

Use of Routine Health Information System Data to Monitor and Improve Quality of Care

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Introduction

To reduce maternal and neonatal mortality substantially and move towards eliminating preventable causes of maternal and newborn death, increased coverage of services should be accompanied by improved quality throughout the continuum of care. Data enable practitioners to accurately identify quality of care (QOC) problems, prioritize quality improvement initiatives, and objectively assess whether QOC change and improvement has occurred. Collecting and analyzing data are therefore central to the function of quality improvement in any health service.

The World Health Organization (WHO), with support from various global partners, has developed QOC standards for improving maternal and newborn care,¹ child and young adolescent care,² care for small and sick newborns,³ and a monitoring framework⁴ and measures. The measures include inputs, outputs or processes, and outcomes and have been grouped by interventions, such as postpartum hemorrhage (PPH) or newborn resuscitation. At the global level, the monitoring framework proposed 15 common QOC measures or indicators to track across all Quality Equity and Dignity (QED) health facilities across countries. The framework also recommends the use of routinely available data to calculate indicators and that routine data collection sources should include all routine health information system (RHIS) sources, such as:

- a. Information related to clinical service delivery and service utilization (patient records/facility registers including individual-level community data/facility eRegister; data aggregated within Health Management Information Systems (HMIS) or District Health Information Software, version 2 [DHIS2])
- b. Service outcomes and cause of death (Maternal and Perinatal Death Surveillance and Response [MPDSR]; civil registration and vital statistics)
- c. Data on availability of drugs, equipment, etc. (warehouse inventory management system, logistics management information systems [LMIS] and procurement tracker, hospital asset management system)
- d. Availability of skilled personnel (human resources [iHRIS] and staff training data systems).

¹ WHO. (2016). Standards for improving quality of maternal and newborn care in health facilities. Geneva, Switzerland: WHO. Retrieved from <https://www.qualityofcarenetwork.org/knowledge-library/standards-improving-quality-maternal-and-newborn-care-health-facilities>

² WHO. (2018). Standards for improving the quality of care for children and young adolescents in health facilities. Retrieved from <https://www.qualityofcarenetwork.org/knowledge-library/standards-improving-quality-care-children-and-young-adolescents-health-facilities>

³ WHO. (2020). Standards for improving the quality of care for small and sick newborns in health facilities. Retrieved from <https://www.qualityofcarenetwork.org/knowledge-library/standards-improving-quality-care-small-and-sick-newborns-health-facilities>

⁴ WHO. (2019). Quality of Care for Maternal and Newborn Health: A Monitoring Framework for Network Countries. Retrieved from <https://www.qualityofcarenetwork.org/knowledge-library/quality-care-maternal-and-newborn-health-monitoring-framework-network-countries-0>



Study Objectives and Methods

This study, funded by the United States Agency for International Development's (USAID) Bureau for Global Health through the Data for Impact (D4I) project, used the WHO framework with some adaptations to assess how practitioners and government officials use the QOC indicators to inform reproductive, maternal, newborn, and child health (RMNCH) decision making in Bangladesh. Study objectives included:

1. To document what routine health information systems, data elements, and indicators referenced in the WHO framework are available and used in Bangladesh for quality improvement.
2. To document who the RHIS data users are and their perception and experience of using RHIS for QOC improvement efforts.

Methodology

A study protocol was developed, and the ethics review determined no institutional review board (IRB) approval was required. The study team conducted a document review of blank copies of all MNCH facility registers, summary reporting forms, and/or digital tools used for quality improvement. The review was useful in mapping the 15 common QED indicators to Bangladesh quality improvement indicators. Interview guides were used to gather information about experiences in using data from RHIS for quality improvement (QI), facilitators of a strong health information system (HIS), and recommendations to improve use of HIS data for QI.

Key informant interviews were conducted with representatives at the national, district, and health facility levels. Districts and health facilities were selected based on discussions with the quality improvement secretariate (QIS), UNICEF, and MaMoni project staff, who prioritized best-performing sites that had been implementing quality improvement activities for more than two years. In consultation with the QIS, UNICEF, and USAID's MaMoni Maternal and Newborn Care Strengthening Project, the study team identified two districts meeting these criteria: the UNICEF-supported QI initiative that started in 2018 in Moulvibazar, and the MaMoni-supported QI program that commenced in Manikganj at the end of 2019.

The 24 respondents included QIS representatives, directors of MNCH and RHIS at the Ministry of Health and Family Welfare (MOHFW), district QI focal persons, health facility managers and QI focal persons, UNICEF, USAID-MaMoni, WHO, UNFPA, and other nongovernmental organization (NGO) implementing partners.

Fieldwork was undertaken by an independent consultant from December 2020 through March 2021. All interviews were recorded and expanded with field notes. Local language transcripts were translated into English for analysis. ATLAS.ti 9 was used for analyzing qualitative data. Two researchers independently reviewed transcripts and developed codes, which were applied to three randomly selected transcripts to check for discrepancies and then resolved. Codes have been summarized in this final brief.

Findings

Bangladesh joined the first wave of WHO's "Network for Improving Quality of Care," where it undertook several initiatives to support QOC implementation, including a QIS at the national level, QI coordination structures at national and subnational levels, a technical working group, and a Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) Quality Improvement Framework (jointly developed by the MOHFW, in collaboration with all partners). The Bangladesh RMNCAH framework aligns with the global framework on the 15 common indicators and over 200 other indicators. The measurement system has been strengthened and QED indicators integrated in the HMIS (DHIS2) and supported by all partners. Maternal and perinatal death surveillance and response (MPDSR) national guidelines and tools were developed and implemented. We next present study findings by objective.



Information Systems, Data Elements, and Indicators Included in the WHO Framework and Standards for Improving QOC Available and Used in Bangladesh from RHIS for Quality Improvement

- The document review comparing the 15 common QED indicators across the global framework with the Bangladesh RMNCAH framework and national DHIS2 indicators showed that only nine of the 15 QED common indicators are summarized and reported in DHIS2 in Bangladesh. Disaggregated data are required for four common indicators that are not reported in DHIS2 but are available in paper registers or USAID-supported electronic management information systems (eMIS). Table 1 summarizes the list of global QED indicators compared to Bangladesh national QI indicators that are available in DHIS2.

“Among the 15 (QED indicators) actually we get 9 directly from the systems (more than 50% data), another 30% we can get from the register, and the other 20% depends on the quality bundles approach or other supplementary form.” – Project staff

- While most of the QED indicators have been included in the DHIS2, several related to experience of care and water, sanitation, and hygiene (WASH) can only be collected via surveys. It was reported that data on the proposed experience of care and WASH indicators are difficult to collect in RHIS.

“[For] most of those QED indicators we are able to collect the data, except a few of the indicators that we could not manage to get through the routine system, like the WASH indicator. Some of the experience of care indicators are difficult. We are facing those challenges to get the data.” – National level staff supporting QI initiatives

- In addition to monitoring service delivery or the clinical indicators available in DHIS2, respondents at the health facility level reported using human resource management (HRM) data to determine how many human resources are required and whether they are trained; and data from logistics to report if equipment is not functioning or the kinds of medicines and supplies needed, as well as how much medicine is in the medical storeroom record and how much will be needed in the future. However, it was reported that it is difficult to get information about how much supply will be provided by the distribution center. Table 1 shows the global QED common indicators compared to those used in Bangladesh.

“The government has a logistic management information system (LMIS). We work at the national level strengthening, and also at the district level so that the district managers utilize that system effectively and identify stockouts early on and also request supplies from their relevant authority. This input also goes to the district level. DHIS2 has a separate domain for human resource information system to update the human resources status.”
– Project staff supporting QI initiatives

- Health facilities reported a range of indicators used, such as antenatal care (ANC) 4 visit, accurate plotting of partographs, normal delivery and percent cesarean sections, and others. At the health facility level, indicators are selected based on local needs and priority areas for improvement. While the approach provides flexibility to health facility teams on selecting their priority aims and indicators, it adds a dual burden for health facility staff, as they have to analyze the health facility indicators as well as the 15 QED common indicators.
- Mapping of the different data systems used for quality improvement showed six types of data sources are used by health facility staff. Figure 1 summarizes the six types of data sources used for quality improvement of MNCH services in Bangladesh.

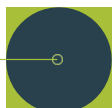


Table 1. Global QED common indicators versus Bangladesh national QI indicators available in DHIS2

| # | QED common indicators (CI) ^{iv} | Bangladesh national QI indicators ⁵ | Available in Bangladesh DHIS2* |
|----|---|---|--------------------------------|
| | NA | Neonatal deaths in the health facility | Yes |
| 1 | # of neonatal deaths by cause | Neonatal deaths in the health facility due to prematurity Neonatal deaths in the health facility due to birth asphyxia Neonatal deaths in the health facility due to sepsis Neonatal deaths in the health facility due to other causes | No No No No |
| 2 | # of predischage maternal deaths | Predischage maternal deaths | Yes |
| 3 | # of maternal deaths by cause | Predischage maternal deaths due to hemorrhage Predischage maternal deaths due to preeclampsia/eclampsia Predischage maternal deaths due to sepsis Predischage maternal deaths due to other causes | No No No No |
| 4 | Institutional stillbirth rate (disaggregated by fresh/macerated when possible) | Institutional stillbirth rate (total) Institutional stillbirth rate – fresh Institutional stillbirth rate – macerated | Yes No No |
| 5 | Predischage neonatal mortality rate | Predischage neonatal mortality rate | Yes |
| 6 | Obstetric case fatality rate (disaggregated by direct/indirect when possible) | Obstetric case fatality rate (total) Direct obstetric case fatality rate Indirect obstetric case fatality rate | Yes No No |
| 7 | Proportion of women who received predischage counseling for mother and baby (woman-reported) | % of women reporting postpartum counselling for themselves and the baby | No** |
| 8 | Companion of choice (woman-reported) | % of women who wanted and had a companion of choice during labor % of women who wanted and had a companion of choice during childbirth | No** No** |
| 9 | % of women who experienced physical or verbal abuse in labor or delivery (woman-reported) | % of women who reported physical abuse anytime during labor, childbirth, or postpartum period | No** |
| 10 | Verbal abuse % of newborns alive breastfed within one hour | % of women who reported verbal abuse anytime during labor, childbirth, or postpartum period % of newborns breastfed within one hour of birth | No** Yes |
| 11 | % of women who received immediate postpartum prophylactic uterotonic for PPH prevention | % of women who received immediate postpartum uterotonic for PPH prevention | Yes |
| 12 | % of newborns with birthweight documented | % of newborns with birthweight documented | Yes |
| 13 | Proportion of newborns weighing <2000g initiated KMC | % of premature babies initiating KMC | Yes |
| 14 | Proportion of QED facilities with at least one functional handwashing station | | No** |
| 15 | Proportion of QED facilities with basic sanitation available to women during labor and childbirth | | No** |

*Review of Bangladesh HMIS forms

**Proposed to be collected via surveys or health facility assessments

⁵ Bangladesh Reproductive Maternal Neonatal Child Adolescents Health (RMNCAH) Quality Improvement (QI) Framework. Retrieved from <http://qis.gov.bd/wp-content/uploads/2019/05/RMNCAH-Quality-Improvement-QI-Framework.pdf>



Figure 1. Six types of data systems used for quality improvement in Bangladesh



- An example of using data from multiple sources was reported for ranking health facilities. This is being used under a different quality improvement approach.

“Health facilities are ranked based on data from multiple sources. A total of 31 data elements/indicators under 10 domains (service delivery, health workforce, HIS, logistics, leadership, access, quality, coverage, safety, site monitoring) are used to compute facility score. Thirteen sources of data sets (EmONC, HMC, IMCI, DGHS: Dashboard, daily OPD, bed statement, HMC, major equipment, DHIS2: Event capture, biometric attendance, HRM, mobile phone, site monitoring) are used to create the scores.”

– Health facility QI focal person



Who Uses the Indicators, How, and at What Level

- At the district, subdistrict, and facility levels, QI committees have been formed in both districts. It was reported that regular meetings of the QI committees are being held to discuss performance and data quality issues.

“There are monthly reviews at every level. For example, at the upazila [subdistrict level], monthly meetings are held to discuss the data. DQA is done there and the indicator-wise data is discussed. MCH data is reviewed periodically by respective program personnel in district- and national-level MCH services units.” – District QI focal person

- At the hospital level, a network of working teams and committees use QI-related data. The hospital-level central quality improvement committee (QIC) oversees all the QI aspects of all departments. Data are reviewed every month and all decisions are communicated to the respective departments. Each ward has a ward improvement team (WIT). Active participation of WIT committees was observed in all district hospitals in the study. WITs meet once a week in each ward (gynecology, neonatal, etc.). They identify constraints and issues and take action. Issues that require the intervention of, or need to be reported to, a higher authority are referred to monthly QIC meetings.
- Use of DHIS2 has facilitated data management functions, including collection, reporting, analysis, and visualization.

“Due to the increased number of service recipients in our hospital, the data volume has also increased. Previously the Assistant Health Inspector [AHI] used to do a monthly report manually, and the data was disorganized. DHIS2 allows us to view many indicators at a glance. It also helps to make decisions where there are opportunities to improve our work/service. This has made the task easier. Together we have been able to create three to four reports per year.” – District hospital staff

- In Manikganj district, supported by the MaMoni Project, the implementation of a bundle approach allows health workers and managers to look at three layers of intervention—coverage, quality, and the use of that indicator.

“We have the clinical bundle, and of course there are aims to input the quality of services. The bundle’s aim is to look at three elements. First, the numbers of partograph completed; second, the quality of the completed partograph; and third, the use of the partograph as a decision-making tool.”

– District QI focal person

- In Moulvibazar district, the Plan-Do-Check-Act (PDCA) cycle and Special Care Newborn Unit (SCANU) forms are analyzed to help identify the number of vacant posts, number of human resources by technical area, and availability of functional equipment. These forms are only being used in UNICEF-supported districts.



“I have always been using DHIS 2 since 2011. Since DHIS 2 data are recorded online, I can access them from anywhere at any time whenever I feel the need. Moreover, there is no risk of data loss. I can easily present data with the help of the dashboard. It saves a lot of time and helps us to understand the quality of hospital services quickly by saving data digitally. I no longer have to use a hard copy of the data manual. I mostly use the EmOC, SCANU, Daily OPD, Emergency, Indoor, Death, Hospital Management Committee (HMC), IMCI, data components. Currently, I have the support of superintendents, RMOs, and managers if I have any problems using DHIS2.”
[Shamimara Begum, Statistical Officer, district hospital, Moulvibazar]



Summary

At the health facility level, multiple types of data and digital systems are used to manage QI. Figure 2 summarizes our learning on how the effective design of RHIS systems can support data use from multiple sources, presented as an example scenario. When a woman comes to the health facility for antenatal care or delivery, an e-tracker system—used to register every pregnant woman—generates a unique ID, which can be used to track services and allows the woman to receive services from different facilities. From a quality improvement perspective, the QI team needs to assess diagnostic tests conducted, their results, and medicines given or prescribed (for example, oxytocin for PPH). Diagnostic tests may be conducted in a laboratory (blood sample) or at the clinic (blood pressure monitoring). The medical record should be able to record the result or obtain it directly from a laboratory information system. Similarly, information on drugs prescribed or administered should be recorded in the patient’s file or received directly from the logistics system. Next, the system should capture who the care provider is and if the provider is trained in providing the required services. An electronic medical record should connect with an HRIS and store information on the health provider. A messaging system can be used to generate and send customized messages and reminders to a registered mobile number. Additionally, connecting the individual client with any financial transaction related to user fees or insurance payments can be helpful in gathering and analyzing data around health financing issues. These connected data systems can create a data warehouse that will store data from multiple sources at the client level to provide comprehensive analysis capabilities across the QI continuum and support managers in making better decisions.

There is a strong vision from the government to move towards the digitization of health information systems in Bangladesh. DHIS2 is implemented in all health facilities under the Directorate General of Health Services (DGHS). An eMIS system has been developed for the DGHS and the Directorate General of Family Planning (DGFP).⁶ The eMIS manages data at the individual client level, and 36 of 64 districts currently have eMIS coverage under DGFP at lower-level health facilities. Digitization under the eMIS brings many benefits to the health system in Bangladesh. Use of eMIS will help managers “monitor the quality of care and pursue referral cases,” according to national level staff supporting MIS strengthening. It has been designed to capture the entire business process. Some of the features include a decision-guiding algorithm, messaging, notification, job-aid tools, data sharing between community and facility for continuum of care, automatic month-end report, and data for measuring different national and global indicators.

“In the fourth sector plan, the government has a vision to establish a digital health information system, so that the data can be real-time data and useable by all. This is not only for the routine health system but also for the quality of care, this is the vision from the government.” – National level staff

⁶ Walker, D., Azim, T. (2018). Bangladesh’s Electronic Management Information System: Using Digital Technology to Link Community Data with Facility Data Case Study. Retrieved from <http://www.rhis.net.bd/>

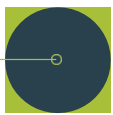
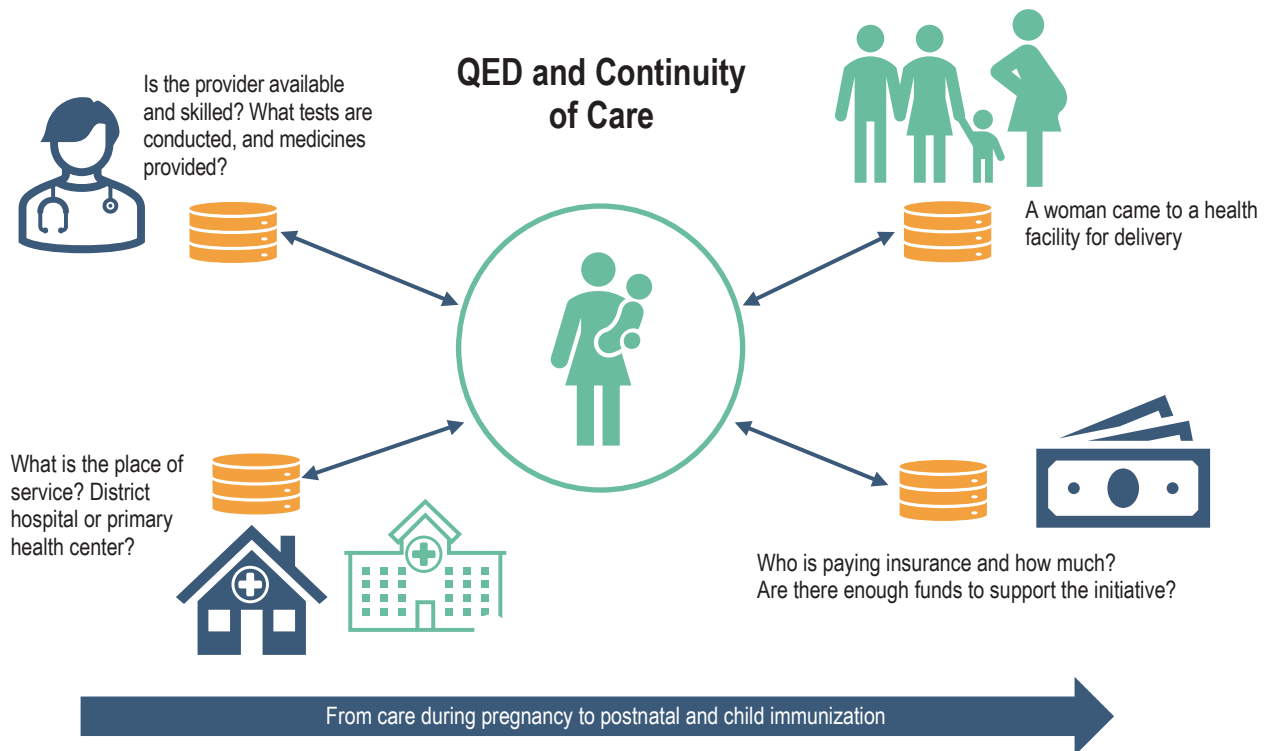


Figure 2. An example model of using data from multiple sources to make better decisions for quality improvement

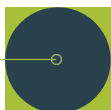


Various development partners are working to reduce maternal and child mortality at the subnational levels. However, variations were observed in the modality of QI and data collection and use practices in the districts covered by the study team. Similarly, DGHS and DHFP manage parallel reporting systems.

“There are two general platforms to gather the MNCH service data. One platform is the DHIS2 supported by the DGHS MIS division. It captures data from community clinics, university health centers, and district hospitals through various registers and then compiles them for reporting. Another platform is DGFP obtained MIS source, collected through upazilla health and family welfare center [UHFWC] and mother and child welfare center [MCWC] service registers. To determine the total number of facility deliveries in a district, the two numbers from these two sources need to be added.” – District level staff

Although Bangladesh’s health sector has built a strong culture of data collection, data use remains suboptimal. A shortage of manpower in the two districts to provide data-related support was reported as a factor hindering efficient analysis and use of data. The problem was observed to be much worse in the Manikganj district than in the Moulvibazar district. In Manikganj, a staff nurse is responsible for data entry and monthly reporting on the DHIS2 platform, adding an additional burden. The same human resources shortage problem was observed at the *upazila* level, where a newly appointed health assistant is given the responsibility for preparing the monthly report and record-keeping despite lacking computer skills.

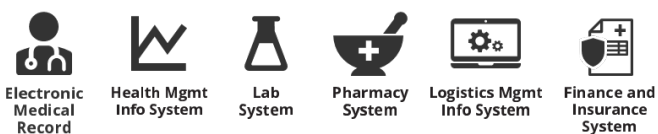
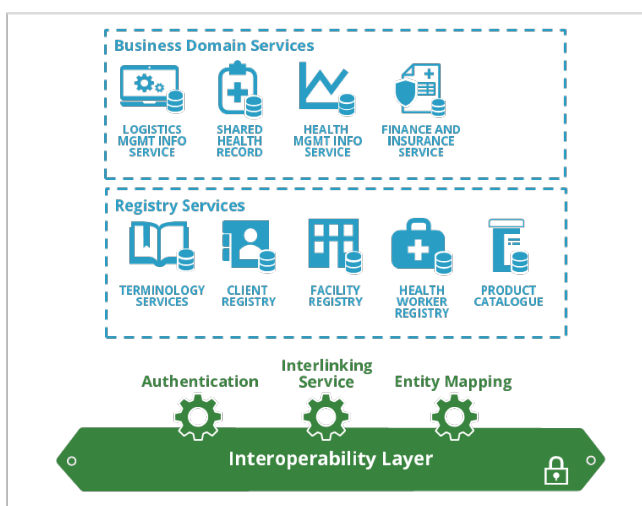
Progress in incorporating all QI indicators within the routine data systems remains slow, including a lack of data sharing across multiple systems within the DGFP and DGHS and overall data quality. Lack of coordination between the MOHFW and its entities (such as the DGHS, DGFP, and health economics unit or DG-HEU) was observed.



Recommendations

1. The various data systems across DGHS, DGFP, and multiples partners should be harmonized. There are many common features and unique aspects that will benefit the QI initiative as it is rolled out in other districts. This will help improve data quality and use and, at the same time, institutionalize a system of testing and innovations in digitization and data. For example, the bundle approach of looking at indicators on quality of services and use of PDCA and SCANU forms to identify functional equipment and logistics should be part of an enhanced RHIS. Harmonizing data across DGHS- and DGFP-supported health facilities will provide a comprehensive view of the various levels of the health system.
2. Ensuring the semantic and syntactic standards and open-APIs via a Government of Bangladesh-endorsed middle layer, allowing for new diagnostic and personal health tools to plug quickly into the ecosystem. Digitization brings many benefits to the health system in Bangladesh. It is useful to healthcare workers and managers in monitoring the quality of care and pursuing referral cases. Standards will be critical in facilitating data exchange across multiple systems—as shown in Figure 1—which are critical for monitoring the QI initiative.
3. Although the increasing use of digital tools is promising, interoperability across multiple systems, defined by QI needs, is needed. DHIS2, eMIS, logistics, maternal and newborn mortality system development are big steps in this direction. Building on the success, development of a quality improvement health information exchange (HIE) architecture is needed. OpenHIE⁷ is one such framework that describes multiple components of a comprehensive health information system (Figure 3). This will be helpful in providing a comprehensive view of the various health system domains for every individual client data point across delivery, logistics, human resources, finance, and so on, through a QI lens. This will help in summarizing the additional indicators not currently captured in DHIS2 that are available at health facility levels in eMIS.
4. The 15 common indicators are focused on service outcomes and do not include any indicators on human resources, logistics, or supplies. It would be helpful to expand the list of these common indicators that focus on other health system strengthening components to understand drivers of quality of care.
5. Improvement aims should focus on the quality and content of care, and indicators selected accordingly. This will be helpful in analyzing related data from other sources, such as the availability of functional equipment, medicines, and trained human resources, and the allocation of funds for the same.

Figure 3. OpenHIE framework describing the multiple components of a comprehensive health information system



“If we want to measure the quality of ANC in a case, we need to see whether the blood pressure was measured or not and whether their weight was taken or not. That kind of information is not available in the monthly summary report or DHIS2.” – Project staff supporting QI initiatives

⁷ Retrieved from <https://ohie.org/>



6. Use of any financial indicator or measure was not reported. Inclusion of financial indicators will help in understanding if the funds are available towards priority areas for improvement or not.
7. New ways of collecting data on the experience of care and designing analytical modules that can combine data from these sources with routine data should be developed.
8. Evidence of use of data from multiple sources at the health facility level was observed; however, this is an area that needs further strengthening. Building skills of health managers in data systems and data use should be an essential component of data and digital competency building. Overall, the study team did not find any global or country guidance on how to analyze and use data from multiple sources for improving QOC. This would be useful to support the current QI implementation in Bangladesh as well as in other countries.

For more information

D4I supports countries to realize the power of data as actionable evidence that can improve programs, policies, and—ultimately—health outcomes. We strengthen the technical and organizational capacity of local partners to collect, analyze, and use data to support their move to self-reliance. For more information, visit <https://www.data4impactproject.org/>