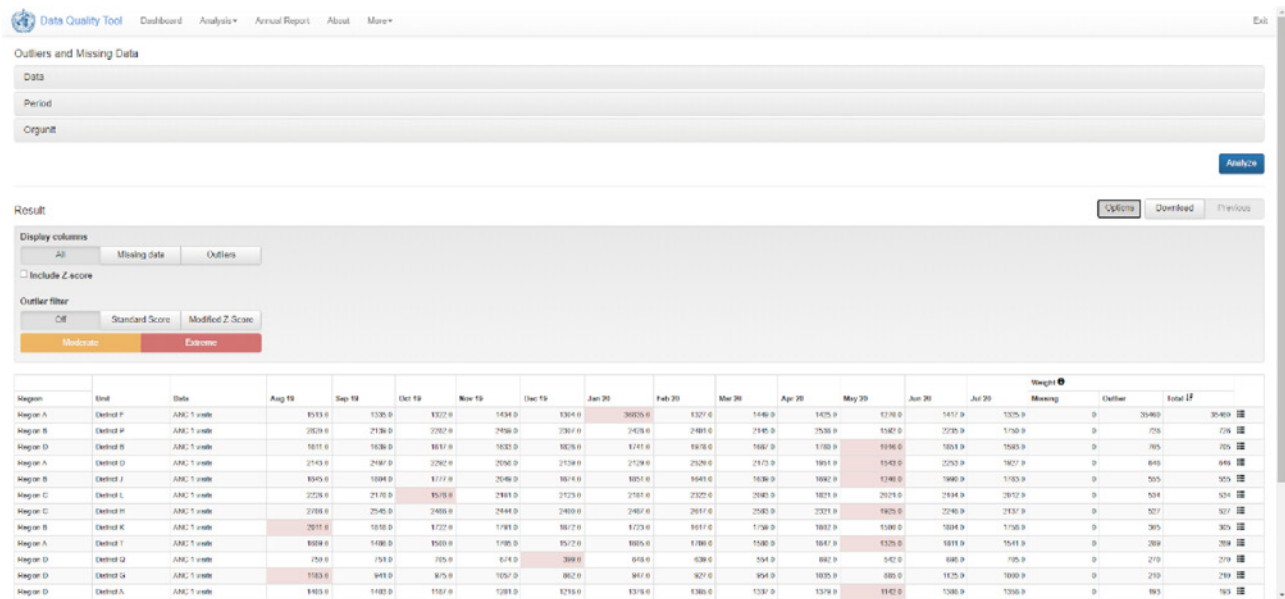
Consistency

The **Consistency** tab under the **Analysis** menu allows you to delve deeper into consistency both over time and between related indicators than is possible from the dashboard.

Select the analysis type: 1) "Between Indicators", or 2) "Over Time" (Figure 25). Depending on the selection, different options are available.

Figure 25. DHIS2 WHO Data Quality tool – select the analysis type for consistency

Selecting "Between Indicators" gives the further option to select:

⯮ What to compare, either:
  • Overall result – the overall result is the relationship of the two indicators at the national level based on the actual data in the database (i.e. the observed result), and selecting this option compares subnational unit results to the national result. (The "Expected relationship

- 2 option is greyed out and not available when overall result is selected.)
- Expected result – the expected result is the result based on the relationship between the two indicators if the data quality is good. For example, for two indicators whose values should be more or less the same (e.g. positive malaria tests: patients treated for malaria) the ratio of one indicator to the other would yield a result close to 1.

▷ Expected relationship
  - A ≈ B means the two indicators are more or less equal.
  - A > B means Indicator A should always be bigger than Indicator B.
  - "Drop-out Rate" measures the loss over the course of a series of events (e.g. vaccination for DTP given in series, from 1 to 3 doses at specific ages).

When "Over Time" is selected from the "Analysis Type" menu, there is also the option to select:

▷ What to compare (overall versus expected result, as above).

▷ The expected trend – When analysing the consistency of an indicator or data element over time, we compare a value from a recent period to a historical trend in the indicator or data element to see whether the recent value is consistent with what has happened before. What the recent value is compared to depends on the observed trend in the indicator or data element. The recent value for indicators or data elements that typically remain constant over time (i.e. ANC 1) should be compared to the *average* over the preceding time periods (a "constant" trend). Indicators that rise or fall over time should be evaluated differently. For a non-constant trend, the recent value should be compared to a value predicted by the trend (i.e. the slope of the line).
  - constant – to compare a recent value to the average value over the preceding time periods;
  - increasing/decreasing – to compare a recent value to the value predicted by the trend in the preceding time periods.

▷ Under "Criteria" one can specify the quality thresholds for the analysis. The default is 33%. This means that subnational units with values (of the ratio comparing one indicator to another) that are more than 33% larger or smaller than the national result (or expected result) are indicative of data quality problems. The default is set fairly high in order to highlight only the most extreme cases. However, depending on the number of subnational units with divergent values, the threshold can be changed to find more, or less divergent, subnational units, as needed.

▷ Select the indicator or data element under the "Data" menu.
- If "Between Indicators" is selected as the analysis type, the figure to the right is displayed. Select either "Data element" or "Indicator" for the first indicator in the relationship. Select the indicator group, then the indicator.
- Select the data element or indicator with which you want to compare. Select the indicator group, then the indicator.
- If "Over Time" is selected as the analysis type, the figure at the right is displayed. Select either "Data element" or "Indicator" for the analysis of consistency over time. Select the indicator group, then the indicator.

▷ Select the period for the analysis using the "Period" menu.

▷ Select the boundaries of the analysis using the "Org Unit" menu.

▷ Click "Analyse".
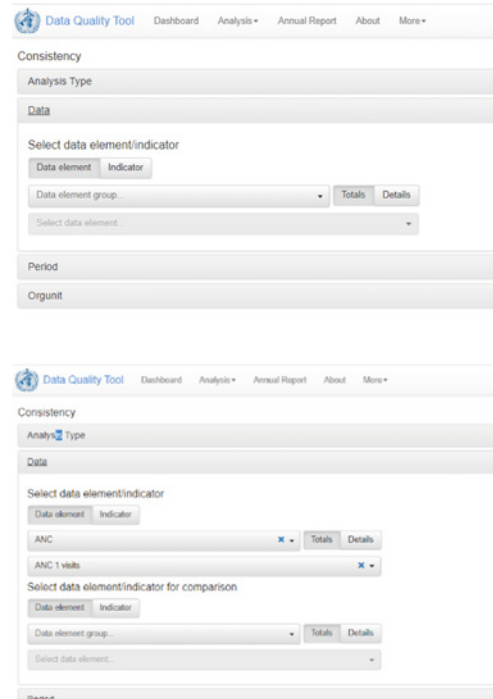
Figure 26. DHIS2 WHO Data Quality tool – consistency over time (Analysis menu)
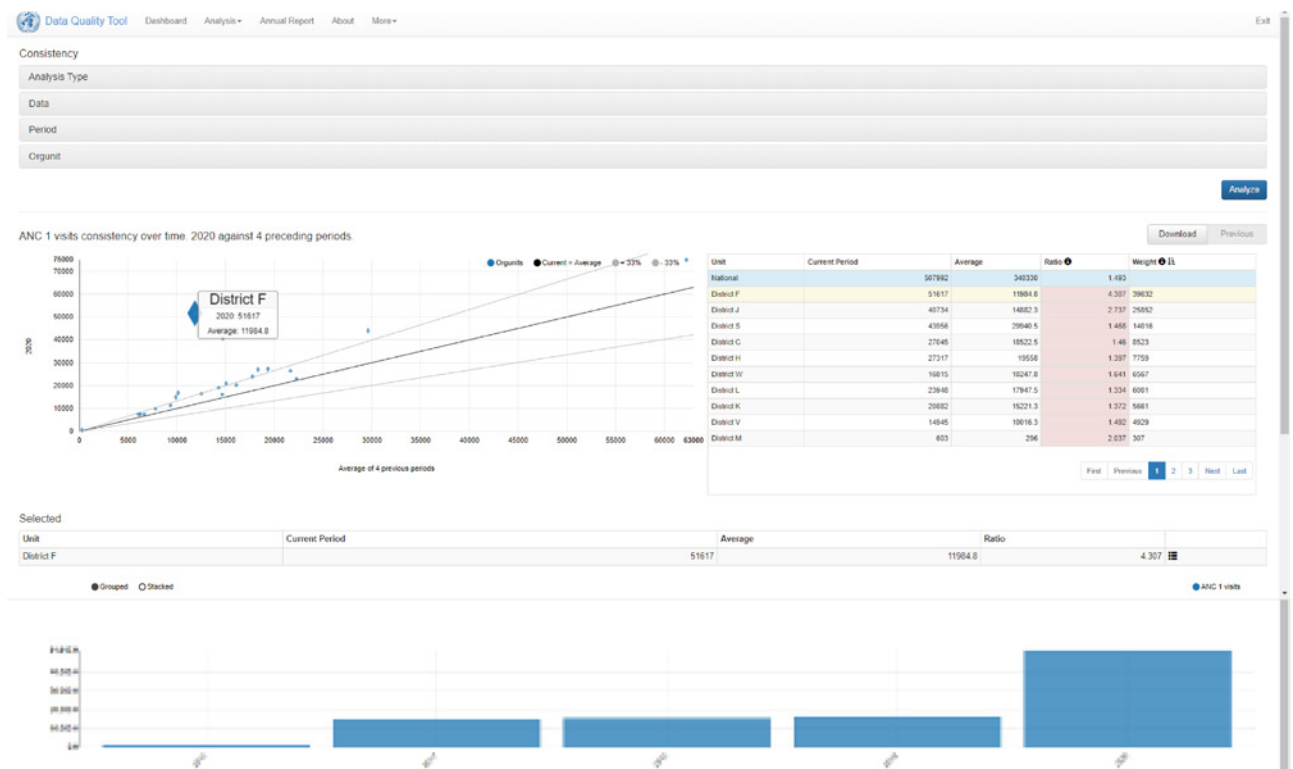
The output is a scatterplot showing the consistency over time (or between related indicators). A table of values for the output is also available, with the results weighted by severity as before.

Clicking on the subnational units (diamonds on the graph) or within the table will highlight the values and will show a bar chart depicting the value of the indicator or data element over time (Figure 26).

Annual Data Quality Report

The *Annual Data Quality Report* provides a static report of all the results by data quality domain for the indicators previously configured in the Administration tab. Indicators identified as "core" in the **Administration** tab can be included together, or programme-specific reports can be produced to show all indicators configured in the Administration tab from the same programme area.

Select the period (image at right) by selecting a year for the report, and all data reported for that year will be included in the analysis. Select also "Preceding years for reference" which will enable the analysis of consistency over time.
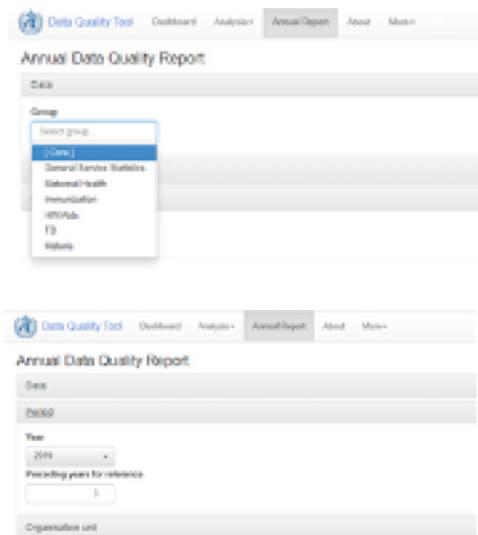
Then select the organizational units as before. Select the subnational unit to compare with national results for all metrics (Figure 27).

⧩ Select "National" and a subnational level to obtain metrics that compare the selected subnational unit to the national level.

⧩ Select "Other" to limit analyses to specific subnational units.

Figure 27. DHIS2 WHO Data Quality tool – Annual Data Quality Report, selecting organizational units

Click "Generate" to create a PDF of the annual report.

The report includes a summary with results for each metric by domain (Figure 28), as well as the number and percentage of subnational units from the selected level with suspected problems of data quality (based on the default or user-defined thresholds for quality).

The report contains domain-specific results (Figures 29 and 30) which go into depth for each metric, and provides the names of subnational units with suspected data quality problems. In addition, the domain-specific sections of the report permit the addition of textual interpretations to be included in text boxes for each metric. This feature permits persons who are analysing the data to provide context to the evaluation of results in order to facilitate the drawing of conclusions about the findings. For instance, missing data for immunization indicators could result from a failure by subnational units to report, or from an absence of service delivery because vaccines are out of stock in the those areas. It is critical to have someone with extensive knowledge of the dynamics of service delivery during the period (i.e. a programme manager) to help with the analysis of the findings since such contextual details are essential for a complete understanding of the results.

Figure 28. Annual Data Quality Report – Summary

Figure 29. Annual Data Quality Report – Domain 1: Completeness of reporting
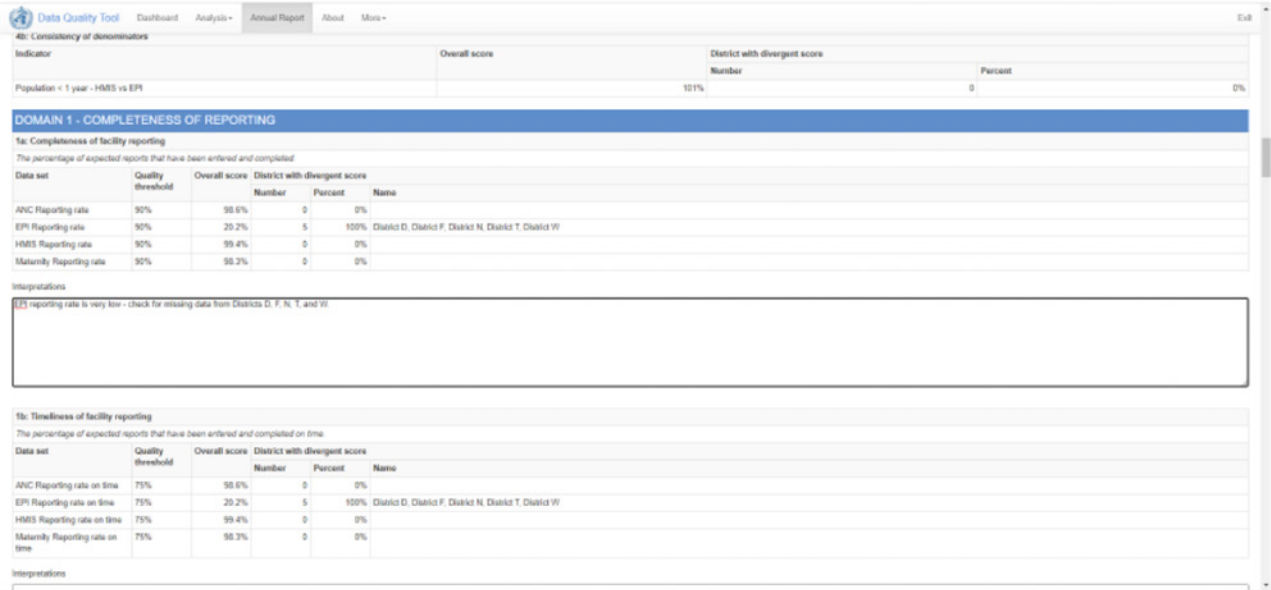
Figure 30. Annual Data Quality Report – Domain 2: Consistency over time

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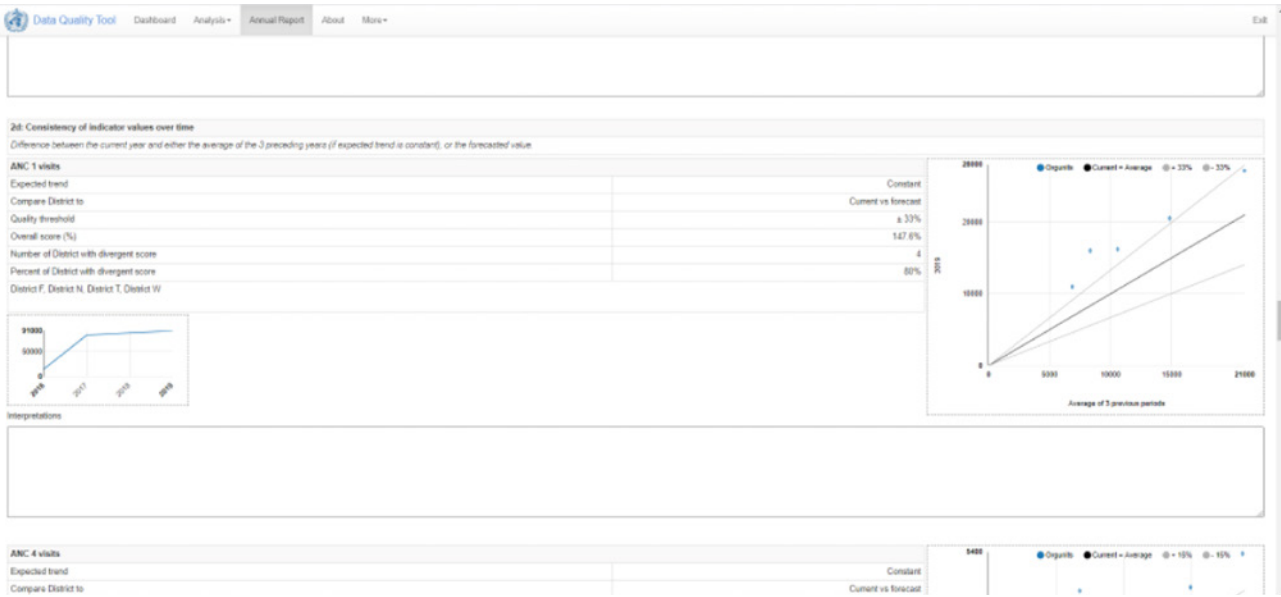
Overview of analysis with the Desk Review Excel tool

Figure 31. Desk Review analysis – Summary dashboard

BURUNDI - ANNUAL DATA QUALITY REVIEW: RESULTS, 2016

DOMAIN 1: COMPLETENESS OF REPORTING

No.	Indicator	Definition	National Score (%)	# of districts not attaining quality threhold	% of districts not attaining quality threshold
Indicator 1: Completeness and timeliness of reporting					
1a	Completeness of District Reporting	National district reporting completeness rate and districts with poor completeness of reporting	99.1%	1	2.1%
1b	Timeliness of District Reporting	National district reporting timeliness rate and districts with poor timeliness of reporting	90.3%	3	6.4%
1c	Completeness of Facility Reporting	National facility reporting completeness rate and districts with poor facility reporting completeness	96.1%	8	17.0%
1d	Timeliness of Facility Reporting	National facility reporting timeliness rate and districts with poor facility reporting timeliness	89.6%	11	23.4%
Indicator 1e: Completeness of indicator data - presence of missing and zero values					
1e.1	Completeness of indicator data (missing values)	Maternal_Health - ANC 1st Visit	98.9%	1	2.1%
		Immunization - 3rd dose DPT-containing vaccine	99.3%		
		HIV_AIDS - Number of HIV+ persons in palliative care	99.8%		
		Malaria - Number of confirmed malaria cases reported	99.8%		
		Immunization - OPV3	98.9%	1	2.1%
		Multi-program - Penta 1st doses	99.1%		
1e.2	Completeness of indicator data (zero values)	Maternal_Health - ANC 1st Visit	98.9%	2	4.3%
		Immunization - 3rd dose DPT-containing vaccine	99.5%		
		HIV_AIDS - Number of HIV+ persons in palliative care	100.0%		
		Malaria - Number of confirmed malaria cases reported	99.5%	1	2.1%
		Immunization - OPV3	100.0%		
		Multi-program - Penta 1st doses	100.0%		
Indicator 1f: Consistency of reporting completeness over time					
1f.1	Consistency of Reporting Completeness - District Reporting	Consistency of district reporting completeness and districts deviating from the expected trend	105.8%		
1f.2	Consistency of Reporting Completeness - Facility Reporting	Consistency of facility reporting completeness and Districts deviating from the expected trend	103.5%		

DOMAIN 2: INTERNAL CONSISTENCY OF REPORTED DATA

No.	Indicator	Definition	National DQ Score (%)	# of districts with poor scores	% of districts with poor scores
Indicator 2a: Accuracy of event reporting - Identification of Outliers					
2a.1	*Extreme Outliers (relative to the mean):* Percentage of national values that are extreme outliers relative to the mean (≥ 3 SD) and districts with extreme outliers	Maternal_Health - ANC 1st Visit	0.2%	1	2.1%
		Immunization - 3rd dose DPT-containing vaccine	0.0%		
		HIV_AIDS - Number of HIV+ persons in palliative care	0.5%	3	6.4%
		Malaria - Number of confirmed malaria cases reported	0.0%		
		Immunization - OPV3	0.4%	2	4.3%
		Multi-program - Penta 1st doses	0.0%		
		Total % of national values	**0.2%**		

The tab **Summary_dashboard** (Figure 31) displays results for all Desk Review domains and metrics in summary form, without details or graphics. The standard form for results is the value

of the metric plus the number and percentage of subnational units that do not attain the established benchmark for the metric. The subnational units that do not attain the standard are listed on the domain-specific dashboards.

Domain-specific dashboards

Domain 1 – Dashboard: Completeness and timeliness of reporting

Figure 32. Domain 1: National district completeness

Indicator 1a: National district reporting completeness rate and districts with poor completeness rate

	2014
National district reporting completeness rate	98.3%
Number of districts with completeness rate below 75%	4
Percent of districts with completeness rate below 75%	5.6%
Districts with reporting completeness rate below 75%	District 1, District 3, District 7, District 10

Interpretation of results: Indicator 1a
- Good reporting completeness continuing a trend upwards from recent years.
- Investigate districts with < 75% completeness for the year.
- Districts 1 and 3 had stock out of reporting forms during 2nd quarter of last year
-

Domain 1 includes the following metrics:

▷ Completeness of subnational unit reporting compares the number of reports received to the number of reports expected from subnational units (Figure 32).

▷ Timeliness of subnational unit reporting compares the number of reports received by the deadline to the number of reports received from subnational units.

▷ Completeness of facility reporting compares the number of reports received from health facilities to the number of reports expected from health facilities.

▷ Timeliness of facility reporting compares the number of reports received from health facilities by the deadline for reporting to the number of reports received from health facilities.

▷ Completeness of indicator data measures the percentage of missing or zero values reported from subnational units (Figure 33).

> Consistency of subnational reporting completeness compares the mean of reporting completeness of the three years immediately prior to the year of analysis to the reporting completeness of the year of analysis. If the trend in reporting completeness is non-constant (i.e. it either increases or decreases), the drop-down menu in cell C92 can be used to select the trend in reporting (constant or increasing or decreasing). If the trend is non-constant and either increasing or decreasing is selected, the reporting completeness for the year of analysis is compared to a value predicted on the basis of the slope of the trend during the previous three years. The actual trend in reporting completeness can be judged from the graphic 1f – Consistency of reporting completeness – on the Domain 1 dashboard (Figure 34).

> Consistency of health facility reporting completeness is dealt with in the same manner as above for subnational unit consistency of reporting completeness except that it is for reporting from health facilities to the subnational units. Select the trend in reporting (constant or increasing or decreasing) from the drop-down list in cell C93. Again, the actual trend in reporting completeness can be judged from the graphic 1f on the Domain 1 dashboard.

Figure 33. Completeness of indicator data

Indicator 1e: Completeness of Indicator Reporting - Presence of Missing and Zero Values

Program Area and Indicator	Quality Threshold	Type	National score %	No.	%	Name
					2016	
				Districts with > user-defined % of zero or missing values		
Maternal_Health - ANC 1st Visit	<= 90%	Missing	98.9%	1	2.1%	District 44
		Zero	98.9%	2	4.3%	District 17, District 29
Immunization - 3rd dose DPT-containing vaccine	<= 90%	Missing	99.3%	1	2.1%	District 19
		Zero	99.5%	1	2.1%	District 17
HIV_AIDS - Number of HIV+ persons in palliative care	<= 90%	Missing	99.8%			-
		Zero	100.0%			-
Malaria - Number of confirmed malaria cases reported	<= 90%	Missing	99.8%			-
		Zero	99.5%	1	2.1%	
Immunization - OPV3	<= 90%	Missing	98.9%	1	2.1%	District 7
		Zero	100.0%			-
Multi-program - Penta 1st doses	<= 90%	Missing	99.1%	1	2.1%	District 21
		Zero	100.0%			-
Total (all indicators combined)		Missing	99.3%	4	8.5%	
		Zero	99.6%	4	8.5%	

Interpretation of results: Indicator 1e
-
-
-
-

Figure 34. Consistency of reporting completeness
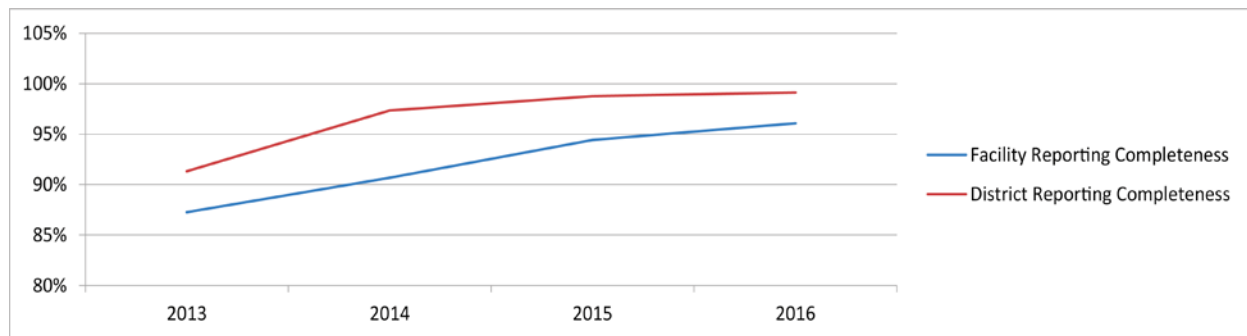
Domain 2 – Internal consistency

Domain 2 includes the following metrics:

▷ **Identification of extreme outliers:** Monthly (or quarterly) values entered for subnational units selected as the level of analysis are examined for the presence of extreme outliers – i.e. values that are ≥ 3 standard deviations from the mean of monthly (or quarterly) values entered for subnational units. For each primary indicator entered on the **Program Areas and Indicators** tab, the number and percentage of values that are extreme outliers are calculated and the subnational units are identified (Figure 35).

Figure 35. Internal consistency – extreme outliers

DOMAIN 2: INTERNAL CONSISTENCY OF REPORTED DATA

Indicator 2a: Identification of Outliers

Indicator 2a.1: Extreme Outliers (>3 SD from the mean)	National score	2016		
		Districts with extreme outliers relative to the mean		
Program Area and Indicator	%	No.	%	Name
Maternal_Health - ANC 1st Visit	0.2%	1	2.1%	District 39
Immunization - 3rd dose DPT-containing vaccine	0.0%			-
HIV_AIDS - Number of HIV+ persons in palliative care	0.5%	3	6.4%	District 9, District 38, District 41
Malaria - Number of confirmed malaria cases reported	0.0%			-
Immunization - OPV3	0.4%	2	4.3%	District 31, District 39
Multi-program - Penta 1st doses	0.0%			-
Total (all indicators combined)	0.2%			

Interpretation of results - Indicator 2a1:
-
-
-
-
-
-

> **Identification of moderate outliers:** Monthly (or quarterly) values entered for subnational units selected as the level of analysis are examined for the presence of moderate outliers – i.e. values that are between 2 and 3 standard deviations from the mean of monthly (or quarterly) values entered for subnational units. For each primary indicator entered on the **Program Areas and Indicators** tab, the number and percentage of values that are moderate outliers is calculated and the subnational units identified. Moderate outliers are also identified on the basis of the modified Z-score which evaluates monthly (or quarterly) values in relation to the median of monthly (or quarterly) values entered for subnational units. The modified Z-score is preferable for routine data with large variability in monthly values, or when quarterly values are entered for subnational units.

> **Consistency over time:** The plausibility of reported results for selected programme indicators are 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 were reported during the year or over several years (Figure 36).

Figure 36. Internal consistency – consistency over time
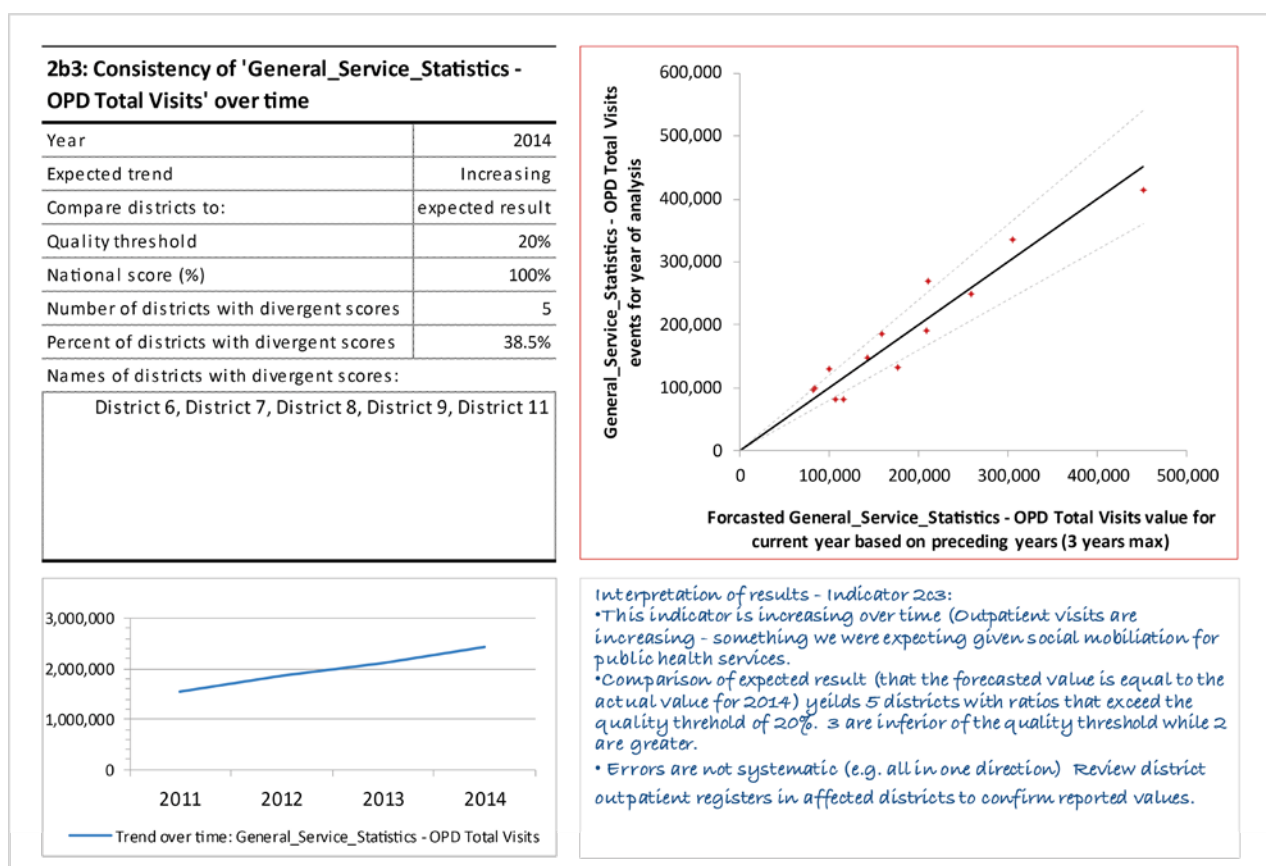
For this metric the annual value of primary indicators for the year of analysis (aggregated from monthly or quarterly values entered for subnational units) is compared to the mean of annual values for the three previous years. Subnational units with a ratio – i.e. of the annual value for the

year of analysis to the mean of the annual values from the three preceding years – that diverges from the expected ratio (or national ratio) more than the recommended (or user-defined) quality threshold are identified, and the number and percentage of such subnational units are calculated.

Users can customize the evaluation of consistency over time in two ways, namely:

1. Users can select how subnational units are evaluated, by either: a) comparing the subnational unit ratio (i.e. the ratio of annual value for the year of analysis to the mean of values for the three preceding years) to the national ratio (i.e. the ratio of the aggregate of the indicator for all subnational units for year of analysis to the mean of aggregate annual values for the three preceding years), or b) comparing the subnational unit ratio to the expected value. The value expected is the value when the trend in the data is consistent. If it is consistent, the ratio equals "1" since the annual value for the indicator equals the mean of the three preceding years. If subnational units are expected to have a ratio that is more like the national ratio (e.g. because of a variation or disruption in service delivery) comparison to the national ratio should be selected. The comparison to expected ratio or national ratio can be selected by using the drop-down list in column F for the line "Compare districts to:" for each of the six indicator-specific dashboards for consistency over time on the "Domain 2 – Internal Consistency" dashboard.

2. Users can select whether to a) compare the annual aggregate value from subnational units to the mean of the annual values for the preceding three years (for a constant trend in the indicator), or b) compare the annual aggregate value from subnational units to the value predicted (or forecast) from the slope of the trend line of the annual values from the preceding three years. The actual trend in the indicator values can be determined by evaluating the trend graphic for each of the primary indicators in the indicator-specific dashboards for consistency over time on the "Domain 2 - Internal Consistency" dashboard. The trend in the indicator (constant or increasing or decreasing) can be selected by using the drop-down list in column F for the line "Expected trend" in the indicator-specific dashboards on the "Domain 2 – Internal Consistency" dashboard.

Consistency between related indicators: Programme indicators which have a predictable relationship to each other are examined to determine whether, in fact, the expected relationship does exist between those indicators. This process examines whether the observed relationship between the indicators, as depicted in the reported data, is that which was expected (Figure 37).

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Figure 37. Internal consistency – consistency between related indicators

Indicator 2c: Internal Consistency - Consistency Between Related Indicators
Consistency between related indicators - Ratio of two related indicators and Districts with ratios significantly different from the national ratio *

2c1: Maternal Health Comparison: ANC 1st Visit : IPT 1st Dose	
Year	2014
Expected relationship	equal
Compare districts with:	national rate
Quality Threshold	10%
National Score (%)	114%
Number of districts with divergent scores	2
Percent of districts with divergent scores	15.4%

Names of districts with divergent scores:

District 5, District 6

Interpretation of results - Indicator 2c1:
• Data seem pretty good - only district 5 has a largely discrepant value
• IPT seems consistently lower than ANC1 - more pregnant women should be receiving IPT
• Stock out of fansidar in Region 2 could explain low number of IPT in Districts 5. Call DHIO in these districts to investigate
• National rate is 114% - most districts are close to this value. District 6 is performing well relative to the other districts but is 'discrepant' relative to the national rate. - no follow up needed.

For this metric, annual aggregate values for primary indicators are compared with annual aggregate values for secondary indicators that are input into the programme area-specific Indicator Data tabs. A ratio of the primary indicator to the secondary indicator is calculated and compared with the national ratio of the same two indicators, or with the expected value of the ratio of the two indicators. The expected value is the value of the ratio when the two indicators are equal or, for a ratio, have the value of 1.

There are two ways in which users can customize the evaluation of consistency between related indicators, namely:

1. Users can select the type of comparison of the two indicators: a) that the two indicators are equal; b) that the primary indicator (Indicator 1) is greater than the secondary indicator (Indicator 2); c) that the primary indicator is less than the secondary indicator; or d) that it is a special case of a drop-out rate (a drop-out rate is a calculation of the loss of clients from one public health process to another associated process, e.g. the loss of clients from the 1st dose of DTP to the 3rd dose). Selection of an equal relationship will enable a scatterplot to show the two indicators and it will be possible to choose between comparing subnational units to the national-level ratio between the two indicators, or the expected value of 1.

Selection of any of the other types of comparisons between the two indicators yields a line graph of the ratio between the two indicators, with target thresholds in red. The type of comparison can be selected using the drop-down list in column F of the line reading "Expected relationship" in the indicator-specific dashboards for "2c: Internal Consistency – Comparison" between related indicators on the "Domain 2 – Internal Consistency" dashboard. (Note: Macros must be enabled for the Excel workbook to work correctly for this functionality.)

2. If "equal" is selected as the expected relationship between the two indicators, the user has the option of choosing how to evaluate subnational units, either: a) by comparison with the national rate (the ratio of the primary indicator to the secondary indicator aggregated over subnational units to derive a national value for each indicator), or b) by the expected result. As noted, the expected result for indicators that are "equal" is 1. Subnational units with a ratio between the two indicators greater than 1 plus the recommended (or user-defined) quality threshold – or less than 1 – are flagged for potential data quality problems.

Domain 3 – External consistency
The level of agreement is assessed between two sources of data measuring the same health indicator. 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.

Data for recent population-based surveys are entered in the **External_Data_Sources** tab. Routine data entered for primary indicators are aggregated to the administrative units of the survey, as indicated on the **Survey_Mapping** tab. The routine data value for the appropriate survey administrative units is then divided by the population value, which is also aggregated to the survey administrative unit in order to derive a rate that is comparable to the survey value for the same administrative unit. The ratio of the routine value to the survey value is then calculated. Subnational units with a ratio greater than 1 plus the recommended (or user-defined) quality threshold (or less than 1 minus the quality threshold) are flagged for potential data quality problems.

In the graphics in the indicator-specific dashboards and the "Domain 3 – External Consistency" dashboard (Figure 38), the routine values are depicted as bars. The survey values are depicted as points (a triangle) with error bars based on the standard error of the survey estimate (entered in the **External_Data_Sources** tab) depicting the range of acceptable error between the survey and the routine values.

Note: this metric requires intensive calculation in Excel which can sometimes slow down navigation within the "Domain 3 – External Consistency" dashboard, or between the Domain 3 dashboard and the neighbouring dashboards. It is important to allow Excel time to do the calculations and complete the navigation.

Figure 38. External consistency – comparison with survey values

Indicator 3a: Comparison of Routine Data with Population-based Survey Values from the Same Period

3a1: 'ANC 1st Visit' consistency ratio (ratio between the facility rates and survey rates)	
Year	2014
Quality Threshold	33%
National Score (%)	106%
Number of Regions with divergent scores	3
Percent of Regions with divergent scores	30.0%
Names of Regions with divergent scores:	
Region 2, Region 4, Region 8	

Interpretation of results - Indicator 3a1:
• ANC HMIS value in region 4 looks too low - could result from missing source documents or a failure to record service delivery. Review report forms from districts in the region to verify the reported values.
• ANC HMIS value in regions 2 and 8 seems too high - could be double counting or duplicate reporting. Call District Health Information Officers to investigate.
•

Domain 4 – External consistency of population data

This data quality metric helps determine the adequacy of the population data that are used in the calculation of health indicators. Population data serve as the denominator in the calculation of a rate or proportion and provide important information on coverage. The metric compares two different sources of population estimates (for which the values are potentially calculated in different ways) 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.

Figure 39. Consistency of population data – comparison with UN population estimate of live births

Indicator 4a: Consistency with UN population projection

	2014
Ratio of population projection of live births from the Bureau of Statistics to a UN live births projection	0.98

Interpretation of results - Indicator 4a:
• Good agreement between official government estimate of live births to the UN estimate. Discrepancy could be related to growth rate used to calculate intercensal years.
•
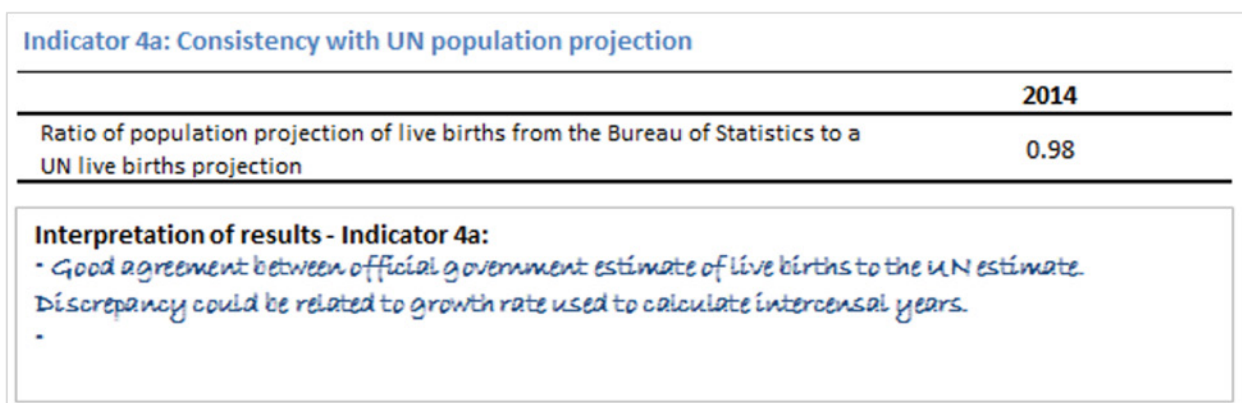
Indicator 4a – "Consistency with UN population projection" compares an estimate of live births from official government sources to the United Nations estimate. A ratio statistic is used to measure discrepancies between the two estimates. Values of the ratio that exceed the established quality threshold should be investigated (Figure 39).

Indicator 4b – "Consistency of denominators between different population data sources" compares the standard population estimate from one population data source to the same population estimate used by an alternative source. If the estimates are different, they can be compared in order to determine the level of congruence. The default population estimates used for comparison in the DQA are: 1) Live births; 2) Expected pregnancies; and 3) Children < 1 year of age. However, user-defined populations can be used by selecting "User defined" in row 9 of the **Input_Standard_Populations** tab under the indicator column headings (Figure 40).

Figure 40. Input Standard Populations tab – input user-defined indicators

The output is a scatterplot with the national-level ratio of data source 1 compared to data source 2 depicted by the dark gray line (Figure 41). The default or user-defined quality thresholds are shown by the dotted lines above and below the national ratio. The ratio of data source 1 and data source 2 for subnational units are shown by the red dots. Subnational unit values that fall above or below the thresholds for quality represent differences from the national-level ratio that are greater than the established standard and are therefore potential data quality problems.

Figure 41. Consistency of population data – consistency between estimates from different data sources

Indicator 4b: Consistency of denominator between program data and official government population statistics

Indicator 4b1 - Comparing the official Live Births denominator to a program denominator, if applicable

Year	2014
Quality Threshold	10%
National Score (%)	106%
Number of districts with divergent scores	4
Percent of districts with divergent scores	30.8%

Names of districts with divergent scores:

District 1, District 5, District 7, District 12

Interpretation of results - Indicator 4b1:
• the Program denominators in Districts 1, 7, and 12 seem too large - and too small in District 5. Review growth rates used by program to estimate intercensal yearly values for live births.
•

Chapter 5. Dissemination and use of DQA results

Data validation workshop

After the data are analysed using the DHIS2 Data Quality tool or the Desk Review Excel tool, and once the results of the health facility assessment are available, a data validation workshop should be conducted with health programme and data managers to review the results and interpret the findings. This workshop is critical for determining whether the results are plausible and whether they are within the range of expectations. Health programme managers have detailed knowledge of service delivery patterns for specific health programmes and are the best placed for determining plausibility. They can also determine the most noteworthy results from the assessment to highlight them in reports. Data managers can help uncover data quality problems, if necessary.

Results should be presented so that all participants can review and discuss the findings. Open and honest discussion of the results among health-sector stakeholders will improve the quality and acceptability of the results. A smaller group can be identified from among the workshop participants to draft the final report. Table 2 shows a sample agenda for a data validation workshop.

Objectives of the Data validation workshop

1. Review DQA findings with programme area experts and determine the plausibility of results.

2. Interpret the results and identify key points.

3. Discuss and identify the root causes of any data quality problems.

4. Formulate recommendations to address data quality problems.

5. Begin planning actions for system strengthening – begin work on a data quality improvement plan.

6. Finalize data analysis and presentation of the data.

Table 2. Template: Agenda for Data Analysis and Verification Workshop

Time	Day 1	Day 2	Day 3	Day 4	Day 5
8:30–9:00	Welcome, workshop objectives and expected outputs	Expected outputs (overview and summary report)	**Report writing by indicator: group work** • Production of tables and graphics • Draft of narrative	**Report back from group work** • Presentation of analysed data and results • Presentation of proposed interventions	**Presentation of Data Quality Improvement Plan**
9:00–0:30	Field survey and data collection • Data entry • Response rate • Lessons learned from field experience (strengths and weaknesses)	Data quality metrics – results and analysis			
10:30–10:45	**Break**	**Break**	**Break**	**Break**	**Break**
10:45–13:00	**Overview of DQA data processing and analysis** Steps in data processing • Data cleaning • Validation by field supervisors	**Data validation by indicator: group work** • Review of results • Discussion of plausibility • Stakeholder buy-in and intervention planning	**Report writing by indicator: group work (continued)** • Production of tables and graphics • Draft of narrative	**Session on cross-cutting data quality challenges** • Discussion on addressing data quality issues that affect all programme areas, and interventions to address cross-cutting issues	**Synthesis and next steps**
13:00–14:00	**Lunch**	**Lunch**	**Lunch**	**Lunch**	**Lunch**
14:00–16:00	**DQA indicator calculation** • Adaptation of the "batch edit" in CSPro (DQA specificities) • Calculation of DQA indicators • Demonstration and practice	**Data validation by indicator: group work (continued)** • Review of results & findings • Discussion of plausibility • Stakeholder buy-in and intervention planning	**Report writing by indicator: group work (continued)** • Production of tables and graphics • Draft of narrative	**Drafting the Data Quality Improvement Plan** • Issues and interventions • Budget • Stakeholders • Mechanism of intervention • Timeline	
16:00–16:15	**Break**	**Break**	**Break**	**Break**	**Break**
16:15 – 18:00	**Use of the Excel tool for automated production of "standard" DQA tables and graphs** • Demonstration and practice	**Report back from group work** • Presentation of findings from data quality assessment and proposed interventions	**Report writing by indicator: group work (continued)** • Production of tables and graphics • Draft of narrative	**Drafting the Data Quality Improvement Plan (continued)**	

Final report

The validated results of the DQA should be written up in narrative form as a report, with graphics depicting results to support the narrative. Graphics can be cut and pasted from the DQA Excel chartbooks and the Desk Review Excel tool or downloaded from DHIS2. Key survey findings should be included, as should recommendations for interventions to address shortcomings in data quality. The report should be disseminated to all staff expected to participate in health-sector planning initiatives (e.g. health-sector review) several weeks prior to the planning event. Other stakeholders – such as donors, technical assistance organizations, relevant national and international NGOs, private-sector bodies (e.g. universities, civil society organizations) and concerned ministries – should receive copies of the report.

The report should contain the following sections:

> Overview – this should place the assessment and findings in the proper context for the reader.

> Methods – this section should describe how the assessment was designed and should note any departures from the standardized methodology.

> Results – this is about what was found in the DQA health facility survey, including:
>   • completeness and timeliness of reporting;
>   • verification factors for tracer indicators;
>   • distribution of discrepancies among health facilities;
>   • reasons for discrepancies;
>   • reasons for missing source documents and reports;
>   • system assessment findings.

> Discussion – this lets the reader know why results that are highlighted are important.

> Recommendations – these inform the reader of possible remedies can be applied to rectify data quality problems. Recommendations also facilitate the drafting of the Data Quality Improvement Plan.

Outline for the Data Quality Assurance final report

1. Introduction – this describes the goals and objectives of the assessment.

2. Background – this places the assessment and findings in the proper context for the reader and relate them to what has come before.

3. Methods – this section describes how the assessment was conducted and notes any departures from the standardized methodology. The section includes:
   3.1. Indicator selection
   3.2. Master facility List
   3.3. Sampling
       3.3.1. Weighting of indicators
   3.4. Data collection
   3.5. Data validation and analysis
   3.6. Quality assurance.

4. Results – This describes what was found by the DQA health facility survey. The section includes:
   4.1. Completeness and timeliness of reporting
   4.2. Verification factors for tracer indicators
   4.3. Distribution of discrepancies among health facilities
   4.4. Reasons for discrepancies
   4.5. Reasons for missing source documents and reports
   4.6. System assessment findings.

5. Desk review results, namely:
   5.1. Domain 1 – Completeness and timeliness
   5.2. Domain 2 – Internal consistency
   5.3. Domain 3 – External consistency
   5.4. Domain 4 – Consistency of population data.

6. Discussion – this lets the reader know why highlighted results are important. This section includes:
   6.1. Principal findings and what they mean
   6.2. Unexpected results
   6.3. Challenges encountered
   6.4. Limitations to the survey results (if any).

7. Recommendations – this section lets the reader know what possible remedies can be applied to rectify data quality problems.

8. Annex of data tables, namely:
   8.1. Survey estimates by indicator
   8.2. Other results.

Develop a Data Quality Improvement Plan[1]

Purpose

The purpose of the Data Quality Improvement Plan is to outline the steps and inputs required to address the causes of data quality problems found during the DQA. Needs should be identified and prioritized, and interventions should be developed and costed to address those needs. A mechanism for monitoring and coordination should be identified or created to ensure that interventions are implemented in good time and within the allotted budget. The goal of the plan is to improve both the quality of the data and the performance of the routine health information system. To meet this goal the plan should provide specific and practical actions that, when implemented, will improve the quality of the data.

Best practices for developing the Data Quality Improvement Plan:

> The development and implementation of the Data Quality Improvement Plan should be led by the Ministry of Health (or other government ministry responsible for the management and upkeep of the health information system).

> The improvement plan should be developed in collaboration with important stakeholders – such as donors, partners and NGOs – to ensure consensus and stakeholder buy-in.

> The activities and interventions in the improvement plan should be relevant to the context in the country and should address the priority needs of the country or organization, including its subunits.

> The interventions should build on what already exists and should be both feasible and appropriate for the context of the health information system and the health system workforce.

> The activities and interventions should promote and facilitate the sustainability of the information system so that the system can satisfy the information needs of the present and can evolve as those needs change.

Data Quality Improvement Plan – the process

Engage stakeholders

To ensure optimum development and implementation of the Data Quality Improvement Plan, important stakeholders should be brought in to participate. Being part of the development

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[1] Adapted from: Moving from assessment to action (user's kit). Chapel Hill (NC): Performance of Routine Information System Management (PRISM) — MEASURE Evaluation, October 2018 (https://www.measureevaluation.org/resources/tools/health-information-systems/prism/performance-of-routine-information-system-management-prism-users-kit-moving-from-assessment-to-action/view, accessed 28 September 2020).

process will encourage stakeholders to invest in the success of the plan, and will help ensure continued support and buy-in. The interests, requirements and priorities of stakeholders should be understood, as should their capacity to commit resources to ensure success. There are likely to be many stakeholders, although not all will need to be involved. Sometimes having too many stakeholders can inhibit the development of a responsive plan. Know your stakeholders and choose them strategically – i.e. choose those that will give the Data Quality Improvement Plan the best chances for success. Stakeholders can help advocate for necessary changes and can mobilize resources to assist with implementation.

A stakeholder engagement matrix can help identify organizations and individuals who have a stake in the improvement of the information system.

A stakeholder engagement matrix (Table 3) can help you identify the organizations, people and groups who are the stakeholders in a data quality improvement process – as contributors, influencers or beneficiaries. The matrix is a structured way to define the roles that stakeholders play in the activity and to assess the resources they could bring to bear. The matrix also provides a framework for assessing the stakeholders' interests, knowledge, positions, alliances, resources, power and importance – Who will resist the initiative? Who will support it? What are their reasons? The matrix helps in assessing which stakeholders to include in the process by determining their relative importance. Which stakeholders have the highest priority for success of the plan?

The identification and engagement of relevant stakeholders contributes to the development of an improvement plan that meets everyone's expectations and needs.

Table 3. Stakeholder engagement matrix

Name of stakeholder organization, group or individual National, regional or local?	Stakeholder description Primary purpose, affiliation, funding	Potential role in the issue or activity Vested interest in the activity	Level of knowledge of the issue Specific areas of expertise	Level of commitment Support or oppose the activity, to what extent, and why?	Available resources Staff, volunteers, money, technology, information, influence	Constraints Limitations: need funds to participate, lack of personnel, political or other barriers	Engagement strategy How will you engage this stakeholder in the activity?	Follow-up strategy Plans for feedback or continued involvement
Government sector								
Political sector								
Commercial sector								
Nongovernmental sector								
Other civil society								
Donors and partners								

Review of DQA results

A formal review of the DQA's results is a good way to understand and prioritize the data quality problems that the assessment has identified. The assessment is an opportunity to discuss potential solutions, prioritize recommendations and prepare a realistic action plan. To encourage and promote ownership of the assessment results, it is recommended to begin by conducting an internal review with the Ministry of Health followed by a review in a workshop setting with a broader group of participants. During this phase of reviewing and analysing the results of the assessment, it is important to ensure that the designated participants from the Ministry of Health and other stakeholder organizations are capable of analysing the DQA's findings, are knowledgeable about the country context and the country's HMIS and, therefore, have the ability to recommend appropriate actions to improve data quality. To ensure a productive review workshop, give the assessment report, charts, graphs and other relevant materials to the participants in advance so that they can prepare. Also identify facilitators who have the skills to keep participants focused and on track to achieve the workshop's expected outcomes.

The review workshop can be combined with the action planning phase. If it is decided to make action planning part of the workshop, ensure that the workshop participants have the authority to make decisions. Alternatively, the first part of the workshop can be for experts of the health information system or health programme to review and validate the quality and relevance of the assessment results and prepare summaries and presentations for the decision-makers. In the second part of the workshop, relevant decision-makers would join the health information system experts. The decision-makers would be briefed on the assessment results and recommendations, would contribute to specifying actions and interventions to address the findings and define the timelines, and would identify responsible persons and organizations and resources required.

In order for the review and formulation of relevant recommendations to be effective, it is recommended to conduct discussions in small groups. The groups should have equal representation from the following categories of participant:

> decision-makers and other users

> health programme managers

> data managers and M&E specialists

> health providers.

The composition of, and tasks assigned to, each group may be as follows:

> ❯ by health programme area (e.g. maternal health, child health, HIV/AIDS, tuberculosis, malaria, etc.)

> ❯ by level of the health system (e.g. national, regional, district, health facility/community).

Results to be reviewed are as follows:

> ❯ Output from the DV/SA
>   - accuracy by indicator
>   - timeliness and completeness
>   - system assessment.

> ❯ Desk review of data quality
>   - completeness
>   - internal consistency (including outliers, trends over time, and consistency between related indicators)
>   - external consistency (including comparisons with population-based survey data and with alternative data sets (e.g. programme-specific databases)
>   - review of population data (including comparisons between official government statistics and alternative sources such as the United Nations and country health programmes).

A plenary session should follow the group discussions, to enable all participants to provide feedback and input on the groups' ideas and proposals, and to learn from one another.

If the review of the DQA assessment and the formulation of recommendations are conducted separately from the action planning session, the assessment results and recommendations should be disseminated to the relevant decision-makers to support them in identifying appropriate strategies and actions for strengthening routine health information systems .

Action planning

The planning process to improve data quality follows the review and discussion of the DQA results and recommendations and the prioritization of strategies to achieve an improved quality of data for HMIS.

The planning process requires good facilitation in order to develop an action plan that describes specific, measurable, achievable, relevant and time-bound (SMART) objectives and activities. Responsibility for the implementation of each activity should be assigned to a specific person or organization.

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Prioritizing interventions for data quality improvement

When formulating recommendations and developing the action plan, it is important to prioritize activities that will lead to the greatest improvement in data quality with available resources (or for which resources can be mobilized). Sustainability of the interventions should also be considered.

Participants in the action planning session can use the prioritization matrix (Table 4) to score the proposed activities based on their expected impact on data quality and on the ability of the organization and stakeholders to implement the activities. Scoring help prioritize the interventions that are most feasible and likely to yield the greatest results.

Table 4. Intervention prioritization matrix

High impact	4				
	3				
	2				
	1				
Low impact					
		1	2	3	4

Difficult to implement (low ability)   Easy (high ability)

The prioritization exercise is conducted through consensus. Participants in the action planning session agree on the level of impact that each recommended intervention will have and the ability of the stakeholders to implement it, while at the same time taking account of the available resources (human, financial, technical, etc.). Participants can work in small groups to discuss and complete the matrix, and then come together in a plenary session to produce a complete and mutually agreed matrix.

The prioritization matrix has a scale for impact on the vertical axis and a scale for ability to implement with the required level of investment (human and financial resources, effort, time)

on the horizontal axis. Each axis is divided into four scores: 1 represents the lowest score for the attribute and 4 represents the highest. The interventions with the most impact, that are the easiest to implement, and that require minimal investment are put in the top right cells of the matrix, and the interventions with the least impact and that are least feasible (i.e. require a high level of human or financial resources or efforts) are put in the lowest cells of the matrix on the left.

Depending on the context, the use of this matrix helps distinguish relevant interventions that are easy, or relatively easy, to implement and that produce moderate-to-high impact from interventions that are less feasible or yield low impact.

Once an intervention has been determined, it should be broken down into well-defined sub-activities so that the person or organization responsible for implementation and funding can be assigned. Table 5 provides an example of how to break down the main intervention into sub-activities that result in data quality improvement.

Scheduling and budgeting activities

The purpose of scheduling and budgeting is to elaborate the overall data quality improvement plan in order to provide a roadmap for the activities under each recommended intervention. Understanding the work required to implement each recommended intervention allows activities to be broken down to estimate the time and resources required for implementation more accurately. Aligning the activities with the resources they require makes it possible to estimate the costs of data quality improvement efforts and to determine the time requirements, and the timetable, for implementation.

Table 5. Example table for scheduling and budgeting activities

Priority actions	Objective	Activities	Short-term	Medium-term	Long-term	Responsible entity	Supporting partner	Budget
Intervention 1								
Action 1	Obj 1	Activity 1	✘					
		Activity 2	✘					
		Activity 3	✘					
Action 2	Obj 2			✘				
				✘				
				✘				

Monitoring and follow-up

Monitoring and evaluation (M&E) helps in measuring performance and assessing the impact of different strategies, interventions and inputs on the efforts to improve data quality. The results of M&E contribute to the learning experience and help decision-makers to improve the interventions.

The action plan itself serves as a monitoring tool to follow up the implementation of the interventions and activities it stipulates. Moreover, the use of DQA routine data quality supervisory checklists can help track progress in improving data quality. For purposes of evaluation, the next implementation of the DQA health facility assessment (DV/SA) can be used to measure the success of interventions. Regular review of implementation of the action plan and monitoring of findings helps stakeholders to identify any mid-course corrections that may be needed.

Example data quality problems and potential solutions

In order to address data quality problems accurately, the nature of the problems should be understood as far as is possible. Knowing the causes of data quality problems means that solutions can be more accurately targeted, making data quality improvement easier and more effective.

Data quality problems should be defined as clearly as possible. The solution may not require a large intervention or costly inputs. Sometimes the solution requires only a visit to a health facility by a supervisor who will work with those managing the data to refresh their skills. The first step is to define the scope of the problem – i.e. how pervasive is it? Is it occurring in all, or most, facilities? Or is it limited to just a few facilities? The issue is: is the problem *limited* or is it *systematic*? If it is limited, the interventions can be targeted at just those facilities experiencing the problem. If it is systematic, however, a broader approach is required.

The nature of the data quality problem must be identified. Is the problem a result of standard practice at the facility – i.e. does the error result from the facility's usual data management practices and therefore occurs repeatedly? Or does the error result from a departure from standard practice and only happened once, or occasionally? Again, the solution will differ depending on the nature of the problem found and will depend on an accurate description of the causes of the problem.

Solutions to data quality problems will depend on the resources available and the political will to intervene. If the causes of data quality problems are well defined, it will be easier to make the case for resources to address the problems adequately. Problems should be fully described in writing, scoped and budgeted, and then presented to stakeholders (e.g. the HMIS technical working group, or inter-agency coordinating committee) at the appropriate time (i.e. when budgetary priorities are being discussed). The Data Quality Improvement Plan is a mechanism by which data quality problems, and their potential solutions, can be presented to policy-makers.

Below are some common data quality problems and potential solutions.

Accuracy of reporting

The accuracy of reporting is the extent to which the results reported by the facility represent the true level of service delivery for a selected period and indicator. The true level of service delivery is represented by the data in source documents (e.g. register). While there may be errors in recording service delivery in the source document, this is the best record we have of that service delivery. For most data quality assessments we must make the assumption that the data in the source documents are sufficiently accurate for our purposes.

If there are suspicions of problems with the data in source documents, methods exist to determine how accurately they reflect actual service delivery. For instance, we can observe how facility staff record the service delivery in the source document. Is it recorded contemporaneously (i.e. at or around the same time)? Is it done by a trained staff member? Are the staff using standard data collection tools?

The value of the indicator for a selected reporting period – generally a month, or several months if the reporting is monthly – as reported by the facility to the next level (in the monthly HMIS or programme report) is compared to a validated value. The validated value is the value of the indicator for the selected period recalculated by the assessment team from the source documents. We calculate a verification factor (VF) to represent the reporting accuracy for the facility, which is the ratio of the recounted value to the reported value. The VF can range from zero to infinity but a perfect congruence between the source documents and reports yields a value of 1. Values greater than 1 represent under-reporting (i.e. more service delivery was found in the source documents than was reported by the facility) while values less than 1 indicate over-reporting (i.e. less service delivery was found in the source documents than was reported by the facility).

The most common causes of poor accuracy of reporting (typically a VF more than 10% different from 1 – i.e. VF ≤ 0.9 or VF ≥ 1.1 – although the standard may depend on the agency commissioning the DQA) are missing source documents and/or reports, incorrect compilation of data, inadequate tools for data collection, and calculation errors. There are more precise causes within these general categories so it is important to fully understand data quality problems in order to target solutions effectively.

Missing source documents or reports

Missing documentation is one of the primary concerns when evaluating data quality problems. The effects of missing documents usually depend on which document is missing. A missing source document tends to result in a VF < 1 (over-reporting) since less service delivery could be verified than is reflected in the monthly reports. Conversely, missing monthly reports tend to result in a VF > 1 (under-reporting) since more service delivery is recorded in the source documents than is evident in the available monthly reports.

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Potential causes:

- *Non-adherence to data storage protocols* of the national programme or HMIS. Either some staff members do not know the protocol or do not understand the importance of maintaining a data archive. The national programme or HMIS probably has a protocol which states how long filed source documents should be kept by the facility (e.g. 5 years).

- *Inadequate storage space.* Does the facility have a space for a data archive? Ideally, the facility should have a room, or a corner of a room, which is secure – i.e. only those who need access have access – as well as being clean and dry.

Potential solutions:

- Non-adherence:
  - If the non-adherence is limited in scope or is non-standard practice, this may be addressed during supervisory visits.
  - If non-adherence is systematic or is standard practice, a memo could be sent to all facilities to remind them of their data archiving responsibilities. If the failing persists, refresher training could be required for data management staff. Or there could be more severe penalties

- Inadequate space:
  - Institute a programme for filing and archiving, including designating a room (clean, dry and secure) in the facility and purchasing filing cabinets and/or shelving units, file folders, etc.

Misunderstanding of indicator definitions

Problems with reporting accuracy can arise when data managers (or those compiling the monthly report at the facility) do not understand, or misunderstand, what to count. For example, how is the indicator supposed to be aggregated, or disaggregated? What constitutes a client served, or a service delivered?

Potential causes:

- *Inadequate training.* The training may have been substandard or it took place too long ago. Was the current data compilation protocol for the relevant indicator included in the training?

- *Inadequate documentation of reporting protocols at sites.* Is there a document that describes the indicator compilation process for each indicator (e.g. a job aide, or HMIS manual) and is there a printed copy accessible at the site?

- *Staff turnover.* The trained staff member may have left the job for another one and has been replaced by someone who has not had the benefit of training.

> *Workload.* There may be no staff member designated to do the data compilation and the task is left to whoever is available, regardless of whether or not they have the appropriate training.

Potential solutions:

> If the problem is limited in scope it can be addressed by supervisory visits from the district to bolster the skills of the staff involved.

> If the problem is more systematic it may require refresher training on protocols for aggregating monthly results by indicator at facilities.

> If there are job aides describing how to compile the indicators, these can be distributed to facility staff. If there are no such job aides, they should be developed and distributed to facility staff.

> All staff members who compile monthly data should have had the appropriate training. A training database should be maintained to so that the training needs of all personnel can be tracked. A training database can show which staff have had which training and when, and which staff have not or are overdue for training.

> A staff member should be designated as the data manager. A stand-in should be trained to take over in the event that the designated staff person is not available.

> A poster can be put on the wall at the facility as a reminder.

Inadequate data collection tools

Up-to-date, well-designed, and always-available data collection tools are critical for good quality reporting.

Potential causes:

> Indicators have changed since the last time the tools were printed and distributed and the data collection tools no longer meet the needs of reporting.

> There are insufficient copies of blank data collection tools available at the facility so staff use improvised forms.

> If a coding scheme is used, the codes are not clear and concise, or not used consistently.

> There is insufficient space on the tools to enter all the required information.

Potential solutions:

- ⮞ Ensure an adequate supply of blank data collection tools. If reproduction and distribution of the tools is more expensive than the HMIS or programme can bear, donor partners should be approached to obtain commitments for supporting reproduction and distribution of essential forms, reports and registers.

- ⮞ Conduct a review of the data collection tools to ensure that they still meet the needs of reporting for the current list of priority indicators.

- ⮞ Redesign, reprint and distribute new data collection tools.

- ⮞ Avoid buying too many blank copies of the tools. Although it may be cheaper to print several years' worth of tools at the same time, this makes the system less adaptable to changes in indicators.

- ⮞ Supervisors should verify (i.e. take inventory) the availability of blank forms/tools at the sites they visit.

- ⮞ Ensure the process for ordering new forms/tools is well known and transparent. This should be written up and distributed to all health facilities.

- ⮞ Investigate the possibility of electronic data collection tools and the transfer of aggregate results.

Calculation errors / recording errors

Errors are inevitable but should be kept to a minimum. If the calculation errors are random, and they do not systematically inflate or reduce indicator values, they may go unnoticed. Even large errors are often masked in the aggregate data at district level and higher. It is better to prevent the errors from getting into the system than to try and find them in the aggregate data afterwards.

Potential causes:

- ⮞ Key punch errors (for computerized systems at facility level) or transcription errors for paper-based systems. Key punch errors (typographical errors) and/or writing the wrong number, or writing an illegible number that is misinterpreted by a data entry clerk somewhere else, are bound to happen. Humans are error-prone.

- ⮞ Arithmetical errors may occur – especially for indicators with a large volume of service (e.g. immunization in large facilities) which require aggregation of data across daily or weekly summary forms or tally sheets.

Potential solutions:

▷ For key punch errors, controls can be introduced into the data entry software to restrict entries that are implausible or impossible. For instance, a computer could prevent you from entering service delivery for antenatal care if the client is male, or not of child-bearing age. Some systems can compare the value entered to the mean of values for the previous year and flag those that are more than two or three standard deviations from the mean of values.

▷ For transcription errors, the best way to prevent these is for a designated person (ideally a supervisor) to conduct data verification on the form prior to submission to the next level. Each value should be checked for plausibility (e.g. by assessing whether the value seems likely given the size of the facility catchment area and the values reported for that indicator by that facility in the past).

▷ If such as system is not in place, a data quality checking protocol can be introduced and facility staff trained to implement it. The DQA includes health facility data quality checklists for this purpose.

▷ At district level and higher, analyses such as those proposed for the Desk Review of data quality are a good way to identify extreme values in the data set. Analyses to identify outliers, anomalous trends and implausible relationships between related indicators are all ways to identify data that have been entered in error.

▷ The best way to identify calculation errors is by conducting data quality checks on the forms before submission to the next level. Also, a calculator can be purchased at minimal cost for the data manager

Missing or incomplete data

"Completeness of reporting" measures the extent to which all health facilities that are expected to report actually do report on a monthly basis. "Completeness of indicator data" measures the extent to which indicator values are included on the reporting form from facilities that are expected to report on a particular indicator. Missing reports and data cause gaps in the understanding of the true levels of service delivery and hinder the ability to make informed decisions based on evidence. The less complete the data, the less useful it is for planning, monitoring and evaluation.

Potential causes

▷ *Non-reporting by health facilities.* Some facilities do not report when they are supposed to, for a variety of reasons such as staff absences, the lack of means to transmit the report (no Internet connection, no fuel for the car, etc.), or withholding of data to extract concessions during employment disputes.

> ❯ *Late reporting (lack of timeliness in reporting).* Timeliness is a form of completeness. If the report is late it is not available when needed for decision-making.

> ❯ *Values for certain indicators not included.* The causes of missing values are many and are similar to the reasons for missing reports. It may be the data were not compiled in time from source documents, or the source documents were missing. It is important, however, to be able to distinguish missing values from a valid report of zero service delivery. For some service areas, it is possible to have no services provided during a given reporting period. For instance, there could be a stock-out of vaccines making immunization impossible before the facility is resupplied. Many data managers are taught to include zero values when there is no service delivery so that no one at higher levels will misinterpret a missing value for a zero value. Increasingly, however, computerized information systems tend not to store zero values since they use a lot of space in the database.

Potential solutions

> ❯ The best way to address incomplete reporting is to try to avoid it. Legislation should be in place to compel public and private facilities alike to report routinely and on time. Facilities that do not report should be contacted immediately by the established mechanism (telephone, email, or other communication platform) to determine why the report is missing and to encourage the facility to send the report.

> ❯ Most often, a lack of data does not mean there was no service delivery. The report was just not compiled and sent, which means that subsequent decision-making and policy formulation at national level will not have that evidence available at the required time. One way to improve incomplete data is to adjust the completeness of the data based on the extent of missing data. For instance:
> - How much service is provided by the non-reporting facilities? None? Some? About half as much as facilities that do report? The same as the reporting facilities? More than the reporting facilities?
> - Adjustment depends on assumptions about the number of service outputs (pregnancy care, vaccinations, etc.) provided at non-reporting facilities compared to those that reported.
> - The adjustment can be expressed as follows: $N_{(adjusted)} = N_{(reported)} + N_{(reported)} * (1/(c)-1)*k$, where N=number of service outputs, c=reporting completeness, and k=adjustment factor.
> - An example would be 1000 DPT1 vaccinations reported, but 80% completeness. It is assumed that the non-reporting facilities provide services at half the rate of reporting facilities (k=0.5): $N_{(adjusted)} = 1000 + 1000*(1/0.80 – 1)*0.5 = 1000 + 1000 *(1.25-1)*0.5 = 1125$.
> - Selecting the best adjustment factor for k:
>   - k=0: no services in non-reporting facilities;
>   - k=0.25: some services, but much lower than in reporting facilities;
>   - K=0.5: half the rate compared to reporting facilities;

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- K=0.75: almost as much as in reporting facilities;
- K=1.0: the same rate of services as in reporting facilities.
- Considerations:
  - Stock-outs (e.g. vaccines) are an example of an actual absence of service delivery.
  - It is important to consider the proportion of all services that are delivered by private facilities that may or may not be compelled to report?
  - Large facilities represent a large proportion of all service delivery, and data missing from these facilities will have a large effect on overall completeness. Is it sufficient to adjust values from these facilities alone?
- While adjustment is likely to provide a more accurate picture of the level and trends of service delivery for priority indicators, it should not be done hastily or without due regard to the integrity of the data set. For instance, do the adjusted values become official values for the health facilities or districts for the periods for which reports were missing and data were adjusted? What if a report comes in late, and the values are different than those predicted? National and subnational HMIS and programme data managers should agree on when and how to adjust data, and how to deal with adjusted values for the official record.

Example outline of a Data Quality Improvement Plan

1. Introduction
   1.1. Background
   1.2. DQA methodology

2. Results of DQA
   2.1. Accuracy by indicator
   2.2. Timeliness & completeness
   2.3. System assessment
   2.4. Results of Desk Review of Data Quality
   2.5. Results of routine data quality checks during supervision
   2.6. Review of systematic data quality problems identified through routine supervision

3. Cross-cutting interventions to address cross-cutting data quality problems
   3.1. Activities
   3.2. Responsible agencies and partners
   3.3. Budget
   3.4. Timeline
   3.5. Agency or unit responsible for monitoring & follow-up of implementation

4. Maternal & Child Health interventions to address MCH data quality problems
   4.1. Activities
   4.2. Responsible agencies and partners

4.3. Budget

4.4. Timeline

4.5. Agency or unit responsible for monitoring & follow-up of implementation

5. Immunization programme interventions to address immunization programme data quality problems
   5.1. Activities
   5.2. Responsible agencies and partners
   5.3. Budget
   5.4. Timeline
   5.5. Agency or unit responsible for monitoring & follow-up of implementation

6. HIV/AIDS programme interventions to address HIV/AIDS programme data quality problems
   6.1. Activities
   6.2. Responsible agencies and partners
   6.3. Budget
   6.4. Timeline
   6.5. Agency or unit responsible for monitoring & follow-up of implementation

7. TB Programme interventions to address TB programme data quality problems
   7.1. Activities
   7.2. Responsible agencies and partners
   7.3. Budget
   7.4. Timeline
   7.5. Agency or unit responsible for monitoring & follow-up of implementation

8. Malaria programme interventions to address malaria programme data quality problems
   8.1. Activities
   8.2. Responsible agencies and partners
   8.3. Budget
   8.4. Timeline
   8.5. Agency or unit responsible for monitoring & follow-up of implementation

9. Monitoring and oversight of implementation
   9.1. Agency responsible for implementation
   9.2. Plan for monitoring and evaluation

10. Overall programme budget

11. Overall programme timeline

12. Conclusion

Annex 1: Recommended indicators

Core indicators

Recommended DQA 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

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 after 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[1] are correct as per standards and benchmarks (B1.4) for paper-based systems[2]*
	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

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[1] 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).

[2] Standards and benchmarks for tuberculosis surveillance and vital registration systems: checklist and user guide. Geneva: World Health Organization; 2014 (WHO/HTM/TB/2014.02; http://apps.who.int/iris/bitstream/10665/112673/1/9789241506724_eng.pdf?ua=1, accessed 20 July 2020).

Additional indicators, continued

Programme area	Indicator name	Full indicator
Recommended DQR indicators		
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 (suspected and con-firmed) 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
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, 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, 3rd dose of pneumococcal vaccines

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.

Annex 2. Recommended indicators – Quality Desk Review

Program	Data type		Indicator
General service statistics	Population		• Total population
	Routine		• Total outpatient visits
Maternal health	Population		• Estimated number of pregnant women • Estimated number of deliveries
	Survey	Core	• ANC1 coverage • Institutional deliveries
		In-depth	• Tetanus toxoid (TT) 1st dose
	Routine	Core	• ANC 1st visit
		In-depth	• ANC 4th visit • Institutional deliveries • ITP1 • Tetanus toxoid (TT) 1st dose • Postpartum care coverage
Immunization	Population		• Estimated number of children < 1 year ("surviving infants")
	Survey		• Estimated coverage with 3rd dose DTP-containing vaccine
	Routine	Core	• 3rd dose DTP-containing vaccine in children < 1 year
		In-depth	• 1st, 2nd, 3rd dose DTP-containing vaccine (DTP1-3/Penta1-3) • Number of children vaccinated with 1st dose of measles-containing vaccine • Doses of PCV1–3 in children < 1 year[1]
HIV/AIDS	Population		• Total population • HIV prevalence to estimate population in need
	Survey	Core	• Currently on ART is not normally assessed by household surveys
		In-depth	• HIV counselling and testing during last 12 months • Pregnant women HIV-tested in ANC
	Routine	Core	• Number and % of PLHIV who are receiving HIV care (including ART services) (HIV coverage)
		In-depth	• % of HIV-positive persons on ART (or ART coverage)[2] • PMTCT ART coverage • ART retention at 12 months • Viral suppression

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[1] If the country has implemented vaccination with PCV, note that some countries may use this in a 2+1 schedule by which the third dose may be given at or after 12 months.
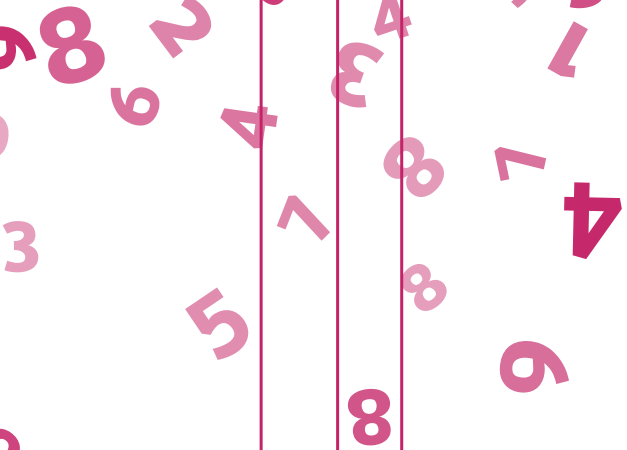
[2] Depending on the country's policies on ARV coverage – e.g. adoption of WHO's 2013 ARV guidelines recommendation of 85% of HIV-infected persons on treatment.

Program	Data type		Indicator
TB	Population		• Total population
	Routine	Core	• Number of notified TB cases (all forms of TB)
		In-depth	• Number of TB cases successfully treated (all forms of TB) • Number of TB cases (new and relapse) tested for HIV • Number of HIV-positive TB patients initiated on ART • Number of MDR-TB cases detected • Number of MDR-TB cases successfully treated
Malaria	Population		• Total population
	Survey	Core	• Malaria confirmation by health facilities is not normally assessed by household surveys
		In-depth	• Proportion of pregnant women treated with 3 or more doses of IPTp • % of children with fever who took first-line antimalarial among those given any antimalarial treatment
	Routine	Core	• Number of cases of malaria confirmed by microscopy or RDT
		In-depth	• Number of malaria diagnostic tests performed (microscopy or RDT; positive or negative) • Number of confirmed malaria cases (positive microscopy or RDT) • Number of presumed malaria cases • Number of confirmed malaria cases treated • Total number of malaria cases (suspected and confirmed) treated • Number of pregnant women attending antenatal clinics treated with 3 or more doses of IPTp

Note: ANC = antenatal care; ART = antiretroviral therapy; DTP3 = diphtheria-tetanus-pertussis; IPT = intermittent preventive therapy; MDR-TB = multidrug resistant tuberculosis; PLHIV = people living with HIV; PMTCT = Prevention of mother-to-child transmission; RDT = rapid diagnostic test.

Notes

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DATA QUALITY ASSURANCE