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FACTORS ASSOCIATED WITH DATA QUALITY IN THE DISTRICT HEALTH MANAGEMENT INFORMATION SYSTEM II (DHIMS 2) IN THE MION DISTRICT OF NORTHERN REGION OF GHANA

ESTHER TERKOUR PADI

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MANAGEMENT INFORMATION SYSTEM II (DHIMS 2) IN THE MION DISTRICT OF
NORTHERN REGION OF GHANA.

BY

ESTHER TERKOUR PADI

MASTER OF PUBLIC HEALTH

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SEPTEMBER, 2024

DECLARATION

STUDENT

I hereby declare that this dissertation/thesis is the result of my original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate:

Signature: ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~Date: 5th September, 2024

Name: Esther Terkour Padi

SUPERVISOR

I hereby declare that the preparation and presentation of the dissertation/thesis was supervised following the guidelines on supervision of dissertations/thesis, laid down by the University for Development Studies.

Supervisor:

Signature: ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~Date: 5th September, 2024

Name: Professor Martin Nyaaba Adokiya

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ABSTRACT

Enhancing the efficacy and efficiency of healthcare services requires a well-designed health information management system that ensures high-quality data collection and generation. Despite efforts, data quality in Ghana, including the Mion district, remains poor and inadequate, hindering its use in program decisions. The Mion district still faces significant barriers, particularly in primary healthcare. This study aimed to identify the factors and challenges associated with the District Health Management Information System II (DHIMS 2) data quality in the Mion district of Northern Ghana. Using a descriptive cross-sectional design, the research incorporated quantitative and qualitative data collection methods, including questionnaires and in-depth interviews, and analyzed the data using SPSS. Key findings include data completeness rates of 99.9%, 97.1%, and 100% for 2020, 2021, and 2022, respectively, and timeliness rates of 91.5%, 95.3%, and 99% for the same years. Significant associations were found between data quality and factors such as knowledge of DHIMS 2, proper supervision, training, and management support. Challenges identified include internet connectivity issues, lack of comprehensive training, the burden of data validation, and inadequate support from district officers. These findings underscore the importance of continuous training, effective supervision, and robust management support to enhance data quality in the Mion district.

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DEDICATION

I dedicate this thesis to my family who never stopped believing in me.

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LIST OF ABBREVIATION/ACRONYMS

CAC – Comprehensive Abortion Care

CBS – Community-Based Surveillance

CHAG – Christian Health Association of Ghana

CHPs – Community-based Health Planning and Services

DHIMS 2 – District Health Information Management System II

DHMT – District Health Management Team

DHIS 2 – District Health Information System II

EPI – Expanded Programme on Immunisation

GHS – Ghana Health Service

HIS – Health Information Systems

HMIS – Health Management Information System

IDSR – Integrated Disease Surveillance and Response

Monthly Form A – Monthly Midwife Returns

Monthly Form B – Monthly Family Planning Returns

OPD – Outpatient Department

PRISM – Performance of Routine Information System Management

RHIS – Routine Health Information System

WHO – World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Data quality is critical for achieving high standards of patient care and effective governmental financial planning (Chen et al., 2014). High-quality data ensures safe and dependable healthcare, supporting performance monitoring, evaluation, and planning.

The World Health Organization (WHO) identifies key qualities of data quality: accuracy, reliability, dependability, completeness, readability, timeliness, accessibility, usefulness, and confidentiality (WHO, 2017). Common data quality limitations include missing numbers, bias, measurement mistakes, and human errors in data entry and processing.

HMIS integrates data collection, processing, reporting, and utilization to improve healthcare system efficiency (Scott et al., 2015). Quality data underpins health system policies, governance, research, human resource development, education, training, service delivery, and finance (Nisingizwe et al., 2014).

Many developing nations, especially in sub-Saharan Africa, struggle with data quality despite efforts to improve health information systems. Public health surveillance data is essential for urgent public health action, program planning, and assessment (Koumamba et al., 2021). Issues with completeness, timeliness, and accuracy affect data quality at various levels (Adokiya et al., 2016).

Before DHIMS 2, health data was collected using spreadsheets, leading to errors and reduced confidence in health information (Mensah, 2016). DHIMS 2, an open-source, web-based health

information system, was adopted by the Ghana Health Service (GHS) in 2012. It has improved data collection, management, and stability of the national health system (Ghana Health Service, 2018). DHIMS 2 includes health data entry, capture, reporting, and a tracker module for data visualization (Nyonator & Ofosu, 2013).

Quality data—accurate, complete, and timely—is crucial for healthcare planning, management, and decision-making. Data quality assessments often ignore technical, organizational, and behavioral issues (Chen et al., 2014).

A study in Tanzania found that knowledge of HMIS concepts and the presence of focal personnel were associated with improved data quality while training alone was not (Rumisha et al., 2020; Mboera et al., 2021).

This study aimed to identify factors associated with DHIMS 2 data quality in the Mion district and highlight the challenges affecting these factors.

1.2 Problem Statement

To support the effectiveness of a health system, a health information system is supposed to produce high-quality data.

For several reasons, including assessments of the health sector, for planning, program monitoring, quality improvement, and reporting. High-quality data, particularly in terms of timeliness, completeness, and accuracy are required to achieve all the stated reasons (Weichselbraun & Kuntschik, 2017).

Therefore, it is crucial to regularly have access to high-quality data on the performance of the health sector to have improved and robust healthcare systems constantly (WHO, 2017).

Quality data is the foundation for sound judgment and so it is important to ensure that the data used in any important health-related decision-making process is of high quality (Cheburet & Odhiambo-Otieno, 2016a). The performance of the health sector is mostly measured using data from health facilities. Most of the reported data are often incomplete, out of date, and poor quality and impact greatly the decisions made about the health sector (Mremi et al., 2021).

There are many issues affecting the quality of the data generated from the community level or peripheral health facility of the health care system. In the Mion district, the generated data from the community level is transmitted to the district level to be entered into the electronic systems, which is the DHIMS 2 in Ghana. Poor data quality is not exclusive to Ghana and Mion district alone but is also a serious issue in the majority of developing countries (Odei-Lartey et al., 2020). These issues that mainly arise can be seen in terms of the data's completeness, accuracy, and timeliness (Mensah, 2016).

Though a data audit team has been established at several levels of the data collection and transformation system, the team at the district level and in particular Mion district have consistently been working hard to evaluate and enhance the quality of data produced. Their tireless efforts have gone unnoticed due to the poor data produced at the district level in Ghana for the past few years (Ghana Health Service, 2020).

The 2030 Agenda for Sustainable Development's health-related goals are significantly hindered by the weak health information systems (HIS), as they prevent timely, accurate, or thorough evaluation of health system performance (Mutale et al., 2013a; WHO, 2021).

In addition, even with the increased attempts to improve health information systems in recent years, many developing nations, especially those in sub-Saharan Africa (SSA), still lack the

capacity necessary to produce quality data and the Mion district is no exception (Mremi et al., 2021).

A health information system that produces inaccurate, delayed, and unreliable information currently dominates disease surveillance data reporting in most developing countries including Ghana and the Mion district for that matter. The poor data quality reflects in the overall poor quality and standard of health care delivered in these countries (Adokiya et al., 2015).

The WHO states that timely, accurate, and comprehensive healthcare data are essential for the creation, maintenance, and planning of healthcare services. When data is suitable for its intended uses in operations, decision-making, and planning, it is considered to be of high quality (WHO, 2017).

The Mion District is one of the many districts in Ghana that has several challenges to the health care services and the bedrock of the problem is the quality of the data produced. The data is relied upon at the district level to make health-related decisions that impact the lives of the patients seeking health care within the district. To help improve the quality of data produced in the district, this study is imperative to unearth the challenges and recommend solutions that would ameliorate the challenges to provide quality health care to the patients who seek care in the district. It would also help the nation as a whole move closer to achieving the health-related goal of the UN Agenda 2030.

1.3 Rationale/ Justification

A criterion that guarantees that health management information system-generated data usage ensures proper health outcomes is data quality. Consequently, there is a need for a health management information system that can adapt to the demands of evolving health service management, delivery, and standards across various jurisdictions (Rumisha et al., 2020).

To ensure the integrity of the data obtained is not compromised and therefore loss its quality, numerous measures have been devised to safeguard its integrity and quality. Despite these safe guiding measures, the health directorates continue to receive erroneous, sparse, and delayed data from various healthcare facilities (Lee et al., 2022).

A monthly return monitoring chart is utilised at many district health directorates in Ghana to track the timely submission of forms at the district level. Additionally, every district performs routine data validation and verification during the first week of every month on the forms received from the various health facilities for the previous month. This is to help ensure that the forms submitted by the management of the various health facilities are accurate and complete (Zumah et al., 2022).

Various data reporting formats are used to gather and report the generated data at the facility level in the community. The data audit team and supervisors receive these reports at the district level, and they audit and validate them before the transmission to the next level, the regional health directorate. The verified information is added to the national database, DHIMS 2. In addition, at the district level, the data audit team is to ensure accurate and trustworthy data quality is generated at all times. The work of the team is highly essential to obtaining the needed high data quality and boosting users' trust in public health authorities and their performance (Chen et al., 2014).

If high-quality data is to be ensured in a routine health information system, it is necessary to maintain high standards and ensure quality data is produced year in and year out. It helps achieve this, it is imperative to identify the root causes of poor data quality, the factors that ensure quality data and the challenges that influence the data produced from the facility level from where all the data emanates.

1.4 Research Questions

1. What is the level of data quality in terms of timeliness and completeness in the Mion District of Northern Ghana?

2. What are the health workers' knowledge of DHIMS 2 in the Mion District?

3. What is the level of perceived efficacy of health workers responsible for data collection, reporting, and all DHIMS 2 activities in Mion District?

4. What are the challenges health workers face in carrying out DHIMS 2 activities in the Mion district?

1.5 Research Objectives

1.5.1 Main

To assess the factors associated with data quality in the District Health Information Management System II (DHIMS 2) among health facilities in Mion District.

1.5.2 Specific Objectives

1. To determine the level of quality of data in terms of completeness and timeliness using health facility reports in Mion District.

2. To assess the health workers' knowledge of DHIMS 2 in the Mion District.

3. To describe the perceived self-efficacy of health workers responsible for data collection, reporting, and all DHIMS 2 activities in Mion District.

4. To identify the challenges faced by health workers in carrying out DHIMS 2 activities in the Mion district.

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1.6 Conceptual Framework

This study used a conceptual framework called the Performance of Routine Information System Management (PRISM) (Belay & Lippeveld, 2013). The concept identifies five basic but key components that are necessary for improving the health information management system's overall data quality. These key components are factors such as technical, behavioural or individual, organizational, socio-demographic as well as HIMS processes itself.

The study adopted the above-stated concept for that of DHIMS 2 data quality, the independent variables were, socio-demographic factors, organizational factors, behavioural/ individual factors, technical factors and DHIMS 2 processes. On the other hand, the dependent variable was the DHIMS 2 data quality.

Socio-demographic factors that impact the data quality of DHIMS 2 include the age, sex, and position of the person assigned to collect and enter the data at the facility level. The educational level and work experience of the personnel also play a pivotal role in getting quality data collected and entered at the facility level.

The second factor, organisational factors includes the support offered to personnel by management to enable them to effectively collect and enter data at the facility level, training which comprises both pre-service and in-serve training given to them to keep them up-to-date and refreshed to continue to collect and enter data effectively that will prove to be of the highest quality. Furthermore, regular feedback from supervisors to enable the personnel involved with data collection and entry to improve on their work and make available incentives to encourage them to always give off their best month after month.

The next factor, behavioural/ individual factors include the personnel's knowledge of the contents of the individual forms, the skill of checking the data quality, the confidence level of the person and the person's motivation to get the work done regularly.

Furthermore, technical factors include, the complexity of the reporting forms, formats and procedures, computer software user-friendliness and the standard set of indicators with definitions also help greatly impact the quality of data produced from the facility level to the district level.

Finally, DHIMS 2 processes factors that impact the quality of the data produced including the collection of the data itself, the processing of the received information or data, the analysis of the processed data to make meaningful conclusions and the checking of the data to ensure it is of the highest quality.

These various factors combine to varying degrees of influence to produce the level of quality data that would be put out.

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Figure 1. 1: Performance of Routine Information System Management Conceptual Framework

Source: HMIS Data Quality 2018 Adopted from WHO Prism Framework.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

District Health Information Software 2 (DHIS 2), the world's largest Health Information Management System (HMIS), is used by health ministries in over 80 nations for managing health data, personal health records, and operational decision-making. It collects data for planning, budgeting, monitoring, and patient follow-up (MEASURE Evaluation, 2017).

An improved version of the DHIS 2 designed specifically for Ghana's health sector is called District Health Information Management System II (DHIMS 2). It is a technology used in the health domain for gathering, verifying, analyzing, and presenting aggregated statistical data (Ghana Health Service, 2020).

DHIMS 2's capacity to enhance district-level health data management is significant. Providing fast and precise health data makes better planning, monitoring, and decision-making possible. This system is essential for monitoring the achievement of health objectives, assessing the results of medical interventions, and guaranteeing the effective use of available resources (Odei-Lartey et al., 2020).

Data quality measures data's suitability to serve its purpose in a given context, characterized by several key dimensions. Different organisations consider different factors, but the WHO identifies data quality dimensions as accuracy, reliability, dependability, completeness, readability, timeliness, accessibility, usefulness, and confidentiality (WHO, 2017). Data quality is often measured by considering factors like accuracy, timeliness, and completeness (Lee et al., 2022).

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Data is said to be accurate if it is correct and free from errors. Completeness ensures that data is comprehensive and includes all required information, thus, no necessary data is missing. Timeliness relates to data being up-to-date or current and available when needed (Kumwenda et al., 2014; Manya et al., 2015).

The objective of this review is to identify and analyse factors associated with DHIMS 2 data quality and some challenges health workers face with ensuring quality.

2.2 Methodology

This literature review explored factors associated with DHIMS 2 data quality. A systematic search was conducted to identify relevant literature using a combination of DHIMS 2 and data quality-related keywords. The following keywords were used: DHIMS 2 data quality, DHIMS 2 data quality assessment, factors associated with DHIMS 2 data quality, improving DHIMS 2 data quality and challenges affecting DHIMS 2 data quality.

These keywords were used to search on Google Scholar and PubMed and the articles were then managed and organised using Mendeley reference management software. The search was conducted without regard to publication date to guarantee a thorough review of the subject. Key themes were found through preliminary searches, which also directed subsequent reading of pertinent papers. The final selection of papers for inclusion was made based on both the quality of their content and their relevance to the research question.

2.3 Findings/ Discussion

2.3.1 Data quality

Data quality has been a major issue in the delivery of health services in many developing nations. The fact that the health information systems lack sufficient human, material, and financial resources is one of the causes cited by Lippeveld. Few, if any, standardised guidelines are given to care providers on how to gather data, and the data that is collected is frequently irrelevant to their own information needs. Lower-level healthcare professionals are required to submit enormous amounts of data to higher levels, with little to no response in return. Because of this, they are less motivated to ensure the accuracy of the data collected and to adhere to reporting requirements (Belay & Lippeveld, 2013). A survey conducted in Nigeria revealed that poor data quality was one of the major issues that is insufficient to support decision-making. Most developing countries' HMIS data is not well validated and analysed as a result, making data incomplete, inconsistent, and inaccurate (Omole, 2015). For prompt action, the majority of routine data are collected. The HMIS mandates the daily collection of information on crucial components, which must be comprehensive and accurate reporting of notifiable cases. According to the findings of a Malawian investigation, some facilities were sending no reports at all, while some others were not sending them regularly. The completeness of routine data was a major issue since the facilities that sent reports regularly did not submit data on every element every month, and those that did not send reports on every data element regularly continued to miss certain records (Koumamba et al., 2021).

The availability, completeness, correctness, and timeliness of data were measured in a cross-sectional mixed study carried out in Kenya. The study found that the total reported data completeness was 44%, while some reporting summaries were completely missing, and a total of 56% of the data were accessible in time for a report. According to the study's description,

the study area's data quality was improving with a little culture of information use (Cheburet & Odhiambo-Otieno, 2016a). On the other hand, a study done in Rwanda revealed good data quality. In all areas, the majority of health facilities (73.3%) accurately sent data from registers to monthly reports and electronic databases. The average proportion of complete reporting and timeliness was 98% and 93.8%, respectively (Innocent et al., 2016).

According to a study done in India, 63% and 71% of facilities did not meet acceptable standards for accuracy and content completeness. With a 10% tolerance for all items, about 37% of the institutions were within acceptable bounds. Only 71%, 63 %, and 58 % of institutions were within the stipulated limits for pentavalent-1 vaccine, measles, and DPT booster vaccines, while all institutions were within the established criteria for prenatal registration (Gudi et al., 2020). A study conducted in Uganda shows that there was good general performance with the median completeness being high in 2020 (99.5%; IQR 97.8-100%) and 2021 (100%; IQR 98.7-100%), as was the median timeliness (2020; 82.8%, IQR 74.6-91.8%; 2021, 94.9%, IQR 86.5-99.1%). Kampala Region was the only region that consistently failed to reach ≥ 80% OPD timeliness (2020: 44%; 2021: 65%). Nakasongola was the only district that consistently performed poorly in the submission of timely reports in both years (2020: 54.4%, 2021: 58.3%) (Zavuga et al., 2023a).

2.3.2 Factors Affecting Data Quality

Technical, organisational, behavioural (person), and other variables affect data quality (Chen et al., 2014). A study in Ghana also affirmed the significance of the influence that management support, resource availability, user involvement, education and training have on the system's use and continued usage. The study concludes that although the implementation of the system

(DHIMS 2) has been successful, there are concerns over data integrity (Gyaase & Bright, 2019). A study conducted in the Bago region, Myanmar shows that organizational factors such as incentives and perceived complexity of the technical aspects were shown to be directly linked to behavioural factors in the framework for HIMS performance (Hlaing & Myint, 2022).

2.3.3 Socio-demographic factors

The study conducted at Uasin Gishu County referral hospital in Kenya found that socio-demographic factors such as age, level of education, professional training, and years of experience among health workers have a significant impact on the quality of data in the routine health management information system (RHIS). Specifically, the findings proposed that well-trained and experienced health workers are more likely to collect and manage data accurately. The study highlights the importance of continuous education and training for health workers to improve RHIS data quality, which is crucial for informed decision-making in healthcare (Cheburet & Odhiambo-Otieno, 2016a).

2.3.4 Technical factors

A study by Hlaing T et al. shows that the primary HMIS implementers experience overwork due to paper-based systems, inadequate technical expertise, and operational cost assistance. Fragmented information systems and inconsistent report forms contribute to unsatisfactory data quality, requiring significant time and effort (Hlaing & Myint, 2022).

Additionally, a cross-sectional study carried out in Tanzania to evaluate the standard of routine HMIS data at district and primary healthcare facility levels identified certain technical factors affecting data quality, such as lack of standardized indicators that can also result in inconsistent data, making comparisons and analysis difficult, and complex or unintuitive reporting formats that cause data entry and reporting errors (Rumisha et al., 2020).

The availability of resources like computers and internet connectivity, which are essential for data processing and assessment, is one of the technical factors that some researchers in Ethiopia discovered to be affecting the use of routine HMIS. The proficiency of healthcare professionals in utilizing HMIS also has a big impact on how well they can use the system. A system that is user-friendly and satisfies the demands of health workers is more likely to be utilized efficiently. In addition, the functionality and dependability of the HMIS software are essential (Seid et al., 2021).

2.3.5 Organizational factors

About 81% of respondents to a study in Tanzania said they had never received HMIS training. The reviewed HMIS booklets were never finished in 55% of the institutions, although 91% of respondents had a good opinion of the system. One delivery register from just one healthcare facility was 100% complete out of all the documents we analysed (Nyamtema, 2010).

In Kenya, it has also been stated that donors or partners have strengthened their areas of support due to a lack of financial support and lack of cooperation from authorities in the creation and replication of data-gathering systems (Helen, 2011). Data verification gaps were found in the consistency and completeness of the data in the health facility, according to a second study

conducted in Kenya on organisational aspects affecting data quality. The study demonstrated that a key element in evaluating the quality of data in routine health information systems is the availability of robust organisation rules for data quality (Cheburet & Odhiambo-Otieno, 2016a). One of the most important mechanisms for improving quality data is regular supervision. The lack of regular systems of supportive supervision affects the importance and quality of data collection. Therefore, without regular and programme-specific supportive supervision, it is difficult to achieve information transformation. Although supervision was not considered significant in this study, other authors have proven that supervision is significantly associated with HMIS data quality (O'Hagan et al., 2017).

According to a study conducted in Benin, infrastructure quality and management and planning capacity are other factors that affect the quality of HMIS. The competence of health workers within the parameters of their training is significantly influenced by human resources. It has been discovered that health facilities with capable administration and well-trained staff have higher-quality health information systems. Large quantity of data needed in tools, data collection form type, staff demotivation in HMIS tasks, and inadequate capability (Ahanhanzo et al., 2014).

2.3.6 Behavioural/ Individual/ Human factors

Tanzanian researchers conducted a cross-sectional study to identify the variables that affect the accuracy of HMIS data. By contrasting with and without the knowledge, the relationship between HMIS concept knowledge and data quality was evaluated. Knowledge of the HMIS concept and the presence of focal persons were found to be related to improved data quality, whereas training was not. According to the study's description, receiving a basic HMIS

education may not be related to understanding the fundamentals of the system. According to a report, training is frequently not the issue; rather, it is most likely a sign of the poorly supervised health workers' lack of commitment and accountability as well as their unwillingness to complete the paperwork (Mboera et al., 2021). Human behavioural factors influencing the quality of frequently gathered data were identified in a comparative observational conducted in South Africa. According to the survey, 64% of respondents had weak analytical skills and scant statistical and data quality-checking abilities. The respondent's average confidence level in their ability to do RHIS tasks was 69%, although only 22% showed competence exceeding 50%. Although the staff seems to be decently motivated, their ability to understand and use data is seriously lacking (Nicol et al., 2013).

2.3.7 DHIMS 2 processes

According to a study conducted in Kenya that focused mostly on HMIS process variables, there is a high correlation between data quality and process factors, such as a lack of methods for conducting data quality checks and a lack of data quality protocols in place (Cheburet & Odhiambo-Otieno, 2016b).

2.4 Challenges health workers face with carrying out DHIMS 2 activities

There are several challenges health workers face with carrying out HMIS activities and has been identified in some literature. These challenges are said to affect HMIS data quality.

Despite these challenges, HMIS remains useful for developing District Implementation Plans (DIPs) and planning other projects (Kasambara et al., 2017).

The challenges identified include

2.4.1 Inadequate or lack of training on HMIS

A study conducted in Tanzania identified lack of training as one of the challenges health workers face with carrying out HMIS activities in that, approximately 41.4% of health workers had not received any training on HMIS in the past months before their survey (Mboera & Rumisha, 2021). However, it is a major challenge as identified in a study conducted in Malawi, approximately 81% of health workers had never received any formal training on HMIS. They also went ahead to say that, this gap in knowledge affects data collection, interpretation and utilization (Kasambara et al, 2017).

2.4.2 Workload

Addressing workload is crucial for improving HMIS outcomes. Workload was identified as a challenge in studies conducted in Tanzania and Malawi where it was said that overburdened health workers prioritise clinical tasks over HMIS responsibilities. This ends up affecting data collection and they end up producing incomplete data (Kumwenda et al., 2014; Mboera et al., 2021).

2.4.3 Lengthy HMIS Processes

In a study conducted in Malawi, it was identified that health workers complained about lengthy HMIS processes which lead to missing values arising from incomplete registers (Kasambara et al, 2017). There is a need for targeted interventions to address these challenges and enhance HMIS data quality.

2.5 Critical Evaluation and Gaps

The reviewed literature reveals several gaps that this study aims to address. Firstly, while many studies have identified issues with data completeness and timeliness, few have investigated the underlying causes, such as the lack of standardized guidelines and inadequate resources. Additionally, there is a limited understanding of how these factors affect data quality in different contexts, such as urban versus rural settings.

Moreover, while some studies have highlighted good data quality in certain countries (e.g., Rwanda and Uganda), there is a lack of comprehensive analysis across multiple regions to identify best practices and common challenges. The existing research also often fails to consider the socio-demographic factors affecting data quality, such as the level of education and professional training of health workers.

Furthermore, the literature tends to focus on the technical aspects of data quality, with less attention given to organisational and behavioural factors. There is a need for more holistic approaches that consider all dimensions of data quality, including accuracy, reliability, and usefulness.

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This study aims to fill these gaps by providing a comprehensive analysis of DHIMS 2 data quality in the Mion district, considering technical, organizational, and socio-demographic factors. By identifying specific challenges and best practices, the study will contribute to improving data quality and informing decision-making in the health sector.

2.6 Conclusion

From the literature, the key factors associated with HMIS data quality include factors such as behavioural factors such as individual knowledge of HMIS and confidence to carry out HMIS activities. Technical factors like reliable HMIS software, standardized indicators, availability of computers, and complexity of reporting formats. Socio-demographic factors such as level of education, profession, and years of working experience (Ahanhanzo et al., 2014).

Organisational factors include adequate training, management support, and regular supervision. Additionally, HMIS processes like data quality checks and protocols. All these factors are said to affect data quality in one way or the other. It is imperative to tackle these concerns to guarantee dependable and valuable data for healthcare decision-making (Cheburet & Odhiambo-Otieno, 2016a; Meghani et al., 2021).

Poor data quality has significant implications on decision-making and health outcomes, leading to misinformed decisions, ineffective interventions, and inadequate resource allocation. Inaccurate or incomplete data can result in incorrect diagnoses, inappropriate treatments, and faulty disease surveillance, ultimately compromising patient care and outcomes (Hlaing & Myint, 2022).

Furthermore, poor data quality can also lead to wasted resources, inefficiencies, and ineffective public health programs, exacerbating health disparities and reducing trust in the healthcare system. Moreover, it can also hinder research and development, slowing down the discovery of new treatments and interventions. Poor data quality can have far-reaching and devastating consequences, emphasizing the importance of prioritizing data quality and accuracy in healthcare decision-making (Mboera et al., 2021).

To improve HMIS data quality, it is recommended that regular training be provided to health workers, data collection tools and procedures be improved and robust supervision and feedback mechanisms be established. The implementation of these recommendations will significantly enhance the accuracy, completeness and timeliness of HMIS data which may lead to informed decision-making and improved health outcomes (Marie et al., 2021).

CHAPTER THREE

METHODS

3.1 Study Setting/Area

Ghana is located in West Africa on the African continent and is made up of sixteen (16) administrative regions. These regions are further divided into 261 municipalities and districts. Administratively, the health system has five levels: national, regional, district, sub-district and community levels. The study was conducted in the Mion district which is one of the sixteen (16) districts in the Northern Region of Ghana (GSS, 2021).

Mion district has Sang as its district capital and is located between latitude 9°- 35° North and 0°-30° West and 0°-15° East in the eastern corridor of the Northern Region of the Republic of Ghana. The district shares boundaries with Yendi Municipal to the East, Tamale Metropolitan to the West, Gushegu and Karaga to the North, Nanumba North, and East Gonja to the South. The distance from the district capital Sang, to the regional capital, Tamale is about 66km (Tom-Dery et al., 2023).

The district covers a total surface area of 2,714sqkm. There are three (3) Area Councils in the District namely, Sang, Kpabia, and Jimle. The district has 23 demarcated Community-based Health Planning and Services (CHPS) zones (of which 13 have physical CHPS compounds) and also has 210 Community-Based Surveillance (CBS) areas maned by community member.

The district has a population of 94,930 according to the population and housing census conducted in 2021 (Ghana Statistical Service, 2021).
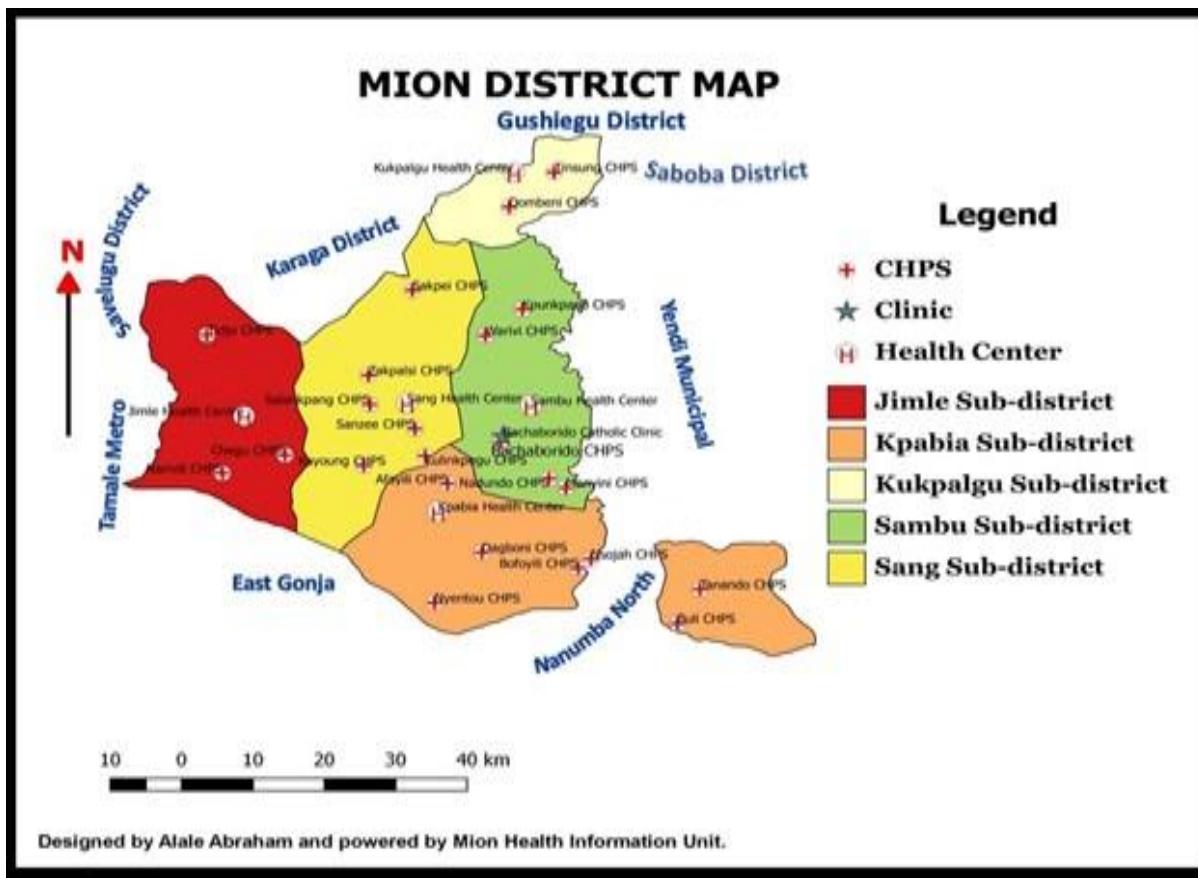
Figure 3. 1: Map of Mion District

Source: Mion District Assembly

The district is administratively further divided into five sub-districts namely: Sang, Sambu, Jimle, Kpabia and Kukpalgu. A total of five health centres are found within the district with one located at Sang, Sambu, Jimle, Kpabia and Kukpalgu. The district also has twenty-three (23) Community-Based Health Planning and Services (CHPS) zones which deliver serve to the residents but only thirteen (13) of these zones have compounds (physical structures) located in the vicinity of Dabogni, Sakpe, Nadundo, Tidjo, Bofoyili, Tanado, Warivi, Nanvili, Tinsung and Kpunkpano, Manyini, Chegu, and Zakpalsi.

Table 3. 1: Distribution of Health Facilities in Mion District

Facilities	Numbers
No. Communities	210
Hospitals	0
Polyclinics	0
Health Centres	5
CHAG	1
Private Clinic	1
CHPs Compounds	13
CHPs Zones with Services	23

Source: Mion District Health Directorate information office

3.2 Study Type/Approach/Design

The study was done using a descriptive cross-sectional study design. The study set out to describe the various factors associated with data quality among health workers in the Mion district in the Northern region. Mixed methods, that is, both quantitative and qualitative approaches were used in the data collection and analysis.

In a descriptive cross-sectional study design, data is collected at one point in time, and it is the most frequently used and most fundamental design in social survey research. This design is most appropriate for making inferences about the characteristics of the population from which the sample is drawn and inferences about the relationships between variables at the time data was collected. Data from this research design may either be used to describe a sample on one variable or several variables or to demonstrate the association between the variables. This research design is appropriate for this study because the research aims to describe the data quality in terms of timeliness and completeness. The research design also determines the relationship between these factors (variables) and data quality.

The quantitative part of the study was used to answer research questions one to three while the fourth research question was answered with the qualitative part. The quantitative part first involved secondary data obtained from the Mion district health directorate and then, primary data from a questionnaire answered by the health workers who participate in the data collection and entry processes at the health facilities in the district of Mion. The qualitative method involved the use of an in-depth interview.

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3.3 Study Population

The study population consisted of all health workers involved with DHIMS 2 data collection and entry activities in all the functional health facilities and CHPs zones under the Mion District.

A functional health facility refers to a healthcare facility with adequate infrastructure, adequate workforce capacity and equipment to provide efficient services such as primary healthcare, vaccination, maternal care, health promotion and education. These functional health facilities include health centres, medical centres, and CHPs compounds.

There were thirty (30) functional health facilities under the Mion District and the estimated number of health workers involved in data collection, reporting and all other DHIMS 2 data processing activities in the district was sixty-five (65).

3.4 Inclusion Criteria

All participants in this study were health workers responsible for the DHIMS 2 data activities from all the functional health facilities under the Mion District. The DHIMS 2 data activities that the participants are involved in include data collection, cleaning, and entry of data from their various health facilities.

The study included participants based on the following criteria:

1. **Relevance to Research Objectives**: Only health workers directly involved in DHIMS 2 data activities were included. Their firsthand experience and involvement are critical to the quality of data produced in terms of completeness and timeliness.

2. **Willingness to Participate**: Participants were selected based on their willingness to participate and their consent to engage in the study. This ensures ethical considerations and voluntary participation.

3. **Completion of Questionnaire**: Only those who completed the questionnaire were included in the analysis, ensuring that the data used for evaluation was comprehensive and complete.

Furthermore, the study utilized all the reporting forms from all 30 health facilities under the district to assess data quality. By including all facilities, the study aimed to provide a comprehensive evaluation of data completeness and timeliness across the entire district. The questionnaires were administered to all 65 health workers in the district responsible for data activities. This approach ensured that the perspectives and experiences of all relevant personnel were captured and analyzed.

These comprehensive inclusion criteria ensure that the study's participants and data are aligned with the research objectives and provide a clear rationale for participant selection. This enhances the validity and reliability of the findings.

The qualitative part which was done using the in-depth interviews was stopped after fifteen (15) participants after data saturation was reached.

3.5 Exclusion Criteria

Workers of the health facilities who were not responsible for any data-related activity or not remotely involved in data collection, entry, processing and analysis. The workers mainly included janitorial staff and security personnel.

Health workers responsible for data or involved in any data activities but who were absent from their duties be they approved or not leave at the time the study was conducted.

3.6 Sample Size/ Sampling Technique

All 30 health facilities in the Mion district were included in this study to ensure comprehensive coverage and minimize bias and confounding factors that might arise from sampling. Including all facilities was cost-effective and feasible, allowing for a thorough assessment of data quality across the district. This approach also fostered a sense of inclusion among all health personnel, encouraging their active participation.

The quantitative component involved administering a questionnaire to each of the 65 health workers responsible for data collection, reporting, and entry for all DHIMS 2 activities within their respective health facilities. This ensured that the perspectives and experiences of all relevant personnel were captured, providing a complete overview of data quality practices in the district.

For the qualitative aspect, a total of 15 health workers were interviewed. The sample size for the qualitative interviews was determined based on the principle of data saturation, which was reached after the 15th interview. This approach ensured that sufficient depth and detail were obtained to understand the challenges and factors affecting DHIMS 2 data quality.

By including all health facilities and administering questionnaires to all relevant health workers, the study aimed to provide a comprehensive and unbiased assessment of DHIMS 2 data quality in the Mion district. The combination of quantitative and qualitative methods allowed for a robust analysis, capturing both the breadth and depth of data quality issues.

3.7 Completeness and Timeliness

The years 2020, 2021 and 2022 were selected for data analysis to ensure that the findings are relevant and up-to-date, allow for trend analysis, assess the impact of the COVID-19 pandemic on data quality, and because this recent data is accessible and practical for data analysis.

Selecting the years 2020 to 2022 for analyzing data quality in terms of completeness and timeliness can be justified with several rationales:

1. **Recent Data**: These years represent the most recent data available, ensuring that the findings are relevant and reflect current trends and practices in data quality.

2. **Impact of the COVID-19 Pandemic**: This period encompasses the global COVID-19 pandemic, which had significant impacts on healthcare systems and data management. Analyzing data from these years can provide insights into how the pandemic influenced data quality and healthcare delivery.

3. **Trend Analysis**: Covering a three-year period allows for the identification of trends and patterns in data quality. This can help determine if there have been improvements or declines in data completeness and timeliness over time.

4. **Policy and Intervention Impact**: If there were any policies, interventions, or improvements implemented during these years, analyzing data from this period can help assess their effectiveness and impact on data quality.

5. **Consistency and Comparability**: Using data from consecutive years ensures consistency and comparability in the analysis. This helps in drawing accurate and meaningful conclusions about data quality trends.

6. **Data Availability**: The availability and completeness of data for these specific years make them suitable for analysis. Ensuring that the data for these years is reliable and accessible is crucial for accurate evaluation.

By selecting the years 2020 to 2022, your study can provide valuable insights into the factors affecting data quality and the challenges faced during this specific and impactful period.

3.8 Data Collection Tools

The PRISM assessment tools were modified to serve as data-gathering tools. The tool is designed to meet the local context and mostly consists of questions to evaluate the correctness, completeness, and timeliness of HMIS data (Belay & Lippeveld, 2013). Organisational, behavioural, and technical determinants of data quality in a health centre were covered in a self-administered structured questionnaire for the quantitative aspect of this study. An in-depth interview guide was used to collect the primary data for the qualitative aspect.

Before the actual data-collection period, the tools were pretested on five (5) to ten (10) health workers in a different district to determine their usability as stated by (Perneger et al., 2015).

Following this pre-test, further modifications were made to the tool which increased its usability.

The questionnaire was then used to collect the data from all the 65 healthcare workers in the district involved with data activities.

3.9 Data Collection Procedure

Secondary data was extracted from the District Health Information Management System II (DHIMS 2) which covered a period of three years, January 2020 to December 2022 on monthly reporting forms from all health facilities within the Mion District.

A structured questionnaire was used to collect primary data from all 65 health workers responsible for DHIMS 2 data activities in all the health facilities in the Mion District.

For the qualitative part of the research, an interview guide was used to conduct an in-depth interview with some of the 65 health workers responsible for DHIMS 2 data activities. The interviews were conducted face-to-face, documented and also digitally recorded. They were all transcribed within 72 hours for analysis. A total of fifteen (15) interviews were conducted and a saturation level was reached. It was ideal that all the interviews were conducted by the principal investigator since the principal investigator was doing the qualitative analysis based on the interview, literature, personal observation and judgments. A thematic analysis technique was used to analyse the interviews manually.

3.10 Quality Control and Data Handling

Quality control measures ensure that a research study is conducted according to the protocol, good clinical practices guidelines, standard operating procedures and regulatory requirements. It also ensures uniformity in the collection and handling of data while preventing personal biases from influencing the results obtained (Bansal et al., 2023).

The data extracted from the DHIMS 2 software was exported to Microsoft Excel where the data was cleaned and checked for data incompleteness and non-response before analysis. Also, the tools used for the collection of primary data were adapted from a standard tool used in previous studies (Solomon, 2018). The tools were tested and edited to make sure they were able to answer research questions and further tested among health workers in different health facilities to make sure it was easily understandable and fit for purpose. This helped find gaps in the questions and worked on them before the main data was collected.

All 65 health workers were included in the study. During the data collection process, participants were left to answer the question on their own but allowed to seek clarification where needed and the process was supervised by an expert.

To preserve and ensure anonymity, names were not included in the questionnaire. Answers from the questionnaire were extracted from the Google forms, entered into Microsoft Excel and cleaned. The data was entered into SPSS version 26 where coding and analysis were done. To ensure uniformity, monthly forms that were used or reported by all the facilities were used for the analysis. Variables were cross-checked before analysis to make sure that they were complete.

For the qualitative aspect, the in-depth interviews were written, digitally recorded and transcribed within 72 hours after the interview. This was done to prevent recall bias. Both the recorded and written data from the interviews were also compared to prevent bias.

After analysis, the results were assessed by another person to make sure that the results had answered all the research questions the study set out to answer.

Table 3. 2: Study Variables and their Definition

Variable	Operational Definition	Type of Variable
DHIMS 2 data quality	The degree to which the data stored and transmitted through District Health Information Management System 2 (DHIMS 2) meets the required standards. In this research, data quality is a function of the completeness and timeliness of each facility	Dependent variable
Socio-demographic factors	This includes; ❖ the age of respondents in years at the time of the study. ❖ The gender of the respondents. ❖ Level of education of the respondent at the time of the study. ❖ Position of the respondent at the time of the study.	Independent variable

	❖ Number of years of work experience of the respondent at the time of study.	
Individual/behavioural factors	This includes; ❖ Knowledge of the contents of DHIMS 2 forms – The respondent's understanding of the specific data elements and information collected through the DHIMS 2 forms. ❖ Data checking skill – the respondent's ability to verify and ensure the accuracy, completeness and timeliness of data. ❖ Confidence level of DHIMS 2 tasks – the degree of assurance that the healthcare workers have in their ability to accurately complete tasks within the DHIMS 2. ❖ Motivation – This refers to the driving forces that encourage health workers to enthusiastically and consistently use DHIMS 2 to collect, manage and analyse healthcare data.	Independent variable
Organisational factors	These factors include; ❖ Management support for DHIMS 2 – this refers to the backing and resources provided by the healthcare facility managers, district health officials and	Independent variable

other leaders to ensure the successful implementation and utilization of DHIMS 2.

❖ Training -this refers to the process of educating and equipping healthcare workers and data managers with the necessary skills and knowledge to effectively use the DHIMS 2 to collect, manage and analyse healthcare data.

❖ Supervision – refers to the oversight and guidance provided to healthcare workers and data managers to ensure accurate, complete and consistent data collection, management and analysis.

❖ Regular feedback – this refers to the ongoing process of providing and receiving information about data quality, system usage and performance.

❖ Availability of incentives – refers to the presence of motivators that encourage healthcare workers and data managers to consistently and accurately use the system.

| Technical factors | These include; | Independent variable |

❖ Complexity of the reporting formats and procedure – refers to the level of difficulty and intricacy in the process of gathering, organizing and submitting data or information.

❖ Availability of computer software/ database – having the necessary tools and storage for managing health data. This includes the software (DHIMS 2 application); the tool that helps collect, analyse and visualize health data and the database; and the storage space where health data is kept, organized and secured.

❖ Standard set of indicators with definition – These are a collection of predetermined metrics or parameters that are widely accepted and used to measure and assess specific aspects of healthcare. Examples include mortality rates, vaccination coverage, and disease prevalence, among others.

DHIMS 2 processes	These include;	Independent Variable

❖ Data collection – collecting health data from various sources, such as health registers, and patients, among others.

❖ Data processing – this includes entering collected data into the DHIMS 2 system and checking data for errors, inconsistencies and completeness to ensure accuracy and quality.

❖ Data quality check – verifying data against a set of rules, constraints, and standards to ensure accuracy, completeness and consistency.

❖ Data Analysis – this process is to identify trends, patterns and insights using tools like dashboards, charts and maps.

Source: self construct 2024

3.11 Operational Definition

DHIMS 2 data quality: This refers to the degree to which data is accurate, complete, consistent, reliable and relevant for its intended use.

Content completeness: This refers to the extent to which the data is comprehensive and includes all necessary information. The completeness rate is calculated by dividing the actual reporting forms by the expected forms, multiplied by 100%.

Report timeliness: Refers to promptness and efficiency in delivering reports, meeting deadlines, and providing information on time. The timeliness rate is calculated by dividing the actual reports received on time by the expected reports, multiplied by 100%.

Data elements: Refers to all the necessary information which are to be filled in each cell of the DHIMS 2 database or reporting forms.

Health workers: Refers to any health professional (nurses, public health officers, laboratory technicians, among others) who are responsible for or involved in collecting and reporting health information.

Functional health facility: Refers to a healthcare facility that provides essential health services, has adequate infrastructure and staff and delivers quality care that is accessible, equitable and affordable, while continuously improving its services and quality. CHP compounds, CHPs zones, Health Centres, and Clinics that provide these essential services, have adequate infrastructure, equipment and trained staff and deliver quality care can be considered functional.

Confidence level/ Self-efficacy: Refers to the belief health workers have in their abilities to perform a specific activity related to DHIMS 2.

3.12 Data Analysis

The secondary data was extracted from DHIMS 2 into Microsoft Excel. It was then cleaned and exported for analysis using SPSS version 26. The analysis included performing descriptive statistics to obtain the completeness rate and timeliness rate of health data from the year 2020 to 2022.

The data summary sheets' completeness was calculated as (Actually completed summary sheets submitted divided by the total number of expected summary sheets) * 100. The results were ranked using the GHS standard data completeness target of 98%: Excellent (98% or higher), Very good (90% - 97.9%), Good (85% - 89.9%), Poor (75% - 84.9%), and Very poor (Less than 75%) (Ghana Health Service, 2020).

Data timeliness was calculated as; (the actual summary sheets submitted within the specified time frame divided by the total number of expected summary sheets) * 100 and the data timeliness was also ranked using the GHS standard target of 90%: Excellent (90% or higher), Very good (85% – 89.9%), Good (75% – 84.9%), Poor (65% - 74.9%), and very poor (Less than 65%) (Ghana Health Service, 2020).

The data quality for each health facility is determined using the combination of its completes and timeliness. A facility must have complete and timely data to be consider quality. Any one of them not been adequate per the G.H.S definition is categorised as having poor data quality.

Furthermore, descriptive statistics was performed on the primary data obtained from data collection using the questionnaire. In the analysis, these types of category choices were further

regrouped and recoded into three categories dichotomized strongly agree and agree to 'agree' as a positive rating and strongly disagree and disagree to 'disagree' as a negative rating. The neutral response is believed to be equidistance to the adjacent ratings in both directions and is ignored as a non-response for this study purpose Moreover, the possible factors that affect the use of DHIMS 2 were analysed using Pearson's chi-square test. Pearson's correlation with a significance of 0.05 was used.

The qualitative data obtained through the in-depth interviews was analysed by doing a thematic analysis. After the interviews were held, the results from the questionnaire added to the interview were compared and possible explanations concerning the issue at hand were discussed. Comparison was then also made between the findings of this study and other related research works

3.13 Limitations of the Study

Content completeness was assessed only for reporting formats, so it could not represent the completeness of registration forms and tally sheets.

A structured questionnaire was used to collect data therefore, there was a restriction hence, no further explanation or reason behind the answers given by respondents.

Using secondary data may underestimate the findings. To minimize this effect, data for three consecutive years were used.

Focusing solely on statistically significant findings may overlook important practical implications.

3.14 Strengths of the Study

The use of all health workers in charge of DHIMS 2 data activities in the Mion district was able to cover up for any form of bias that may arise with sampling.

Including all the 30 health facilities in the study was able to cover up for any form of bias that may arise with sampling.

Using multiple data sources (primary and secondary data) and analysis methods (descriptive, chi-square test and thematic analysis) provides a more comprehensive understanding of the research topic. Provides a complete understanding of the research topic covering both existing knowledge and new insights from the questionnaire.

Using secondary data from DHIMS 2 and including all health workers under the Mion district provides a large sample size, increasing the study's statistical power and generalisability. The study's findings can be generalised to a larger population due to the large sample size and objective data.

Reduced data collection cost.

The study can produce robust and reliable findings, contributing to the existing body of knowledge.

3.15 Ethical Consideration

Ethical clearance was obtained from the Committee on Human Research, Publications and Ethics- Kwame Nkrumah University of Science and Technology in Ghana (Letter dated 6th November, 2023; Ref: CHRPE/AP/1001/23). A letter of cooperation was obtained from the

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Mion District Health Directorate with the assistance of the University for Development Studies, School of Public Health. Verbal consent was obtained from each respondent before the start of data collection for the in-depth interview while a signed informed consent was taken before each questionnaire was answered. Confidentiality of the data was ensured through anonymity.

CHAPTER FOUR

RESULTS OF THE STUDY

4.1 Introduction to the Results

The findings of the study are provided in this chapter. These are the evidence generated for the study objectives. All The respondents' sociodemographic details are displayed in one section. Findings are presented in tables, graphs and bar charts, as deemed appropriate to facilitate understanding.

4.2 Characteristics of Respondents

A total of 65 respondents participated in the study out of which 28 (43.08%) were males. There were 9 (13.84%) respondents who were between the ages of 25 and 29, 27 (41.53%) between the ages of 30 and 34 and 29 (44.61%) between the ages of 35 and 49. 7 (10.77%) of the respondents were the heads of the facility, 25 (38.46%) were heads of departments at the facility, and 10 (15.38%) were nurses in charge. In addition, 19 representing (29.23%) were senior staff in the facility while 4 which is 14.29% were community health officers. The professional category saw that a majority of 37 (56.92%) of respondents were nurses and 26 (40.00%) were midwives. One respondent was a public health officer and another was a technical officer. The highest level of education attained by respondents was 9 (13.85%) with a certificate, 12 (18.46%) had a diploma while the majority of respondents 44 (67.69%) had attained a bachelor's degree. Finally, 21 (32.31%) of the respondents had a work experience of less than five (5) years, 30 (46.15%) had a work experience of five (5) years to nine (9) years,

a further 12 (18.46%) had a work experience of ten (10) to fourteen (14) years and 2 (3.08%)

of the respondents had a work experience greater than fourteen (14) years.

Table 4. 1: Characteristics of respondents

Variables	Category	Frequency	Percentage (%)
Age	25-29	9	13.9
	30-34	27	41.5
	35-39	20	30.8
	40-44	3	4.6
	45-49	6	9.2
Total		**65**	**100.0**
Sex	Male	28	43.1
	Female	37	56.9
Total		**65**	**100.0**
Work experience	<5	21	32.3
	5-9	30	46.2
	10-14	12	18.5
	≥15	2	3.0
Total		**65**	**100.0**
Level of education	Certificate	9	13.9
	Diploma	12	18.5
	Bachelor's degree	44	67.6
Total		**65**	**100.0**
Professional category	Nurse	37	56.9
	Midwifery	26	40.1
	Public health	1	1.5
	Technical (Disease Control Officer)	1	1.5
Total		**65**	**100.0**
Position of respondent	Head of the institution	7	10.8
	Head of the department	25	38.5
	Nurse in-charge	10	15.4
	Senior staff	19	29.2
	Community health officer	4	6.1
Total		**65**	**100.0**

Source: Field Survey, 2024

4.3 General Structure of DHIMS 2

All the health facilities included in the study had DHIMS 2 focal persons who are in charge of reviewing and aggregating data before submitted to the next level thus, the district. the respondents had no written job description. All the facilities had a functional electronic database. All facilities had a way or rules to prevent unauthorized changes to data some of which were stated as password and lock and key. The facilities also had an established performance team.

Table 4. 2: General structure of DHIMS 2

Variables	Expected number of items	Observed number of items	Percentage (%)
DHIMS 2 focal person	65	65	100.00
Have written job description	65	0	0.00
Electronic database (computer software)	65	65	100.00
Currently functional computer software	65	65	100.00
Rules to prevent unauthorized changes to data	65	65	100.00
Establish a performance monitoring team	65	65	100.00

Source: Field Survey, 2024

4.3 Record keeping

All the health centres kept copies of the reports. The count for a year of copies of reports shows that the monthly report kept ranges from 10-12 copies.

4.4 Level of quality

The Table 4.3 below shows a summary of reporting forms' completeness and timeliness in the years 2020,2021 and 2022 in the Mion District. In each year, a total of 336 monthly reports were expected to be submitted for each of the reporting forms except for the year 2022 where 348 reports were submitted for Monthly Outpatient Department (OPD) returns, monthly statements of outpatients and monthly malaria data on anti-malarial.

For the monthly OPD morbidity returns, timeliness increased in 2021 by 8% (26/336) and decreased by 1% in 2022 while completeness remains 100% for the 3 years (2020, 2021 and 2022).

For monthly statements of outpatients, completeness decreased by 0.6% (2/336) in 2021 and was maintained (100%) in 2022. Timeliness increased by 6.5% (22/336) and 0.3% in 2021 and 2022.

For monthly malaria data on anti-malarial, there was no data recorded for the year 2020 but completeness and timeliness increased by 25% and 24.4% respectively in the year 2022.

Monthly form A – midwife's returns' data was complete for the 3 years but there was an increase in timeliness by 5.7% (19/336) in 2021 and 1.5% (5/336) in 2022.

Monthly form B – family planning returns' data was complete for the 3 years but timeliness increased by 7.4% (25/336) and 1.2% (4/336) in the years 2021 and 2022 respectively.

No monthly Comprehensive Abortion Care (CAC) reports were recorded for the years 2020 and 2021 but completeness and timeliness for the year 2022 were 100% (336/336) and 92% (309/336) respectively.

There was a 100% (336/336) completeness of data for the monthly vaccination report while timeliness was increased by 11.9% (40/336) in 2021 and a decrease of 1.2% (4/336) in 2022.

Monthly health promotion data was complete for the 3 years while timeliness was increased by 8.9% (30/336) in 2021 and remained 100% (336/336) in 2022.

Monthly Integrated Disease Surveillance and Response (IDSR) summary report completeness increased by 0.3% (1/336) in 2021 and remained 100% (336/336) in 2022 while timeliness increased by 4.5% (15/336) and 4.8% (16/336) in 2021 and 2022 respectively.

No monthly nutrition and child health data was recorded for the year 2020 whereas, there was a 100% (336/336) completeness of data for 2021 and 2022. Timeliness also increased by 8.3% (28/336) in 2022.

Table 4. 3: Data quality in terms of completeness and timeliness by sub-district

Sub-District	Completeness						Timeliness					
	2020		2021		2022		2020		2021		2022	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Jimle	336	100	420	97.2	480	100	307	91.4	416	96.3	474	98.8
Kpabia	671	99.9	839	97.1	960	100	616	92.7	828	95.8	952	99.2
Kukpalgu	252	100	315	97.2	360	100	231	91.7	307	94.8	357	99.2
Sambu	504	100	630	97.2	720	100	456	90.5	616	95.1	712	98.9
Sang	588	100	734	97.0	875	99.9	536	91.2	716	94.7	862	98.7

Source: field survey 2024

Table 4. 4: Date completeness and timely by type of forms

Reporting Forms	Period (Years)	Expected Reports	Actual Reports (Completeness (%))	Actual Reports on Time (Timeliness (%))
Monthly OPD	2020	336	336 (100)	310 (92.3)
Morbidity	2021	336	336 (100)	336 (100)
Returns	2022	348	348 (100)	345 (99.1)
Monthly	2020	336	336 (100)	310 (92.6)
Statement of	2021	336	334 (99.4)	333 (99.1)
Outpatients	2022	348	346 (99.4)	346 (99.4)
Monthly Malaria	2020			
Data on Anti-	2021	336	252 (75)	252 (75)
malarial	2022	348	348 (100)	346 (99.4)
Monthly Form A	2020	336	336 (100)	312 (92.9)
– Midwife's	2021	336	336 (100)	331 (98.5)
Returns	2022	336	336 (100)	336 (100)
Monthly Form B	2020	336	336 (100)	307 (91.4)
– Family	2021	336	336 (100)	332 (98.8)
Planning	2022	336	336 (100)	336 (100)
Returns				
Monthly CAC	2020			
Reports	2021			
	2022	336	336 (100)	309 (92)
Monthly	2020	336	336 (100)	295 (87.8)
Vaccination	2021	336	336 (100)	335 (99.7)
(EPI) - New	2022	336	336 (100)	331 (98.5)
Monthly Health	2020	336	336 (100)	306 (91.1)
Promotion	2021	336	336 (100)	336 (100)
Report	2022	336	336 (100)	336 (100)
Monthly IDSR	2020	336	335 (99.7)	305 (90.7)
Summary	2021	336	336 (100)	320 (95.5)
Report	2022	336	336 (100)	336 (100)
Monthly	2020			
Nutrition and	2021	336	336 (100)	308 (91.7)
Child Health	2022	336	336 (100)	336 (100)
Report - New				

Source: Field Survey, 2024

4.5 DHIMS 2 processes

All 65 (100) respondents received supervision from higher officials in the past three (3) months, participated in data aggregation and compilation and filled out registration and tally completely. 56 (96.55%) and 2(3.45%) conduct accuracy checks on a monthly and quarterly basis respectively. 62 (95.38%) receive feedback monthly while 3 (4.62) receive feedback from top-level organizations quarterly (Table 4.6).

Table 4. 5: DHIMS 2 processes

DHIMS 2 processes		Yes (%)	No (%)
Participation in the aggregation or compilation of data		65 (100)	0
Filling registration or tally completely		65 (100)	0
Conduct accuracy check		58 (89.23)	7 (10.77)
Monthly		56 (96.55)	
Quarterly		2 (3.45)	
Supervision		65 (100)	
Feedback		65 (100)	0
	Monthly	62 (95.38)	
	Quarterly	3 (4.62)	

Source: Field Survey, 2024

4.6 Technical factors

All 65 (100%) respondents reported that they had a set of indicators including case definitions in their departments. Among the respondents, 59 (90.77%) reported that there are skilled staff able to aggregate data and fill out formats while 13 (20%) and 52 (80%) reported that DHIMS 2 is user-friendly and very user-friendly respectively. 16 (24.62%) of the respondents reported that DHIMS 2 is easily understandable, 2 (3.10%) reported that DHIMS 2 is somehow easily understandable and 47 (72.31%) reported that DHIMS 2 is very easily understandable.

4.7 Behavioural factors

All respondents (65 (100%)) knew DHIMS 2. Assessing the individual perception towards DHIMS 2, 62 (95.38%) respondents reported that, they are discouraged when DHIMS 2 data are not used for decision making. 16 (24.62%) feel bored when carrying out DHIMS 2 activities. 5 (7.69%) feel that DHIMS 2 activities are being enforced on them. All respondents reported that DHIMS 2 activities are meaningful to them and give them the feeling that data is used for performance monitoring.

Table 4. 6: Behavioural factors

Behavioural factors	Yes (%)	No (%)
Knowledge of DHIMS 2	65 (100)	0
Individual perception (motivation)	71.28%	28.72%
Self-efficacy (confidence level)	96.92%	3.08%

Source: Field Survey, 2024

4.8 Self-Efficacy

The confidence level of health staff to perform DHIMS 2 tasks was assessed using the Likert scale. The average score obtained for the seven questions was expressed as a percentage. Higher confidence was observed in plotting data by months/ years, identifying gaps setting targets, and using data for making various types of decisions and providing feedback (100%). A lower confidence was observed in checking data accuracy and calculating percentages/rates correctly (89.23%) relatively. The average confidence level of respondents to perform DHIMS 2 activities was 96.92% (Figure 4.1).
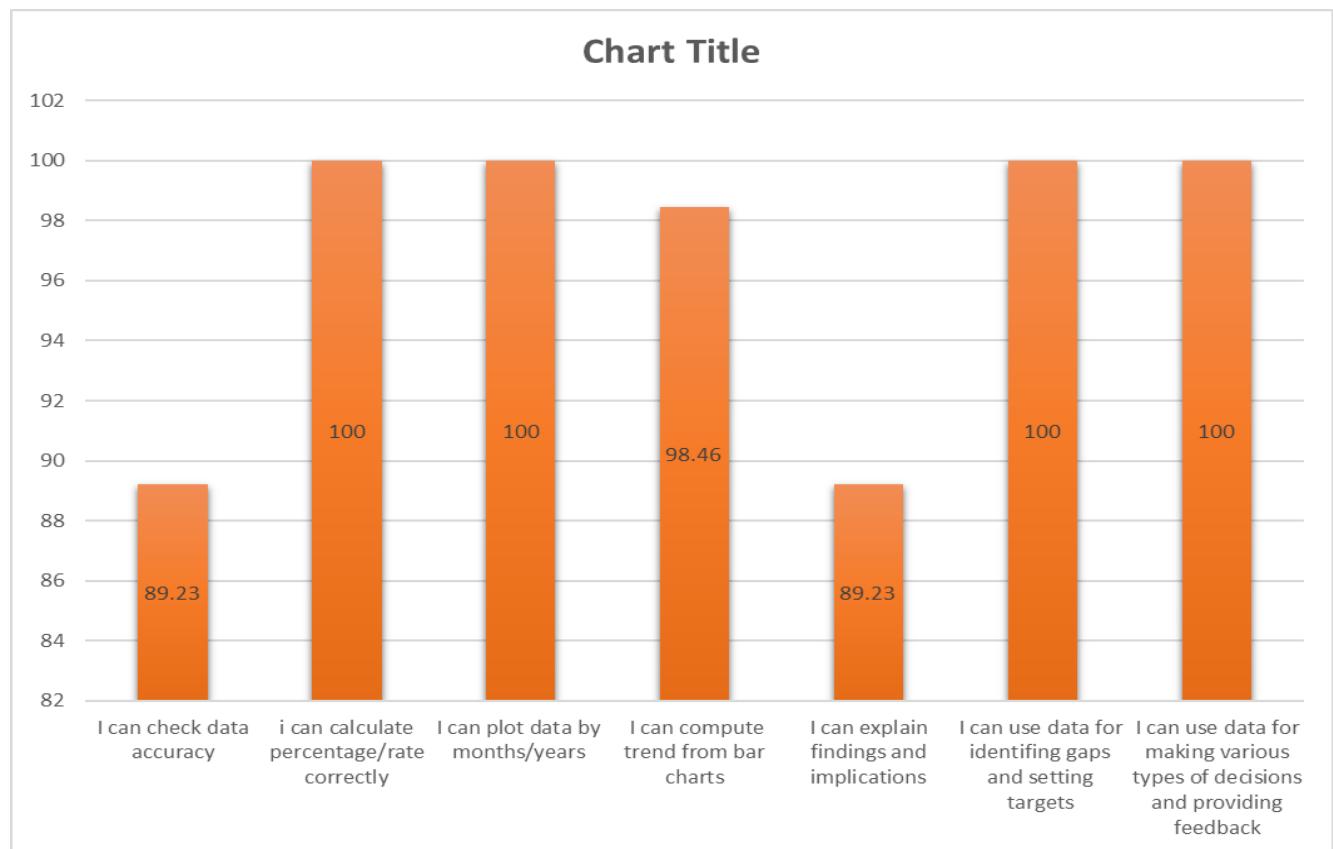
Figure 4. 1: Self-Efficacy

Source: Field Survey, 2024

4.9 Organisational factors

As presented in Table 4.7 below, only 8 (12.31%) of respondents received training on DHIMS 2 and out of these, 7 (10.77%) received in-service training and 1 (1.54%) received pre-service training. Those who received training reported that their training was organized by the Ghana Health Service, the District Health Directorate and the Regional Health Directorate and were trained on the interface of the DHIMS 2 software and how to enter data into the DHIMS 2. Out of the 65 respondents, 7(10.77%) received incentives for carrying out DHIMS 2 activities which included, money, training, recognition and handouts.

All 65 (100%) respondents reported that there was a procedural manual for data collection with definitions at their health facility. Also, 17 (60.71%) stated that decisions made at their facility were evidence-based. 64 (98.46%) respondents agreed to the extent of management support regarding DHIMS 2 activities.

Table 4. 7: Self-Efficacy

Organisational factors	Yes (%)	No (%)
Training	8 (12.31)	57 (87.69)
In-service	7 (10.77)	58 (89.23)
Pre-service training	1 (1.54)	64 (98.46)
Incentives	7(10.77)	58(89.23)
A procedural manual for data collection with definitions	65 (100)	0
Evidence-based decision	17 (60.71)	11 (39.28)
Management support for DHIMS 2	64 (98.46)	1 (1.54)

Source: Field Survey, 2024

4.10 Supervision quality

All 65 (100%) respondents agreed that their supervisors seek regular feedback from concerned persons, emphasize data quality in monthly reports, use DHIMS 2 data for setting targets and monitoring, report on data quality regularly, provide regular feedback to staff and report on data accuracy regularly. Also, all respondents 65 (100%) disagreed with their supervisors encouraging over-reporting of data for underperformed reports.

4.11 Factors associated with DHIMS 2 data quality

The chi-square test was done to explore the factors associated with DHIMS 2. Below are the null and alternate hypotheses with a significance level of 0.05

4.11.1 Chi-square test for data quality and Knowledge of DHIMS 2

Null hypothesis 1: there is no relationship between data quality and Knowledge of DHIMS 2

Alternate hypothesis 1: there is a significant relationship between data quality and knowledge of DHIMS 2.

From the chi-square test table 4.8 below, enough evidence exists to reject the null hypothesis. The was significant evidence of an association, ($\chi2 = 19.6$; df= 1; p< 0.001).

4.11.2 Chi-square test for data quality and Filling registration or tally forms completely

Null hypothesis 2: there is no relationship between data quality and Filling registration or tally forms completely

Alternate hypothesis 2: there is a significant relationship between data quality and Filling registration or tally forms completely

From the chi-square test table 4.8 below, enough evidence exists to reject the null hypothesis. The was significant evidence of an association, (χ2= 32.5; df = 1; p< 0.001).

4.11.3 Chi-square test for data quality and supervision

Null hypothesis 3: there is no relationship between data quality and supervision

Alternate hypothesis 3: there is a significant relationship between data quality and supervision

From the chi-square test table 4.8 below, enough evidence exists to reject the null hypothesis. There was significant evidence of an association, (χ2=14.3; df =1; p=0.026).

4.11.4 Chi-square test for data quality and Training

Null hypothesis 4: there is no relationship between data quality and Training

Alternate hypothesis 4: there is a significant relationship between data quality and Training

From the chi-square test table 4.8 below, enough evidence exists to reject the null hypothesis. There was significant evidence of an association, (χ2=11.8; df =1; p=0.003).

4.11.5 Chi-square test for data quality and level of education

Null hypothesis 5: there is no relationship between data quality and level of education

Alternate hypothesis 5: there is a significant relationship between data quality and the level of education

From the chi-square test table 4.8 below, enough evidence does not exist to reject the null hypothesis. Therefore, the evidence fails to reject the null hypothesis, ($\chi 2$=1.9; df =1; p=0.092).

4.11.6 Chi-square test for data quality and self-efficacy

Null hypothesis 6: there is no relationship between data quality and Self-efficacy (Perceived confidence level)

Alternate hypothesis 6: there is a significant relationship between data quality and Self-efficacy (Perceived confidence level)

From the chi-square test table 4.8 below, enough evidence does not exist to reject the null hypothesis. Therefore, the evidence fails to reject the null hypothesis, ($\chi 2$=2.3; df =1; p=0.732).

4.11.7 Chi-square test for data quality and the availability of procedural manual

Null hypothesis 7: there is no relationship between data quality and the availability of procedural manual

Alternate hypothesis 7: there is a significant relationship between data quality and the availability of procedural manual

From the chi-square test table 4.8 below, enough evidence does not exist to reject the null hypothesis. Therefore, the evidence fails to reject the null hypothesis, ($\chi2=0.5$; df =1; p=0.469).

4.11.8 Chi-square test for data quality and a standard set of indicators

Null hypothesis 8: there is no relationship between data quality and the standard set of indicators

Alternate hypothesis 8: there is a significant relationship between data quality and a standard set of indicators.

From the chi-square test table 4.8 below, enough evidence does not exist to reject the null hypothesis.

Therefore, the evidence fails to reject the null hypothesis, ($\chi2= 2.5$; df =1; p= 0.673).

4.11.9 Chi-square test for data quality and management support

Null hypothesis 9: there is no relationship between data quality and management support

Alternate hypothesis 9: there is a significant relationship between data quality and management support

From the chi-square test table 4.8 below, enough evidence exists to reject the null hypothesis. There was significant evidence of an association, ($\chi2=8.6$, df =1, p=0.008).

Table 4. 8: Correlation of factors associated with DHIMS 2 data quality among health workers in Mion district

Variables		Data quality		χ2/Pearson Chi-square	P-Value
		Good	Poor		
Knowledge of DHIMS	Yes	51	14		
	No	0	0	19.6	0.000*
Filling registration or tally forms completely	Yes	51	14		
	No	0	0	32.5	0.000*
Supervision	Yes	51	14		
	No	0	0	14.3	0.026*
Training	Yes	8	1		
	No	44	13	11.8	0.003*
Level of education	No certificate	7	2		
	Diploma	8	4	1.9	0.092
	Degree	36	8		
Self-efficacy	Yes	50	13		
	No	1	1	2.3	0.732
Availability of procedural manual	Yes	51	14		
	No	0	0	0.5	0.469
Standard set of indicators	Yes	51	14		
	No	0	0	2.5	0.0673
Management support	Yes	51	13		

| No | 0 | 1 | 8.6 | 0.008* |

Source: Field Survey, 2024

4.12 Challenges Affecting Data Quality

The challenges found from the in-depth interviews were grouped under two (2) main thematic areas; data entry and validation, and training and support challenges.

The data entry and validation thematic area showed the following main challenges. Poor internet connectivity was the first challenge, many found it difficult to effectively enter data into the DHIMS 2 without experiencing frequent and intermittent network fluctuations causing delays and discouraging them from putting maximum effort into getting it done. One participant said,

> *"Our facility always doesn't have internet so entering data is a problem for us'".* *Another also said, "As for this internet, let's not talk about it because we are tired of it*. **(Participant # 1 and #5)**

Secondly, the lack of computers was one of the major challenges they faced regarding data entry. Some participants said

> *"We don't have computers to enter the data so we have to go all the way to the district to submit the forms, sometimes, we get so busy that sending the forms to the district becomes difficult, hence untimely submission of the monthly forms. If we had computers, we would've been entering the data here at our facility to save time and money".* **(Participant #8)**

> *"I have never seen a computer here at my facility and all we do is send the forms to the district to be entered by the information officer. I think if we had computers here, things would've been easy for us all".* **(Participant #7)**

One of the health workers also said,

> *"We have the computers but they don't work well. We're always having issues with it so we just submit the forms to the district to be entered into the DHIMS 2".* **(Participant #2)**

Some challenges health workers face with data validation are mainly about the number of forms they have to compare with the source data thus, the registers. One participant said,

> *"The forms are too many to be compared with the registers and sometimes there can be an oversight which mostly leads to errors".* **(Participant #4)**

> *"Comparing all these forms with the registers is a lot of work and sometimes takes a lot of time to finish it".* **(Participant #15)**

Training was one of the major challenges health workers faced regarding DHIMS 2. One participant said,

> *"I was assigned the responsibility of data collection, compilation and filling of forms but I wasn't trained on that. I just have to ask some of my colleagues from other facilities who have a fair knowledge of these to help me out. If we are trained before assigned these responsibilities will go a long way".* **(Participant #12)**

> *"Training is a major problem we are facing here. Very few people in the district are fortunate to have received training on DHIMS and some of us who haven't are lagging and are also expected to carry out certain responsibilities that we have little or no idea about".* **(Participant #3)**

> *"Training should be given to all health workers since the responsibility for data is assigned to just anyone without a written job description".* **(Participant #9)**

Participants also emphasized the need for adequate support from the management, which was perceived as lacking. A participant reported,

"When I have questions or issues with DHIMS 2, I don't receive timely or helpful support from our seniors rather, I have to ask my colleagues who have little knowledge of it". **(Participant #14)**

"Our bosses from the district don't seem to understand the challenges we face with DHIMS 2, and they don't provide sufficient guidelines and resources". **(Participant #10)**

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

In this chapter, the results of the study were discussed in the light of existing literature. The discussion aims to interpret and describe the meaning of the findings and their implication for policy and practice of health concerning data quality. Findings are discussed by the objectives of the study.

5.2 Data quality in terms of completeness and timeliness

Effective health planning and decision-making in Health Management Information Systems (HMIS) depend heavily on the quality of the data. Timeliness and completeness are two essential components of data quality. The results from this study indicate that both data completeness and timeliness for the three years were good and there was an increase in timeliness percentage over the three years while there was a drop in data completeness for the year 2021 and an increase again in 2022. Over the three years, an improvement in data quality in terms of completeness and timeliness was observed. The results demonstrate that the health facilities' data quality is good to exceptional. Good data quality is essential for the operations, decision-making and planning of healthcare services. This may be due to the health worker's knowledge of DHIMS 2, Training on DHIMS 2, motivation, or ability to carry out certain DHIMS 2 activities. This analysis supports the fact that quality could be associated with organisational and behavioural factors as stated by Lasim et al. (Lasim et al., 2022). In another study in Ethiopia, the completeness and timeliness of facility reporting varied significantly

between regions. These variations underscore the importance of addressing regional disparities in HMIS performance (Ataklti et al., 2017; Teklegiorgis et al., 2016).

5.2.1 Completeness

Completeness is the degree to which all necessary data has been collected and documented. A high degree of completeness guarantees that health data are all-inclusive and accurately reflect the state of health in the real world.

The data quality in terms of completeness was 99.98%, 97.14%, and 100% for the years 2020, 2021, and 2022 respectively. Regarding content completeness, the health facilities scored 99.98% in 2020, 97.14% in 2021 and 100% in 2022 which is higher than a study conducted in Ghana (94.9%), Kenya (56%), and Ethiopia (83.2%) (Asem & Ekame, 2021; Haftu et al., 2021; Munda Mucee et al., 2016) and similar a study conducted in Mekelle Zone, Ethiopia (100%) and Rwanda (98%) (Ataklti et al., 2017; Innocent et al., 2016). This finding implies that sufficient information is available when required to make decisions about the population's health and to target resources to improve health system coverage, efficiency, and quality in the Mion district.

Significant differences in completeness across many health indicators were discovered in Tanzania during an assessment of the quality of HMIS data at primary healthcare facilities (Rumisha et al., 2020). Similar findings were found in Chad, where research found that although data completeness was typically excellent, there were noticeable differences in the reporting of malaria data for children under the age of 15. Strong data collection procedures and frequent audits are necessary to guarantee data completeness, as these findings show (Moukénet et al., 2021).

5.2.2 Timeliness

The promptness with which data are gathered, reported, and made available for use is referred to as timeliness. For policy-making and relevant health measures, timely data are crucial. Inadequate data reporting can impede prompt decision-making and health-related intervention.

Data in terms of timeliness recorded for the years 2020, 2021, and 2022 was 91.5%, 95.34%, and 98.96%, respectively. The overall timeliness in the health facilities in the district was 91.5%, 95.34%, and 98.96% for 2020, 2021 and 2022 respectively based on a 90% tolerance of timeline. In this study, the result of 91.5% for 2020 is similar to a study conducted in Rwanda (93.85%) and the result of 98.96% for 2022 is also in line with the study conducted in Mekelle (100%), but lower than a study conducted in Uganda (75.5%). This may be due to a difference in the knowledge of respondents about the implications of reporting data promptly and their commitment to data quality (Zavuga et al., 2023b).

5.3 Health workers' knowledge of DHIMS 2

Health practitioners must have a solid understanding of Health Management Information Systems (HMIS) for efficient management of health data and decision-making. Nevertheless, many studies have pointed out knowledge gaps that may affect how well health systems operate as a whole.

Knowledge of DHIMS 2 in this study was 100% thus, all participants knew DHIMS 2 which is higher than a study conducted in Southern Ethiopia (71.3%) (Getachew et al., 2022).

A study conducted in Tanzania revealed that a significant proportion of health workers lacked adequate training on HMIS. Specifically, 81% of the respondents had never received training on HMIS, and 65% could not properly define the system (Nyamtema, 2010). This knowledge extended to the practical use of HMIS data, with 42% of health workers not utilizing the collected data for planning, budgeting, or evaluating services (Nyamtema, 2010).

Another study emphasized that the discipline of health workers influences their knowledge of HMIS. For instance, medical doctors, nurses, and health volunteers generally had a better understanding of HMIS compared to other cadres. Despite this, the overall training on HMIS remains insufficient across various health worker categories (Kebede et al., 2020).

The gaps in HMIS knowledge are often linked to several factors, including lack of training, inactive supervision, and the laborious nature of the system. Addressing these gaps requires innovative approaches, such as incorporating HMIS training into curricula for all healthcare providers and developing more user-friendly systems (Nyamtema, 2010).

A study revealed that a significant proportion of health workers lacked training on HMIS, with 65% unable to properly define the system and 42% not utilizing the collected data for planning or evaluation purposes. The study also identified that health workers' knowledge varied by discipline, with medical doctors and nurses generally having a better understanding of HMIS compared to other cadres (Endriyas et al., 2019).

Although in this study, organizational factors such as incentives and perceived complexity of the technical aspects were not associated with data quality from a statistical point of view, these factors were shown in other studies to be directly linked to behavioural factors in the framework for HIMS performance (Hlaing & Myint, 2022).

5.4 Supervision quality

Regular supervision with feedback is key in addressing quality issues in helping to improve the overall performance of DHIMS 2 especially for better achievement of data quality (Kebede et al., 2020). To guarantee the precision and dependability of data from the Health Management Information System (HMIS), the quality of oversight is crucial. When health workers are given the proper direction, assistance, and oversight, effective supervision can greatly improve the quality of the data.

All respondents who participated in this study were supervised by a higher level as per standard in the last 3 months (quarterly) and agreed to the extent to which supervisors ensure quality in their supervisory role unlike a study conducted in Myanmar that had 66.12% (Hlaing & Myint, 2022). One of the most important mechanisms for improving quality data is regular supervision. The lack of regular systems of supportive supervision affects the importance and quality of data collection. Therefore, without regular and program-specific supportive supervision, it is difficult to achieve information transformation. Although supervision was not considered significant in this study, other authors have proven that supervision is significantly associated with HMIS data quality performance (O'Hagan et al., 2017).

By giving health workers the required feedback and encouragement, supportive supervision dramatically enhanced data quality in the Bago region of Myanmar. Likewise, research conducted in Tanzania has indicated that frequent supervisory visits are linked to improved data completeness and correctness (Mphatswe et al., 2012). Effective supervision in Malawi was found to be significantly hampered by the infrequency of supervisory visits and the shortage of qualified supervisors (Kumwenda et al., 2014). However, areas with frequent

supervisory inspections and supervisors with proper training reported better data quality (Mutale et al., 2013b).

Several studies have highlighted the challenges and importance of HMIS supervision. For instance, a study in Ethiopia found that poor supervision was a significant factor contributing to the low quality of HMIS data. The study reported that only 48% of health facilities met the expected standards for data accuracy, with common issues including incomplete data, untimely reporting, and inaccuracies. The lack of supportive supervision and feedback mechanisms was identified as a major barrier to improving data quality (Endriyas et al., 2019).

Another study emphasized the role of supervision in enhancing data quality by providing continuous training and feedback to health workers. It was noted that regular and supportive supervision could significantly improve the timeliness, completeness, and accuracy of HMIS data. The study also highlighted the need for accountability and the establishment of dedicated units for health information management to ensure sustained improvements (Kebede et al., 2020).

Moreover, a systematic review of health worker supervision found that the effectiveness of supervision depends on various factors, including the context, availability of resources, and the implementation strategies used. The review suggested that tailored supervision approaches, which consider the specific needs and challenges of health facilities, are more likely to yield positive outcomes (Deussom et al., 2022).

5.5 Level of perceived self-efficacy

A higher self-efficacy among health workers is associated with better use of HMIS data as found in a study conducted in Uganda where self-efficacy was found to have a direct influence on the use of Routine Health Information System (Hotchkiss et al., 2010).

Another study conducted in Tanzania found that health workers with higher self-efficacy are more likely to engage in data management tasks effectively. Training programs that enhance self-efficacy can lead to improved data quality and utilization (Mboera et al., 2021).

Similarly, a Ugandan study identifies that self-efficacy impacts motivation and performance in HMIS tasks. Workers with higher self-efficacy are more motivated and perform better in data-related activities (Hotchkiss et al., 2010).

According to Hotchkiss et al., in Uganda, and other authors, perceived self-efficacy is associated with HMIS performance unlike in this study where self-efficacy was not significant although the average perceived level of confidence of the participants was 96.92% (Hotchkiss et al., 2012).

5.6 Factors associated with DHIMS 2 data quality

The results of the chi-square tests indicate several significant associations between various factors and the quality of District Health Management Information System II (DHIMS 2) data. Knowledge of the DHIMS 2 system was strongly associated with data quality ($\chi^2 = 19.6$; df = 1; $p < 0.001$), suggesting that familiarity with the system enhances the accuracy and reliability

of data. This finding aligns with recent studies that emphasize the importance of system knowledge in improving data quality (Kebede et al., 2020).

Additionally, the complete filling of registration or tally forms was significantly associated with data quality ($\chi^2 = 32.5$; df $= 1$; p < 0.001), corroborating the work of Mutale et al. (2013b), who highlighted the critical role of thorough documentation in health information systems (Mutale et al., 2013b).

Supervision was another factor found to be significant for data quality ($\chi^2 = 14.3$; df $= 1$; p $= 0.026$). This result is consistent with the findings of Kawila et al. (2018), who noted that regular supervision and feedback are crucial for maintaining high data quality standards (Kawila et al., 2018).

Training, including both pre-service and in-service training, also showed a significant association with data quality ($\chi^2 = 11.8$; df $= 1$; p $= 0.003$). This supports the conclusions of Mphatswe et al. (2012), who argued that continuous training is essential for the effective use of health information systems (Mphatswe et al., 2012).

Lastly, management support was found to have a significant association with data quality ($\chi^2 = 8.6$; df $= 1$; p $= 0.008$). This finding is in line with the research by Manya et al. (2015), which demonstrated that strong managerial support is vital for the successful implementation and sustainability of health information systems (Manya et al., 2015).

Overall, these results underscore the multifaceted nature of data quality in HMIS and highlight the need for comprehensive strategies that address knowledge, documentation practices, supervision, training, and management support to enhance data quality.

5.7 Challenges health workers face in carrying out DHIMS 2 activities

The challenges health workers face in carrying out District Health Management Information System II (DHIMS 2) activities are multifaceted and significantly impact the effectiveness of health data management. The findings from this study highlight several critical challenges faced by health workers in carrying out DHIMS 2 activities.

Participants consistently reported internet connectivity issues, which led to frequent disruptions in data entry tasks. This aligns with findings from a study in Tanzania, where poor internet connectivity was identified as a significant barrier to effective HMIS implementation (Nyamtema, 2010). Similar findings were stated in a study conducted in India (Samal, 2016).

Additionally, the need for adequate computers was emphasized, mirroring similar concerns in other studies where insufficient hardware resources hindered efficient data management (Rumisha et al., 2020).

The lack of comprehensive training on DHIMS 2 was another major issue, leading to difficulties in navigating the system. This is consistent with previous research indicating that inadequate training is a common obstacle in HMIS utilisation (Lee et al., 2023). Also, a study conducted in India identified a similar challenge where it was found that insufficient training led to difficulties in navigating the HMIS, which is consistent with the findings from this study (Samal, 2016).

Also, another significant challenge identified was the burden of data validation, where health workers had to compare numerous forms with source data, such as registers. This additional workload can lead to errors and inefficiencies, further complicating the data management process. This is similar to a study that identified that health workers are often overwhelmed with clinical duties, leaving little time for HMIS activities, which are perceived as additional

tasks rather than integral components of their roles Health professionals frequently have too much on their plates with clinical responsibilities, leaving little time for HMIS activities, which are seen as extra labour rather than essential parts of their jobs (Alemu et al., 2020).

Furthermore, participants highlighted the need for adequate support from district officers, which was perceived as lacking. The finding is supported by other studies that have identified insufficient supervisory support as a critical barrier to effective HMIS operations (Nyamtema, 2010; Rumisha et al., 2020).

Overall, these challenges underscore the need for improved infrastructure, comprehensive training programs, and stronger support systems to enhance the effectiveness of DHIMS 2 activities

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

6.1.1 Data quality in terms of completeness and timeliness

The District Health Management Information System II (DHIMS 2) data quality parameters of timeliness and completeness were investigated in this study. Data completeness concerns the degree to which all necessary data fields are filled out completely and precisely whereas, data timeliness refers to the promptness with which data is gathered, reported, and made available for use. To determine the variables influencing timeliness and completeness, a cross-sectional study of DHIMS 2 data from different health facilities in the Mion district was conducted as part of the research.

Key findings showed that, except for 2021, which received a score of 97.1%, data completeness was scored above the Ghana Health Service standard aim of 98%, while data timeliness for the three years was scored above the standard target of 90%.

6.1.2 Health workers' knowledge of DHIMS 2

The study explored the knowledge of health workers regarding the District Health Information Management System (DHIMS 2) and its impact on data quality. The research assessed their understanding of the DHIMS 2 concept, data entry practices, and the utilization of health information.

Remarkably, the study found that health workers demonstrated a 100% knowledge level of DHIMS 2. This high level of proficiency was reflected in their ability to accurately define DHIMS 2, effectively use the system for data collection and reporting, and utilize the collected data for planning, budgeting, and evaluating health services. This study also highlighted the factors contributing to this high level of knowledge, including robust training programs, effective supervision, and the integration of DHIMS 2 education into healthcare curricula. Key findings revealed that all 65 participants knew DHIMS 2.

6.1.3 Supervision quality

The research involved a comprehensive assessment of supervision practices across various health facilities under the Mion district, focusing on the frequency, effectiveness, and support provided during supervisory visits. Remarkably, the study found that the quality of HMIS supervision was rated at 100%, indicating that supervisory practices were highly effective and supportive.

Key findings revealed that regular and supportive supervision significantly improved the completeness and timeliness of DHIMS 2 data. Health workers reported receiving constructive feedback, continuous training, and adequate resources during supervisory visits, which enhanced their performance and adherence to data quality standards.

All participants were supervised by higher officials and received regular feedback quarterly and monthly. They also agreed to the quality of supervision in their various facility.

6.1.4 Perceived self-efficacy

The study investigated the perceived self-efficacy of health workers responsible for District Health Management Information System II (DHIMS 2) activities. Self-efficacy can be defined as the belief in one's ability to execute tasks successfully, which is a critical factor influencing the performance of DHIMS 2 tasks. The findings of this study revealed an average perceived self-efficacy score of 96.9%, indicating a high level of confidence among health workers in their ability to manage DHIMS 2 activities. Experience is a key factor that contributed to this high self-efficacy. These results underscore the importance of self-efficacy in ensuring the effective functioning of DHIMS 2.

6.1.5 Factors associated with data quality

This study aimed to assess the factors associated with the District Health Management Information System II (DHIMS 2) data quality in the Mion district. Using chi-square tests, the relationships between data quality and various factors were examined, including knowledge of the DHIMS 2 system, completeness of registration or tally forms, supervision, training, and management support. The results indicated significant associations between data quality and all these factors, highlighting the multifaceted nature of data quality in HMIS. These findings underscore the importance of comprehensive strategies that address multiple dimensions to enhance data quality.

6.1.6 Challenges health workers face with carrying out DHIMS 2 activities

The study examined health workers' various challenges while performing DHIMS 2 activities. Utilizing a mixed-methods approach, the research gathered data through surveys and

interviews with health workers across different facilities in the Mion district. The findings revealed several key challenges, including inadequate training, resources, heavy workload, infrastructure, and support from the district. These challenges collectively hinder the effective implementation and utilization of DHIMS 2, impacting the quality and reliability.

6.2 Conclusion

6.2.1 Data quality in terms of completeness and timeliness

The study highlights a high data quality in DHIMS 2, particularly in terms of timeliness and completeness. The results show that data completeness rates were 99.9%, 97.1%, and 100% for 2020, 2021, and 2022, respectively, indicating an overall improvement over the three-year period. Similarly, timeliness rates improved from 91.5% in 2020 to 95.3% in 2021 and 99% in 2022. However, the accuracy could be compromised due to high workloads and other factors. This suggests that while completeness and timeliness are achieved, other quality dimensions like accuracy must also be addressed to ensure overall data reliability. Implementing targeted interventions such as regular training, enhanced supervision and feedback, and improved resource allocation is essential to sustain high-quality data. Ensuring timely and complete data is crucial for effective health system management and decision-making, ultimately leading to better health outcomes. Future research should focus on the data accuracy dimension, developing and testing innovative solutions to overcome barriers and improve overall data quality in DHIMS 2.

6.2.2 Health workers' knowledge of DHIMS 2

The findings reveal that health workers possess a comprehensive understanding of the District Health Management Information System (DHIMS 2), with a knowledge level of 100%. This exceptional level of knowledge has significant positive implications for the quality of health data and the overall effectiveness of health service delivery. Proficiency in DHIMS 2 ensures that data is accurately collected, reported, and utilized for decision-making processes, leading to improved health outcomes. This high level of DHIMS 2 knowledge among health workers can be attributed to robust training programs, effective supervision, and the integration of DHIMS 2 education into healthcare curricula. The 100% knowledge level represents a significant achievement, highlighting the importance of continuous education, supportive supervision, and resource allocation. Maintaining and further enhancing this knowledge base will be crucial for sustaining high-quality health information systems and achieving better health outcomes.

6.2.3 Supervision quality

The study findings underscore the critical role of high-quality supervision in ensuring the comprehensiveness and reliability of DHIMS 2 data. The 100% supervision quality rating reflects the effectiveness of current supervisory practices in supporting health workers and maintaining high data quality standards. Effective supervision enhances health workers' adherence to data collection protocols, improves their skills through continuous training, and provides the necessary resources for accurate and timely data reporting. This high level of supervision quality contributes to better health information management and more informed decision-making, ultimately leading to improved health outcomes.

6.2.4 Perceived self-efficacy

With an average score of 96.9%, the study found that health workers in charge of DHIMS 2 tasks have a high level of perceived self-efficacy. This high self-efficacy is likely to positively impact the quality and reliability of health data collected and reported, essential for effective health planning and decision-making. Despite the overall positive findings, the study identified areas for improvement, such as continuous training and better resource allocation. Addressing these areas could further enhance the self-efficacy of health workers and improve the performance of DHIMS 2.

6.2.5 Factors associated with data quality

The findings of this study reveal that knowledge of the DHIMS 2 system, thorough documentation practices, regular supervision, continuous training, and strong management support are crucial for improving the quality of DHIMS 2 data. Each of these factors showed a significant association with data quality, suggesting that interventions targeting these areas could lead to substantial improvements. This study contributes to the existing literature by providing empirical evidence and aligns with previous research conducted in other Low- and Middle-Income settings. Future research should explore the implementation of targeted interventions to further validate these findings and develop best practices for DHIMS 2 data quality improvement.

6.2.6 Challenges health workers face with carrying out DHIMS 2 activities

The study concluded that health workers face numerous obstacles in executing DHIMS 2 activities, which significantly impedes the efficiency and effectiveness of DHIMS 2 operations. Inadequate training and resources, coupled with infrastructure and lack of support from the district, were identified as major challenges. The production of timely data is essential for prompt decision-making by health managers therefore, there is a critical need to address the issues of internet connectivity and computer adequacy to enhance data entry efficiency.

Addressing these issues is crucial for improving the quality of health data, which is essential for informed decision-making and effective health planning. The study underscores the need for targeted interventions to enhance the capacity of health workers and optimize DHIMS 2 performance.

6.3 Recommendations

6.3.1 Data quality in terms of completeness and timeliness

Based on the findings of this study, the following actionable recommendations can be made to improve data quality in terms of timeliness and completeness with the District Health Information Management System (DHIMS 2):

1. Conduct Regular Comprehensive Training: Organize monthly training sessions for health workers on DHIMS 2 data entry and management. These sessions should cover the importance of data timeliness and completeness, along with practical techniques for achieving high data quality.

2. Continuous Monitoring and Evaluation: Implement a bi-annual audit system to assess DHIMS 2 data quality. Regular audits and assessments can help track progress and identify areas for improvement.

3. Develop Clear Policies and Guidelines: Formulate detailed policies on data quality standards and expectations. Ensure these guidelines are updated annually to incorporate best practices and emerging challenges in DHIMS 2.

By implementing these recommendations, health systems can enhance the timeliness and completeness of DHIMS 2 data, leading to more reliable health information and better decision-making.

6.3.2 Health workers' knowledge of DHIMS 2

To maintain and further enhance the high level of proficiency in DHIMS 2:

1. Ongoing Professional Development Programs: Implement quarterly refresher courses and workshops to keep health workers updated on the latest DHIMS 2 advancements and best practices.

2. Equip Health Facilities with Necessary Tools: Provide each health facility with updated computers, reliable internet access, and necessary data collection tools to facilitate accurate and timely data reporting.

3. Robust Supervision System: Establish a system for regular feedback and support to ensure health workers adhere to high data quality standards.

4. Mentorship Programs: Develop mentorship programs where experienced health workers mentor new staff. Peer learning sessions can facilitate knowledge sharing and foster a collaborative learning environment.

5. Advanced Training Modules: Introduce advanced training modules focusing on data analytics, interpretation, and the use of DHIMS 2 data for strategic decision-making. This will empower health workers to leverage their knowledge for more complex health information management tasks.

6.3.3 Supervision quality

To maintain the 100% supervision quality indicated by the study results:

1. Comprehensive Training Programs for Supervisors: Conduct annual training programs for supervisors to update them on effective supervisory practices.

2. Regular Feedback Mechanisms: Implement a bi-weekly feedback system to provide supervisors with updates on their performance and areas for improvement.

3. Develop Clear Guidelines and Expectations: Create detailed guidelines outlining the roles and responsibilities of supervisors. Ensure these guidelines are accessible and regularly reviewed.

4. Mentorship Programs for Supervisors: Establish mentorship programs where senior supervisors can mentor less experienced ones. This will help maintain high standards of supervision.

6.3.4 Perceived self-efficacy

To enhance the self-efficacy of health workers:

1. Regular and Updated Training Sessions: Organize bi-monthly training sessions to ensure health workers remain proficient in the latest DHIMS 2 tools and practices.

2. Access to Necessary Resources: Ensure that health workers have access to updated technological tools and adequate support staff to perform their DHIMS 2 duties effectively and confidently.

3. Supportive Supervision System: Implement a system where health workers receive regular feedback and guidance to address challenges and reinforce their self-efficacy.

4. Further Research: Conduct studies to explore other factors affecting self-efficacy and evaluate the impact of interventions aimed at improving DHIMS 2 performance.

6.3.5 Factors associated with data quality

Based on the study's findings, the following recommendations can enhance DHIMS 2 data quality:

1. Increase Training Programs: Offer monthly training sessions focused on DHIMS 2 system usage and data quality.

2. Ensure Complete and Accurate Data Entry: Emphasize the importance of accurately filling registration or tally forms through regular reminders and training.

3. Regular Supervision and Feedback: Implement a quarterly supervision and feedback mechanism to maintain high data quality standards.

4. Update Training Programs: Continuously update both pre-service and in-service training programs to reflect the latest practices.

5. Strong Management Support: Ensure that management provides the necessary support for implementing and sustaining these interventions.

6.3.6 Challenges health workers face with carrying out DHIMS 2 activities

To address the challenges health workers, face in carrying out DHIMS 2 activities:

1. Implement Comprehensive Training Programs: Tailor training programs to specific needs and update them regularly.

2. Adequate Resource Allocation: Allocate sufficient resources, including technological tools and support staff, to facilitate smooth DHIMS 2 operations.

3. Supportive Supervision and Mentorship: Establish a robust system of supportive supervision with regular feedback and mentorship to promptly address challenges.

4. Effective Workload Management: Develop strategies for effective workload management, such as hiring additional staff or redistributing tasks.

5. Policy Formulation: Create policies that prioritize the professional development of health workers.

6. Further Research: Conduct research to explore additional factors affecting DHIMS 2 performance and develop tailored interventions.

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APPENDIX I

Questionnaire /Interview Guide

Factors Associated with District Health Management Information System II (DHIMS 2) Data Quality in the Mion District of Northern Ghana.

Introduction

The purpose of this questionnaire is to collect data on the factors associated with DHIMS 2 data quality in Mion District. The findings will assist in informing strategies and opportunities for improvement. Please express your opinions honestly. Your responses will remain confidential and anonymous and will only be used for purposes of the research in aggregated forms. Your participation and assistance in completing this study is highly appreciated.

Instructions

Kindly provide responses by circling the one applicable and by filling in the spaces provided.

For any clarification contact Ms. Esther Terkour Padi, Tel. 0506986830/ 0547405127

Part one: Routine Data Quality Assessment

DATE	
HEALTH CENTER IDENTIFICATION: ……………………………………	
SUB-DISTRICT	
NAME OF THE HEALTH FACILITY	
DEPARTMENT	
TELEPHONE NUMBER	
POSITION OF PERSON INTERVIEWED	

GENERAL STRUCTURE OF DHIMS 2		
Is there a designated staff (DHIMS 2 focal person) responsible for reviewing aggregated numbers or data prior to submission to the next level (e.g.: to the district).	Yes	No
Is the responsibility for recording health facility data in reporting forms on source documents clearly assigned (have written job descriptions) to a relevant staff?	Yes	No
Does the health center have electronic database (computer software)?	Yes	No
Is the electronic database (computer software) functional?	Yes	No
Is there any system in place to prevent unauthorized changes to data?	Yes	No
If there is, please state it		
Is there an establishment of a performance monitoring team at the health facility?	Yes	No

DATA RECORDING			
	Does this health facility keep copies of the monthly reporting forms that are sent to the district? DHIMS 2 monthly reports which are sent to the district?	Yes	No
	How many monthly reporting forms are available? Count the number of monthly reports that have been kept at the facility for the last twelve months		

RECORD REVIEW TOOL TO ASSESS DATA COMPLETENESS		
	How many data items does the heath facility need to report on in the DHIMS 2 monthly report? This number does not include data items for services not provided by this health center.	
	How many data items are missing? Count the number of data items that are supposed to be filled in by this facility but left blank without indicating "0" in the selected month's report.	

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Part two: Organisational and Behavioural Assessment Tool

What is the sex of the respondent?

Male

Female

What is the age of the respondent in years? …………………………

What is the position of respondent?

Head of institution

Department Head

DHIMS 2 Focal Person

 Other (specify) ----------------

What is the highest level of education of the respondent?

Certificate

Diploma

Bachelor's degree

Master's degree

Other (specify) _____

What is the field of study for the highest level of education of the respondent?

Nurse

Health information& technology (HIT)

 Midwife

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Pharmacist

Laboratory Technology

Health Officer

Other (specify) …………………

How many years of working experience does the respondent have? _____

Have you ever received in-service training on HMIS related activities in last six months?

Yes

No

If yes, what were you trained on during the in-service training? …………………..

Where did the training take place? …………………………..

Which institution organized the in-service training? …………………….

Did you receive pre-service training on DHIMS 2?

Yes

No

Have you been participating in aggregation or compilation of data from tally sheet/registration?

Yes

No

If yes, can you explain your specific activities during aggregation or compilation of data from tally sheet/ registration?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

………………………………………………………………………………………………

In your opinion, how user friendly are the registration and report formats?

Very user friendly

User friendly

Somehow user friendly

Not user friendly

Very not user friendly

In your opinion, how easily understandable are the registration and report format?

Very easily understandable

Easily understandable

Somehow easily understandable

Not easily understandable

Very not easily understandable

How consistently do you document your daily activities? …………………………

Do you fill the register /tally sheet completely?

Yes

No

Do you conduct data accuracy test?

Yes

No

If yes, how frequently?

Weekly

Bi-weekly

Monthly

Quarterly

Semi-annually

Annually

In the past 3 months did you get supervision from higher officials?

Yes

No

If yes, how many times did the unit/department get supervised?

One time

Two times

Three times

Do you get regular Feedback from top level organization through regular report based on evidence?

Yes

No

If yes, how often?

Monthly

Quarterly

Semi-annually

Annually

Do you have a standard set of indicators with their definition?

Yes

No

If yes, what are some of the standard indicators? ………………….

Do you have a procedural manual in your department?

Yes

No

Are there any incentives for DHIMS 2 process?

Yes

No

If yes, what kind of incentives?

Training

Money

Recognition

Other (specify) …………………….

Is there a skilled human resource able to fill formats?

Yes

No

Knowledge of DHIMS 2	Yes	No
DHIMS 2 is used to collect data from service and administrative records.		
DHIMS 2 provides signals that can be reviewed frequently to monitor program implementation		
Data collected into DHIMS 2 is used for decision making		
DHIMS 2 data is important for policy making and management decisions.		
DHIMS 2 data is important for monitoring and evaluation of performance		
DHIMS 2 data can be presented by using charts, graphs, and tables		
DHIMS 2 data is an integral part of Health Information System.		

In your health facility, staff	Yes	No
Document their activities and keep records		
Feel committed in improving health status of the target population		
Set appropriate and double target of their performance		
Feel guilty for not accomplishing the set target/ performance.		
Are rewarded for good work		
Staffs are empowered to make decisions.		
Able to say no to supervisors and colleagues for demands/ decisions not supported by evidence.		
Are made accountable for poor performance.		
Use DHIMS 2 data for community education and mobilization.		
Admit mistakes for taking corrective actions		

Perception towards DHIMS 2 activities Collecting information…	Yes	No
which is not used for decision-making discourages me.		
makes me feel bored.		
is meaningful for me.		
gives me the feeling that data is needed for monitoring facility performance.		
gives me the feeling that it is enforced on me.		
is appreciated by co-workers and supervisors.		

INSTRUCTIONS

The survey asks for your opinion on certain health facility activities. The scale assesses your belief intensity, ranging from strongly disagree to strongly agree. To express your opinion, determine whether you agree or disagree with the statement and the intensity of agreement or disagreement. Variations in agreement or disagreement are expected, and the information will remain confidential. The survey encourages honesty and frankness in choosing your answer. The information will remain anonymous and not shared with anyone.

To what extent, do you agree with the following on a scale of 1-5.

Questions to assess supervision quality. In your opinion, supervision…	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
Seek feedback from concerned persons.					
Emphasize data quality in monthly reports					
Discuss conflicts openly to solve them					
Seek feedback from concerned community					
Use DHIMS 2 data for setting targets and monitoring					
Check data quality regularly					
Provide regular feedback to their staff through regular reports based on evidence					

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Report on data accuracy regularly (Talk to higher level staff about accuracy of data)					
Encourage their supervisees to over report (false reports) their performance					

Management support at health department…	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Uses DHIMS 2 data for day-to-day management of the health facility.					
Motivates us to display data for monitoring their set target.					
Inspires us to gather data to find the root cause(s) of the problem.					
Stimulates us to develop appropriate criteria for selecting interventions for a given problem.					
Incites us to develop appropriate outcomes for a particular intervention.					
Encourages us to evaluate whether the targets or outcomes have been achieved					

Part three: Self-Efficacy

This part of the questionnaire is about your perceived confidence in performing tasks related to health information systems. High Confidence indicates that person could perform the task, while low confidence means there is a room for improvement. We are interested in knowing how confident you feel in performing DHIMS 2 related tasks. Please be frank and rate your confidence honestly. Please check the appropriate box that best explains your confidence level in accomplishing DHIMS 2 activities.

Self-Efficacy	Very High	High	Neutral	Low	Very
I can check data accuracy.				7	
I can calculate percentages/ rates correctly.					
I can plot data by months or years					
I can compute trend from bar charts					
I can explain findings and their implications.					
I can use data for identifying gaps and setting targets					
I can use data for making various types of decisions and providing feedback.					

Part four- Qualitative Study

In-depth interview guide

1. What is the most challenging activity for you with regard to your work?

2. What specific challenges with regards to DHIMS 2? Can you please elaborate.

3. Do you wish to add anything else to what has already been said?

Consent Form

My name is Esther Terkour Padi. A student at the University for Development Studies (UDS), School of Public Health, Department of Global and International Health and will be conducting research on **"Factors associated with District Health Information Management Systems II (DHIMS 2) data quality in Mion District of Northern Ghana"** for partial fulfilment of Master of Public Health (MPH). I received permission from Ghana Health Service through the Mion District Health Directorate with the help of the University for Development Studies (UDS) School of Public Health and an ethical consideration from the Committee on Human Research Publications and Ethics (CHRPE)- Kwame Nkrumah University of Science and Technology to conduct this study. The information that you provide will be kept confidential by using only code numbers and locking the data. Only the principal investigator will have the access to the non-coded data and the data will not be used for purposes other than the study. Your willingness and active participation are very important for the success of this study. The results of the study will hopefully serve as an important input for intervention programs that aim at improving DHIMS 2 data quality at local level to understand major factors of the problems of DHIMS 2 data quality in your health center. If you will not be willing to participate in the study, you will have the right to discontinue at any time in the process. If you need any further information or explanation regarding to the study, you can have this address to contact.

Name – Esther Terkour Padi

Tel no – 0506986830/ 0547405127

E-mail – padi.esther1990@gmail.com

Do you have any questions?

Based on the information provided are you willing to participate in the study?

Yes____ No_____

If Yes, read the consent form to the participant, sign it and continue the interview.

If No, thank you for your time.

Informed consent

Certified by:

Respondent's signature --------------------------------Date----------------------------------

Interviewer: Name--------------------------------------- Signature--------------------------------

Questionnaire number------------------------------------

Date of interview------------------ Time started-------------------- Time completed-------------

Result of interview:

1. Completed

2. Respondent not available

3. Refused

4. Partially completed

Checked by: Supervisor: Name _____ Signature_____

APPENDIX II

SIGNED SUMMARY OF PLAGIARISM REPORT

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Esther Terkour Padi

FACTORS ASSOCIATED WITH DATA QUALITY IN THE DISTRICT HEALTH MANAGEMENT INFORMATION SYSTEM II ...

📄 Quick Submit
🖥 Quick Submit
🎓 University for Development Studies

Document Details

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APPENDIX III

CHRPE ETHICAL CLEARANCE

Kwame Nkrumah
University of Science
and Technology, Kumasi

College of Health Sciences
SCHOOL OF MEDICINE AND DENTISTRY

COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/1001/23

6th November 2023

Miss Esther Terkour Padi
Department of Global and International Health
University for Development Studies.
TAMALE.

Dear Madam,

LETTER OF APPROVAL

Protocol Title: *"Factors Associated With Data Quality in the District Health Management*
Information System II (DHIMS 2) in the Mion District of Northern Ghana."

Proposed Site: *Mion District, Northern Region.*

Sponsor: *Self-Sponsored.*

Your submission to the Committee on Human Research, Publications, and Ethics on the above-named protocol refer.

The Committee reviewed the following documents:

- A notification letter of 12th October 2023 from Mion District Health Directorate (study site) indicating approval for the conduct of the study in the District.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning **6th November 2023** to **5th November 2024** renewable thereafter. The Committee may, however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.
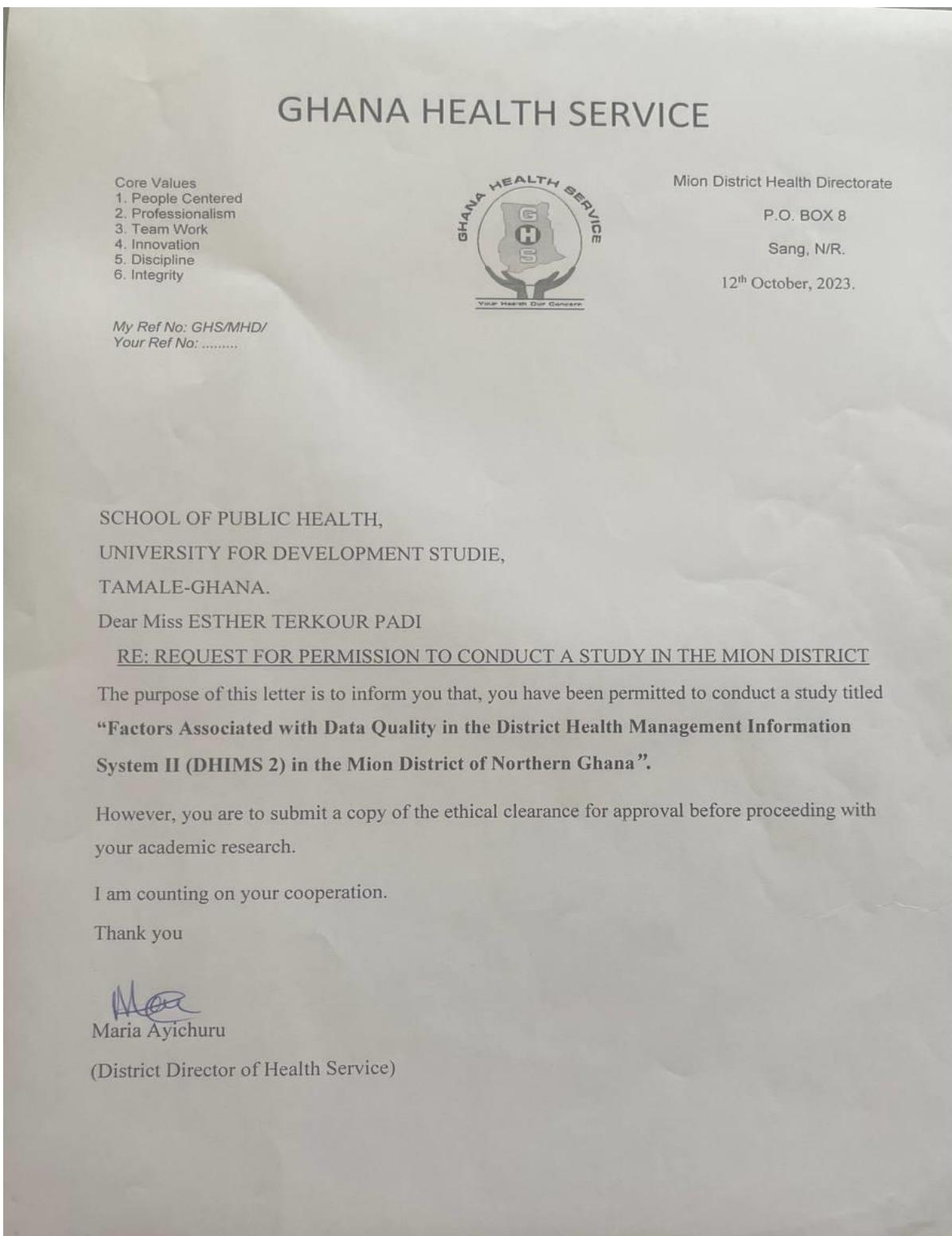
Thank you for your application.

Yours faithfully,

Rev. Prof. John Appiah-Poku.
Honorary Secretary
FOR: CHAIRMAN

Room 7, Block L, School of Medicine and Dentistry, KNUST, University Post Office, Kumasi, Ghana
Tel: +233 (0) 3220 63248 Mobile: +233 (0) 20 5453785 Email: chrpe.knust.kath@gmail.com/chrpe@knust.edu.gh

APPENDIX IV

LETTER OF AUTHORIZATION

GHANA HEALTH SERVICE

Core Values
1. People Centered
2. Professionalism
3. Team Work
4. Innovation
5. Discipline
6. Integrity

Mion District Health Directorate

P.O. BOX 8

Sang, N/R.

12th October, 2023.

My Ref No: GHS/MHD/
Your Ref No: ....

SCHOOL OF PUBLIC HEALTH,

UNIVERSITY FOR DEVELOPMENT STUDIE,

TAMALE-GHANA.

Dear Miss ESTHER TERKOUR PADI

RE: REQUEST FOR PERMISSION TO CONDUCT A STUDY IN THE MION DISTRICT

The purpose of this letter is to inform you that, you have been permitted to conduct a study titled **"Factors Associated with Data Quality in the District Health Management Information System II (DHIMS 2) in the Mion District of Northern Ghana"**.

However, you are to submit a copy of the ethical clearance for approval before proceeding with your academic research.

I am counting on your cooperation.

Thank you

Maria Ayichuru

(District Director of Health Service)

APPENDIX V

INTRODUCTORY LETTER

UNIVERSITY FOR DEVELOPMENT STUDIES
School of Public Health

Tel : 03720 - 94080
E-Mail : sphdean@uds.edu.gh
Local : 5:7811/106.15
Internet: www.uds.edu.gh

Post Office Box TL 1883,
Tamale, Ghana, West Africa.

Office of the Dean   17/10/2023

The Chairman
Ethical Review Committee
KNUST
Kumasi, Ashanti Region.

LETTER OF INTRODUCTION
ESTHER TERKOUR PADI- UDS/MPH/0022/21

This is to introduce to you **Ms. Esther Terkour Padi,** a final year Master of Public Health student in the Department of Global and International Health, School of Public Health of University for Development Studies. **Ms. Terkuor** is applying to your committee for ethical clearance on the topic: *"FACTORS ASSOCIATED WITH DATA QUALITY IN THE DISTRICT HEALTH MANAGEMENT INFORMATION SYSTEM II (DHIMS 2) in the Mion District of Northern Ghana".*

I would be grateful if you could provide her with this information and any other assistance she may need.

Thank you.
OFFICE OF THE DEAN
SCHOOL OF PUBLIC HEALTH
UNIVERSITY FOR DEV'T
STUDIES TAMALE
Prof. Adadow Yidana
Dean, SPH