The Influence of Parallel Reporting Systems on Data Quality and Information Use in Northwest Ethiopia: *A* Qualitative Study

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Abstract

Background: Ethiopia utilises the district health information system for health information management. However, the lower level health structure seems inaccurate in comparison to the parallel reporting system, with limited evidence on its effect on data quality and information use. Therefore, the present study aimed to assess the influence of a parallel reporting system on data quality and information use at the lower level structures of the Amhara region, Northwest Ethiopia.

Methods: The study was conducted in five districts of the Amhara region using an explanatory case study design. Twenty respondents were interviewed from the 1st – 30th April 2021, using a semi-structured key informant interview (KII) guide with multiple probes to explore relevant information. The data was transcribed into English and transferred to the Open-Code 4.02 software for analysis. Textual data were coded, and themes were identified from the synthesis. Inductive thematic analysis was applied to identify the relationships among the emerging themes in order to draw a relevant conclusion.

Results: Five themes were emerged from the analysis, including the current practice of parallel reporting, a program area of parallel reporting, the influence of parallel reporting, reasons for parallel reporting, and means to avoid parallel reporting. Likewise, parallel reporting was done at the district level and at the point of service delivery. The respondents described maternal and child health programs often using parallel reporting. Parallel reporting was described as having undesirable impacts on routinely collected health data quality and use. Moreover, it increases the work burden; and affects service quality, the the satisfaction levels of clients and staff, and the overall efficiency. The main reasons for practicing parallel reporting were: missing important data elements in DHIS2, single language, varying stakeholders' interests, and lack of conducting a partner forum.

Conclusion and implication: Against the national health information system's guiding principles and vision, parallel reporting is practiced at the lower health system levels for various programs. Therefore, a corrective measure should be taken to achieve the country's information revolution (IR) agenda. To avoid parallel reporting mechanisms, it is recommended that regular partner forums at the district level must be strengthened, important data elements should be incorporated into the DHIS 2, and additional language platforms should be be included in the DHIS2 system.

Key-words: parallel reporting, effect, lower level, Amhara region, data quality, information use

Key messages

- Against the national health information system's guiding principles, parallel reporting is widely practiced at the lower health system levels, which should be corrected to realize the country's IR agenda.

Key finding

- Parallel reporting was frequently practiced at the district level and points of service delivery.
- Parallel reporting negatively impacts routinely collected health data quality and use; it increases the work burden; and affects service quality, satisfaction of clients and the staff, and overall efficiency.
- The reason for practicing parallel reporting was missing important data elements in DHIS2, single language, varying stakeholders' interests, and lacking a common partner forum.

Key implication

- Parallel reporting is practiced against the national health information system guiding principle and vision, and achieving the country's information revolution (IR) agenda is difficult.
- Corrective measures are needed to avoid parallel reporting.

Introduction

The health information system (HIS) provides a foundation for informed decision-making through the use of data for planning and managing health services, controlling epidemics and monitoring disease trends, and for the periodic evaluation of performance (1). A good HIS brings all relevant stakeholders together to ensure quality and useable data access. Health data are of little value unless data are available in a format that meets multiple users' needs, including individuals, communities, healthcare providers, planners, managers, and policy-makers (2). In low-resource settings, health data were either inaccessible or of poor quality, with insufficient use of information for routine decision-making and policy formulation (3-9). Furthermore, ensuring data quality and the culture of information use

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remained a challenge in the health sector. This implies that routinely collected data from health facilities and other relevant sectors need to ensure overall quality and timely reporting in order to facilitate the effective use of information (1,10).

In Ethiopia, Health Management Information Systems (HMIS) have brought remarkable achievements since its establishment in 2008 (11,12). Furthermore, the health information revolution agenda has been developed as one of the transformation agendas used to maximize the availability, accessibility, quality, and use of health information for decision-making processes through the appropriate use of Information Communication Technologies (ICTs). Though, the country has prioritized the HIS implementation, the data management and use culture remained a major gap at all levels characterized by untimely, incomplete, poor quality reporting and poor data use culture (8,13-16). Barriers like poor HIS infrastructure (like access to the internet, power supply, and insufficient medical recording rooms), inadequate support, low staff commitment, poor data analysis skills, parallel reporting systems, the high attrition rate of Health Information Technicians (HIT), and the limited use of eHealth applications or digitalization contributed to poor data quality and low information use (8,17). This implies the need to link multiple stakeholders, including researchers, with the health sector in order to establish strategic and sustainable interventions which can be used to address the complex challenges.

A properly designed health reporting system is an essential attribute of the routine health information system that allows administrators and healthcare workers to easily access quality data and use of information products for routine and strategic decisions (2). On the other hand, healthcare workers are overburdened by poorly designed and coordinated reporting systems, excessive data, and demands from multiple stakeholders (2). Parallel reporting has been shown to compromise data quality and increase administrative workload because it needs multiple and redundant data sources and reporting formats (18). Parallel reporting posed additional burdens on the system and contributed to poor data quality because some indicators relevant to several programs were not captured centrally in the RHIS. Therefore, it needs a singular and integrated reporting system to ease and facilitate timely access and use of data at each health system level.

Ethiopia established a unified Health Management Information System (HMIS) with a single reporting channel in 2008 with the principle of integration, standardization, simplification, and institutionalization (12). Evidence suggests that Ethiopia's parallel reporting has been greatly decreased as a result of ongoing assessment and mentoring of the newly established HMIS(11). Despite the accomplishments, parallel reporting channels remain a problem. Different initiatives and contributors demanded parallel reporting channels, according to studies (12). The parallel structure has created a problem in integrating different datasets from different regions. Conducting a national-level analysis is quite challenging without manual data integration. There is still limited evidence on the bottlenecks of improving routine health reporting systems in resource-limited settings, such as Ethiopia.

Irrespective of improvement in the overall HMIS implementation, poor data quality and inadequate information use have remained major challenges in implementing IR at all levels of the country (13). Poor data quality and inadequate use of information for decision-making were also problems in the Amhara region[8]. Parallel reporting, a lack of supportive supervision, and a lack of review meetings have all been identified as major barriers to data quality and information use (12). Administrative decision-making was also limited due to multiple data sources and reporting formats characterized by untimely, incomplete, and poor-quality reporting (15). However, the findings are insufficient to articulate the effect of parallel reporting on data quality and information use for decision-making. Evidence is required on the challenges of parallel reporting and its effect on data quality and information use specific to the local context.

Therefore, this study aims to assess how the parallel reporting system affects the data quality and information use in the lower-level health systems of the Amhara region in the northwest of Ethiopia. Understanding the current practice of parallel reporting and its effects on data quality and information use could provide scientific insight, which can be used to improve data quality and develop a culture of information use.

Methods

Study Setting and Period: The study was conducted in five selected districts of Amhara National Regional State from April 1st – 30th , 2021. The ANRS is located in Ethiopia's northwestern and north-central parts. The Amhara National Regional State was subdivided administratively into 12 zones and three administrative cities , in which 211 districts were found. Eighty-six hospitals, 874 health centers, and 3551 health posts were located in the region, which are used to deliver healthcare services. The health system employed more than 40,083 health professionals across the region (19). The five districts were selected randomly (Tacharmachiho, Wogera, Gondar, Awabel, and Tehuledrie Woreda). In the five districts, there were five hospitals, 33 health centers, and 192 health posts.

Study design

A qualitative phenomenological study design was applied to understand situations in their uniqueness as part of a particular context and their interactions (14). This design helped the researcher examine the data closely in order to understand the phenomenon of the data (15).

Study population and sampling

This study consisted of 20 key informants. The study participants included facility heads, department heads, and HMIS focal personnel in health facilities, as well as WoHOs, such as WoHO heads, program coordinators, and M&E officers from the selected districts. Participants in the study included were individuals who

had worked in the facility or districts for more than six months. Thus, the initial sample size for Key Informant Interview (KII) was determined based on reaching the level of information saturation. A purposive sampling technique was applied to select study participants from all levels. Furthermore, this study recruited nine case team leaders and three health facility heads from the health center. Moreover, this study recruited four program officers, heads from the woreda health office, and four individuals from the hospital.

Data collection tools and procedures

After reviewing relevant literature, an interview guide was developed for key informant interviews. The English version was translated to the Amharic language for data collection. Domain experts reviewed the interview guide, and refinement was done accordingly. The interview guide was also pretested on three participants (Gondar Zuriya district) who were not included in this particular study. Based on the inputs from the pretest, the interview guide was revised for actual data collection. The interview guide included questions that addressed the participant's socio-demographic characteristics, current reporting system, and data quality problems. It also included questions which were used to explore the influence of parallel reporting, reasons for parallel reporting, and means to avoid parallel reporting in their context.

Data collection was carried out by the investigators and two trained data collectors. The data was collected using audio-recorded face-to-face interviews. An audio recorder was used to record the participant's information, and the audio data was transcribed verbatim. During interviews probing questions were asked to participants to explore the issues in-depth. The interviews lasted, on average, 35 minutes. This research utilised multiple people for coding to minimize the bias. If there was some inconsistency between the interpretation of one and that of others, then the agreement between the data and the interpretations is more likely by repeated going over the translations and recordings and ensuring common ground between the recorded data and the transcribed data.

Data analysis

Initially, audio records of interviews were transcribed verbatim and translated into English. The translated data was cross-checked with the audio file to ensure its proper transcription and translation. The investigators read the translated data repeatedly to understand the concept and related meanings of the data.

Thematic analysis was used to analyze the data, and five themes emerged from the analysis. Codes were developed and inductively identified in the data, fixed to sets of notes or transcripts, and then transformed into categorical labels or themes. Materials were sorted by these categories, identifying similar phrases, patterns, relationships, and commonalties or disparities. Besides, sorted materials were examined to isolate meaningful patterns and processes. To ease the overall data coding and synthesize the themes, Open-Code version 4.02 software was used.

Operational definitions

Parallel reporting: is a type of reporting channel used for any report of indicators or data elements other than the routine District Health Information System (DHIS2). It also includes submitting a report for the same organization using a different language and reporting format or sending the report for a different organization using a different language and reporting format that requires additional work extra rework from the source of the data and duplication of the report.

Data quality is suitable for their intended use in operations, decision-making, and planning; reflects real value or true performance, and the data meets reasonable standards when compared against quality standards (20).

Information use: the process through which decisions makers and stakeholders explicitly consider the information in one or more steps of the process of policymaking, program planning and management, or service provision, even if the final decision or action is not based on that information (21).

Lower level health structure: a facility or institution which includes the woreda health officers, health centers, and primary/district level hospitals.

Results

Participant's Characteristics

Data was collected from five district health offices, five health centers, and three primary hospitals (Table 1). A total of twenty participants were included in the study, of which six were female participants. Study participants' age and work experience ranged from 23 - 42 years and 3- 20 years, respectively. The study comprised of nurses, health officers, midwives, medical doctors, public health specialists, and health informatic technicians. In terms of the level of education, two of them had a master's degree, four had a diploma, and the rmaining participants had a bachelor of science degree from various disciplines (Table 1).

Table 1: **Study characteristics of the participants in selected districts of the Amhara region, 2021**

S. No	Sex	Age	Level of education	Profession	Experience	Working Facility type
1	Male	27	BSc	HO	5	HC
2	Male	41	BSc	Nurse	17	HC
3	Female	33	BSc	Nurse	10	Hospital
4	Female	29	BSC	Midwifery	8	HC
5	Male	29	BSc	Nurse	7	HC
6	Male	37	MPH	Public health	14	WoHos
7	Female	28	Diploma	HIT	9	WoHos
8	Male	29	BSc	HO	3	HC
9	Female	23	Diploma	HIT	3	HC

10	Male	29	BSc	Nurse	10	HC
11	Female	25	Diploma	HIT	7	Hospital
12	Male	26	BSc	Midwifery	9	HC
13	Male	27	BSc	HO	8	HC
14	Female	37	BSc	HO	13	HC
15	Male	38	BSc	HO	11	HC
16	Male	25	BSc	MD	3	Hospital
17	Male	40	MPH	Public health	16	WoHos
18	Male	26	Diploma	HIT	7	HC
19	Male	28	BSc	Midwifery	9	Hospital
20	Male	42	BSc	HO	20	WoHos

Five themes were emerged from the current practice of parallel reporting: a program area, the effect, the reason, and the means through which parallel reporting can be avoided. The study indicated that parallel reporting has been continued to be practiced at the district level and points of service delivery. As such, the majority of the respondents described that maternal and child health programs were frequently requested for parallel reporting, which had undesirable effects on data quality and use. Moreover, parallel reporting increased the work burden, affected service quality, lowered the satisfaction of clients and staff, and ultimately disrupted staff satisfaction. The main reasons to practice parallel reporting mechanisms were missing important data elements in DHIS2, single language use/English language/, the different interest of stakeholders , and a lack of common partnership forums regarding the reporting system.

Current practice of parallel reporting

This study revealed that parallel reporting was practiced at the lower levels of the health systems. Although, there was a standardized national DHIS-2 reporting system, evidences from respondents indicated that there were other reporting mechanisms besides DHIS-2. The respondents responded that parallel reporting was a common practice at their health facilities. They also articulated that in their practice they were supposed to report to different partners besides the regular DHIS-2 system. Even if the requested data element was not different between reports sent via DHIS-2 and those sent to others, A 28-year-old MCH unit working in HC supports this statement;

> *"Yes, we are reporting data elements for different stakeholders and partners; besides, we regularly report our performance via DHIS-2. Therefore, we are asked to report similar data elements even if the reporting format is not completely similar.''*

Another participant also reported that different stakeholders requested to send reports of selected data elements or indicators outside of the standard reporting period of DHIS-2. This finding is supported by one of the participants.

> *"We are sending EPI reports weekly for EPI partners, and also we are sending them monthly for DHIS-2 report. We are reporting to the partners and DHIS-2 similar data elements from the same data source EPI register.'' Working in HC& EPI focal*

But, few respondents stated that they didn't have a culture of parallel reporting and that all staff used a formal reporting method using the DHIS-2. They noted that the woreda health office and the facilities had a common platform for reviewing and minimizing the practice of parallel reporting systems by directly requesting the data from the M & E unit for the institutions. This result has supported a HIT working in WoHOs:

> *"I will not prepare and send any parallel report to anybody who needs my program reports, and I simply inform them to access what they want from the DHIS-2 database."*

Similarly, the primary health care unit supervisors also reported that they informed and supervised the health facilities under their cluster as all should work to avoid the practice and culture of the parallel reporting system. Due to these regular activities, the culture of the parallel reporting system is minimized, and now almost nonexistent. A WoHOs plan officer stated that:

> *"We have informed all health professionals under our supervision as the only means of reporting is DHIS-2, and everybody shouldn't send any parallel report and as they should inform anyone who needs report should access DHIS-2 database as a source of the report."*

Program areas of parallel reporting practiced

The study also revealed that parallel reporting was more commonly practiced in program areas with donor support. The respondents reported that in the program areas of MCH, EPI, nutritional services, malaria, trachoma, TB/Leprosy, NCD, and HIV/AIDS were among the programs that were commonly practiced in a parallel reporting system. However, results varied accross institution that rely on the support of non-governmental organizations for the program. Those institutions which did not have non-governmental support might not have the practice of parallel reporting. The WoHOs plan office supported this idea;

> *"Parallel reporting is a usual activity on MCH and EPI programs which have donor-driven partners. We have challenges on those partners who are donor-driven, and they don't want to access reports from the DHIS-2 database, and they collect from the health facilities frequently by their reporting format."*

Additionally, the study revealed that parallel reporting was more frequently practiced at the health center level on those closely followed and supported by the NGO partners bypassing the woreda health office or zonal health departments.

Another participant working in HC stated that:

> *"…parallel reporting is practiced routinely in our health centers that have NGOs supported programs like TB, MCH, and HIV/AIDS. When the NGO needs a report, the staff will prepare the report and give it to them. Maybe the WHOs didn't know about this, but the facility head may permit to collect the report independently for these NGOs."*

Reason for parallel reporting

Missing important data elements in routine DHIS2: The study revealed that one of the reasons for practicing a parallel report system was the missing of important data elements in routine DHIS2. The participants stated that the reason for their practicing of the parallel reporting system was missing important data elements of the routine DHIS 2. Additionally, they noted that the commonly overlooked data elements in the regular DHIS-2 reporting system were nutritional service-related elements, newborn care services, maternal health services, non-communicable diseases, hygiene and sanitation programs, and laboratory service-related reports. The WHOs expert supports these ideas:

> *The major reason for practicing a parallel reporting system is the routine data collection system that is DHIS2 lacks some essential data elements. For instance, the nutritional data, growth monitoring, newborn care service, hygiene, and sanitation program, laboratory service, etc. Even if the data elements are available in the DHIS2, the program managers and other leaders may need the data quickly. Mainly, the maternal service data is collected and reported monthly, but the programmers and leaders need weekly, leading to a parallel reporting system and distorting the routine data system.*

Single language

The study also found that the main reason to practice a parallel reporting system was that the DHIS2 system uses only English. The participants articulated that they were practicing the parallel reporting system because routine DHIS 2 used a single language format. Additionally, this single language format had a problem with understanding among all health care providers, especially Health Extention Workers. WoHOs HIMS officer supports these ideas:

> *The reason for practicing a parallel reporting system is that most health extension workers used and understood the Amharic language. But the DHIS2 system has used the English language, so we have used different reporting formats, which are Amharic and English. In Amharic format, we have included extra data from the DHIS 2 and compared it with the English version.*

Interests of stakeholders

The study revealed that the reason for practicing a parallel report system was that stakeholders had different interests from the standard reporting systems. The participants said that they practiced the parallel reporting system because stakeholders had different interests in routine data elements and indicators. They also required additional reporting data elements beyond the routine information management system. The WoHOs head supported these ideas:

> *The reason for using a parallel reporting system is that different stakeholders need extra information and data from the routine information system, even beyond the registers. In that cases, we have obligated to use different reporting and registering formats to get the required data for their needs. This stakeholder may support our districts in funding the program due to their interest and getting the funding; we have obligated to use different reporting formats.*

Lack of common agreement on reportable data elements

The study showed that the reason for practicing a parallel reporting system was the lack of a common agreement on the reportable data elements and the timeliness for each data element. The participants stated that they practiced the parallel reporting system due to a lack of common agreements on the reportable data elements and the timeline for each data. The WoHOs M&E office supported these ideas:

> *We have used different reporting formats for the program's reporting, monitoring, and evaluation in our district and zone because the reported data element and the routine HMIS period differ from our interests. For instance, we have a weekly reporting format of maternal health in our parallel reporting system but not in the routine HMIS. We have also used the Amharic version for the child health program, which is more comprehensive and includes the most interests of all our stakeholders.*

Lack of trust in the data of DHIS2

The study revealed that the other reason for practicing a parallel reporting system was because the stakeholders did not rely on the DHIS 2 report. The participants stated that the reason for practicing the parallel reporting system was that the stakeholders didn't rely on the reported data of the DHIS2. The program coordinators or focal personnel had distinct reporting formats to collect, analyze and use the data independently from the routine system. This was supported by WoHOs working as HIT:

> *Most program coordinators and officers have used a parallel reporting system to compare the routine HMIS reporting format. The reason for practicing the parallel reporting system is the program officers or coordinators didn't believe the data of the DHIS 2 system. They believe in the data of their report format when they collect, analyze and report by themselves.*

Lack of accessing DHIS2 data

The study also found that the reason for practicing a parallel report system was that the program managers and workers had a problem accessing the DHIS 2 data for analysis, interpretation, and feedback. Most participants stated that they felt that due to practicing parallel reporting, program managers had no access to

use, interpret, and analyze the DHIS 2 data for their program improvements. Additionally, in the absence of the M&E experts or HIT, they had no access to use the data in their institutions. A WoHOs officer supports this argument:

> *The program coordinators, focal persons, and officers have practiced a parallel reporting system using different reporting formats because they have no access to use, view, and analyze their data using routine DHIS2 in the absence of the HIT, so they have obligated to use their data using their own reporting format.*

Effect of parallel reporting

The study revealed that the parallel reporting system negatively impacts routinely collected health data quality and information use. Furthermore, it increased the workers' burden of work, by affecting their quality of service, client satisfaction, efficiency, and staff satisfaction.

Data quality

The study found that parallel reporting affects health data quality by violating the basic dimensions of data quality like standardization, timeliness, completeness, and consistency. The respondents said they used to apply different formats for the same data element and give different data for the same purposes as requested by stakeholders. Additionally, They used to provide reports via telephone without any formats/sources, and they sent the same information via DHIS2 and parallel reporting for the same organization during the same period. The participants also stated that the parallel reporting system had affected data quality in their institutions. This is supported by an HIT working at a hospital:

> *Obviously, a parallel report has a negative effect on the data quality of our health information system. As we all know, major data quality dimensions ensure data quality. But if there is a parallel report, we have violated the data quality dimensions of standardization, timeliness, consistency, and accuracy.*

Information use

The study revealed that parallel reports also have affected information utilization for decision-making at all levels. This study also revealed that parallel reporting was one cause and/or the source of false reporting that would affect decision-making. Additionally, the existence of parallel reporting can lead to the misallocation of resources and affect the prioritization of activities. The participants articulated that parallel reporting had a negative effect on the practice of information use in their institution. A participant working in HC stated that:

> *A parallel report system can affect our health system of information use if the manager of each institution has a probability of different data sources from each different reporting system and might also have different decisions based on the available data. Generally speaking, this system can affect the culture of data utilization and the information use practice.*

Burden of workload

The study also found that a parallel reporting system increased the work overload for health care workers. The respondents stated they were busy and experienced increased workloads when they frequently registered, tallied, and reported the same data elements. Additionally, it leads to a double burden or reworking of the same task even when standardized and/or existing registers and forms are available. Moreover, most participants stated that the focal person of the different programs invests their primary time by registering and preparing the parallel report for various stakeholders. A health care provider working in HC stated that:

> *A parallel report system has a negative impact on the burden of workload. Preparing different reports using different formats takes extra time and increases workers' workload. Sometimes we have also prepared a report from individual medical records, which is not found in the standard registers. In this case, it needs extra workers and additional working hours, which increase the workload.*

Quality of service

The study found that the parallel reporting system also affects the quality of service for health institutions. The study respondents stated that health facilities and districts use different data for decision making, which results in incorrect decisions, which affect the delivery of health services. Most of the time, health care providers use different registers for the same data elements, leading to incomplete data and affecting the individual level quality of care. This is supported by a midwife working in HC who said that:

> *The quality of the service is maintained through regular monitoring of the information flow of the institutions. Additionally, the quality of service needs appropriate allocation of resources based on the quality of the data. The parallel report negatively impacts data quality and, similarly, the quality of services.*

Low efficiency and satisfaction

The study also found that parallel reporting has undesirable effects on staff satisfaction in addition to the efficiency of the institutions. The participants stated that the parallel reporting system negatively impacted staff satisfaction. Most of the time, health care workers were requested for double registrations, tallying, and reporting without any relevant program interest . They were also tired/exhausted due to work overload, which will, in turn, affect their satisfaction. Furthermore, they also stated that the parallel reporting system had a negative impact on diverting the efficiency of the institutions. The clients in the facilities were also dissatisfied due to being tied/exhausted as a result of the double burden of the reporting mechanisms. An HC head stated that:

> *The client and staff satisfaction are affected due to the increased workload and extra duty to prepare and document other reports. Additionally, client satisfaction also decreases regarding service quality and staff satisfaction. Generally speaking, the efficiency of the*

institutions depends on client satisfaction, the quality of service, and the overall performance of the health facilities. The parallel reporting system has a negative impact on staff satisfaction, client satisfaction, and efficiency of the facilities.

Means to avoid parallel reporting

The findings also suggested possible strategies to overcome the practice of parallel reporting systems. The mechanisms provided data access for the program focal personnel or leaders and incorporated an additional language in DHIS2 software besides English language. Moreover, strengthing of the partner forums and incorporating the missed data elements in the regular reporting formats were also important solutions for avoiding parallel reporting mechanisms.

Provide data access for the programmers

The study found that the program officers could avoid the parallel reporting system by providing data access which could be used and analyzed using the DHIS2. The participants agreed that one of the means which could be used to avoid the parallel reporting system was providing data access to be used and analyzed by the DHIS2 data for the program coordinators, officers, or focal persons. The WoHOs head supports this:

To avoid the parallel reporting system in our district, we should first provide the data access and security of DHIS 2 software to use their program data and analyze them. After that, they believed in their data and practiced the routine HMIS system.

Strengthening regular partner forums

The study also found that a possible solution to avoid the parallel reporting system was in strengthening the regular partnership forums with different stakeholders. The participants stated that the solution of avoiding the parallel reporting system was by strengthening the regular partner forum with different stakeholders. The WoHOs M&E officer supports this:

The one solution for avoiding the parallel report system is strengthening the regular partner forum with different stakeholders. We will discuss and solve different problems during the forum and have a common sense of ownership for the routine HMIS system.

Incorporating important data elements in DHIS2

The study revealed that one way to avoid the parallel reporting system was to incorporate important data elements in routine DHIS2. The respondents argued that the possible solution to avoid a parallel reporting system was by incorporating important data elements in the routine DHIS 2 system based on the agreement of stakeholders. The study participants also agreed that most of the hygiene and sanitation, none communicable disease prevention, and maternal health programs needed additional data elements in the routine DHIS 2 software which has to be added to the regular reporting formats. The WoHos vice head supports this idea:

One of the possible solutions to avoid the parallel reporting system in our region is incorporating the missed data elements in the routine reporting format of DHIS 2 software. For instance, most of the hygiene and sanitation, none communicable disease prevention*, and maternal health programs have needed additional data elements in the routine DHIS 2 software to be added in the regular reporting formats.*

Including additional languages

The study also found that including additional language platforms besides English language in the DHIS2 system was the recommended strategy to avoid the parallel reporting mechanisms. The study participants agreed that including additional language platforms in the DHIS2 system was the recommended strategy which could be used to avoid the parallel reporting mechanisms. This is supported by a HIT working in the WoHOs:

To avoid the parallel reporting system in our districts, we have used different reporting formats: Amharic and English. Most of the admin and health workers can understand the Amharic version format, so we need to include a local language version in the DHIS 2 system.

Discussion

This study was employed to explore the existence of parallel reporting systems, major program areas of parallel reporting, the effects of parallel reporting, drivers of parallel reports, and solutions to cut down on parallel reporting practices. Furthermore, this study found that parallel reporting was still a common practice at the district level and point of service delivery. This practice was against the national guidelines of the information revolution implementation standards (22,23). Although a standardized national DHIS-2 reporting system was introduced in 2017, the findings indicated that there were other reports besides the DHIS-2 weekly and monthly reports. They report to different partners; some reports were identical to the DHIS-2 data elements. This implies that the implementation and impact of the information revolution has been insufficient for supporting effective decision-making at all the health system structure levels. This is due to the interest of the partners and stakeholders that were willing to evaluate the data elements and indicators beyond the routine health information systems. However, in some health facilities, parallel reporting is not a problem especially in district or facilities without NGOs. This finding is supported by other studies as well (24,25).

In the study setting, parallel reporting was more common in programs that had donor-driven partners. The major program areas were MCH, EPI, TB/Leprosy, NCD, and HIV/AIDS. These program areas had different donating r stakeholders which assisted them in accomplishing the desired outcome. The findings of this study were supported by the findings of other studies (26,27). This can be explained by the fact that donors want to track project activities and whether they are being implemented as per the initial agreement or not . Additionally, this might be due to the interest of project managers in checking whether their objectives meet the desired outcome or not. Thus, they pursue returns in the

form of reports for verification purposes or for progress evaluations.

The result also indicated that parallel reporting has an undesirable effect on routinely collected health data quality, information use, workload burden, service quality, efficiency, client satisfaction, and staff satisfaction. The parallel reporting will likely affect data quality by causing task shifts from working on data quality aspects to reporting. The health care providers provided information without seeing data sources outside their facility, which lead to a discrepancy between reports sent via parallel reporting and routine DHIS2, which is stated as under and over-reporting. Most efforts were given to reporting, compilation and aggregation as per the request. The parallel report can also cause an increase in the workers' work burden and affect the quality of service. Parallel reporting leads to duplication of effort without value-added outcomes. Ultimately, parallel reporting may result in low utilization of health services, causing poor client satisfaction. The existence of parallel reporting could affect data quality which was explained by the fact that dedicating more working hours to report compilation may compete with the time allocated for data quality activities (19,28).

Similarly, this study also found that the existence of a parallel reporting system affects the information use culture of the organization. Since health facilities, district managers, and other stakeholders received reports from different channels with data quality problems, they face difficulties in using that data for decision-making. They could make incorrect decisions if they use incomplete, inconsistent, and inaccurate data. Furthermore they may struggle to meet the needs of the people due to inaccurate information pertaining to their problem and thereby draw inaccurate conclusions regarding the solution to their problems. This result is supported by the study done elwehere (29,30).

In this study, different reasons for parallel reporting were described. For instance, important data elements were missed in the DHIS-2. DHIS-2 presents only summarized and selected reportable data elements that are compatible with the international classification of disease, while doner- driven partners seek out these customized reportable data elements. DHIS-2 also presents its data in a single language, whereas local governments may seek reports in the local language(31). The other issue was the existence of different interests among stakeholders demanding fraternal report schedules and content.

Additionally, the lack of a common partnership forum regarding the reporting system hinders having a common agreement on the types of data and details, was listed as the main reason for practicing parallel reporting. These findings were consistent with the studies conducted elsewhere (31-33). This can be explained by the fact that reportable data elements from the DHIS-2 were condensed using only the English language, whereas the partner's and stakeholder's intention might be to get more detailed information in the local language which may be easier for them to understand and to be able to enable them to take administrative and accountability measures.

Finally, in this study, respondents stated that strengthening regular partnership forums at the district level, incorporating important data elements into the DHIS-2 system, and including additional language platforms in the DHIS2 system were the recommended strategies which could be used to avoid the parallel reporting mechanisms. This finding is similar to other studies conducted elsewhere(34-37). This could be the fact that when there is a chance of discussion between partners and health sector personnel, there will always be room for partners to adjust their report inquiries. In addition, if the DHIS-2 used an additional local language, it could be easily understood by local governing bodies.

Limitations

The conduction and execution of the present study had several strengths and limitations. In terms of some of this study's strengths, it reviewed the behaviors of health workers in performing RHIS activities and discovered the perceptions of individuals in their contexts. On the other hand, personal insight may introduce social desirability bias as a limitation. Furthermore, it excluded the use of data at the healthcare facility level.

Conclusion and recommendations

The study indicated that parallel reporting is still practiced at the lower health system levels for different programs. Parallel reporting is a more common practice in program areas with donor support; more frequently practiced at the health center level on those closely followed and supported by the NGO partners bypassing the woreda health office or zonal health departments. The commonly overlooked data elements in the regular DHIS-2 reporting system were related to nutritional services, newborn care services, maternal health services, hygiene and sanitation programs, and laboratory service-related reports. This has unintended impacts on routinely collected health data quality and use. Moreover, it increases the workers' work burden, affecting the quality of service, client satisfaction, efficiency, and staff satisfaction. The main reasons for practicing parallel reporting mechanisms were: missing important data elements in DHIS2, single language use, stakeholders' interests, stakeholders that did not rely on the DHIS 2 report, lack of agreement of reportable data elements, and a lack of common partner forums regarding the reporting system. Therefore, corrective measures should be taken to achieve the information revolution agenda of the country. To avoid parallel reporting mechanisms, it is recommended that regular partnership forums at the district level be strengthened, important data elements must be incorporated into the DHIS 2 system, and additional language platforms should be included in the DHIS2 system.

List of Abbreviations

DHIS: District Health Information System; DHIS2: District Health Information System version 2; EPI: Expanded Program on immunization; FMOH: Federal Ministry of Health; HC: Health Center; HIS: Health Information System; HMIS: Health Management

Information System; HSDP: Health Sector Development Plan; HSTP: Health Sector Transformation Plan; IRR: Information Revolution Roadmap; RHIS: Routine Health Information System; WoHOs: Woreda Health Offices.

Declarations

Ethical approval and consent to participation: The study protocol was approved by the ethical review board of the University of Gondar and received ethical clearance. Furthermore, the Amhara Region Health Bureau provided written support for the data collection. Participants consented before proceeding with the interview. Data was collected anonymously by taking only the participant's age, sex, experience, and academic career. Moreover, the analysis was done using codes, and results were reported without any personal identifiers. The researchers were honest in presenting the findings as obtained without making the data exaggerated or overlooked. Subject involvement was minimized as much as possible during data collection and write-up.

Consent for publication

Not applicable

Availability of data and materials

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

Author's contributions

All authors made a significant contribution to the work reported, with regards to the conception, study design, execution, acquisition of data, analysis, and interpretation. All the authors took part in drafting, revising, and/or critically reviewing the article; gave their final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the research.

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Competing interests

The authors declare that they have no competing interests

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