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Research Article

Users Perception and Factors Affecting Data Quality in Nyarugenge Public Health Facility, Rwanda

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Abstract

The study evaluated the users' opinions on data quality and related characteristics in ten public-health institutions of Nyarugenge district. A study used a cross-sectional design, data was collected through quantitative (n=150) methodology while qualitative data was obtained using interviews (n=20) and focus group talks (n=3). A checklist was utilized to examine the completeness, accuracy, and timeliness of data quality aspects. Collected quantitative data was analyzed through logistic regression by SPSS to examine the association of variables, while qualitative data was analyzed using the summative content analysis (SCA) to summarize the key themes. A 95 percent confidence level, Odds Ratio (AOR) were used to establish the strength of correlation among study variables, while a p-value of less than ($p<0.05$) was utilized to identify the variables which were statistically significantly associated to HMIS data quality. The study finding showed that the majority (53.0%) was female while 33 years was an average age, the majority of health practitioners (52.7%) had an A1 diploma. Approximately 90.6% of respondents have positive perceptions on the system usage. Limited ability and a lack of relevant technology equipment such as computers and the internet have been cited as the challenges while using the system. Factors such as training [AOR:2.62(95% CI:1.45-4.30),p=0.000], supervision [AOR:1.81(95% CI:1.02-2.88),p=0.036], [AOR:2.50(95% CI:0.85-5.90),p=0.05] for education background, works-experience [AOR:1.60(95% CI:090-3.01), p=0.010] are factors associated with data quality. Maintaining, supportive supervision, regular training and refresher courses should be regularly offered to public health professionals to improve their knowledge in order to maximize the use of health information.

Keywords:
Data quality; Health system information system; Perception; HMIS; Rwanda

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Introduction

Public health science decision-making has been critical dependents on the appropriate and convenience of comprehensive knowledge, and more likely based on important resources that are endowed for enhancing health information of the systems. In fact, that knowledge observance and analysis has been improved by utilization of the information systems, moreover knowledge and decision-making has been created. Then again, numerous health systems are incompetent to fully match evidence to decisions and are also limited in their ability to serve the health system decision [1]. In fact, a lack of data and facts leads to financial losses and bad decision-making.

Inadequate quality of data may cost the American enterprises more than USD 600 billion per year, it is examined that the price of poor data quality may take 8-12 percent from the revenue of an average company. notes that despite the high cost this phenomenon that is costing and provide the extra charges, the topic of data quality management is not very thoroughly studied. Moreover, HIS is among of the building blocks of health system established to generate use of data and information as the main objectives of introduction of health information system (HIS), we may say that, it can regularly provide the evidence to assist in making of health-related decision making [2]. A complete system is able to provide such information which is known as Health information Systems (HIS), its function is to gather, analyze, generate and display information. In supports of the decision-making process by showing the evidences to contribute on improved health status of population [3].

During 2008, the Rwandan HMIS system for filing health facility information was presented, the main reason for the establishment of an information system in the health sector was to make significant efforts in data management processes that provide a regular and systematic compilation and recording of health information and data to improve healthcare in Rwanda, as well as regular analysis and interpretation of statistics for providing enough and sufficient records for assuring as (Electronic health gadget initiatives), before 2008, the Rwandan healthcare was once being recorded in difficult copies and books. Despite the efforts made by the authorities for enhancing the quality of recordings in Rwanda for availability of quality information, the frequent challenges in the utilization of quality records is still critically in use, moreover, lack of high-quality information for making decisions still exists and that statistics would not regularly meet the 3 criteria dimensions such as accuracy, completeness and timeliness standards and consequently the tools accustomed acquire and manipulate health care information in Rwanda is at still revolving stage around from hard copies to digital fitness records recording [4].

A study by Woody Herman showed that utilization of Health information Systems among the less developed countries is still ineffective, however the huge amount financial and human resources spent on the HIS. Despite these efforts, the evidence on HMIS use continues to be inadequate and terribly

poor implementation, (G, the data quality benchmarks still found to be between 45–90% in several developed countries [5]. In Rwanda, the HMIS was established in 1998 with the goal of improving the quality of routinely-collected and generated data quality from over 700 public health facilities, the recent evidence shows that data quality is nonetheless beneath than 90% country wide expectation [6].

For all that, the implementation of health information systems (HMIS) shows that, the efficient use of system generates a high quality of data to support healthcare improvement and quick decision making in an efficient manner. However, despite the benefits of using health information systems in medical and healthcare practices, the adoption rate of such systems is still low and encounters resistance from doctors and healthcare professionals [7]. According to Gilworth G & Wadley, when systems switch from the traditional paper medical records to the electronic medical records, many doctors and other healthcare workers generally display resistance [8].

Moreover, functioning of HMIS remains ineffective in developing world, and there are still many obstacles to overcome before its effective and successful implementation [9]. Blingaut, 2018, indicated in his study that only 60 % of physicians reported having an effective and fully functional HIS system, while 40 % reported having an average performing system. Further evidences showed that most important facts in the system weakness such as its poor implementation, discrepancies in the records which are limiting the system to generate the quality data for decision making at the health facilities, even when information is available, it is not often used and mostly serves for decision-making [4]. In fact, that the quality of such data is not optimal in accordance with the requirements (accuracy <80%, completeness <85%, timeliness <85%), and several gaps also are evidenced at some stage in records versus analysis and presentation. Consequently, inadequate data quality leads to financial losses, thus the examination shows that company may be charged the extra expenses of 8-12 % due to poor information management system [10]. Despite the challenges, the reporting completeness has been improved overtime in Rwanda where the average monthly district reporting completeness rate was 98% across 10 key indicators from 2008 to 2012. Completeness of indicator data increased over time: 2008, 88%; 2009, 91%; 2010, 89%; 2011, 90%; and 2012, 95% [11].

Although the few studies carried out, the theme of data quality management and use, is still not enough examined to assess a significant quantify the magnitude of associations between the dimensions and criteria of data quality regarding the utilization of the HMIS at the health facilities level. Regarding this problem statement, this research determined how a health facility should arrange and improve its data quality management and procedures to minimize the cost and efforts to support the improvement of health systems based on reliable data for decision making. Therefore, this study has the aim of compare and contrast the current problems in data management through a well-integrated information system for figuring out the procedures to assess and describe data quality standards and requirement for the functioning in the health information system by the public health facility in Nyarugenge District, Rwanda.

Health information systems technologies are being implemented in health centers in the form of online based database, but with a lack of enough relevant significant research conducted in the country about the utilization and empirical analyses of quality dimensions of generated data. Research users will obtain insight and knowledge based on evidences that may occur in the utilization of health information as a result of this research and also suggesting the recommendations for improvement for the health information system use. Therefore, this research sought to assess the perception of user's and affecting factors of data quality in the HMIS at public health facility. The findings from this study shall be used by different levels of users for improving healthcare services by using of data management technologies.

Methods

Research Design

The study is designed as an observational cross-sectional and retrospective design, that gives a researcher the chance for using both qualitative and quantitative technics in which data to be collected from sampled 10 public health facilities which are offering comprehensive health care package in Nyarugenge District. In fact, to collect enough evidences during study, we triangulated all methodolo-

gies to collect quantitative and qualitative information, therefore analyses from the findings answered the research objectives, moreover, the study carried out in Nyarugenge District public health facilities.

Study Population

The study population were health center and non-health center staff in Nyarugenge district. The population under study were 170 participants who were comprising by District Health Unit Staff(5), Sector Environmental health Staff and in charge of health related services(15) and Health Facilities professionals: Head of health centers, Nurses, Medical Clinical Officers all HMIS staff and Data Managers, Health Committee, Laboratory technician and Pharmacist, IT Staff, Cashiers, Nutritionist, Social worker, Community and Environmental Health Officer(150) who are interacting with the HMIS while manipulating, collecting, analyzing, displaying and using of health data for decision making in Nyarugenge District Health facilities.

Sample Size

A sample frame was constructed and then the members were randomly sampled from the entire population. Based on the appropriate sampling procedures, a total of 170 participants were taken from the entire population of 290 to participate in this study. The sample size of the study is calculated based on the Cochran formula which allows calculating a correct sample size required in a desired level of precision with a high level of confidence.

Sampling Technique

Sampling technique includes the techniques and illustrating the formula that Sample size was calculated. During quantitative data collection a sample of (n=150) such as the health facilities professionals including Head of health centers, Nurses, Medical Clinical Officers all HMIS staff and Data Managers, Health Committee, Laboratory technician and Pharmacist, IT Staff, Cashiers, Nutritionist, Social worker, Community and Environmental Health Officer who were randomly selected from the technical staff in Nyarugenge District; the following assumptions were made to determine an appropriate sample size: P= 50%, d= 5% allowed margin of error, 95% Confidence level, and α= 5%.

The formula is demonstrated as below: Sample size:

n=N/(1+N(e) 2) that gives,

n= 290/(1+290(0.05)2)=170

Where,

n=sample size,

N= population under study,

e = the margin error 5%, 0.05,

Altogether 170 participants were enrolled to participate in this study. Furthermore, a checklist and an assessment tool were utilized for further examination of data quality of health facilities reports (n=50) in terms of its accuracy, completeness and timelessness. Study adopted probability sampling techniques for quantitative data collection based on the appropriate sample size as it is elaborated by the breakdown table as below, for sampling Techniques as following.

Data Collection Methods

Data was collected using an administered structured questionnaire, which was designed in English as well as the Kinyarwanda language. The questionnaire comprises close-ended questions divided into three sections: first section covering the basic biodata profile including gender, level of education, year of experience of the participating; second was consisting of questions related to basic knowledge regarding HMIS, as well formal training, usage of the system and perceptions by users regarding the advantages and disadvantages of the HMIS and as well the checklist to assess the data quality indicators of the past six month health centers records.

In methods of data collection, the quantitative data was collected through structured questionnaires(n=150) to be addressed by face-to-face interviews to Nurses, Medical Clinical Officers all HMIS

staff and Data Managers, Health Committee, Laboratory technician and Pharmacist for assessing the users' perceptions and factors affecting data quality in the use of HMIS. And KIIs (20), FGDs- focus group discussion(3) and direct observations, through conducting face to face conversations with Head of health centers, Direction of health staff at District, Sector Environmental health staff, IT Staff, Cashiers, Nutritionist, Social worker and Community and Environmental Health Officer. This provided in-depth information regarding the perceptions, factors affecting data quality. Hence, 170 participants were enrolled to participate in this study. Moreover, during a systematic review of HMIS documents and completed forms at Health facilities an Assessment Checklist tool was used to analyse the which extent that collected, recorded and analyzed data in the last 6 months have been significantly undertaken against the data quality criteria. The study used also the quantitative checklist which comprised by checking variables to measure data quality of reports in terms of the completeness, accuracy and timeliness based on the variable scales of examination such as (1 Strong Observed), (2 Observed), (3 Moderate Overserved), (4 Not Observed). These variable scales are determined as the most effective ways for ranking variables based on weigh scores of measurements [12].

Data collection techniques and documents to be assessed

Interviews

Head of health centers, Direction of health staff at District, Sector Environmental health officers, Nurses, Laboratory technician, Pharmacist and all HMIS staff were reached. Issues interviewed were about: HMIS users regarding to its utilization, advantaged and disadvantages, bio profile of respondents including gender, staff status, training, types of services rendered, HMIS tools availability, report compilation and preparation, factors associated with data quality, time set aside for recording, report dissemination, supervision and data use for decision making.

Document to be Assessed

In further desk review, 6 months archives reports were examined such as almost documents that recorded in the period of 6 months were tracked retrospectively to examine its data quality in terms the completeness, accuracy and timeliness.

Data Collection Instruments

A mixed methods of collecting data, such as field data collection, are helpful and support in interviews or questionnaire data collection. This is because they assist the researcher to understand the context of the study. In this study such as primary or secondary facts were gathered like primary source of data focused on data quality utilization in the of HMIS of public health facility in Nyarugenge District by interview scheduling, questionnaire and use of assessment checklist tool to examine the factors associated with data quality in the use of HMIS.

Quantitative Questionnaires

A questionnaire is defined as a study tool which contains a sequence of questions for obtaining the data from research participants to answer the research questions and objectives. Questionnaires were used to collect and quantify data (Malecela_MN, 2019), Quantitative were addressed to the Nurses, Medical Clinical Officers all HMIS staff and Data Managers, Health Committee, Laboratory technician and Pharmacist. Moreover, participants (n=150) interviewed through the quantitative questionnaires for assessing the users' perceptions and factors associated with data quality in utilization of the HMIS.

Qualitative Questionnaires

Interview questions define the experiences of the interviewed participants. Qualitative questions in the form of Key informant interviews were addressed to the Head of health centers, Direction of health staff at District, Sector Environmental health staff, IT Staff, Cashiers, Nutritionist, Social worker and Community and Environmental Health Officer, Moreover, participants(20) interviewed through qualitative questionnaires and to being selected through purposive sampling for further investigations of user's perceptions and associated factors with data quality in utilization of the HMIS.

Table 1. Criteria for Data Quality Assessment by Grading levels

Category	Grading
90 percent and above	High quality (Very good)
71 percent - 90 percent	Medium quality (good)
60 percent - 70 percent	Low quality (poor)
Less than 40 percent	Very low quality (Very poor)

Check List Assessment Tool of Data Quality in Terms of the-Completeness, Accuracy &Timeliness

A well-developed Checklist tool is elaborated to determine the data quality dimensions, and find out to which extent that data quality has been assessed in terms of standards, according to the information quality criteria for further examination its data quality in terms the completeness, accuracy and timeliness. The Checklist tool was comprised of closed tick boxes and the variables assessed on the four grading scales such as (Scale 1: Strongly Observed), (Scale 2: Observed), (Scale 3: Moderate Overserved), (Scale 4: Not Observed). The Four Grading levels prove as a systematic processes examining the study variables using the measurement magnitude. As shown in the figure below, the output from the study of quality labeled as excellent rate (Ninety percent - above), as the very good rate (Seventy One Ninety percent) and while (negative or poor-rate (less than 60%). These scoring standards based on a scoring mechanism adopted to check the capability and degree of data quality and magnitude of data in the information structures of health healthcare [13]. (Table 1)

Data Collection Procedure

Quantitative information was collected through by structured questionnaires to be addressed by face-to-face interviews with the Nurses, Medical Clinical Officers all HMIS staff and Data Managers, Health Committee, Laboratory among others, as well as qualitative information was collected through by semi-structured questionnaires in form of KIIs-FGDS and direct observations, through conducting face to face conversations with Head of health centers, Direction of health staff at District, Sector Environmental health staff, IT Staff, Cashiers, Nutritionist, Social worker, and Community and Environmental Health Officer to be selected and interviewed. Furthermore, A Checklist assessment tool was used to assess the data quality dimensions, and identify to which extent that data quality had been assessed in terms of standards, according to the data quality criteria for further investigations of factors affecting data quality in the use of HMIS. The Checklist which comprised by checking variables to measure and rank data quality levels. In addition, the Checklist assessment tool was used in a systematic review of HMIS documents and completed forms.

Data Analysis

Quantitative data entered in and analyzed using the SPSS to analyse biodata of participants as well A P value of (p value<0.05) was used in multivariate analysis to confirm a statistically significant association variable in HMIS data quality. Odds ratios (OR) with 95% confidence intervals (CI), P value were used to examine the strength of association and to observe the effect of position, sex, years of experience and implementation of HMIS, while qualitative data was analysed through summative content analysis(SCA) to analyse the users' perception regarding the effectiveness, advantages and disadvantages on the system was analysed presented in the form statement, frequencies and percentages. Furthermore, a checklist was used to analyse the data quality indicators of the past six month health centers records.

The research used statistical logistic regression models to ascertain the degree to which independent variables can influence the dependent variable (Health Information system aspects). In order to investigate the condition and subset of variables, the researcher used univariate analytic approaches. Furthermore, the study also used the mean and standard deviation analysis of the variables. To obtain the findings on specific research objectives, a statistical logistic regression models was used with a P

value of (p value<0.05) to confirm a statistically significant association variable in HMIS data quality. Odds ratios (OR) with 95% confidence intervals (CI), P value were used to examine the strength of association and to observe the effect of position, sex, years of experience during analysis of data related to the factors associated with data quality in the Health Management Information System at public health facility.

Qualitative information was obtained from semi-structured questionnaires in form of KIIs: Key informant interviews and FGDs: focus group discussion, a summative content analysis (SCA) was used whose basis to analyses the opinions and experiences on utilization of the system [14]. During analysis of data related to the user's perceptions regarding the utilization, advantages and disadvantages of the Health Management Information System at public health facility a summative content analysis(SCA) was used to summarize the key findings regarding the themes of qualitative findings.

Ethical Consideration

Ethical approval was obtained from Mount Kenya University institutional ethical review board prior to conducting this study while formal acceptance of conducting research was approved by Nyarugenge District Headquarters. The participants were given a consent before conducting the interview. The information provided by participants remained confidential as required by research ethical protocol.

Results

The data for the study was collected using a questionnaire that was distributed to 170 respondents, while the indicators of data quality in the Health Management Information System (HMIS) reports were examined using a checklist in terms of completeness, timeliness and correctness and the data were analyzed using both descriptive and inferential statistics approaches to gain insight information and explain the findings, particularly as per research objectives.

Demographic Characteristic of Respondents

A total of 170 participants were interviewed for this study through 150 interviews, 17 key informant interviews, and 3 focus group discussions. Respondents had a wide range of characteristics of the participants, as shown by the table 2 below.

The demographic characteristics of the sampled population showed that Females made up the vast majority of those who responded (53.0 %), while males made up 47.0 percent. The major of those who responded were between the ages of 20 and 34 (57 %). Further analysis revealed that the majority of respondents (52.7%) had an A1 certificate, 34.0 percent have a Bachelor's Degree, and 13.3% have a Secondary School certificate. Clinical staff accounted for 33.3 % of responses, followed by public health practitioners (30.1 %), nurses, and HMIS Focal persons (23.3 %). The respondents had worked for two to eight years, implying that the majority (60.0 %) had stayed in their current field of employment for two to five years, followed by those who had stayed for five years or more (26.7 %), and those who had stayed for less than one year (10.0 %) (13.3%). Females are more prominent in the demographic structure as a result of the study's findings, with the majority of the studied population between the ages of 20 and 34. This indicates that the active youthful population covers the majority of professions, demonstrating that if properly trained and held accountable, they can quickly adapt to the needs of the health management information system.

User's Perceptions Regarding the Utilization, Advantages and Disadvantages of the Health Management Information System at the Health Facility.

This study revealed that, according to the study, 90.6 percent of respondents agreed that and have positive perceptions about the HMIS. They were mainly happy with the use of HMIS in terms of efficiency and creating quality data and were aware of HIMS's potential for handling patient data, minimizing mistakes, and enhancing treatment quality, with just nine point three percent not satisfied and doubting its ease of use when compared to their information demands. Perception of HMIS users regarding the utilization of the Health Management Information System at the health facility.

The study identified and selected the relevant variables in order to investigate user perceptions of HMIS, including their use, benefits, and limitation.

Table 2. Background_and demographic_characteristic of respondents

Variables	Demographic characteristic	Frequency	Percent(%)
Sex of the respondents	Male	71	47.0
	Female	79	53.0
Age distribution	20 to 34 years	85	56.7
	35 to 44 years	45	30.0
	45 to 54 years	18	12.0
	54 and more	2	1.3
Level of education	Bachelor Degree:	51	34.0
	A1 Diploma:	79	52.7
	Secondary School Certificate:	20	13.3
Job position	Clinical staff	50	33.3
	HMIS Managers/Focal points/ Health data Records	20	13.3
	Nurses	35	23.3
	Public Health practitioners	45	30.1
Years of experiences	Below than 1 year	30	13.3
	2 to 5 years	90	60.0
	5 and more	40	26.7

According to the report 90.6 percent of respondents believe that using a Health Management Information System (HMIS) improves data quality, especially in health electronic recording, patient registration, and reducing errors in hard copies while reporting and that it also provides many other benefits, such as lowering facility costs and providing quality data. (Table 3)

Table 3. Users perceptions regarding the utilization of the Health Management Information System (HMIS) in public health facilities

Questions:	Yes:(%)	No:(%)
Used_friendly_and simple to understand&utilize:	81	*19*
Promoting a decision-making culture based on information	93	*7*
Reduce record-keeping mistakes.	94	*6*
Digital recording allows for data uniformity.	93	*7*
Quick and efficient, with minimal effort waste	91	*9*
Make reporting process very simple and meet the timeliness	92	*8*
Percentage Average	90.6	9.3

Table 4. Utilization and function of HMIS at health facilities

Utilization of HMIS at Health facilities	Yes:(%)	No:(%)
Capture and entry of patient data:	88	12
For_reporting_or retrieval:	62	38
Monitor_epidemics:	36	64
Decision_making and planning:	48	52
Data visualization and analysis:	33	67
Billing-monetary transactions:	62	38
Percentage Average	54.8	45.1

As shown in the table above, approximately 90.6 percent were generally happy with the efficiency and quality of data generated by HMIS. While only 9.3% of respondents compared their information needs, were dissatisfied, and questioned its ease of use, the majority of respondents strongly agreed that the HMIS system helps their productivity by delivering prompt and high-quality service.

" "The adoption of HMIS has a big impact on how healthcare services are delivered." Prior to the HMIS, there were far too many errors in copies, as well as poor storage and missing patient files."(HC¬ Head) (Table 4)

The majority of respondents stated that the HMIS is useful in their daily job and that it decreases the usage of manual labor, demonstrating that it saves time and is effective.

One participant remarked throughout a key informant interview:

"Compared to when people didn't use health information/data for evidence-based decision-making, information use has improved in recent years." Some people, however, believe the system is still under the control of the HMIS Unit only and HMIS officers instead of them. However, we have a tendency to still need awareness so as to use HMIS "(Data Manager, HMIS unit).

User's Perceptions on Skills to Handle the HMIS Features

The research examined the HMIS users' ability to utilize the system by using a five-point Likert scale; frequencies/percentages of answers were acquired, and average and standard deviation were computed to score their opinions. (Table 5)

The results indicate that 34.4 percent strongly agreed that possesses data entry abilities, 42.6 percent, standard dev = 1.07 strongly disputed that has the skills to check faults in data quality whereas 58.8%, agreed that has HMIS template and forms skills, whereas 58 percent accepted that possesses data manipulation and retrieval skills for reporting purposes. Many participants were explicit that they still need frequent coaching so as to stay up with HMIS enhancements and practicality, as well as refresher

Table 5. Skills of respondents on HMIS features

HMIS_features	Strong_ Agree:	Agree_	Disagree_	Strong_ Disagree	Mean_	Std. Dev__
Data entry abilities	40(34.4%)	60 (51.7%)	11(9.4%)	5(4.3%)	3.16	1.66
Data quality checking skills to check for faults	5(6.6%)	30(40%)	32(42.6%)	8(10.6%)	2.42	1.07
Ability to analyze and present data	9(13.6%)	35(53.0%)	8(12.1%)	14(21.2%)	2.59	0.88
Experience with HMIS templates and forms	22(25.8%)	50(58.8%)	10(11.7%)	3(3.529412	3.07	1.39
Data production and retrieval capability for reporting	20(28.5%)	41(58.5%)	5(7.1%)	4(5.7%)	3.1	1.56

courses to improve their system handling abilities. While on-the-job training was judged to be a good temporary technique for retraining untrained users, participants complained that it was not as thorough as they had hoped, which lowered their enthusiasm for using the system.

In a key informant interview;

"All of the facility's employees should be taught when the HMIS is modified." As a result, frequent coaching ought to be provided to stay our morale high" (Pharmacist at health facility).

User's Perceptions on Supportive Supervision and Technical Support for the HMIS users

According to the study, 60.1 percent of respondents had supervision in the preceding 12 months, although training and supportive supervision have declined since the COVID-19 outbreak began. Sixty-eight % of supervisors gave the official reports to their supervisees once after the visits. Access to the developer's website, according to participants, provided information on new system enhancements as well as general help. Furthermore, the participants regarded a lack of IT skills as a barrier to dealing with technical issues when they emerged.

Perception of HMIS Users Regarding the Advantages of The Utilization of HMIS

The health information system (HMIS) is a crucial instrument for improving the services and treatment quality of healthcare facilities. HMIS was considered useful and valuable by:70.6 % of respondents for up aid services by creating choices supported by quality data; the system's benefits area unit is listed within the table below. (Table 6)

The most important benefit of HMIS, according to the majority of respondents, is that it makes it easier to prepare and submit monthly and quarterly reports. Other benefits mentioned by participants include easy access and retrieval of medical documents, storage, communication, and consistency in work performance, time-cost savings, resulting in faster service delivery at health facilities and, ultimately, reducing the time it takes to prepare reports, particularly monthly and quarterly reports.

During FGD, the majority of respondents agreed that they need information using the on HMIS.

" Assist us in information assortment and Wilson's thrush faster, what I actually have to try to to is push a button and patient records emerge straightaway, instead of longing the files one by one" (secretarial assistant and information entry operator).

Perception of HMIS Users Regarding the Disadvantages and Challenges in the HMIS Utilization

The majority of respondents claimed the most difficult barrier to HMIS adoption is a lack of knowledge and information technology equipment like PCs and the Internet. Participants claimed that while the internet is poor, the system is ineffective. In fact, it will be difficult to obtain and retrieve patient data for decision-making purposes. Inadequate technical capabilities in terms of people training, maintenance, and the cost of obtaining HMIS training, since they believed the training given was inadequate. Others argue that people are hesitant to move away from paper-based systems due to a lack of dedication and

Table 6. Perception of HMIS users regarding the Advantages of the utilization of HMIS at health facilities

HMIS_benefit	Yes:(%)	No:(%)
Evaluate the patient's_history and data	72	28
Being paperless (digitalization)	77	23
Monthly and quarterly reports must be prepared and submitted.	89	11
Tracking trends of diseases	55	45
Produce high-quality data for decision-making support.	60	40
Percentage Average	70.6	29.4

Table 7. Perception of HMIS users regarding the disadvantages/challenges of the utilization of HMIS at health facilities

HMIS: _Disadvantages_limitation	Yes:(%)	No:(%)
Limited knowledge of information technology such as computers and the Internet	71	29
IT support was delayed, Feedback systems are lacking.	40	60
Staff rotation turnover	30	70
There is a lack of dedication and attitude toward HMIS throughout the facility's whole workforce and management.	60	40
Incentives/motivation/promotion are lacking.	49	51

attitude toward HMIS. Others waited for IT support because they believed their supervisors weren't doing enough, as it is shown in the table 7 below.

During Key Informant Interviews, some challenges that influence the deployment of HMIS were raised (KII). Lack of expertise and awareness of technical equipment, such as computers and, by extension, the internet, could lead to data entry errors.

"We just recruited a new nurse who has been with us for two months. As a result, she struggles to use the system; also, connectivity is spotty, and we are unable to enter or view data." (Data-HC-Administrator).

Factors Associated with Data Quality in the Health Management Information System at the Health Facility

A condition, situation or occurrence that had a direct or indirect influence on data quality is referred to as a factor. In fact, to determine the factors that influence data quality. At a 95 percent confidence level, an adjusted odds ratio (AOR) was used to establish the strength of the correlation, while a p-value of (p0.05) was utilized to identify variables that are statistically significant to HMIS data quality. The study revealed that sex (AOR=1.05(95% CI: 0.55 - 1.80) with p=0.006), age (AOR:1.86(95% CI: 0.52 - 4.02) with p=0.005) are not enough associated. Training (AOR: 2.62 (95% CI:1.45 - 4.30) with p=0.000), supervision (AOR=1.81(95% CI:1.02-2.88) with p=0.036), (AOR=2.50(95% CI: 0.85 - 5.90) with p<0.05) for education, a trained person with skills to fill HMIS forms (AOR=2.74(95%CI:1.124 -5.445),p=0.024), p=0.01 to experience, feedback (AOR=3.01(95% CI:1.62to 4.08) with p=0.020), professional occupation-HMIS unit(AOR: 1.301(95% CI: 1.040 - 2.50) with p=<0.001), those factors confirmed to be associated with data quality in HMIS by those who have been trained had 2.62 times more likely to produce data quality than who were not get training while those who received support supervision were 1.81 significantly more likely to produce higher-quality data than those who were not, and those with more than 3 years of working experience had 1.60 times better ratings to use the system effectively (2 to 5 years of experience) by working experience (p=0.001). (Table 8)

During multivariate analysis, to examine the factors associated with data quality as shown in the table, the reference groups were taken from HMIS users (n=) such as the HMIS Unit including the data managers and focal persons(36), nurses(25),pharmacists(8),nutritionists(8),laboratory technicians (8), others (21). On the other hand, one of the criteria mentioned to help with data usage was the availability of training. However, while the majority of health practitioners stated that they had already completed HMIS training, one respondent stated that they had not.

Training and a well-designed HMIS reporting format, according to 79.3% of respondents, can affect positively data quality in public health facilities. Those indicated variables showed a strong link to data quality (AOR: 2.62 (95 % CI: 1.45-4.30)) and (AOR: 2.74 (95% CI: 1.124-5.445)).

Health professional skills (technical know-how on using various resources in data collection, computer software, Information Technology, data collection tools, complexity of data tool, information processing and interpretation for decision making resulting in improved health service outcomes) are among the technical determinants. Being trained enhances staff capacity and helps them establish a confidence attitude toward data/information, which may assist in maintaining data quality production and utilization. In the HMIS, (AOR: 2.62(95% CI:1.45-4.30),p<0.05), training has showed a very strong and

Table 8. Factors associated with data quality in the Health Management Information System at the health facility among the HMIS users (n=106)

Associated_Factors	HMIS_Utilization(Data Quality)		AOR_(95% CI)	P_Value
	Yes(%)	No(%)		
Training on HMIS;	84(79.2)	22(20.7)	2.62(1.45 to 4.30)	0.001
Sex:	Male(52.1)Female(65.0)	Male(47.8)Female(35.0)	1.05(0.55 to 1.80)	0.006
Age:	20 to 35 years		1.86(0.52 to 4.02)	0.005
Support Supervision:	67(63.2)	39(36.7)	1.81(1.02,2.88)	0.036
Regular feedback:	62(61.3)	39(38.6)	3.01(1.62 to 4.08)	0.020
Education:	Degree(60.0)	Degree(40.0)	2.50(0.85 to 5.90)	0.005
Experience:	2 to 5 years		1.60(090 to 3.01)	0.001
Data Quality Checking skills:	57(53.7)	49(46.2)	1.74 (0.50 to 2.09)	0.300
Professional Occupation (HMIS unit):	18(90)	2(20)	1.301(1.040 to 2.50)	0.001

significant link (P=0.000) with data quality. Those who had received training were 2.62 times more likely than those who had not received training to utilize and report quality data.

One of the attendees said during the Focus Group.

"*Data training is essential because it enables workers to understand what data they collect and why they should use it wisely."(*District level, the HMIS focal point).

Discussion

Health information system improves healthcare practices, particularly including to increase the ability of health facility in decision-making processes. An extensive conducted similar studies and reviewed literatures in the domain of applicability of health information system, its adaptability has been mostly created the debate among the users. According to this study, more than (90%) of the health information system users assure that the system is still useful and willing to continue to use it, to ensure the validity of these findings, it was compared to other study conducted at a public facility in Saudi Arabia (80.2%) and in Iran (70.1%) which showed that the benefit of HIS in digitalization of healthcare services found to influence its adaptability by healthcare professionals. In further investigation on adoption and usage of HIS to store the health facility data, On average, this study showed that data quality to be (86.7%), these results are connected to insufficient and frequently training, counting and data entry mistakes and discrepancies in the This result is higher in the records than another study conducted in India's Chandigarh hospital, which corroborated the findings (68%). A close correlation been observed regarding training and data quality. In this study those who received formal training were 2.6 six times more likely to produce high-quality data than those who did not [15,16,17].

Further ensuring the validity of this statement, the role of technical capacity, including training was also emphasized in the other study conducted by Tsedeke [18], it is noted that the most effective to use the HMIS is that to have trained staff on place, who are able to deal with the system, mainly data recording, analysis and presentation of information. Moreover, his study noted that the effectiveness of the HMIS performance depends on data reporting and feedback relationships as well as on trained and motivated staff at each level that properly carry out their data collection, reporting and use responsibilities.

According to this study, each system has its benefit, as well limitation that can influence its smooth implementation, particularly to the limitation, the study results found showed that the current knowledge gap still exists such as lack of regular training in data quality assurance and data manipulation knowledge; the study showed that high quality of data in health records has a strong association with

related data quality verification skills AOR:1.74(95% CI:0.50,2.09). In comparison with other study, it is shown that in Ethiopia, Dilewedawa health facilty [19] trained health professionals partciculary on data management have using the system effectively(80%). During this study, those who get the chance for being trained on data management, specifically on the topic of data quality checking skills were(1.7) times more performer than other health professional. In term to maintain the regular capacity building of health workers, the commitment of government by its regularly updating HMIS modules shall be always done together with regular training to improve not just HMIS knowledge, skills, culture, and efficiency, but also onsite training for health-care workers. Other point highlighted in this study, is that system users were not regularly use the checklist of HMIS ground rules, according to the HMIS requirements, health care practitioners must fill out suitably booklets on time, in the other words, as soon as possible after providing health care services and before patients or customers leave the facility, this can help the facility to keep the information on time by immediate data entry without waiting to gather a huge amount of data, the data to be accumulated in 3 days after patient visiting the facility for example. as well as a small amount of data gathering at the health facility level.

Accordingly a significant degree, support supervision was linked to HMIS data quality (68.0 %). Health professionals who got continuous supervision scored 1.81 to perform than those who did not to submit quality data when compared to those who did not. In line with these findings, this conclusion was supported by other investigations conducted in Ghana (59%) and Eastern Ethiopia (65%) that continuous supervision to health facilities improves the quality of recording. In the same way, Health professionals who had received feedback were around 3.01 times 3.01(1.62 to 4.08) more likely to be proficient in the use of HMIS than those who had not received feedback. This conclusion is higher when compared to similar studies, where supportive supervision was recorded at 50% [20]. Despite the positive effects of Health Information Systems and Electronic Medical Records use in medical and healthcare practices, the adoption rate of such systems is still low and meets resistance from healthcare professionals in developing countries [21].

Specially In Rwandan the previous studies showed that some advantages of HMIS have long been demonstrated and realized. The majority of HIS users believe this system is cost-effective, with the added benefit of eliminating clinical errors in patient identification and medical reporting. The time-consuming and extensive tools and functionalities of HMIS were highlighted by a small number of respondents as a limitation. This, we feel, has something to do with the ability and speed required for keyboard and screen use, both of which are based on personal experience and competency. Despite the lack of computer knowledge and training, more than half of our respondents believe that HMIS does not necessitate substantial computer skills, Similarly, a qualitative study in Uttar Pradesh, India, indicated that just a small minority(7.6%) of respondents said the system was time-consuming.

In reality, HMIS was also created to generate high-quality data for decision-making. However, data misuse is a contentious issue in the case of HMIS performance. Almost half of our participants agreed that the introduction of system improved the data quality in the health records (overall average data quality was found at 86.7 %), however, the major concern was that the generated data by HMIS could be not regularly exploited in terms of usage mainly for decision making for facility business, the linked answer to this issue is most likely to limited and regulated data access and data manipulation capacity. When compared to a similar study conducted in Dire Dawa, Ethiopia was found to be less as than 75%. The several reviewed literatures showed that data quality has also been linked to properly completed HMIS forms and patient cards, as well as data quality check capabilities, monitoring, training and verification of data before entering them into the system. Refer to the other research, only 77% of participants in Bahr Dar, Ethiopia, found to be registered and validated data before entering them into the system to ensure its validity.

Our study found that, overall average data quality was 86.7% (90.1% of completeness, 78.8% of accuracy, and 91.2% for timeliness). The findings were also similar to those reported in other studies in Eastern Ethiopia, where 76% of respondents claimed data accuracy and 62% claimed report consistency [22] respectively, and the findings of this study are also in consistent with those reported in other studies in Rwanda's Eastern Province, where 82 % of HMIS monthly reports were submitted on time. It was previously reported that increasing completeness of reporting and internal consistency of the Rwanda HMIS data. The improvement is likely attributable to interventions implemented in the country by the

Rwandan government and non-government organizations to strengthen health systems and improve data quality [11].

Furthermore, a similar study in North Gonder revealed that 89 percent of HMIS reports were filed and submitted on time, with 96 percent of these reports being entirely filled out on time, this was due that health facilities had a reliable system for data recording and quality assurance as to implement the recommendations which were made during the supportive supervision [23].

Conclusions

The HIMS system was found to be user-friendly and beneficial, according to the study. They also found that training, data analysis skills, supervision, regular feedback, and the type of health facility all have significant relationships with HMIS data, which they identified and demonstrated. The study also identified and recommended solutions to system usage difficulties such as a lack of regular training and refresher courses, as well as worries about data entry. According to the analysis, the data quality was good in reality. This, however, falls short of the national health-care goal. To conclude this, frequent training and support supervision should be provided to public health professionals in order to improve their competences and maximize the productivity of the health information system.

Health practitioners should get regular capacity building and follow-ups on data capture, management, and quality assurance. Health care institutions can enhance data quality by verifying reports for correctness on a regular basis, transmitting quality reports on time and regularly.

Competing Interests

The authors have declared that no competing interests exist.

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