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Data Quality and Associated Factors in The Routine Health Information Sytem Among Health Centers Of West Gojjam Zone, Northwest Ethiopia, 2021

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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Department Of Health System Project Management and Health Economics

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A THESIS RESEARCH SUBMITTED TO DEPARTMENT OF HEALTH SYSTEM PROJECTMANAGEMENT AND HEALTH ECONOMICS, SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCES, BAHIR DAR UNIVESITY; IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTERS OF PUBLIC HEALTH IN HEALTH SYSTEM AND PROJECT MANAGMENT

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DEPARTMENT OF HEALTH SYSTEM PROJECT MANAGEMENT AND HEALTH ECONOMICS

DATA QUALITY AND ASSOCIATED FACTORS IN THE ROUTINE HEALTH INFORMATION SYTEM AMONG HEALTH CENTERS OF WEST GOJJAM ZONE, NORTHWEST ETHIOPIA, 2021

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APRIL, 2022

BAHIR DAR, ETHIOPIA

APPROVAL SHEET

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Declaration

By my signature below, I declare and affirm that this thesis is my own work. This has not been previously submitted to this or any other institution for degree qualification and all sources of material used for the thesis have been acknowledged.

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Acronyms and abbreviation

ANC	AnteNatalCare
ANC4	AnteNatalCarefourthvisit
CAR	Contraceptive accepter rate
DTP3	Diphtheria-Pertussis-Tetanusthirddose
DHIS2	District Health Information Software 2
FMOH	FederalMinistryofHealth
HC	Healthcenter
HIT	HealthInformationTechnician
HIV	Human immune virus
HSTP	Health sector transformation plan
KII	Key informant interview
LQAS	LotQualityAssurances Sampling
LMIC	Low and/or Middle Income Countries
WoHOs,	Woreda of health office
OPD	OutpatientDepartment
PEPFAR	President'sEmergency PlanforAIDSRelief
PMT	Performance monitoring team
PMTCT	Prevention of mother-to-child transmission
PRISM	PerformanceofRoutineinformation system management
RDQA	RoutineDataQualityAssessment
RHIS	RoutineHealthInformationSystem
SNNPR	SouthNationNationalityPeopleRegion
WHO	World health organization

Abstract

Background: Data quality is a multi-dimensional term that includes accuracy, precision, completeness, timeliness, integrity, and confidentiality.The quality of data generated by a routine health information system is still very poor in low and middle-income countries.There is a paucity of studies as to what determines data quality in health facilities in the study area. Therefore, this study was aimed to assess the magnitude of the quality of routine health information system data and its determinants among health centers.

OBJECTIVE: To assess data quality and its associated factors in routine health information system among health centers of West Gojjam Zone, Northwest Ethiopia in 2021.

METHOD: A facilitybasedquantitative studydesign triangulated by qualitative method was conducted.A total of 314 health professionals from 32 health centers were selected using a simple random sampling procedure.Data were gathered and utilized using a standardized checklist, interviewer administered questionnaires, and key informant interviews guideline. Descriptive statistics to describe variables and binary logisticregression to identify factors associated with data qualitywere computed usingSTATA version 14. Variables withp-value of less than 0.25 in the bivariate analysis were entered in to multi-variablelogistic regression analysis. Then p-value of less than 0.05 at95%CIwas taken to declare statistically significant.Manual analysis was done forqualitative data collected from purposively selected key informants.

Results: The study found level of good data quality practice 74% (95% CI: 68 - 78) at health center of West Gojjam Zone. Complexity of routine health information system format (AOR=3.8; 95%CI: 1.7-8.5), problem solving skillfor RHIS tasks (AOR=2.8; 95% CI: 1.2-6.4) and know duties, role and responsibilities (AOR=12; 95%CI: 5.6-25.8),were significantly associated with data quality and lack of human resource, poor feedback mechanisms, delay in completing data records, lack of use of data, inadequate training on health information systems were barriers affect data quality.

Conclusions and recommendations: level of good data quality practice in the public health facilities was less than the expected national level. Complexity of routine health information system,problem solving skill for HIS tasks andknow duties, role and responsibilitieswere significantly associated with data quality.Training and written feedback should be provided to increase the knowledge and skills of the health workers.

KEY WORDS: Data Quality; Routine Health Information System; West Gojjam

Introduction

1.1 Background

Data quality is a multi-dimensional term that includes accuracy, precision, completeness, timeliness, integrity, and confidentiality(1). Quality data represents what its official source intended or defined, is objective, unbiased, and adheres to established standards(2). Data quality aim is to guarantee that data is accurate, timely, and consistent enough for the organization to make sound decisions (3).

The routine health information system (RHIS) is one of the six components of a health system that is responsible for the generation and utilization of data for various purposes(4). It also serves as the framework for all areas of the health system's decision-making, including policy development and implementation, governance and regulation, health research, human resource development, health education and training, service delivery, and support(5, 6). The goal of a health information system is to generate high-quality health data on a regular basis(7).

Since 2008, Ethiopia's RHIS has gathered and provided fundamental monitor-able indicators that may be utilized to improve health-care delivery and, as a result, population well-being. Since then, the RHIS has proven to be an invaluable tool for tracking and revising policy implementation and resource allocation(8). For health decision-making, the requirement for organized, accessible, timely, and reliable data is becoming a major problem. The Ethiopian federal minister of health has responded by reforming and redesigning the national RHIS. The reform has taken significant measures to address a lack of routine health data, which has hindered the quality of care, planning, and management systems, as well as decision-making (9).

The District Health Information Software (DHIS) is an open-source software platform that is utilized in over 60 countries for data reporting, analysis, and dissemination for all health-related initiatives(10). RHIS is the primary information system of Ethiopia's "One plan, one budget, and one report" policy(11). As a result, the need for an information revolution was identified as one of the four transformation goals in the health sector transformation plan (HSTP), which includes development on the two methodologies from data collection to decision-making. The information revolution is concerned not just with technological advancements, but also with cultural shifts and attitudes toward information(9, 12).

In healthcare planning, management, and decision-making, having data that is correct, complete, and delivered on time is crucial. However, data quality is frequently evaluated as part of an RHIS efficacy or performance; yet, data quality assessment is sometimes overlooked within these scopes. This could result in a lack of understanding of data management and data quality awareness (13). As a result, the goal of this study is to analyze the current state of data quality and associated factors in routine health information system among health centers of West Gojjam Zone.

1.2Statement of the problem

In the global health system, the quality of data created by routine RHIS in low and middle-income countries is still quite poor (14). In India, Nepal and Pakistan the overall data quality was under the national standard (15-17).

Many African countries' data quality was found to be between 34 and 72% (18). According to the DHIS 2 performance report has been raised to all districts, with an average of 68% remaining with 12% to reach the national objective of 80% (19). In Malawi show that RHIS data quality was below national standard (20). In Nigeria, reported that facility-reported data were incomplete by 40% of the time (21). In low and middle income countries findings have reported lack of truthful health data and poor management for district routine health information systems. Poor quality health data, low level of health information use, and poor management of routine health information systems were found (22).

In Ethiopia's routine health information system found that data quality is below the national average of 80% and data management and decision-making were lacking at lower levels of the health system, as well as data quality assurance, feedback mechanisms, Lack of accuracy, timeliness and completeness of RHIS reporting remains a weakness, and such delays contribute to the challenge to use data as the basis for informed decision-making in health care planning and management (23, 24).

In our country RHIS data quality and information use showed content completeness, reporting timeliness and accuracy were 39%,73% and 76% respectively (23).In Dire Daw the overall data quality in unit or department was found to be 75.3%(24). Evidence suggests that in Ethiopia, including the SNNPR, a low level of data quality was recorded as a gap that fell below the national threshold. The data accuracy rate in health facilities was 36.22%, which was significantly below than the national target (18, 24).Another Research report done on SNNPR show that all data items were inaccurate, 96.9% and 84.7% of facilities reported institutional maternal death and skilled birth attendance as being within acceptable ranges, Reasons for variations included technical, behavioral and organizational factors(25). In Jimma, completeness and timeliness of facility reporting were determined to be highest in Gomma (75% and 70%) and lowest in Kersa (34% and 32%), respectively.(26).

In Southwest Shoa Zone found that At health center level RHIS recording and reporting, indicator reference, National classification of diseases and data quality and information use manuals available are 25%,33%,17% and 58% respectively(27). On the other hand in Harari Region show that the level of good data quality in the public health facilities was 51.35%(28).

In the Metema Primary hospital, Completeness of data recording improved from 69.0% to 96.0%, data consistency improved from 84.0% to 99.5%, and report timeliness improved from 66.0% to 100%(29).In Wogera and Tach Armacheho districts, the overall average degree of accuracy of reports for six different health services was 0.95 and 0.86, respectively(30).There is a paucity of studies as to what determines data quality in health facilities in the study area. Therefore, this study was aimed to assess the quality of routine health information system data and associated factors in health centers of West Gojjam Zone, Northwest Ethiopia.

1.3 Significance of the study

The findings of this study will deliver the information on data quality and associated factor at the health center. Therefore, this assessment will helps to determine the current status of the data quality of routine health information system according to accuracy, completeness and timeliness and shows areas that needs special attention and further follow up. It will contribute to policy and program managers to take necessary intervention. It will also input for West Gojjam Zone health department and facility managers on area of improvement and enhances evidence based decision making and improve the quality of health care delivery. Moreover, this finding will used as reference material for other researchers and academic education.

2. Literature review

2.1. Magnitude of data quality

According to a study conducted in India, 63% and 71% of facilities had accuracy and content completeness levels, respectively. Only 71%, 63%, and 58% of the institutions were within the established thresholds for prenatal registration (31).

According to a study done in Nigeria revealed that, one of the key challenges is low data quality, which is insufficient to enable decision-making (31). According to a research conducted in Malawi, some facilities did not send reports at all, while others did not send reports on a regular basis. The facilities that sent reports on a regular basis were not submitting data (32).A cross-sectional mixed study conducted in Kenyarevealed that, total data completeness was 44%, and that only 56% of data was supplied on time for coverage(33). A research conducted in Rwanda, on the other hand, found that the health care facilities sent data had 73.3% of accuracy. The average percentage of comprehensive reporting was 98%, with a 93.8% average of timeliness(34).

A cross-sectional study in Ethiopia indicated that overall data quality was below the national expectation threshold of 75.3%, while 57.7% of feedback reports were available, 77.4% of department heads submitted RHIS reports on time, and 68.6% reported receiving directives to double-check data accuracy and fill out forms entirely.Content completeness and reporting timeliness were below the national objective of 39%and 73%, respectively and the accuracy of the data reported was76%(23).A research conducted in the Mekelle found that the content completeness and timeliness of reports were both 100%.Overall, the data quality score was 76%. The data accuracy between registers and the reports prepared was inconsistent(35). Study conducted in Hadiya zone reviled that the accuracy, completeness, and timeliness parameters were all below the national target of 76%, 83.3%, and 88.4%, respectively(36).In a recent research conducted in Dangila Weekly report completeness and timeliness were both 100% and 94.6% (37).

2.5. Factors associated with data quality

Technical, organizational, and behavioral factors have an impact on data quality(13, 38).

Organizational factor

According to the PRISM framework, the nature and size of the facility, as well as culture, politics, hierarchy, planning and control systems, strategy, management, and communication, are all elements considered in organizational determinants(39, 40).

Factors associated to the quality of RHIS data were identified in a cross-sectional study conducted in Tanzania. Although training was not shown to be connected with enhanced data quality. As stated in the study description,Understanding fundamental RHIS ideas may or may not be related to basic RHIS training. It has been observed that in many cases, training is not the issue; rather, refusal to fill out forms and a lack of dedication and accountability on the part of inadequately supervised health work forces(41). Another study conducted in Tanzania, around 81% of respondents had never received RHIS training(42). According to a study conducted in Benin, management and planning capacity, as well as the level of infrastructure, all influence the quality of RHIS. The quality of data and the competency of health workers within the extent of their training are largely determined by human resources. Facilities with managerial capabilities have higher-quality health information systems(43). According to the study in Kenya, the availability of robust data quality organization guidelines was determined to be a critical predictor in determining the quality of data in routine health information systems(44). Lack of training support, inadequate provision, supportive supervision, timely feedback, management commitment and awareness, are one of other factor studied in different literature (23, 45-47).

Individual (behavioral) factors

Individual-level factor influence RHIS task performance. People will completing RHIS activities if they value the task's utility, feel confident and competent, and believe the task's complexity is challenging but not overwhelming(40, 48).

Human (behavioral) factors affecting the quality of frequently gathered data were identified in a comparative observational research done in South Africa. According to the survey, 64% of respondents had low math skills and inadequate statistical and data quality checking skills, and while the average confidence level in doing RHIS tasks was 69%, only 22% really demonstrated

competence above 50% Personnel are visible(49). Lippeveld cites Care providers are rarely provided standardized guidelines on how to gather data, and the data collected is often inaccurate. Lower-level health-care providers are compelled to send large amounts of data to higher-level officials in exchange for little or no response.Health professionals' motivation towards routine health care data have shown a strong association with data quality(5, 46). A study conducted in Kenya focused primarily on issues connected to the RHIS process and found a strong link between data quality and process factors such as a lack of technique for conducting data quality checks and a lack of data quality protocol in place (50). Research done in Tanzania show that, there was a link between RHIS concept knowledge and data concept and the presence of focus individuals(41). Recent study done in Adis Ababa show that problem solving skill, know role, duties and responsibility significant associated on data utilization on RHIS(51). A Study in Bahir Dar show that a low attitude among health workers was one of the factor affecting data quality(47).

Technical factors

A study done in London revealed that factors that are used to build, manage, and enhance RHIS operations and performance and are tied to technology. The creation of indicators, the design of data gathering forms, and the preparation of procedural manuals, processes, systems, and methodologies are technical determinants(38).An empirical study on data warehouse adaptation suggests that the complexity of information technology is a crucial determinant for the adaptation of new information systems(40).Other similar study done in London show that user-friendly health information system is unavoidable for data quality improvement, in addition to having the correct user attitude and skills with effective design(39).

Study done in Kenya show thatdespite the fact that 91% of respondents were satisfied with the system, 55% of the locations never completed the RHIS booklets. Out of all the records examined, only one delivery register from a single health facility was confirmed to be 100% complete(42). Well-trained personnel also one of the determinant factor of data quality(43). Another mixed study in Kenya, Ethiopian and Tigray show that complexity of registration form and delay of data record and report were barriers for data quality respectively (52-55).

A study done in Jimma zone had 38.3% report inconsistency and 26.0 % ambiguity in report forms, with the reasons being a lack of knowledge of the tools/formats related to non-understand

ability, ambiguity (45). It was discovered that people were over-reporting of essential resources or inputs, such as a lack of skilled focal persons, were recognized as key results in the study(23).

Mixed study done in Addis Ababa reveal that Lack of adequate Health information system task competence, wascommonly reported reasons for poor data quality(46).

Study done in Dangilla revealed that Staff who had been educated in data collection and compilation, who had a defined reporting guideline, who had a routine process for evaluating report quality, and who had clear instructions on filling out reporting forms were 17 %, 37 %, 38 % and 54% of respectively(56).

A study conducted in Bahir Dar revealed that there were no local quality control procedures in place, Lack of proper technology in the system, a lack of RHIS manipulations skill human resource, technical assistance, and non-participation of RHIS staffs in the system were the driver of the data's poor value(47).

In general, the studied literatures imply that data quality in developing nations is poor and is influenced by a variety of factors. The investigations determined the amount of data quality that results from the data collection, transmission, and processing resulting in low data utilization in decision making. Associated factors that affect the quality of RHIS data were also identified in the studies.As a result, data quality is critical in allowing evidence-based decision-making and promoting an information-use culture.

2.7 conceptual framework

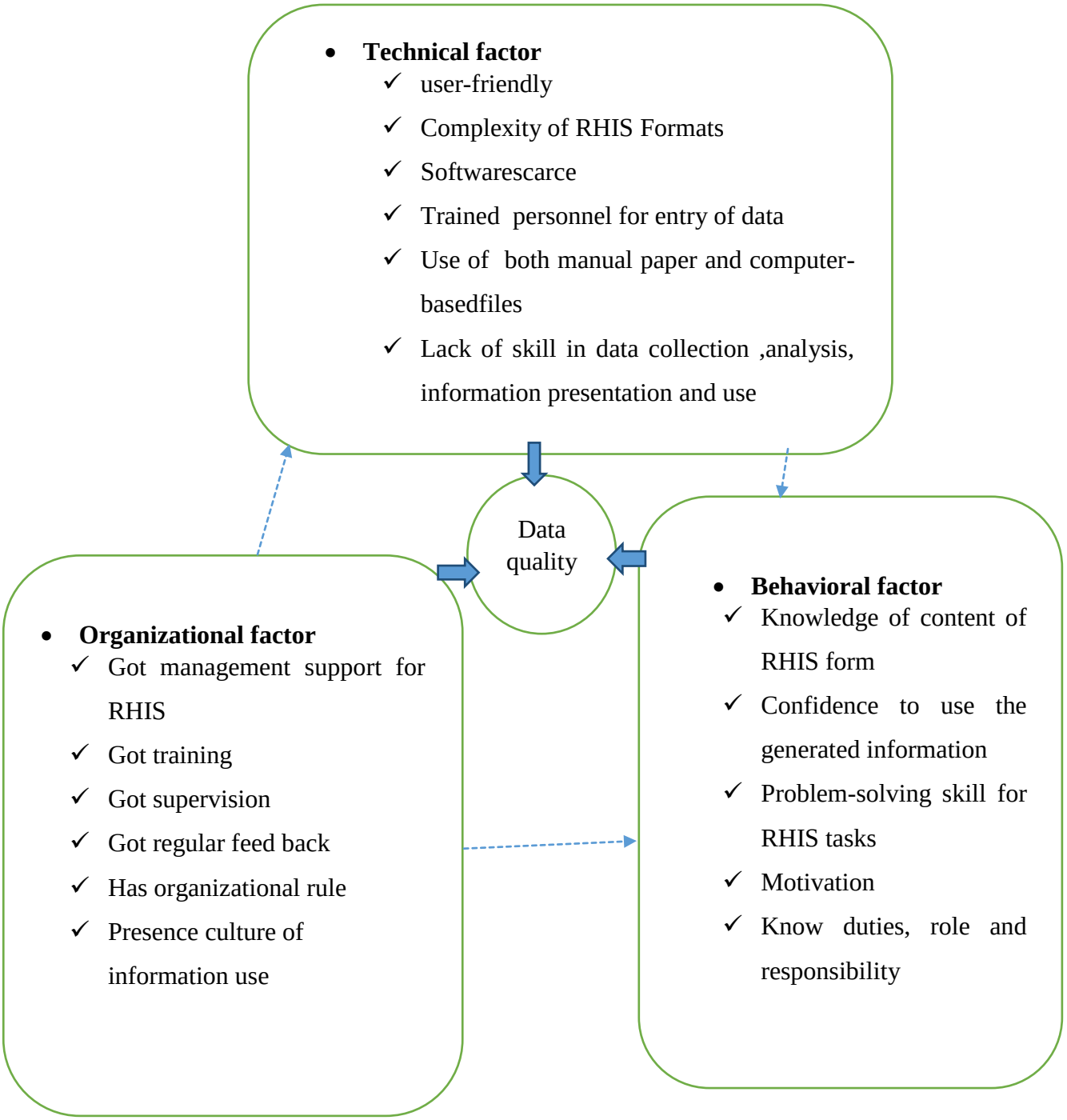


Figure 1: Conceptual framework of data quality and associated factor in RHIS among West Gojjam Zone, Northwest Ethiopia,2021 adapted from WHO PRISM framework (18, 36, 38).

3. Objectives

3.1 General objective

To assess quality of data and associated factors in the routine health information system among health centers of West Gojjam Zone, Northwest Ethiopia from September to October, 2021.

3.2 Specific objectives

- To determine level of quality of data in the routine health information system amonghealth centers of West Gojjam Zone, Northwest Ethiopia in 2021.
- To identify factors affecting qualityof data in the routine health information systemamong health centers of West Gojjam Zone,Northwest Ethiopia in 2021.
- To explore barriers of data quality in the routine health information system among health centers of west Gojjam Zone, Northwest Ethiopia in 2021.

4. Methodology

4.1 Study area

The study was conducted in West Gojjam Zone, which is found in Amhara National Regional State of Ethiopia, comprises of 16 districts, 2 town administration and 404 kebeles. Its capital city is Fnote selam town, which is located at 524 km north-west of Addis Ababa, It is bordered by on the south by the Abay River which separates it from the Oromia Region and Benishangul-Gumuz Region, on the west by Awi Zone, on the north and northwest by North Gondar and also on the north by South Gondar, and on the east by East Gojjam. 2,758,806 million, of which, 1,393,197 were males and 1,365609 were females. The zone has one general hospital, 6 primary hospitals, 108 health centers and 404 health posts. The zone has 3175 health professionals from different disciplines (57).

4.2 Study design and period

A facility based quantitative study triangulated by qualitative method was conducted from September 1 to October 30, 2021to assess data quality in routine health information systemamong health centers of West Gojjam zone Northwest Ethiopia.

4.3.1 Source population

All public health centers available in West Gojjam Zone weresource populations to this study.

4.3.2 Study Population

Randomly selected public health centers of West Gojjam zone were study population.

4.4 Exclusion and inclusion criteria

Inclusion criteria

All public health centers that available in West Gojjam Zone were considered to be study participants in the study.

Exclusion criteria

New Health centers that are not implement HIS for more than 6mounth were excluded to study.

4.5 Sample size determination

For Accuracy dimensions

Samples of 32 Health centers were selected to assess data quality. Based on the national RHIS information use and data quality manual, seven to nine data elements from each health center is satisfactory to assess data accuracy (58). Data elements were selected randomly from top priority indicators at national level. Therefore, seven data elements from the 32 selected health centers were verified. Two month documents were reviewed to check consistence of selected data elements of by random selection of the months September and October and the accuracy of data elements were determined by Accuracy Ratio (recounted data from the source document or registrations over reported data to the next level) for the respective data element.

For completeness and timeliness

Completeness was assessed by proportion of filled data elements of report content and registration content pertaining to selected months. A tolerance level of ≥85% was used in grading health centers, which meant that each health center expected to complete at least ≥85% of data elements on report content and registration content. All data elements of two months RHIS reports were reviewed to assess content completeness of reports.

Timeliness was assessed as a report submission within the accepted time period through observing the reporting date on the reporting form of two randomly selected monthly reports. A tolerance of ≥85% was used in grading health centers.

Sample size was calculated using single population proportion formula based on the following assumption,magnitude of the data quality of routine health information system among departments in public health facilities of Dire Dawa (75.3%) (24), desired degree of precision was 5%, 95% of confidence interval and using a contingency of 10% for non-respondents the final sample size was 314. Sample size determination was as follows:

$$\mathbf{n} = \frac{Z^2_{\alpha/2} p(1-p)}{d^2}$$

Where; Z=the standard score corresponding 95% confidence level, P=magnitude of the data quality of routine health information system among departments in public health facilities of Dire Dawa, D=margin of sampling error and n=number of sample

$$n = \frac{(1.96)^2 (0.753)(0.247)}{(0.05)^2} + 10\%, \text{ non-response rate} = 314$$

4.6Study variables

Dependent variables

- Data quality

Independent variables

Technical factors; user-friendly, complexity of RHIS Formats, software scarce, trained personnel for entry of data, use of both manual paper and computer-based files, lack of skill in data collection ,analysis, information, presentation and use.

Individual /behavioral factors; knowledge of content of RHIS form, confidence to use the generated information, problem-solving skill for RHIS tasks, Motivation, know duties, role and responsibility

Organizational factors; got management support for RHIS, Got training, got supervision, got regular feedback, has organizational rule and presenceculture of information use.

4.7Operational definition

Good quality data: The data that fits the criteria for the three quality dimensions - accuracy ≥80%, completeness ≥85%, and timeliness ≥85 % (59, 60).

Poor quality data: The data that do not fit the three criteria (accuracy <80%, or completeness <85%, or timeliness <85%)

Data Accuracy: was measured by calculating the number from source document over the number from report submitted to the next level. Based on 10% tolerance for data accuracy was classified as follows; Over reporting (<0.90 or 90%), Acceptable limit (0.90-1.10 or 90%-110%) and Under-reporting (>1.10or110%).The health center data is considered accurate if the average was ≥80% (60).

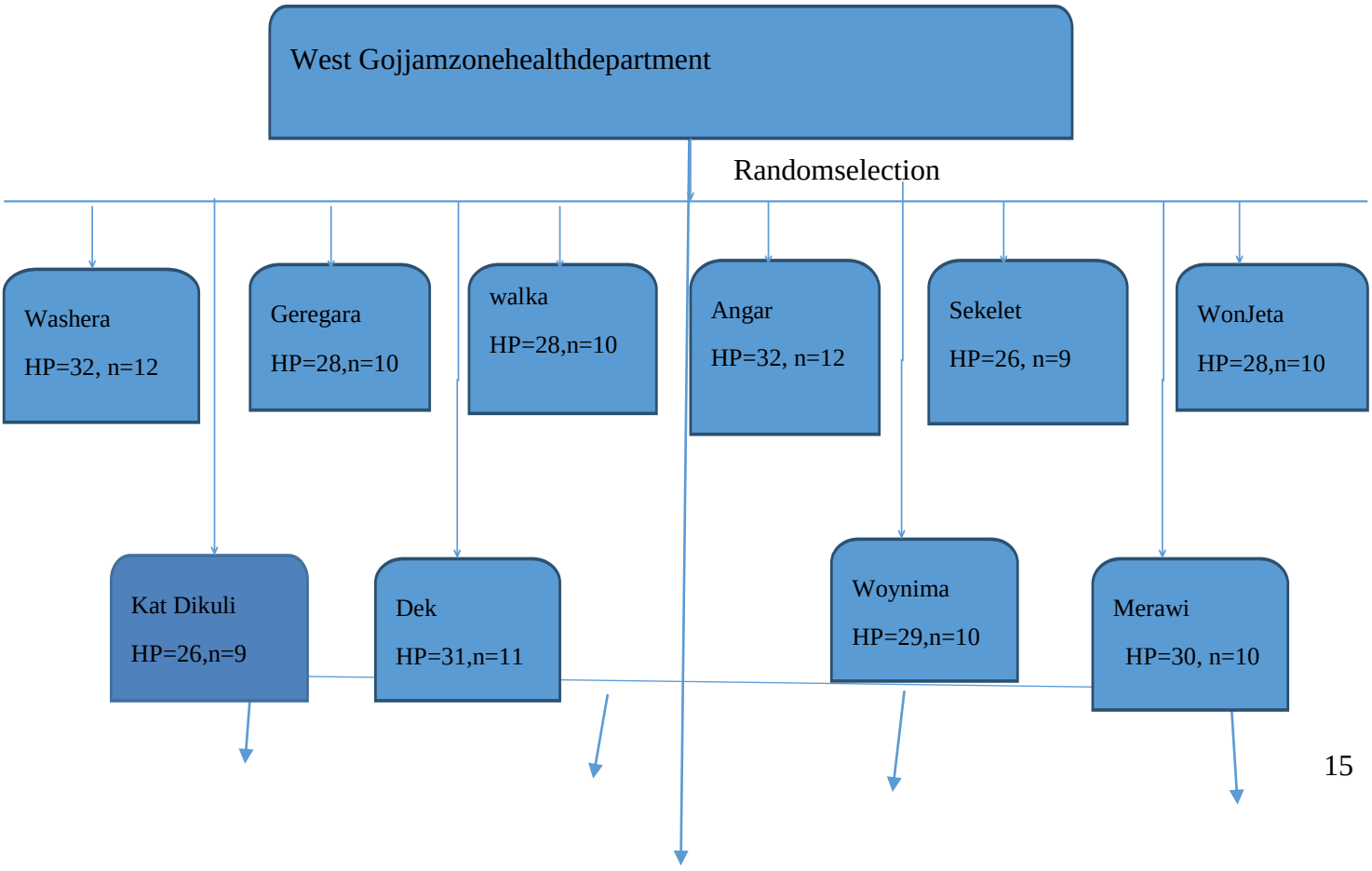
Completeness:was the average of the source document or registration content completeness and report content. The data is complete if the average is≥85%(61).

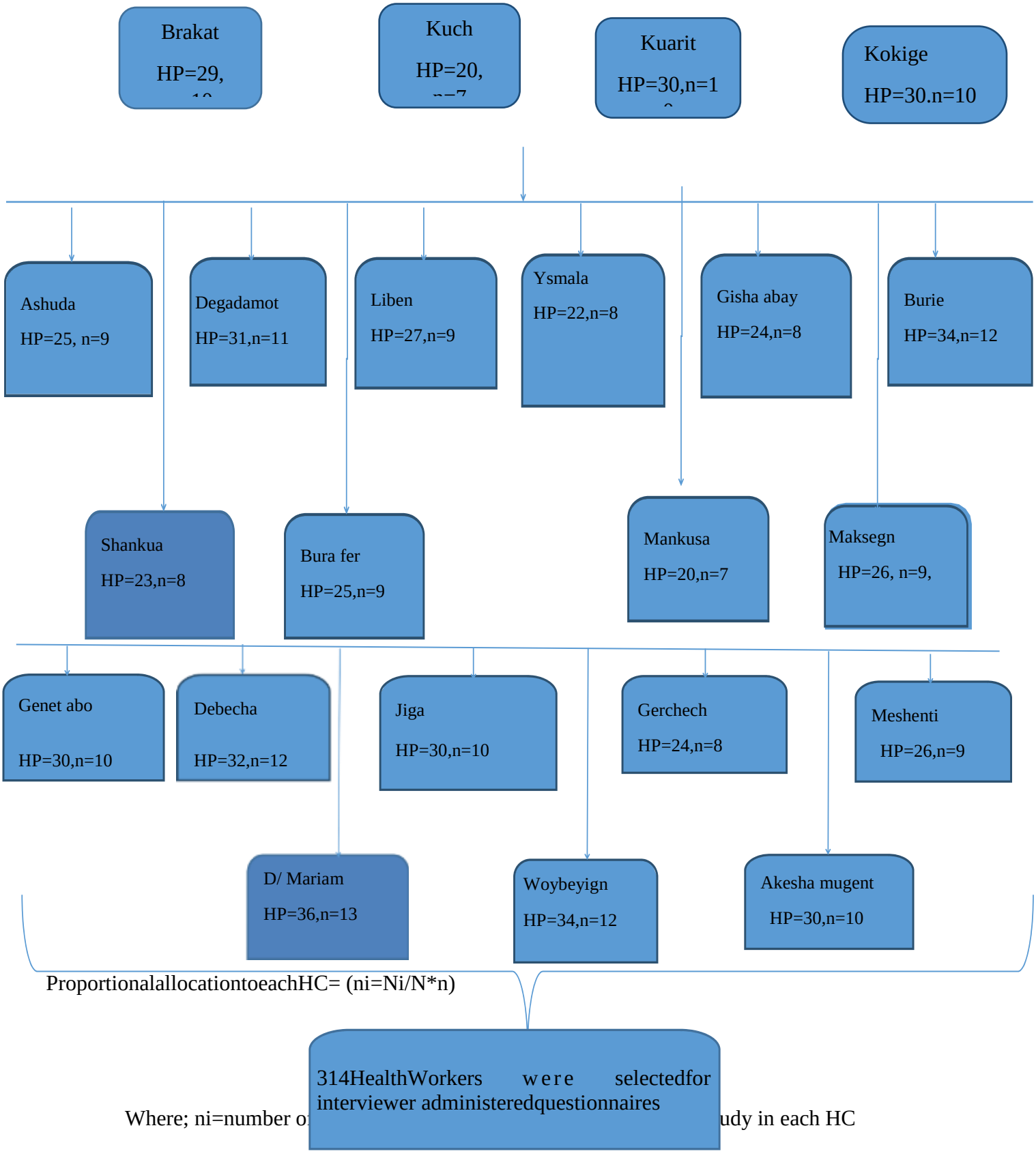
Timeliness:was assessed as a report submission within the accepted time period through observing the reporting date on the reporting form of two randomly selected monthly reports.The data of the health center is timely if the average is≥85% (59).

Confidence level or self-efficacy: was measured in a scale of 0-100 that means from no confidence (zero) to full confidence (100) to perform RHIS tasks.

4.8 Sampling procedures

WHO recommended for assessment of health facilities by considering the available funds and human resources, selecting 10%-50% facilities to have representative sample. Among the total 108 health centers in the zone 30% of health centers was selected based on the suggestion(62). A total of 32 health centers were selected randomly. The calculated sample size for respondents interviewer administered questionnaire was proportionally allocated to each health center, then health professionals was selected randomly who were involved in RHIS activities starting from daily register of the source document to the final report was included. For the qualitative method, participants was selected using the purposive sampling technique [are Head of health center and Health Information Technicians (HIT)] for key informant Interview (KII). Figure 2 below shows the sampling procedure of the health centers.





Where; ni=number o udy in each HC

Ni=total number of health professionals in each health centers

N=total no of health professionals in all (32) HC

n=calculated sample size

Figure 2: schematic presentation of sampling for data quality and associated factor at health center of West Gojjam zone, North West Ethiopia, 2021

4.9 method of **data collection and analysis**

4.9.1 **Data collection tools and procedures**

Quantitative data were collected using structured checklist, interviewer based administer questionnaires adapted from the PRISM assessment tools version3.1**(18, 58).**The tool included; checklist to assess accuracy, completeness and timeliness of data quality, background information of the respondent's, organizational, behavioral, and technical determinants of data quality in health centers.Qualitative data were collected using key informant interview. The data collection tool wereKII question guide. The interviews were recorded for an average of 30 minutes using a tape recorder and note was taken by a recorder and moderated by a facilitator. The principal investigator facilitated the interview process. Three health professionals were recruited for data collection, who were experienced and had training on RHIS related tasks.

4.9.2 **Data quality management/assurance**

Pretest was done by taking 5% of the sample health professionals to ensure reliability and validityprior to data collection. Training was provided to data collectors and supervisor about the objective of the study, data collection tool, data collection procedures, ethical consideration during data collection. Day to day supervision was conducted by assigned supervisor.

4.9.3 **Data processing and analysis**

The data were checked for completeness, coded and entered in epi-data version 3.1 and analysis was made by STATA version14.Descriptive statistics were used to describe study population in relation to relevant variables. Bi variable and multivariable binary logistic regression analysis was computed to assess associations of factors with data quality. Adjusted Odds ratio with its 95% CI is reported and P- value < 0.05 was considered as statistically significant.The goodness of fit was tested by Hosmer-Lemeshow statistic which was greater than 0.05. The qualitative data collected during field visits was organized, coded, and analyzed as per themes emerged using manual

analysis. Finally, thematic analysis was performed and descriptive summaries was made based on what participants described.

4.10 **Ethical consideration**

Ethical clearance was obtained from research and ethical review committee of Bahir Dar University College of Medicine and Health Science. Letter of permission was written by collage of Medicine and Health sciences academic and research director.A formal written letter was provided to West Gojjam zone health office, Woreda health office and health centers. Participant related data were kept confidentiality throughout the study.

4. Result

4.1 Socio demographic characteristics

A total of 32 health centers in West Gojjam Zone were included in the study and 304 respondents from different departments and service areas were involved making the overall response rate to be 96.8%. Regarding service year, 171 (56.3%) of them have less than five years of experience. In this study more than half of participants, 158(52%) were the age of ≥31 years. 162 (53.3%) of participants were females. 166 (54.6%) of participants were degree holders. 81 (26.6%) of participants were nurseand 110(36.2%) of participants were adult outpatient department of working unit (table1).

Table 1: Socio demographic characteristics of respondents in health enter of West Gojjam Zone Northwest Ethiopia, 2021(N=304).

Variables	Categories	Frequency (N)	Percentage (%)
Age in years	<31	146	48.0
	≥31	158	52.0
Experience	<5	171	56.3
	5-9	81	26.6
	10-14	39	12.8
	≥ 15	13	4.3
Sex	Male	142	46.7
	Female	162	53.3
Education level	Diploma	107	35.2
	Degree	166	54.6
	Masters and above	31	10.2
Job title	Nurse	81	26.6
	Public health officer	48	15.8
	Pharmacy	49	16.1
	Midwifery	54	17.4
	Laboratory technician	7	2.3
	Others	65	21.4
	Others ; HIT, doctor , environmental health		

Working unit	Adult OPD	110	36.2
	Dispensary	44	14.5
	Maternity	52	17.1
	Laboratory	36	11.5
	Emergency	8	2.6
	HIT room	16	5.3
	Under 5 OPD	9	3
	ART room	21	6.9
	Immunization room	8	2.6

4.2. Technical factor

Out of 304 respondents, 229(75.33%) agreed that most health information systems require Information technology, 218(71.71%) agreed that the use of both manual paper and computer based file for recording information, and 213 (70.1%) greed that need of trained personnel for data entry(table2).

Table 2: technical factors of quality of data at health centers of West Gojjam Zone, Northwest, Ethiopia, 2021 (N=304)

Technical factor	categories	Frequency (N)	Percent (%)
Information technology easy to manage	Agree	229	75.33
	Dis agree	75	24.67
User-friendly	Agree	195	64.14
	Dis agree	109	35.86
Complexity of RHIS formatmakes it hard for health workers to use the system	Agree	187	61.51
	Dis agree	117	38.49
RHIS Software scares	Agree	196	64.47
	Dis agree	108	35.53
trained personnel data entry	Agree	213	70.1
	Dis agree	91	29.9
Use of both manual paper and computer based file	Agree	218	71.71
	Dis agree	86	28.29

Presence of incomplete data	Agree	155	51
	Dis agree	149	49
Late data presented	Agree	167	54.9
	Dis agree	137	45.1
Provision of feedback	Agree	104	34.2
	Dis agree	200	65.8
oriented for use of data collection tool	Agree	104	34.2
	Dis agree	200	65.8
Discussion on monthlyperformance	Agree	167	54.9
indicator	Dis agree	137	45.1
Lack of skill in data collection	Agree	178	58.55
	Dis agree	126	41.45
Lack of skill data analysis	Agree	171	56.25
	Dis agree	133	43.75
Lack of skill info presentation	Agree	174	57.2
	Dis agree	130	42.8
Lack of skill information use	Agree	180	59.2
	Dis agree	124	40.8
Total		304	100

4.3. Organizational factor

Out of 304 respondents, 230(75.66%) agreed on Lack of sufficient financial resource and 225(74%) agreed on staff are aware of their responsibilityfor data quality of routine health information in the health center(table3).

Table 3: organizational factors of quality of data at health centers of West Gojjam Zone, Northwest, Ethiopia, 2021 (N=304)

Organizational factor	categories	Frequency (N)	Percent (%)

Has organizational rule value and practice	Agree	219	72.04
	Dis agree	85	27.96
Lack of sufficient financial resource	Agree	230	75.66
	Dis agree	74	24.34
Presence poor leadership & low management support	Agree	221	72.70
	Dis agree	83	27.30
Routine health information compilation supervision	Agree	165	54.28
	Dis agree	139	45.72
Able to access to timely report	Agree	173	56.9
	Dis agree	131	43.1
Got timely feedback	Agree	136	44.7
	Dis agree	168	53.3
Presence of level of culture of information use	Agree	218	71.71
	Dis agree	86	28.29
Presence well streamlined RHIS policy	Agree	206	67.76
	Dis agree	98	32.24
Got regular staff meeting to review action plan	Agree	183	60.2
	Dis agree	121	39.8
Share data with other stakeholders	Agree	201	66.1
	Dis agree	103	33.9
Staff are aware of their responsibility	Agree	225	74
	Dis agree	79	26
Staff are trained in data management & use	Agree	114	37.5
	Dis agree	190	62.5
Report on data accuracy regularly	Agree	158	52
	Dis agree	146	48
Use RHIS data for day to day management facility	Agree	132	43.4
	Dis agree	172	56.6
Gather data to find the root cause of the problem	Agree	173	56.9

	Dis agree	131	43.1
Use RHIS data for education and community mobilization	Agree	193	63.49
	Dis agree	111	36.51
Total		304	100

4.4. Behavioral factor

Out of 304 respondents, 237(74.3%) were agreed on data collection meaningful to me, 237(74.3%)disagreed on data collection makes one bored and 218(71.71%) disagreed on collecting information gives a feeling that is a burden on me (table4).

Table 4: behavioral factors of quality of data at health centers of West Gojjam Zone, Northwest, Ethiopia, 2021 (N=304)

Behavioral factors	Categories	Frequency (N)	Percent (%)
Level of knowledge of content of RHIS forms	Agree	201	66.12
	Dis agree	103	33.88
Problem-solving skill for RHIS tasks	Agree	200	65.79
	Dis agree	104	34.21
Confidence to use generated information by RHIS management team	Agree	204	67.11
	Dis agree	100	32.89
Staff competence to perform their RHIS tasks	Agree	182	59.9
	Dis agree	122	40.1
Staff attitude toward data collection and recording	Agree	202	66.4
	Dis agree	102	36.6
The belief about Routine RHIS	Agree	195	64.1
	Dis agree	109	35.9
Lack of motivating incentives to staff during the data collection	Agree	208	68.42
	Dis agree	96	31.58
Collecting information that adds no value irritates	Agree	87	28.6

me	Dis agree	217	71.4
Data collection makes one bored	Agree	78	25.66
	Dis agree	226	74.34
Data collection meaningful to me	Agree	237	78
	Dis agree	67	22
Collected information used for planning, monitoring	Agree	207	68.1
	Dis agree	97	31.9
Know duties, roles and responsibilities	Agree	180	59.2
	Dis agree	124	40.8
Collecting information gives a feeling that is a burden on me	Agree	86	28.29
	Dis agree	218	71.71
Understand and appreciate my roles and responsibilities	Agree	145	47.70
	Dis agree	159	52.30
Total		304	100

4.5 Self-efficacy

Confidence level to perform RHIS tasks for health professionals were assessed on a scale of 0 to 100. The average score obtained for the seven questions expressed as a percentage. Higher confidence was observed in checking data accuracy (56%) and lower confidence was observed in explaining findings & their implication and compute trend from bar charts (42%) relatively. The average confidence level to perform RHIS activities of respondents were 46 % (figure3).

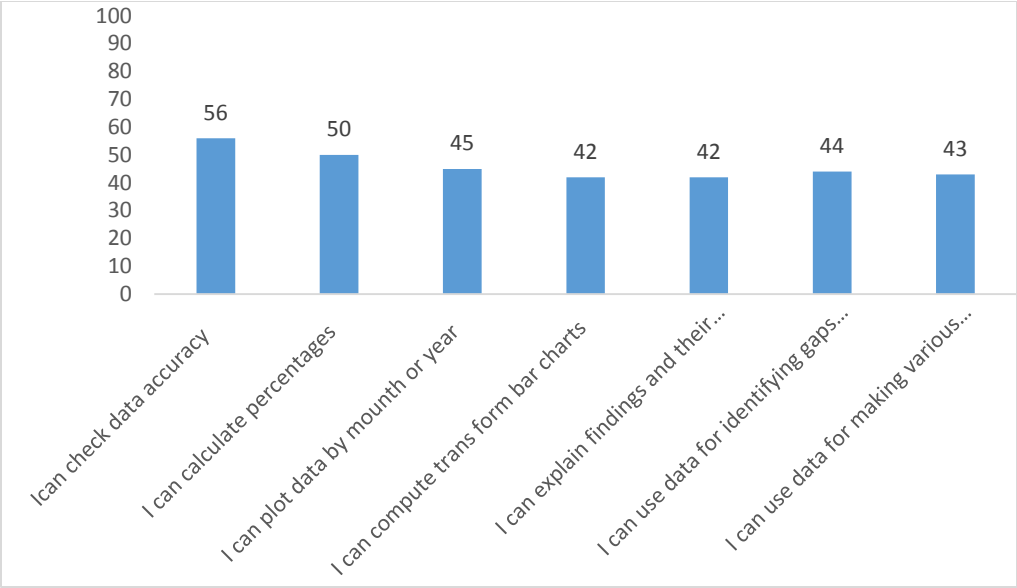


Figure 3: Self-reported level of confidence to perform specific RHIS tasks at health centers of West Gojjam Zone, Northwest Ethiopia, 2021.

4.6. Level of the data quality

4.6.1 Data quality in-terms of accuracy

Among the 32 health center for which data accuracy was checked, (74%) of heath facility had accurate data while 26 % had inaccurate data. Seven data items or indicators were assessed for data accuracy. Service delivery reports and registration books were checked for the month September and October by random selection of the months. Seven indicators verified were Antenatal care fourth visit (ANC4), Contraceptive acceptance rate (CAR), Institutional delivery, Pentavalent third doses (Penta 3), PMTCT, TB cure rate and confirmed malaria cases from top priority indicators at national level. Data were over reporting in all health facility (figure4).

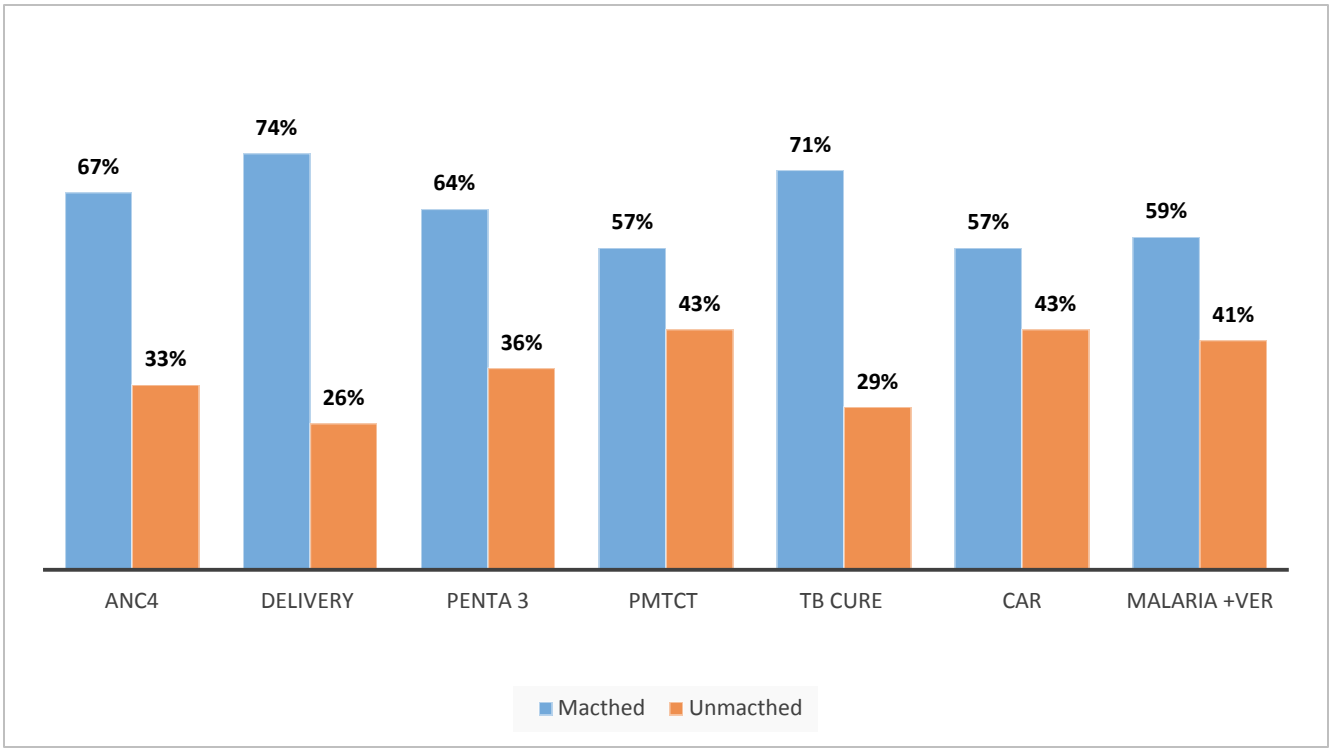


Figure 4: Accuracy of data based on indicator type at health centers of West Gojjam Zone, Northwest Ethiopia, 2021.

4.6.2.Data quality in-terms of completeness

Content completeness was assessed by checking two months service delivery report and registration content whether the required data elements in a report and registration form are filled or data were completed. Based on this among the 32 health center for which data completeness was checked 70% data element had completely registered while 30% had incompletely registered.

4.6.3. **Data quality in-terms of timeliness**

Timeliness of the RHIS reports were assessed by checking whether RHIS data reporting by the health centers met the predetermined deadline of reporting period received by the facility head.

The records of report receipt showed that 78% of health center the RHIS reports sent were met the reporting deadline while22%were not met the reporting deadline.

4.7. Overall data quality

Based on the three dimensions of data quality the overall data quality of the health centers was 74%.4.8. Factors associated with data quality of routine health information system

In bivariate logistic regression, information technology is easy to manage, user-friendly, the complexity of routine health information systems format, RHIS software scarce, use of both manual paper and computer-based files for recording information, lack of skills among health workers in data collection, lack of skill data analysis, has organizational rules, values and practices, lack of sufficient financial resources, presence poor leadership and low management support, presence the level of culture of information use, level of knowledge of content of RHIS forms, problem-solving skill for RHIS tasks, confidence to use the generated information, lack of motivating incentives to staff during the data collection, know duties, roles and responsibilities and collecting information gives a feeling that is a burden on me were associated to the data quality. However, the complexity of RHIS format , problem solving skill for RHIS task and know duties, roles and responsibilities were significantly associated to the data quality in both bivariate and multivariate analysis. Those who agreed complexity of RHIS format were 3.8 times more likely to have good data quality as compared to those who disagreed complexity of RHIS format (AOR=3.8; 95%CI: 1.7-8.50). Those who agreed problem solving skill for RHIS task were 2.8 times more likely to have good data quality as compared to those who disagreed problem solving skill for RHIS task (AOR=2.8; 95%CI: 1.2-6.4). Those who agreed know duties, roles and responsibilities 12 times more likely to have good data quality as compared to those who disagree know duties, roles andresponsibilities (AOR=12; 95%CI: 5.6 -25.8) (table5).

Table 5: Bi variable and multivariable logistic regression analysis of factors associated with data quality at health center of West Gojjam Zone, Northwest Ethiopian, 2021 (N=304).

	Data quality				
Variables	**Good (N=224)**	**Poor (N=80)**	**COR (95%CI)**	**AOR (95% CI)**	**P-value**
Complexity of RHIS					
Agree	159 (71%)	28(35%)	4.5 (2.6 – 7.8)	3.8(1.7- 8.5)	0.001
Disagree	65 (29%)	52 (65%)	1	1	
Problem-solving skillfor RHIS tasks					
Agree	161(71.9%)	39(48.8%)	2.7(1.6 - 4.5)	2.8(1.2– 6.4)	0.016
Disagree	63(28.1%)	41(51.2%)	1	1	
Know duties and roles					

Agree	165 (73.7%)	15(18.8%)	12.1(6.4 - 22.9)	12 (5.6 – 25.8)	0.001
Disagree	59 (26.3%)	65 (81.2%)	1	1	

4.9. Barriers on data quality /Qualitative Data Analysis

A total of eight keyinformant interview were conducted. The manual analysis found the following recurring themes; data quality practices and challenges.

4.9.1Data Quality Practices

The participants of the KIIs said that the main finding for data quality practices was that there were specific processes dedicated to ensuring the quality of the data. The first thing to ensure data quality practice was by doing lot quality assurance sampling, second thing was through a performance monitoring team; third thing was random supervision using an indicator. But in some health facilities, PMT was not properly working.

For example, a 41-year-old female key informant head of a health center said, "We do have any specific things we do to ensure data quality practice, always by doing LQAS, random supervision, and to some extent, using PMT." Another 29-year old male key informant health information technician reported that, "in addition, the monthly summary form has to be signed by a superior officer at the health facility verifying the data collated, thus a data quality mechanism. However, this verification is not usually done and forms are only signed to allow timely submission to the Woreda health office".

Most of the key informants explained in data quality practice that, furthermore, the staff expects the quality to be verified and ensured by the next level officers at the district during routine data quality assurance visits to the health facility by the district and other sub-national level officers. The data quality assessments were conducted periodically by staff from the health facility and Woreda health office. However, this was not done regularly, and when it was done, only a small fraction of the data elements were verified at the health facilities.

4.9.1Challenges

The majority key informants said that the challenges facing health staff in the health facility were clinical work overload for most health staff, use of complex and bulky forms, poor feedback mechanisms, delays in completing data records, lack of use of generated information at health facilities, and inadequate training on health information systems. Firstly, health staff, already overburdened with clinical duties, were expected to also collect and manage the facility data. This

duty was often relegated to the last hours of the day when health workers were already fatigued.Here, other participants of the KIIs repeatedly raised the analysis of the data, which highlighted two main issues for the HIT responsibility. Firstly, though the policy of the government is to have one HIT professional in all health facilities, this was the case in the sampled health facilities.

For instance, a 32-year-old female key informant health information technician said that, "Yes-we do have a health record officer in the health facility. I and my assistant handle all data records in the health facility." Secondly, the bulk of the data management processes rest with the clinical staff: Another 35-year-old male key informant head of the health center explained that, "the nursing staff are responsible for collating the data when they have the time".

In summary, there is a significant gap in the availability of required staff to manage routine health information systems in the health facility.

For instance, a 35-year-old male key informant health information technician explained that"if we have too many patients or on immunization days, we may forget to enter all the patients in the daily registers or only do that after some days when we may have forgotten some of the details".

Another of the key informants said that, in addition to workload, the complexity of the forms and registers expected to be completed by health care professionals in order to meet the reporting requirements of the standard health information system.For example, a 37-year-old male key informant head of the health center said that "We have a lot of other tasks to do in the health center, therefore the government should hire additional people".

Most of the key informants of the respondents had never had any formal training in the use of the data reporting tools. This poses a serious challenge in ensuring good quality data practice because when individuals do not understand data definitions, it is difficult for them to understand or ensure that the correct data is collected in the health facility. For instance, a 27-year old female key informant health information technician reported that "I will wish that I could attend more training on data management but there is no sponsorship or opportunities".

The key informants explained that the delays in the completion of daily records or monthly records leave room for missing data records and incorrect entries. Feedback on data submitted to

the district and captured on the DHIS was found to be very poor as most respondents had either never been given feedback on values captured on the DHIS by district officers.

For example, a 33-year-old male key informant head of a health center said that "We do attend meetings monthly to submit our data to the Woreda health office, but we don’t get any feedback on the data submitted to the Woreda health office."

5. Discussion

In this study data quality was74%(95%CI:68.-78); which wasconsistent with study conducted in Dire Dawa (75.3%) and in Adis Ababa (76.22 %.)(24, 46).However the result waslower than study conducted in Hadya Zone(82.5%)(36). This might be because of the difference in the way the dimensions of the data quality were measured which means Hadya zone completeness measured only report content.On the other hand this finding which was higher than the study conducted in Harargi 51.35%(28). This variation could be due to health care setup (study conducted in Harargi were includes health posts and hospitals) and study period.

In our study the accuracy of data was found to 74%(95%CI:68.76-78.66) and it was inlinewith study conducted in Hadiya zone(76)(23). But this study was less than 79% in Nigeria (21). The difference might be because of the difference in the type of facilities and level of the feedback provided to the departments. Also, the interval of verification factor used to measure the data accuracy in Nigeria was wider (0.85–1.15) (21) than the verification factor interval used in this study (0.9–1.1) to measure the data accuracy. Due to data accuracy can be affected by errors that occur during data entry, intentionally manipulating the data for different reasons like competition among staffs and facilities, false report to increase achievement, and reports not made on time.

In the current study regarding to content completeness the result found 70%(95%CI:64.30-74.66), which was lower than a study conducted in Mekelle(100%), Hadya Zone (83.3%), Addis Ababa (96%)and Rwanda (98%)(34-36, 46).This might be due health workers focus on managing patients rather than recording data due to the work load and lack of commitment to the data. whereas the result was comparable with a study conducted recently in Harari region (69.6%)and in India (71%)(28, 63). However the recent study was higher than previous done on Hadya zone39% and in Kenya 44%(23, 33). This due to study year difference.

In this study 78%(95%CI:72.92-82.28) timeliness of the data revealed which was inline with study conducted in Hadya zone (73%)(23), but higher than study in Kenya 56%(33). This could be due to early checkup and follow up on deadline of report by facility head. But lower than study done in Hadya zone 88.4%, in Mekelle 100%, and in Rwanda 93.85% (34-36). Possible reasons may be due to lack of knowledge of respondents about the implications to send reports on timely manner among the health workers and it may also be less emphasis was given for data quality during supervision.

In our study data quality on those health worker who were agreed complexity of RHIS format were 3.8 times more likely to have good data qualityas compared to those who disagreed complexity of RHIS format(AOR=3.8; 95%CI: 1.7-8.50). This was supported qualitative result and study done in Jimma zone(45). This might be the reasons being a lack of knowledge of the tools/formats related to non-understand ability, ambiguity.

Those who agreed problem solving skill for RHIS tasks were 2.8 times more likely to have good data qualityas compared to those who disagreed problem solving skillfor RHIS tasks (AOR=2.8; 95%CI: 1.2-6.4). This was supported by study done in Adis Ababa(51). This might be due to the performance of health workers to know and engage in health information-related activities.

Those who agreed know duties, roles and responsibilities 12 times more likely to have good data quality as compared to thosewho disagreed know duties, roles and responsibilities (AOR=12; 95%CI: 5.6 – 25.8)This was supported by study done in Adis Ababa. (51). This might be due towell understanding their job description.

In our study we used qualitative methods to explore the barriers of data quality using key informant interview at health center. Complexity of registration forms affect data quality which was supported by study done in our countries, South Africa, and Kenya (45, 52, 54, 55). Human resource shortages appeared to affect all levels of the RHIS process, most prominently at health facilities, where health workers were responsible for data collection on top of their clinical service. This creates workload for RHIS. Similar human resource challenges have been found elsewhere (5, 24, 47). At the level of the health facility, delay in completing data records have become a typical issue. As previously stated, access to technology such as computers and the internet would increase timely data transmission. This would not address the problem of parallel reporting obligations, which added to workload and reporting delays (53). Other finding in qualitative data lack of training and feedback affects data quality. This is supported by research done in Jimma Zone, Adis Ababa and Ethiopia as whole (23, 45, 46). Lack of use of generated information at health facilities is also another barrier that affect data quality which is supported by research done in Ethiopia.(22, 23, 53).

6. Limitation of study

This study was conducted only at health centers level which may not be representative of all health facility.

7. Conclusions and Recommendations

7.1. Conclusions

Data quality for the three dimensions was scored below acceptable level of data tolerance. Complexity of RHIS format, problem solving skillfor RHIS tasks and know duties, role and responsibilities were significantly associated with data quality in quantitative data and lack of human resource, use of complex and bulky forms, poor feedback mechanisms, delay in completing data records, lack of use of data, inadequate training on health information systems were barriers affect in data quality.

7.2. Recommendations

Based on the result of the present study, we recommended the following points:

For Ministry of Health, regional health bureau and Zonal health Department

- Decisions are based on reliable information so that shall be give emphasis on data quality (accuracy, completeness and timeliness) of reports.
- There complexity of routine health information systems format makes it hard for health workers to use the system, so provide training for health workers.
- Shall be strength written feedback.
- Shall be hiring sufficient health professionals and use data appropriately.

For Woreda health office

- Shall be prepare orientation session(training) for health professionals in order to have common understanding and clearly use of RHIS
- Shall be strengthen written feedback to the lower health institutions

Health facilities

- Health works shall be know duties, roles and responsibilities on data quality
- Shall be strengthen problem solving skill for RHIS tasks

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9. Annexes

Annex 1: Subject information sheet /Consent Form

Bahir Dar University

School of public health

Questionnaire for Health Workers, HIT Personnel's and in charge (Managers) of Public Health Facilities

Dear Sir / Madam,

My name is _____, I am a health professional working at Bahir Dar health science college and now I am collecting data from health professionals for the research being conducted to assess data quality and associated factor at health center in West Gojjam Zone North West, Ethiopia by Afework Chekol who is working on his thesis for an award of Masters of public health in Bahir Dar University College of Health Sciences, School of Public Health department of health system and project management . The information you will give is purely for academic purposes and will be treated with confidentiality. Your participation is purely voluntary and has no monetary value. The report produced will be intended mainly for academic purposes shared with the University and West Gojjam Zone public health centers with their correspondence health offices to understand the constraints in data quality. Thanks for taking 15 - 20 minutes and answering the questionnaire.

Are you willing to participate? □ Yes □ No

Annex 2: Informed consent (Participant Consent Form)

I_____ voluntarily agree to participate in this research study. I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind. I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.

I understand that participation involves 15-20 minutes and I will not benefit directly from participating in this research. I understand that all information I provide for this study will be treated confidentially. I understand that in any report on the results of this research my identity will remain anonymous. I understand that under freedom of information legalization I am entitled to access the information I have provided at any time while it is in storage as specified above. I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Signature of participant_____ Date_____/_____/_____

Signature of data collector _____ Date_____/_____/_____

Annex 3. Part one

SECTION A: BACKGROUND INFORMATION

In the section below, tick the most appropriate option that best describes you

101. Age of the respondent _____

102. Gender of the respondent (1). Male (2). Female

103. Level of education

(1). Diploma (3). Postgraduate

(2). Degree (4). Masters and above

104. What is your Job Title?

(1). Nurse (5). Doctor

(2). Health officer (6). Information Technologist

(3). Pharmacist (7). Laboratory technician

(4). Midwifery (8). other, specify

105. Department/Division of affiliation

(1) .Adult OPD/IP (3) .Maternity

(2) .Dispensary (4) .Laboratory

(5) .Emergency

(8). ART room

(6). IT room

(9). Immunization room

(7). Under 5 OPD

106. For how long have you been at the this facility _____ years

SECTION B: INDEPENDENT VARIABLES

- Technical factors
- Organizational factors
- Behavioral factors

I would like to know your opinion on how you agree with the statements. There is no right or wrong answer, only express your opinion using the Likert scale; 1-Strongly Disagree, 2 Disagree, 3-Neither Agree or Disagree, 4-Agree 5-Strongly agree.

Hint; RHIS=Routine Health Information System

Please be open and flank to choose the answer honestly

Technical factor

Indicate your level of agreement on the following statements regarding howtechnical factors influence Data Quality of Routine health information system in the health center public					
Statement	(1)	(2)	(3)	(4)	(5)
200. Information Technology is easy to manage	(1)	(2)	(3)	(4)	(5)
201. The system design used in data management isuser-friendly	(1)	(2)	(3)	(4)	(5)
202. The complexity of routine health informationsystems format makes it hard for health workers to use thesystem	(1)	(2)	(3)	(4)	(5)
203. The software for running the system of datamanagement is scarce	(1)	(2)	(3)	(4)	(5)
204. Most health information systems require theemployment of trained personnel for entry of data	(1)	(2)	(3)	(4)	(5)
206. Use of both manual paper and computer-basedfiles for recording information	(1)	(2)	(3)	(4)	(5)
207. presence of incomplete data	(1)	(2)	(3)	(4)	(5)
208. Late data presented	(1)	(2)	(3)	(4)	(5)
209. Provision of feedback to data collectors routinelydone at all levels	(1)	(2)	(3)	(4)	(5)

210. Staff oriented through the use of data collectionTools	(1)	(2)	(3)	(4)	(5)
211. Discussion on Monthly performance indicator toassess progress, for planning and decision-making	(1)	(2)	(3)	(4)	(5)
212. Lack of skills among health workers In data collection	(1)	(2)	(3)	(4)	(5)
213. Lack of skills among health workers Data analysis	(1)	(2)	(3)	(4)	(5)
214. Lack of skills among health workers Information presentation	(1)	(2)	(3)	(4)	(5)
215. Lack of skills among health workers Information use	(1)	(2)	(3)	(4)	(5)

B. Organizational factors

Indicate your level of agreement on the following statements regarding how organizational factors influence data quality of Routine health information system in public health centers					
Statement	(1)	(2)	(3)	(4)	(5)
216. Has organizational rules, values and practices	(1)	(2)	(3)	(4)	(5)
217. Lack of sufficient financial resources	(1)	(2)	(3)	(4)	(5)
219.presence of poor leadership and Low management support	(1)	(2)	(3)	(4)	(5)
220. Routine health information compilation supervision	(1)	(2)	(3)	(4)	(5)
221. Able access to timely reporting	(1)	(2)	(3)	(4)	(5)
222. Got timely feedback on routine health information	(1)	(2)	(3)	(4)	(5)
223. Presence of level of culture of information use of a healthFacility	(1)	(2)	(3)	(4)	(5)
224. Well streamlined Health information system policies	(1)	(2)	(3)	(4)	(5)
225. Regular staff meetings to review action plans	(1)	(2)	(3)	(4)	(5)
To what extent do you agree with the following statements on influencing data quality for Decision making; at the organizational level					
226. Share data with other stakeholders	(1)	(2)	(3)	(4)	(5)
227. Staff are aware of their responsibilities	(1)	(2)	(3)	(4)	(5)
228. Staff are trained in data management and use	(1)	(2)	(3)	(4)	(5)
229. Report on data accuracy regularly	(1)	(2)	(3)	(4)	(5)
230. Use RHIS data for day to day management of thefacility	(1)	(2)	(3)	(4)	(5)
231. Gather data to find the root cause of the problem	(1)	(2)	(3)	(4)	(5)

232. Use RHIS data for education and communityMobilization	(1)	(2)	(3)	(4)	(5)

Indicate your level of agreement on the following statements regarding how behavioral Factors influence the Data Quality of Routine health information system.					
Statement	(1)	(2)	(3)	(4)	(5)
233. Level of knowledge of content of RHIS forms	(1)	(2)	(3)	(4)	(5)
234. Problem-solving skill for RHIS tasks	(1)	(2)	(3)	(4)	(5)
235. Confidence to use the generated information by RHIS management team	(1)	(2)	(3)	(4)	(5)

C. Behavioral Factor

236. Staff competence to perform their RHIS tasks	(1)	(2)	(3)	(4)	(5)
237. Staff attitude toward data collection and recording	(1)	(2)	(3)	(4)	(5)
238. The belief about Routine RHIS	(1)	(2)	(3)	(4)	(5)
239. Lack of motivating incentives to staff during the data collection	(1)	(2)	(3)	(4)	(5)
240. Collecting information that adds no value irritates me	(1)	(2)	(3)	(4)	(5)
To what extent do you agree with following on influencing data quality Decision making is based on; individual level					
241. Data collection makes one bored	(1)	(2)	(3)	(4)	(5)
242. Data collection meaningful to me	(1)	(2)	(3)	(4)	(5)
243. Collected information used for planning, monitoring and evaluating facility performance	(1)	(2)	(3)	(4)	(5)
244. Know duties, roles and responsibilities	(1)	(2)	(3)	(4)	(5)

Self-Efficacy	No	Yes									
245. Collecting information gives a feeling that is a burden on me	0	10	20	30	40	50	60	70	80	90	100
246. Understand and appreciate my roles and responsibilitiesregarding health information management	0	10	20	30	40	50	60	70	80	90	100
249. Icancheck data accuracy	0	10	20	30	40	50	60	70	80	90	100
250. I can calculate percentages/ratescorrectly											

PART THREE;-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. We are interested in knowing how confident you feel in performing HIS related tasks. Please be frank and rate your confidence honestly. Please rate your confidence in percentages that you can accomplish the HIS 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

251. Icanplotdata bymonthsoryears	0	10	20	30	40	50	60	70	80	90	100
252. Icancomputetrendfrombarcharts	0	10	20	30	40	50	60	70	80	90	100
253. I can explain findings & their implications	0	10	20	30	40	50	60	70	80	90	100
254. I canuse datafor identifyinggaps andsettingtargets	0	10	20	30	40	50	60	70	80	90	100
255. Icanusedataformakingvarioustypesof decisionsandprovidingfeedback	0	10	20	30	40	50	60	70	80	90	100

Part 4: Key Informant Interview Guide

Questions

1. What is your specific role in this health facility?

2. What is your educational background?

3. Do you work with anyone to ensure data quality in the health facility? Please describe.

4. Do you attend training's on data management and specifically data quality? How often in a year?

5. What is your understanding of data quality?

6. How do you ensure data quality in your health facility?

7. What are the challenges you encounter ensuring data quality in your facility?

Record review toolto assess DataAccuracy	

Part five Observational checklist

Findthefollowinginformationfromregistersfortheselectedtwomonths.Comparethefigureswith thepaperbaseddatabasesubmitted to nextlevel						
If one or more of the following services are notprovidedintheinstitution,pleaseincludeareplacementdataelement						
Item	Dataelements	#from Registers		From reportsubmitted		
1	Antenatal care fourth visits(ANC4)					
2	Totalnoofbirthsattendedby skilled personnel					
3	Under one yrs who take Pentavalent third doses (check EPI records)					
4	PMTCT					
5	Tuberculosis cure rate(PTB)					
6	Total Contraceptive accepters(repeat and new)					
7	Confirmed\ malaria cases					

Completeness and timeliness of report receiving

RecordreviewtooltoassesscontentCompletenessfrom2months Report	

9.	How many data items does the heath centerneedto report and registration content on intheRHISmonthlyreport?Thisnumberdoesnotincludedata itemsforservices notprovidedbythishealth center			
10.	Count the numberof data items that are supposedto be filled inby this facility but left blank without indicating "0" in the selectedmonth'sreport.			

Types of facility	**Before dead line**	**After dead line**	**Not at all**		**Before dead line**	**After dead line**	**Not at all**