



Implementation Evaluation of District Health Information System (DHIS2) Among Public Health Institutions of Kaffa Zone, Southwest Ethiopia

An Evaluation Thesis Submitted to Jimma University Department of Health Policy and Management, Health Monitoring and Evaluation Program Coordinating Unit for the Purpose of the Requirements of the Master's Degree in Health Monitoring and Evaluation

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December, 2022

Jimma, Ethiopia

**Implementation Evaluation of District Health Information System
(DHIS2) among Public Health Institutions of Kaffa Zone, South
West Ethiopia**

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Abstract

Background: District Health Information System is an integrated, open-source and web-based platform for health data collection, validation, analysis, and presentation of aggregated and individual data. It improves health service delivery by strengthening the health management information system. It is a newly implemented platform which is essential for the improvement of data quality and evidence-based decision making. This evaluation tries to indicate major strengths, weakness and the way forward for the implementation of District Health Information System.

Objective: To evaluate the implementation status of District Health Information System and associated factors in Public Health Institutions of Kaffa Zone, Southwest Ethiopia, 2022.

Method: Institution based single case study design was conducted with both quantitative and qualitative data collection method. The dimensions of evaluation were availability adherence and compliance. The study populations were institutions, health workers and documents with purposive sampling technique. Quantitative data were collected by self-administered questionnaire, document review and resource inventory and analyzed by using SPSS version 26.0. The qualitative data from direct observation and key informant interview was analyzed manually through thematic analysis with respective dimensions.

Result: A total of seventeen health institutions and one hundred twenty six performance monitoring team members were participated in the evaluation. About 56.3% of health institutions had assigned specific units for the program. Non functionality of computers in two health centers, failure of the online system in three health centers and inadequate budget in fifteen health institutions were the major findings with respect to resource availability. Although majority of the participants (86.5%) were trained for the system, gaps were identified which is related with the training content and approach. An observation illustrates strength in using routine data entry apps but significant challenges were observed in utilization of system based data for informed decision making. Previous knowledge on HMIS, computer skill and User friendliness of the tool were significantly associated with implementation of the system. An overall evaluation result of 55.4% scored and judged as fair according to agreed judgment parameter.

Conclusion: This evaluation demonstrated gaps related with non-comprehensive training method, low report timeliness and completeness which is below the national target and poor practice of exercising system data for analysis and informed decision making in contributed for fair implementation status in the study area. Possible recommendations suggested were maintaining nonfunctional computers and internet access, adequate budget allocation, integrating practical training approach and regular supportive supervision in line with the program.

Key Words: availability, adherence, application, compliance, data analysis, district health information system

Acknowledgement

First and for most I would like to thank Almighty God for being on the side of me in the efforts towards my successful completion of this Evaluation. Secondly Jimma University Department of Health policy and management, especially health Monitoring and Evaluation unit, deserve special thanks and recognition for providing me an opportunity to this work. I would like to extend my deepest gratitude and appreciation to my advisors Mr. Feyissa Tolessa(BSc, MSc-HME) and Mr. Asaye Birhanu (BSc, MSc) for their continuous guidance and effort for making me a competent evaluator.

Lastly my special thank goes to Kaffa zone health department, Woreda health offices and health center study participants for their willingness and for providing necessary input for this thesis.

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Abbreviations	
ANC	Antenatal Care
DHIS	District Health Information System
HMIS	Health Management Information System
HCs	Health Centers
HF	Health Facilities
HI s	Health Institutions
HIS	Health Information System
HIT	Health Information Technician
HISP	Health Information Strategic Plan
HMIS	Health Management Information System
HSDP	Health Sector Development Plan
HSTP	Health Sector Transformation Plan
ICT	Information And Communications Technology
M&E	Monitoring And Evaluation
MNCH	Maternal Neonatal Child Health
MOH	Ministry of Health
PMT	Performance Monitoring Team
RMNCAH	Reproductive Maternal Neonatal Child Adult Health
SWEPRS	South Western Ethiopian People Regional State
WoHO	Woreda Health Office
ZHD	Zonal Health Department

Operational Definitions

Data element: - All necessary information that are to be filled in each cells of the DHIS data base or report form

Health institutions (HIs): All health sector facilities including administrative offices (ZHD, WoHO, hospital and health centers).

Health Facilities: Service providing health institutions (Health Centers and Hospitals) excluding administrative offices.

PMT members: Any staffs of HIs that as assigned to lead case teams, CEO or HMIs focal person that have a primary purpose of monitoring institutional performance and participated in recording and reporting of health information.

Functional Computer: A desktop or laptop located in HMIS unit with an installed DHIS2 application.

Uninterrupted Electric Service: An electric supply with functional backup generator that helps using of application at any time needed.

Internet Connection: Any line of internet that helps to enter data and send to upper level online.

Evaluation judgment matrix: A matrix that shows the list of indicators to be evaluated, the criteria for giving judgment and actual scores of each indicator depending on the finding.

Availability: Refers to the presence of inputs (resources) required for implementation of DHIS2, like human, financial and materials resource.

Adherence: Implies whether DHIS2 training is being delivered as it was intended or prescribed by its developers both in terms of content and methods.

Compliance: Refers to the level at which health workers involved in DHIS2 application process conduct activities according to DHIS2 implementation guideline of 2022.

Implementation status of District Health Information System: was assessed by availability, compliance and adherence dimensions. The overall implementation status was calculated by taking the sum of **availability ,compliance and adherence** dimensions scores and judged as follows Judgment parameter ≥ 90 - **Excellent**, [89–80]-**V. good** , [65 – 79] –**Good**, [50-64] – **Fair**, [<50] – **Poor**.

1. Introduction

1.1. Background

District Health Information System is an integrated, open-source and web-based platform for health data collection, validation, analysis, and presentation of aggregated and individual data(4). It is a data analysis and management platform through electronic software. It helps to improve health service delivery by strengthening the health management information system (HMIS). Easy aggregation of reproductive, maternal, newborn, child, and adolescent health data using DHIS2 has played a critical role in supporting all system pillars like policy formulation, proper health management, evidence based decision-making, prudent resource usage, monitoring and assessment of the public health situation, health care delivery, and all outcomes that need reliable and timely health information (1).

The aims of district health information system software are; to deliver complete data management results founded on data storage ideologies and a modular system that can simply be data entry or can be tailored to replicate paper forms; deliver diverse types of tools for data authentication and enhancement of quality of data, and deliver one-click reports with charts and tables that are easy to use for preferred indicators or summation reports using the blueprint of the tools for data collection and flexible and dynamic data analysis in the analytics modules (6).

The Ethiopian MOH has taken DHIS2 as guiding program management and policy development tool for decision-making and taken as a national electronic health management information system. It is used to promote one of the four transformation agendas in the country's health sector transformation plan which is 'Information Revolution'(5).

In Ethiopia, district health information system is vital in the realization of the 2030 vision with an intention to have fair and affordable healthcare at the highest attainable standard to the citizen of the country and to strengthen the health information pillar. Data is routinely collected and uploaded to DHIS2 by health records and information officers from every lower tier of health facilities to a higher level which is later utilized by the county health managers and Ministry of Health in decision-making. Besides, health information generated from DHIS2 is also used by researchers and health care providers in decision-making to improve patient care(5).

1.2. Statement of the Problem

The major purpose of DHIS-2 is supporting decentralized, action-oriented, evidence-based decision-making and M&E by managers and health workers at all levels of the health system and providing quality information for routine service delivery(7). But many developing countries struggle with incomplete, inaccurate and untimely information which is not useful for health decision-making (8). This is due to shortage of skilled HIS personnel, absence of separate HIS aggregating application system, inadequate budgets allocation for HIS, inadequate data quality assurance, shortage of supervisory support, shortage of infrastructure with respect to information and communications technology application in different levels of health institution(9,10).

DHIS2 implementation is at its immature age in developing countries due to resource constraint. Many of health professionals focus only on routine data entry due to lack of adequate training, limited skill and awareness on the importance of using data quality, validation, analysis and interpretation applications. Due to this decision-makers cannot identify problems and needs, track progress, evaluate the impact of interventions and make evidence-based decisions on health policy, program design and resource allocation(13).

According to health sector transformation plan (HSTP II) and information revolution road map of 2021-2025, in Ethiopia an implementation status of district level health information system (DHIS2) are the major contributing factors data quality and information use at all levels. This is due to many factors like lack of attention given to HIS, insufficient electricity and internet access, untrained human power, incongruence to the end user manual, lack of integration, absence of standards and guidelines, inadequate staffing and poor ownership. In addition to these, HIS Activities are weakly coordinated at the districts and facilities level where data was produced primarily(12).

For DHIS to be implemented successfully, it is vital to assign responsible person with appropriate training and allocating budget specifically to accomplish tasks related to DHIS. However, study in Jimma zone, southwest of Ethiopia revealed that about 22% health facilities didn't assign HMIS focal person and of those facilities that assigned focal persons around 72% didn't have information technology training. Concerning to budget about 78% health facilities and 70% of the total districts didn't allocate recommended budget for HMIS. Furthermore, there

was limited culture of using DHIS for planning, evidence based decision-making and program management. Around 73% of the facilities didn't exercise discussion and make decisions using findings from routine health information (11).

Despite this fact studies on DHIS2 implementation status in Ethiopia is generally limited. There is a gap of scientific evaluation to DHIS2 implementation in Kaffa Zone as well. This evaluation tries to fill this gap by assessing the implementation status of DHIS2 in public Health Institutions of Kaffa Zone by evaluating the program organizational and utilization plan with a mirror of preset standards.

1.3. Significance of the Evaluation

The findings of this evaluation are expected to identify major strengths, challenges and the way forward in implementation of DHIS2 in Kaffa Zone. It will provide relevant information for planning, M&E and shows areas that needs special attention and further follow up. Also it will be used as crucial inputs for resource allocation, planning, capacity building and strengthening informed decision-making based on quality information. It will contribute for the improvement of service quality for the general population.

Furthermore, Kaffa Zone health department, South West Ethiopian People Region (SWEPR) health bureau, federal ministry of health (MOH) and all other nongovernmental organizations can use the finding of this evaluation as an input for informed decision-making in resource allocation, efficient utilization and identifying area which need special concern.

Finally, the finding of this study will fill the gap in current literature on evaluation of DHIS2 implementation in health institutions and will serve as input and reference in conducting other evaluation and further research on the same area.

2. Program Description

2.1. Stage of Program Development

2.1.1. International Context

The DHIS project is born out of the political processes of change in South Africa following the fall of apartheid, and as a synergetic collaboration between public health activists from the anti-apartheid struggle and information system developers from the Scandinavian tradition. DHIS emphasizes the use of information for action and improved health services, user participation and ‘live’ (in real contexts), agile and rapid prototyping. The first DHIS prototype aimed at capturing and analyzing routine monthly data (‘the MD module’), which was released for pilot testing in the HISP pilot districts in March 1998, and went through a series of very rapid prototype cycles during the next 4 to 6 months. By 2001, the DHIS was implemented in all provinces and districts in South Africa. Development of DHIS version 2 began in 2004 under the leadership of the University of Oslo, but aimed at distributing development activities to many countries in the HISP network like Mozambique, India, Kenya etc, in order to bring software development closer to the contexts of use(14).

Today, DHIS2 is the world’s largest Health Information Management System (HMIS) platform, in use by ministries of health in 73 low and middle-income countries. 2.4 billion People (30% of the world’s population) live in countries where DHIS2 is used. With the inclusion of NGO-based programs, DHIS2 is in use in more than 100 countries. The system generates customized reports for various health indicators from local, provincial, and national health departments (15).

2.1.2. National Context

In Ethiopia, as per a report made by HSDP III (2005/06-09/10), lack of timeliness and completeness of HIS reporting remains a weakness, and such delays contribute to the failure (at all levels) to use data as the basis for informed decision-making in health care planning and management. Recognizing the weaknesses of existing routine paper-based system, there have been repeated efforts to reform HMIS in Ethiopia. Some of such reforms include “standardization of procedures in data collection, analysis and reporting; selection of sector-wide

and programmatic indicators with the involvement of stakeholders and unified flow of information”.

The project HISP-Ethiopia was initiated in 2003 as a collaborative project between departments of Information Science, Addis Ababa University and the University of Oslo, Informatics department. The Program initially targeted implementation of DHIS 2 version 1.3 and version 1.4 that was introduced in five regional states: Oromia, Amhara, Tigray, Benishangul-Gumuz, and Addis Ababa. The objective was to change the existing routine paper-based HIS by adapting and implementing DHIS software; collaborating on the development of standardized essential data sets, reporting formats and indicators; and in building capacity through training of health workers and managers at different levels of each region. Because of the fact that the public health care system in Ethiopia is characterized by differences across regions and between districts and zones, in terms of human and infrastructural resources, it become the major presenting contextual challenges in the attempt to introduce DHIS in the different states. With Gradual customization and update in 2015 again DHIS 2 was proposed, customized and pilot-tested(15). At the end of 2017, DHIS2 version 2.27 re-launched in Ethiopia. DHIS2 version 2.27 upgraded to version 2.30 by solving previous problems and adding new features in September 2019.

2.1.3. Program Stage in Kaffa Zone

In Kaffa Zone District health information system (DHIS2) was initiated in 2018 by giving training for HMIS focal and health center directors from selected woredas. Consequently the installation of the database and internet line (DSL) was followed by the regional technicians on woreda health centers. From 2019 onwards, even though there is an electric power and internet interruption in zonal catchment, offline DHIS2 database is installed used in all woredas of Kaffa zone and the program is immature at this study period (16).

2.2. Program Goal and Objectives

2.2.1. Goals

- To support evidence-based decision-making through providing quality information that contribute for the improvement of the health status of Kaffa zone people (16).

2.2.2. Program Objectives

a) General Objective

- To support decentralized, action-oriented, evidence-based decision-making through DHIS2 that regularly provides timely, reliable, and relevant information based on routine service delivery and administrative records(16).

b) Specific Objectives and Targets

- Increase proportion of budget allocated to HIS (from the total health budget) from 4.3% to 15% in June 2022.
- Increase proportion of health institutions with adequate number of HIS health workforce from 45% to 70% in June 2022.
- To increase proportion of HIs with report completeness of 90 and above from 65% to 85% in June 2022.
- To increase proportion of HIs with report timeliness of 90 and above from 60% to 80% in June 2022. (17).
- Increase proportion of public health institutions that implement DHIS-2 from 67% to 100% in June 2022.
- Increase proportion of health facilities that have LAN connectivity 28% to 70% in June 2022.
- To increase Proportion of health facilities that met minimum information use standards/criteria from 65% to 80% in June 2022 E.C.
- To increase Proportion of health facilities that utilize DHIS2 for data aggregation, analysis and presentation purpose from 39% to 75% in June, 2022.(12).

2.2.3. Major Strategies

- **Nurture digitalization for data management and use:** Establish customized DMIS software system at woreda, sub city, zone, regional, and federal levels.
- **Improve HIS Infrastructure:** Procure computers and install required system and Train staff in basic computer literacy and in DHIS2 electronic system.
- **Improve HIS capacity of Health Workforce:** An effective DHIS2 requires an institutional structure that has appropriate staffing patterns, filled by persons with

appropriate skills to perform their tasks, at each level. So to achieve this on job training, supportive supervision and mentorship is important

- **Improve culture of information use** by providing complete, accurate and timely data by using DHIS2 which is directed towards supporting and strengthening local action-oriented performance monitoring.
- **Improve HIS governance**
- **Improve HIS financing**(12).

2.3. Program Activities and Resources

2.3.1. Program Resources

The resources needed for DHIS2 implementation are:

- Human resources: Trained manpower (HIT, M&E, health care providers and etc.)
- Material resources: Guidelines, Training manuals ,recording tools, reporting formats, supervisory checklist
- Infrastructures: HMIS office, electricity, computers, printer, internet access, Generator
- Financial resources

2.3.2. Program Activities

There are different activities that must be conducted for DHIS implementation. These include:

- Distribution of formats , guidelines ,manuals and HMIS materials
- Conducting theoretical and practical Training
- Conducting refreshment training
- Cascading Supportive Supervision and providing feedback
- Conducting Review Meeting
- Data collection, Recoding, Tallying
- Online/Offline Report: Entering, Aggregating, Analyzing, Interpreting, Storing/Backup
- Installing Computers with Offline DHIS app

- Distributing power supply, CDMA, LAN & Printers

2.3.3. Program Outputs

The expected program output of DHIS2 after conducting activities by using the above resources are:

- Computers installed with Offline DHIS app
- Distributed CDMA, LAN & Printers Trained health worker,
- No of training session conducted
- Guidelines ,manuals ,recording and reporting formats distributed
- Registration and tally sheet filled
- Data entered, analyzed, interpreted and transmitted
- Supportive supervision conducted and feedback given
- Review meeting and self-assessment meeting conducted

2.3.4. Program Outcomes

The expected outcomes of DHIS2 implementation are:

- Improved knowledge, skill, practice on DHIS
- Improved Data Quality
- Evidence based decision-making
- Improved Service Delivery

2.3.5. Program Impact

The expected impacts of DHIS2 implementation are:

- Contribution to Reduction of Morbidity and Mortality
- Contribution to Health Promotion

2.4. Program Logic Model

A logic model is a plausible and sensible model of how a program will work under certain environmental conditions to solve identified problems (17). It is a systems model that shows the connection of interdependent parts that together make up the whole process(26).

Implementation Evaluation of DHIS in Public Health Facilities of Kaffa Zone, SWEPRS, 2022

Problem Statement: - The major problems of DHIS implementation status are related to data quality and information use at the districts and facilities level where data was produced primarily. As a result of this the health system is challenged with incomplete, inaccurate and untimely information which is not useful for health decision-making.

Goal: - To support evidence-based decision making through providing quality information that contribute for the improvement of the health status of Kaffa zone people.

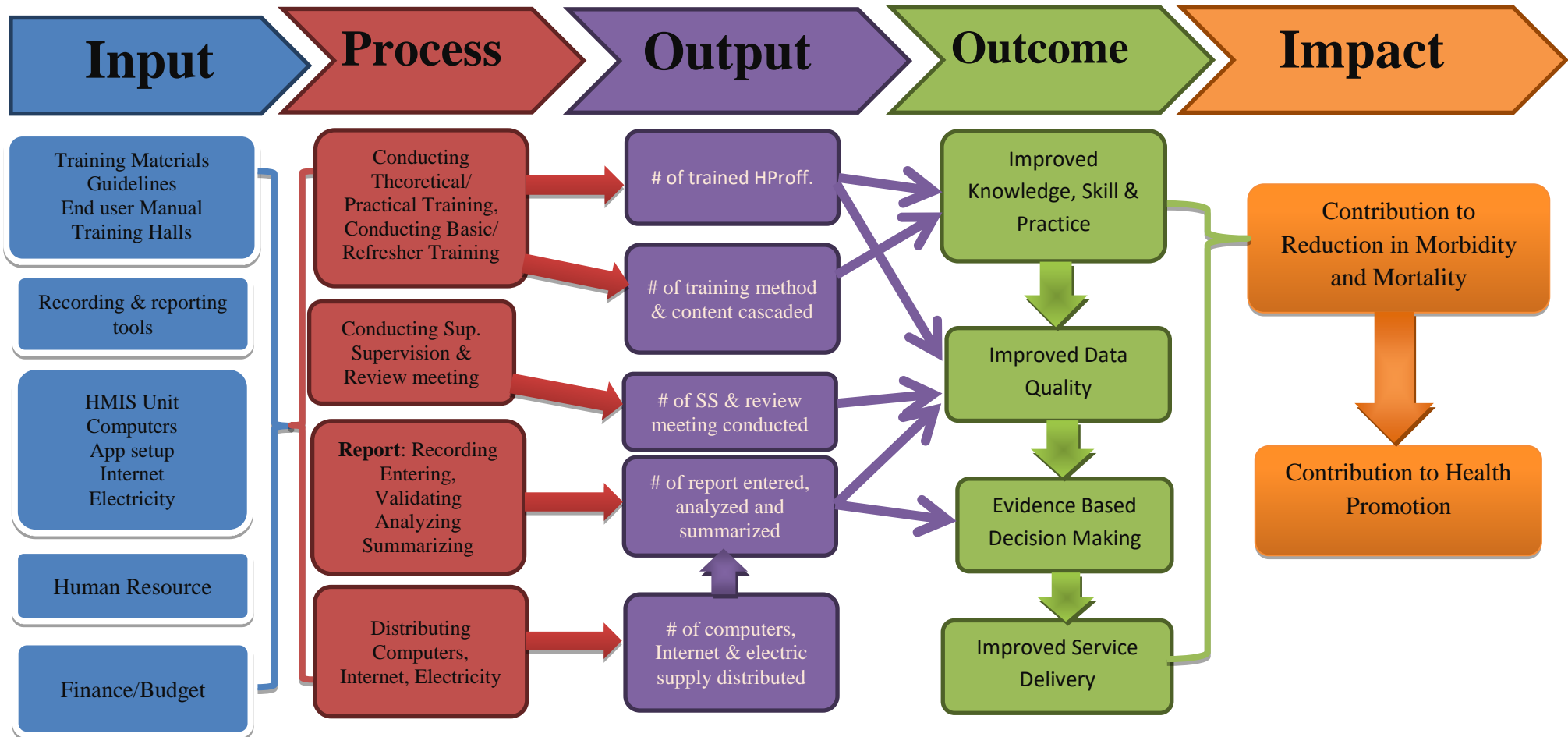


Figure 1 Program Logic Model of DHIS2 implementation in PHIs of Kaffa Zone, Southwest Ethiopia, 2022

2.5. Program stakeholders

Stakeholders are individuals, groups, or organizations that can affect or are affected by an evaluation process or its findings(25). Stakeholders identified during Evaluability assessment were participated in providing the general information of the program, decided on the readiness of program for evaluation and identifies the areas of the program to be evaluated. Similarly, they took part in providing the necessary information throughout the evaluation process. Lastly, evaluation result dissemination plan to all stakeholders to communicate the findings and lessons learned was included in the report. The table below shows detail information about stakeholder`s roles in program and evaluation, interest in evaluation, way of communication and level of importance.

Table 1: Stakeholder Analysis Matrix for Implementation Evaluation of DHIS2 in Public Health Institutions in Kaffa Zone, Southwest Ethiopia, 2022

Stakeholder	Role in the Program	Perspective/Interest on Evaluation	Role in the Evaluation	Communication Strategies	Level of Importance
Ministry of Health	<ul style="list-style-type: none"> • M&E • Supportive supervision • Implementation 	<ul style="list-style-type: none"> • Program Continuity • Use the finding for Program improvement 	<ul style="list-style-type: none"> • Source of indicators • Utilization of findings 	<ul style="list-style-type: none"> • E-mail 	High
SWEPRs Health Bureau	<ul style="list-style-type: none"> • Planning • M&E • Supportive supervision 	<ul style="list-style-type: none"> • Program Continuity • Use the finding for Program improvement 	<ul style="list-style-type: none"> • Utilization of findings 	<ul style="list-style-type: none"> • Tele Phone • E-mail 	High

	<ul style="list-style-type: none"> Resources allocation Capacity building Implementation 				
Kaffa Zone Health Department	<ul style="list-style-type: none"> Planning M&E Supportive supervision resources allocation Implementation Capacity building 	<ul style="list-style-type: none"> Program Continuity Program improvement Use the finding 	<ul style="list-style-type: none"> Select evaluation questions Set criteria for judgment Data source Coordinate evaluation 	<ul style="list-style-type: none"> Tele Phone E-mail Face to Face 	High
Woreda Health Offices	<ul style="list-style-type: none"> Planning Implementation M&E Supportive supervision Resources allocation capacity building 	<ul style="list-style-type: none"> Program improvement Use the finding 	<ul style="list-style-type: none"> Select evaluation questions Set criteria Data source Coordinate evaluation 	<ul style="list-style-type: none"> Tele Phone Face to Face 	High
Health Facilities	<ul style="list-style-type: none"> Planning Resource allocation Implementation M&E 	<ul style="list-style-type: none"> Program improvement Use the finding planning and resource allocation 	<ul style="list-style-type: none"> Select evaluation questions Set criteria Data source 	<ul style="list-style-type: none"> Face to Face Tele phone 	High

Local Grantees (NGO's)	<ul style="list-style-type: none"> • Providing Training • Funding the program 	<ul style="list-style-type: none"> • Use the finding for planning, Resource allocation & advocacy 	<ul style="list-style-type: none"> • Selecting evaluation questions and methods • Utilizing the results/ findings 	<ul style="list-style-type: none"> • Letter • Telephone • E-mail • Face to Face 	Medium
HIs Governing Board	<ul style="list-style-type: none"> • Planning • M&E • Supportive supervisions • Resources allocation 	<ul style="list-style-type: none"> • Program Continuity • Use the finding for Program improvement 	<ul style="list-style-type: none"> • Source of information for indicators • Utilization of findings 	<ul style="list-style-type: none"> • Face to Face • Telephone 	High

3. Literature Review

3.1. Use of DHIS2 in Health Information System

The district health information system plays a critical role in supporting evidence-based decision-making for all system pillars. Policy formulation, proper health management, evidence based decision-making, prudent resource usage, monitoring and assessment of the public health situation, health care delivery, and outcomes that need reliable and timely health information (27).

Adoption of DHIS2 enhanced regular reporting of outpatient, inpatient, and health service utilization data at all levels, relevance and thoroughness. As a result, the system has the potential to transform health facilities from the era of unreliable and fragmented HIS system to the more ideal situation of availability and use of quality health information for rational decision making. The system enables health care workers to analyze their levels of service provision, predict service needs, and assess performance in meeting health service targets. It has a number of qualities that can help with the task of improving the quality of data; User-defined validation criteria are used when entering data to guarantee that it is obtained in the desired logical range and format as well as reports on data coverage and comprehensiveness (24).

The purpose of DHIS2 application is to produce, compile, and disseminate information to support proper policy development, budget allocation, hiring of personnel, planning, implementation, monitoring, and evaluation of health services, distribution of medical supplies, and program participation in the health sector. However, a number of issues have been identified with the use of DHIS 2 data, especially in the context of developing countries. These issues include insufficient infrastructure support, a workforce with insufficient skills to manage the data, a lack of awareness of the data requirements, and disorganized data collection. Lack of coordination is also influenced by disorganized data collecting and disjointed organizational structure. These issues must be addressed for effective use of the software (24). Concerted efforts are required rightly from National Government to County Governments“ Health Managers to build capacity among all health providers on the importance of DHIS2 information and its subsequent use to make informed health care decisions geared towards service improvement(19).

Quality data empowers informed healthcare decisions. For example, quality HIS metrics managed well can be used in the surveillance of diseases, to prevent outbreaks. Healthcare professionals can use data for training or research, and policy guidelines to inform national health policies and programs (27).

3.2. What are the new features of DHIS2?

According to the reported experiences of the countries using DHIS2, this program has more technological capabilities than the first DHIS. The DHIS2 is Web-based, so this enhanced software might help user's access information in the system from anywhere as long as there is a computer and Internet connectivity. It could also evaluate and report on data. The software also has open sourcing software, the option to use the application offline, and the ability to send SMS messages. Through information integration and aggregation, the DHIS2 can help with the proper administration of data in the health system and make data entry easier at the operational level of service supply. For instance, DHIS2 allowed Zanzibar to combine its previously disparate systems. For instance, in Zanzibar, DHIS2 facilitated the merging of the nation's previously divided systems, removing many of the inherent issues associated with running a number of disparate systems (20). Additionally, by offering tools for evaluating data quality, encouraging feedback and self-assessment for reports, and identifying facilities that fail to report, DHIS2 may help to enhance the quality, timeliness, and completeness of data. The adaptability of the program is strength of the DHIS2 (21). There is an option to add additional modules to the DHIS2. As a result, DHIS2 can be tailored to each country's specific needs (21).

3.3. Availability of Required Inputs

According to a study done in developing countries, infrastructure and system issues are what pose the most obstacles to DHIS implementation. As it was noted, the majority of developing countries have poor HIS infrastructure (22). Implementing of DHIS2 requires consistent financial resources which should be taken into account in the annual budget (4).

According to a cross-sectional study carried out in Kenya, inadequate computers, unstable internet access, a lack of power backup, and resistance to change were the most obstacles to using DHIS2 for evidence-based decision-making (28). To save money and time, computers and other electronic data collection devices should be fixed locally. An Internet data subscription for CHCPs can guarantee timely reporting. To ensure timely reporting, there should be more

modems at the sub district and district levels and each municipality should have a dedicated laptop for the statisticians (25). The majority of those polled generally expressed a need for more computers, a steady internet connection, a sufficient budget, and additional resources to support the effective use of DHIS2 (26).

Inadequate staff training is one problem that could lead to additional implementation of DHIS2 issues. The adoption of the DHIS2 software and lack of understanding of it constituted a significant issue in Ghana (23). The DHIS2's deployment in Zanzibar ran into issues because information management unit staff lacked technological competence (20). Therefore, during the DHIS2 implementation, staff training should receive the proper amount of attention (24).

In the study conducted in Sierra Leone, respondents were asked to indicate the challenges affecting the implementation and effective use of DHIS2. The following were majorly reported issues like inadequate connectivity and ICT support, slow internet speed was a serious problem, data quality and overwhelming paperwork was a challenge(26). As DHIS2 is a web-based system, the availability of Internet is essential to support system usage. Although the system has an offline version, the synchronization of data to the main server requires an Internet connection that was not reliable and which affected the transmission of data to the main server. It was highly recommended that the ministry to find ways of providing reliable Internet connectivity especially in facility levels where data is collected02:35 PM.

The study conducted in Tigray revealed the possible gaps related with necessary inputs of the system implementation. Although almost all of health workers reported that there is HIT personnel specifically assigned for HMIS activities and there is HMIS office or unit in their facilities, only one fourth of them were reported that they have had internet service in their facilities for sending and receiving activities. Regarding guidelines and manuals, all health facilities had end user manual and implementation guideline.

A Cross-sectional study conducted in Uasin Gishu County, Kenya 2018 showed the major challenges experienced in the use of DHIS2 for evidenced-based decision-making were the lack of management support (34.3%), poor skills among the users (48.6%), lack of adequate computers (36.7%), unreliable internet connectivity (47.1%), lack of power backup (27.6%), and resistance to change (21.0%)(28).

3.4. Adherence to the Training

Health professionals especially those directly related with data production and analysis must be properly qualified and skilled as primary requirements for implementing the DHIS2 application. Studies in underdeveloped nations like Kenya and Sierra Leone have shown that implementation hurdles for the DHIS2 could include a shortage of employees with proficient computer skills, a lack of awareness of the platform, and a high volume of work connected with implementation (30). DHMs need access to the DHIS2 and training on how to use it in order to use the data from it. A little more than half of them claimed to have a user name and password to access the DHIS2. The DHIS2 was used to train somewhat less than half of the DHMs in data analysis. Possible factors likely to be associated with good understanding of the training in DHIS2 data analysis were long experience at work, respondents who are program coordinators and respondents with previous basic ICT skill (26).

The study also found that poor data quality with missing or incorrect data were associated with the training approach. Therefore, this situation could be linked to the lack of proper user training amongst DHIS2 users. Since the primary goal of any information system is to generate accurate and timely reports for decision making. The ministry should ensure the data entered into the system is of good quality. An emphasis should be made on equipping the necessary skills to those who are responsible for data entry(30).

The study conducted in Bangladesh manifested that since DHIS 2 is used at different levels of the health system, from service delivery at the community level to policymaking at the national level, the DHIS 2 training curriculum should be tailored to the needs of health professionals working at different levels. Separate training sessions on medical terminology for community and sub district level staff and update to the software or data collection forms by refresher trainings should be organized to improve staff knowledge and efficiency. The statisticians, who are central to reviewing and analyzing RMNCAH data, articulated the need for trainings twice a year. A standardized training curriculum and tools are also needed. Furthermore, soft copies of training manuals should be shared with staff via e-mail so they can be easily updated and disseminated(25)

Many countries utilized a variety of user training techniques. Kenya used the Trainer of Trainees technique to provide the necessary training. First, a select group of teachers was chosen and prepared. A cascade model was then used to transfer training to lower levels (30). Kenya used the SMS messaging capabilities of DHIS2 to enable users to share their experiences with others. On-the-job training was another method of instruction in Kenya. Using this strategy, trips were undertaken across the nation, and the software was especially evaluated at users' workplaces while offering coaching and mentorship services (32). The creation of the international DHIS2 Academy³ will enable design, establishment, and maintenance of the DHIS2 at the national and regional levels. The international DHIS2 Academy³ has been created to provide the necessary capacity to empower design, establishment and maintenance of the DHIS2 at national and regional levels (22). In addition, the DHIS2 was introduced to Sri Lanka through the MSc in Biomedical Informatics course at the University of Colombo. These students have become “a strong network for health information systems implementation” (31). Zanzibar’s first experience, which focused on training delivery by international consultants were failed. However, in the subsequent attempt which involved the participation of local employees, the DHIS2 was successfully implemented (26).

The study conducted in South western Ethiopia showed that post training regular supportive supervision and feedback mechanism about DHIS from intra-facility, woreda health office and regional health bureau were mandatory for proper understanding of the training concepts and implement the system as it is prescribed in its end user manual.

3.5. Compliance to National Implementation Guideline

According to a study done in low- and middle-income countries (LMICs), routine health information systems (HIS) are typically weak(32), with multiple storage formats, record duplication, fragmentation, and incompleteness being some of their main flaws (6). As a result, some LMICs, including Ghana, Kenya, Tanzania, and Sierra Leone, have started a series of health information system reforms to gather and standardize data across the nation to produce an important resource for decision-making in the health sector (21, 22). The implementation of an open-source District Health Information System (DHIS2) by is an illustration of such significant changes. These information systems are designed to harmonize data across the country and

provide a foundation for analyzing health trends, making wise decisions, and developing activities to enhance living conditions in these nations (23-25).

A Cross-sectional study conducted in Uasin Gishu County, Kenya 2018 showed the major challenges experienced in the use of DHIS2 for evidenced-based decision-making were the lack of management support (34.3%), poor skills among the users (48.6%) and resistance to change (21.0%)(28).

The study conducted in Bangladesh demonstrated respondents skill levels based on their ability to enter data into the DHIS2 and use the data for decision-making. The ability to prepare league tables to rank the level of health facility performance was used as a proxy for data use. Approximately half (1287/2598, 49.54%) of the DHMs reported having an advanced level of skill for data entry, and approximately half (1321/2598, 50.85%) reported having average or advanced skills to prepare and use league tables. The proportion of team members with no skills to enter data or prepare and use league tables was very small (1.31% and 2.27%, respectively). Approximately two-thirds of the respondents had an average or high level of confidence in conducting data validation (68.28%) and analyzing DHIS2 data to produce visualizations (60.16%). Slightly less than three-quarters (71.79%) of the team members had an average or high level of confidence in using DHIS2 data for planning. Of these team members, less than half were highly confident in conducting data validation (44.3%) and using DHIS2 data for planning (47.61%). Only one-third (36.07%) of them were highly confident in analyzing DHIS2 data and producing visualizations. Other areas in which data from DHIS2 are used include staff deployment and allocation of funds, medicine, and supplies(26).

The study in Tigay manifested that out of all the total respondents, 50 (72.5%) of them said that the information they collected had used for planning and 42.4% respondents were used to observe trends of health service. In fact all the Health facilities had established PMT and all 69(100%) respond PMT conducted monthly meeting using a minute book, but only 43 (62.3%) said that PMT puts a solution according to the problem identified, additionally all respondents said that they have conducted LQAS on monthly bases and 49 (71%) of case teams that uses result of LQAS for decision making. Regarding to the principles of DHIS 62(89.9%) of the respondents said that the system facilitated information use and 62 (89.9%) data standardization. In line with this 48(69.6%) said DHIS reduces data burden, 48(69.6%) of them agreed reporting

system is simple. From the total respondents 46(66.7% of the participants said data handling using DHIS is inexpensive and 57(82.6%) DHIS permit easy communication with higher level and 43 (62.3%) appropriate for data analysis, transfer and presentation. The study in Jimma Zone identified that more than half of the respondents (57.3%) had good utilization of DHIS for clinical decision making (95% CI 50 to 64.2) (36).

3.6. Factors affecting DHIS implementation

Behavioral (Individual) Factors Affecting DHIS2 is individual factors related to the educational level, confidence, motivation, and competence of staff in using the information in DHIS2 for decision-making. The use of this application has been shown to increase employee satisfaction and gain the support of stakeholders. Experiences of Ghana, Uganda and Kenya have demonstrated that due to the highly efficient reporting capabilities of DHIS2, the workers' satisfaction with this software was enhanced (4). Evidence showed in the Amahara region, Ethiopia 45.9% there is a motivation mechanism to improve the use of information for evidence based decision-making (19). One of the problems facing health systems in developing countries is the lack of information usage for decision-making. In some countries where the DHIS2 has been used, the culture of information usage for decision-making has been encouraged and developed (4). Lack of interest in reporting by some individuals on staff and lack of motivation to use new systems (such as DHIS2) can also contribute to problematic implementation experiences. Therefore, modifying the attitude of employees towards reporting and encouraging them to use new systems seems essential (4).

Technical Factors are the factors related to the specialized know-how and technology to develop, manage, and improve HIS processes that affect RHIS performance both directly and through behavioral factors. It also looks at the availability and user-friendliness of data collection tools and procedures. Technical challenges related to lack of information technology, problems of data management software, inadequate ICT skills, poor disease identification and classification, high burden of data collection, lack of standardized indicators and procedures and the availability and quality of data in general accompanied with limited technical know-how (37).

Organizational Factors are issues that mediate in the decision-making process. These include policies and procedures, organizational hierarchy, and organizational politics. Organizational

determinants comprise of information culture, structure, resources, and roles and responsibilities of key contributors at each level of the health system(37).

3.7. Summary of the Literature Review

District health information system (DHIS2) has simplified the health information system by decentralizing, open sourcing and supporting evidence based decision-making. As a system it is facing many challenges arising from the system, health institutions, responsible personnel etc. these issues can be categorized under major themes: Socio demographical, Technical, behavioral and organizational factor. Each factor has its own manifestation and solving approaches. From the literature above we can have a gross problem related with lack of system friendliness and operating skills from technical aspect motivation, incentives and personal attitude towards implementing DHIS2 from behavioral factors and culture of information use, bureaucracy and hierarchical organizational factors. Summary of the literature above indicates that poor implementation of district health information and there are many factors within the institutional capacity that affects utilization of district health information in a health facility. However, these factors can only be revealed through studies that look at the implementation of health information systems such as DHIS2. The following conceptual framework adapted from WHO PRISM will summarize the whole mentioned issues in a precise way.

Furthermore, A pilot Study on District health information software2 challenges & a lesson learned conducted in Ethiopia 2015, revealed that Health Information experts did some other tasks; such as service delivery to clients, High human resource turn over, Not enough computers for health data management, Inadequate access to DHIS skilled personnel, Low health information knowledge, Not enough attention paid to district information technology protection and infrastructure to ensure DHIS software maintenance, DHIS training infrastructures is undesirable, first-level data production and gathering is inefficient, there is no computerized report in urban and rural health facilities, and namely, there is not enough information for decision-making in this level. (11).

In general, more than half of health professionals showed a good level of DHIS utilization 149 (57.3%). Skills, training, supportive supervision, feedback and motivation to use DHIS were the most determinant factors for DHIS utilization(38)

3.8. Conceptual Framework

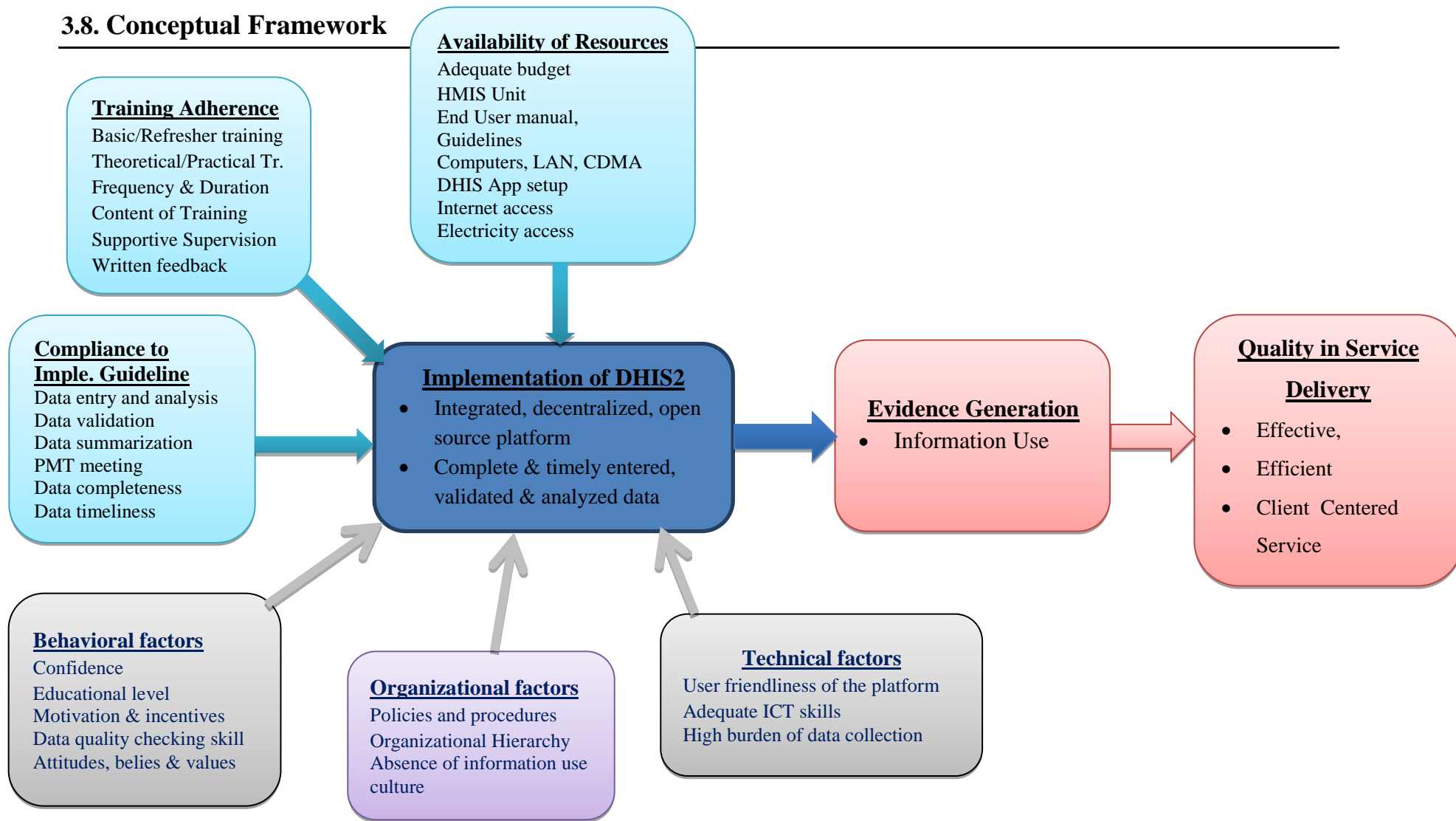


Figure 2: Conceptual Framework Summarizing the Literature Review on Implementation of District Health Information System

4. Evaluation Questions and Objectives

4.1. Evaluation Questions

1. Are the required program resources available to implement the DHIS2 program in PHIs of Kaffa Zone, Southwest Ethiopia, in 2022? If yes how? If not why?
2. Did the DHIS2 training given as it was designed by its developers with respect to content and method at HI level? If yes how? If not why?
3. Do the HIs congruence to national implementation guideline in cascading of the program? If yes how? If not why?
4. Are there factors affecting the implementation status of DHIS in PHIs of Kaffa Zone, Southwest, Ethiopia, 2022? If yes, what are them and how?

4.2. Evaluation Objectives

4.2.1. General Objective

- To evaluate the implementation status of District Health Information System and associated factors in PHIs of Kaffa Zone, Southwest, Ethiopia, 2022.

4.2.2 Specific Objectives

- To assess availability of resources for DHIS2 implementation in PHIs of Kaffa Zone, Southwest Ethiopia, in 2022
- To evaluate adherence of DHIS2 training as it was predesigned in PHIs of Kaffa Zone, Southwest Ethiopia, in 2022
- To evaluate whether the program is being implemented according to the national guideline in PHIs of Kaffa Zone, Southwest Ethiopia, in 2022
- To determine factors affecting implementation of DHIS2 in PHIs of Kaffa Zone, Southwest Ethiopia, in 2022

5. Evaluation Methods

5.1. Study Area

Kaffa Zone is found in the South West Ethiopian Peoples Regional State. Its capital is Bonga Town, which is 449Kms away from Addis Ababa. There are 14 Woredas, 05 town administrations, 293 rural kebeles and 21 urban kebeles with total population of 1,251,367. There are 14 Woreda health offices, 05 town administration health offices, 01 general hospital, 02 primary hospitals, 46 health centres, and 292 health post. There are around 488 PMT members in the catchment composed of heads of HIs (64), Case team leaders (360) and HMIS focal Persons (64) (16).

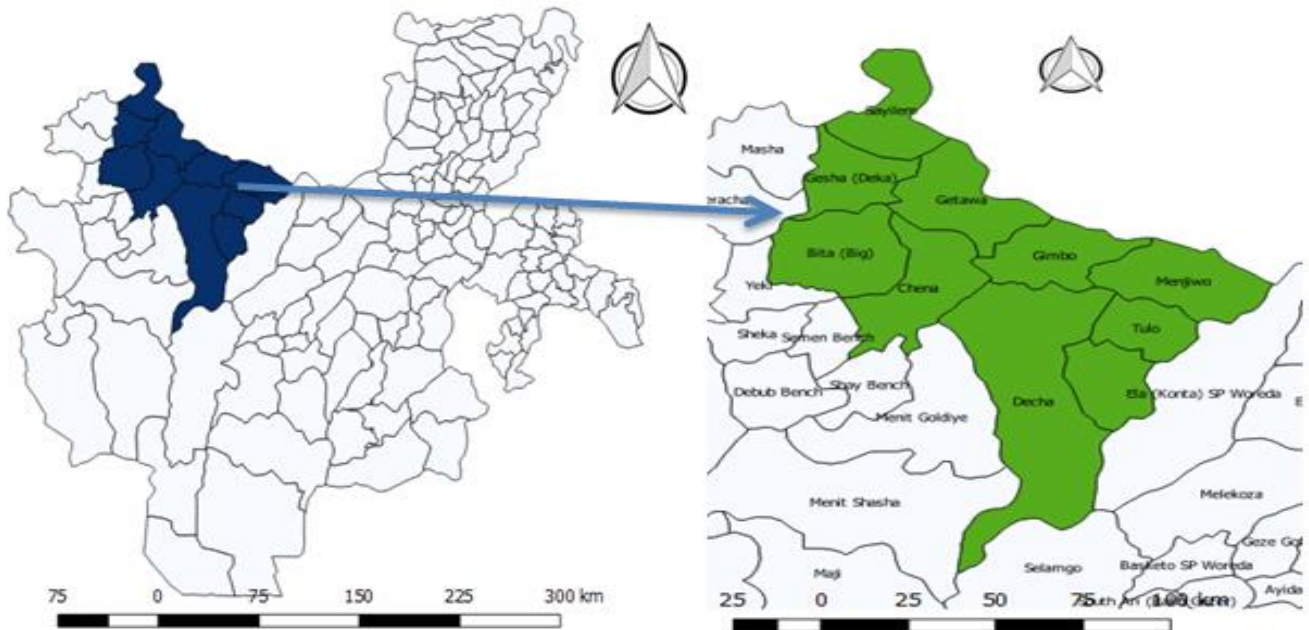


Figure 3 Map of Kaffa Zone, Southwest Ethiopia

5.2. Evaluation Period

Evaluability Assessment was conducted from **May 15-30/2022** and evaluation was conducted from **June 01– August 30/2022..**

5.3. Evaluation approach

An evaluation approach was formative with a purpose of improving DHIS2 program by examining the process of its implementation and organizational context. As a change oriented

evaluation approach, it is especially attuned to assessing in an ongoing way, any discrepancies between the expected direction and outputs of the program and what is happening in reality, to analyzing strengths and weaknesses and to generate understandings about how the program could be implemented better(42).

5.4. Evaluation Design

Single Case study design which was sequential explanatory with both quantitative and qualitative data collection method was conducted. This design is used to investigate a contemporary phenomenon within its real-life context and helps to examine whether programs are being implemented as intended or designed, what problems have been encountered and what adaptations were made and why. It depends on multiple data sources to answer evaluation questions (39).

5.5. Focus of Evaluation and Dimensions

This evaluation was focused on the process theory of the DHIS2 program. The dimensions of evaluation were **Availability, Adherence and Compliance**.

5.6. Indicators and Variables

5.6.1 Availability Indicators (07)

- Proportion of HIs with HMIS unit in the organization
- Proportion of HIs with at least one health information technician (HIT) assigned for DHIS2 data management.
- Proportion of HIs that allocate 15% of the total budget specifically for HIS from total health budget according to the HIS strategic plan(2021-2025)
- Proportion of HIs with functional computer installed with offline DHIS2 application
- Proportion of HIs that have updated DHIS2 V2.30 End-user Manual
- Proportion of HIs with uninterrupted electric service with functional backup generator
- Proportion of HIs with any type of internet connection currently used for DHIS activity

5.6.2. Adherence to Training Indicators (06)

- Proportion of HIs that delivered training on DHIS2 as set in annual plan by the health institutions.
- Proportion of PMT members who received **basic training of DHIS2** at least once.
- Proportion of PMT members that took DHIS2 **both theoretical and practical training** in the institutions.
- Proportion of PMT members that took DHIS2 training up to the **full schedule**.
- Proportion of PMT members that **pass post training exam after DHIS2 training**.
- Proportion of HIs received DHIS2 specific **supportive supervision** from higher level with written feedback quarterly in the past 12 month.

5.6.3. Compliance Indicators (16)

- Proportion of PMT members operating applications of data entry by **routine data entry app**.
- Proportion PMT members operating applications of data entry by **plan setting app**.
- Proportion of PMT members operating applications of data entry by **gross disease registration app**.
- Proportion of PMT members operating the data quality module to improve the accuracy of the data in the system through **validation rules app**.
- Proportion of PMT members operating the data quality module through **STD deviation outlier analysis**.
- Proportion of PMT members operating the data quality module through **min-max outlier analysis**.
- Proportion of PMT members operating the data quality module through **follow-up analysis**.
- Proportion of PMT members operating a **pivot table app** for data analysis and summarization.
- Proportion of PMT members operating a **data visualize app** for data analysis and summarization.
- Proportion of PMT members operating a **GIS app** for data analysis and summarization.
- Proportion of HFs with DHIS2 **report completeness** greater than or equal to 90%.
- Proportion of HFs with DHIS2 **report timeliness** as per greater than or equal to 90%.

- Proportions of HIs that conduct **PMT meeting** based on DHIS2 finding as per standard.
- Proportions of PMT members that gather DHIS2 based data to **identify and prioritize the problem/s** in the institutions
- Proportion of PMT members that gather DHIS2 based data to develop appropriate criteria for **selecting interventions** for a given problem
- Proportion of HIs that **display** DHIS2 based data with charts, tables for monitoring the trends of health services.

5.6.4. Dependent Variables

- **Implementation of District Health Information System**

5.6.5. Independent Variables

- **Technical Factors:**
 - Availability of data management software
 - User-friendliness of the tools
 - Adequate ICT skills
 - Lack of standardized indicators
 - Training
 - Supportive supervision
- **Behavioral Factors**
 - Data Quality Checking Skill
 - Motivation and incentives
 - Competence of Staff Knowledge
 - Educational Level
 - Confidence
 - Attitudes, beliefs & values of HMIS focal persons about DHIS
- **Organizational Factors**
 - Policies and procedures
 - Organizational hierarchy
 - Reviewing process, before report submission to next level
 - Organization incentivizes reporting high performance rather than quality data
 - Absence of culture of information use

- Regular feedback
- Computer access
- Internet access
- Management support

5.7. Target Population

- All public health institutions in Kaffa Zone that have been implementing the district health information system.

5.8. Source Population

- **For qualitative study:** All functional public health institutions implementing DHIS2 and their respective HMIS focal persons and heads involved in DHIS2 activities.
- **For quantitative study:** All PMT members of HIs involved in DHIS2 activities

5.9. Study Population

- **For quantitative study:** All sampled PMT members of HIs involved in DHIS2 activities from selected health institutions.
- **For qualitative study:** All sampled HMIS focal persons and heads
 - Sampled HMIS Units for resource inventory
 - Sampled DHIS2 documents

5.10. Study Units and Sampling Units

- **Quantitative data** was collected from sampled PMT members of selected HIs.
- **Qualitative data** was collected from sampled head of institutions, HMIS focal persons and DHIS2 backup documents.

5.11. Unit of Analysis

- **Primary unit of analysis:** PMT members, HMIS focal persons and Heads
- **Secondary unit of analysis:** Health Facilities
- **Tertiary unit of analysis:** Woreda and Town Health Offices
- **Final unit of analysis:** Zonal Health Department

5.12. Sample Size and Sampling Procedure/Technique

5.12.1. Sample Size for Health Institutions

- Based on WHO suggestion to have representative samples for a study area with a range of 40-59 districts, 30%-40% of the total institutions must be selected(40).
- Considering the above principle purposive sampling was employed to select **four** (40%) woredas from a total of 12 Woredas based on their 2020/2021 HSTP II Performance: 02 High performing (Sayilem & Tello) and 02 Low performing (Goba & Adiyu) Woredas.
- Performance based selection of **02 (High & Low Performing)** Town Administrations (35%) was done.
- From each woreda **02** health centers (**High & Low Performing PHCU**) and from each town administrations one hospital was selected by convenient sampling technique.
- In addition to these, Kaffa Zone Health Department, Sampled Woredas and Town Health Offices were part of the study.

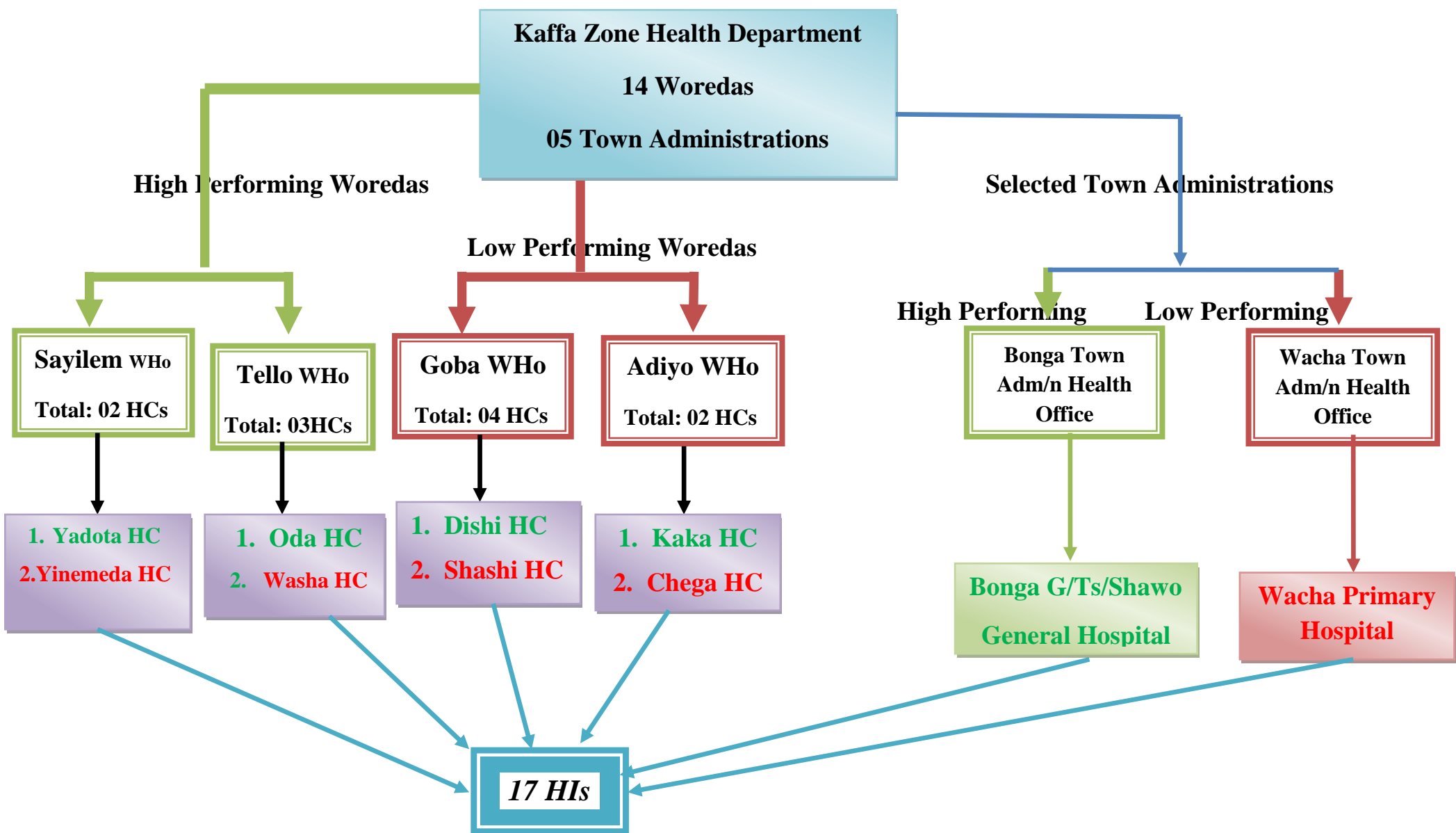


Figure 4. Schematic Presentation of Sample Size for Health Institutions for Implementation Evaluation of DHIS2 in Kaffa Zone, Southwest Ethiopia

5.12.2. Sample Size for Quantitative Data Collection

I. Sample Size for Self-Administered Questionnaire

The sample size for self-administered questionnaire was calculated using single population proportion with the following assumptions. P=0.57 (Utilization of district health information system and its associated factors among health professionals working at public health facilities of the southwest of Ethiopia(41)) marginal error (d) of 5%, confidence interval of 95% and $Z_{\alpha/2}$ is the value of the standard normal distribution corresponding to a significant level of alpha (α) of 0.05, which is 1.96. This yields a sample size of

$$n = \frac{(z_{\alpha/2})^2 p(1 - P)}{d^2} = 3.8416 \times \frac{0.57(0.43)}{0.0025} = 377$$

Where: -

- n = the maximum possible sample size
- $Z_{\alpha/2}$ = standard score value for 95 % confidence level of two sides normal distribution
- p = 0.57 (Utilization of district health information system and its associated factors among health professionals working at public health facilities of the Southwest of Ethiopia)
- d is margin of error (5%)

Because the total PMT members who are involved in DHIS2 data compilation and reports are less than 10,000 which are 168, finite population correction formula used:

N=168

$$nf = \frac{n}{1 + \frac{n-1}{N}} = \frac{377}{1 + \frac{376}{168}} = 116$$

Concedering **10% non response rate** sample size for self-administered questionnaire was **128** and it was distributed proporsionally to select members of PMT from each public health institutions. The following table shows proportional distribution of sample size for self-administered questionnaire for PMT members of selected HIs.

Name of HIs	High Performing HF's				Low Performing HF's		
	HF's		Total PMT members	Proportional SS	HF's	Total PMT members	Proportional SS
High Performing Woredas	Sayilem	<i>Yadota HC</i>	10	7	<i>Yinemedda HC</i>	7	5
	Tello	<i>Oda HC</i>	10	7	<i>Washa HC</i>	8	5
Low performing Woredas	Goba	<i>Dishi HC</i>	9	6	<i>Shashi HC</i>	7	5
	Adiyo	<i>Kaka HC</i>	11	8	<i>Chega HC</i>	9	6
Town Adm/ns	Bonga	Bonga Town Adm/n Health Office	11	8	<i>Bonga G/Ts/S General Hospital</i>	21	10
	Chena	Wacha Town Adm/n Health Office	10	7	<i>Wacha Primary Hospital</i>	19	9
ZH Dept			16	11			
Sayilem WHO			12	8			
Tello WHO			10	7			
Adiyo WHO			11	8			
Goba WHO			9	6			

Table 2: PMT members proportional SS for self-administered questionnaire in selected HIs

5.12.3. Sample Size for Qualitative data Collection

I. Sample for Key Informant Interviews (KII)

- A total of **34 KII** was conducted with Heads and HMIS focal persons of 17 selected health institutions.

II. Resources Inventory

- It was held in **17 health institutions** with a support of inventory checklist.

III. Sample for Document Review

- All selected **17** HIs was part of document review.
- Attendances, Pretest and posttest exam results of the two recent basic DHIS2 training were utilized to assess the adherences of the trainees.

a. Sample for Report Completeness

All reports that are expected to be entered were checked for the previous 12 months (July 2021G.C.-June 2022G.C.) whether all the required reports are entered or not. It was measured by using the number of reports observed in the online system divided by total number of reports expected to be entered in the previous 12 months.

b. Sample for Timeliness

All reports that are expected to be entered were checked from the online system for the previous 12 months (July 2021G.C.-June 2022G.C.) whether it was entered timely to the respective higher levels. Timeliness was measured by the number of reports entered before deadline over the total number of reports expected from online report summery app.

IV. Sample for Direct Observation

A total of 85 Direct Participatory Observations were undertaken, **06** from each selected health institutions, **03** observation per one HMIS foal person while utilizing the platform and **02** PMT meetings while conducting monthly PMT in order to observe congruence to the implementation guideline. The first one observation per one HMIS foal person was omitted from analysis to control howthrone effect as recommended in USAID Evaluation Kit.

5.13. Inclusion and Exclusion Criteria

5.13.1. Inclusion Criteria

- All PMT members, HMIS Focal persons and Heads working in Woredas of Kaffa Zone were included.

5.13.2. Exclusion Criteria

- PMT members, HMIS focal persons and heads who work at the institutions for less than three months.

5.14. Development of Data Collection Tools

Data collection tools are prepared by evaluator after reviewing relevant literature. For quantitative data self-administered structured questionnaire containing background information of the respondents, availability of resource and adherence of DHIS2 training both in terms of content and method were prepared. Document review template for consistency, completeness and timeliness and self-efficacy test to know confidence level of staffs in DHIS2 tasks are arranged.

For qualitative data key informants interview guide containing availability of resources, compliance to national guidelines and adherence of DHIS2 training as well as physical observation and resource inventory checklist are organized. Questionnaires are adopted from PRISM frame work, DHIS2 implementation guideline , DHIS2 training manuals and DHIS2 end user's manual (42–45)

Observation check-list was used to assess PMTs towards compliance to DHIS guideline. The tool was adapted from research made on the assessment of DHIS checklist(39).

The tools was pretested prior to actual data collection then based on the result of pretest further adjustment was made. The pretest was held in similar setting with study area, which is not included in actual study.

5.15. Data Collectors Decisions

Four BSc. professionals who are experienced on DHIS2 tasks and had training on DHIS2 were recruited for data collection and two M&E professionals was selected as supervisors. Training was given for the data collectors and supervisors on the questionnaire, data collection method and procedures by the primary investigator for two days.

To maintain data quality during the data collection period, the supervisors and the principal investigator was expected to perform supervision of data collection procedures, check every completed questionnaire, and give onsite technical assistance to the data collectors.

5.16. Data Collection Field Work

Pretest was conducted before the actual data collection. The process of data collection was supervised closely. The performance of the data collection process was assessed with the group members and appropriate correction was taken for the next day for problem occurs if any. Quantitative data was collected through self-administered structured questionnaire and resource inventory checklist and qualitative data was collected by using direct observation, key informants interview guide and document review.

The data was checked for completeness and consistency on daily base. Appropriate correction was given by supervisors and principal evaluator at any time during data collection field work and in each day collected in-depth interview data was categorized in thematic area.

5.17. Data Management and Analysis

5.17.1. Data Entry

The data were checked every day by principal evaluator together with data collectors and supervisors for completeness after data collection and any problems encountered was discussed among the evaluation team and solved immediately. Finally, the data was coded and entered to Epi data 3.1 for further processing then export to SPSS for analysis.

For the qualitative data, responses from key informants were coded, categorized and analyzed using thematic analysis technique manually.

5.17.2. Data Cleaning

Incomplete, inconsistent and invalid data was refined properly to get maximum quality of data before, during and after data entry. Corrections were made according to the original data.

5.17.3. Data Analysis

After data cleaning, analysis was conducted by using SPSS version 26.0 through descriptive statistics. The finding of assessment was presented using tables, graphs and figures. In order to determine the association between dependent and independent variables binary logistic regression was used and those variables with a p-value of less than 0.25 in the bi-variant

analysis was entered in to multivariate analysis. Odds Ratio with 95% confidence intervals was computed to show the strengths of associations. Lastly, a p-value of less than 0.05 at the multivariate analysis was used to identify variables significantly associated with the utilization of a routine health information system.

The overall implementation status was calculated by taking the sum of availability, adherence and compliance dimensions scores from the judgment matrix.

The qualitative data was analyzed manually using thematic analysis with respective dimensions and results were presented in narrative form. The final interpretation of results was based on evaluation weights and statistical analysis result of the evaluation.

5.17.4. Data Quality Management

To ensure the quality of data the following activities was done:

- Adapting questionnaires from standard tools
- Training data collectors and supervisors
- Conducting pre-test and double entry (two personnel by one computer) of data in Epi Data soft ware
- Inconsistent and incomplete data was managed accordingly
- Data entry and cleaning was done by the principal investigator.

5.18. Matrix of Analysis & Judgment

Almost every research activity involves a certain degree of judgment. In evaluation, these judgments are sensitive and usually may be linked to immediate actions. As a result, evaluations try to develop a more explicit plan to make judgments. Detail information of information and judgment is presented at annex part.

5.19. Ethical Consideration

The ethical approval and letter of support was obtained from Jimma University, institute of health, ethical review board. An official permission was sought from Kaffa zone health department; WoHOs and each facility participate in the study. Data collection for the evaluation was done with all consideration of the norm and values of the study participants.

Moreover, oral consent was obtained from participant's data collection time. Confidentiality was assured for the information provided.

5.20. Evaluation Dissemination Plan

The final evaluation finding was presented to Jimma University, Institute of Health, Department of Health Economics, Management and policy, Health Monitoring and Evaluation Coordinating Unit for approval then one day finding presentation session for key stakeholders was arranged. Hard and electronic copies of report will be disseminated to key stakeholders. Finally the finding will be disseminated through publication for scientific community.

6. Result

6.1. Socio-Demographic Characteristics

From seventeen health institutions included in this study, 08 (47%), 06(35%), 02 (12%), and 01(6%) was HCs, WoHOs, hospitals and ZHDs respectively. In self-administered questionnaire a total of 126 PMT members were participated in the study with a 98% response rate. Majority 76 (60.4%) of respondents age was less than 30 years with median (\pm SD) age of 27 ± 5.93 years. Majority of the participants (70.8%) were male. Half of respondents (61) were from health centers and 64 (50.4%) of respondents were diploma holders. Around 31 (24.6%) HMIS focal persons and heads were participated while the rest 95 were case team leaders.

Table 2: Socio-Demographic Characteristics of Respondents of Implementation Evaluation of DHIS in Kaffa Zone Public HIs, 2022.

Variables	Category	Frequency	%
Age	< 30 years old	76	60.3
	> 30 years old	53	42.1
Sex	Male	89	70.6
	Female	37	29.4
Type of HIs	Health center	51	40.4
	Hospital	32	25.3
	WHO	31	24.6
	ZHD	11	8.7
Educational Status	Diploma	64	50.8
	Degree	55	43.7
	Masters and above	7	5.6
Position in the case team /department	Case team leader	92	73.0
	HMIS Focal Persons	17	13.5
	Heads	17	13.5
Job experience	<1 year	19	15
	1-3 years	71	56
	>3 years	36	29

6.2 Availability of Resource for DHIS Implementation

A total of 17 HIs (One ZHD, four WoHOs, two town administrations offices, two hospitals and eight HCs) were observed for the presence of required resources for the implementation of DHIS.

From all observed HIs, about 09 (56.3%) namely Saylem, Tello, Goba and Adiyu WoHOs, Bonga and Wacha Town Admin Hos, Bonga G/Shu GH, Wacha Hospital and Kafa ZHD had assigned specific unit for the Program. The KII from WoHO head supports the finding and gives possible reasons by:

"....due to shortage of rooms in health facilities about 50% of facilities in our catchment share same office for both facilities heads and HMIS focal persons....but some that understood the importance of information prioritized and given separate office to this activities despite the shortage of buildings....."

HMIS focal person from HC said that,

".... In our set up due to low concern given for the facility class management, I am working in compacted uncomfortable room.....that absolutely affect the quality of HIS related activities including DHIS...."

All (100%) HIs assigned full time HMIS focal person dedicated for DHIS activities and three fourth 15(76%) of them except Chega, Shashi and Kaka HCs were HIT professionals. In these HCs the focal persons are Clinical Nurses, Health Officers and BSc Nurses because of lack of trained HITs (51%), skill gap to manipulate DHIS software by HITs (37%) and misusing trained HITs to the card room (12%).

One of key informants from WoHO reported,

".....The reason why we used other health professionals for DHIS program was because of shortage of HIT professionals and some of them didn't feel the setup..... Confused when we assigned to computer utilization.....it requires experience for HITs....with this regard hospitals and woredas are better than health centers..... "

Another respondent who was head of HC said,

".....Since they are fresh and didn't take the training and we couldn't assign HIT professional as DHIS focal person, we rather prefer other trained health professionals for DHIS activity....."

By reviewing previous fiscal year financial report concerning budget allocation even though all of HIs (17) assigned and expend budget specifically for DHIS activities in line with HMIS only Zonal Health Department(14%) and Bonga G/T/S hospital(15%) allocated and utilized the recommended amount out of their total budget.

One of key informants who was 35 years old head of WoHO said,

".....There is low budget allocation specifically for DHIS, may be due to shortage of the grant budget even for essential expenses like drug procurement..... After all due to low concern given for HMIS from finance sector....."

A 28 years old female PMT member from finance case team said,

"There is no specific budget code for DHIS so we had been using budget from other code.....currently, budget constraint prevented us even from conducting other activities"

The DHIS2 V2.30 End user manual was available in 08 of observed (47%) HIs namely Bonga and Wacha Town Admin HOs, Saylem, Goba and Adiyoo WoHOs, Bonga G/Sha GH, Wacha Hospital and Kafa ZHD. About 15 (88.2%) of observed HIs have computer installed with offline DHIS2 app, facility ID and password. The rest 02 (Chega and Shashi HCs) have nonfunctional computers. Majority of observed institutions (14) have internet connection with 12 CDMA (71%), 02 LAN (12%), but 10(59%) are using it for online DHIS related activities. Majority (10) of all observed HIs (ZHD, 04 WoHOs, 02 To Admin HO, 02 Hospital and Kaka HC) had electric power with functional backup generator.

Table 3 Institutional Resources Inventory Summary

S.N	Items to be assessed	Adm. Off. n=7	%	HF's n=10	%	Tot.	%
1	HMIS unit /office specifically given for DHIS2	4	57	4	40	8	47
2	Health Information Technician (HIT) assigned for DHIS2	7	100	8	80	15	88
3	Allocation of 15% of the total budget specifically for HIS	1	14	1	10	2	12
4	Specifically assigned computer installed with offline DHIS2	7	100	8	80	15	88
5	DHIS2 V2.3 end user manuals available near by the work place	6	86	3	30	9	53
6	Uninterrupted electric service with functional backup generator	6	86	4	40	10	59
7	Any type of internet connection currently used for DHIS activity	7	100	3	30	10	59

- The overall value for **availability dimension** was **57.94%** which is **FAIR** according to judgment criteria agreed by stakeholders.

Table 4 Judgment matrix for availability dimensions for implementation evaluation of DHIS in Kaffa Zone public HIs, 2022

Indicators	Expected	Observed	Weight	Score	%=
	(E)	Val. (O)	given(W)	S=[W*O /E]	[S/W*100]
Proportion of HIs with HMIS unit specifically given for DHIS activities	17	8	5	2.35	47.1
Proportion of HIs with at least one health information technician (HIT) assigned for DHIS2 data management.	17	15	3	2.65	88.2
Proportion of HIs that allocate 15% of the total budget specifically for HIS from total health budget	17	2	5	0.59	11.8
Proportion of HIs with functional computer installed with offline DHIS2 application	17	15	7	6.17	82.4
Proportion of HIs that have updated DHIS2	17	9	5	2.64	52.9

V2.30 End-user Manual						
Proportion of HIs with uninterrupted electric service with functional backup generator	17	10	5	2.94	58.8	
Proportion of HIs Proportion of HIs with any type of internet connection currently used for DHIS activity	17	10	5	2.94	58.8	
Sum	119	68	35	20	57.94	
Judgment parameter						
>=90- Excellent, [89–80]-V. good , [65 – 79] –Good, [50-64] – Fair, [<50] – Poor						

6.2. Adherence to DHIS Training

The value of adherence dimension was obtained from individual self-administered questionnaire, key informants (HMIS focal persons, heads and training facilitators) interview and **reviewing the pretest and posttest exam results** of the previous two rounds of **basic DHIS2 training**.

Adherence		HMIS FP	Heads	PMT Members	Total	%
Trained HPs		17	17	75	109	87
Frequency of Training	One times	0	2	23	25	23
	Two times	4	5	31	40	33
	More than two times	13	10	21	44	31
Type of Training	Basic T.	17	14	35	66	61
	Refreshment T.	17	17	42	76	60
Total days of Training	3-5 days	5	4	20	29	27
	6-7 days	9	11	39	58	54
	8-10 days	3	2	16	21	19
Training Approach	Theoretical & Practical T.	11	13	47	71	65
	Theoretical Only	6	4	28	38	35
Completed Full scheduled Training		17	17	75	109	87

Table 5: Summary of Adherence Dimension from Self-Administered Questionnaire

Out of 126 respondents participated in the study 109(87%) were trained with a frequency of one time(23%), two times(33%) and more than two times(31%) and 76(60%) of all had refreshment training on DHIS. All heads and HMIS Focal persons (100%) took DHIS training including the refreshment for more than two times.

Two third (64%) of all trainees took for two or more times and of these about 27%, 54% and 19% took a training for 3-5 days, 6-7 days and 8-10 days duration respectively. Even though all

of the trainees took up to full schedule, only 71(65%) of them took both theoretical and practical approach while the rest took theoretical training only.

A 38 years old Zonal HMIS focal and training coordinator said that

“In our zonal health institutions there is no shortage of training schedules..... In my assumption the problem is related with training approach and method..... which is clearly manifested in their pretest posttest progress....”

One of the respondents from HC:

“... If training is needed to be effective... both practical and theoretical approach must be integrated, that means the theory must be supported by online exercise so that we can pass the post training exam...”

Reviewing the recent two Basic DHIS2 training, there were a total of 83 training participants in the past 12 month. Taking the average, it is observed that all of the training participants had relative progress (increment) in their pre-post training exam result but out of the total trainees only 34 passed the posttest exam. Out of 34 trained HMIS focal persons and heads only 10 and 05 of them passed the posttest respectively, whereas the rest got less than average.

A 25 years old HMIS Focal person from HC reported

: “... For example I didn't fully understand the concept of DHIS2 and I have a big gap in data entry and analysis.... not because of lack of both basic and refreshment training, it is due to the way of training mechanism that we took it from power point slides and manuals rather than the computer supported procedural approach.”

A 43 years old Zonal HMIS data analyst and JSI coordinator said that

“....There is no problem on the schedule of DHIS2 training rather on the method.... Only theoretical way cannot capacitate them... lack of training hall with sufficient one to one computer and internet access in zonal catchment area may be the major cause for lack of practical sessions..... Most of the time due to this problem we train the theory part in zonal center and appoint practical sessions to be held on their woreda and HF during supportive

supervision.... This might contribute for low practice of DHIS2 Mini apps in our trainees afterwards.... ”

Regarding supportive supervision all (07) zonal and Woreda level DHIS activities were supervised semiannually as planned. Whereas only 46% of the health centers and hospitals were supervised with standard schedule (quarterly) of which only 29% of them namely Bonga G/Ts Hospital, Wacha Primary Hospital, Yadota, Yinemeda and Kaka HCs were using standard checklist. The supervision incorporates technical and practical support in only 29% of the total sessions cascaded.

Written feedback is expected after every supervision but only 07(41%) of supervised HIs namely Kafa ZHD, 04 Woreda HOs, Bonga G/Tsa hospital and Yadota HC were given with it. The rest 57% were given only oral feedback. Only ZHD conduct DHIS related review meeting quarterly with all facilities under their jurisdiction. Even though it is included in their annual plan of 2020/2021, all WoHOs and Town Admin HOs didn't perform it in the last 12 months due to budget constraint (81%) and lack of attention (19%).

Table 5 Judgment Matrix for Adherence Dimension For Implementation Evaluation of DHIS in Kaffa Zone Public HIs, 2022

Dimension	Indicators	Expected (E)	Observed (O)	Weight given (W)	Score [W*O/E]	Ach. in % [S/W*100]
Adherence (30%)	Proportion of HIs that delivered training on DHIS2 as set in annual plan by HIs	17	17	4	4	100
	Proportion of PMT members who received in service training of DHIS2 at least once	126	109	3	2.6	86.5
	Proportion of PMT members that took DHIS2 both theoretical and practical training in the institutions	126	71	7	3.9	50.0
	Proportion of PMT members that took DHIS2 training up to the full schedule	109	109	4	4.00	100.0
	Proportion of PMT members that pass post training exam on DHIS2	83	34	6	2.46	41.0

Proportion of HIs received SS on DHIS2 from higher level with written feedback in the past 6 month	17	7	6	2.47	41.2
Sum	478	339	30	19.43	64.7
Judgment parameter					
>=90- Excellent, [89-80]-V. good , [65 – 79] –Good, [50-64] – Fair, [<50] – Poor					

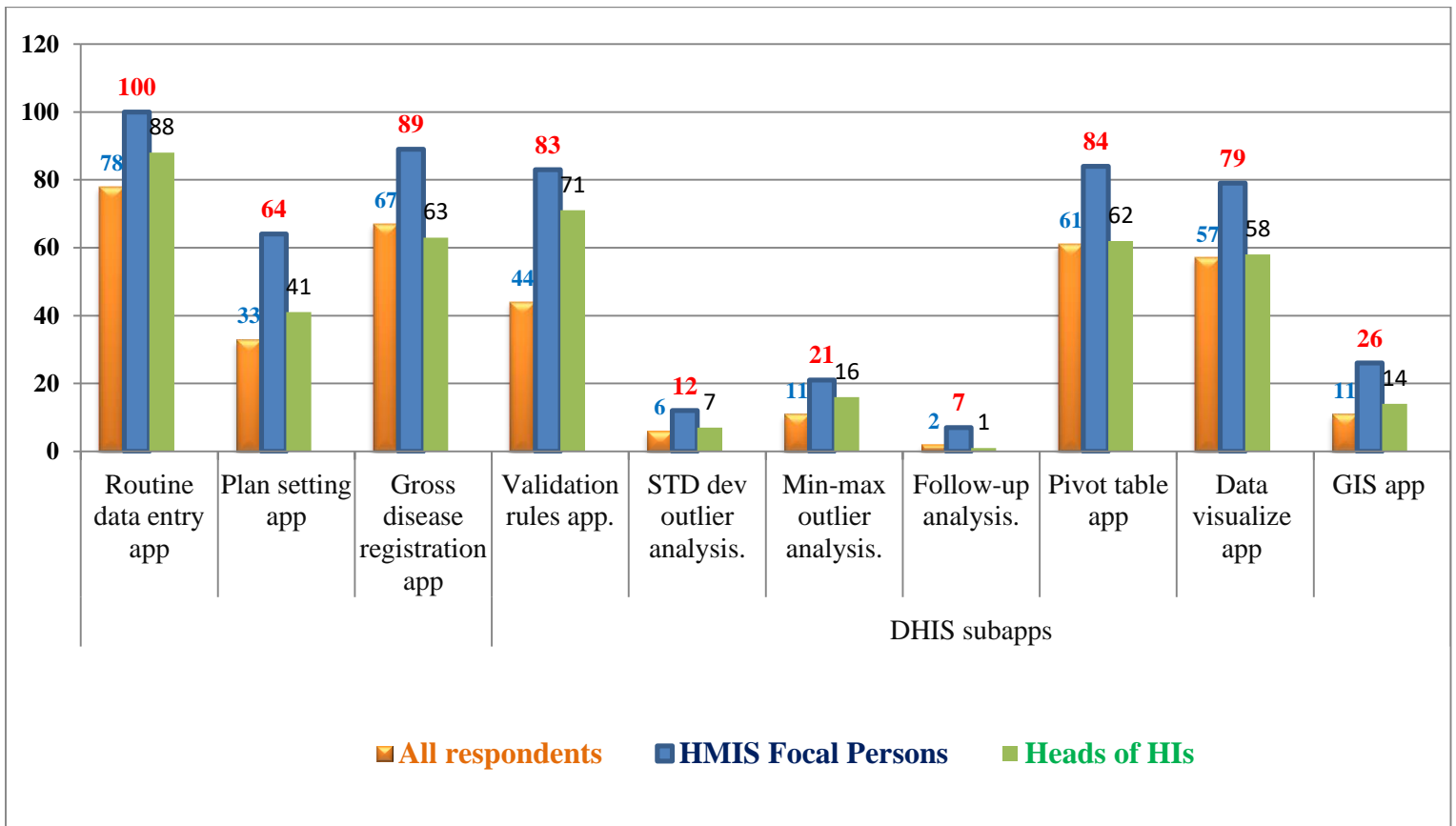
The overall **Adherence was 64.7%** which falls under **FAIR** implementation according to preset judgment parameter.

6.3 Compliance to Implementation Guideline

The value of compliance dimension was obtained from self-administered questionnaire and supported by direct observation, key informants interview (HMIS focal persons and heads) and reviewing online DHIS datasets.

Among the respondents, 100% of HMIS focal persons, 81% of HI heads and 98(78%) of PMT members are capable of using routine data entry applications. And two third of them (84) are capable of utilizing disease registration app. Apps of data quality module and analysis like validation rules (41%), STD dev outlier analysis (28%), min-max outlier app (34%) and follow-up analysis(23%) are almost utilized by only HMIS focal persons. Applications of data presentation like pivot table (67%) data visualize (49%) and GIS app (21%) are manipulated by almost all respondents.

Figure 5. Graph Summarizing Self-Administered Questionnaire for Congruence to the Implementation Guideline



A total of **85** Direct Participatory Observations were undertaken, **05** on each sampled HIs, **03** observation per one HMIS focal person while utilizing the platform for monthly data entry and analysis and **02** monthly PMT meetings in order to observe their level of congruence to use DHIS based data as directed by the implementation guideline. The first one observation with HMIS FP was omitted from analysis to minimize Hawthorne effect as recommended in USAID Evaluation Kit.

All 34 observation results revealed that from the two month data entry assessment of implementation of mini apps of DHIS all of the HMIS focal persons are capable of using routine data entry applications. And two third (22) of all showed as they are capable of utilizing disease registration app. Apps of data quality module and analysis like validation rules (14), STD deviation outlier analysis (10), min-max outlier app (12) and follow-up analysis (08) are utilized by HMIS focal persons from 34 observation of monthly data entry and analysis. Applications of data presentation like pivot table and data visualize are manipulated by majority of the them as an input for performance monitoring meeting but GIS app was exercised by only HMIS Focal persons of ZHD to some extent at the time of observation.

A KII with one of HMIS focal person in HC explained the reason not to utilize mini applications of DHIS as:

“Even though I can exercise those mini apps no one is requesting sophisticated analysis other than plan v/s achievement table.... Including the WoHO....in catchment area meeting.”

KII with Zonal HMIS expert revealed that:

“Analyzed data request from PMT members and heads is poor even at zonal and woreda level, applications of analysis and summarization are utilized only at the planning core process for the purpose of data quality....”

Findings from observation while in monthly PMT meeting showed about 30(88%) HIs except Washa, Shashi and Chega HCs conducted the meeting based on DHIS data to identify and prioritize problems and 16 of them used DHIS based criteria for setting and prioritizing interventions for a given problem. From 34 PMT meeting observation attended about 19, 21, 20, 23, 18 and 30 of observations revealed the use of DHIS to find the root cause(s) of the problem/s

in department, plan future actions, monitor changes in indicators, evaluate whether the targets or outcomes have been achieved, use analyzed DHIS2 data for day to day management of their activities, display DHIS2 based data with charts and tables for monitoring the trends of health services. (Fig.6)

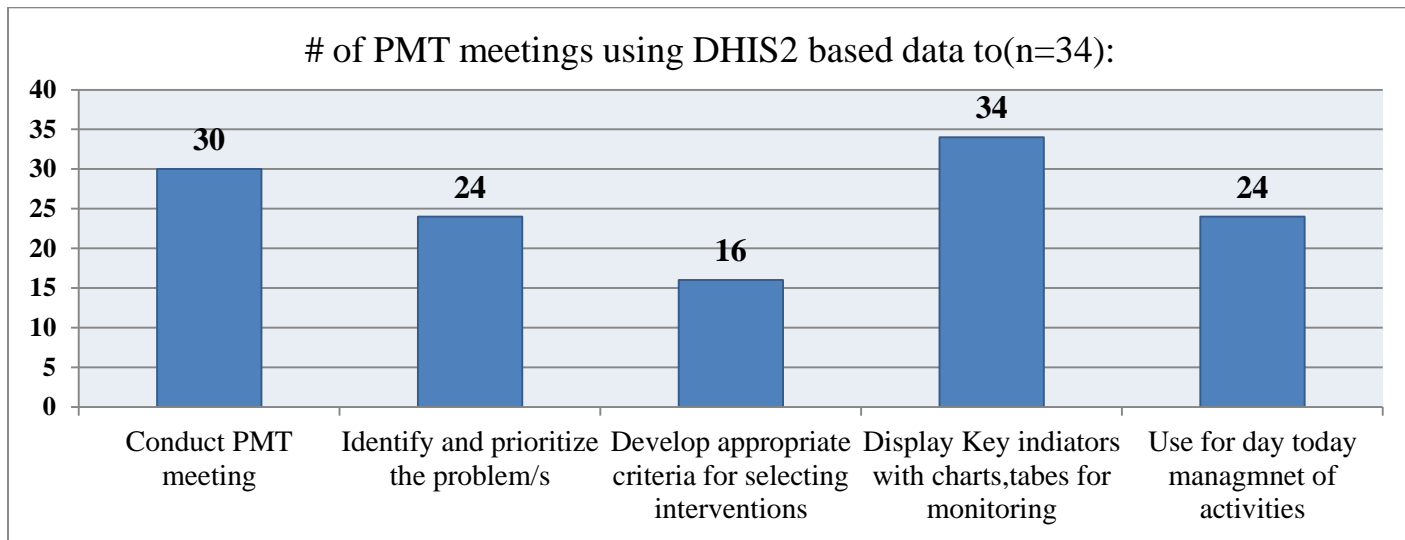


Figure 5 Observation result in operating DHIS2 based data for PMT meeting as indicated in its Implementation Guideline

Result from key informants' interview revealed that there have been problems on compliance of DHIS as it was predesigned especially in facilities level.

A 39 years old key informants who was head of WoHO said,

".....Even all HCs are operating DHIS for data entry purpose, There is a problem in the analysis of DHIS data especially at lower level.... because they are not using data to compare their target with achievement monthly and quarterly. We need to use the platform to analyze and present data and based on the findings obtained, there must be action plan.... this kind of assessment conducted rarely at health center level in my catchment....."

Another key informant from ZHD who was 34 stated,

"..... From my supportive supervision finding most of HCs in our catchment require pushing from us for utilization of DHIS data analysis apps. These may be due to knowledge gap and

attitude toward computer use. In most my supportive supervision I noticed while they are using the software for reporting purpose only..."

Finding from key informant interview showed that some of HIs get quarterly supervision with written feedback except ZHD which is semiannually. A 37 years old male respondent who was one of WoHO HMIS focal reported,

"..... PRT meeting held monthly and feedback given monthly on core indicators based on DHIS reports to be improved. Not only that there is review meeting quarterly and after it oral as well as written feedback given for facilities based on the gaps identified..... supportive supervision held quarterly for all WoHOs and selected health centers. Based on finding observed feedback given on site as well as organized feedback sent to respective WoHos after incorporating all comments and facilities supervised..... There is no specific supervision for DHIS only but integrated with other programs. Important point is, there is specific checklist for DHIS program....."

Documents were reviewed to measure report completeness by using the number of reports observed in the online system divided by total number of reports expected to be entered in the previous 12 months. Half (53%) of expected reports are entered into the online system mainly the service delivery (98%) and disease registration report (86%). But entering other expected reports of PHEM (16%), TB (12%), Hygiene and Sanitation (16%), Key Performance Indicators (21%), Reform (26%) and Woreda Management Standard (22%) into online system is low. Only Bonga town health administration office and Gebre Tsadik Shawo General Hospital fulfilled report completeness (91%) where as it is extremely low in Shashi(21%) and Chega HC(28%).

Timeliness was measured by the number of reports entered before deadline over the total number of reports expected from online report summery app. A total of 12 months back DHIS reports were checked from the online whether reports were submitted timely to respective higher levels. Lastly a tolerance level of 90% was used in grading facilities. Only 08 HIs (02 Hospitals, 02 Town administrations, 02 leading HCs and 01 WoHO) fulfilled more than 90% report timeliness. The report timeliness is relatively good on service delivery report but it is less than average in other report items. Since it is interconnected from Health Posts to HCs and Woredas, their performance affected zonal report timeliness to be very low (31%).

Table 6: Judgment Matrix for Compliance Dimension For Implementation Evaluation of DHIS in Kaffa Zone HIs, 2022

Dimension	Indicators	Expected	Observed	Weight	Score	Ach.
		(E)	Value(O)	given(W)	[W*O/E]	[S/W*100]
Compliance -35%	Proportion of HMIS focal persons operating applications of data entry by routine data entry app.	34	26	3	2.29	76
	Proportion of HMIS focal persons operating applications of data entry by plan setting app.	34	11	2	0.67	34
	Proportion of HMIS focal persons operating applications of data entry by gross disease registration app.	34	23	3	2	67
	Proportion of HMIS focal persons operating the data quality module to improve the accuracy of the data in the system through validation rules app.	34	15	3	1.31	44
	Proportion of HMIS focal persons operating the data quality module through STD dev outlier analysis.	34	2	1	0.06	6
	Proportion of HMIS focal persons operating the data quality module through min-max outlier analysis.	34	4	1	0.11	11
	Proportion of HMIS focal persons operating the data quality module through follow-up analysis.	34	1	1	0.02	2
	Proportion of HMIS focal persons operating a pivot table app for data analysis and summarization.	34	21	3	1.83	61
	Proportion of HMIS focal persons operating a data visualize app for data analysis and summarization.	34	19	2	1.14	57

Proportion of HMIS focal persons operating a GIS app for data analysis and summarization.	34	4	1	0.11	11
Proportion of HFs with DHIS2 report completeness greater than or equal to 90%.	17	2	2	0.24	12
Proportion of HFs with DHIS2 report timeliness as per greater than or equal to 90%.	17	8	2	0.94	47
Proportions of HIs that conduct PMT meeting based on DHIS2 finding as per standard.	17	17	3	3	100
Proportions of PMT members that gather DHIS2 based data to identify and prioritize the problem/s in the institutions.	34	23	3	2.05	68
Proportion of PMT members that gather DHIS2 based data to develop appropriate criteria for selecting interventions for a given problem	34	10	3	0.9	30
Proportion of HIs that display DHIS2 based data with charts and tables for monitoring the trends of health services.	17	17	2	2	100
Sum	476	203	35	14.9	42.6
Judgment parameter					
>=90- Excellent, [89–80]-V. good , [65 – 79] –Good, [50-64] – Fair, [<50] – Poor					

The overall value for **compliance dimension of the evaluation** was **42.6%** which is **POOR** implementation according to judgment criteria set by stakeholders.

5.7 Judgment matrix for overall Implementation status of DHIS

Implementation of DHIS was assessed by three dimensions: availability, adherence and compliance from 100%. Availability, adherence and compliance weighted as 35%, 30% and 35% respectively by stakeholders. Availability, adherence and compliance scored **57.94%**, **64.7%** and **42.6** respectively when each dimension was computed from 100%.

Table 6 Overall Judgment Matrix of Implementation of DHIS in Kaffa Zone Public HIs, 2022

Dimensions	Number of Indicators	Value given (x)	Percentage achieved (y/x*100)	Value achieved (y)	Judgment
Availability	07	35	57.94	20.28	FAIR
Adherence	06	30	64.7	19.41	FAIR
Compliance	16	35	42.6	14.91	POOR
Total	29	100	54.9	54.6	FAIR

Judgment parameter
 >=90- Excellent, [89–80]-V. good , [65 – 79] –Good, [50-64] – Fair, [<50] – Poor

The evaluation result shows that **Availability 20.28%**, **Adherence 19.41%** and **Compliance 14.91%**. The overall evaluation result was **54.6% judged as FAIR** according to agreed judgment parameter.

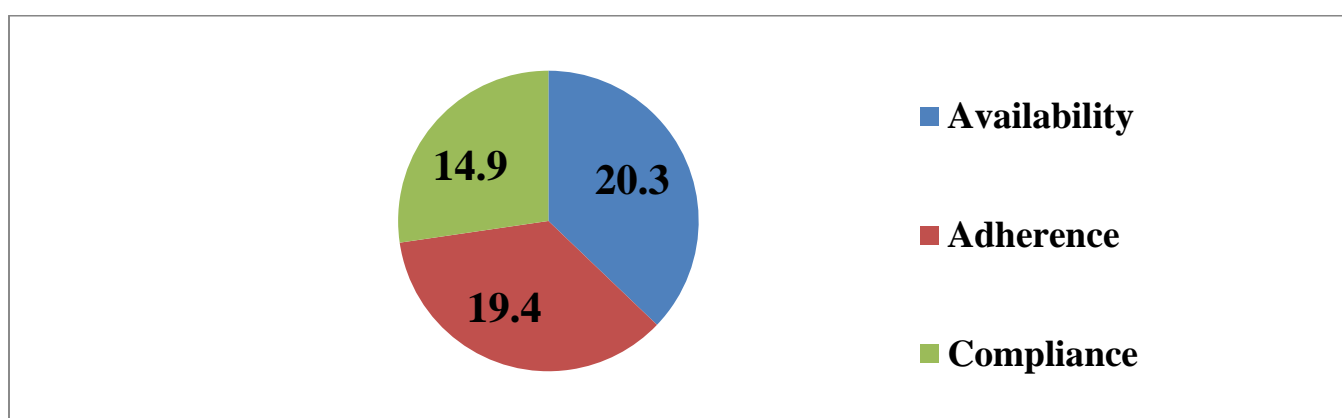


Figure 6 Contributions of each dimension for the overall DHIS implementation in Kaffa Zone HIs, 2022

6.5 Factors Associated With District Health Information System Implementation

6.5.1 Bi-Variable Logistic Regression

Bi-variable logistic regression was conducted to identify candidate variables for multi-variable logistic regression. Variables with P-value less than 0.25 were identified as candidate for multi-variable logistic regression. Based on these variables like age, user friendliness of the tool, management support, resource availability, supervision, DHIS training, levels of confidence, Background knowledge of HMIS, ICT skill, knowledge and educational status of respondents were candidate to multi-variable analysis.

6.5.2 Multi- Variable Logistic Regression

Candidate variables from bi-variable logistic regression were subjected to multi-variable logistic regression analysis. Then those variables with p-value less than 0.05 in multi-variable analyses were identified as predictor's variables for district health information system implementation. It was identified that background knowledge on HMIS, Confidence level, Being Program focal person and User friendliness of the tool were significantly associated with district health information implementation at a p-value 0.05.

PMT members with good background knowledge on HMIS were 1.6 times more likely to implement DHIS than those who has poor knowledge [**AOR=1.576, 95% CI (1.012, 2.454)**]. Professionals with high confidence to perform DHIS activities were 1.9 times more likely to implement district health information as compared to professionals who were not [**AOR=1.873,95% CI (1.264,2.776)**]. PMT members with good ICT skills were 2.3 times more likely utilize the system than those who were not [**AOR=2.289, 95% CI (1.293, 4.05)**]. PMT members who those register data daily were 2.5 time more likely to implement district health information when compared to their counterparts [**AOR=2.529, 95% CI (1.023, 6.251)**]. Those PMT members who perceived the tool as User-friendly were 2 times more likely to implement health information than those who perceived the tool as complex [**AOR=1.971, 95% CI (1.29, 3.011)**]. (Table 8)

Table 7 Factors Associated With District Health Information System Implementation among PMTs of Kaffa Zone HIs 2022.

Independent Variables		Implementation (n=126)		COR (95% CI)	AOR (95% CI)
		Good	Poor		
Age of respondents	>30yrs	26 (52.4%)	23(47.6%)	1.282* (0.888, 1.852)	0.917(0.609, 1.382)
	<30yrs	36(46.2%)	41(53.8%)		1
Educational status of respondents	Degree and above	20(41.6%)	29(58.4%)	0.63* (0.434, 0.914)	0.908(0.591,1.394)
	Diploma and below	41(53.1%)	36(46.9%)		1
Background Knowledge of HMIS	Good knowledge	49(52.6%)	44(47.4%)	1.908* (1.258,2.896)	1.576** (1.012, 2.454)
	Poor knowledge	12(37.6%)	21(62.4%)		1
ICT Skill	Yes	43(55.6%)	35(44.4%)	2.099* (1.438 ,3.063)	1.339(0.876, 2.045)
	No	18(37.4%)	30(62.6%)		1
Confidence level	Confident enough	43(55.5%)	34(44.5%)	2.039*(1.401, 2.968)	1.873** (1.264, 2.776)
	Not Confident	19(38%)	30(62%)		1
Training on DHIS	Yes	27(54.7%)	23(45.3%)	1.502* (1.039,2.171)	0.954 (0.62 ,1.469)
	No	34(44.6%)	42(55.4%)		1
Supportive Supervision	Yes	41(51.8%)	39(48.2%)	1.416* (0.974,2.058)	1.04 (0.681, 1.59)
	No	20(43.2%)	26(56.8%)		1
Resource availability	Available	50(51%)	47(49%)	1.511* (0.978,2.333)	1.017(0.596,1.736)
	Not available	13(43.5%)	16(56.5%)		1
Management Support	Had support	42(53.2%)	37(46.8%)	1.639 * (1.125 ,2.388)	0.978(0.612, 1.562)
	No support	19(41%)	27(59%)		1
Being Program focal person	Yes	58(53.7%)	48(46.3%)	3.478* (2.043 ,5.922)	2.289**(1.293 ,4.05)
	No	5(25%)	15(75%)		1

* Shows candidate variables for multivariable analysis at p<0.25

** Shows predictor variables for DHIS implementation at p<0.05 and 1 shows reference group

Cont... Factors Associated with District Health Information System Implementation among PMT members in...

Independent variables		Implementation (n=126)		COR (95% CI)	AOR (95% CI)
		Good	Poor		
User-friendliness of the tools	User friend	47(56%)	38(44%)	2.511* (1.684,3.744)	1.971** (1.29,3.011)
	Not User friend	14(33.5%)	27(66.5%)		
Motivation	Yes	33(48.5%)	36(51.5%)	0.985(0.687, 1.412)	1
	No	28(48.8%)	29(51.2%)		
Management support	Yes	35(49.8%)	37(50.2%)	1.113(0.775,1.598)	1
	No	26(47.1%)	29(52.9%)		

* Shows candidate variables for multivariable analysis at $p < 0.25$

** Shows predictor variables for DHIS implementation at $p < 0.05$

1 shows reference group

7. Discussion

This evaluation research tried to assess the implementation status of district health information system by using three dimensions: - These are Availability of Resource (Inputs) needed to implement the program, Adherence and Compliance to Implementation Guideline by Performance Monitoring Team.

7.1 Availability of Resource

The availability dimension scored **57.1%** which was **FAIR** according to judgment criteria agreed by stakeholders. This score was much less than 83% availability of resources revealed by evaluation conducted in Tigray region (46). As the previous study was conducted in city administration which may be more advanced as compared to current study areas. The result indicates probably this study setup may have less infrastructural, human and financial resources relative to previous study. But it is much higher than the study done in Harari Region (32.5%) may be due to wide remote areas were included in the study.

According to this evaluation study 56.3% of HIs had assigned specific unit/office for DHIS. As compared to studies conducted in Mekele and India it showed lower achievement(46,47). The variation could be from insufficiency of infrastructure in current study settings as compared to previous one.

DHIS requires trained technicians for manual and electronic data processing since without adequate trained staff the system will not work(48). In line with this all (100%) HIs under this study assigned full time HMIS focal person. HSTP report showed that 61.4% facilities assigned full time HMIS workers(49). According to Mesfin G *et al*, full time HMIS focal person assigned in 78% health facilities(50). The result of current study showed better achievement than former studies. This may be due to increased awareness about importance of HMIS focal persons in the facilities to transform information. The finding also shows that 76% of them were HIT professionals. This result was higher with report from HSTP and Mesfin G *et al*, 25.7% and 28% respectively (49,50). This finding approaches an evaluation conducted by Ataklti W, Kidane T, G/tsadik, ,which reported 97.1% (46). Probably this is due to availability of HITs in market and the health sector has given higher emphasis for the training of them in order to achieve information revolution. But the problem identified was related with undesignated role and responsibility of HMIS focal person for their unit.

During KII, the HMIS Focal person from one HC reported that *“I have shared responsibility to do their need to perform other administrative duties (e.g., preparing salary sheets, drafting letters). As a result, I cannot conduct data entry and analysis tasks during office hours and must work on overtime to complete them.”* Similar other mandates given for them minimize their interest towards the primary task they were procured for.

It is well known that budget is very important to conduct program activities. Despite this fact only two of health institutions participated in this study allocated the recommended budget specifically for HMIS/DHIS. The result was comparable with the study conducted by Tadesse K, Gebeyoh E, Tadesse G (51). In study done by Ataklti W, Kidane T, G/tsadik majority of health facilities allocated budget specifically for DHIS activities(46). The assessment of Ethiopian National Health Information System revealed that 24% of woredas reported having an HMIS/M&E budget(50). The discrepancy was probably due to less attention given for DHIS by officials at different level during budget allocation in current study setting. Response from key informant interview supported this finding *“.....there is no budget allocated specifically for DHIS due to lack of attention given for information..... There is no specific budget code for DHIS so we have been using budget from other code.....currently Shortage of budget prevented us even from conducting other activities ...”*

According to DHIS principle end user manuals and implementation guidelines should be available to detail all aspects of data entering, analysis and presentation(48). DHIS2 end user manual were available in all observed HIs (100%). This is similar with study conducted in Mekele which showed that it was available in all health facilities (100%)(46). This may be as a result of repetitive trainings and supportive supervisions were conducted on the site.

Computers are the backbone for DHIS system as it will considerably enhance ability to enter, analyze, present and transfer data quickly, accurately and efficiently(48). Eighty two percent of HIs observed in study area have computer specifically assigned for DHIS task. This is much higher than result from study conducted in SNNPR by Belay H. et al which reported that 25% of facilities had computer(52). Probably this is due to the time length between the two studies.

This study revealed that 82.5% observed institution have internet connectivity. Regarding internet connectivity this study shows higher achievement than assessment conducted in SNNPR

and Mekelle by Belay H. et al and Ataklti W, Kidane T, G/tsadik which reported 33% facilities have internet connectivity(52). The variation may be due to wide distribution of CDMA internet by MOH for DHIS2 related activities in past two years.

7.2. Adherence to DHIS training

Adherence to DHIS training dimension scored **70.9%** which was **FAIR** according to judgment criteria agreed by stakeholders. Out of 126 respondents participated 109(86.5%) were trained and all had refreshment training on DHIS. This shows there is no as such problem on training coverage. The finding was similar with study conducted by Shiferew A.(53). It was better achievement when compared to other studies conducted in western Amhara region, Tigray and India(47,54,55). This result was higher than the finding from study conducted at Diredawa which showed that 75% of study participants were trained on DHIS(56). The difference may be attributed to difference in number of participants and large study areas of the later study. Participants of previous study were all care providers while the participants of this study were case team leader who had great opportunity to be recruited for training. It was also higher than the finding from study conducted by Ataklti W, Kidane T, G/tsadik. at Tigray region which reported that 67.7% of the respondents, had received DHIS training(46). The difference may be due to difference in number of participants in the studies i.e. number of participants in this study was twice less than the participants of study conducted at Tigray region this may result in enrolment of a lot of professionals who were not trained on DHIS. Despite there is no training schedule gap in our study area and most of eligible bodies are trained there is observed limitation on manipulating the platform as it is prescribed by its developers for proper utilization of the system for timely, complete and consistent data entry analysis and summarization. This is clearly shown in their pre-post training exam result and continuous assessment done after it. Even though most of the PMT members were trained only 41% of the total trainees passed the post training exam. This may be directly related with the background HMIS knowledge and basic computer skill of the trainees. The other major attributable factor for post training practical failure might be the training approach which encompasses only the theoretical session of basic trainings. One of Zonal data analyst and training coordinator reported that *“We don’t have computerized and networked meeting hall by which all the trainees could practice on it, so we are obliged to cascade the training with a single centrally networked computer rather than missing the schedule....that made the trainees less effective to practice afterwards.”*

Quarterly woreda level supportive supervision usually has been identified as an essential element for improving overall performance, and particularly quality of care by most programs. As with all aspects of continuously improving DHIS depends on ongoing supportive supervision(48). More than half (62.5%) health institutions participated in this study supervised by their respective higher level as per standard in the last two quarters. The result was supported by studies conducted previously in different areas (46,47,52,57). Even though the result was comparable with other studies conducted earlier, about 37.2% facilities were not supervised regularly. One of the most important mechanisms to improve the implementation of program is regular supervision. Therefore without regular and program specific supportive supervision it is difficult to achieve information transformation.

Almost all heads and HMIS Focal persons (97.8%) of the facilities took DHIS training including the refreshment for more than two times. The finding was much higher than the study conducted by Shefarew A.(53). It was better achievement when compared to other studies conducted elsewhere(47,54,55) including the finding from study conducted at Harari Region which showed that 26% of study participants were trained on DHIS(54). The difference may be attributed to difference in study participants. Study participants of this study were case team leader while the participants of previous study were all care providers who had less opportunity to be recruited for training. The other reason for the difference may be due to difference in number of participants in the studies i.e. number of participants in Harari region was more than twice the participants of this study area (this may result in enrolment of a lot of professionals who were not trained).

Regular supportive supervision, usually at quarterly intervals, has been identified by most programs as an essential element for improving overall performance, and particularly quality of care. As with all aspects of health care effective, continuously improving HMIS depends on ongoing supportive supervision(48). More than half (62.5%) health institutions participated in this study supervised by their respective higher level as per standard in the last two quarters. The result was supported by studies conducted previously in different areas (46,47,52,57). Even though the result was comparable with other studies conducted earlier, about 37.2% facilities were not supervised regularly. One of the most important mechanisms to improve DHIS training outcome is regular practical follow-up and supportive supervision. Therefore without program

specific and regular supportive supervision it is difficult to achieve improvement in DHIS implementation.

7.3. Compliance to Implementation Guideline

The overall score for **compliance dimension of this evaluation was 40.2%** which was **POOR** implementation according to judgment criteria set by stakeholders. This result had less achievement as compared with evaluation research conducted in Tigray region which revealed compliance dimension 70%(46). This might be due to very detail indicators of this study that measure each and every concept of the implementation guideline including the familiarity with those DHIS mini apps.

From the finding there is no major gap in utilizing mini applications of data entry and disease registration apps of DHIS which is 83% in the study area. But a big problem was noticed in apps of data analysis and summarization which had low performance (28%). This finding was similar with the study done in Bangladesh(25). One of the health information technologists reported that *“In 2019, the DHIS 2 log in dashboard was much popular and everyone was accessing it. At that time, everyone was operating DHIS for data entry, whereas few almost no one thinks of the analysis apps at that time. Then, in 2020, in line with the concept of decision-making we emphasized on DHIS based data analysis for performance monitoring. Still few of PMT members demand utilizing apps of data analysis and presentation there is an improvement on the sides of HMIS focal persons and heads of HIs.”* Woreda HMIS expert, KII

On data quality sub dimension regarding report completeness half (53%) of institutions under study fulfilled 90 percent tolerance criteria for completeness. It was low with the study at Tigray region that all health facilities have complete report and met nationally acceptable completeness standard(46). The result was also low as compared to study conducted in India and Innocent K *et al* in Rwanda and Kihuba E *et al* in Kenya(9,58) that detailed all of the catchment facilities in each district had send the reports completely(47). This was attributed to the difference in measuring the indicator between the studies that this thesis compared it from the online entered report numbers while others measured it from the number of reports with a hard copy (paper form).

Twelve out of seventeen (75%) HIs fulfilled 90% tolerance level data consistency criteria. It revealed slightly better achievement to the study done in India that about 63% facilities were not in acceptable limits of consistency(47). The difference may be attributed to the time period which is almost 5 years in between and national and zonal level efforts made after an agenda of information revolution. The tendency of over and under reporting were observed in some indicators. This result shares similar features with result obtained from evaluation conducted in Tigray region and systematic review conducted in Ethiopia(46,50). These finding indicates low utilization of data validation app, poor understanding of indicators that are cumulative and connected and problems in source hard copy report. This all affect the overall data quality and may lead to wrong decision-making by PMT members including policy makers at higher level.

Report timeliness is measured as the reports that are received and entered on time over the expected number of reports for that specific HI. During evaluation period report summery app were reviewed. Out of seventeen HIs only eight of them fulfilled 90 % tolerance level timeliness criteria. The result revealed similar achievement when compared to study conducted previously in Hadiya zone by Abera E et al, only 59.6% reports submitted on recommended time period(59). The difference may be due to the time period wasted while reports are collected and transported at remote health posts and health centers that may affect the timeliness of the WoHO and ZHD as a hole. This reason is supported by urban HIs and hospitals without catchment health posts. It was supported by studies conducted elsewhere previously(57,58,60). Even though it revealed comparable result with different studies, still it was much lower from national standard.

Seventeen HIs were observed to identify whether data were analyzed or not within the institutions. The finding revealed that all (100%) institutions under study analyzed and updated data quarterly by table and graphs. It was greater than the finding obtained by assessment conducted in SNNPR ,about 6% ZHDs and 25% WoHOs and 61% Health Facilities, were not analyzed data by table/graph(52). The difference may be attributed to the time period between studies which means previous study conducted 7 years far from this study. It is clear that different capacity building activities conducted by different stakeholders since then, so this may increase importance of monitoring data routinely.

Using information supplied through DHIS for action-oriented performance monitoring, particularly where the information is generated, is the primary objective of district level health information system. This is the heart of decentralized, evidence-based decision-making (48).

Three fourth (75%) of HIs in study area had functional performance monitoring team. The finding was similar with study conducted in SNNPR by Belay H. et al(52) and study conducted in districts of the Brong Ahafo region in Ghana(34). However it was less as compared to evaluation conducted at Tigray region (46). All HIs participated in this study established performance monitoring team, however nearly 25% facilities didn't conduct DHIS based monthly PMT meeting regularly. This may be due to less attention paid for importance of information and negligence from management bodies.

A systematic review conducted by Mesfin G et al disclosed that only 37% facilities discussed findings from district health management system(50). The finding of this study which was 75% HIs use DHIS data during PRT meeting, much more better than result from Mesfin G. The variation may be still due to positive effect of information revolution and the time period in between. Concerning to evidence based decision-making this evaluation revealed that about 43.75% health institutions made decision based on DHIS data in the previous two quarter. The finding was slightly better than result revealed by Mesfin G et al that was 37% and assesment conducted in the SNNPR which revealed that 63% WoHOs didn't make decisions according to HMIS review(50,52). The improvement may came from the emphasis given for evidence based decision-making by different stakeholders. Besides that the previous studies conducted 7 years before, so there may be awareness differece between study participants due to time variation. The finding also showed that about half 54.54% of health facilities conducted minute self-assessment meeting including all staffs twice in the last two quarters using data from DHIS.. Based on the finding obtained from the meeting each facility should develop action plan and give written feedback to respective facilities or case teams. A 39 years old key informants who was one of heads of administrative office said,

"... They can use DHIS based data to compare achievement monthly and quarterly sometimes they used data for community mobilization. However this is not the way, based on the findings

obtained, there must be action plan and responsibility should be given for somebody implement the action plan developed.... This kind of assessment conducted rarely in the lower level....."

According to study done in Tanzania 42% of respondents did not use the collected and entered data for planning, budgeting and evaluation of services provision(61). In this evaluation 64.2% & 66.2% respondents utilize DHIS based data for plan future actions and evaluate whether the targets or outcomes have been achieved. So the finding shows greater achievement when compared to preceding research. The difference may be because of attention given for data utilization currently in Ethiopia this intern influence local decision-makers and service providers to develop positive attitude in utilization of data. This finding was nearly comparable with result from evaluation conducted at Tigray region, which stated that out of all total respondents 72.5% of them said that the information they collected had used for planning(46).

7.4 Determinants of DHIS implementation

Odds of DHIS implementation among PMT members with good background knowledge on DHIS were greater than those who had poor knowledge [AOR=1.576, 95% CI (1.012, 2.454)]. The result was supported by studies conducted elsewhere(51,55). Similarly this result was supported assessment done by Lippeveld T ,Belay H. at 2013, stated that Limited knowledge about usefulness of data has been the primary factor linked to lack of demand for data quality and use of information(62). Odds of DHIS implementation among PMT members those who were confident enough to perform DHIS activities were higher than their counterpart [AOR=1.873, 95% CI (1.264, 2.776)]. The results from studies conducted in SNNPR and Uganda supports this finding (52,63). WHO measure evaluation also suggested this factor as one of determinants of DHIS implementation (42). Probably health professionals self-efficacy may come from knowledge and understanding about HMIS. Good knowledge and understanding of HMIS tasks in turn result good DHIS implementation data analysis and decision-making. PMT members having good ICT skill during reporting period were 2.3 times more likely to implement DHIS than those who were not [AOR=2.289 , 95% CI (1.293, 4.05)]. Those PMT members who are focal person for some program (ART, TB, PHEM etc...) were 2.3 time more likely to implement DHIS [AOR=2.529, 95% CI (1.023, 6.251)]. These were supported by WHO measure evaluation and HMIS use guideline(42,64). Repeated exposure to data aggregation and entry may increase positive attitude towards the platform and increase knowledge on HMIS

activities. Having positive attitude and knowledge on HMIS creates favorable condition for professionals to be familiar with the system. Odds of DHIS implementation was higher on those PMT members who perceived DHIS as user friendly tool than their counterparts [AOR=1.971, 95% CI (1.29, 3.011)]. One of principles during redesign of DHIS tool is simplification of data entry, analyzing, and interpreting(48).The result was supported by WHO measure evaluation which listed complexity of the tool as one of impediments for DHIS implementation and other assessments done elsewhere (42,62,64,65). This may be due to the fact that when the tool is not easily understandable, it is difficult to enter relevant data in a correct manner and retrieval of these data will be trouble full.

Limitations of the Evaluation

The study tried to show the implementation status of DHIS. However, the study was not free from limitations like:

- Information bias from PMT members were observed because of their interests on positive assessment of their institutions.
- Turnover of health workers in WoHO faced us difficulty to get more rich information about the program weakness and strength and reasons for good or poor achievement that occurs before.
- Missing/incomplete data from training document review
- Secondary data use(document review)/Supported by KII

Challenges Faced

- Network interruption for communication

8. Conclusion and Recommendations

8.1. Conclusion

An evaluation clearly indicated inadequacy of program inputs needed for DHIS activities. All HCs have no specified unit for the program due to shortages of building within institutions that cause incapability to assign DHIS office specifically. Adequate budget were allocated for DHIS related activities in only ZHD and Bonga G/TS General Hospital. Assigning other health professionals other than HITs were noticed in Chega, Shashi and Kaka HCs. Availability of offline installed functional computers, end user manual and implementation guideline were in all HIs were observed strength related with availability of the resource for the system.

Regarding training adherence even though there were no shortages of basic and refreshment training schedules, the study observed tangible gap in the training approach that focuses only on theoretical one way learning approach which lacks practical session. Due to these trainees didn't capture platform's concept and couldn't apply mini apps of DHIS as presented by the end user manual. The possible reason raised by training coordinators was unavailability of well infrastructure training hall composed of one to one computer and internet access. In addition to the above mentioned problems lack of regular program specific supportive supervision and feedback system made the system adherence dimension to be fair.

These observed gaps contribute for poor performance of compliance to national DHIS implementation guideline. The result obviously revealed that the platform was not implemented as it was predesigned to support data analysis, summarization and its readiness for decision-making. It was clearly observed that there were low exposure and exercise to mini applications of data analysis and summarization. Using DHIS based data as input for performance monitoring, problem identification and prioritizing intervention mechanisms were poor. Besides, consistency, timeliness and report completeness were found to be below national target. Possible strength illustrated from the finding indicated offline monthly data entry of service delivery and disease registration report by all HMIS focal persons of selected health institutions. The major factors that affect the overall implementation of the system were user friendliness of the tool, background knowledge of HMIS, ICT skill and educational status of program implementers. These all factors made the implementation of the system to fall under **fair** judgment according to

agreed judgment parameter which boldly shows a need of continues program improvement in the study area.

8.2. Recommendations

The following recommendations were given for respective HIs based on an evaluation finding.

To Kaffa Zone Health Department

- Ensure to have Practical session while facilitate basic DHIS training
- Should strengthen regular supportive supervision with written feedback to the lower HIs
- Improve report timeliness by solving underline causes
- Ensure monitoring of DHIS based data utilization for decision-making in all HIs
- ZHD in collaboration with local Grantees and SWEPRS RHB, should perform continues in service training to update PMT members.
- In collaboration with SWEPRS RHB, KZHD should solve problem in building infrastructures and electric power supply in HIs

To Woreda Health Offices

- Ensure the functionality and installation of offline DHIS2 apps under its catchment
- Should monitor HIs utilization of CDMA and LAN for its primary purpose(DHIS activity)
- Should monitor appropriate assignment of HIT professionals in the right place.
- Should strengthen regular supportive supervision and written feedback to the lower HIs
- Should conduct PMT meetings by using analyzed DHIS based data.
- In collaboration with ZHD, WoHO should solve shortage of rooms in each HIs under their jurisdiction.

To Health Institutions

- Ensure the functionality and installation of offline DHIS2 apps under its catchment
- Should assign specific office for DHIS by prioritizing the program
- Should assign trained HIT professionals for DHIS activities

- Should maintain and install non-functional computers
- Ensure the availability of DHIS2 V2.30 End user manual.
- Should utilize the internet access for its primary purpose (DHIS activity)
- Should conduct DHIS based PRT meeting and use it for their routine activities management

To PMT members:

- Should exercise different apps of data analysis and summarization in DHIS2
 - Should submit all the required reports within its time period for responsible HMIS unit.
 - Should gather DHIS2 based data to identify and prioritize the problem/s in the institutions.
 - Should gather DHIS2 based data to develop appropriate criteria for selecting interventions for a given problem
 - Should use analyzed DHIS2 data to display key indicators with charts, tables for monitoring the trends of health services.
- Finally Health Facilities Governing Board should facilitate recommended budget (15%) allocation specifically for HIS and facilitate local area networking access to health facilities for better data quality and information revolution.

9. Meta Evaluation

Meta-evaluation is used to assess the quality of a single study or a set of studies in different ways. This paper is focus on formative Meta evaluation which assists evaluators to plan, conduct, improve, interpret, and report their evaluation studies based on the following evaluation standards: utility, feasibility, propriety and accuracy.

9.1. Utility Standards

To enhance use of the finding this evaluation was fully participatory from the starting to the end. The stakeholders were identified at the beginning with evaluator. The evaluation process was conducted with a standard way by consulting advisors and different stakeholders. Since, the evaluation questions were the needs of stakeholders and the finding at the end was disseminated timely according to the interest of the stakeholders. This all was assure use of evaluation finding by the target beneficiary.

9.2. Feasibility Standards

With the agreement of the stakeholders, the methods for the evaluation designed in realistic way to make the whole evaluation process is practical in order to keep disruption to a minimum while relevant and needed information is obtained, and producing sufficient information with a minimum cost. Different groups of people with different power and need that can affect the evaluation were considered to increase the feasibility of the evaluation.

9.3. Propriety Standards

All data collection tools were designed by considering the ethical and legal issues for the rights and welfare of the study participant. Ethical clearance was taken. There were not procedure that affects privacy, dignity, confidentiality, and rights of participants. Stakeholders agreed and consensus reached to do this process evaluation before starting the evaluation and Conflict of interest was dealt with openly and honestly.

9.4. Accuracy Standards

Started by accurately describing the program being implemented the context in which the program exists. The purpose and procedures of the evaluation clearly described so that it can be identified. As the evaluation is all about getting technically adequate information to determine the programs worth and merit, the source of the information was described in detail, and the method for the information gathering chosen in a way to produce valid and reliable information

in a systematic way. Data analysis was done in appropriate and systematic manner that are able to answer the evaluation questions and that can lead to justified conclusion.

9.5 Overall Score for Meta evaluation

Checklist was used to assess the evaluation based on the four standards of evaluation. It was evaluated by the principal evaluator. Overall score was 81% which is judged as Good by the evaluator.

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Annex 1. Information and Judgment Matrix

Table 8 Information Matrix Availability

Evaluation Question	Indicators	Sources of data	Data collection method	Data collection tools
<p>Are the required program resources available to implement the DHIS2 program in public health institutions of Kaffa Zone, Southwest Ethiopia, in 2022? If yes how? If not why?</p>	Proportion of HIs with HMIS unit in the organization	<ul style="list-style-type: none"> • HMIS Units • PMT members 	<ul style="list-style-type: none"> • Self-administered Questionnaire • Interview • Resource Inventory 	<ul style="list-style-type: none"> • Interview guide • Structured inventory checklist
	Proportion of HIs with at least one health information technician (HIT) assigned for DHIS2 data management.			
	Proportion of HIs that allocate 15% of the total budget specifically for HIS from total health budget			
	Proportion of HIs with functional computer installed with offline DHIS2 application			
	Proportion of HIs that have updated DHIS2 V2.30 End-user Manual			
	Proportion of HIs with uninterrupted electric service with functional backup generator			
	Proportion of HIs with any type of internet connection			

Table 9 Information Matrix Adherence

Evaluation question	Indicators	Sources of data	Data collection method	Data collection tools
<p>Did the DHIS2 training given as it was designed by its developers with respect to content and method at health institutions level? If yes how? If not why?</p>	Proportion of HIs that delivered training on DHIS2 as planned	<ul style="list-style-type: none"> • Training document • PMT member • HMIS Document 	<p>Self-administered Questionnaire Interview Document review</p>	<ul style="list-style-type: none"> • Interview guide • Structured checklist
	Proportion of PMT members who received in service training of DHIS2 at least once			
	Proportion of PMT members that took DHIS2 both theoretical and practical training in the institutions			
	Proportion of PMT members that took DHIS2 training up to the full schedule			
	Proportion of PMT members that pass post training exam on DHIS2			
	Proportion of HIs received supportive supervision on DHIS2 from higher level with written feedback			

Table 10 Information Matrix Compliance

Evaluation Question	Indicators	Sources of data	Data collection method	Data collection tools
<p>Are DHIS2 activities implemented according to national guideline? If not why?</p>	<p>Proportion of HMIS focal persons operating applications of data entry by routine data entry app.</p> <p>Proportion of HMIS focal persons operating applications of data entry by plan setting app.</p> <p>Proportion of HMIS focal persons operating applications of data entry by gross disease registration app.</p> <p>Proportion of HMIS focal persons operating the data quality module to improve the accuracy of the data in the system through validation rules app.</p> <p>Proportion of HMIS focal persons operating the data quality module through STD dev outlier analysis.</p> <p>Proportion of HMIS focal persons operating the data quality module through min-max outlier analysis.</p> <p>Proportion of HMIS focal persons operating the data quality module through follow-up analysis.</p> <p>Proportion of HMIS focal persons operating a pivot table app for data analysis and summarization.</p> <p>Proportion of HMIS focal persons operating a data visualize app for data analysis and summarization.</p> <p>Proportion of HMIS focal persons operating a GIS app for data analysis and summarization.</p> <p>Proportions of HFs that conduct PMT meeting based on DHIS2 finding as per standard.</p> <p>Proportion of HFs with DHIS2 report completeness as per national standard.</p> <p>Proportion of HFs with DHIS2 report timeliness as per national standard.</p> <p>Proportions of PMT members that gather DHIS2 based data to identify and prioritize the problem/s in the institutions.</p> <p>Proportion of PMT members that gather DHIS2 based data to develop appropriate criteria for selecting interventions for a given problem</p> <p>Proportion of HIs that display DHIS2 based data with charts, tables for monitoring the trends of health services</p>	<ul style="list-style-type: none"> • HMIS Units • PMT members 	<p>Direct Observation</p> <p>Interview</p> <p>Document review</p>	<ul style="list-style-type: none"> • Interview guide • Structured checklist • Observation Checklist

Table 11 Judgment Matrix Availability (8)

		Indicators	Weight given	Observed Value	Judgment parameter
Dimensions	Are resources needed to implement DHIS2 available? If not why?	Proportion of HIs with HMIS unit in the organization	5		>=90- Excellent , [89–80]- V. good [65 – 79] – Good [50-64] – Fair , [<50] – Poor
		Proportion of HIs with at least one health information technician (HIT) assigned for DHIS2 data management.	3		
		Proportion of HIs that allocate 15% of the total budget specifically for HIS from total health budget	5		
		Proportion of HIs with functional computer installed with offline DHIS2 application	7		
		Proportion of HIs that have updated DHIS2 V2.30 End-user Manual	5		
		Proportion of HIs with uninterrupted electric service with functional backup generator	5		
		Proportion of HIs with any type of internet connection currently used for DHIS activity	5		
		Sum	35		

Table 12 Judgment Matrix Adherence (7)

Dimensions		Indicators	Weight given	Observed Value
Adherence (30%)	Did the DHIS2 training given as it was designed by its developers with respect to content and method at health institutions level? If yes how? If not why?	Proportion of HIs that delivered training on DHIS2 as planned	4	
		Proportion of PMT members who received in service training of DHIS2 at least once	4	
		Proportions of PMT members that took DHIS2 theoretical training in the institutions	4	
		Proportion of PMT members that took DHIS2 both theoretical and practical training in the institutions	5	
		Proportion of PMT members that took DHIS2 training up to the full schedule	3	
		Proportion of PMT members that pass post training exam on DHIS2	5	
		Proportion of HIs received supportive supervision on DHIS2 from higher level with written feedback	5	
		30= 100% for Adherence Dimension	30	
		Judgment parameter >=90- Excellent , [89–80]- V. good , [65 – 79] – Good , [50-64] – Fair , [<50] – Poor		

Table 13 Judgment Matrix Compliance (16)

Dimension	Indicators	Weight given	Observed Value	
Compliance (35%)	Are DHIS2 activities implemented according to national guideline? If not why?	Proportion of HMIS focal persons operating <i>applications of data entry</i> by routine data entry app.	3	
		Proportion of HMIS focal persons operating <i>applications of data entry</i> by plan setting app.	2	
		Proportion of HMIS focal persons operating <i>applications of data entry</i> by gross disease registration app.	3	
		Proportion of HMIS focal persons operating the data quality module to improve the accuracy of the data in the system through validation rules app.	3	
		Proportion of HMIS focal persons operating the data quality module through STD dev outlier analysis.	1	
		Proportion of HMIS focal persons operating the data quality module through min-max outlier analysis.	1	
		Proportion of HMIS focal persons operating the data quality module through follow-up analysis.	1	
		Proportion of HMIS focal persons operating a pivot table app for data analysis and summarization.	3	
		Proportion of HMIS focal persons operating a data visualize app for data analysis and summarization.	2	
		Proportion of HMIS focal persons operating a GIS app for data analysis and summarization.	1	
	Proportion of HFs with DHIS2 report completeness greater than or equal to 90%.	2		

Proportion of HFs with DHIS2 report timeliness as per greater than or equal to 90%.	2
Proportions of HIs that conduct PMT meeting based on DHIS2 finding as per standard.	3
Proportions of HIs that gather DHIS2 based data to identify and prioritize the problem/s in the institutions.	2
Proportion of PMT members that gather DHIS2 based data to develop appropriate criteria for selecting interventions for a given problem	3
Proportion of PMT members that display DHIS2 based data with charts and tables for monitoring the trends of health services.	3
35%	
Judgment parameter	
>=90- Excellent, [89–80]-V. good , [65 – 79] –Good, [50-64] – Fair, [<50] – Poor	

Annex 2. Self -Administered Questionnaire for PMT Members

I. Socio-Demographic Characterstics

<i>S. No</i>	<i>Questions</i>	<i>Answer</i>
1	Respondent age	
2	Respondent sex	1. Male 2. Female
3	Type of health institution	1. Health center 3. Hospital 2. WoHO 4. ZHD
4	Educational status	1. Diploma 2. Degree 3. Masters
5	Position of respondents in the case team /department	1. Case team leader 2. HMIS Focal Person 3. Head of HI
6	If a case team leader from which case team is he/she?	1. MCH case team 2. OPD case team 3. Emergency case team 4. Phar/Lab case team 5. Finance/HR case team
II. Availability		
7	Do you have a responsible unit for HIS at your bureau/office/ facility?	1. Yes 2. No

8	Does your office/facility have personnel specifically to HIS/DHIS2? (Note: the person could have duties directly to HIS)	1. Yes 2. No
9	If yes for the above Qn.what is the profession of HMIS focal Person?	1. HIT 2. ICT 3. Other HPs
10	If the focal Person is not HIT what is the reason?	1. Lack of trained HITs 2. Skill gap to manipulate DHIS software by HITs 3. Misusing trained HITs to the card room 4. Other reasons
9	Is there a budget allocated specifically for HIS from total health budget?	1. Yes 2. No
10	If yes for question number 9 in your opinion How much of the total health budget is allocated for HIS?	1. <5% 2. 5-10% 3. 10-15 %

		4. 15% 5. >15%
11	Do you have functional computer specifically assigned for DHIS2?	1. Yes 2. No
12	Is there an updated DHIS2 V2.3 End-user Manual ?	1) Yes 2) No
13	What is the power supply for HIS Unit	1) No source of power 2) Electric power only 3) Electric power with functional backup Generator 4) 4
14	Do you have internet connection currently used for DHIS activity in your HIS unit?	1) Yes 2) No
15	How do you mostly access the internet for your work? Through:	1. Never use it for work. 2. Through LAN 3. Mobile provider's wireless modern 4. CDMA 5. Other

16	Currently, how would you rate the internet access provided at your work of place?	1. Satisfied 2. Very satisfied 3. Unsatisfied 4. Very Unsatisfied
III. Adherence		
19	Did you attend basic training on DHIS2?	1. Yes 2. No
20	Did you get refreshment training on DHIS2? #	1. Yes 2. No
21	If yes for the above Question, how many times did you get the refresher training?	2. One times 3. Two times 4. Three times 5. More than three times
20	If “Yes “For Question No. (13) For how many total days training on DHIS2 were made?	1. 3-5day 2. 6-7day 3. 8-10day 4. >10 day
21	In which form was the training taken?	1. Only theoretical 2. Both theoretical & Practical
22	How would you rate your level of training on DHIS2?	1. Very poor

		<ul style="list-style-type: none"> 2. Poor 3. Good 4. Very Good 	
9	What portion of the training do you took on DHIS2 training?	<ul style="list-style-type: none"> 1. Up to the full schedule 2. Half of the schedule 3. Less than a half of it 	
10	What was your <i>Pre DHIS2 training</i> exam result?	<ul style="list-style-type: none"> 1. <50% 2. 50-75% 3. 75-85% 4. >85% 	
10	What was your <i>Post DHIS2 training</i> exam result?	<ul style="list-style-type: none"> 6. <50% 7. 50-75% 8. 75-85% 9. >85% 	
28	Have you received supportive supervision on HIS from higher level?	<ul style="list-style-type: none"> 1. Yes 2. No 	

12	If yes for Q17, how many times the unit/department supervised in the past 12 months?	<ol style="list-style-type: none"> 1. One time 2. Two Times 3. Three Times
13	Did you get Feedback from the higher level organization (supervision team)?	<ol style="list-style-type: none"> 1. Yes 2. No
14	If yes, how often?	<ol style="list-style-type: none"> 1. Monthly 2. Quarterly 3. Semi-Annually 4. Annually 5. As Needed.
IV. Compliance		
1	Which of the following <i>applications of data entry</i> are you operating? (Multiple answers accepted)	<ol style="list-style-type: none"> 1. Routine data entry app 2. Plan setting app 3. Gross disease reg. app
2	Which of the following data quality improving <i>applications of system</i> are you operating? (Multiple answers accepted)	<ol style="list-style-type: none"> 1. Validation rules app 2. STD dev outlier analysis. 3. Min-max outlier analysis.

		4. Follow-up analysis.
3	Which of the following data analysis and summarization <i>applications of system are you operating?</i> (Multiple answers accepted)	1. Pivot Table App 2. Data Visualize App 3. GIS App
3	Do you have functional PMT in your institution?	1. Yes 2. No
4	If yes for the above Qn, Have you conducted <i>PMT meeting</i> based on DHIS2 finding?	1. Yes 2. No
5	If yes, how often?	1. <i>Monthly</i> 2. <i>Quarterly</i> 3. <i>Every Six month</i> 4. <i>Occasionally</i>
6	Is DHIS2 platform important to you or your area of work?	1. <i>Yes</i> 2. <i>No</i>
7	If yes, how do you use the DHIS2 information in your institution? (Multiple answers accepted)	1. To enter our data and send to higher officials 2. Use analyzed DHIS2 data for day to day management of their

		<p>activities.</p> <ol style="list-style-type: none"> 3. to identify and prioritize the problem/s 4. for selecting interventions for a given problem 5. To monitor the trends of health services 6. Organize feedback 7. Budget allocation 8. To identify and manage epidemics
13	<p>What challenges are experienced in the use of DHIS2 information for evidence-based decision-making? (Multiple answers accepted)</p>	<ol style="list-style-type: none"> 1. Poor training outcomes 2. Poor skills set amongst users 3. Lack of adequate computers 4. Unreliable internet services 5. Lack of power back up 6. DHIS platform complexity 7. Lack of accurate and quality data 8. Lack of management support 9. Others
14	<p>Have you conducted DHIS related review meeting with facilities under their catchment?</p>	<p>1. Yes 2. No</p>

15	If not conducted, why?	1. Due to budget constraint 2. Lack of attention 3. Due to other reason
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Part V- Factors Influencing DHIS2 Use

I would like to know your opinion about how strongly you agree with certain statements. There are no right or wrong answers, only expressions of your opinion on a scale from 1 (strongly disagree) to 5 (strongly agree). You have to determine first whether you agree or disagree with the statement. Second, decide about the intensity of agreement or disagreement. If you disagree with statement then use left side of the scale and determine how much disagreement that is – strongly disagree (1), or disagree (2) and circle the appropriate answer. If you are not sure of the intensity of belief or think that you neither disagree nor agree, then circle 3. If you agree with the statement, then use right side of the scale and determine how much agreement that is – agree (4), or strongly agree (5) and circle the appropriate answer. Please be frank and choose your answer honestly.

S. N	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	DHIS 2 is easy to use (User friendly/easily understandable)					
2	There is trained staff able to use DHIS2 software.					
3	The training I was received adequate					
4	DHIS2 includes necessary features and functions.					
5	DHIS2 meets my department/organization/ facilities requirements.					

6	DHIS 2 can be easily modified, corrected, or improved.					
7	Age influence the way health workers adopt and use DHIS2					
8	I have the skill to perform DHIS2 Software.					
9	I am confident enough to perform DHIS2 related activities such as data entry, analysis & interpretation					

Part VI- Self-Efficacy

This part of the questionnaire is about your perceived confidence in performing tasks related to health information systems. High confidence indicates that person could perform the task, while low confidence means room for improvement or training. We are interested in knowing how confident you feel in performing HMIS-related tasks. Please be frank and rate your confidence honestly. Please rate your confidence in percentages that you can accomplish the DHIS applications and activities.

Rate your confidence for each situation with a percentage from the following scale

0 10 20 30 40 50 60 70 80 90 100

S.N	Question	No					Yes					
SE1	I can utilize routine data entry app.	0	10	20	30	40	50	60	70	80	90	100
SE2	I can utilize plan setting app.	0	10	20	30	40	50	60	70	80	90	100
SE3	I can utilize gross disease registration app	0	10	20	30	40	50	60	70	80	90	100
SE4	I can utilize validation rules app.	0	10	20	30	40	50	60	70	80	90	100

SE5	I can utilize STD dev outlier analysis.	0	10	20	30	40	50	60	70	80	90	100
SE6	I can utilize min-max outlier analysis.	0	10	20	30	40	50	60	70	80	90	100
SE7	I can utilize follow-up analysis.	0	10	20	30	40	50	60	70	80	90	100
SE8	I can utilize pivot table app.	0	10	20	30	40	50	60	70	80	90	100
SE9	I can utilize data visualize app.	0	10	20	30	40	50	60	70	80	90	100
SE10	I can utilize GIS app.	0	10	20	30	40	50	60	70	80	90	100
SE11	I can analyze key indicators with charts, tables for monitoring the trends of health services.	0	10	20	30	40	50	60	70	80	90	100

Table 14 Physical Observation and Resources Inventory Checklist

Health Institution seen----- make "√" if available, or "X" if not available under the column provided

Equipments /materials /things to be observed	Available(Yes)	Not available(No)	Remarrk
HMIS unit /office specifically given for DHIS2			
Health Information Technician (HIT) assigned for DHIS2			
DHIS2 training manuals available near by the work place			
DHIS2 implementation guideline available nearby workplace			
HMIS minute book available nearby workplace			
Computer specifically assigned for DHIS2			

Printer available in the institution			
Working computers with internet service			
Availability of electricity in the working area			
Stationary materials (paper, pen and pencil) available			
Report forms and (for health facilities tally and registers) available			
Analyzed data displayed by graph/table/chart in HMIS office /in the room of institution head /in the room of departments coordinators			
Achievements of target by chart /table/graph displayed in visible area of place			

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application.

Name of the student: Henok Taye

Date: 12/01/2015 EC

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor: Mr. Feyissa Tolessa (BSc,MSc)

Date: 12/01/2015 EC

Signature:

APPROVAL OF THE SECOND ADVISOR

Name of the second advisor: Mr. Asaye Birhanu(BSc,MSc)

Date: 12/01/2015 EC

Signature: _____

