

Research Article

Assessment of RHIS Quality Assurance Practices in Tarkwa Submunicipal Health Directorate, Ghana

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Background. Routine health information system (RHIS) quality assurance has become an important issue, not only because of its significance in promoting high standard of patient care, but also because of its impact on government budgets for the maintenance of health services. Routine health information system comprises healthcare data collection, compilation, storage, analysis, report generation, and dissemination on routine basis at the various healthcare settings. The data from RHIS give a representation of health status, health services, and health resources. The sources of RHIS data are normally individual health records, records of services delivered, and records of health resources. Using reliable information from routine health information systems is fundamental in the healthcare delivery system. Quality assurance practices are measures that are put in places to ensure the health data that are collected meet required quality standards. Routine health information system quality assurance practices ensure that data that are generated from the system are fit for use. This study considered quality assurance practices in the RHIS processes. **Methods.** A cross-sectional study was conducted in eight health facilities in Tarkwa Submunicipal health service in the western region of Ghana. The study involved routine quality assurance practices among the 90-health staff and management selected from facilities in Tarkwa Submunicipal who collect or use data routinely from 24th December, 2019, to 20th January, 2020. **Results.** Generally, Tarkwa Submunicipal health service appears to practice quality assurance during data collection, compilation, storage, analysis, and dissemination. The results show some achievement in quality control performance in report dissemination (77.6%), data analysis (68.0%), data compilation (67.4%), report compilation (66.3%), data storage (66.3%), and collection (61.1%). **Conclusions.** Even though Tarkwa Submunicipal health directorate engages some control measures to ensure data quality, there is the need to strengthen the process to achieve the targeted percentage of performance (90.0%). There was significant shortfall in quality assurance practices performance especially during data collection, with respect to the expected performance.

1. Introduction

In recent years, RHIS quality assurance has become an important topic, not only because of its significance in promoting high standard of patient care, but also because of its impact on government budgets for the maintenance of health services [1]. Authorities at all levels of healthcare, including hospitals, community health centres, outlying

clinics, and aid posts, as well as ministries or departments of health, should be concerned about poor data quality and the impact it has on the quality of healthcare [2]. In many countries (including Ghana), administrators are dogged by poor medical/health record documentation, large backlogs of medical records waiting to be coded, and inconsistent coding. Besides there is poor access to, and utilization of, accurate and accessible morbidity data. These challenges are

related not only to the quality assurance of record documentation but also to the collection of healthcare statistics at all levels, from the largest hospital to the smallest clinic or Community-Based Health Planning and Services (in the case of Ghana). At the hospital or clinic level, statistics are used to assess how much services are being used to enable the facility to make appropriate financial and administrative plans and to conduct vital research. At district, regional, and national levels, governments use health statistics for planning healthcare services and allocating resources where they are needed most. The quality assurance of the routine health information processed, thus, is vital to the smooth running of the facility and also in assisting governments with decisions on the provision of healthcare services locally and nationally [2]. Despite the importance of quality routine health information, it appears there is no literature on globally accepted benchmarks on performance quality assurance practices (QAPs) for comparative analysis.

Routine health information system comprises healthcare data that are generated, compiled, stored, analyzed, report-generated, and disseminated on daily basis at the various healthcare settings. These healthcare settings can be public, private, community-level health facilities or institutions. The data from RHIS give a representation of health status, health services, and health resources. Most of the data are gathered by healthcare providers as they go about their routine work. The sources of RHIS data are normally individual health records, records of services delivered, and records of health resources. High quality RHIS data with all things being equal will lead to quality service delivery. Using reliable information from routine health information systems is fundamental in the healthcare delivery system. [3–7]. Quality assurance practices, on the other hand, are measures that are put in places to ensure RHIS meet required standards prescribed by the standard operating procedures (SOPs). Routine health information system QAPs ensure that data that are generated from the system are fit for use and thus can be used to make appropriate decisions by the various stakeholders [5, 7–9]. Routine health information system QAPs include sensitization of data collection staff, using the appropriate logistics, ensuring data accuracy and completeness, comparison of past and present records, discussing discrepancies after data analysis, etc. We considered QAPs in the following RHIS stages of data management: data collection, compilation, storage, analysis, reporting, and dissemination [5, 7]. In order to ensure proper management of the health system, healthcare providers need accurate, reliable, and complete health information about the population. This reliable health information is acquired through a well-functioning routine health information system [10, 11].

Even though there is an increase in the requirements for recording and reporting routine health information, there is no substantial evidence that the information recorded or reported is used for decision making by the various stakeholders due to data quality glitches at the various RHIS stages [10, 12, 13]. Routine health information systems are confronted with challenges of poor data quality inaccuracy and untimeliness of data [5, 14–16]. The ability of a

healthcare professional to perform an RHIS QAPs is an important promoter in the quality of the health information. Most healthcare professionals do not have confidence or knowledge to undertake RHIS tasks, let alone to make effective and efficient decisions [10, 17]. Improving knowledge and skills in analyzing, interpreting, and decision making either is directly proportional or serves as a promoter to the overall quality of RHIS QAPs [10, 11, 18]. In Ghana and many low- and middle-income countries for instance, these challenges are exclusive to neither the public nor the private sectors [19]. The data collected in both sectors are faced with data quality issues. The poor data, however, appear not to be true representation of the services provided in the health sector. As a result, they are not appropriate for making informed decisions and planning.

To improve RHIS data quality issues and promote use of data for decision making, President's Malaria Initiative (PMI) in collaboration with the Ghana Health Service (GHS) developed the District Health Information Management System (DHIMS) in 2012. This is a robust web-based data management system and has contributed significantly to the nation's RHIS activities, thus, improving data collection, reporting, and analysis. The system allows health facilities all over the country to enter their summarized reports directly into an electronic database [20, 21]. In addition to ensuring continuous RHIS QAPs, the GHS provided data quality assurance document on SOPs which provides a formalized system to guide data collection, collation, storage, analysis, reporting, and utilization. The aim of the SOP is to reach maximum accuracy, completeness, integrity, and traceability of the data in the GHS and other health implementing agencies. These standard procedures (or RHIS QAPs) start prior to data collection and continue after reporting and utilization, requiring ongoing coordination and oversight. These RHIS QAPs outline how to manage data to obtain complete, accurate, and timely data to facilitate decision making in the service. It also specifies the minimum data quality and quantity requirement as well as the procedures that will be used to analyze and report those data. The SOPs ensure that service providers follow the same procedures and that the procedures do not change as a result of change of personnel. All health personnel should be thoroughly familiar with this SOP [22]. The GHS SOP requires that facility summaries of all data collected are verified by in-charges and documented. Facilities are also required to validate their data for entry into DHIMS. As part of QAPs, facilities without access to computers and/or Internet access submit their verified data to the subdistrict for further verification and data entry. Districts are to collate quarterly activity reports of subdistricts/facilities and submit to Regional Offices. Regional Offices collate quarterly activity reports from districts and submit to Programmes and National level. Regional hospitals and some specialized health facilities perform day-to-day duties without the direct oversight of the District Health Directorates in which they are located. These reports are transmitted manually or electronically through the Regional Offices to the National level [22].

Notwithstanding the robust QAPs measures put in place by GHS, data quality challenges identified in the previous

studies [5, 14–16] appear not to be different from what pertain in Tarkwa Submunicipal (TSM) RHIS. For instance, the 2017 annual report of TSM revealed data quality issues such as poor data quality, lack of staff training on the quality assurance practices, and inadequate feedback from managers to data collectors. Dormant data validation teams, inadequate record officers, and lack understanding of definitions of key indicators among data collectors were discovered in the same report. Other issues the report revealed include deficient supervision by managers especially at data generation points, shortage of data collection tools, data incompleteness, data discrepancies, and lack of interest in data management and use [23]. Nevertheless, regular RHIS QAPs checks and audits have been classified as one of the major promoters of data quality in the routine health information system [24–26]. A study conducted in five Sub-Saharan African countries (Ghana, Mozambique, Rwanda, Tanzania, and Zambia) by Mutale et al. on improving health information systems for decision making outlined that there is the need for districts and facilities to integrate routine data quality audits which include QAPs within routine health information systems. Regular audits complemented with regular feedbacks will enhance the quality of data in health information system [24, 25, 27, 28]. This study assesses the extent of RHIS QAPs in health facilities in TSM.

2. Methods

2.1. Study Design. The study used a cross-sectional design to collect data from health staff and management who collect or use data routinely at eight facilities in TSM from 24th December, 2019, to 20th January, 2020. This design sought to determine the knowledge of the various healthcare professionals on data quality assurance practices, general challenges associated with RHIS in TSM health directorate, and specific challenges with regard to ensuring data quality assurance practices were determined.

2.2. Profile of Study Area. This study was carried out at TSM of Tarkwa-Nsuaem Municipality (TNM) in the western region of Ghana. Tarkwa Submunicipal is one of the nine administrative submunicipalities in the TNM with 16 communities. It is located in the extreme northern part of the municipality, bordered by the Bogoso District in the north, Iduapriem submunicipality in the east, and Simpa submunicipality in the south. The district capital is within this submunicipality. The study area has an estimated population of 28,954 people with an annual growth rate of 2.5%. One of the major economic activities in the area is surface mining and small-scale mining popularly called “Galamsey.” There are multinational companies engaged in the mining of gold and manganese. These companies which are mostly manned by elite whites employ Ghanaians and other African nationals; the submunicipality consists of people of different socioeconomic backgrounds. The municipality can boast 12 primary and junior high schools as well as 3 senior high schools and a university. The submunicipality also has 12 functional public health facilities

providing both curative and preventive services. These include two public hospitals, one Reproductive and Child Health (RCH) clinic, and nine Community-Based Health Planning and Services (CHPS). The CHPS model delivers healthcare directly to the household and community levels by placing community health officers (CHOs) in the communities and using community-based approaches for delivery of primary health services.

2.3. Study Population. The study population was 117 healthcare providers involved in data management processes in the eight health facilities that took part in the research. The eight facilities are Tarkwa Municipal Hospital, Apinto Government Hospital, Tarkwa RCH, New Takoradi CHPS, Brahabobom CHPS, Layout CHPS, Low Cost CHPS, and Nkamponase CHPS.

2.4. Sample Size Determination. A sample size of 90 was selected from a population of 117 using StatCalc function in EpiInfo software version 3.01 [confidence level = 95%, expected frequency = 50%, acceptable margin of error = 5%, design effect = 1, cluster = 1].

2.5. Sampling Procedure. Facilities were purposely selected and included in the study because they had a true representation of Data Collectors and Managers. Simple random sampling technique was used to select 90 out of 117 participants. A sheet of paper with a “YES” and a “NO” inscription was placed in a bowl and mixed. Each of the staff was asked to pick a sheet of paper from the bowl randomly without replacement. Those who picked a sheet of paper with a YES inscription were selected to be part of the research work. This process continued until all 90 respondents were sampled. Those who picked “NO” were not selected to be part of the study.

2.6. Data Collection Techniques and Tools. Structured questionnaire and observational instrument were used to solicit information from respondents. Items in the questionnaire were designed in such a way that each RHIS QAPs dimension was addressed appropriately. The observational instrument also contained specific variables according to predefined RHIS QAPs. The questionnaire was divided into socio-demographic characteristics of the respondents and six QAPs dimensions. These include RHIS QAPs during data collection, data storage, data compilation, data analysis, report compilation, and report dissemination. Each section sought data on a specific RHIS quality assurance practice. The items were grouped under these dimensions: knowledge of RHIS quality assurance practice, challenges, and the measures in place. Likewise, the observational instrument was divided into demographics of the health facility and other 6 sections.

2.7. Data Collection Process. Observations were conducted on the day questionnaires were given out. The questionnaires were collected a day after the distribution so that

respondents could have ample time to answer them. This was also done in order not to interfere with their duty of healthcare provision to their clients.

2.8. Measurements and Data Analysis. In assessing compliance to RHIS QAPs, we adopted the Performance of Routine Information System Management (PRISM) framework [29] and GHS Standard Operating Procedures (SOP) on health information management [22]. The PRISM concept was operationalized as having six dimensions of RHIS practices, namely, (1) data collection QAPs, (2) data compilation QAPs, (3) data storage QAPs, (4) data analysis QAPs, (5) report compilation QAPs, and (6) report dissemination QAPs. The processes outlined in the SOP for undertaking a specific task within each dimension, to ensure data quality, was used as QAPs criteria. Data collection QAPs were measured by six items describing quality assurance practices such as training of staff who collect or use data, use of standardized preprinted registers, daily review of data, daily compilation (counts) of data, sensitization of staff who record data, and supervision of records staff. Data compilation QAPs were measured by six items describing quality assurance practices such as in-charge (supervisor) check (authentication), double-checking (verification) of data, two or more staff involved in data collation and validation, use of multiple data sources (triangulation) to compare data, immediate tallying of data as and when it was recorded, and follow-ups with gaps identified, if any. On the other hand, data storage QAPs were measured by four items describing quality assurance practices such as keeping files in lockable cabinet, restricted access to data, duplicate copies of report for archival purpose, and keeping registers in lockable office. To assess data analysis, QAPs were measured by five items describing quality assurance practices such as comparing past and present data, discussing discrepancies during analysis, two or more staff involved in data analysis, ensuring proper (accurate) data from data collection points, and in-charge of the facility checks/validating results of analysis. Six items such as collective efforts in report compilation, two or more people involved in compilation, disaggregation of data comparisons of past and present data, double-checked data, and health facility in-charge reviewing report indicators are used to assess report compilation QAPs. With respect to report dissemination QAPs, the following items were measured: staff review of report before dissemination, double-checked report, printed additional copy of report used for reference, comparisons of data over time (monitoring over time), and facility in-charge ensuring the person responsible for the dissemination is knowledgeable in the subject matter.

The completed questionnaires were double-checked for completeness of responses and entered into EpiData (version 3.1) database. The completed data was exported into IBM SPSS (version 22) and a descriptive statistical analysis was performed to calculate frequencies and percentages for the categorical variables; means and standard deviation (SD) were also used to summarize the continuous variables. Graphs and tables were used to display the results. Each

QAPs action statement or item related to these dimensions was assessed using a dichotomy (Yes/No). All items belonging to a specific dimension and their ratings were added together, divided by the total number of items and multiplied by one hundred to create an overall percentile score. We adopted the concept of data verification factor (VF) as a proxy determining QAPs-ready. VF is one of the metrics for measuring data quality performance. The global standard margin of VF acceptability is plus or minus 10% of 100%. However, individual programs can select their own ranges of acceptability, as deemed appropriate [30]. Therefore, we used a minimum score of 90 percentile as facility QAPs-ready.

2.9. Ethical Considerations. We sought institutional approval instead of University of Cape Coast IRB due to challenges of getting timely approval with respect to the limited time for completion and submission of project work. An introductory letter from the Department of Health Information Management, University of Cape Coast, was sent to the Tarkwa Municipal Health Directorate. This was to seek approval from the Director of Health Services in the municipality to carry out the research in the public health facilities in the TSM. The letter also explained the purpose of the study as well as the reason for the collecting the data. An approval letter was given by the directorate and was presented to the in-charges and Medical Superintendents of the CHPs and hospitals, respectively. After permission was granted by the heads of each health facility, the questionnaires were administered to the respondents. Respondents were assured of confidentiality of the information they would be providing. The purpose of the study and the various sections of the questionnaires were explained to respondents to enable them to answer the questions conveniently.

3. Results

Majority of respondents interviewed were females (59%) and the rest were males. Ninety-three percent of the respondents had post-senior-high education. The remaining had senior high school education or lower. The mean age of the respondents was 32 years (range: 21–46 years). Mean working experience of respondents in baseline was 5.9 years (range: 1–18 years).

The specialization of respondents included physician assistants (5.6%), nurses/midwives (49.9%), pharmacist/dispensing technician (10%), health information officers/biostatisticians (11.2%), and other staff (13.3%), as shown in Table 1. Of the 90 staff interviewed, 70 (77.8%), 16 (17.8%), and 4 (4.4%) were selected from two hospitals, five were selected from CHPS Compound, and one was selected from RCH, respectively.

Observed RHIS quality assurance practices (QAPs) at the facilities indicated that 87.5% kept a copy of report sent to the Municipal Health Directorate (MHD), 75.0% of the facilities always checked data accuracy, 62.5% compared data with submunicipality targets, and 50.0% had tally

TABLE 1: Sociodemographic characteristics of respondents.

Variables	Number of respondents (n = 90)	Percentage
<i>Year of employment</i>		
1-4	40	44.5
5-8	29	32.2
9-12	17	18.8
13 and above	4	4.4
<i>Educational qualification</i>		
Intermediate	3	3.3
Certificate	19	21.1
Diploma/degree	59	65.6
Masters	6	6.7
Others	3	3.3
<i>Category of staffs</i>		
Physician assistants	5	5.6
Nurses/midwives	45	49.9
Pharmacist/disp. technician	9	10.0
<i>Health information</i>		
Officer/biostatistician	10	11.2
Nutrition officer	2	2.2
Disease control officer	2	2.2
Lab technologist/tech	5	5.6
Other staff	12	13.3

Source: 2020 survey.

sheets. However, all facilities, 100.0%, ensured data completeness, submitted data before deadline, had registers, and also had frequent review meetings (Table 2). The observed QAPs were confirmed in through facility reports, minutes, archives, and SOPs. The overall observed RHIS QAPs at the health facilities is 80.1 percent (not shown in the table).

Investigation on RHIS QAPs during data collection among staff revealed that 80.0% of the respondents had not received any training on RHIS quality assurance practices in the last six months prior to the study. Also, 72.2% of the respondents had preprinted registers for recording data in their facilities. To ensure quality routine health information, 52.2% of respondents claimed to perform daily compilation (counts) of data and 67.8% claimed to have sensitized staff who recorded data, while 82.2% received supervision from their in-charges/supervisors (Table 3). The overall perceived RHIS QAPs during data collection were 61.1 percent (not shown in the table).

Enquiries on RHIS QAPs during data compilation revealed 78.7% of respondents claimed their facility in-charge double-checked monthly summary reports generated from the various departments/units before aggregation.

According to 62.9% of respondents, two or more staff are usually involved in data compilation to ensure accuracy. To guarantee reliable and consistent data, 60.7% of respondents claimed to use multiple sources to compare before data were compiled (Figure 1). The overall perceived RHIS QAPs during data compilation were 67.4 percent (not shown in the chart).

Table 4 depicts RHIS quality assurance practices perceived by respondents during data analysis. Approximately 77.0% of respondents said that analysis was done by comparing present and past data and 64.4% revealed that data

TABLE 2: Observed RHIS QAPs at the health facilities.

Variables	Number of facilities (n = 8)	Percentage
<i>Does this facility keep copy of RHIS monthly reports sent to the district/subdistrict office?</i>		
Yes	7	87.5
No	1	12.5
<i>Did you receive a directive from the Senior Management/district/subdistrict office that there will be consequences if you do not check the data accuracy?</i>		
Yes	6	75.0
No	2	25.0
<i>Does this facility ensure data completeness?</i>		
Yes	8	100.0
No	0	0.0
<i>Did you receive a directive from the Senior Management/district/subdistrict office that there will be consequences if you do not submit the monthly report by declared deadline?</i>		
Yes	8	100.0
No	0	0.0
<i>Does facility keep register?</i>		
Yes	8	100.0
No	0	0.0
<i>Does the facility have routine meetings to discussion and take decision on RHIS information related issues?</i>		
Yes	8	100.0
No	0	0.0
<i>Does the facility compare target with submunicipality/municipal/national targets?</i>		
Yes	5	62.5
No	3	37.5
<i>Do data processing procedures/tally sheet exist?</i>		
Yes	4	50.0
No	4	50.0

Source: 2020 Survey.

TABLE 3: Respondents' perceived RHIS QAPs during data collection.

Variables	Number of respondents (n = 90)	Percentage
<i>Trained in RHIS activities in the last six months prior to the survey</i>		
Yes	18	20.0
No	72	80.0
<i>Use of standardized preprinted registers</i>		
Yes	65	72.2
No	25	27.8
<i>Daily review of data</i>		
Yes	65	72.2
No	25	27.8
<i>Performing daily compilation (counts) of data</i>		
Yes	47	52.2
No	43	47.8
<i>Sensitization of staff who record data</i>		
Yes	61	67.8
No	29	32.2
<i>Supervision of records staff</i>		
Yes	74	82.2
No	16	17.8

Source: 2020 Survey.

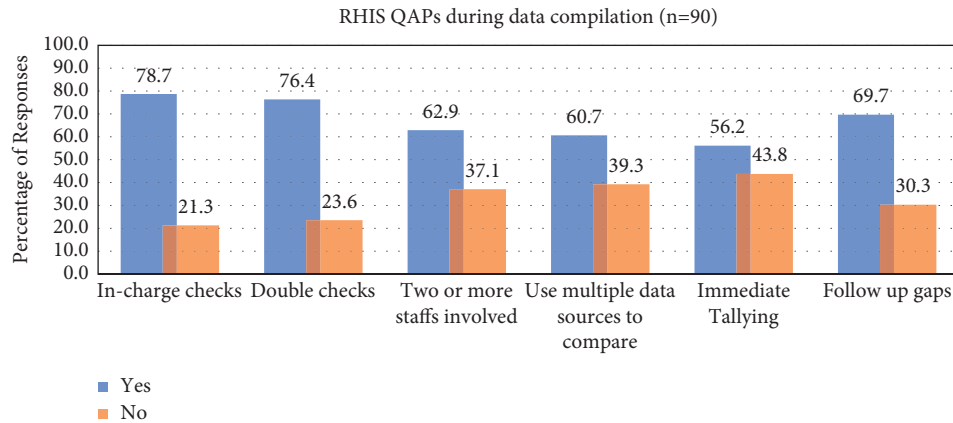


FIGURE 1: Respondents’ perceived RHIS QAPs during data compilation (source: 2020 Survey).

TABLE 4: Respondents’ perceived RHIS QAPs during data analysis.

Variables	Number of respondents (n = 90)	Percentage
<i>Comparing past and present data</i>		
Yes	69	76.7
No	18	20.0
Nonresponse	3	3.3
<i>Discuss discrepancies during analysis</i>		
Yes	58	64.4
No	29	32.2
Nonresponse	3	3.3
<i>Two or more staff involved in data analysis</i>		
Yes	49	54.4
No	38	42.2
Nonresponse	3	3.3
<i>Ensure proper data from data collection points</i>		
Yes	68	75.6
No	19	21.1
Nonresponse	3	3.3
<i>Ensure proper data from data collection points</i>		
Yes	68	75.6
No	19	21.1
Nonresponse	3	3.3
<i>Health facility in-charge checks</i>		
Yes	62	68.9
No	25	27.8
Nonresponse	3	3.3

Source: 2020 Survey.

discrepancies were discussed during analysis, while 75.6% revealed that proper data from all data collection points were ensured during data analysis. The overall perceived RHIS QAPs during data analysis were 68.0 percent (not shown in the table).

The study revealed collaborative efforts employed as a QAPs strategy to ensuring quality report compilation, as claimed by 64.4% of respondents. Other QAPs strategies used by respondents included 55.6% assigning two or more staff to the report, 47.8% disaggregation of data prior to compilation, and 81.1% historical data comparison, 74.4% double-checked data, and 74.4% review by in-charge (Figure 2). The overall perceived RHIS QAPs during report compilation were 66.3 percent (not shown in the chart).

With regard to data storage QAPs, 74.4% of respondents kept their data in lockable cabinets, 65.6% restricted data access to unauthorized persons, 63.3% made backup of report generated, and 61.1% kept their data in a lockable office (Table 5). The overall perceived RHIS QAPs during data storage were 66.1 percent (not shown in the table).

The study indicated that 78.9%, 76.7%, and 68.9% revealed, double-checked, and printed backup copy as a reference were some of the RHIS QAPs put in place before disseminating report. Other considered QAPs included 88.9% monitoring the process and 74.4% recruiting a person with requisite skills in report dissemination (Table 6). The overall perceived RHIS QAPs during report dissemination were 77.6 percent (not shown in the table).

When respondents were asked why it was necessary to undertake RHIS QAPs, 47.8% said it was to ensure the quality of data collected. However, 27.8% were of the view that it was done to ensure the accuracy of data while 6.7% and 4.4% said it was to make data meaningful for decision making and to ensure data completeness respectfully (Figure 3).

On the issue of challenges respondents encountered in their quest for RHIS QAPs, they mentioned the following: administrative (32.2%), data incompleteness (20.0%), shortage of logistics (18.9%), and delay in data submission (11.1%), data inconsistency (6.0%), and nonresponse (12.0%), respectively.

Figure 4 shows that there is some achievement in quality control performance in report dissemination (77.6%), data analysis (68.0%), data compilation (67.4%), report compilation (66.3%), data storage (66.3%), and data collection (61.1%).

Regarding glitches associated with RHIS QAPs, the study showed that 32.2% of respondents mentioned administrative whereas 20.0% were concerned about data incompleteness. About 18.9% and 11.1% attributed it to shortage of logistics and delay in data submission, respectively (not shown in the table/chart). When asked what measures should be put in place to address the challenges, 37.8% of the respondents believe in-service training of staff could help minimize snags. However, 15.6% and 10.0% also believe enforcing deadline of data submission and sensitization of staff on the importance

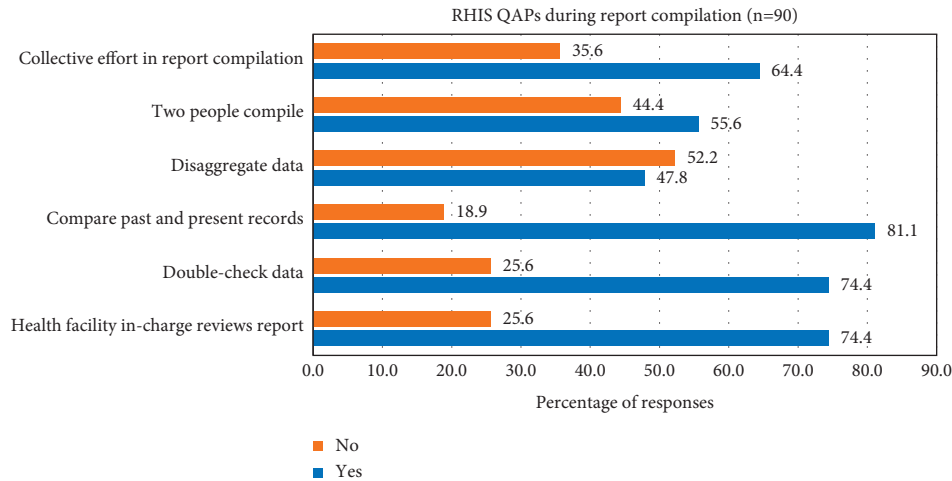


FIGURE 2: Respondents’ perceived RHIS QAPs during report compilation (source: 2020 Survey).

TABLE 5: Respondents’ perceived RHIS QAPs during data storage.

Variables	Number of respondents (n = 90)	Percentage
<i>Files kept in lockable cabinet</i>		
Yes	67	74.4
No	23	25.6
<i>Restricted access to data</i>		
Yes	59	65.6
No	31	34.4
<i>Two copies of report made</i>		
Yes	57	63.3
No	33	36.7
<i>Registers kept in lockable office</i>		
Yes	65	61.1
No	35	38.9

Source: 2020 Survey.

TABLE 6: RHIS QAPs during report dissemination.

Variables	Number of respondents (n = 90)	Percentage
<i>Staff review of report before dissemination</i>		
Yes	71	78.9
No	19	21.1
<i>Double-check of report</i>		
Yes	69	76.7
No	21	23.3
<i>Printed copy used for reference</i>		
Yes	62	68.9
No	28	31.1
<i>Comparisons of data over time (monitoring over time)</i>		
Yes	80	88.9
No	10	11.1
<i>Ensure the person responsible is knowledgeable in the subject matter</i>		
Yes	67	74.4
No	23	25.6

Source: 2020 Survey.

of RHIS QAPs, respectively, could help. Marginal number of respondents mentioned other interventions such as motivation, securing storage facilities, and using appropriate tool for dissemination (not shown in the table/chart).

4. Discussions

Data quality assurance is the process of data profiling to discover discrepancies and other variances in the data, as well as performing data cleansing activities (e.g., removing outliers, missing data interpolation) to improve quality. Prevention through quality assurance controls is the first step in dealing with data errors and is by far more preferable than “cure.” Quality assurance practices by health staff were classified under collection, compilation, storage, analysis, and dissemination of RHIS. The result suggests infrequent staff training on the quality assurance practices which is no different from what other studies observed [31, 32]. These studies concluded that frequent training of data collectors and users improves their competency and culture of information among staffs. Tarkwa Submunicipal health directorate should organize frequent training sessions on RHIS tasks (data collection, storage, compilation, analysis, reporting, and data dissemination) for healthcare professionals who are involved at least once in every quarter.

Routine health information system quality assurance practices such as the use of preprinted registers, immediate recording of data, and supervision of record staff were mostly observed in all facilities. This finding is consistent with best practices, which pointed out that healthcare professionals/providers collect data routinely in all their activities, so most quality assurance practices at this stage are mostly observed [33–35]. To ensure quality RHIS, the health facility supervisors must check and discuss data discrepancies during analysis, usually involving two staff. This is commendable and contrary to what other studies observed [5]. Discussing discrepancies is crucial in data analysis because it helps health facilities to appreciate health outcomes of their efforts. This knowledge is a recipe for data use at the frontline to influence quality healthcare delivery. However, the findings of this study show that quality assurance practices are least observed during report compilation. On the flipside, some facilities in the submunicipality appeared to not adhere to RHIS quality assurance practices during the preparation of monthly report. This finding is not different

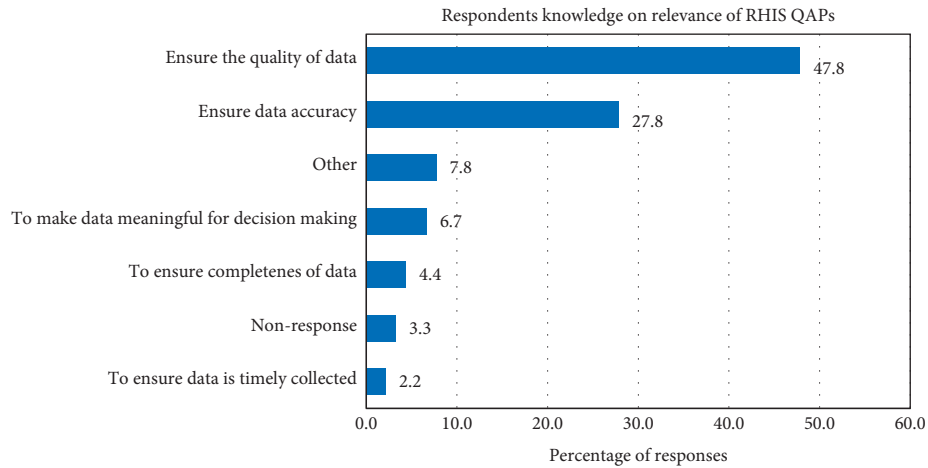


FIGURE 3: General level of knowledge of respondents on RHIS quality assurance practices. *NB: Others include help improve healthcare; improve decision-making; ensure confidentiality (source: 2020 survey).

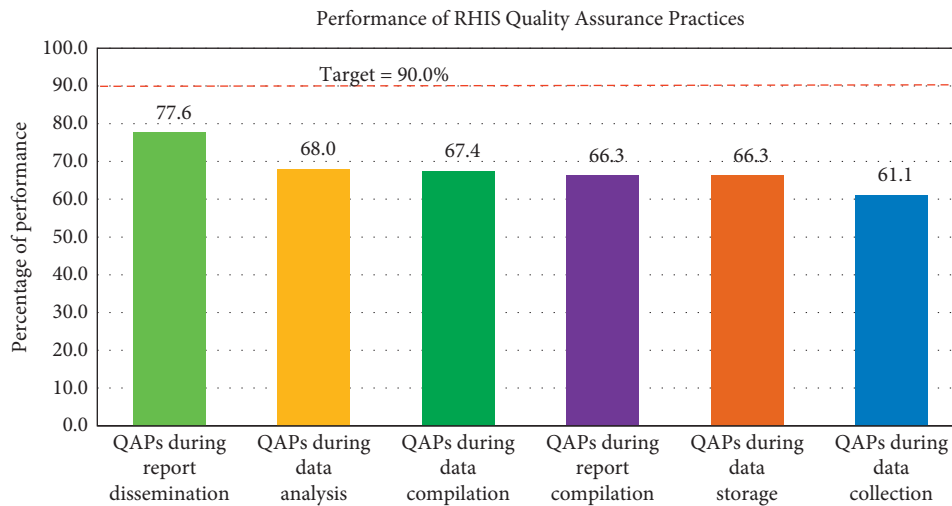


FIGURE 4: Performance of RHIS QAPs among health facilities in TSM (source: 2020 survey).

from a similar study in Uganda which recorded low adherence to quality assurance during report generation. There is perceived noncollaborative effort in generating report as supervisors rarely review it prior to dissemination. Data were not adequately checked for accuracy and consistency before disseminated to the next level [5, 7]. This may be attributed to the desire to meet reporting deadlines, thus neglecting the quality assurance practices at this stage.

Most staff members have general knowledge on data quality but the specificity of quality assurance practice for the various RHIS tasks was not clearly outlined. The study revealed that healthcare professionals had inadequate knowledge on the overall subject of quality assurance practice. Majority of the respondents had knowledge of data accuracy and completeness, which falls under data collection and compilation quality assurance practices. However, few of them had knowledge of RHIS quality assurance practices during report compilation, data storage, and report dissemination. The above findings concur with several studies which indicated that healthcare professionals do not have

enough confidence to undertake RHIS tasks, because they feel they do not have enough knowledge to be able to interpret data and use information to make effective and efficient decisions [10, 17, 18, 36]. The result of this study highlighted that there was statistically significant association between category of health professionals ($p = 0.001$) and level of RHIS QAPs knowledge (Table 1). Improving knowledge and skills of the various categories of health staff in analyzing, interpreting, and decision making processes may influence the overall quality of the routine health information system [10, 11, 18].

In LMIC, human resource and technical expertise of health staff remain a challenge to RHIS [37, 38]. Most health facilities do not have health staff that are solely responsible for data management. Due to understaffing, records are sometimes left uncompleted which results in the quality of data being compromised [5, 38]. The study revealed multitude of challenges such as illegible handwriting, unwillingness to compile accurate data, missing links, wrong documentation, language barrier, and lack of commitment

and appreciation of disseminated report. Other challenges included shortage of data collection logistics, data inconsistencies, and delay in data submission.

From the study, it was revealed that 37.8% of the respondents believed in-service training of staff could help minimize challenges in RHIS. Sensitization of staff, increase in number of data managers, motivation, and securing storage facilities are some of the measures that are put in place to minimize RHIS quality assurance challenges. Routine health information system's quality may be assured by taking into consideration all the determinants of data quality and addressing them accordingly. Measures in addressing RHIS quality assurance challenges include provision of standardized reporting forms and manuals, periodic training of healthcare professionals who are involved in data management, and effective sensitization and supervision of health staff who undertake RHIS tasks and organize meetings regularly to discuss RHIS related issues and provision of adequate feedback mechanism to data producers at the remote sites [5, 7, 8, 35].

Generally, TSM appears to practice quality assurance during data collection, compilation, storage, analysis, and dissemination (Figure 4). Nevertheless, there is significant shortfall with respect to the expected performance (90.0%). However, there is no empirical evidence on QAPs performance benchmark from health facilities up to the national levels in Sub-Saharan Africa; and Ghana being no exception, this study will serve as baseline for further assessments. Prevention is primarily a data management issue, not statistical one. Many of the quality problems encountered are due to data collection and management. Sources of poor data quality due to data entry errors can be eliminated or greatly reduced by using quality control techniques. One very effective strategy is to have the data independently recorded or entered by two persons and then validate for agreement.

4.1. Limitations of the Study. The study involved only selected public health facilities in the submunicipality and, thus, cannot be used for generalization.

4.2. Suggestions for Further Research. Areas for further studies could focus on comparative analysis of RHIS QAPs in both public and private health facilities, a comprehensive study on quality assurance practice for selected health indicators on key indicators of selected interventions.

5. Conclusions

We conclude that QAPs are performed, to some extent, by TSM health facilities during RHIS processes. However, performance of QAPs achievement was below the expected target across RHIS process trajectory. To attain continuous sustainable target, QAPs should be aggressively pursued at all levels of the health system, especially at the frontline, to improve quality of data. This could be achieved through regular training, monitoring and evaluation, and feedback on QAPs performance. The findings have policy, operational, and management implications in quality healthcare

delivery particularly in interventions where routine health data are used for analysis and assessment of performance of process and outcome indicators. Regardless of the system used, whether manually or electronically managed RHIS, it is essential that staff are trained on the nitty-gritties of the system. This will not only enhance the smoothness of RHIS tasks execution but also provide a reliable information for planning and decision making.

Data Availability

The survey data used to support the findings of this study are restricted by the University of Cape Coast (UCC) IRB in order to protect respondents. Data are available from UCC IRB, for researchers who meet the criteria for access to confidential data.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication this paper.

Authors' Contributions

ROB contributed to the concept, design, data collection, analysis of the research, and manuscript writing. JOY contributed to the data collection and analysis. KAOB contributed to the manuscript writing and review. NKM and GAA contributed to manuscript review.

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Supplementary Materials

RHIS QAPs Health Facility Questionnaire is a tool used to observe facility quality assurance practices. RHIS QAPs Health Staff Questionnaire is a tool used to assess respondents' quality assurance practices. (Supplementary Materials)

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