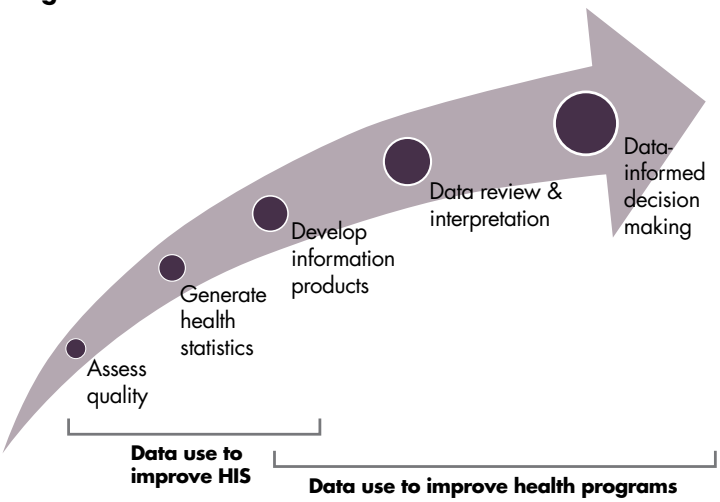
Mapping the Stages of MEASURE Evaluation's Data Use Continuum to DHIS 2

An Example from the Democratic Republic of the Congo

Background

The use of good-quality health data for decision making is the key output of strengthened health information systems (HIS) and a cornerstone of a well-functioning health system. Data use is defined as "the analysis, synthesis, interpretation, and review of data as part of decision-making processes, regardless of the source of data" (Nutley & Reynolds, 2013). MEASURE Evaluation, which is funded by the United States Agency for International Development, has developed the data use continuum, which describes how data are used both to strengthen HIS and to improve health programs.

Figure 1. Data use continuum



Source: MEASURE Evaluation, 2017

As depicted in Figure 1, data are first analyzed to **assess their quality**, ensuring confidence in the information being used to strengthening the HIS. Routinely collected health data should be reviewed by HIS and health managers at each level of the health system to identify and understand any gaps, inconsistencies, and inaccuracies in reporting. Targeted interventions and corrective actions to make sure that data are complete, accurate, and timely can then be determined and implemented to strengthen the HIS. Next, the data are analyzed to **generate health statistics** that address key health questions for stakeholders at all levels of the health system. The statistics include indicators needed for program management to monitor and evaluate progress against targets for donors, for a health-specific strategy, or for monitoring and evaluation (M&E) plans. The health statistics are subsequently synthesized, analyzed, visualized, and packaged in **tailored information products** that are easily interpreted and understood by stakeholders. These products may be reports, dashboards, bulletins, policy briefs, and speeches that cover important issues for stakeholders, describe findings, and recommend actions. The information products are then **reviewed and interpreted** for program performance in a proactive and interactive process that brings together the people who produce the data and those who use the data. The health statistics and information products are reviewed during program monitoring, planning, and improvement; advocacy; and policy development and review. This review process helps to identify priority problems, craft solutions to address them, and advocate decisions that will ultimately improve health programs, systems, and outcomes. Data-informed decision making is frequently a multisectoral process involving actors beyond the authority and control of the organization managing the HIS and, in some cases, the health sector itself. Health data are among several factors that influence decision making. Other factors are the availability of financial and human resources, political will to advocate decisions, and governance structures and processes for decision making.

DHIS 2 Implementation in the DRC

Many countries are transitioning to the use of electronic systems to aggregate and manage routine data and to improve the collection and storage of data so they are more accessible by decision makers. DHIS 2 is an electronic platform for the collection and analysis of health data. The Ministry of Health of the Democratic Republic of the Congo (DRC) adopted DHIS 2 as the country's national health information system. The government began to pilot and roll out the system subnationally in 2014, scaling it up countrywide over three years. The U.S. President's Malaria Initiative (PMI) funded MEASURE Evaluation to conduct an assessment in 2017 that highlighted several barriers to

the use of malaria data at multiple levels of the health system in the country (Box 1). This assessment informed a series of interventions to strengthen the use of DHIS 2. This brief documents the key phases of the data use continuum and describes the ways in which the rollout and implementation of DHIS 2 in the DRC facilitated the use of data to improve the HIS and health programs.

MEASURE Evaluation has supported the strengthening of DHIS 2 in the DRC in the following ways:

- Facilitated formal training for health personnel at the service delivery and intermediary levels in the use of DHIS 2, including data analysis, data visualization, and data use.
- Supported the streamlining and configuration of program-specific indicators in DHIS 2.
- Selected 77 health facilities in three priority provinces of PMI to serve as center(s) of excellence (COE) for M&E to model good data quality practices. These COE received data management tools and equipment and specialized supervision, coaching, and targeted training, enabling them to input data directly in DHIS 2.
- Led routine data quality assessments at health facilities in targeted health zones and at selected health facilities (COE).
- Provided technical assistance through provincial advisors in data collection, data analysis, and data interpretation.
- Established procedures and processes to standardize data review meetings and use data to identify and follow up on recommendations for priority actions.

Methods

MEASURE Evaluation organized a series of key informant interviews to understand how the stages of the data use continuum map to the implementation of DHIS 2 in the DRC. Thirteen interviews were conducted with DHIS 2 users—staff from the National Malaria Control Program (NMCP), provincial health divisions (divisions provinciales de santé [DPS]), health zones (*equipes cadres de la zones de santé* [ECZS]), and COE in the provinces of Haut-Katanga and South Kivu, and with national and provincial advisors from MEASURE Evaluation. The interviews were conducted in French by a lead researcher using a semi structured interview guide. All respondents provided verbal informed consent, and the interviews were recorded using digital audio recorders. Detailed notes were developed based on the recordings.

Box 1. Findings from MEASURE Evaluation's 2017 assessment of data use barriers in the DRC

Findings from an assessment conducted in seven provinces highlighted several barriers to the use of malaria data in the DRC (Brodsky & Nyanzi, 2017). Barriers included the following:

- Data availability and access were impeded by low confidence in the use of DHIS 2, resulting in a lack of ownership of the health data.
- Poor data quality—problems with accuracy, completeness, and timeliness of reported data—resulted in low confidence in the data that were available for decision making. Data quality checks and audits did not occur regularly.
- Although data management processes were well defined—with formalized, standard guidelines for the data continuum, from data collection through data review and reporting—data management and analysis tasks were primarily carried out at the provincial level and were not decentralized to lower levels.
- The dissemination of information was limited and did not occur on a regular basis. For example, few chief officers had copies of newsletters, reports, or bulletins published by their sites in the past year.
- Supportive supervision visits, when they did occur, focused mainly on data quality. There was no emphasis on the review of data for M&E purposes or to help teams answer key programmatic questions.

Stages of the Data Use Continuum

Assess Data Quality

The use of DHIS 2 improved the ability of health staff to assess data quality and, as a result, improved the timeliness and completeness of data capture and recording. In the DRC, DHIS 2 was configured to include more than 100 data validation rules for entering data in DHIS 2, which ensure that data are captured consistently using the correct formats, within reasonable ranges, and meeting logical conditions. Respondents from the health facilities, especially COE, indicated that DHIS 2 validation rules contributed to strengthened ownership of data quality processes, because these rules allowed facilities to verify the data themselves before sending the data to higher levels, and facilities did not have to wait for feedback from provinces to ensure the quality of data.

Several respondents noted that embedding data quality checks in the DHIS 2 platform helped improve their attitude and promoted routine data collection and reporting practices. Respondents stated that health workers were "more careful" when entering and coding data to avoid contradicting validation rules. Because data quality reviews have become a routine part of daily activities, health facility personnel were paying more attention to data quality issues, recognizing the importance of the data, and trying harder to ensure high-quality data. Respondents reported a daily practice of reviewing data, more consistent use of tally sheets and registers to facilitate the aggregation of monthly data, and regular meetings at the facility level to verify data before they were entered in DHIS 2. Respondents also indicated that DHIS 2 helped strengthen feedback mechanisms at health centers based on the timely review of submitted data. Regular schedules for monthly data submission and data certification/review at the health centers and health zones were institutionalized, along with established processes for monthly feedback after review meetings, coupled with the development and monitoring of action plans.

Examples of results from the review of data for data quality are given in Box 2.

Generate Health Statistics

The DHIS 2 platform allows users to easily configure indicators (i.e., incidence rates, proportions, and ratios) based on data elements in the system. This feature facilitates the simple calculation and analysis of program indicators, including data quality indicators on the completeness and timeliness of reporting.

Respondents from the different levels of the health system in the DRC noted that prior to the introduction of DHIS 2, the process for collating and analyzing data to review program performance was confusing and time-consuming. It was also very difficult to conduct more complex analyses, such as trend analysis and comparisons across units of analysis. The introduction of DHIS 2 has simplified the process for comparing indicators. It has also helped address a lack of understanding of indicator definitions and the interpretation of selected indicators, for example, by facilitating comparisons of related indicators across a case-management cascade. With the ease of producing analyses in DHIS 2, respondents indicated that these types of analyses have become standard and "are done as a matter of routine practice." Health center data can be entered by a facility itself, with indicators automatically calculated by the system. This empowers health staff at lower levels to actively use data to make recommendations and decisions at their level, because, according to one respondent, they can "work with

> Before [the introduction of] the DHIS 2, everything was in disorder, and data collection and reporting took a lot of time. Data reporting and analysis only happened on demand. Now with the DHIS 2, health staff have access to the data whenever they want it. . . . It motivates workers. — Provincial M&E advisor

Box 2. Use of data to improve the HIS

- One health zone analyzed two indicators (number of suspected cases of malaria and number of suspected malaria cases that were tested) and found that there were fewer suspected cases tested than expected. This prompted a visit from the health zone to the facility, where it was discovered that the malaria rapid diagnostic tests (RDTs) were not properly recorded. (They were recorded as thick smears rather than as tests.) This discovery led to further training from the health zone to health personnel on how to record the malaria test as thick smears rather than as tests.
- The NMCP conducted an analysis in DHIS 2 and noted that stockouts of test kits reported in a province did not align with the reported consumption of test kits. The data also showed that more tests were administered than the number of suspected cases reported. Further investigation revealed that consumption data were being reported directly to an implementing partner, bypassing reporting to the province. The NMCP responded by conducting training to clarify data recording processes for malaria tests performed and modifying the reporting and decision-making processes for responding to stockouts.
- At an indicator harmonization meeting conducted in 2017, a review of malaria indicators in DHIS 2 showed a spike in malaria cases. A comparison of related malaria indicators, including the number of suspected cases, the number of tests conducted, and the number of cases confirmed by a malaria test, indicated discrepancies in the data. For example, the data showed that there were more suspected cases tested than the number of malaria tests used. The findings were investigated, and it was determined that there was a lag in entering the malaria case and consumption data, which could lead to delays in identifying stockouts of RDTs. In response, facilities were instructed to consolidate data on a weekly basis instead of on a monthly basis, thereby ensuring that sites had a secure stock level, to avoid stockouts.

the data themselves. . . . Now they don't just report it and wait for higher-up levels to analyze data." Higher levels receive information that has already been entered and analyzed by facilities.

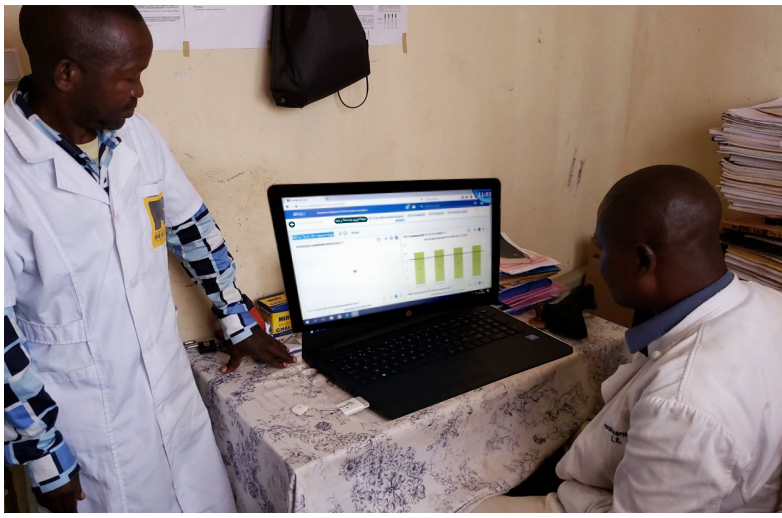
Respondents at provincial and health zone levels stated that DHIS 2 had simplified the process of providing feedback to lower levels and reduced the amount of time needed for data compilation and analysis. Instead of providing individual feedback separately, DHIS 2 has made it easy to compile and present disaggregated information such that supervisors can easily analyze and compare across geographic units at the same time. The ability to generate information on critical health statistics and indicators easily has also facilitated the production of information products.

Develop Information Products

DHIS 2 has modules that allow users to present indicators in tables, charts, graphs, and maps, which can then be combined into a dashboard, permitting users to quickly visualize multiple analytical objects at one time. The ability to access synthesized data formats that are easily understood facilitates more frequent monitoring, review, and interpretation of data. Respondents in the DRC identified several information products and outputs generated based on data from DHIS 2, including dashboards, graphs, maps, data tables, data bulletins, and annual reports. For example, dynamic performance monitoring indicator dashboards were set up by the NMCP to track priority malaria indicators, which are regularly updated as new data are entered.

Respondents noted that the DHIS 2 dashboards were targeted to health facility staff, especially the COE, at which the regular production, analysis, and use of DHIS 2 dashboards for program and data quality indicators occurred. Health providers also regularly consulted the DHIS 2 visualizations to track health indicators (e.g., an increase or decrease in malaria cases) and to discuss actions based on the data, including the development of behavior-change communication messages for communities in response to changes in the health indicators. Information products were also regularly disseminated and brought to zonal and provincial review meetings for review and discussion.

> Before [the DHIS 2], we would simply present data and look at numbers during data review meetings. Now we know about data analysis and can discuss the significance of what the numbers are saying. —Staff member from COE, South Kivu



Use of the DHIS 2 dashboard at a health facility. Photo courtesy of Scott McKeown

Data Review and Interpretation

Outputs from DHIS 2, including calculations of critical health statistics and data visualizations and dashboards, are an important component of data review meetings at all levels. Respondents indicated that they frequently viewed DHIS 2 on computer screens or projected visualizations and dashboards during data review meetings. Data review meetings can promote data use by generating regular demand for data; respondents cited these meetings as a prime opportunity to review data together and encourage exchange between units, calling them a venue to "review our performance in relation to other health centers in the zone." However, respondents also reported that the introduction of DHIS 2 and the availability of its outputs were not sufficient to guarantee that data would be reviewed and used in decision making. To fully leverage improvements in data availability, access, and quality, MEASURE Evaluation facilitated capacity building workshops on data collection, quality, analysis, and use across the levels of the health system. The project also worked to institutionalize processes to conduct data review meetings, ensuring a comprehensive approach that had adequate preparation, execution, and follow-up and established a schedule for the standardized review of data, with monthly feedback to facilities following each review meeting for follow-up, correction, and action. Action plans are regularly followed over time, at subsequent review meetings, to ensure accountability and track progress. One respondent noted that an "analysis team" had been created to direct how data analysis and review tasks would be completed and by whom. The organization and quality of the data review meetings has improved substantially, resulting in actionable recommendations that can be implemented and followed up locally.

Table 1. Data review structures in the DRC

Level of health system	Types of meetings
National level	• Annual program review • Quarterly NMCP data analysis meeting
Provincial level	• Provincial semiannual review • Quarterly data review (all programs) • Monthly malaria data validation meeting
Health zone level	• Monthly data review (all programs) • Quarterly data review with COE
COE (health facility) level	• Data quality review held every Monday • Monthly data review meeting prior to submitting data to DHIS 2 • Quarterly data review with health zone (See above.)

Data-Informed Decision Making

Respondents identified several ways in which the use of DHIS 2—and the data use continuum—have led to improvements in data-informed decision making for enhanced program planning and management, supervision, and program improvement. One respondent noted that decisions are made in more methodological ways, as achievements are compared to targets, issues and problems are identified, likely causes of underperformance are highlighted, and corrective actions are prioritized.

Data from DHIS 2 have been used to inform planning and preparation for supportive supervision visits, thereby improving the quality and effectiveness of the visits. Respondents from the health zone indicated that supervision visits were previously conducted without prior knowledge of the priority issues at their assigned health facilities. With the introduction of DHIS 2, managers can now look at the data to inform their supportive supervision visits, identify and address recurring data problems with health facility staff prior to the visits, and flag problematic performance issues at the health facilities during their visits. Information products, such as reports and dashboards, can be quickly retrieved during the supervision visits for review and analysis, improving the effectiveness of the visits and time management during the visits. Respondents noted that recommendations made during the visits were now more informed by data and more transparent: "Before, supervisors would make recommendations, but [because] we didn't really understand them or on what [information] they were based, the recommendations were not followed. Now we do understand and follow [the] recommendations." Supervision visits were identified as an important component to improve the use of data, because they provide a mechanism for positive reinforcement of the use of DHIS 2 and the importance of data through regular coaching and mentoring.

> Before, we would go on supervision visits without knowing what the problems were in the health facilities. Now, we know the problems beforehand and can look at the overall situation before the visit. Supervisors now go on the visits with analyzed information, which is then discussed during the visit. This allows for the identification of problems and discussion of solutions. — ECZS staff, South Kivu

Respondents also noted several ways in which data were reviewed, to interpret information and draw conclusions, that resulted in the identification of potential solutions and implementation of actions at all levels of the health system. These examples showcase ways in which data from DHIS 2 moved through the data use continuum to inform action.

- **Data were used to better inform and advocate for the allocation of resources.** For example, a quarterly review of data in one province indicated that only 16 percent of pregnant women received long-lasting insecticidal nets (LLINs) during antenatal care visits, owing to the lower availability of LLINs in the health zones. This information was used to advocate that implementing partners accelerate the supply of LLINs in the health zone. At the provincial level, a trend analysis from DHIS 2 showed an increasing number of malaria cases, prompting a follow-up investigation by a technician and a clinician. They discovered that the geographical area was insecure, resulting in the interruption of a malaria community case-management project and increased barriers to clients accessing health services. Based on these findings, recommendations called for more supervision visits to ensure the availability of sufficient stocks of malaria commodities and plan for better coordination with partners.
- **Data were used to adapt approaches and strategies for service delivery**. For example, a review of data from a DHIS 2 dashboard flagged poor performance on immunization-related indicators at a health center. This prompted follow-up analysis and interpretation of the data during a supervision visit, which indicated that the number of vaccination sessions conducted each month was not sufficient to reach targets. Based on the recommendations from the health zone supervisors, a

decision was made to increase the number of vaccination sessions at the health facility. Further, at the national level, a review of data during a National Strategic Information System Working Group meeting revealed discrepancies among the number of bed nets distributed, the stock of bed nets, and the number of bed nets in use. These findings prompted the organization of a field visit by the NMCP, DPS, MEASURE Evaluation, and Centrale d'Achat des Médicaments Essentiels de Lubumbashi, during which the team discovered poor management of commodities. Recommended actions based on the findings included the integration of bed net distribution in the delivery of other health services (e.g., postnatal care services, such as child immunizations) and refresher training for health personnel on criteria for bed net distribution.

Health facility staff access and review data in the DRC. Photo courtesy of Olivier Kakesa

Conclusion

The introduction of DHIS 2 in the DRC has contributed to improvements in data quality, the availability and accessibility of health statistics, and the generation of data visualizations to facilitate data interpretation. Coupled with strengthened HIS governance mechanisms; capacity building; and ongoing mentoring activities in data quality, analysis, and use, respondents from the DRC reported increased ownership of data tasks at lower levels and improved motivation to use data for action.

References

Brodsky, I., & Nyanzi, I. (2017). *Data use in the Democratic Republic of the Congo's malaria program: National and provincial results*. Chapel Hill, NC, USA: University of North Carolina at Chapel Hill. Retrieved from https://www.measureevaluation.org/resources/publications/tr-17-165-en

Nutley, T., & Reynolds, H. W. (2013). Improving the use of health data for health system strengthening. *Global Health Action*, 6, 20001. Retrieved from https://www.tandfonline.com/doi/full/10.3402./gha.v6i0.20001

MEASURE Evaluation. (2017). *Strengthening health information systems in low- and middle-income countries—A model to frame what we know and what we need to learn*. Chapel Hill, NC, USA: MEASURE Evaluation, University of North Carolina. Retrieved from https://www.measureevaluation.org/resources/publications/tr-17-156

This publication was produced with the support of the United States Agency for International Development (USAID) under the terms of MEASURE Evaluation cooperative agreement AID-OAA-L-14-00004. MEASURE Evaluation is implemented by the Carolina Population Center, University of North Carolina at Chapel Hill in partnership with ICF International; John Snow, Inc.; Management Sciences for Health; Palladium; and Tulane University. Views expressed are not necessarily those of USAID or the United States government. FS-19-344

USAID FROM THE AMERICAN PEOPLE

MEASURE Evaluation