

Process Evaluation of the District Health Information System Version Two (DHIS2) in East Belesa District, Central Gondar Zone, Northwest Ethiopia

Mulatu Wubu^{1*}, Geta Asrade^{2*}, Amare Minyihun^{3*}, Tsegaye Gebremedhin^{4*},

Fentahun Bikale^{5*}, Kebede Mulatu^{6*}

¹, MPH in Monitoring and Evaluation (Plan, Monitoring and Evaluation Expert at Ethiopian Public Health Institute)

² MPH in Health service management ((Lecturer at University of Gondar, Assist Prof)

³ MPH in Health economics ((Lecturer at University of Gondar, Assist Prof)

⁴ MPH in Monitoring and Evaluation (Lecturer at University of Gondar)

⁵ MPH in Monitoring and Evaluation (Plan, Monitoring and Evaluation Expert at Ethiopian Public Health Institute)

⁶ MPH in Monitoring and Evaluation (Quality Officer at Minjar Shenkora Woreda Health Office)

^{1*} Corresponding author: cell phone, +251989333642, Gondar Ethiopia

Abstract

Background: DHIS2 is the most widely used open-source e-HMIS system that suite to provide flexibility, customization of data elements, data entry forms, validation rules, indicators, and reports to create a fully-fledged system for data management. However, evidence shows that data quality is poor and is not used especially at lower levels of health care for program decisions in Ethiopia, and it remains a major challenge and its implementation status has not been evaluated yet.

Evaluation objective: To evaluate the process of the District Health Information System (DHIS2) in the public health facilities and district health office of East Belesa, central Gondar zone, northwest Ethiopia, 2020.

Methods: A single case study evaluation design with a mixed method was employed from February 01 to 29/ 2020 to assess availability, compliance and data quality of DHIS2. A self-administered questionnaire was used to interview all health care providers who work more than six months (161). Similarly, 36 service document reviews and 14 key informant interviews were conducted. The quantitative data were cleaned and entered to Epi-Data version 4.6.0 software and exported to SPSS version 25 for analysis. In the multivariable logistic regression analysis, a p-value of less than 0.05 and AOR with a 95% CI was taken to declare factors associated with health information utilization. The qualitative data were transcribed, translated, coded, and analyzed using thematic analysis. The overall process of program implementation was measured based on pre-determined judgmental criteria

Results: The overall level of the implementation process of the DHIS2 was 64.7%, to which availability of resources, healthcare providers' compliance with the national guideline, and data quality contributed was 60.33, 55.75, and 78.0%, respectively. The overall health information utilization is 67.7 % with 95 % CI (59.6, 74.5). There is a shortage of essential inputs like Internet access, electricity with a backup generator, and HMIS manuals. Activities like feedback, action plan, and data verification were not practiced well. The use of electronic devices [AOR = 2.52; 95% CI: 1.03, 6.16], discussion of monthly performance using the standard indicators [AOR = 4.65; 95% CI: 1.03, 21.03], accountability for poor performance [AOR = 5.28; 95% CI: 1.94, 14.42], and agreement on the usefulness of (DHIS) were factors associated with health information utilization [AOR=7.06; 95 % CI: 1.87, 26.57]

Conclusion and recommendation: The process of DHIS2 was not successfully implemented, although the data quality was fairly implemented. Activities like feedback, action plan, and data verification were not practiced well. For health care providers better to discuss the monthly performance regularly and the health facilities need to have emphasis on accountability for poor performance and work on increasing the perception of health care providers on DHIS2 usefulness.

Keywords: Process, Evaluation, Data quality, Availability, Compliance, information use, East Belesa

1 Introduction

1.1 Background

The district health information system two (DHIS2) is the most widely used open-source e-HMIS system that suite to provide flexibility, customization of data elements, data entry forms, validation rules, indicators, and reports to create a fully-fledged system for data management. DHIS 2 provides a wide range of solutions based on Hypertext markup language, (HTML5) short message service, and Java(5).

Information System is a system that provides information support to the decision-making process at

each level of an organization(6). Health Information System is a system that integrates data collection, processing, reporting, and use of the information, which is necessary for improving health service effectiveness and efficiency through better management at all levels of health services. Health Management Information System is an information system specially designed to assist in the management and planning of health programs, as opposed to delivery of care(6, 7).

The DHIS was originally developed for three health districts in Cape Town (the legislative capital of South Africa) in 1998-99; but has since spread via the HISP network to more than 40 countries in Africa, Asia and Latin-America(8).

The user interface of DHIS2 has been fully translated into eight languages: English, Chinese, Spanish, French, Russian, Portuguese, Vietnamese, and Tajik. DHIS2 also allows users to translate database content into any number of languages. Users can easily switch between languages and translate the user interface into new languages(9).

The district health information System (DHIS) is used in more than 60 countries around the world. DHIS is an open-source software platform for reporting, analysis, and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)(8). The core development activities of the DHIS 2 platform are coordinated by the Department of Informatics at the University of Oslo. And supported by the Norwegian Agency for Development Corporation (NORAD), President's Emergency Plan for AIDS Relief(PEPFAR), The Global Fund to Fight AIDS, Tuberculosis and Malaria, UNICEF and the University of Oslo(8)

Ethiopian Ministry of Health through the Health Sector Transformation Plan (HSTP-I) envisions all of its citizens to enjoy the quality and equitable access to all types of health services. To realize this, the FMOH and RHBs are leading a sector-wide reform to strengthen and improve the quality of health services in Ethiopia(10). Districts are central to these reform

efforts and several recent initiatives have specifically sought to improve the quality of health services. Such initiatives include:- Ethiopian Hospital Services Transformation Guidelines (EHSTG), Health Sector transformation in quality (HSTQ), Saving Life through Safe Surgery (SaLTS) and Clean and Safe Hospitals (CASH) and the revised Health Management Information System (HMIS) and District health information system two (DHIS2) are among others (10).

By borrowing technical assistants from HISP, Oslo University to support the implementation Ethiopia started a pilot study on regions that were designed to provide important lessons for large-scale implementation of DHIS-2 at the national level from February to November 2015. Among the nine regional and two city administration health bureaus found in Ethiopia, purposely South Nations, Nationalities and Peoples' Region (SNNPR), Oromia, Addis Ababa, and Gambella regions were selected(11).

A central server was configured for the database. The advantage of using one central server in the country was because it was easier to provide technical support to only one central server installation(11). The main advantage with a central server was that changes made at any point of the system were immediately available to all users across the country(12).

After customizing and testing the software, the Federal Ministry of Health (FMOH) Ethiopia, organized the Master Training of Trainers (TOT) in Adama on Nov 20–24, 2017(13). Since DHIS2 is a flexible, web-based, open-source, information system, it released a digital data package to accelerate case detection, situation reporting, active surveillance, and response for COVID 19(14). In the same year (2017), east Belesa district has been implementing this DHIS initiative.

Information garnered from health information systems (HIS) is essential for monitoring health, and for evaluating and improving the delivery of health-care services and programs. Yet the collection, analysis, and reporting of health data in most developing countries are faced with major problems resulting in incomplete, inaccurate, and untimely data which is not useful for health decision-making(15). Increasingly there is a growing demand for good quality health information from developing countries, because of performance-based resource allocation by donors. This has led to some initiatives in these countries to reform the existing paper-based systems through computerization(15).

The health information system helps to produce quality information and conduct evidence-based monitoring, adjusting policy implementation, and resource use. However, pieces of evidence show that

data quality is poor and is not utilized for program decisions in Ethiopia especially at lower levels of health care and it remains a major challenge(16).

High-quality information is especially important for populations experiencing high burdens of disease and mortality, such as pregnant women, newborns, and children(17).

The use of HMIS in the facilities of Amhara region in the case of Bahirdar city administration is found to be very low because of lack of appropriate technology, skilled human resource, and coordination effort, although the institutions like regional health bureau and sub City office were performing relatively better(18).

In most developing countries, particularly in sub-Saharan Africa, health reporting has been dominated by paper-based data collection and storage systems that tend to generate incomplete and inaccurate reports(19). The information flow is also fragmented and characterized by a parallel reporting system with no integration among the various subsystems. This resulted in redundant and conflicting reports and poor quality of data in terms of accuracy and timelines, preventing information users from effective utilization of information for decision-making and research (20).

Recent years have seen an increasing focus on the strengthening of Health Information Systems (HIS) in countries. On the ground, however, HIS development in Africa has proved difficult due to; poor and unevenly developed infrastructure, fragmented health programs and donor initiatives, and poor capacity(12).

Many times, data is assembled in shelves, databases, or reports and they are not sufficiently used in advocacy, strategic planning, program development, and improvement, and policy development. Quality data is not sufficient to ensure data use because information requirements of those who make decisions are often not assimilated in the data-gathering efforts and data use has not been incorporated into decision-making processes(21). Until plans and intercessions are developed geared towards improving the utilization of data from information systems, health structures will never fully be able to meet the needs of the communities they serve(21). To date, there is a lack of clear direction on how to comprehensively enhance decision making that is data-informed(21). Computer access, supportive supervision, HMIS training, and availability of HMIS guideline and formats were important factors affecting health information utilization(22).

There are few evaluations of DHIS2 in other countries. In Ethiopia, there is no evaluation on DHIS2 except the pilot study conducted in 2015, so the analysis aims to determine the availability of resources, compliance of health care providers, data quality, and health information utilization in East Belesa district. Further, it will assess factors responsible for the observed level of implementation, which adds value to the expertise of health care managers to produce quality data that will be used further for informed decision-making.

HSTP, which will be implemented from 2015/2016-2019/2020, intends to work towards improving the quality of health service delivery at all health facilities based on quality data produced for informed decision-making. Because of the above stated-information, so it is very important to evaluate the process of the DHIS2 to assess factors responsible for the observed level of implementation

Additionally, this evaluation will increase the implementation status by providing valid and accurate information that will be utilized by respective initiative implementers, users and other stakeholders participating in the implementation of DHIS initiatives

The evaluation findings will enhance the HSTP transformation agenda, which is set as an Information

revolution for reforming the methods and practice of collecting, analyzing, presenting and disseminating the information

The way DHIS has succeeded or failed would help policymakers to continue initiative efforts in the future. It also provides insight into possible levels of improvement in the health information system.

Generally, this study will serve as the starting point for the assessment of the current DHIS2 based on the situation in public facilities to identify the strength and weaknesses of the system. The findings and recommendations of the study would contribute towards the ongoing efforts of developing a better health management information system. Specifically, the findings of the study benefit facilities and institutions by helping them to identify their weaknesses in implementing the new system and propose better ways that help them improve their information system. The FMOH and Amhara National Regional Health Bureau (ANRHB) would also be beneficiaries as it helps them to get quality information from the facilities.

Methods

Evaluation design and setting

A case study evaluation design with a concurrent mixed method was used to evaluate Process

evaluation of the district health information system version two (DHIS2) in East Belesa district, central Gondar zone, northwest Ethiopia, from February 01 to 29/2020. Qualitative and quantitative data were collected concurrently. The district had one primary hospital (Guhala primary hospital), and five health centers (Guhala, Zuy-hamusit, Tayimen, Kalay sholit, and Mukatera health centers) which provide services as per the health facilities tier level. There are a total of 152 hospital staffs of which 71 health care providers and 81 administrative staffs and there are 98 health care providers and 69 administrative staffs in the health centers of the district. There are 169 health care providers and 150 administrative staffs

Evaluation approach

As this program is in its early stage a formative evaluation was employed to assess the process of the DHIS in the health facilities of the East Belesa district. A formative evaluation was carried out to evaluate the process of DHIS2 implementation. It can provide in-depth and detailed information on the programs that are working. What is not working so well and formative evaluation is particularly valuable at the early stages of the program when there is likely to be a great deal of development and change.

Focus of evaluation

This evaluation was focused on the process of DHIS2; the implementation status of the new system that was how and why it implemented, what works?

Dimensions of Evaluation

The major data quality dimensions were validity/accuracy, reliability/consistency, completeness, and timelines. This process evaluation on DHIS2 used data quality dimensions; timeliness, completeness, and accuracy (can measure the consistency of reported data and original records)(1) since they are deemed to be important to assess the DHIS2 implementation status. Availability and compliance from another dimension(49) to assess whether resources required for initiative implementation were in place and health care providers were compliant with DHIS.

Availability: The volume and types of inputs or resources required to implement the DHIS2 initiative.

Compliance: This evaluation has assessed the compliance of health care providers whether they were aligned with DHIS2 guidelines to implement the initiatives or not

Timeliness: Data were times when they were up-to-date (current), and when the information was available within deadlines (21st -26th of the month)

Completeness of reports: The total reports received from all health facilities from the total reports expected for a given period.

Accuracy: Data was accurate when data that was compiled in databases and reporting forms were accurate and reflects no inconsistency between what was in registers and what was in databases/reporting forms at the facility level.

Finally, **data quality** was measured by using indicators set at the judgment parameter (the proportion of health facilities having designated staff for reviewing data quality, the proportion of health facilities having Written policy on when and how to conduct data quality checks, Percentage of reports received by the due date, Percentage of complete and accurate Reports)

Population and sampling

Source population

The source populations of the evaluation were all health care providers working in the district health facilities, all the health facilities head, district health managers, plan officer and HIT of the district and all documents of health facilities.

Study population

The study populations were health care providers of the health facilities with work experience more than

six month,all HIT personnel of the health facilities,all the health facilities head, district health manager, district plan officer and HIT, Service registration books, and monthly service reports.

Study Unit and Unit of analysis

Study unit: -The study unit was health care providers, HIT, health facility heads, district health manager, Health Plan Officer in the District, service registration books, and service reports

Sampling unit: -

Primary sampling unit: health facilities

Secondary sampling unit: health care providers and services documents

Unit of analysis: -

The primary unit of analysis: health care providers of the district, health facilities

Secondary/final unit of analysis: DHIS2 in East Belesa District

Indicators/variables

Indicators

The following indicators were negotiated and agreed upon and were used during the evaluation of the implementation of DHIS2 through the active participation of stakeholders. The indicators were

adapted from related literature (18, 50) and some developed from health facilities assessment tool(13)

Availability indicators (6)

- The Proportion of health facility staff trained on DHIS2
- The Proportion of health facilities having computer dedicated for DHIS is in place and it is currently functioning
- The Proportion of health facilities with functional internet access
- Percentage of health facilities with medical record unit which is assisted by the use of an electronic system (Electronic Medical Record System)
- Percentage of health facilities having at least four manuals which facilitate the implementation of HIS (HMIS procedure/data recording and reporting, HMIS Indicator reference guide, HMIS disease classification (NCoD), Data quality and use)
- Percentage of health facilities having dedicated (separated) office for HMIS

Compliance indicators (7)

- Percentage of PMT meetings conducted monthly to oversee the service delivery of the health facilities in the last six months
- The proportion of health facilities who gave Written feedback to work owners or information sources on

strengths and weaknesses based on the analysis of information collected

- The proportion of health facilities who prepared an action plan for the identified priority problems/challenges
- The proportion of health facilities those performed LQAS for all the last six months and the score is greater or equal to 90%
- The proportion of health facilities those who have monitoring and evaluation system with the corresponding time frame is in place and is being implemented
- The Proportion of health facilities whose data verification has been carried out in the last six months
- The proportion of health facilities those have made available information based on selected indicators and has presented it to the society and other concerned bodies using different channels

Data quality indicators (5)

- The proportion of health facilities having designated staff for reviewing data quality
- The proportion of health facilities having Written policy on when and how to conduct data quality checks
- Percentage of reports received by the due date(21st-26th of the month)
- Percentage of complete Reports

Number of health facilities reported accurately

Variables

Dependent variable: Information use status

Independent variable:

Technical factors: Training, daily recording system, friendly format, and an electronic device, standardized set of indicators and discussion of the monthly performance

Organizational factor: Culture of data use, responsibilities, award, accountability, data quality checking system, supervision, health information policies, regular meeting, and feedback

Behavioral factor: Demand for information, attitude toward data collection, commitment and perceived DHIS useful

Inclusion and exclusion criteria

Inclusion criteria

For document review: Service documents (registrations on books and reports) from the last six months since service documents were data sources for national priority indicators selected by the stakeholders to check data accuracy and PMT minutes.

For survey: Health care providers who work more than six months in the health facilities

For key informant interview: All HIT of the district health office, health facilities head, plan and head of district health office.

Exclusion criteria

For survey: Health care providers who work less than six months in the health facilities

Sample Size

The total numbers of health facilities included in the evaluation were one primary hospital and five health centers and the district health office (all health facilities in the district)

The sample size for Quantitative

Retrospective document review: It included a review of service documents in the last six months from July 01/2019 to December 30/2019.

Health facilities documents (PMT minutes):- a total of six PMT minutes were checked whether the performance monitoring team discussed as per the standard set (monthly)

Service registration book: 36 registration books (six registration books per health facilities) were reviewed purposely since listed registration books were data sources for national priority indicators selected by the stakeholders to check data accuracy. From six health facilities Family planning, ANC, Delivery, PNC, IMNCI, and SC registration

books were required to assess the accuracy of the report.

Monthly service reports of the last six months to check completeness and timeliness. A one-month (January 2020) of the data collected for assessing accuracy. Generally, six-monthly service reports were required from each health facilities since the selected national priority indicators were required service reports as a data source

Survey: Self-administered questionnaires were conducted on 161 health care providers to assess the factors that were responsible for the observed level of information use. To get the maximum sample size all health care providers from one primary hospital and five health centers were interviewed.

The sample size for Qualitative

Key informant interview: 14 key informant interviews were conducted in which: One KII with district health office plan officer, one KII with HIT from the district health office, six KII with the head of the health facilities, one KII with district health office head and five KIIs with health information technician (HIT) because one health facility had no HIT.

Variables and measurements

The formative evaluation approach was used to evaluate the process of DHIS2 implementation. The availability of resources was assessed using six-item

indicators to determine whether essential resources required for the initiative were supplied or not in the health facilities. The compliance of healthcare providers was also assessed using a seven-item-indicators through measuring the adherence level of the healthcare providers to the DHIS guideline during implementation and data quality using five-item indicators. Moreover, health information utilization was measured using a 13 item questions, each containing a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) alternatives. Finally, health workers' mean scores were used to label health professionals' health information utilization as "health information utilized" when they scored above the mean value, or "health information not utilized" when they scored equal to and below the mean value(43, 47).

The indicators were developed from the national health information system (HIS) implementation guideline (2). Indicators' weight is the weight given by stakeholders before the evaluation for each selected indicator, and indicator scores were calculated using the formula, Indicator score = (observed number X indicator weight)/ expected number. The judgment parameter was determined based on the calculated indicator score; judged >80 %, 75-80 %, 70-75 %, and <70 % as successfully implemented, partially implemented (needs

improvement), fairly implemented (needs urgent improvement) and not successfully implemented (needs urgent and major improvement) respectively

Data collection

Data collection tools and procedures

A structured self-administered questionnaire for the survey and semi-structured questionnaire for key informant interviews were adapted from different literatures (18, 50, 51) which were initially developed in English and translated to the local language (Amharic) were used. The self-administered questionnaire was distributed to the health care providers by in-person (one administrative staff for each health facility) working within that health facility.

Document review template and resource inventory tool were prepared which were used to collect data from health facility documents (service registration books, reports, and PMT minutes) and available resources to implement the process.

The indicators were developed from the national health information system (HIS) implementation guideline (4).

For the qualitative part, the interview guide first developed in English, and translated into the Amharic language to maintain the consistency of the guides.

Hence, interviews were conducted in Amharic. Probing was used to obtain an in-depth understanding of the participant's perspective. A tape recorder was used as a tool to gather relevant information in this study

The Cronbach's alpha value of 0.7 to 1.0 is considered good, which shows the items used were internally consistent (52). The average Cronbach's alpha reliability coefficient for the instrument was 0.83, which was within the acceptable reliability range.

Data collectors

The self-administered questionnaire was distributed to the health care providers by in-person (one administrative staff for each health facility) working within that health facility so generally six administrative staffs were required since they were not involved in the evaluation process. The principal evaluator conducted key informant interview. The principal evaluator and one HIT technician, who was selected from Guhala health center conducted resource inventory, and document review at Guhala primary hospital. The principal evaluator and one HIT from the hospital conducted resource inventory and document review for health centers.

The facilitators (one administrative staff for each health facility) and document reviewers received one-day training on the evaluation objective, data

collection instruments, and techniques, and ethical issues. The training was the same day to minimize discrepancies among them.

Data collection fieldwork

Data were collected through document review, self-administered questionnaire, in-depth interview, and resource inventory.

Resource inventory: was conducted using the resource inventory checklist and it was done first

Document review: The document review in this evaluation included health facility documents (service registration books, service reports and PMT minutes)

Survey: Self-administered questionnaire was conducted on all 161 health care providers to assess factors that were responsible for the observed level of information use.

Key informant interview: was conducted by using a key-informant interview guide. The interview started from the HITs then health facility heads and head of the district health office were interviewed.

Data quality control

For quantitative data: -To ensure the quality of data care was undertaken in the process of data collection, entry, and analysis. Before data, collection training for those, who were involved in the data

collection process, was given on the evaluation objectives, data collection instruments, and techniques.

A pre-test was administered on 20 health care providers in Ebnat primary hospital and Ebnat health center, at Ebnat district, south Gondar zone. The final versions of the tools were modified based on the pre-test findings before the actual data collection. Supervisors checked data accuracy, consistency, and completeness daily.

For qualitative data: -The guides were evaluated carefully and cleared from leading questions.

Qualitative data were collected by the principal evaluator for controlling data quality and it was audio taped. To ensure the trustworthiness of the qualitative data different measures were used like assuring them their response will help to explore many things, which will increase the creditability of the research. Besides, the interviews were in private places, which were agreed by study participants at offices and health facility levels. A brief explanation about the purpose of the study was given for each study participant to let them discuss freely and showed interest to participate.

Data management and analysis

The quantitative data were cleaned and entered to Epi-Data version 4.6.0 software and exported to

SPSS version 25 for analysis. Both descriptive statistics and binary logistic regression analyses were done. In the multivariable logistic regression analysis, a p-value of less than 0.05 and AOR with a 95% CI was taken to declare factors associated with health information utilization.

The audio-recorded data was transcribed into Amharic language and translated to English by the research team members.

Transcripts for data collected were read and re-read independently by the principal investigator and transcripts for data collected by the Amharic language were done via listening of the audio records. The MS Word data was converted to plain text then exported to Open Code software version 4.02 to code and categorize the data. After reading and re-reading the text data an attempt was made to create categories by combining codes formed using the software. Finally, it was analyzed using thematic analysis through thematizing input (availability), process (compliance), and output (data quality) of the DHIS2 initiative. The report presented by summarizing the themes, quoting important verbatim. Finally, each dimension of the process of the DHIS was judged based on the predetermined

judgmental criteria to decide the level of the implementation.

Matrix of analysis and judgment

The judgment parameter for data quality is (completeness and timelines 100 % and for accuracy 95-

100 %. The overall parameter infrastructure accounts for 30 %, data quality 30%, and compliance 40 % (4).

The judgment parameter was determined based on the calculated indicator score; judged >80 %, 75-80 %, 70-

75 %, and <70 % as successfully implemented, partially

implemented (needs improvement), fairly implemented (needs urgent improvement) and not successfully implemented (needs urgent and major improvement) respectively.

Results

Availability of Resources

The total numbers of health facilities included in this evaluation were five health centers and one primary hospital. One hundred sixty one health care providers with a response rate of 100 % for the survey, five health centers and one hospital for resource inventory,

36 documents/registries for review, and 14 for KII participated in this evaluation

There was five HIT in the district. Five (83.3%) of the health facilities had HIT personnel specifically assigned for DHIS activities in their facilities whereas, only two (33.33%) health facilities had dedicated/separated offices for HIT. All health facilities had a computer, which is dedicated to DHIS activities but only 50 % of these facilities had a telephone line. Key informant interview results indicated that there was a shortage of HIT in the district, resulting in the inaccuracy of reports. Hence, PMT discussion and feedback were not provided in the health center where there is no HIT. Some of the key informant respondents said that existing challenges/ problems in connection with the successful implementation of the DHIS2 initiative were lack of HIT personnel

“There is no HIT in the health facility so that during report time we have a great problem. As a solution, the report has been done by using HIT personnel from another site” [key informant respondent who has two years of service]

“There is a shortage of human resources specially HIT. Not all health facilities have HIT. As a solution, what we are doing is that health information

technicians who are working in the office will go monthly to those health centers to fill the gap to report by the facilitation of vehicles to them. In addition to this, there is a problem with transportation, network, and electricity. However, to bring in the required thing, we are using the resources that we have at hand and we are asking HIT to be employed” [key informant respondent who has two years of service]

Only two (33.3%) were reported that they have had internet service in their facilities for sending and receiving activities. Even though there is electricity with a backup generator in four (66.67%) of health facilities only two (33.33 %) of them had internet (broadband type) access.

“According to our district, the availability of internet access is questionable to run the tasks needed because we have health centers without electricity service. For example, Tayimen and Mukatera health centers have no electricity service at all” [District HMIS officer who has two years of service]

Only two (33.33%) of the health facilities had a dedicated/separated office for HIT. All health facilities had HMIS disease classification (NCoD) manual. HMIS procedure manual, HMIS Indicator

reference guide, and Data quality and use manual were only available in Guhala primary hospital in soft copies (Table 2).

Table 1: Availability of the resource for process evaluation of DHIS2 in Health facilities of East Belesa District, 2020

Types of resource required	Available at the time of observation (n = 6) N (%)	Available in the last six months (n = 6) N (%)
HIT	5 (83.3%)	5 (83.3%)
Dedicated/separated office for HIT	2 (33.33%)	2 (33.33%)
Computer	6 (100%)	6 (100%)
Printer	6 (100%)	6 (100%)
Telephone line	3 (50%)	3 (50%)
Internet access	2 (33.33%)	2 (33.33%)
Stationery HIT office	6 (100%)	6 (100%)
Shelf for HI	3 (1.9%)	3 (1.9%)
Electricity with a backup generator	4 (66.67%)	4 (66.67%)
UPS (back-up system)	1 (16.67%)	1 (16.67%)
Recording formats	6 (100%)	6 (100%)

Reporting formats	6 (100%)	6 (100%)	manual
HMIS procedure manual	1 (16.67%)	1 (16.67%)	The process of the DHIS2 in terms of program resource availability was measured to be 60.33 % (Table3). Table 2: Summary of DHIS resource availability in East Belesa district, 2020
HMIS Indicator reference guide,	1 (16.67%)	1 (16.67%)	
HMIS disease classification (NCoD)manual	6 (100%)	6 (100%)	
Data quality and use	1 (16.67%)	1 (16.67%)	

Indicators	E*	O*	W*	S*	A*	JP*
The proportion of health facility staff trained on DHIS2	161	91	6	3.4	56.67	Not successfully implemented
The proportion of health facilities having computer dedicated for DHIS is in place and it is currently functioning	6	6	9	9.0	100.00	successfully implemented
The proportion of health facilities with functional internet access	6	2	9	3.0	33.33	Not successfully implemented
Percentage of health facilities with medical record unit which is assisted by the use of an electronic system	6	5	1.8	1.5	83.33	successfully implemented
Percentage of health facilities having at least four manuals which facilitate the implementation of HIS	6	1	1.2	0.2	16.67	Not successfully implemented
Percentage of health facilities having dedicated (separated) office for Health information technicians	6	2	3	1.0	33.33	Not successfully implemented
Overall availability of DHIS resources			30	18.10	60.33	Not successfully implemented

E*=Expected, O*= Observed, W*= weight, S*(Score) = ((observed X weight)/Expected),

A^* (Achievement in percentage) = $((S/W) * 100)$, JP^* = Judgment Parameter.

Compliance with the DHIS guideline

All the health facilities in the district had a performance-monitoring team to oversee the overall activities monthly.

However, only 50% of the health facilities had written policy (term of references) on when and how to conduct data quality checks. Out of the total 36 PMT discussion expected, 22 (61.11%) were discussed monthly using minutes and only Guhalaprimary hospital uses PMT logbook.

“To keep the data quality of DHIS, there is PMT, which consists of different case teams with their job aids we will review reports monthly before sending to the district health office” [Health facility head, which has four years of service]

“We will review it by the available PMT members but not sometimes all members may be available due to work overload and when they are in the outreach activities to support health extension workers” [HIT who has two years of service]

After each PMT discussion, 33.33% and 8.33% feedback and action plan provided and prepared based on the performance respectively.

“After PMT, discussion feedback is not that much provided monthly because all the activities are left to the HIT. Quarterly we will provide feedback” [A five years of service health facility head]. A one-year work experience, health information technician added, *“Written feedback is not given, we discuss and write on the PMT minutes only”*

All health facilities had monitoring and evaluation systems with the corresponding time frame and made available information in the form of a table, chart, etc. based on selected indicators and presented it to the society and other concerned bodies using different channels. Data verification was not conducted by the district health office for all health facilities. Moreover, health facilities that performed LQAS for all the last six months and the score is greater or equal to 90% were only 47.22 % (Table 4).

Table 3: Document review result on DHIS implementation on the following activities in the last six months (July 01/2019- December 30/2019) in East Belesa district, 2020 (n=36)

Activities	Observed frequency	Percentage (%)
PMT discussion using minutes	22	61.11
Feedback provided	12	33.33
Action plan prepared after discussion	3	8.33
LQAS	17	47.22
Designated staff for reviewing data quality (n=6)	6	100.00
A written policy on when and how to conduct data quality checks (n=6)	3	50.00
Monitoring and evaluation system with the corresponding time frame (n=6)	6	100.00
Data verification (n=6)	0	0.00
Made available information in the form of a table, chart, etc. based on selected indicators and presented it to the society and other concerned bodies using different channels (n=6)	6	100.00

Overall, 55.75 % of the health care providers complied with the DHIS guidelines during the implementation (Table 5).

Table 4: Summary of performance indicators of compliance to DHIS guideline in East Belesa district, 2020

Indicators	E*	O*	W*	S*	A*	JP*
Number of PMT meetings conducted regularly to oversee the service delivery (every month) in the last six month	3 6	2 2	8	4. 9	61. 25	Not successfully implemented
The proportion of health facilities who gave Written feedback to work owners or information sources on strengths and weaknesses based on the analysis of information collected	3 6	1 2	4	1. 3	32. 50	Not successfully imple

						mente d
The proportion of health facilities who prepared an action plan for the identified priority problems/challenges	3 6	3	4	0. 3	7.5 0	Not succes sfully imple mente d
The proportion of health facilities those performed LQAS for all the last six months and the score is greater or equal to 90%	3 6	1 7	8	3. 8	47. 5	Not succes sfully imple mente d
The proportion of health facilities those who have monitoring and evaluation system with the corresponding time frame is in place and is being implemented	6	6	6	6. 0	10 0	succes sfully imple mente d
The proportion of health facilities whose data verification has been carried out in the last six months	6	0	4	0. 0	0.0 0	Not succes sfully imple mente d
The proportion of health facilities those have made available information based on selected indicators and has presented it to the society and other concerned bodies using different channels	6	6	6	6. 0	10 0	succes sfully imple mente d
Overall compliance with DHIS			4 0	2 2. 3	55. 75	Not succes sfully imple mente d

E*=Expected, O*= Observed, W*= weight, S*(Score) = ((observed X weight)/Expected), A*(Achievement in percentage) = ((S/W) * 100), JP*= Judgment Parameter.

Data Quality

Timeliness was measured by the district health office receiving health facilities reports by the predetermined deadlines. The district health office had a computerized system to measure timeliness. The computer-based system showed that 66.67% of the health facilities compile and sent DHIS report on time or met the reporting deadline. All health facilities have a complete report rate of 88.89.

“One of the major problems in our district is regarding the completeness, quality, and timeliness of data in collecting data from different units and reporting to the next level. Reports will not reach timely because of lack of electricity and even if reports are incomplete, vehicles are not available for re-correcting this problem at the health centers.”

[HMIS officer who has two years of service]

Table 5: Timeliness and completeness of DHIS2 reports by health facilities for the last six month (July 01/2019- December 30/2019) in East Belesa district, 2020

Health facilities	Timeliness			Completeness		
	Timely reported	Total reports expected	Percentage (%)	Number reported	Total reports expected	Percentage (%)
Guhala Primary Hospital	6	6	100.00	6	6	100.00
Guhala HC	3	6	50.00	5	6	83.33
Zuy-Hamusit HC	2	6	33.33	5	6	83.33
Tayimen HC	3	6	50.00	5	6	83.33
Kalay HC	6	6	100.00	6	6	100.00
Mukatera HC	4	6	66.67	5	6	83.33
Overall	24	36	66.67	32	36	88.89

Health facilities were evaluated for the accuracy of the total number of Newborn weighing <2000gm and/or premature and some children who exit from severe acute malnutrition treatment during the reporting period were found that 116 % and 112 % respectively. Family planning new acceptors by age 25-29 years and the total number of pregnant women that received ANC First visit by gestational week(>16 weeks gestation) were 92 % and 98 % respectively. As well as a total number of Pregnant women received Iron Folic Acid at least 90 plus and the total number of live births attended by skilled health personnel was 91 %.

Postnatal visits within 7 days of delivery, the number of children treated for diarrhea with ORS & Zinc, and the number of U5 yrs. Children screened and have severe acute malnutrition were 80%, 83%, and 42% respectively (Table 7).

Table 6: Result of RQDA (Verification Factor for Health Facilities Assessment) for process evaluation of DHIS2 in Health facilities of East Belesa District, 2020

DHIS Data elements		Total	Verification Factor of HF
Family planning new acceptors by age 25-29 years	Recounted figure	50	0.92
	Reported figure	54	
Total Number of pregnant women that received ANC First visit by gestational week(\geq 16 weeks gestation)	Recounted figure	285	0.98
	Reported figure	288	
Total number of Pregnant women received IFA at least 90 plus	Recounted figure	244	0.91
	Reported figure	268	
Total Number of live births attended by skilled health personnel	Recounted figure	143	0.91
	Reported figure	157	
Total Number of Newborn weighing <2000gm and/or premature	Recounted figure	7	1.16
	Reported figure	6	

Number of postnatal visits within 7 days of delivery	Recounted figure	136	0.8
	Reported figure	168	
Number of children treated for diarrhea with ORS & Zinc	Recounted figure	256	0.83
	Reported figure	306	
The number of U5 yrs. Children screened and have severe acute malnutrition	Recounted figure	9	0.42
	Reported figure	21	
Number of children who exit from severe acute malnutrition treatment during the reporting period	Recounted figure	18	1.12
	Reported figure	16	
Overall data accuracy	Recounted figure	1148	0.89
	Reported figure	1284	

The total overall data accuracy of all health facilities in the district was 89 % (table7) and overall, the data quality was found to be 78% (table 8).

Table 7: Summary of data quality on DHIS report in East Belesa district, 2020

Indicators	E*	O*	W*	S*	A*	JP*
The proportion of health facilities having designated staff for reviewing data quality	6	6	4.8	4.8	100.00	successfully implemented
The proportion of health facilities having Written policy on when and how to conduct data quality checks	6	3	4.8	2.4	50.00	Not successfully implemented

Percentage of reports received by the due date	100	66.67	8.4	5.6	66.67	Not successfully implemented
Percentage of complete Reports	100	88.96	6	5.3	88.33	Partially implemented
Number of health facilities reported accurately	100	89	6	5.3	88.33	Partially implemented
Overall data quality			30	23.4	78.00	Fairly implemented

E*=Expected, O*= Observed, W*= weight, S*(Score) = ((observed X weight)/Expected), A*(Achievement in percentage) = ((S/W) * 100), JP*= Judgment Parameter.

The overall evaluation of DHIS was 64.70%. Whereas, availability dimensions (60.33%), compliance dimension (55.75%) and data quality dimension 78.0% (Table 9).

Table 8: Summary of judgment matrix for process evaluation of DHIS2 in Health facilities of East Belesa District, 2020

Dimensions	E*	O*	W*	S*	A*	JP*
Availability	100	60.33	30	18.10	60.33	Not successfully implemented
Compliance	100	55.75	40	22.30	55.75	Not successfully implemented
Data quality	100	78.00	30	23.40	78.00	Fairly implemented
Total score			100	64.70	64.70	Not successfully implemented

E*=Expected, O*= Observed, W*= weight, S*(Score) = ((observed X weight)/Expected), A*(Achievement in percentage) = ((S/W) * 100), JP*= Judgment Parameter.

One hundred sixty-one healthcare professionals were included in the study, giving a response rate of 100% for assessing factors affecting health information utilization. About 62.7% of the respondents were male, 112(69.6%) were diploma graduates. The majority of the health care providers' profession was a nurse (38.5 %). About 42.2 % of the total health care providers were currently working in the hospital the rest in health centers of the district. Regarding their current position in the health facilities, 121 (75.2%) of them were staffs and 11.8 % of them were case team leaders (Tables 10).

Table 9: Socio-demographic characteristics of health care professionals working at public health facilities in East Belesa District, 2020 (n=161)

	Variables	Frequency	Percentage (%)
Sex	Male	101	62.7%
	Female	60	37.3%
Level of education	Diploma	112	69.6%
	BSc	46	28.6%
	Master	2	1.2%
	Others	1	0.6%
Profession	Medical Doctor	5	3.1%
	Public Health officer	12	7.5%
	Nurse	62	38.5%
	Midwife	31	19.3%
	Pharmacy	29	18.0%
	Laboratory	15	9.3%
	Other	7	4.3%

Health facility	Guhala Primary Hospital	68	42.2%
	Guhala HC	22	13.7%
	Zuy-Hamusit HC	20	12.4%
	Tayimen HC	17	10.6%
	Kalay HC	17	10.6%
	Mukatera HC	17	10.6%
Current position	Case manager	4	2.5%
	Case team leader	19	11.8%
	Pharmacy head	6	3.7%
	Laboratory head	5	3.1%
	Matron/head nurse	6	3.7%
	Frontline workers	121	75.2%

Note: Other in the level of education were a junior nurse and in the Profession of HCP were like IESO, x-ray technicians, anesthetist, and psychiatry

Technical Factors

Just half (50.3 %) of respondents received no orientation on health information utilization during employment. About 43.5 % of the respondents did not take training on DHIS for the last 12 months. Formats used were not friendly and standard health indicators were not easily understandable for 11.8 % and 21.1 % of the respondents respectively.

“Regarding the data quality technical capabilities of the individuals that mismatch with the data quality requirement of now days are the major challenges. Not knowing some new indicators related to DHIS is also one of our challenges as a district” [District health officer who has five years of service]

The monthly performance was not discussed using the standard indicators by 9.3 % of the respondents and 33.5 % of them did not change the collected data into information in health facilities (Tables 11).

Table 10: Technical characteristics of health care professionals working at public health facilities in East Belesa District, 2020

Variables		Frequency	Percentage (%)
Orientation on health information utilization during employment	No	81	50.3%
	Yes	80	49.7%
Training on DHIS for the last 12 months	No	70	43.5%
	Yes	91	56.5%
Training provided by	By the health facilities staff (in-service training)	45	72.6%
	By WoHO	4	6.5%
	By ZHD	9	14.5%
	RHB and above	4	6.5%
Daily recording system	No	2	1.2%
	Yes	159	98.8%
Existence of friendly formats	No	19	11.8%
	Yes	142	88.2%
standard health indicators easily understandability	No	34	21.1%
	Yes	127	78.9%
Discussion of the monthly performance using the standard indicators	No	15	9.3%
	Yes	146	90.7%
Tool for data collection correctly and fill	No	31	19.4%
	Yes	129	80.6%
Changing the collected data into information in health facilities	No	54	33.5%
	Yes	107	66.5%

Organizational Factors

Of the total participants, 16.8, 13.7, and 88.8% noted that the health facilities did not encourage the culture of data use, health information was not used for decision making in health facilities and health facilities were not motivated for good work respectively. Also, 61.5 %, 33.1 %, 14.9 %, 32.3 % of health care providers respond that accountability for poor performance in health facilities; regular supervision system, regular meetings, and provision of regular feedback on the report was not practiced (Table 12).

“Supportive supervision from the zonal health department and regional health bureaus are important but currently they are not supporting us. Not only our district but also in others the quality of data is not satisfactory because there is no supportive NGO’s for data quality and information use” [HMIS officer who has five years of service]

Table 11: Organizational characteristics of health care professionals working at public health facilities in East Belesa District, 2020

Variables		Frequency	Percentage (%)
The facility encourages the culture of data use	No	27	16.8%
	Yes	134	83.2%
Use of health information for decision making in health facilities	No	22	13.7%
	Yes	139	86.3%
Award in health facilities as a motivation for good work	No	143	88.8%
	Yes	18	11.2%
Accountability for poor performance in health facilities	No	99	61.5%
	Yes	62	38.5%
Regular supervision system	No	53	33.1%
	Yes	107	66.9%

Regular meeting	No	24	14.9%
	Yes	137	85.1%
Receiving regular feedback on your report	No	52	32.3%
	Yes	109	67.7%

Behavioral Factors

About 95.0 % of the respondents had a demand for health information and 93.8 % of them had a good attitude towards data collection. On the contrary, 16 (9.9 %) of the health care providers perceived that the district health information system (DHIS) is not useful. All 161 (100 %) respondents believe that decisions based on evidence improve service delivery (Tables 13).

Table 12: Behavioral characteristics of health care professionals working at public health facilities in East Belesa District, 2020

Behavioral factors of health care providers on health information utilization	Agreement status on health information utilization	
	Disagree	Agree
demand for information	8 (5.0%)	153 (95.0%)
good attitude toward data collection	10 (6.2%)	151 (93.8%)
Usefulness of district health information system(DHIS)	16 (9.9%)	145 (90.1%)
Collecting information adds value	2 (1.2%)	159 (98.8%)
collected data is customized to patients treatment	6 (3.8%)	154 (96.3%)
Health facilities staffs document their activities	15 (9.3%)	146 (90.7%)
Health information outputs give feel committed	3 (1.9%)	158 (98.1%)

Understand and appreciate my role and responsibilities	3 (1.9%)	158 (98.1%)
Decisions based on evidence improve services delivery	0 (0.0%)	161 (100.0%)

Health information utilization

The majority of 158 (98.1%) of the respondents used health data for disease prioritization and the rest 129 (80.1%) for resource allocation.

“There is a system to be followed to check whether data are used appropriately by case teams at their department level. For example, if we see the under-five OPD we will see whether registration books are complete or not. OPD whether it is registered and tally daily. To see the over patient flow we will see the central registration. Also, the VCT, youth and friendly services will be monitored since they are used later for decision-making” [Health facility head that has five years of service]

“Data are used both for administrative and clinical purposes after feedback is provided. The health care providers use the information at the clinical areas while the administrative or the management uses data to compare with performances” [HIT who has three years of service]

About 139 (86.3%), 143 (88.8%), 151 (93.8%), 144 (89.4%), 144 (89.4%) for evaluation of staff performance, for selection of best experience within a health facility, for sharing health data to other facilities and stakeholders, for decision-making, and community mobilization and discussion respectively

“Since the main reason for reviewing data by PMT is for decision-making based on evidence, the office makes decisions based on collected data. Still birth may increase referral rate may be above the target so this condition will be seen seriously and I believe data are used properly

” [HIT who has two years of service]

The overall health information utilization among the health care professionals noted was 67.7% (Table 14).

Table 13: Health information utilization among health care professionals at public health facilities in East

Belesa District, 2020

Activities used from health information utilization	Agreement status on health information utilization	
	Disagree	Agree
Treating patient	8 (5.0%)	153 (95.0%)
Disease prioritization	3 (1.9%)	158 (98.1%)
Drug procurement	16 (9.9%)	145 (90.1%)
Monitoring day to day health service activities	12 (7.5%)	149 (92.5%)
Checking data quality	4 (2.5%)	157 (97.5%)
Resource allocation	32 (19.9%)	129 (80.1%)
Departments performance evaluation	7 (4.3%)	154 (95.7%)
Planning	8 (5.0%)	153 (95.0%)
Monitoring the performance of staffs	22 (13.7%)	139 (86.3%)
Selecting good experience within the facility	18 (11.2%)	143 (88.8%)
Sharing experience for other facility	10 (6.2%)	151 (93.8%)
Decision making	17 (10.6%)	144 (89.4%)
Community mobilization and discussion	17 (10.6%)	144 (89.4%)
Overall health information utilization	Utilized	67.7%
	Not utilized	32.3 %

Factors associated with health information utilization

Both descriptive statistics and binary logistic regression analyses were done. In the multivariable logistic regression analysis, a p-value of less than 0.05 and AOR with a 95% CI was taken to declare factors associated with health information utilization.

And it was noted that the use of electronic devices in health information utilization, discussion of the monthly performance using the standard set of indicators, accountability for poor performance in health facilities, and DHIS2 usefulness was significantly associated with health information utilization.

Goodness of fit test results of the Hosmer-Lemeshow test with p-value of 0.94, which is not significant indicating good fit

Accordingly, the odds of health information utilization among health care professionals using electronic devices were 2.52 times more than compared to their counterparts [AOR = 2.52; 95% CI: 1.03,6.16]. Those health care providers who used standard indicators for monthly performance discussion were 4.65 times more likely to utilize the health information than those who did not use [AOR = 4.65; 95% CI:1.03,21.03].

The odds of health information utilization in health facilities with accountability for poor performance were 5.28 times higher than those health facilities without accountability for poor performance [AOR = 5.28; 95% CI:1.94, 14.42].

The odds of health information utilization for health care providers who agree on the usefulness of the district health information system (DHIS) were 7.06 times higher than those who disagreed [AOR=7.06;95 % CI: 1.87,26.57] (Table 15).

Table 14: Factors associated with health information utilization among health care professionals at public health facilities in East Belesa District, 2020

Variables		Health information use status		COR (95% CI)	AOR (95% CI)
		Used	Not used		
Friendly format	No	12(11%)	7(13.5%)	1.0	1.0
	Yes	97(89%)	45(86.5%)	1.25(0.46,3.40)	0.62(0.17,2.20)
Use of	No	63(60.6%)	41(39.4%)	1.0	1.0

electronic devices in health information utilization	Yes	45(81.8%)	10(18.2%)	2.93(1.34,6.45)	2.52 (1.03,6.16)*
Discussion of the monthly performance using the standard set of indicators	No	6(40.0%)	9(60.0%)	1.0	1.0
	Yes	103(70.5%)	43(29.5%)	3.59(1.20,10.71)	4.65(1.03, 21.03)*
Accountability for poor performance in health facilities	No	57(57.6%)	42(42.4%)	1.0	1.0
	Yes	52(83.9%)	10(16.1%)	3.80(1.74,8.40)	5.28(1.94,14.42)*
Data quality checking system	No	24(22%)	19(36.5%)	1.0	1.0
	Yes	85(78%)	33(63.5%)	2.04(0.98,4.20)	1.34(0.52,3.47)
Regular supervision system	No	32(29.4%)	21(41.2%)	1.0	1.0
	Yes	77(70.6%)	30(58.8%)	1.68(0.84,3.37)	0.65(0.25,1.67)
Regular feedback on the report	No	27(51.9%)	25(48.1%)	1.0	1.0
	Yes	82(75.2%)	27(24.8%)	2.81 (1.40,5.64)	1.94 (0.74,5.07)
The usefulness of district health information system(DHIS)	Disagree	6(37.5%)	10(62.5%)	1.0	1.0
	Agree	103(71.0%)	42(29.0%)	4.08(1.39,11.96)	7.06(1.87,26.57)*

*Adjusted odds ratio for significant variables

2 Discussion

This evaluation research has tried to assess the availability of inputs, the compliance of health care providers towards DHIS2, data quality, the level of information use, and factors that affect information use of health facilities. In this evaluation, the formative approach with driven indicators was used to measure the process of DHIS2 implementation. The overall process of DHIS2 implementation in the district is found to be 64.7%. The structure component was 60.33% as measured by the availability of resources. The compliance of health care providers with the DHIS2 guideline and the data quality dimension was 55.75 and 78.0%, respectively. Based on the finding of this study, the process of the DHIS2 implementation was categorized as not successfully implemented (needs urgent and major improvement) according to the judgment parameter.

There was a shortage of HIT personnel specifically assigned for DHIS activities in their facilities. Only two (33.33 %) health facilities of them had internet access and even internet connectivity is low. Our study finding was in line with that of a qualitative exploratory study done in Bangladesh that revealed barriers to DHIS 2 implementation were lack of human resources, slow Internet connectivity too (35).

The compliance of health care providers with the DHIS2 guideline was 55.75 %. This finding is higher than the findings in Iran, which demonstrated that the mean score of compliance of the DHIS framework was 35.75 % (37). This difference may be due to the strong emphasis of the Ethiopian government taking information revolution as one of the priority health agenda.

Timeliness was measured by the district health office receiving health facilities reports by the predetermined deadlines. Health facilities should send their report within 21st to 26th days of the month to the district health office. The study showed that 66.67% of the health facilities compile and sent DHIS report on time or met the reporting deadline. This finding was higher than that of an evaluation conducted in Jimma by interviewing 14 heads/ units/departments of Health Centers, which showed that only (38.46%) units/departments of health Centers reported within their schedules (42) but far below from the national standard 100% (4).

All health facilities have a completeness rate of 88.89 % which is below acceptable completeness standards with 100 % (4).

Health facilities were evaluated for the accuracy of the total number of Newborn weighing <2000gm and/or premature and some children who exit from severe acute malnutrition treatment during the reporting period were found that 116 % and 112 % respectively were above the standard (VF> 1.10). Family planning new acceptors by age 25-29 years and the total number of pregnant women that received ANC first visit by gestational week (>16 weeks gestation) were 92 % and 98 % respectively. As well as a total number of Pregnant women received IFA at least 90 plus and a total number of live births attended by skilled health personnel were 91 % which were found within the standard (VF=0.90 to 1.10)(1)

Postnatal visits within 7 days of delivery, the number of children treated for diarrhea with ORS & Zinc, and the number of under-five years Children screened and have severe acute malnutrition were 80%, 83%, and 42% respectively which is below the standard level (VF<0.90) (1)

The total overall data accuracy of all health facilities in the district was found to be 0.89(89 %), which indicates lower numbers were recorded as being provided at the source levels than are reflected in the number sent to the next levels. This finding was in line with that of a study done in Malawi that revealed the accuracy of data in four service areas the median verification ratios comparing register and report totals at health centers ranged from 0.78 to 1.0 (39) but lower than the national standard (95-100%)(4)

The data quality was found to be 78 %, which is in line with a study conducted in Dire Dawa Administration health facilities that revealed 75.3%(23) and less than the national standard in all health facilities, which is 80%(23)

From the total respondents of the health facilities, 127 (78.9%) reported that standard health indicators were easily understandable. The rest 34 (21.1 %) complains that they did not understand the standards. This finding was comparable with a study conducted in Jimma (29.0 %) that did not understand the standards due to non-understandability, ambiguity, and lack of any training supports (42). However, this result was lower than that of a study conducted in Uganda showed that 69.9% of the health care workers stated that they were familiar with their performance standards and relevant performance indicators. This variation might be due to differences in the percentage of trained health care providers (46).

Inadequate support from the immediate supervisor 53 (33.1%) compounded by unclear roles and responsibilities 3 (1.9%) were reported as a hindrance to information use. This result is higher than a study

conducted among health workers at government health institutions in East Gojjam Zone, northwest Ethiopia, which is 11.9 %. About 32.3% of the respondents did not receive any regular feedback from the next higher health authority, which is lower than a study conducted in the East Gojjam Zone, northwest Ethiopia 53.5 % (2). About 16.8 % of the respondents lack facility encouragement on the culture of data uses. Encouragement on the culture of data use is higher in this study when compared to a study conducted in the public health sector in Tharaka Nithi County, Kenya with 97.6% lack promotion of information use culture (45). These differences might be due to the emphasis given for information revolution since it is one of the transformation agenda. Behavioral factors give crucial insight into how health workers, managers, and policymakers use information (or fail to do so). As reported by an East African district medical officer, “Staff refuse to use data; they do not appreciate the importance of data, hence they never refer to it in making decisions.” (44)

The overall health information utilization among the health care providers noted was 67.7 %. This finding is higher than that of a study conducted in North Gondar 22.5%, Jimma 32.9%, East Gojjam 45.8%, and west Amhara 38% (2, 22, 42, 43). This variation might be due to attention given to strengthening evidence-based decisions through good governance, transparency, and accountability recently. Besides, the government has given special emphasis on the utilization of information.

But it is lower than that of a study conducted in North Gondar zone 78.5 % (3) and in line with Hadiya zone 69% (53).

Strengths and limitations of the evaluation

This study used three dimensions to evaluate the process of DHIS2 implementation, which makes it more valid than measuring the process by a single dimension. Besides, using both qualitative and quantitative methods also helped us to get accurate and detailed results. The fact that the questionnaires are self-administered may affect the validity of the responses. Due to time and financial constrain the study area is limited around East Belesa district which resulted in a small sample size and thus compromising the representative of the study.

Conclusion and recommendation

Conclusion

The health facilities in the East Belesa district had the least required resources to implement the DHIS2. Essential inputs like Internet access, electricity, and HMIS manuals were not adequate to implement the initiative. The compliance of the health care providers to the national guideline was poor. Activities like feedback, action plan, and data verification were less than expected. The timeliness, completeness, and data accuracy generally is below the nationally expected standards. The use of electronic devices, accountability for poor performance, and agreement on the usefulness of (DHIS) were factors associated with health information utilization. In general, the process of DHIS2 implementation was not successfully implemented (needs urgent and major improvement), although the data quality was fairly implemented.

Recommendation

For health care providers

- Record activates daily
- Discuss the monthly performance using the standard indicators
- Have a good attitude toward data collection
- Understand and appreciate their role and responsibilities

For health facilities

- Avail UPS (back-up system), HMIS manuals (HMIS procedure manual, HMIS Indicator reference guide, HMIS disease classification (NCoD) manual, Data quality, and user manual) and electronic devices.
- Prepare a written policy on when and how to conduct data quality checks
- Increase the perception of health care providers on the usefulness of DHIS2
- Need to have emphasis on accountability for poor performance

For the woreda health office

- Supervise and give feedback on time
- Have access to the internet for all health facilities
- Conduct data verification at least twice a year for all health facilities

For the Zonal health department and regional health bureau

- Supervise and give feedback on time
- Train more HIT personnel
- Continuously train health care providers

Meta-evaluation

Meta-evaluation standards such as utility, feasibility, propriety, and accuracy were used to determine the effectiveness of evaluation. The quality of this study was evaluated based on the Meta-evaluation standards by using program evaluation models Meta-evaluation checklist set by Daniel L. Stufflebeam(54). For each of the 30 standards, the checklist includes 6 checkpoints drawn from the substance of the standard. It is suggested that each standard be scored on each checkpoint. Then judgments about the adequacy of the subject evaluation in meeting the standard can be made accordingly.

Utility standard

The evaluation protocol considers the information needs of major intended users by involving them starting from the evaluability assessment to the implementation of the evaluation. The evaluation questions were the needs of the stakeholders about the program. There was a high likelihood of addressing stakeholder information needs and values to ensure the use of the evaluation findings to improve the program. According to the Meta-evaluation checklist set by Daniel L. Stufflebeam, the score of utility was 78.5 %, which was very good as per the judgment of the checklist.

Feasibility standard

DHIS2is a well-established program with a national guideline that makes certain the availability of adequate data for the evaluation. The cost considered the presence of limited resources and the resources, which were used, are justifiable for the benefits of program improvement. Score 91.6 %, which was excellent

Propriety standard

No procedure affects the privacy, dignity, confidentiality, and rights of participants. Ethical Issues of the evaluation protocol are well respected. This ensures that the evaluation fulfills the propriety standards. Score 71.8 %, which was very good.

Accuracy standard

All the data collection, analysis, and presentation techniques were carried out based on scientific methods. Quality control strategies were formulated well. Data was collected from multiple sources using multiple methods and triangulation was employed to reach a valid conclusion by program document review, and an expert interview to maximize accuracy. Score 81.25 %, which was very good.

Acronyms

ANRHB: Amhara National Regional Health Bureau, CASH: Clean and Safe Hospitals, CEO: Chief Executive Officer, DCT: DHIS Core Team, DHIS: District Health Information System, DQA: Data Quality Assessment, DQA: Data Quality Assessment, DUP: Data Use Partnership, EHSTG: Ethiopian Hospital Services Transformation Guidelines, FMOH: Federal Ministry of Health, HIS: Health information systems, HISP: Health Information System Program, HIT: Health Information Technician, HMIS: Health Management Information System, HSTP: Health Sector Transformation Plan, HSTQ: Health Sector transformation in quality, KII: Key Informant Interview ,LMIS: Logistic management information system, LQAS: Lots of Quality Assurance Sampling, MFR: Master Facility Registry, NCOD: National Classification Of Disease, NORAD: Norwegian Agency for Development Corporation, PMT: Performance Monitoring Team, PRISM: Performance of Routine Information System Management, RDQA: Routine Data Quality Assessment, RHIS: Routine Health Information System, VF: Verification factor, ZHD: Zonal Health Department

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Authors' contributions

All authors contributed to the preparation of the manuscript. MW conceived and designed the evaluation and performed the analysis then GA, AM, TG,FB and KM revised the analysis. All authors read and approved the final manuscript.

Availability of data and materials

Data will be available upon reasonable request from the corresponding author.

Ethics approval and consent to participate

Ethical clearance was obtained from the institutional review board of the University of Gondar, College of medicine, and health sciences institute of public health (Ref. No/IPH/837/06/2012) then permission letter was obtained from the district health office. Each respondent signed informed consent after being told the purpose of the study. Besides, how it would benefit him/her and explained that participation in the study was voluntary. Their right to refuse or withdraw from the study at any given time was allowed. All responses were kept confidential and anonymous.

Consent for publication

It is not applicable.

Competing interests

All authors declared that they have no competing interest.

Author's detail

^{1 and 5} MPH in Monitoring and Evaluation (Plan, Monitoring and Evaluation Expert at Ethiopian Public Health Institute)

^{2,3 and 4} Department of Health Systems and Policy, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Po. Box: 196, Gondar, Ethiopia

⁶ MPH in Monitoring and Evaluation (Quality Officer at Minjar Shenkora Woreda Health Office)

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