Level of health data quality and information use, and contributing factors in the Benishangul Gumuze Region, west Ethiopia: using social ecological framework

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Abstract

Background: Creating responsibility for quality healthcare data and utilization are among the basic functions of leadership. While the benefits of data quality and use are well known, the evidence around the role of healthcare information systems leadership and governance in sustaining data demand and use is limited. Therefore, this study aimed to investigate the level and contributing factors of health data quality and information use in Assosa district, Benishangule Gumuze Region.

Methods: A mixed approach design, using qualitative exploration and a facility-based quantitative cross-sectional approach was used. Seventeen departments from two health facilities were enrolled for the quantitative component, while 28 in-depth interviews were conducted to complete the qualitative part of the study. A phenomenological approach was used to explore factors influencing the quality and use of health data. Quantitative data was analyzed descriptively using tables and graphs, whereas qualitative data was analyzed using content analysis guided by the framework for the social ecological model.

Results: The average levels of information use and report accuracy were 38.6 and 119.33, respectively. Three themes emerged, explaining the main factors that influence quality data generation: individual characteristics, facility and environmental factors, and leadership and governance characteristics. Individual characteristics were motivation, capacity building, commitment, and digital literacy, while facility and environmental factors included infrastructure, healthcare information system resources and supportive supervision. Furthermore, among the leadership and governance related factors, healthcare data, assigning the right person, and system regulation were some of the factors which were identified.

Conclusions: The level of health data quality and its utilization was low during the Asossa city adminstration. The unfriendly physical and organizational working environments and high staff turnover which negatively affected the leadership and governance of the health system are some of the reasons which were sighted with regards to the poor quality of data and information use. Therefore, interventions that have multifaceted effects on data quality and use, such as improving leadership and governance practices and behavior should be implemented. [*Ethiop. J. Health Dev.* 2022;36 (SI-1)]

Introduction

Healthcare data use is one of the important components of the Health Information System (HIS) that helps to reassure value-based care for both individuals and communities (1). The utilization of health data includes using data for evidence-based decisions, policy-making, planning, and interventions (2). Data-driven decision-making is associated with all health system building blocks namely improved leadership/governance, healthcare financing, health workforces, medical products/technologies, information and research, and service delivery (3). It is believed that evidence-based information use practices could help in the reduction of the burden of diseases and mortality rates through enhancing evidence-based planning and decision-making (4).

In low and middle-income countries (LMIC), the utilization of health data for decision making in both service delivery and administration units' remains limited at each level of the health system (3, 5). Despite the increased focus on health information systems in these countries, data from the majority of these systems contribute less to decision-making due to being poor quality (6). Inaccurate and poorly generated healthcare data results in multifaceted problems that could seriously increase the burden of diseases on individuals and the community in general (7).

To solve poor data use practices both nationally and globally, wider approaches have been forwarded (3) such as practices, establishing dedicated healthcare at district levels (8), a performance monitoring team for health sectors, routine health information system performance evaluation (9), supportive supervision (10), and review meetings on a monthly, quarterly and bi-annually basis on health information systems (3). On the other hand, the leadership engagement in all processes of healthcare data management could be a remedy to generating and utilizing quality data (11).

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Equipping leaders and providing responsibility for quality healthcare data and utilization is considered as the most critical driver in health sectors; it also positively influences and reassures better data, better information and better health (12-14). Leadership support is necessary to ensure not only functioning data collection systems but also the analyses, exchange, and interpretation of information for data-driven decision making (15-17).

Obtaining and utilizing healthcare data for clinical practices and administrative decision-making is a critical but underutilized practice in improving health outcomes in a given society (3). Thus, improving information use practices is one of the priority agendas of Ethiopian government as it is pledged in the national health sector transformation plan (7). The barriers and facilitators of quality health data generation are under researched in resource limited settings such as Ethiopia. Therefore, this study aimed to investigate the level of health data quality and use in the Assosa district, by exploring the barriers and facilitators of generating quality health data and utilization.

Materials and Methods
Study setting and period: In November 2020, this research was carried out in the Assosa town administration of the Benishangul Gumuze Region of Ethiopia. The Benishangul Gumuz region is one of the ten regional states of Ethiopia. Based on the Central Statistical Agency (CSA) of Ethiopia, the region had a total population of 1,218,000 (18). The majority of the inhabitants are rural dwellers (76.5%). The total area of the region is estimated to be 49,289.46 square kilometers. Assosa is the capital of Benishangul Gumuz. The total population of the Assosa town administration was expected to be 69,720, with a population made up of 35,795 males and 35,925 females in 2022 (19). Administratively, it consists of 10 urban kebeles, with no rural kebeles. The town consists of one general hospital, 2 health centers and 10 health posts that provide preventive, promotive, and curative health services. Regarding the health workforce, there were 22 urban health extension workers, 146 health workers including nurses, mid-wives, physicians, pharmacists, laboratory technicians, and 52 supportive staff.

Study design: A mixed research approach, using quantitative analysis and qualitative explorations, was applied. An institution-based cross-sectional study was employed, in order to determine the quality of health data generation and use in the Assosa town administration. A phenomenological approach that examines the lived experiences of participants was used to explore the factors that influence the quality and use of health data generated in the town from the lived experiences of the study participants and to support the quanitative component.

Study participants and sample size: Departments were the sampling units used to assess the routine use of health data. To examine the accuracy and completeness of data and quality assurance manual assessment,

health facilities were used as the units of analysis. To obtain the experience of data utilization among health workers, department heads were interviewed. Furthermore,, for the qualitative study, the participants were interviewees who had direct and indirect exposure to the generation and use of health data in Assosa town. To be a part of the qualitative study, the potential interviewees need to be knowledgeable about the factors that influence the production and use of quality health data at different levels. The study participants in the qualitative study consisted of both genders and different age groups, as well as occupational, residential, and educational backgrounds. Specifically, it included the heads of health centers, health information technicians, and department heads. In addition, key informants from the district health office were included.

For the quantitative component, one out of two health centers (the other health center was used for COVID-19 treatment) and one hospital which was the only available hospital in the town was selected, and from these health facilities all actively functioning departmens were analysed. Therefore, a total of seventeen department heads, nine from the selected health center and eight from the hospital were selected for the study to provide information on the experiences of generating quality data and using it in the health centers. For the qualitative component, twenty eight health workers participated in the interview.

Data Collection Tools and Procedures: A structured questionnaire was developed both in English and Amharic in order to capture the quantitative data. The survey instrument was pretested by an interviewer administering approach in the Assosa town in the health center which was providing COVID-19 treatment only. In the actual study, three trained data collectors and supervisors were involved. The training was conducted over two days, which included field practice. To enhance the credibility of the study, members of health facilities who had direct connections with the production and use of quality health data were recruited to participate in the study and to provide their experience in data quality and use. The data collectors chose suitable places to conduct the interviews where participants would be encouraged to respond freely. Records were also reviewed to obtain the data inquired about. In addition, efforts such as proivding the purpose of the study were made to develop participants' trust in its significance so that open, complete, and truthful responses could be obtained. Close and supportive supervision was carried out by the research team and externally recruited field workers at the time of the survey to ensure the quality of data collected.

To facilitate the qualitative data collection process, an open-ended, semi-structured, in-depth interview guide was prepared both in English and Amharic. This helped interviewees to understand how different factors influenced the production and use of quality health data in their health facility. A number of revisions were made to the wording, content, and sequences of questions in the guideline in order to maintain the

validity and reliability of measurement characteristics. The in-depth interviews were conducted in the Amharic language by two interviewers who were experienced in collecting similar data and had bachelor's degrees. Moreover, tape recorders were used to record the interviews, and favorable places were provided to facilitate the confidentiality and quality of the data and to address sensitive issues raised by the topics.

Variables and Measurement: The variables of interest in the study were the production of quality health data and its use for routine activities. Data quality characteristics including completeness, timeliness, and consistency were assessed. The completeness of the data was assessed by measuring whether all the reportable data elements were actually reported. This was with regards to health-centers reporting to the district health office.

To measure the discrepancy between reported and recounted data on the register, the verification factor (VF), or data consistency, was determined using the formula: VF= recounted from the register divided by reported data (20). This was done for the data from six health service outcomes (ANC1, family planning, delivery, malaria, HIV+, and pneumonia), which were collected independently from the source document (the register) and compared to the report. According to the national Health Management Information Systems (HMIS) guideline, a VF value of within 100% $\pm$ 10% is in the acceptable range. If the VF value is > 110%, it indicates under reporting and if VF< 110%, over reporting. Thus, the acceptable range of VF is (0.9, 1.1) (20). Moreover, data quality assurance practice was determined by assessing the Lots Quality Assurance sampling (LQAS) technique (21).

Information use was measured using five composite indicators, such as provision of feedback, decisions made using available information, availability of identified key indicators, target versus achievement calculated, and health coverage calculated. The average value of the five indicators was calculated to determine the level of information used for decision-making. To calculate the proportion, we dichotomized the outcome as "good" if it was equal or above the average value and "poor" if it was not.

Data Management and Analyses: Each copy of the quantitative questionnaire was checked for completeness before being entered into Excel. Data utilization and the completeness, consistency, and accuracy of data entities were summarized descriptively.

The analysis of the qualitative data production started in parallel with the data collection process as successive probing questions were raised based on participants' responses. The data, which had been transcribed and translated into English, was coded and thematically organized using the software Open code 4.03. To examine the factors that influence the generation and use of quality health data, the social ecological model framework was employed as a guide in grouping findings into individual characteristics, facility and environmental level, and leadership and governance factors. Thus, the method of analysis was content analysis, and each emerging theme was grouped into any of the three themes based on its relevance. It was also supported by direct (verbatim) quotations so that the factors influencing data quality and use could be better understood. To further improve the credibility of the study, triangulated (or mixed) method and prolonged engagement with the data was used during the analysis. To maintain its transferability, a detailed description of the context of the study settings and participants was provided.

Results
Quantitative findings: The study included one Health center and one General Hospital in which seventeen departments were examined. Of the total seventeen departments assessed, nine(52.9%) were from the health center, and eight(47%) were from the hospital (Table 1).

Table 1: **Types of departments assessed**

Departments by type	HC Frequency (percent)	Hospital Frequency (percent)
ART clinic	1 (11.11)	1 (12.50)
MCIT head	1 (11.11)	0 (0.00)
Laboratory	1 (11.11)	1 (12.50)
Pharmacy	1 (11.11)	1 (12.50)
OPD	1 (11.11)	1 (12.50)
Under-5	1 (11.11)	0 (0.00)
Tuberculosis Clinic	1 (11.11)	1 (12.50)
Facility head	1 (11.11)	1 (12.50)
Emergency OPD	1 (11.11)	1 (12.50)
IPD	0 (0.00)	1 (12.50)
Total (N=17)	9 (100)	8 (100)

Use of Information for decision-making

The study found that five out of nine (or 5/9) departments in the health centers had identified

indicators, whereas seven out of eight (or 7/8) of departments in the hospital had identified indicators to monitor performance achievements. The target versus achievement was calculated in six out of nine departments in the health centers and three of the eight departments in the hospital. Not all departments in the hospital conducted health coverage, whereas three of the departments in the health center had conducted health coverage.

On the other hand, the study found that four departments in the health center and three departments in the hospital made decisions based on the available evidence. Only 1 department in the health center and another department in the hospital provided feedback to lower-level health workers. The mean value of data use among 17 departments based on the five indicators was 38.6; specifically, the mean (SD) value for data used in the health centers was 42.2(32.2) and in the hospital was 35(25.6). The study indicated that three of the department heads in the health center and four department heads in the hospital had a good level of information use for decision making (Figure 1).
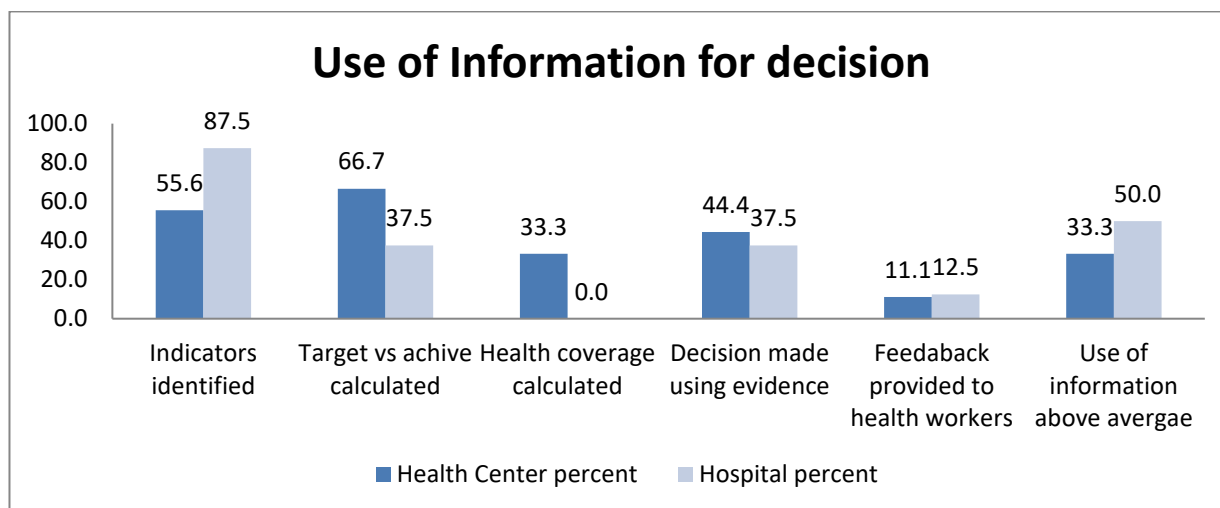

Use of Information for decision

Figure 1: **Level of information use among departments in the Assosa Town, Beninshangul Gumuz, Ethiopia, 2020**

Data Quality
Data quality was measured based on the timeliness, completeness, and accuracy of data between the register and the report. The health center and hospital had not documented the timeliness of reports submitted to the HMIS department in order to monitor the timely submission of reports. For completeness dimensions, all the months of service reports (12/12) were found in the health center and eight (8/12) of the service reports were found in the hospital. Considering the disease report, six (6/12) and ten (10/12) were available in the health center and hospital, respectively (Table 2).

Table 2: **Timelines and completeness of reports**

	Assosa HC	Assosa Hospital
Quality dimensions	Frequency n(n/N)	Frequency n(n/N)
Timeliness		
Record submission date (N=2)	0(0/2)	0(0/2)
Report completeness (N=12)		
Service report	12 (12/12)	8(8/12)
Disease report	6 (6/12)	10(10/12)

Level of data accuracy
The VF for ANC1 in months one, two, and three for the health center was 1.02, 0.82, and 0.99, respectively. For the hospital, the VF for months one, two, and three were 1.09, 0.86, and 1.00, respectively. And, the VF for family planning in the health center and hospital for month one was 0.93 and 0.84, for month two it was 1.73 and 1.08, and for month three 0.88 and 0.88, respectively. Likewise, for service delivery, the VF for month one to month three was 1.00, 1.00, and 0.97 in the health center and 0.96, 1.31, and 1.03 for the hospital, respectively. The VF for malaria in the health center was 16.00, 21.00, and 1.02 for the health center, and 0.00 was reported for the consecutive three months in the hospital. The VF for HIV and pneumonia for the health center was 1.00, 0.5, and 1.00 and 0.66, 55, and 0.52 in the three months, respectively. And, for the hospital, the VF for HIV was 1.00, 1.00, and 0.00 and for pneumonia was 0.88, 0.81, and 0.55, respectively (Table 3).

Table 3: **Verification factor for selected indicators**

Indicators	VF for Month-1		VF for Month-2		VF for Moth-3	
	HC	Hospital	HC	Hospital	HC	Hospital
ANC1	1.02	0.82	0.99	1.09	0.86	1.00
Family Planning	0.93	0.84	1.73	1.08	0.88	0.88
Delivery	1.00	0.96	1.00	1.31	0.97	1.03
Malaria	16.00	0.00	21	0.00	1.02	0.00
HIV +	1.00	1.00	0.5	1.00	1.00	0.00
Pneumonia	0.66	0.88	55	0.81	0.52	0.55

The difference between verification factors of ideal reports and observed reports (1-VF) indicated that majority of the selected indicators had a positive value; ANC1(0.02), family planning (0.01), malaria (0.06), and pneumonia (0.24) indicating 2%, 1%, 6%, 27% of each of indicator was over-reported while delivery (-0.4) and HIV+(-0.42) had a negative value indicating 4% and 42% were under reported respectively (Table 4).

Table 4: **Overall mean verification factors of immunization indicators and deviations from the ideal value.**

Indicators	Statistics					
	Min	Max	Mean of VF	SD	(1-VF)	95%CI of VF
ANC1 (n=2)	0.97	1.00	0.98	0.024	0.02	[-0.01, 0.05]
Family Planning (n=2)	0.92	1.07	0.99	0.10	0.01	[-0.13, 0.15]
Delivery (n=2)	0.99	1.08	1.04	0.70	-0.04	[-1.01,0.93]
Malaria (n=2)	0.00	1.88	0.94	1.33	0.06	[-1.78,1.90]
HIV + (n=2)	0.83	2.00	1.42	0.82	-0.42[a]	[-1.56,0.72]
Pneumonia (n=2)	0.55	0.90	0.73	0.24	0.27[a]	[-0.06, 0.60]

[a]-mean out of 10% precision

The findings revealed that in the health center, the VF for ANC1 was 0.96, for family planning 1.18, delivery 0.99, malaria 12.67, HIV+ identified 0.83, and for pneumonia was 18.73. (Figure 2).
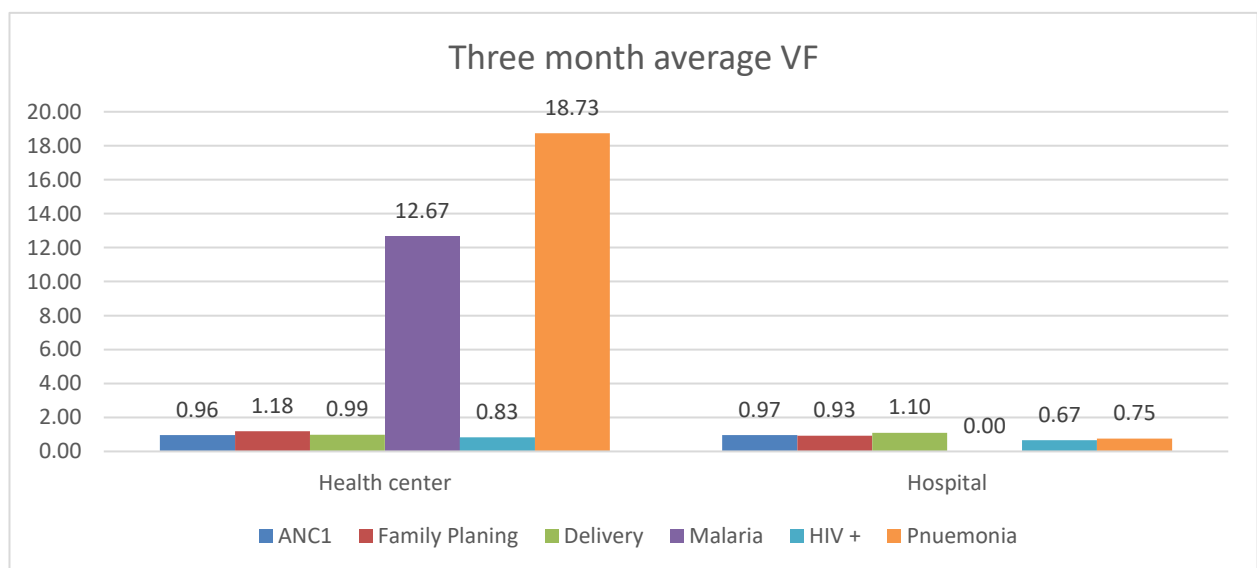

Figure 2: **Three month average verification factor for the selected indicators**

Lots Quality Assurance Sampling practice
Both facilities conducted a self-assessment to check the quality of data regularly. However, Lots Quality Assurance Sampling (LQAS) was only conducted for the service reports in the health center for the past three months. Disease reports for out-patient services were not covered in the LQAS for the past three months (Table 4).

Table 4: **LQAS in Assosa Town, Beninshangul Gumuz, Ethiopia, 2020**

Quality assurance	Asosa District Frequency
Facilities conduct self-assessment (N=2)	2
Conduct LQAS (N=2)	1
LQAS conducted for service report in Month 1 (N=2)	1
LQAS conducted for service report in Month 2 (N=2)	1
LQAS conducted for service report in Month 3 (N=2)	1
LQAS conducted for disease OPD report in Month 1	0
LQAS conducted for disease OPD report in Month 2	0
LQAS conducted for disease OPD report in Month 3	0

Qualitative Findings

A total of twenty eight in-depth interviewees were conducted with ten participants from the Asossa general hospital, nine from the Asossa health center, and another nine from the Asossa health office. The mean (SD) age of the informants was 32.6 (6.8%) years and twenty-two (78.57 %) of them were males. Twenty of the participants had a bachelor's degree, five had diplomas,

and one had a Master of Science degree. In addition, there was a medical doctor and a specialist physician. Among all participants, twenty six (92.8%) received basic leadership, management, and governance (LMG) training and eight (28.6%) received basic training on montitoring and evaluation (M&E) (Table 5).

Table 5: **Basic characteristics of the study participants**

Characteristics	Frequency (%)
Sex	
Male	22 (78.6%)
Female	6 (21.4%)
Age	
24-30	14 (50)
31-40	11 (39.3)
41-50	3 (10.7)
Educational level	
Diploma	5 (17.8)
Bachelor degree	20 (71.4)
Medical doctor/MSc.	2 (7.1)
Specialty	1 (3.51)
Monthly income	
4500-7000	7 (25)
7001-9000	16 (57.1)
9,001-11,500	5 (17.8)
Years of experience	
0-2	17 (60.7)
3-6	9 (32.1)
7-12	2 (7.1)
Health facility	
Assosa general hospital	10 (35.7)
Assosa health center	9 (32.1)
Assosa health office	9 (32.1)
Received basic LMG training	
yes	26 (92.8)
No	2 (7.2)
Received basic training on M&E	
Yes	8 (28.6)
No	20 (71.4)

Trained on data quality and use
Yes	18 (64.3)
No	10 (35.7)

Trained on data quality and use
Yes	11 (39.3)
No	17 (60.7)

Facilitators and barriers of quality data generation and use: Interviewees described the significance of generating quality health data and utilizing it, and various efforts had been made by them to improve the quality of data and use in the region. Participants also identified the different barriers and facilitators of quality data generation and use, and the analysis of these determinants resulted in three themes. The three themes which emergded included individual level factors, facility or environmental level factors, and leadership and governance factors. Each theme is reviewed bellow.

Individual characteristics
Study participants mentioned several barriers and facilitators of data quality production and use in the Benshangul Gumz region. These were related to each other and modify individuals' behavior either negatively or in favor of producing quality data and its utilization.

Motivation
In connection with facilitators that enhance the level of data quality and information use, the organization shall motivate healthcare workers to improve the quality and use of routine health data for decision-making in different ways, such as providing career development opportunities and incentives. It is a mental component that creates a positive energy to accomplish a task; it could be financial or non-financial. One of the respondents explained the following supporting the idea as follows:
"... health workers can be motivated if the quality of the service provided to community members acknowledged by different stakeholders. (Age 28, male, work experience 8 years).

The finding revealed that acknowledging health care workers creates a positive working environment and health leaders are supposed to motivate workers in order to achieve better-quality health data. Respondents also stressed that leaders should evaluate the performance of staff in order to identify staff who deserve apparisals from those who require further motivation. Supporting this ideas a respondents said
"it is necessary to organize the award for those individuals or facilities which have attained the highest level of HIS performance" (Age 43, sex Male, work experience 20 years).

Capacity building
Training, regular supportive supervision, mentorship, and review meetings were the most frequently recommended approaches by the interviewees, which were used to help improve the quality of health data and use of information at all levels. Training of health workers regarding the importance of healthcare data was also strongly recommended. Some of the challenges might not require intensive theoretical

training in order to address the gaps; instead, only onsite training and daily follows up may be enough to fill the knowledge and skill gaps. A respondent confirmed that
"... Though our performance on quality data production and use is lower than other woredas, there is no training and logistics provision to overcome the limitations we have ..." (Age 35, sex female, work experiences 11 years).

Commitment
Health staff commitment has a great impact on improving data quality in certain facilities as committed individuals take care of the HIS process during execution. In this regard, a respondent said
"Health workers usually do not record health data maybe because of lack of commitment in addition to other reasons such as shortage of human power and lack of skills" (Age 36, sex male, work experience 10 years). Leaders' commitment also has a great role in healthcare data improvement. If leaders fail to be committed, it would be a challenge for healthcare system performance. One of the respondents said
"... If there are committed leaders at health facilities level who can regularly implement the review of PMT, the quality of the information will definitely be improved" (Age 27, sex male, work experience 10).

However, respondents stressed that this is not usually the case as the commitment of the leaders in the facilities was very limited.

It was found that health workers usually give more importance to the treatment of patients and/or patient care but not for the data. As a result, the quality of health data falls. Supporting this idea, a respondent said
"Health workers do not consider data recording as their own task; they usually give less value to data." (Age 36, sex male, experience 10 years).

Manual data management practice
It is obvious that electronic data management, directly or indirectly, benefits the improvement of both individual and community health. Planning and decision-making require immediate access to health data where manual/traditional data handling is limited in order to inform decisions which can be used to solve similar problems. The findings suggest that using electronic platforms to collect, analyze, store data for future use would result in better data, better information and better health. One of the respondents said
"One crucial thing that will help for data quality is technology or electronic acceptance and availability of electronic materials which may also help increase the level of data quality" (Age-34, sex-male, work experience 10 years).

Digital literacy

The ability of health workers to execute routine health service activities using technology is a primary concern to deploy and utilize electronic platforms in health care sectors. The current study found that health workers did not utilize the software properly. In most organizations, less attention was given to the system in terms of operating the equipment according to the standards set in place. One of the respondents said

"We have no confidence to use the data using electronic system since there are limitations to manage data. Complexity of the technology, the low capacity to analyze and interpret data, and lack of computer skill are some of the problems" (Age 43, sex male, experience 20 years).

Facility and environmental factors
Infrastructure and HIS resource: The study revealed the importance of HIS infrastructure in highlighting the importance of healthcare data quality and information use. The significance of infrastructures such as the data flow across departments and facilities through networking and the control of missed data through validation rules installed in the system are well understood by the respondents. They indicated that the reason why digital data collection and electronic data recording systems were not implemented was because network infrastructures and rooms to file records were not available. Supporting these ideas, a respondent said,

"The file and data managements were highly compromised because the infrastructure for the HIS is not available. We have very congested medical record rooms which are insufficient to file and store the medical records properly for future use" (Age 28, sex male, work experience 8 years).

Respondents argued that due to the absence of standard medical record systems in the facility, health care providers are facing problems related to data management practices. They also mentioned that other infrastructures related to file handling such as shelves are not provided as per the standards and quality which is required by the facility.

Conducive work environment
The study indicated that the presence of a good organizational environment with a working team could influence the production and use of quality healthcare data. In order to encourage the production and use of quality health data and use, leaders need to be the implementors and provide guidance for these systems. One of the respondents said

"There should be coaching and supportive supervision and the leaders should create conducive working environment for employees. In addition, there should be an active and free participation of the community with the health system" (Age 35, sex male, work experiences 31). Participants also mentioned that fulfilling infrastructures and inputs could improve the working environment.

The current study revealed that most parts of the region including the work places are not conducive to live in for many reasons such as the hot weather conditions, the absence of a consistent power supply and the inaccessibility of most districts. The absence of a consistent internet supply is also one factor which impacts the improvement of existing services and the retaining of staff to work in these environments.

Supportive supervision and mentoring
A positive attitude towards quality data among health workers might not only require training but also continuous support in terms of the revised recording and reporting material which should be implemented. The study also found that not only supervision but also feedback and mentorship have a profound impact on the improvement of quality health care data production and use. One of the respondents said:

"There is a problem of not verifying the facts by leaders beyond looking the numbers; there is no culture of appraising monthly reports timely nor do they give feedback to the lower structure" (Age 39, sex male, work experience 16 years).

Leadership and governance factors
In accordance with the view that data quality and use are influenced by the leadership and governance of the health system, participants raised a number of related points as described below.

Awareness regarding healthcare data
The level of awareness of leaders about healthcare data quality and use definitely affects HIS performance. How leaders and health workers understand the importance of healthcare data determines the health status of individuals and the community. A respondent said:

"The first thing to improve the quality of health data is to increase the awareness of health workers including leaders about the significance of data; subsequently, to engage them to carry-out the HIS activities, and finally to establish a strong monitoring and evaluation system to identify gaps" (Age 36, Sex Male, work experience 10).

Furthermore, this study found that educated people had negative experieces of data quality production and use in the study region. This idea was supported by a respondent saying:

".... Those who have educated, challenge the process of quality data production rather than supporting and harmonizing it. They don't intend to give right information because they consider that no one is knowledgeable than them" (Age 35, sex female, work experience 11 years).

The study revealed that leaders and the community lack awareness about the importance of quality health data and use. Patients or clients are unaware of the importance of health data and how it is obtained and in turn do not accurately provide the necessary information when healthcare providers ask them. It was stressed that the data management structure should start from a community level believing that if the report is not clear and precise, the quality of health data would be negatively affected which could in turn affect the health status of the population at large. A respondent said

"There is lack of awareness and support for the health information systems by the community; there is lack of accurate information from patients, such as inaccuracies in age information" (Age 32, sex male, work experience 16 years).

Assigning the right person to HIS data management
All individuals who are assigned in health care settings are in-charge of capturing, storing and reporting of the beneficiary's information accurately. It is impossible to achieve improvements in the healthcare system without cumulative efforts from all healthcare professionalsof health workforce. Therefore, data quality assurance can be attained by assigning the right person for the right tasks. Assigning individuals in health data management departments without prior knowledge or expertise may affect the quality of healthcare data obtained. A respondent said
"The human workforce assignment to tasks and positions should have been based on their profession and skills which is not, of course, the case here in our offices" (Age 34, sex male, work experience 10 years).

Regulation system
To regulate the implementation of quality data production and use, as the country is in an information revolution era, there are binding rules that govern people who are working in health sectors. However, the study found that there was no accountability rule for those who commit data fabrication in the study area. A respondent said
"... There is no any accountability here and the rules are not functional. There is no accountability even if someone misleads the health facility or institutions; even there is no any information sharing/ data sharing policy while others leave the organization" (Age 34, sex male, work experience 10 years).

Information sharing practices
This study found that information sharing in the health sector is important when utilizing healthcare data. To improve the commitment of health workers and to enhance data utilization, the study suggested that leaders should create a system to evaluate individuals and to share their best experiences with HIS personnel; in order to enhance the political commitment of officials when improving information production and utilization. A respondent said
"The leaders have to organize the experience sharing trips to other regions and facilities, and advocate the HIS activities at the cabinet members meeting" (Age 36, sex male, work experience 10 years).

Feedback provision and use
The current study revealed that health workers receive feedbacks given from respective bodies carelessly. A respondent expressed his feeling saying,
"Even-though feedback is provided the majority of health workers were negligent to utilize it" (Age 43, sex male, work experience 20 years).

The current study also found that providing detailed feedback to concerned facilities was limited in the study region. According to this study, feedback was not properly utilized among health workers in the area. A respondent said:
"If the community members feel the service provided to them is compromised, they provide us feedback to make it better. Though this feedback is supportive of us to improve the quality of care, it is rarely considered to use as in put" (Age 50, sex male, work experience 28 years)

Leaders' commitment
Healthcare leaders are responsible for ensuring the quality of data produced and its usage in the health sector. Furthermore, they are in-charge of improving data completeness, timeliness, and accuracy at every level of the health system. However, according to the study, the healthcare leaders fail to ensure the correctness of health data quality components. A respondent said:
"Though leaders are expected to conduct regular follow-up and avail resources as required, identify the gaps and provide feedback to the respective parties, create a motivation mechanism to acknowledge the best performers, and organize technical skill gap training, they fail to fulfill all these" (Age 50, sex male, work experience 28 years).

Discussion
The current study aimed to assess the quality of health data, information use by health facilities, and the barriers and facilitators for both the production and use of quality health data in the Assosa district, Benishangul Gumuze Region. Data accuracy was verified between facility data registered and the report sent to higher level. Perceptions of health care providers regarding health data quality and information use, as well as barriers and facilitators of quality health data production and use, were explored. The results indicated that there was a report of HIV+ and pneumonia patients in health centers and hospitals. Though the mean value of ANC1, family planning, delivery, and malaria falls within the 10% precision of the acceptable range, differences between the verification factors of the ideal report and observed values indicated that there was more than two-fifths of underreported data for HIV+ and one-third of overreported data for pneumonia cases. Reasons for variations might be due to a lack of awareness, decreases importance towards data capturing, lack of commitment among leaders, lack of trained personnel, and poor data management practices in the study region.

The proportion of data use among departments was almost two in five in the health centers and one third in the hospital. The qualitative assessment concluded with three themes that interconnected: leadership and governance, along with other facilitators and barriers, were mediated by health data management practices in order to influence the production and use of quality health data; second, quality health data and use affected the provision of health services and health outcomes.

The overall routine information utilization for the facilities is much less than the 90% limit set by the federal ministry of health (22). It is also lower than

findings from the North Gondar zone (23), Eastern Ethiopia (24), and Southern Ethiopia Hadiya zone (25). On the other hand, it is higher than findings from studies conducted in Arsi (26) and Jimma (27) of Ethiopia. However, the findings were consistent with that of a study conducted in East Gojam (28). There could be various reasons for the observed discrepancy among the findings such as the differences in study periods, data management knowledge, and facility type/unit. For instance, in the case of Jimma and Arsi both zonal and district health offices were included; the study conducted in North Gondar used a different measurement of information utilization which was about the use of routine health information for treating patients, disease prioritization, drug procurement, the day-to-day monitoring of health service activities, checking data quality, resource allocation, and planning. As a main hospital situated in the capital of a region, the magnitude of data use in Assosa's hospital is, however, very small indicating that it needs much more effort to improve the utilization. The level of data use by the departments of the health center in Asossa is the same if not the worse.

The study revealed that there are facilitators to quality data production and use such as training which helps health workers to enhance their digital literacy, service delivery or leadership capacity. However, infrastructure and HIS resources are crucial inputs to data use and production, especially establishments related to computers, power, networks, etc. Research indicates that trainings should be followed by supportive supervision and feedbacks in order to promote effective change and to establish a system that will not be affected during staff turnover. The study also identified that incentivizing health workers or health facilities motivates them for improved performance or for better data outputs. As a result of all these, it may be possible to develop an organizational culture of producing better data quality and use that can be sustained even at the time of difficulties.

On the other hand, there are barriers that limit the quality of data and its utilizations. Areas of difficulty include the establishment of suitable physical working environments, which are mentioned as a major challenge for the production, communication and use of health data. The problem is exacerbated by the inaccessible districts and villages where health facilities are situated, and poor network connections that hinder data or information flow to and from the regional health offices. Due to environments which make it difficult to work in, staff turnover may be intensified, which would make difficult to develop accountability among HIS workers and to build better organizational culture as repeatedly mentioned by the interviewees. Even though the frequency training for the staff regarding leadership and governance was high, the staff might not have applied them in the institutions as intended. All these situations might negatively impact the leadership and management of the health system which in turn could result in reluctant HIS staff that would negatively affect the quality of health data and utilization.

The study revealed that leadership and governance is positively associated withon the quality of data production and use. However, it also found that the level of leaders in transforming their organizations in the region by optimizing the healthcare data collection, analyses and uses were very limited. The accountability associated with the failure to produce and use quality data was very limited. However, studies indicated that leadership and governance are undoubtedly important for better achievement of quality healthcare data and its usage (13) which results in better information and better health services and health outcomes. Studies emphasised the need for providing leaders with the necessary skill to use quality health data for the purpose of planning and decision making, which is paramount for developing responsible leaders for quality healthcare data and utilization (14). Studies recommend establishing committed leadership to get optimum quality of health information and use for appropriate planning and decisions in the health system (29). Consistently, research across Africa has shown that weak leadership results in poor evidence informed decision-making practices and the lack of data use (30). Possibly, the low levels of involvement of leaders in producing quality data and utilization may be the result of multifaceted problems in the region.

Conclusions
The level of health data quality and its utilization was low in the Asossa district. A number of factors have contributed to the poor quality of data and information use. The unfriendly physical and organizational working environments and high staff turnover which negatively affected the leadership and governance of the health system are belived to be behind the poor data quality and information use. The LMG and M&E trainings offered to staff might not have been used in real settings beyond the mere transfer of knowledge. Therefore, interventions that have multifaceted effects on data quality and use such as improving leadership and governance practices and behavior should be implemented.

Declarations
Ethics approval and consent to participate
Ethical clearance was obtained from the Review Board of the University of Gondar. Informed consent was taken from each study participant. All data was collected based on codes instead of mentioning the name of the respondents to avoid an indication of any personal characteristics. The data was secured in the MOH/University repository and was only accessible to authorized individuals.

Consent for Publication
Not applicable

Availability of data and materials
All relevant data are within the manuscript. The data upon which these findings were developed can also be made available upon request.

Competing interests
The authors declare that they have no competing interests

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