

REVIEW OF DATA QUALITY DIMENSIONS OF MATERNAL DEATH AUDITS IN THE EASTERN REGION OF GHANA.

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REVIEW OF DATA QUALITY DIMENSIONS OF MATERNAL DEATH AUDITS IN THE EASTERN REGION OF GHANA.

A thesis submitted in partial fulfilment of the requirement for the degree of Master of Science in Public Health

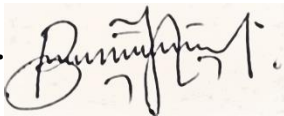
By

Solomon Boamah Amponsah

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ABSTRACT

Background

It is estimated globally that half a million women worldwide die each year during pregnancy and childbirth, and seven million more who survive childbirth experience major negative health outcomes. The Eastern Region contributes substantially to all maternal deaths in Ghana. Maternal Death Reviews (MDR) to ascertain cause of death among other interventions can inform quality obstetric health care delivery to pregnant women in the region to reduce maternal mortality.

Objective

The overarching objective of this study is to assess the Data Quality of MDR in the Eastern region of Ghana, to recommend ways of improving the quality of documentation, and in turn to inform appropriate decisions targeting the reduction of preventable maternal deaths.

Methods

The study used a mixed methods approach. Quantitative descriptive design using secondary data from all 2021 maternal death review reports in the Eastern Region and qualitative primary data from semi-structured interviews with relevant health staff were used.

Results

Notable deficiencies were found in the data quality dimensions of maternal death reviews in the Eastern Region of Ghana to include limited access to relevant data. Furthermore, the MDR data quality performance related to completeness, timeliness, and interpretability were barely above average and data handling procedures were prone to errors. The study also revealed inadequate levels of transparency in the MDR reporting.

Conclusion and Recommendations

The study identified inadequacies regarding the data quality of MDR in the Eastern Region of Ghana and calls for pragmatic efforts such as; review of the MOH/GHS MDR form to capture all relevant data; the use of an electronic database for MDR reporting; organizing training for MDR data handlers and managers, institution of MDR data validation practices, and encouraging blame-free maternal death reviews. Together, these actions will improve all MDR data quality dimensions.

Key Words: Ghana, Data Quality Dimension, Maternal Death Review/Audit, MDR.

Word Count: 11,046 words.

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ABBREVIATIONS

ANC	Antenatal Care
CDC	Centre for Disease Control
CHAG	Christian Health Association of Ghana
CHPS	Community-Based Health Planning and Services
DDNS	Deputy Directors of Nurse Services
DHIMS	District Health Information Management system
DQA	Data Quality Assessment
ERHD	Eastern Regional Health Directorate
FAO	Food And Agriculture Organization
GHS	Ghana Health Service
GSS	Ghana Statistical Service
LBs	Live Births
MaMMAS	Maternal Morbidity and Mortality Assessment System
MD	Maternal Death
MDA	Maternal Death Audit
MDR	Maternal Death Reviews
MDSR	Maternal Death Surveillance and Response
MMRs	Maternal Mortality Ratio
MOH	Ministry of Health
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
RCH	Reproductive and Child Health
SDG	Sustainable Development Goals
SQAF	Statistical Quality Assurance Framework
U.S	United States
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Fund
UNSD	United Nations Statistics Division
WHO	World Health Organization

DEFINITIONS OF KEY TERMS

Maternal Deaths: Maternal death is defined by the World Health Organization as the death of a woman while she is pregnant or within 42 days of her pregnancy termination, regardless of how long the pregnancy lasted or where it occurred, from any cause associated with or aggravated by the pregnancy, or its management, but not from accidental or incidental causes (1).

Maternal Death Audit/Review (MDA/MDR) : A detailed assessment of the events and causes of maternal deaths that occur in health facilities. Initial identification of deaths occurs at the level of the facility, but these investigations also focus on determining the combination of causes at the facility and in the community that contributed to the death and which ones were avoidable (2).

Data Quality Dimensions: Adopted from UNICEF data quality framework; Quality dimensions, as they are used at UNICEF, can be considered in four groups: Access to the data; Output quality; Process quality; and Institutional quality (3.)

Data Quality Assessment / Review: Data quality assessment (DQA) is the process of assessing data in order to establish whether they are of the type and amount necessary to really meet their intended use as well as the requisite quality for projects or business processes (4).

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CHAPTER ONE

1.1 Background

Maternal deaths are grouped based on the underlying cause of death, such as direct and indirect causes and timing of death (1). Direct Maternal Death is death of a woman resulting from obstetric complications of the pregnant state, including pregnancy, labor, and puerperium. Direct deaths are caused by: obstetric complications; unanticipated complications due to interventions, omissions or incorrect treatment; or a chain of events resulting from a combination of these factors (1). According to WHO estimates, the most common direct causes of maternal mortality are haemorrhage (25 percent), sepsis (15 percent), abortion (13 percent), hypertensive disorders of pregnancy (12 percent), and obstructed labour (8 percent) (5).

The term "indirect maternal death" refers to the passing of a woman due to illnesses or non-obstetrical problems that may already exist prior to pregnancy but are made worse by the physiological effects of pregnancy (6). Indirect causes account for about 20% of fatalities among pregnant women. Preexisting conditions such as heart disease, iron deficiency anaemia, tuberculosis, hypertension, malaria, and diabetes mellitus are a few instances that may be made worse by pregnancy (7).

According to global estimates, half a million women worldwide per year pass away during pregnancy and childbirth, and seven million more who survive childbirth experience major health issues (8). Since 1990, the rates of maternal mortality in Sub-Saharan Africa have decreased. Although these rates are not evenly spread throughout the region, Sub-Saharan Africa continues to have the highest rates of maternal death worldwide, with an estimated half of all maternal fatalities happening there (9). These declines are due to several factors; including increased access to basic obstetric care for pregnant women and their unborn babies, improved post-abortion care, better reproductive health services for adolescents, and improved family planning care. Furthermore, the building of robust systems such as strengthening stakeholder partnerships and holistic community engagement. The institutionalization of the system strengthening needs such as supply chain, improving procurement and distribution systems, effective referral systems, and training providers, have also help to diminish the rates of maternal mortality. Ghana's maternal mortality ratio declined from 760 per 100,000 live births in 1990 to 319 per 100,000 live births in 2015 (10). Unfortunately, the decline was not steep enough to achieve the millennium development goal of 190 per 100,000 live births in 2015 (10).

Maternal death is regarded as an indicator of quality care. For decades, practically all national and international goals have included reducing such deaths (11). The Sustainable Development Goals (SDGs) of the United Nations call for the eradication of infant and young child mortality and the reduction of maternal mortality rates worldwide to less than 70 per 100,000 live births by the year 2030 (12).

Maternal and perinatal death audit and review is a commonly advised technique to enhance the standard of care, reduce maternal and perinatal mortality, and may play a significant role in reaching the SDGs (13). A maternal death review offers the chance for communities, families, and health

professionals to learn from a devastating and frequently avoidable tragedy (14). Maternal death reviews' goals include enhancing safe motherhood programming's quality, preventing future maternal and neonatal morbidity and mortality, and coming up with solutions to future problems with access to vital, high-quality maternal and neonatal health services (15). There is evidence that maternal mortality has decreased as a result of maternal death audits (MDA), which have been shown to be an effective technique in improving the standard of obstetric care in Senegal, Nigeria, and Ethiopia (16). In the Eastern Region of Ghana, as mandated by the Ghana Health service, maternal death audits are routinely conducted in all hospitals. The team responsible for MDAs is made up of representatives from the Obstetrics and Gynecology unit, Public Health unit and other units within the hospital and a referral facility where necessary (17). The findings of the audit are used to identify causes of and factors contributing to maternal deaths in order to formulate recommendations for future improvement of care (18).

CHAPTER TWO

2.1 Problem Statement

High maternal deaths are recorded in the Eastern Region of Ghana. It is one of the three regions contributing the highest to all maternal deaths occurring in the country. Out of a total of 4,316 maternal deaths recorded across all sixteen regions of Ghana from the year 2017 to 2021, 10.5% were attributable to the region. Figure 1 below shows the total number of maternal deaths recorded over the last 5 years (2017-2021), highlighting the situation in the Region.

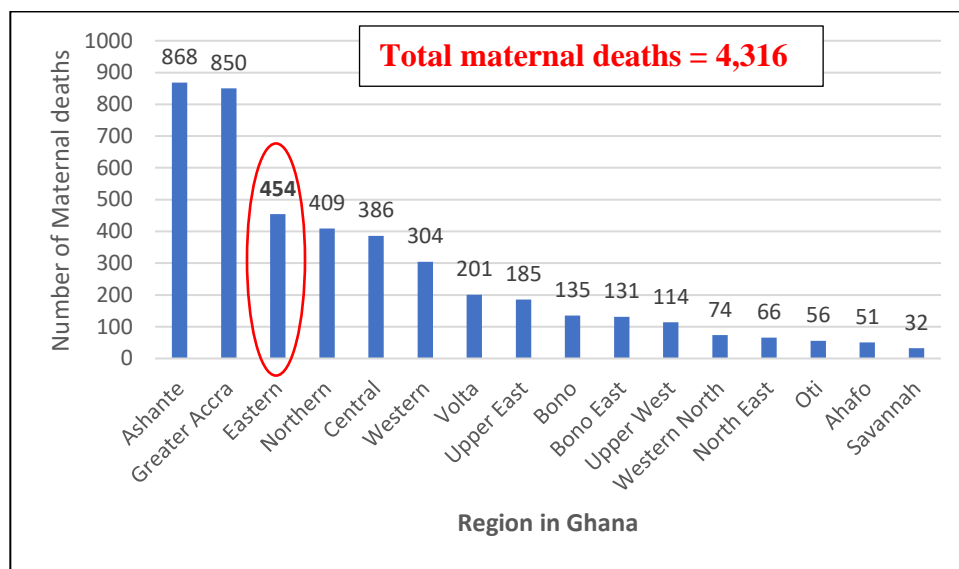


Figure 1: Maternal deaths recorded in 5 years (2017-2021) by regions in Ghana

Source: Monthly Midwifery Returns (GHS-District Health Information Management System2)

Figure 2 below shows a five-year trend of maternal mortality ratios (MMRs/100,000LBs) recorded for the period 2016-2021 in the Eastern Region.

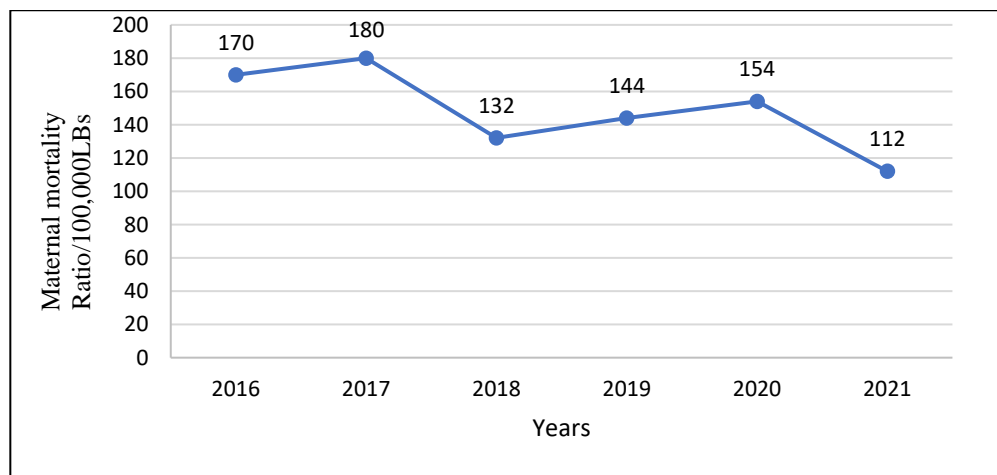


Figure 2: Maternal Mortality Ratio, 2016-2021, Eastern Region-Ghana

Source: 2021 ERHD Annual Report.

Maternal death review by a local facility team is among the region's interventions put in place to investigate maternal deaths and improve maternal health(care). Studies have shown challenges associated with maternal death reviews. These challenges include non-informative audit tool providing unreliable data for review (20); unstandardized clinical indicators (21); missing medical charts and/or information on key data variables (22). Poor data quality can lead to inaccurate findings of such reviews, deeming them inadequate and an unreliable source for decisions aimed at improving obstetric care and preventing maternal mortalities (23).

2.1.1 Justification

Data quality assessment of maternal death records can help identify gaps and system deficiencies in maternal death audits and reviews (24). Recent studies have assessed the Maternal Death Review (MDR) system in Ghana to identify overall achievements, challenges, and gaps (25). while other studies conducted in the Eastern Region have assessed factors contributing to maternal deaths (11). The MDR reports serve as the data source for most of such studies in Ghana (11,25). There is however no known study in Ghana that has specifically assessed the data quality of the MDRs. Ghana is preparing to transition from a Maternal Death Review (MDR) system to Maternal Death Surveillance and Response System (MDSR) (25). The enhanced MDSR system is seen as a model to further measure and track all maternal deaths in real time, aiming to support a more current and in-depth understanding into the underlying factors contributing to maternal deaths, in order to stimulate and guide actions to prevent future Maternal and newborn deaths. The objectives of this envisaged transition which is seen to be heavily dependent on data could only be achieved if the data to be used in measuring and tracking all the maternal deaths is of good quality.

This study therefore aims to describe the data quality dimensions of maternal death reviews in the Eastern Region, which is among the top-three contributors of maternal deaths in Ghana, to highlight current practices and inadequacies associated with MDR data quality, to serve as lessons contributing to knowledge on improving future models like the MDSR which aims to further reduce preventable maternal deaths.

2.2 General Objective

The overarching objective of this study is to assess Data Quality of Maternal Death Reviews in the Eastern region of Ghana, in order to recommend ways of improving the quality of documentation of maternal death reviews, to in turn inform appropriate decisions targeting the reduction of preventable maternal deaths.

2.2.1 Specific Objectives

1. To describe the approach and tools used in Maternal Death Reviews in the Eastern Region of Ghana.
2. To describe the 'Data Process Quality' of Maternal Death Reviews in the Eastern Region of Ghana.
3. To assess the 'Data Output Quality' of Maternal Death Reviews in the Eastern Region of Ghana.
4. To describe the 'Institutional Quality' of Maternal Death Review documentation in the Eastern Region of Ghana.

5. To recommend ways of improving the overall data quality of Maternal Death Reviews in the Eastern Region of Ghana.

2.3 Conceptual Framework

Data quality is addressed in numerous publications across organizations with regard to particular projects or data sets. It helps decision-makers (both internal and external) to use data in the right ways to improve results and maintain public trust in data products. Drawing these data quality principles together into a comprehensive framework enables continuous efforts to develop and disseminate high quality data (3). The framework used in this study is the 2021 Data Quality Dimension Framework designed by UNICEF. The Generic Statistical Quality Assurance Framework (Generic SQA) template created by the UNSD, as well as international organizations like the OECD, FAO, and World Bank, are heavily cited in the framework. The Framework's objective is to facilitate a coherent method of comprehending data quality across the wide range of data types, sectors, and products in order to make informed decision about the meaning of data and to also encourage data-driven decision-making (3).

The quality dimensions, as they are used at UNICEF can be considered in four groups: access to the data; output quality; process quality; and institutional quality. It is crucial to pay attention to each of these areas in order to promote the development of data that can be relied upon to make judgments that are both suitable and goal-oriented (3). The objectives of the research were explored in line with the dimensions of the framework.

Table 1: UNICEF Data Quality Framework

Aim	Category	What do we need to know	Dimension	Specific area
DATA THAT ARE TRUSTED	ACCESS	Can I find the data I need easily?	Accessibility	Target audience Publication platforms Access policy and procedures
	OUTPUT QUALITY	Do the data measure what I need/ what they say they do?	Relevance	Concepts and content Coverage Inclusion
		How accurate are the data?	Accuracy	Completeness Precision Reliability Consistency
		Are the data timely?	Timeliness	Time since reference Punctuality Frequency
		Do the data make sense?	Interpretability	Metadata and documentation Comparability

AND USEFUL	PROCESS QUALITY	Can I see how the data were obtained?	Appropriate sources Metadata and documentation
		Does the data handling process minimize/ check for data handling errors? Do the methods reflect best practice?	Sound methods and systems Ethical data practice Sustainability/cost-efficiency
		Are there processes to keep up to date with best practice?	Review procedures
	INSTITUTIONAL QUALITY	Is the organization impartial and objective?	Impartiality and objectivity
		Is the organization transparent and credible?	Review procedures Data quality framework Statistical coordination

Source: Data Quality Framework, UNICEF, 2021

2.3.1 Access

Accessibility: The utility of data is largely determined by accessibility, which is sometimes treated as merely a component of output quality but which should actually be considered as a separate category. It covers the suitability of the data's available forms, the distribution channels, the accessibility of user support services and metadata, and, if there is a fee, the data's affordability for consumers (26).

2.3.2 Output Quality

Relevance: The specification of the data items and how they are used, with the goal of accurately measuring the feature, trait, or outcome we are looking to report on, are the core concepts of relevance. The degree to which the data set's coverage corresponds to the target population determines this. Whether the measured item adequately responds to the research topic is taken into account in this quality dimension. Since it is based on a reasonable or appropriate assumption or metric (content and concept), it is collected from the population it purports to represent, and it reflects the variety of that population (27).

Timeliness: The amount of time between the data's availability and the occurrence or phenomena it depicts (the "reference period") and whether the data is received quickly enough to be relevant are what define whether a data product or statistical output is timely. (28).

Accuracy: The degree to which data accurately estimate or characterize the quantities or traits that they are intended to assess is known as accuracy. The degree of similarity between the values presented in the product and the (unknown) true values is referred to as accuracy (or error). Since the "true" value of most statistics is frequently unknown, the "accuracy" of our data—or how close

we are to it—is evaluated in terms of the following sub-dimensions: the completeness of the data set; the precision of the result; the reliability (or repeatability) of the result; and the coherence of the data (29).

Completeness: A target population's completeness is determined by how many of the events or people (referred to as "records") were actually recorded (30).

Precision: Precision is a measure of how confident we are in the results, or how certain we are that we have reported the "real" value (31).

Reliability: relates to how consistent the outcome would be if the study or collection was conducted again in the same population, over the same time period, and with the same methodology. It can also reveal how closely values of a statistical output that were initially released compared to numbers afterwards provided for the same reference period (32).

Consistency: The term when used in its broadest sense, denotes the idea that the data are "at least reconcilable." For instance, in order to reconcile two outputs that both claim to cover the same event but differ in terms of durations, valuation, and coverage (33).

Coherence: In order for a dataset to be coherent, the fundamental data elements must be founded on similar ideas, definitions, and classifications (34).

Interpretability: also known as clarity of a statistical output, measures how simple it is for consumers to comprehend and use the data (35).

2.3.3 Process Quality

This has a direct impact on the output quality and the strategies used to find the best data sources, collect them, process them, and display them. The basis for a high-quality process is the choice of acceptable data sources and clear documentation of those sources. Appropriate data sources are not absolute and substantially depend on what is available in each context. It necessitates a precise explanation of the data that is required and when it is needed. To ensure high-quality data processing, sound procedures and systems are necessary. In addition to sound procedures and systems, ethical data practices explicitly acknowledge the hazards that may be present when processing the data. It may be required to collaborate with key users to rank data demands against potential consequences while taking the system's sustainability into account and taking the cost of data collecting into account (3).

2.3.4 Institutional Quality

It is common knowledge that information may be changed and presented in ways to support particular ideologies or political objectives. Users must have faith that data will be presented impartially and objectively if they are to trust the quality of the information used to guide planning and decision-making. This means that professional principles, rather than pressure from service providers, users, or other stakeholders, dictate statistical methods and outputs (3).

languages spoken in the region. Agriculture is the main economic activity in the Eastern region, employing about 53% of the economic active population (36). The Eastern region is well endowed with many mineral and other resources. Its key mineral resources include gold, diamond, bauxite, limestone, kaolin and clay. Gold and diamond are the only commercially mined minerals at this point, with a plan to begin mining its major bauxite deposits in the near future (36). The region additionally boasts of major tourist sites such as Aburi botanical gardens, Akosombo Hydroelectric dam and Boti falls (36).

Health profile

Most of the population in the Eastern region, with the out-patient department (OPD) per capita of 1.5 in 2021 (37), seems to have marginally less access to health services (including maternal and newborn services). The region for the time of this study showed different categories of health facilities; (1 Regional hospital, 18 District Hospitals, 841 Community-Based Health Planning and Services (CHPS) centers and 96 private facilities made up of hospitals and clinics). The Region's estimated doctor to population ratio in 2021 was 1:8,900 and nurse to population ratio for the same period was 1:380 (37). Like other regions in Ghana, maternal and newborn mortalities were key health challenges. The 2021 annual report of the Reproductive and Child Health (RCH) Unit of the Eastern Regional Health Directorate (ERHD) identified the following as key service challenges in the region:

- High maternal death rate
- High still births rate
- Low use of family planning services
- High number of teenage pregnancies
- Decreasing trend of some Reproductive Health indicators
- Poor documentation and management of RCH data in registers and poor data capture in DHIMS2 (38).

3.1.3 Study Sample/ Population

The Data Quality Assessment of Maternal Death Audits in the Eastern region covered all 92 maternal death review reports received by the Eastern Regional Health Directorate in 2021. Interviews were conducted with 35 participants, who were purposively selected based on their technical experience, aiming to provide snapshot of data quality issues relating to maternal death reviews in the Eastern Region. All participants were health staff responsible for maternal death surveillance and reporting in the Eastern Region and consisted of: District Health Directors, Medical superintendents of District Hospitals, Gynecology specialist, Deputy Directors of Nursing Services, Public Health Nurses, Health Information Officers, Clinical nurses, Maternity ward in-charges, and Midwives.

3.1.4 Data Collection

Quantitative

Data collection for this paper included the use of a google form (checklist) by the principal investigator with the support of two research assistants to compare the Eastern region's maternal

death audit form to the Ghana Health services standard form for reporting maternal Death Audits. The Ghana Health Service’s audit form was subsequently compared to the revised 2020 WHO/ UNHCR standard MDR form, which was considered the ‘gold standard’ for the purposes of this study. The WHO/ UNHCR advocates for adjustments and/or propose the use of WHO/ UNHCR standard MDR form when a country’s available form does not comply with minimum standard of needed information (39). Additionally, secondary data captured on all 92 MDR reports received in 2021 by the ERHD were assessed. For each of the audit reports, detailed reviews were conducted to validate information on the report variables, such as client information, services provided, cause of death, location of death and time of death to ascertain their availability and completeness.

Table 2: Data Collection Approach

Objective	Technique used
1. To describe the tools and the approach used in Maternal Death Reviews in the Eastern Region of Ghana.	<ul style="list-style-type: none"> • Comparison of MOH/GHS MDR form with revised 2020 UNHCR standard maternal death review form • Semi Structured Interview with staff.
2. To describe the ‘Data Process Quality’ of Maternal Death Reviews in the Eastern Region of Ghana.	<ul style="list-style-type: none"> • Semi structured interview with staff. • Secondary data analysis of 2021 MD audit reports
3. To assess the ‘Data Output Quality’ of Maternal Death Reviews in the Eastern Region of Ghana.	<ul style="list-style-type: none"> • Secondary data analysis of 2021 MD audit reports • Semi Structured Interview with staff.
4. To describe the ‘Institutional Quality’ of Maternal Death Review documentation in the Eastern Region of Ghana	<ul style="list-style-type: none"> • Semi structured interview with staff.
5. To recommend ways of improving the overall data quality of Maternal Death Reviews in the Eastern Region.	<ul style="list-style-type: none"> • Analysis of quantitative and qualitative findings

Qualitative

In-depth interviews using semi-structured interview guide were conducted through the support of two trained research assistants. Facility staff involved in the compilation of maternal death audit reports and health managers responsible for maternal death surveillance in the Eastern Region were interviewed. The interviews aimed at eliciting responses from the experiences of the staff on data quality issues and decisions relating to maternal death reviews in the Eastern Region. Data collection was carried out through computer-assisted personal interviews in the English language. Following their informed consent, the link to an open question google form interview was sent to participants’ smart phones. The PI followed up with a phone call to participants whose responses required further

probing. The interviews were not tape-recorded because of the virtual technique employed. The form obtained information regarding participants' professional background, their views on data quality dimensions outlined in the UNICEF data quality dimension framework and their recommendations for improvement. On average, it took around 30 to 40 minutes to completing and submitting a response. Data was then downloaded into an Excel spreadsheet for analysis.

3.1.5 Data Analysis

Quantitative analysis for this study employed the use of SPSS version 17.0 to analyze the data for all (census) 92 MDR forms. Results were presented using descriptive statistics such as percentages and frequencies.

To describe the tools used for reporting MDR in the Eastern region, the data items or variables accessible on the 2020 WHO/UNHCR form were compared with those that were on the MDR form used in the Eastern Region in order to detect any gaps. The description includes how any missing data element affect the ability to assess the fitness for purpose of the MDR data. The MDR reporting approach in the Eastern Region was described using expert views from the interviews.

The analysis of **Data Process Quality** consisted of describing the mode of data collection onto the MDR form, the format in which the data were available at source and at the regional level, and any known problems in data processing.

Data Output Quality was analyzed in the following dimensions:

- **Relevance:** Following description of the primary purpose of data collection, gaps were identified between key user needs in terms of coverage and detail and analyzed how well the output data met user needs. Additionally, we described constraints on the availability of data at the required level of detail, the main uses of the MDR data, and any actions taken to improve relevance.
- **Accuracy:** A description of the coverage of MDR data, including any known coverage challenges and sources of error in the MDR data. Missing variable on reporting forms and incomplete reporting are also described.
- **Timeliness:** Differences of time lag from the reference date/period to the release of the final output were determined key user needs for timeliness of data and how these needs have been addressed.
- **Interpretability:** A description of users' responses in the understanding of concepts, definitions, and variables of the MDR form. Proportion of respondents with difficulty in the understanding of the MDR form was also noted. Barriers and facilitators associated with interpretability were also highlighted.

The analysis of **Data Process Quality** consisted of describing the mode of data collection onto the MDR form, the format in which the data were available at source and at the regional level, and any known problems in data processing.

The **Institutional Data Quality** was analyzed by describing respondents' view on the credibility of the data provided on the MDR reports and the transparency in reporting by the facility in question.

Qualitative analysis

The qualitative analysis of the study was guided by the study objectives. Reading through the responses from the open-ended questions on the interview guide and written notes from the follow-up calls by the PI, common themes connected to the data quality dimensions in the framework were developed and used to generate a coding list. The established codes were then applied to all the responses received using excel spreadsheet. Pivot table feature in the excel spreadsheet was used to populate similar thoughts and ideas. Results were presented using percentages and numbers to represent frequency of responses. Direct quotes from participant responses were used to elaborate on major findings.

CHAPTER FOUR

4.1 Results

The results are organized according to the data quality dimensions of the conceptual framework of this study, in line with the study objectives. The results from the secondary data analysis and the semi-structured interviews are presented concurrently to ensure triangulation of information necessary to answer in perspective the study objectives. The background to the secondary data analysis and the interviews are presented first. A total of 92 maternal death review forms were used for the secondary data analysis. All the 92 (100%) maternal death audit reports assessed were in paper-based formats. As highlighted in figure 4, most (61%) of the reports were received from the Regional Hospital, 25% from District hospitals and 11% from Christian Health Association of Ghana (CHAG) hospitals. The rest (3%) came from private facilities.

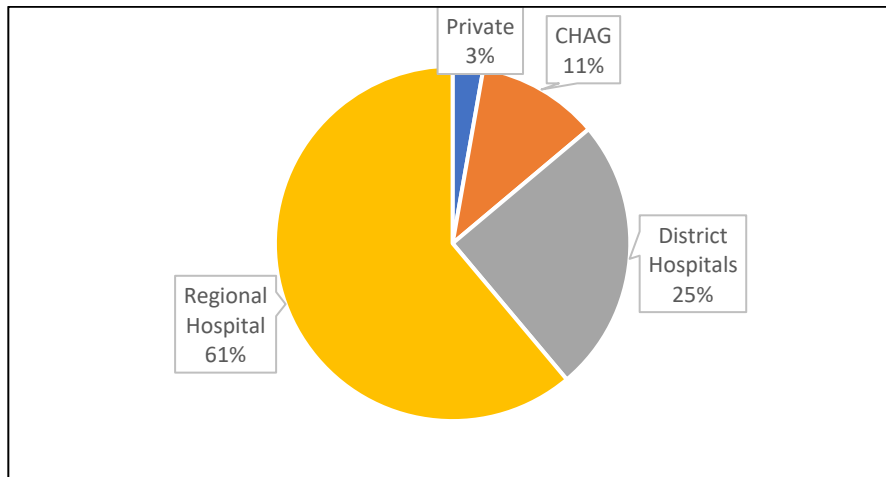


Figure 4: Distribution of MDR reports by health facility types

Figure 5 below presents the professional background of the respondents for the semi structured-interviews. Thirty-five (35) participants responded to the google form interviews. The highest (20%) among them were Health Information Officers, 17% were Public Health Nurses, 14% Midwives, Medical superintendents formed 12%, District Health Directors and Clinical nurses made up 11% each, 9% were Deputy Directors of Nurse Services (DDNS) and 6% were Medical Officers. The gender distribution of the respondents is presented in figure 4. More than half, (58.3%) identified themselves as females and 41% as males.

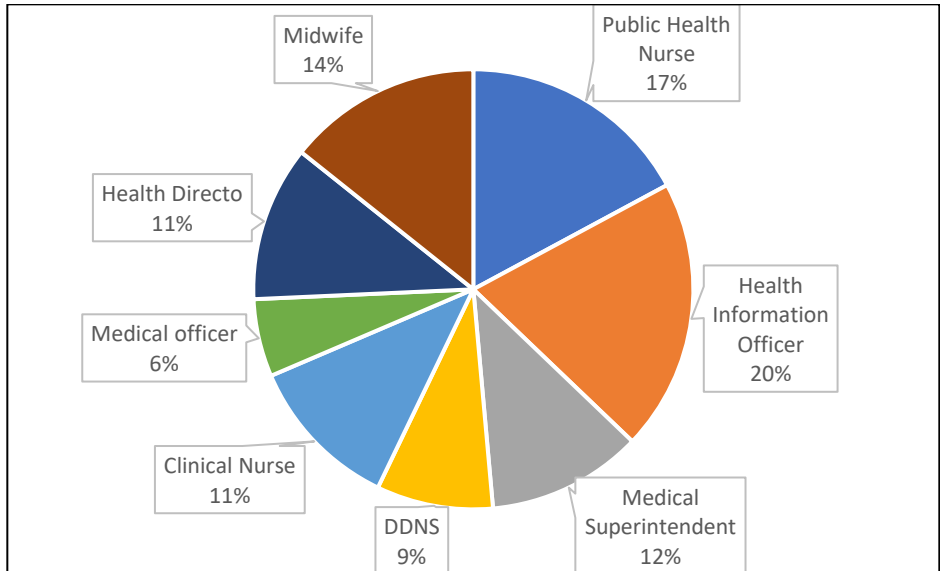


Figure 4: Professional background of respondents

More than half of the professionals interviewed identified themselves as females (58%) and the rest(48%) males as shown in figure 6.

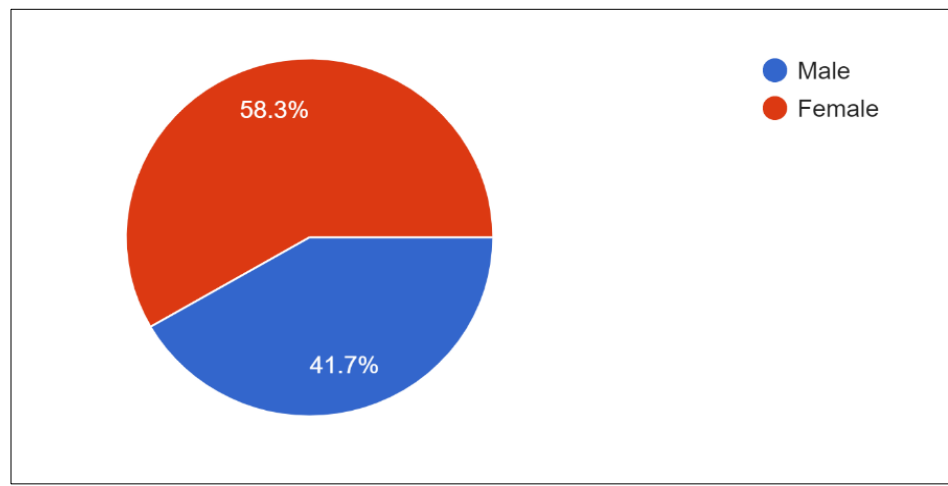


Figure 5: Gender type of professionals

The number of years in professional practice of respondents is presented in figure 7. Among the 35 respondents, 23 (65.7%) had been in professional practice for more than ten years, eight (22.9%) for 5-10 years and four (11%) less than 5 years. None of the respondents had less than 1 year of experience in his or her profession.

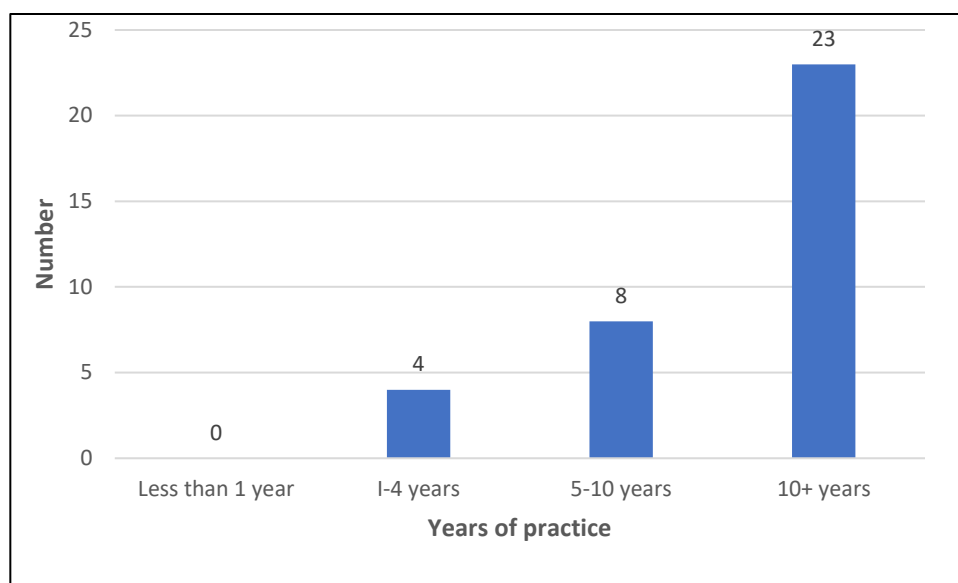


Figure 6: Number of years in professional practice

4.1.1 Description of the approach used in Maternal Death Reviews in the Eastern Region

The key informant interviews provided detailed descriptions of the practical experience of the Maternal Death Review reporting approach in the Eastern Region. This is detailed as follows.

The Maternity ward in-charge or the Deputy Director Nurse Services (DDNS) of the facility where the maternal death occurs, records and notifies (by a phone call or via text) the District Public Health Nurse at the District Health Directorate within 24 hours. The facility DDNS or the District Public Health Nurse notifies the Regional Health Directorate through the Regional Maternal Death Coordinator within same 24 hours. Line-list of maternal deaths, kept at the district and the regional health directorate is then updated by the District and the Regional Reproductive and Child Health Units. Within 7 days of a death, the Maternal death review is conducted in the facility where the death occurred as per the standard of the Ghana Health Service. Members of the Maternal Death Review Team include: the Regional Maternal Death Coordinator, obstetrician/specialist, DDNS, Pharmacist, laboratory in-charge, health administrator, representation from a referral facility if the deceased was referred, midwife and any other staff who were involved in the management of the client when the death occurred. These members review the death as per MOH/GHS' guideline for maternal death review. The information gathered during the review and technical explanation to events are then compiled into the Maternal Death Review (MDR) form after the review by the Maternity ward in-charge and/or the DDNS and any other staff identified to provide information surrounding the death. The finalized MDR report is reviewed again and signed by the head of facility and then forwarded to the Regional Health Directorate. The Regional RCH unit makes a summary of the received MDR report received unto an excel template and subsequently provides feedback. They are also responsible for monitoring implementation of the recommendations made in the audit report. It is worth noting that the MDR form is neither entered, nor stored electronically along the chain of reporting. The facility Health Information Officer is only notified at the end of the month to enter the number of maternal deaths that occurred in the facility for the month unto the District Health Information management system (DHIMS).

The approach to maternal death reviews in the Eastern region as found in this study were generally observed to correspond to the GHS guidance to maternal death reviews in Ghana which emphasizes that; the maternal death reviews should focus on health systems not individuals; maternal death must be a notifiable event; maternal death reporting must be done at specified time periods; and the review mechanism must use a team approach (40).

4.1.2 Description of tools used in Maternal Death Reviews in the Eastern Region

From the secondary data analysis, it was observed that the MOH/GHS MDR reporting form was the main form used by all facilities in the Eastern region, with the main distinction being that some facilities created additional space on the MDR forms to provide data on variables originally not demanded by the MDR form. Examples are family history, community information about the death and perinatal data.

The 2020 WHO/UNHCR revised MDR form and the present GHS/MOH MDR form were contrasted to describe the tools used for reporting maternal mortality reviews in the Eastern region. This was to ascertain whether the current MDR form used in the eastern region met the minimum standard according to WHO/UNHCR. Table 2 presents missing information on the GHS/MOH form after comparison to the so ‘called standard’ in this study, reflecting the existing gap.

Table 3: List of data elements absent on GHS/MOH MDR form

Data Elements
1. Ever seen by health staff for this pregnancy
2. Date of last ANC visit
3. ANC Performed by (qualification only)
4. Has there been any hospitalization during this antenatal period
5. Have any medications been prescribed during this period apart from above
6. Number of PNC visits
7. Condition upon admission
8. Was the partograph correctly filled? (Reviewed by the audit team)

A total of eight (8) minimum standard needed information /data elements for MDR reporting, according to WHO/UNHCR were observed not to be available on the GHS/MOH MDR form. The GHS/MOH MDR form used in the Eastern region did not make provision to indicate whether the deceased were ever seen by health staff during their pregnancy. Though the form made room for the number of antenatal care (ANC) attendances, there was no prompt to indicate the date of last ANC visit, neither did it inquire on the qualification of staff who provided ANC to the deceased. The MOH/GHS MDR form also does not emphasize on whether the deceased was hospitalized or if medications were prescribed during the ANC period. There was no variable for capturing the time between delivery/abortion and maternal death. If the death occurred in the postnatal period, the form does not make provision to indicate the number of PNC visits and /or services provided. The form is not explicit on patient’s condition upon admission or the accuracy of the filed partograph. It was however noted that the current MOH/GHS MDR form provides room for a case summary, which might capture some of the minimum standard needed information missing on the form.

4.1.3 MDR Data Accessibility

Access to appropriate data to complete the MDR form, represents an important component of the data quality process dimension. The responses from the interviews regarding accessibility reflect how readily data for MDR reporting could be discovered, located, and accessed by both generators and users of data. Figure 8 highlights how often participants claimed to have access to all the information needed to complete the MDR form.

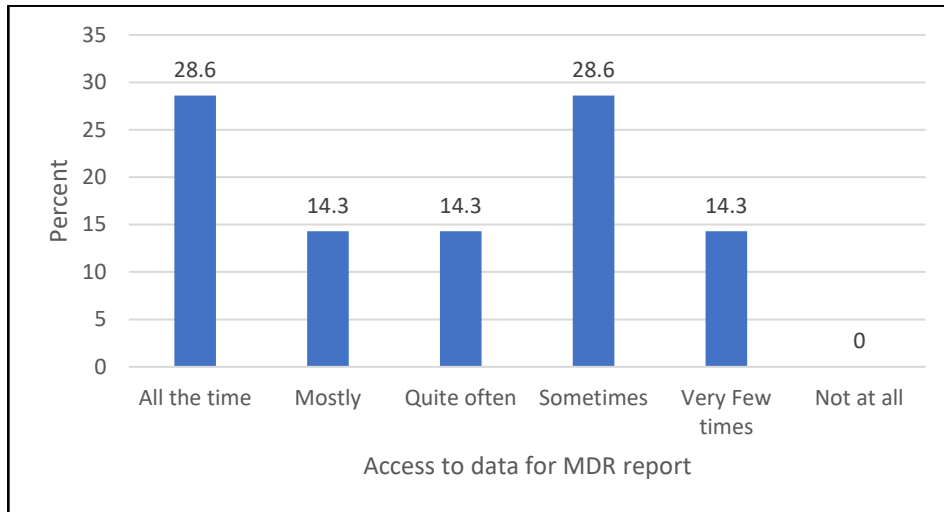


Figure 7: Frequency of access to all the data needed to complete the MDR form

Less than 30% of the respondents mentioned they had access to all the data needed to fill the MDR form ‘all the time’. 14% each described they ‘mostly’ or ‘quite often’ had access to needed data. As high as 28% indicated they ‘sometimes’ had access to the needed data and 14.3% responded with ‘very few times.’

Participants also indicated how readily the needed or relevant data for completing the MDR form were available. Figure 9 presents the responses.

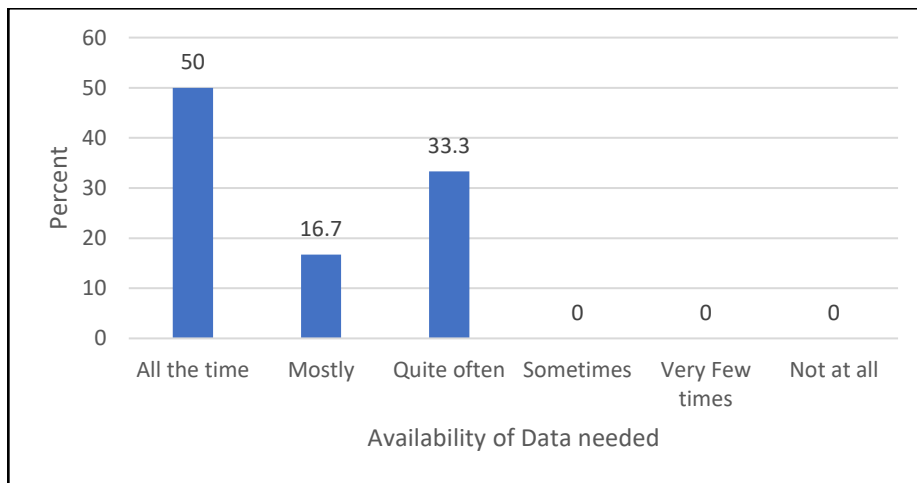


Figure 8: Regularity of the data needed to complete the MDR form

Half (50%) of the respondents indicated the needed data was available ‘all the time’ 16% described it as ‘mostly’ and 33% as ‘quite often.

4.1.4 Data Output Quality of the MDR reports

The results of data output quality assessment are presented in line with the data output quality dimensions (*relevance, accuracy, completeness, timeliness, and interpretability*) as identified by the conceptual framework. The results represent findings from both the secondary data analysis and the key informant interviews.

Relevance of the data used in completing the MDR reports.

Participants in the key informant interviews shared their views on the significance, primary purpose and the main uses of the MDR data collection. Many acknowledged that to effectively identify the underlying causes of maternal mortality and to assist Maternal Death Reviews, adequate and accurate MDR data is needed. The data was said to provide critical information needed to identify opportunities to improve clinical and preventive care for pregnant women. Others also mentioned that the data offers the chance for health staff, to gather important information surrounding a maternal death and to communicate with facts about the magnitude of the problem at a particular point in time.

“It is the data we need before we can know what really happened, without the data we can only speculate or assume the causes of maternal deaths during the maternal death review. The data is needed to provide evidence on what really took place, in order to direct decisions taken during the review. The data can also be used to show trends so we can track progress.” ...Health Information Officer.

Figure 10 describes the extent to which the data from used source documents met the needs of users in completing the MDR forms.

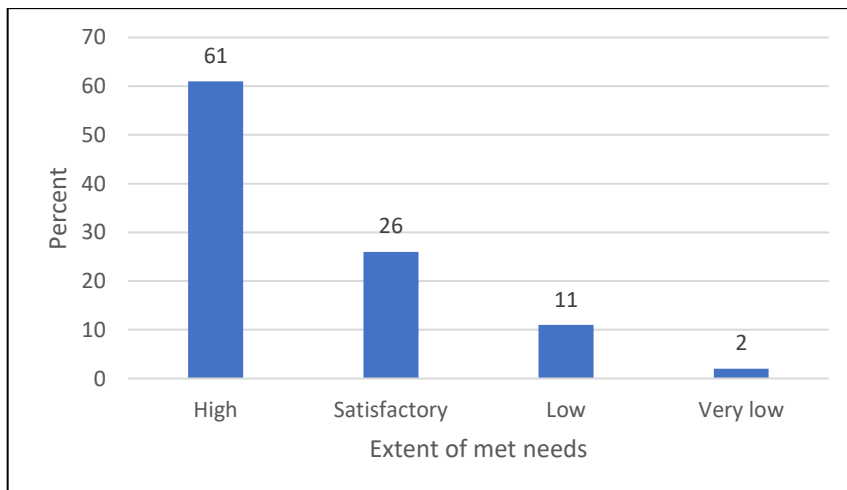


Figure 9: Extent to which MDR data met the needs of users

The majority (61%) of the participants mentioned that the MDR data they received met their data needs for MDR reporting ‘to a high extent’. 26% said they were satisfied with the extent of data they received. 11% and 2% of the respondents described the extent to which the data met their needs as low and very low, respectively. Of those that revealed gaps between the key user needs and the coverage and detail of MDR data, they elaborated the following challenges (figure 11).

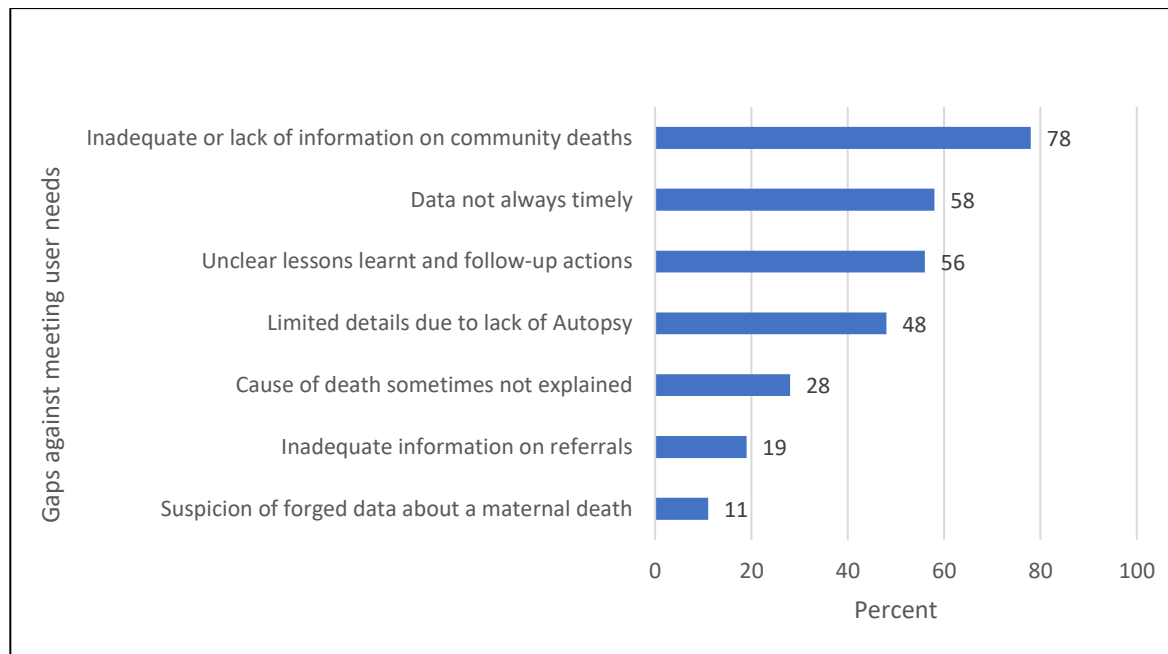


Figure 10: Identified known gaps against user needs

From figure 11 above, close to 80% of the participants acknowledged that one of the major gaps to their data needs was the absence of data on the community perspective about the death on the MDR form. A *district health director explained,*

“In fact, to be certain that these are the true causes surrounding a maternal death, all other factors should be considered, not just the happenings in the health facility, issues in the community where the woman came from should also be investigated to get the total picture of the whole scenario. I don’t know why our Maternal death audit form only captures information at the hospital leaving the community details” ...District Health Director

Another gap, mentioned by 58% of the participants, was the lateness of receiving the MDR reports. 56% of participants mentioned unclear lessons learnt and follow up actions. 48% said most of the causes of death stated on the MDR form are not explained, because autopsies are not regularly performed. 28% of participants acknowledged the limited details on the cause of death captured on the MDR form. 19% had concerns with inadequate referral information in case the diseased was referred from a different facility. 11% of the respondents suspected that data about the whole MDR reporting were sometimes forged.

Participants listed several actions to improve the relevance of the MDR data to meet their needs (figure 12). Out of 35 participants, more than 20 stated that the Eastern region’s current MDR form

should be converted into electronic format to minimize errors and improve timeliness. Close to 20 of the participants responded that, for the data to meet their needs, reports should be timely and complete. Others stated that the MDR data should cover information from the community about the deceased.

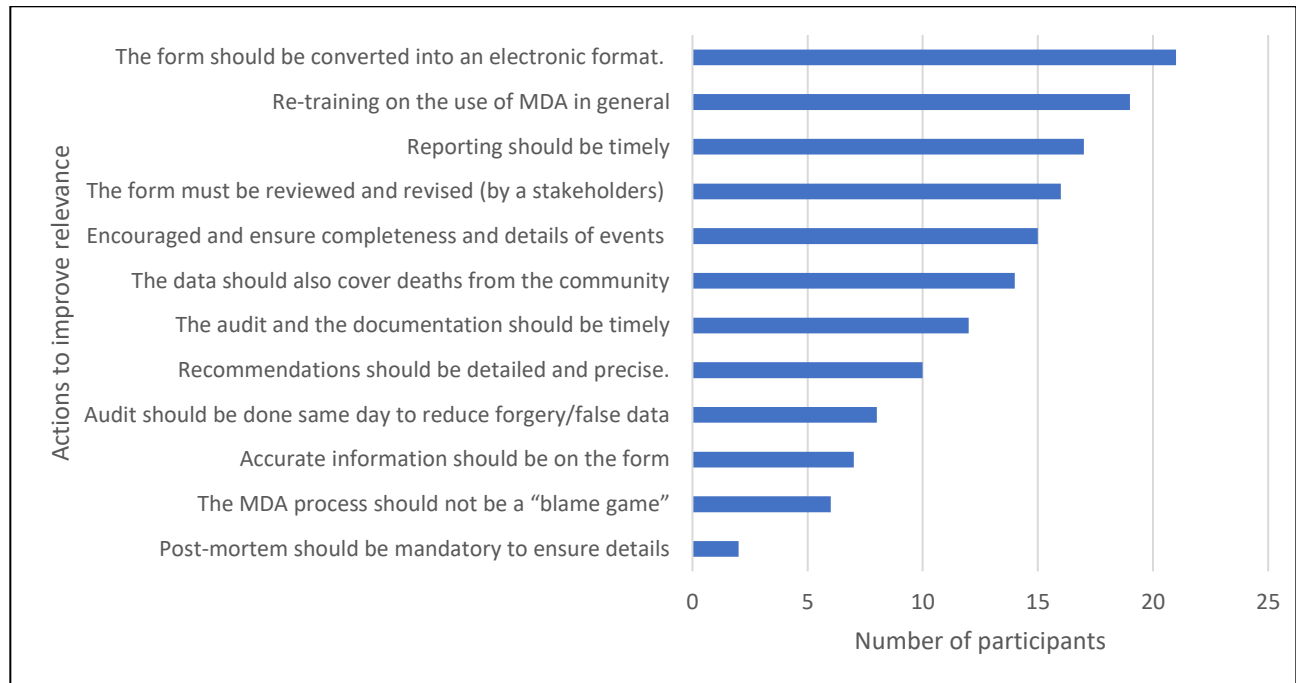


Figure 11: Actions to improve MDR data to meet key user needs

Accuracy of the data used in the MDR reports

Accuracy as a dimension of data output quality in this study was measured in the following sub-dimensions: completeness of data; timeliness and consistency of reporting and the interpretability of that data.

Completeness of the data used in the MDR reports

From the secondary data analysis, it was observed that of the 92 MDR forms, 74% were ‘completely filled’, this implied that data entries were made in all the required fields. 26% of the forms, however, had incomplete records implying that data entries were not made in fields expected to contain records. This is depicted in figure 13.

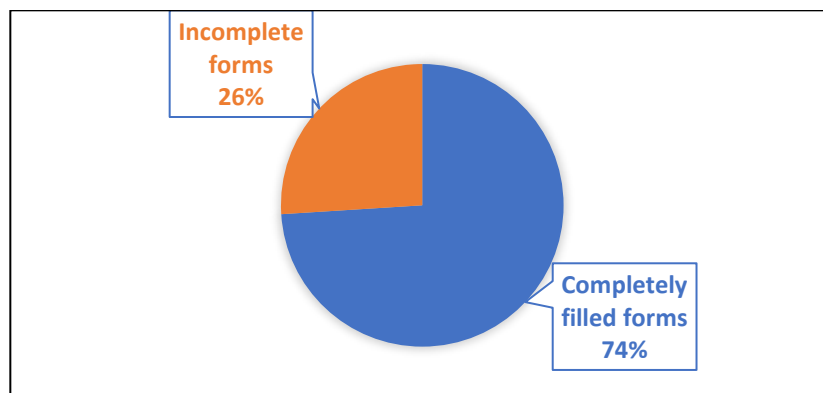


Figure 12: Completeness of MDR forms

A total of twenty-four (24) forms had incomplete records, out of this, the most frequent data elements not completed were; the estimated gestational age at the time of death (91,7%), main symptom prior to death (87,5%); risk factors (70,8%); lessons learnt (70,8%) and date of death (58,3%). The rest are displayed as shown in table 4 below.

Table 4: Top ten (10) data elements not completed on the MDR forms

Data Element	Number of forms not completing the data element. N=24	%
1. Estimated gestational age at the time of death	22	91.7
2. Main symptom prior to death	21	87.5
3. Risk factors	17	70.8
4. Lessons learnt	17	70.8
5. Date of death	14	58.3
6. ANC attendant?	11	45.8
7. List of participants for the Audit	9	37.5
8. Time and date of admission/seen at facility	8	33.3
9. Date of report submission	5	20.8
10. Potential avoidable factors/missed opportunities	5	20.8
11. Obstetric history	2	8.3

Timeliness of reporting the data used in the MDR reports

To determine whether the MDR reports met the deadlines of reporting, the date of death as indicated on the form during the secondary data analysis was compared with the date the report was received

at the Regional Health Directorate. Per MOH/GHS maternal death review guidelines, it is expected that maternal death review is conducted within 7 days of the date of death. A difference of more than 7 days observed on the MDR form was considered late. Out of the 92 forms assessed, 62% of the MDR forms were observed to have been submitted on time. 32% per the analysis, were considered late. 6% of the forms did not indicate the date of death, making the comparison impossible. Figure 14 below highlights this.

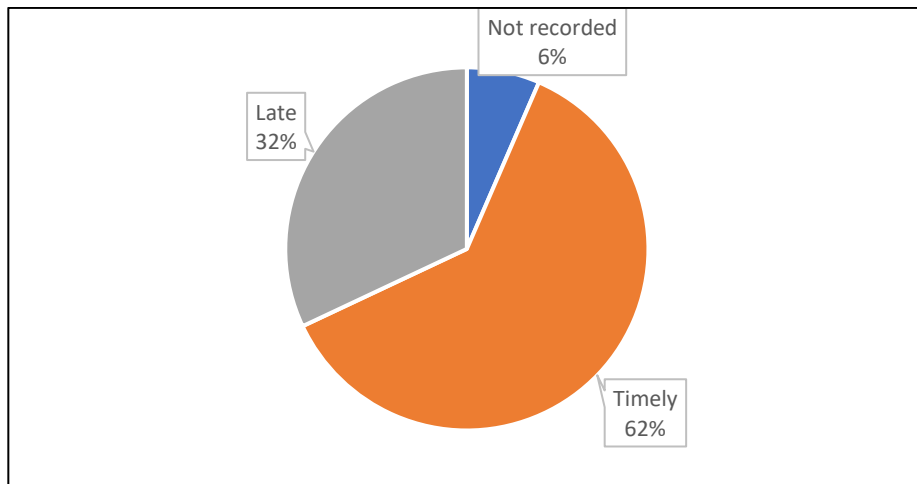


Figure 13: Timeliness of MDR report submission.

Consistency of reporting the data used in the MDR reports

In assessing the consistency (or uniform information) across MDR reporting channels in the Eastern Region, the number of MDR forms (scanned copies) received for secondary data analysis was compared with the total number of maternal deaths recorded as audited on the District Health Information Management System (DHIMS2- *the Ghana Health Services official platform for health information management*). This was additionally compared to the excel line list database at the Regional Health Directorate used for keeping track of maternal deaths in the Eastern region. 92 copies of the 2021 MDR forms were confirmed and received for the secondary data analysis as compared to 80 audited deaths in the DHIMS2 for the same period. The number was even higher (102) on the excel line list used for tracking maternal death audits at the Eastern region.

Interpretability of the MDR data

In the assessment of data interpretability, reflecting the ease with which users understood and properly used the MDR data, participants were asked to share their opinion. Figure 15 shows 76% of the respondents indicated the data provided on the MDR form was clearly understood. 16% mentioned the MDR data was ‘somehow’ understood and 6% said the MDR data was confusing.

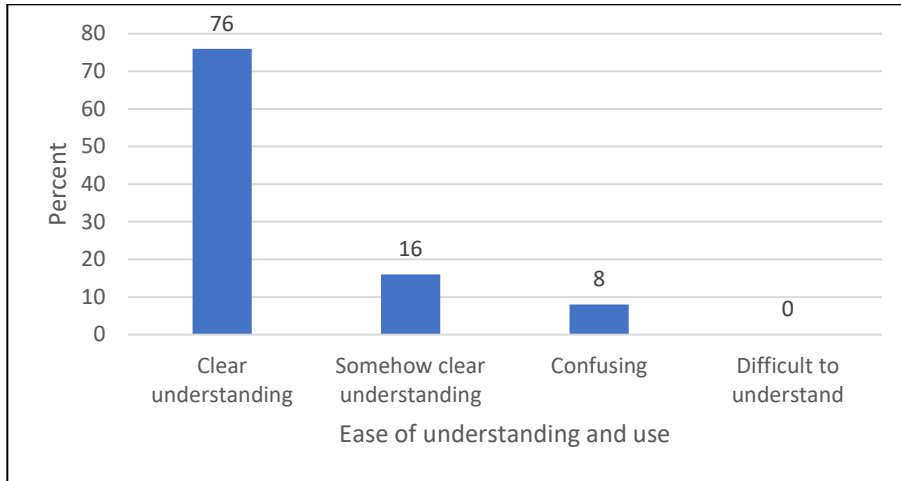


Figure 14: Ease of understanding the MDR data

4.1.5 MDR Data Process Quality

The procedure for compiling the MDR reports were described by participants in the interviews. It was mentioned that several primary source documents such as the maternal health records book, autopsy report, cause of death register, admissions and deaths register, labour records book, nurse notebooks and others were used in the compilation of the MDR reports. Additionally, each portion of the MDR reports were compiled by several other staff depending on their specialty (ie. Medical officer, midwife, anesthetic, pharmacist etc.)

Participants were asked whether they had ever doubted the credibility of the data used in the process of reporting the MDR. Figure 16 below presents the participants views.

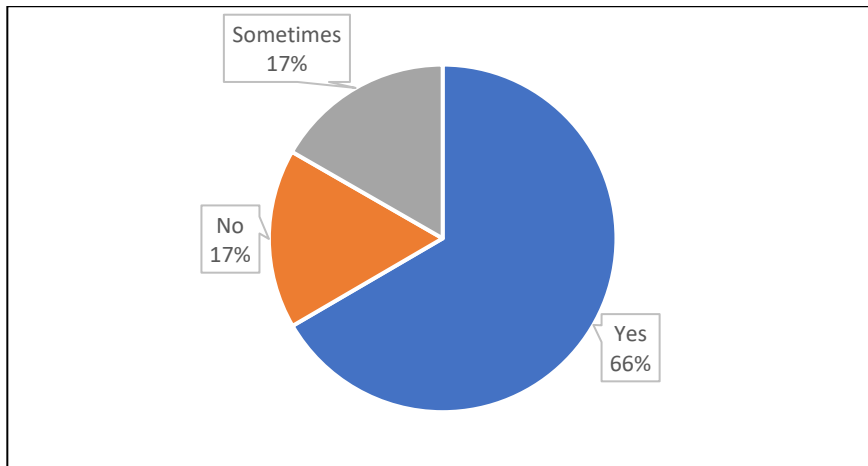


Figure 15: Suspicions about MDR data credibility

The majority (yes: 66% and sometimes: 17%) of the participants ever doubted the credibility of the data used in reporting the MDR, whilst 17% mentioned they had never had any doubts.

When asked about the suspicions, a medical superintendent of a hospital explained.

“The data I suspected could not be traced, I wanted to find out whether the list of medication that had been captured on the MDR report was the same as in the woman’s folder, but the data could not be found anywhere else”....Medical superintendent of a hospital

Furthermore, a midwife explained a specific instance where she had suspicions about the MDR data credibility,

“There was an instance where I received a call from the Region asking me about one case I ever referred for further treatment from my health centre, but later heard she had passed on. I was told that on the MDR form submitted to the region by the hospital where the client died, (I don’t want to mention the name), it was indicated that the lady who died was non-ANC attendant, but I knew that she had received ANC services more than 3 times”....Midwife

Enquiries were made into what prevented a smooth data quality process of completing MDR forms. Figure 17 presents common themes of participants views as emanating from the interviews.

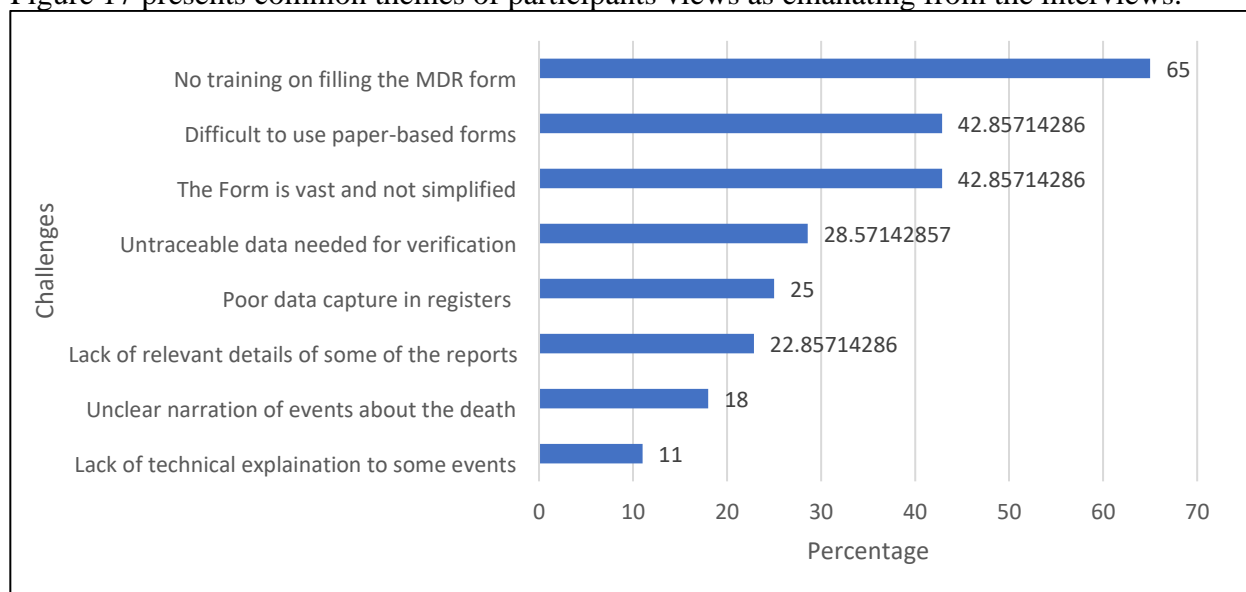


Figure 16: Challenges of the data quality process

In enumerating the main challenges that prevented the smooth process of filling the MDR form, more than 60% of participants mentioned they had not received any form of training on how to fill the MDR form. Over 40% acknowledged the vastness and difficulty associated with using a paper-based format. Almost 30% of the participants also mentioned not being able to trace data from source documents as well as poor data capture. Other identified challenges were: a lack of relevant details of some of the reports (22,8%), unclear narration of events surrounding the death (18%) and lack of technical explanation to issues related to diagnosis, anesthesia and medication (11%).

Participants also suggested ways of improving the data quality process of MDR reporting. Among the suggestions were: providing orientation on filling the MDR forms, ensuring data validation sessions to verify reports and making the MDR form more user friendly by creating an electronic-based format. Two of the participant’s elaborations are captured below.

*“I think there should be immediate training for all the staff who are involved in the reporting process, because some of these staff just provide what they feel is right on the form and not necessarily the right data. Some of my midwives were moved from other units of the hospital to the maternity unit which would require some orientation before they become used to the whole maternal death audit data collection process” ...**Maternity ward in-charge***

*“I suggest that all the reporting process should be done by using electronic means and not using papers and books. Sometimes you find a lot of these papers missing from registers when you need to verify from the registers.” ...**Health Information Officer***

4.1.6 Institutional Quality of Maternal Death Review in the Eastern Region of Ghana.

Participants’ views were sought on whether facilities or staff in the Eastern region were autonomous without internal or external influences to produce credible data for the MDR reports. In figure 18, it is displayed that 45.8% responded in the affirmative, while 54.2% thought the MDR data produced was not without any influence.

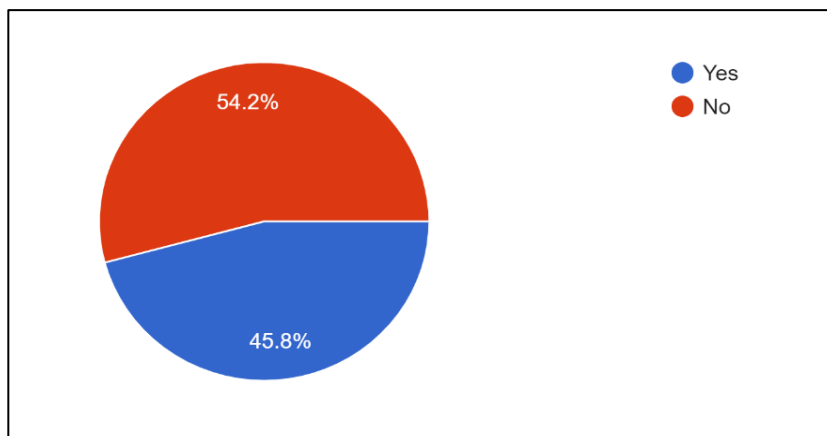


Figure 17: Influence on the credibility of the MDR data

A participant’s view on the kinds of influence on the credibility of the MDR data is expressed in a quote below.

*“Sometimes as a midwife if I even know some of the reasons why the pregnant woman died, for example, maybe you called the doctor on duty and because of some reasons he doesn’t come on time or he is not even around to look at the patient’s situation, and the woman dies either in the hospital or on referral, you will not be able to indicate this on the MDR form because the Doctor will be the one to sign the form before it goes to the Region” ...**Midwife***

The participants’ views on the facilities’ transparency in filling the MDR forms were also sought. Figure 19 highlights the opinions. 68% of the respondents felt that data provided on the MDA form always truly reflected events about the maternal death being reported. 22% thought the data only sometimes truly reflected events. 1% said the data did not truly reflect issues surrounding the death being reported and 9% indicated they preferred not to comment about their facilities’ transparency in reporting the maternal death.

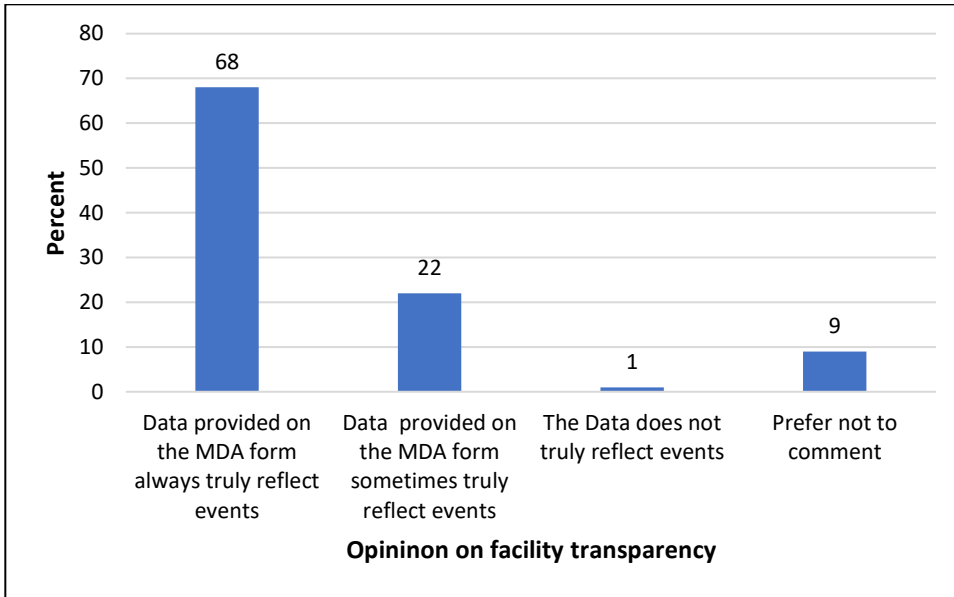


Figure 18: Facility transparency in filling the MDR forms

CHAPTER FIVE

5.1 Discussion

The results of this study point to notable deficiencies in the data quality dimensions of maternal death reviews in the Eastern Region of Ghana. The findings show limited access to all the data required for the compilation of the MDR reports. Data output quality in terms of data relevancy (the degree to which the MDR data met user needs), completeness, timeliness, and the interpretability of the MDR reports were barely above average. Process quality assessment show majority of facilities use data handling procedures that are prone to errors. The institutional quality assessment revealed inadequate levels of transparency in the MDR reporting.

5.1.1 Maternal Death Review approach and tools used; the implications on MDR data quality in the Eastern region

The approach and reporting tools used in the Eastern region for Maternal Death Reviews were to a very large extent in conformity with the MOH/GHS guidelines for maternal death review reporting. The approach highlighted the relevant areas of the MDR process; *notification of appropriate authorities of a maternal death within set timelines; recording of events surrounding a maternal death; the identification of relevant staff for the review process; and adhering to the various channels of reporting.* From the description of the approach in this study, it could be concluded that the approach creates a mechanism for conducting an organized, professional and confidential enquiry into maternal deaths in the Eastern Region. A similar conclusion was reached in a 2021 study conducted in Ghana, that maternal death review system is moderately strong at regional level with timely receipt of data and regular review meetings and reports in most regions (25). In contrast to Ghana, the Ministry of Health in Kenya developed a maternal death review guidelines in 2009 and subsequently gazetted maternal death as a notifiable event. In spite of the structures established to notify and audit maternal and perinatal deaths, there was lack of systematic approach in reporting and reviewing of the maternal and perinatal deaths (41). Under certain assumptions, this can be construed as Ghana's approach strengthening the MDR reporting as compared with other countries in the sub-region. The approach to maternal death review is deemed very crucial to the success of every MDR system.

The importance of a functional MDR approach cannot be over emphasized, because it takes into consideration all the necessary steps to ensure that the review provides the essential and quality information to stimulate and guide actions to prevent future maternal deaths and improve the measure of maternal health.

Facilities in the region were generally seen to be using the MOH/GHS MDR reporting tool, however some facilities included extra space on the forms to capture other information (e.g., community data and family history) which others did not. While the idea behind the capturing of additional information on the MDR form to present other details apart from what the form originally demanded sounds brilliant in theory, concerns may be raised on the proliferation of new data elements on the forms and the effect of this on the standardization of reporting formats. This could introduce risk, as facilities are given total freedom of adding a data element deemed important at any point in time when it feels like it. Findings from a 2020 published study conducted in Tanzania on data quality

of the routine health management information system found that challenges such as ununiform reporting formats led to the mismatch in report synchronization and results summary (42).

Neugebauer et al.(2021) studied the use of standardized and non-standardized tools for measuring the risk of falls and independence in clinical practice and confirmed the importance of ensuring uniformity in the use of assessment scales as one of the very effective ways to enable continue monitoring and the creation of statistics that can drive further improvements (43).

Ensuring consistency and the uniformity in the use of the MDR reporting tool will ensure that users collect the same appropriate and uniform data for wholistic analysis and decisions, in order to drive attention towards result-oriented activities required to address preventable maternal deaths. Any variable deemed useful to be included on the MDR form should be discussed and accepted by the overseeing authorities to ensure uniformity across board.

This study further revealed certain missing ‘minimum standard of needed information’ on the MOH/GHS MDR reporting form. For example, the form did not make provision for users to indicate whether the deceased were ever seen by health staff during their pregnancy, neither did it inquire on the qualification of staff who provided ANC to the deceased. It is suggested that whenever available and feasible, the maternal mortality audit format approved by the Ministry of Health of a country be used. However, WHO/UNHCR pushes for changes when such forms do not comply with minimum standard of needed information (39). Documentation of proven and established needed information necessary for unveiling details and enriching the MDR results is very relevant to consider, with such eliminations, there is the tendency of missing out on important facts needed to unravel the burden of maternal deaths, the causes and avoidable factors essential to providing clear response plan to avoiding preventable future maternal deaths (39).

5.1.2 Outcome and the need for ensuring MDR Data Output Quality in the Eastern Region

Data Relevance

With the relevancy of the MDR data produced by facilities in the Eastern region, this study showed that the data supplied by facilities did not fully meet the needs of considerable number of users/health managers in the Eastern region. Nutley et. al. 2013 conducted a systematic review titled: improving the use of health data for health system strengthening. Their paper acknowledged a similar problem, revealing the ever-widening gap between health managers and their data needs, coming from data generation methods and associated quality challenges (44). There is the assumption that when data does not fully meet the needs of decision makers, efforts to facilitate, plans, implement and evaluate health services and programs would be misdirected resulting into poor outcomes and resource allocation leading to waste in financial and human resources. Tilahun B, et. al. 2021 stated in their paper that having the right information at the right time in the right format at the right level of the health care delivery system to meet user needs would facilitate the full involvement of the various management levels in policy and program development, improvement, strategic planning and advocacy (45).

Another unique finding of concern raised by many in this study was the absence of data on community information about maternal death on the MDR form, urging some facilities to include such variables on collecting community maternal death information on the MDR form even when it has not been widely approved by MOH/GHS or the Eastern Regional Health Directorate. This result is consistent with a study by Campaore et. al. (2022) which found MDR data in Ghana to be

poorly maintained, missing, or incomplete in many cases as there were no data showing the details and notification rate at the community level (41).

It is assumed that a higher level of community deliveries and thus presumably deaths, occur in more remote regions. The paper further indicated that, there should be more focus on community activity where the Maternal Death MDR process has been found to be more complicated than reporting from health facilities in several studies. Similarly in South Africa, where MDSR is well established, most deaths reported are from facilities with no current system for routinely identifying deaths in the community, assuming a certain degree of underreporting (46). Dzoole et. al. 2015, however acknowledged that, it is generally more difficult to establish community based MDR, and that key challenges such as inaccurate reporting and classification of deaths based on information provided by community members and lack of effective and regular supervision of the process often leaves the data coming from the community level much to be desired.(47). Despite these challenges documented by Dzoole et al., other literature by Kongnyuy EJ, et. al.(2008) nearly a decade and a half ago, reiterates the WHO recommendation of combining community-based and facility-based maternal death reviews to improve professional practice and reduce maternal mortality (48). Community data for MDR could play a major role in bridging the data needs gap of managers because good identification and reporting of each maternal death is an essential prerequisite for appropriate action leading to desired improvements. A structured way to capture such information from the community is highly recommended.

One key action recommended by the majority in this study to help improve the relevance of the MDR data to meet user needs, was to convert the current paper-based tool into an electronic format to minimize errors and improve data credibility. Challenges associated with the use of paper based MDR reporting formats, is widely known to include lack of physical space for storage purposes; lack of backups, limited security; its time consuming and error prone nature; and its inconsistent layouts (49). Countries with well-established MDR systems, i.e. Malaysia and South Africa make use of technology to support data analysis, which makes for more rapid aggregation and analysis of information from across districts or states (46,50).

Data Accuracy

Accuracy of the MDR data is heavily dependent on the completeness, timelines and interpretability (3) of the data elements on the MDR form. The study revealed that not all of the MDR forms were completely filled and submitted within set timelines. This means data entries were not made in fields expected to contain records, and submissions of reports to the next level of action exceeded the period for which the report would have been more useful. Not all users according to the study findings clearly understood data provided on the MDR form. These challenges of incompleteness, lateness of reporting and lack of clear understanding is assumed to have adverse effects on the accuracy, reliability and validity of the MDR data. Ahmed et al. (2014) reported similar concerns in the study on maternal deaths surveillance and response in Bangladesh (a lower middle-income country as Ghana) Their study emphasized that national MMR estimates lack precision; are not timely, are often not readily available in desired formats and often provide no clues for action (51). The challenges of the incompleteness, lateness of reporting and lack of clear understanding of the MDR reports could be attributed to the lack of training and orientation as revealed in this study that majority of the handlers of the MDR reports in the Eastern Region had never received any form of training. A publication by Ameme et. al (2016) on training Ghanaian frontline healthcare workers in public health surveillance and disease outbreak investigation and response, mentioned the

consequences associated with untrained staff on reporting health events which are in line with the findings of this study (52). Additionally, Nwankwo et al in 2018 published a study titled “Can training of health care workers improve data management practice in health management information systems?”. Their results showed that training of health care workers resulted in a statistically significant increase in completeness of reporting, overall accuracy rate, timeliness rate of reporting and feedback. The study therefore concluded that in-service training and re-training should be done to improve data management practice of health workers (53).

5.1.3 Data process quality: the pivot to credible MDR data.

From the description of the approach and the tools used in capturing the MDR data, this study found that MDR reports in the Eastern region were compiled from multiple primary source documents that are mostly in the form of hard copy registers, folders, and paper forms. The reports are compiled by different category of staff based on their areas of work and the expected part of the MDR data to be generated by them. The kind of data handling process currently practiced by most facilities in the region, is prone to errors of omission, duplication, data inconsistencies and lateness in report submission (49). This relates to the acknowledgement by half of the MDR data handlers in this study that, not all needed data for the MDR reports were always available during compilation, and a good number of them at a point in time doubted the credibility of the data used for the MDR reports.

Among the challenges to smooth data handling process as revealed in this study are the vastness of the MDR form and the difficulty associated with synchronizing data from multiple paper-based forms and registers. Lugg-Widger et. al. in 2018 assessed the challenges in accessing routinely collected data from multiple providers. Their findings share similar results with this study where data inconsistencies, challenges of integration and data security were identified as major barriers to accessing routinely collected data from multiple providers (54). This study also unveiled suggestions on improving the data quality process of MDR reporting and ways to keep up to date with best practices. Among these were providing training and orientation on filling the MDR forms, ensuring data validation sessions to verify reports from source documents and ensuring an electronic system that captures routine data for the MDR process. The use of electronic medical records (EMR) in Cameroon and Malawi has shown an increase in completeness and accuracy of medical reports such as the maternal death records (55).

5.1.4 Institutional Quality; the pre-requisite for trusted MDR data

This study found that some of the MDR data handlers did not have full control over the production of data onto the MDR form in their institutions, and influences such as final authorization by managers and other bureaucracies had a toll on the credibility of the data used for the MDR reports. Thirty-two percent of staff involved in this study felt their facilities were not transparent in reporting the MDR such that data reported on the MDR did not truly reflect events about the maternal death being reported. Kongnyuy et al in 2018 studied the difficulties of conducting maternal death reviews in Malawi and shares similar findings. Their study revealed that the findings from maternal death reviews are sometimes used by managers to punish those who provided the care, furthermore, correct information may not be obtained especially when maternal death review is seen as a threat by those who took part in the management of the woman who died (48). The lack of institutional quality implies a “hidden agenda” which flaws all efforts targeting the reduction of preventable

maternal deaths in the sense that MDR data will not reflect true events. This in turn misdirects managers on decisions targeting the reduction of maternal deaths.

5.1.5 Limitations of the study

There are limitations to this study. The study was designed to assess the data quality dimensions of maternal death reviews in the Eastern Region. The researcher had less control over the flow of the qualitative interviews because of the online technique used. The analysis design employed to review the data quality dimensions is not exhaustive. There are other important additional statistical analyses such as Calibration and Gage R&R (repeatability and reproducibility) studies test that could be performed to test for accuracy and precision respectively. In calibration studies, the accuracy of your measurement system is tested. Typically, items with a variety of known properties are measured several times, and the measured values are compared to the known values to see whether they are generally accurate or biased. The results of the "gauge R&R studies" let you know if your measurements have too much variability and where to focus your corrective actions. This could not be done due to limited time to review primary source documents such as registers, folders and death certificates for data needed for such analysis Future research could look into this.

Findings from the qualitative interviews provided only a limited picture of MDR data quality concerns by respondents in their respective facilities and may not represent the regional picture.

However, it is strongly believed on the bases of the evidence gathered from the study findings and literature that, the status quo in the Eastern Region mirrors the situations in health institutions in other regions of Ghana.

Despite the identified limitations, this study throws light on the data quality of maternal death reviews and highlights gaps in the various data quality dimensions worthy of consideration for improvement.

CHAPTER SIX

6.1 Conclusion

This study identifies inadequacies regarding the data quality of Maternal Death Reviews (MDRs) in the Eastern region of Ghana. These comprise the absence of certain minimum required information on the MDR form, limited access to needed data to complete the MDR forms, late submission of the MDR report, limited relevancy and interpretability of the MDR form, error-prone data handling procedures and inadequate levels of institutional transparency. Improvements in data quality dimensions (access, output, process and institution) are critical to result oriented decisions aimed at enhancing maternal health. This paper serves as a wakeup call to improve data-driven efforts to address factors associated with preventable maternal mortality.

6.2 Recommendations

To improve the MDR data quality inadequacies revealed by this study, the following targeted recommendations are made.

A. Ministry of Health /Ghana Health Service

1. **Review of the MOH/GHS Maternal Death Review form currently in use, to ensure the inclusion of all minimum needed information as per WHO standards.** The Family Health Division of the Ghana Health Service in-charge of Reproductive and Child Health with the oversight responsibility of maternal death reviews, has a Monitoring and Evaluation unit capable of evaluating the current MDR form in use and providing appropriate advice.
2. **Efforts to develop an electronic database for MDR reporting in Ghana could be considered.** Ghana Health Service has an already-established web-based District Health Information Management System (DHIMS2) which could be further explored for the inclusion of the Maternal Death Review form with minimal or no financial burden and security concerns. This will ensure coherence and consistency of data across all channels of reporting and also enable robust analysis of the MDR data. Clues could also be taken from countries scaling up to Maternal Death and Surveillance Response (MDSR) such as South Africa-using the Maternal Morbidity and Mortality Assessment System (MaMMAS).
3. **Assess the feasibility and practicability of integrating community maternal death and institutional maternal death reviews, to ensure wholistic assessment and reporting of maternal deaths.** Stakeholder engagement involving the Health Directorate, Clinical institutions (public and private), District Assembly, Community leadership and NGOs concerned with maternal health, is encouraged to discuss the possibility and map strategies for integrated institutional and community maternal death review.

B. Regional / District Health Directorate

4. **Standardization of the Maternal Death Reporting forms used in the Eastern Region to ensure uniformity across all facilities in the region.** The Reproductive and Child Health Unit

with support from the Health Information Unit are urged to examine, retract and discourage the use of MDR forms not approved by the Regional Health Directorate.

5. **Training for Maternal Death Review data handlers and managers on Maternal Death Review reporting in the Eastern Region.** There is an urgent need to bring to speed all staff concerned with the filling of the MDR form and use of the MDR data for decision making on the MDR reporting format. This could be integrated into budgeted health trainings mostly targeting the same participants. District Health Directorates could organize all facilities in their Districts to support the budget for such trainings in their districts.
6. **Provide on-the job coaching and support visits to health facilities to ensure the correct filling and completeness of the Maternal Death Review forms.** Periodic Supportive Supervision to health facilities could be undertaken by district and regional reproductive and child health program officers to health facilities to examine registers and other primary source documents to identify issues of concern and provide on the spot coaching on resolving the issue at stake.

C. Health Facilities

7. **Institute data validation sessions to review primary source documents for MDR reports to ensure validity of data captured from such sources onto the MDR form.** “In-house” data validation sessions could be organized to verify data captured on the MDR form from source documents in order to ascertain the truthfulness of figures on the MDR form.
8. **Encourage blame-free maternal death reviews in order to improve institutional transparency in reporting maternal deaths.** Facility-specific MDR-ethics guidelines could be developed to guide the audit of maternal deaths in facilities in order to guard against any form of fear, intimidation and coercion associated with reporting the MDRs

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APPENDIX

Checklist for Secondary data analysis

Review of Data Quality Dimensions of MDRs in the Eastern Region-Ghana

SECONDARY DATA CHECKLIST-FORM

* Required

1. MDA Report Number

2. Date of Maternal Death Review *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

3. Name of person who compiled the report *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

4. Title of person who compiled the report *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

5. Contact (email/phone) of person who compiled the report *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

6. List of participants present at the Audit *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Patient Information

7. Name *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

8. Age *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

9. Education *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

10. Occupation *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

11. Religion *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

12. Ethnicity *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

13. Marital status *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

14. Gravida *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

15. Parity *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

16. Ever seen by health staff for this pregnancy? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

17. HIV status *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

18. Patient on Anti-retrovirals *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

19. Obstetric history *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Antenatal Period

20. Did she have an ANC visit? * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

21. Number of ANC visits * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

22. Date of last visit *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

23. ANC Performed by (qualification only) * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

24. Laboratory test if available * *Mark only one oval.*

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

25. Was intermittent malaria prophylaxis (IPT) provided? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

26. Was Iron and Folic Acid provided? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

27. Risk factors *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

28. Has there been any hospitalization during this antenatal period? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

29. Have any medications been prescribed during this period apart from above *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Delivery / Labour

30. Did the client deliver? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

31. Delivery outcome *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

32. Mode of delivery *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

33. Time between delivery / abortion and maternal death (hours) *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Post Natal Period

34. Describe the postnatal care provided at health facility level, including time and of discharge (if applicable). *Mark only one oval.* * date

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

35. Did the mother have any PNC visits following discharge from the facility or home * birth?

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

36. Number of PNC visits *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

37. Were postnatal visits provided on time according to schedule? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

38. Symptoms/Signs during PNC *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Information on the circumstance of death

39. Main symptom prior to death *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

40. Estimated gestational age at time of death (weeks) *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

41. Date of death *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

42. Time of death *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

43. Condition upon admission * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

44. Time and date of admission * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

45. Name and type of health facility * *Mark only one oval.*
- Record completed
 - Incomplete recording
 - Not recorded (missing data)
 - No provision for data entry on MDA form

46. Referral? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

47. Time and date of admission at referral facility *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

48. Was a partograph[1] used during delivery? *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

49. Was the partograph correctly filled? (reviewed by the audit team) *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Cause of Death

50. Direct cause *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

51. Indirect cause *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

52. Summary history *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

53. Contributory factors *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

54. Potential avoidable factors and missed opportunities *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

55. Lessons learnt *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

56. Recommendation *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

57. Report signed *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

58. Report signed *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

59. Date of report submission *

Mark only one oval.

- Timely
- Late
- Not recorded

60. List of participants present at the audit *

Mark only one oval.

- Record completed
- Incomplete recording
- Not recorded (missing data)
- No provision for data entry on MDA form

Interview guide for Key Informant Interviews

INTERVIEW GUIDE

Data Quality Assessment of Maternal Death Audits in the Eastern region of Ghana.

Thank you for considering to participate in this study. My name is Solomon Boamah, I am MPH student at KIT Royal Tropical Institute, Netherlands. I am undertaking a study aimed at assessing the data quality of maternal death audits in the Eastern region of Ghana in order to recommend ways of improving documentation and reporting of Maternal Death Reviews, to inform proper recommendations and decisions targeting the reduction of preventable maternal deaths.

* Required

1. Consent *

I voluntarily agree to be part of this research

2. Profession *

Mark only one oval.

- Public Health Nurse
- Health Information Officer
- Medical Superintendent
- DDNS
- Clinical Nurse
- Medical officer
- Pharmacist
- Health Director
- Health Administrator
- Public Health Officer
- Other:

3. Gender *

Mark only one oval.

- Male
 - Female
 - Other:
-

4. Years of practice in current profession * *Mark only one oval.*

- Less than 1 year
- 1-4 years
- 5-10 years
- 10+ years

5. Facility type *

Mark only one oval.

- Hospital
- Polyclinic
- Health Centre
- Clinic
- CHPS
- Other:

6. Facility ownership *

Mark only one oval.

- Government
- Private
- CHAG
- QUASI
- Other:

You might be aware of the Maternal Death Notification and Audit Report form(MDA form) used in capturing data for all deaths in pregnant women.

7. Are you aware of the MDA form? *

Mark only one oval.

- Yes
- No

8. If yes, could you describe the approach used for maternal death audits in your

9. Could you also elaborate on the tools/documents/forms used for capturing data for MDRs

10. Have you received any training on the interpretation and the use of the MDA form?

Mark only one oval.

- Yes
- No (If No skip to #5)

11. If "yes" in which form did the training, take? (skip if no training)

Mark only one oval.

- Formal training
- Workshop On the
- Job coaching
- Other:

12. When did you receive this training? (skip if no training)

Mark only one oval.

- Less than 3 months ago
- 3-6 months ago
- Above 6 months to 12 months
- 1 year+ ago I
- don't remember
- Other:
-

13. How would you describe your level of understanding of the concepts, variables, indicators, and other terminologies describing events on the MDA form?

Mark only one oval.

- I have clear understanding
- Somehow clear
- Confusing
- Difficult to understand
- Don't understand most of the variables and indicators Other:
- _____

14. Can you elaborate on your answer above.

15. How would you describe the adequacy of information that is provided on the Maternal Death Notification and Audit report form to enable decision making?

16. Have you ever had any doubts about the information on the MDA form received from the reporting facility?

Mark only one oval.

Yes

No

17. Can you elaborate on your answer above.

18. If yes what were the doubts about? tick all that apply

Check all that apply.

- Forged data
- Incorrect information
- Under reporting
- Over reporting
- Data just to complete the report Other:

19. Can you elaborate on your answer above.

20. Do the data on the MDA form measure what is needed / what they say they do?

Mark only one oval.

- All the time
 - Mostly
 - Quite Often
 - Sometimes
 - Very few times
 - Not at all
 - Other:
-

21. Can you elaborate on your answer above.

22. Considering the reports you reviewed in the past 2 years, is data provided on the MDA form accurate in terms of Completeness? (This is a measure of how many of the events or the 'records' were actually documented) *Mark only one oval.*

- All the time
- Mostly
- Quite Often
- Sometimes
- Very few times
- Not at all
- Other:

23. Can you elaborate on your answer above.

24. Considering the reports you reviewed in the past 2 years, is data provided on the MDA form accurate in terms of Timeliness? (describes whether the data is received within the deadline of submission) *Mark only one oval.*

- All the time
- Mostly
- Quite Often
- Sometimes
- Very few times
- Not at all
- Other:

26. 11. Can you elaborate on your answer above.

27. the MDA form accurate in terms of their Consistency? (uniform information across reporting channels and in registers) *Mark only one oval.*

- All the time
- Mostly
- Quite Often
- Sometimes
- Very few times
- Not at all
- Other:

28. Can you elaborate on your answer above.

29. the MDA form accurate in terms of their Reliability? (the extent to which the data yields the same results when cross checked) *Mark only one oval.*

- All the time
- Mostly
- Quite Often
- Sometimes
- Very few times
- Not at all
- Other:

30. Can you elaborate on your answer above.

31. the MDA form accurate in terms of their interpretability? (reflects the ease with which users can understand and properly use the data) *Mark only one oval.*

- All the time
- Mostly
- Quite Often
- Sometimes
- Very few times
- Not at all
- Other:

32. Can you elaborate on your answer above.

33. Is there a mechanism at your level to ensure corrections, completeness and timeliness of data entered onto the MDA form? If "yes" can you please elaborate on this?

34. What are some of the limitations you have realized with the use of the MDA form for maternal death surveillance or decision making?

35. Are there any recommendation or suggestions you would want to put across for Maternal Death Audit Documentation in the Eastern region?

36. How do you think the Maternal Death Audits can support initiatives to decrease Maternal Mortalities.?

Google Forms