An Assessment of Health Management Information System for Effective Community Management of Acute Malnutrition in Yobe State, Nigeria

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Abstract

The Health Management Information System (HMIS) in Yobe State, Nigeria, plays a crucial role in enhancing health and nutrition service delivery, particularly in the management of community acute malnutrition (CMAM). This study aimed to evaluate the effectiveness of HMIS in Yobe State, focusing on data accuracy, timeliness, resource allocation, and capacity building. The study employed a mixed-methods approach, combining quantitative data analysis and qualitative insights from interviews, observations, and focus groups to assess the effectiveness of the Health Management Information System (HMIS) in managing community acute malnutrition (CMAM) in Yobe State. The findings revealed significant challenges, including inaccuracies in approximately 25% of monthly reports, delays in data reporting, and inconsistent management of essential nutrition supplies such as Ready-to-Use Therapeutic Food (RUTF). Consequently, leading to frequent stockouts, disrupting the continuity of care for malnourished children. Moreover, the study underscores the importance of implementing digital data collection tools, improving training programs, and integrating HMIS with other health services to provide a holistic approach to health management. Additionally, establishing a robust monitoring and evaluation framework is crucial for ensuring the continuous improvement and adaptability of CMAM programs. These insights and recommendations offer a roadmap for policymakers and health practitioners to enhance HMIS and achieve better health outcomes for malnourished children in Yobe State.

Keywords— *Health Management Information Systems (HMIS), Data Collection, Data Quality, Information Usage, Health Facility*

I. INTRODUCTION

Health management information systems (HMIS) are the lifeblood of modern health care, providing the critical data needed to inform policy decisions, enhance program planning, and monitor health service performance (World Health Organization, 2008). Effective HMIS ensures that data is readily available to stakeholders at all levels, from local health facilities to national health ministries, thereby enabling timely and evidence-based decision-making(Macharia & Maroa, 2014; Nyamtema, 2010). In resource-limited settings, such as Yobe State in Nigeria, the importance of a robust HMIS cannot be overstated, especially in the management of public health challenges like acute malnutrition.

Globally, the World Health Organization (WHO) underscores the significance of HMIS as one of the six essential building blocks for strengthening health systems.

This foundational role of HMIS is critical in generating actionable insights that drive health interventions, resource allocation, and policy formulation (World Health Organization, 2008). In Nigeria, the HMIS framework is designed to support the management, planning, and decision-making processes necessary for delivering operational health services. However, despite these ambitions, the HMIS in Yobe State has encountered significant challenges, particularly in the context of community management of acute malnutrition (CMAM).

Acute malnutrition remains a severe public health issue in many parts of Nigeria, with Yobe State being particularly affected. The prevalence of malnutrition in this region necessitates a well-coordinated response, supported by accurate and timely data. Unfortunately, the current HMIS in Yobe State has been plagued by inconsistencies in data collection, delays in reporting, and inadequacies in data management. These issues severely limit the system's capacity to provide the high-quality data required for effective CMAM interventions (Corbett, 2011).

One of the critical functions of HMIS is to facilitate the tracking of nutrition supplies and the monitoring of health outcomes. However, in Yobe State, the management of essential nutrition supplies, such as Ready-to-Use Therapeutic Food (RUTF) and essential medicines, has been inconsistent and often ad hoc. Frequent stockouts of essential supplies and discrepancies in nutrition indicators at various administrative levels highlight the systemic issues within the HMIS. These challenges are further compounded by gaps in training and support for health workers, inadequate infrastructure, and the absence of a cohesive strategy for data harmonization and utilization (Corbett, 2011).

Recognizing these challenges, this study aimed at identifying gaps and opportunities (human and otherwise) for improving HMIS particularly in the delivery of nutrition health services at the HF, LGA, SPHCMB and State levels, with a specific focus on its application in CMAM. The study employs a mixed-methods approach, combining quantitative data analysis with qualitative insights. This methodological framework allows for a comprehensive understanding of the HMIS landscape in Yobe State, capturing both the systemic issues and the contextual factors that influence data quality and utilization. The study draws on the Performance of Routine Information System Management (PRISM) framework, which is instrumental in assessing the key determinants of HMIS performance (Aqil et al., 2009), including data accuracy, completeness, timeliness, and the technical and organizational factors that underpin these attributes (Hiwot Belay, Tariq Azim, 2013).

The study revealed significant deficiencies in the Health Management Information System (HMIS) of Yobe State, particularly in data accuracy, timeliness, and utilization. Inaccuracies were found in approximately 25% of monthly reports, with delays in data submission exacerbating these issues. These problems stem from inadequate training, poor infrastructure, and resource constraints. To address these challenges, the study recommends targeted training programs for health workers, investment in infrastructure to support reliable data collection and reporting, and the development of a comprehensive data harmonization strategy to ensure consistent and timely information flow across all levels of the health system.

A. Problem Background

Health management information systems (HMIS) are vital for integrating all data required by policymakers, providers, and service users to enhance population health. Unfortunately, the data derived from the Yobe State Health Management Information System has proven insufficient in robustness for informed decision-making, particularly in the context of community management of acute malnutrition (CMAM) (Corbett, 2011). This limitation hinders the ability to conduct detailed sensitivity analyses involving pivotal variables, impeding effective health service delivery.

HMIS generates and makes health data readily accessible to both service providers and users, enabling stakeholders to assess real-time progress toward objectives and forecast effective service delivery strategies (Macharia & Maroa, 2014). According to the World Health Organization, HMIS is one of the six fundamentals for strengthening health systems. It supports management, planning, and decision-making across all levels of health service delivery (World Health Organization, 2008). However, in Yobe State, gaps in ensuring consistent, timely data collection, management, and sharing with key stakeholders persist. The management of nutrition supplies, such as Ready-to-Use Therapeutic Food (RUTF) and essential medicines, remains weak and ad hoc, leading to frequent stockouts (Corbett, 2011). Additionally, discrepancies in nutrition indicators between the State Ministry of Health (SMoH) and the State Primary Health Care Management Board (SPHCMB) exacerbate these issues (Corbett, 2011). Addressing these gaps is crucial for ensuring the timely delivery of quality nutritional health services.

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This study aims to improve the ability of the state and local government areas (LGAs) to evaluate and report on CMAM delivery by conducting a health system-strengthening analysis of HMIS. The specific objectives include evaluating the current state of HMIS in Yobe State with a focus on data quality, timeliness, and relevance to CMAM, identifying challenges and opportunities for improvement at various levels, exploring capacity gaps in training support related to nutrition services, and developing recommendations and an action plan to strengthen HMIS for better data quality and management. By addressing these issues, the study seeks to enhance the effectiveness of health and nutrition service delivery in Yobe State.

B. Aim and Objectives

The aim of this study is to enhance the capacity of Yobe State and its Local Government Areas (LGAs) to effectively evaluate and report on the delivery of community management of acute malnutrition (CMAM) by conducting a comprehensive health system-strengthening analysis of the Health Management Information System (HMIS). The specific objectives of the study include:

1) To assess the current state of the Health Management Information System in Yobe State, with a specific emphasis on data quality, timeliness, and relevance to CMAM.

2) To identify the key challenges and opportunities for improving HMIS at the community, health facility, LGA, and state levels.

3) To explore the capacity gaps in training and support, particularly related to nutrition services within the primary health care delivery system.

4) To develop concrete recommendations and an actionable plan to strengthen the HMIS, ensuring improved data quality and management specifically for CMAM.

C. Scope and Duration

The assessment was conducted within the context of Yobe State's Health Management Information System (HMIS), focusing on the community management of acute malnutrition (CMAM). The study comprehensively evaluated HMIS performance at various levels of the primary health service delivery system, including the community, health facilities, Local Government Areas (LGAs), and state levels. Specifically, the research was conducted at Action Agains Hunger AFC-International's nutrition intervention five LGAs: Gujba, Fune, Nangere, Potiskum, and Machina, as well as the Yobe State Ministry of Health and the Yobe State Primary Health Care Management Board (SPHCMB). At the community level, the assessment examined data collection, management, and reporting practices by community health workers. At the health facility level, it focused on the accuracy, completeness, and timeliness of CMAM data. The LGA level evaluation explored the roles and effectiveness of LGAs in supporting data management activities and integrating data into broader health strategies.

At the state level, the study investigated the oversight, coordination, and support provided by the State Ministry of Health and the SPHCMB, emphasizing the harmonization of nutrition indicators and data-driven decision-making processes. The duration of the study lasted for the period of six month from June 2021 – December 2021. This comprehensive evaluation aimed to identify gaps and opportunities for improving HMIS, thereby enhancing the quality of data collected and supporting informed decision-making for health and nutrition services across Yobe State.

D. Limitations

The assessment acknowledged certain limitations, including constraints related to the sample size and study area coverage. While efforts were made to randomly select health facilities and LGAs, the assessment's scope may have been limited by the duration. The six-month duration of the study limited the exploration of longer-term trends and seasonal variations in data collection and reporting. Additionally, access to some health facilities and communities was restricted, due to security challenges. Despite these limitations, the study met the generalization criteria set forth by the World Health Organization (WHO), as more than 35% of the state's health facilities were visited, exceeding the minimum requirement of 25% coverage for generalization (World Health Organization, 2008). These constraints, while notable, do not diminish the valuable insights and practical recommendations generated for enhancing the HMIS in Yobe State.

II. OVERVIEW OF HMIS

Health Management Information Systems (HMIS) are essential tools designed to collect, store, manage, and transmit health information. These systems support decision-making processes at all levels of the health system by providing reliable data for planning, monitoring, and evaluating health services (World Health Organization, 2008). HMIS encompasses various components, including data collection tools, reporting mechanisms, and data management processes, which are integral to ensuring that health data is timely, accurate, and comprehensive (Aqil et al., 2009; World Health Organization, 2008).

A robust HMIS enables health policymakers, providers, and stakeholders to monitor progress towards health goals, identify gaps in service delivery, and make evidence-based decisions to improve health outcomes (Lippeveld, Sauerborn, & Bodart, 2000). It plays a critical role in enhancing the efficiency and effectiveness of health programs by providing real-time data that can inform resource allocation, program planning, and policy development (Macharia & Maroa, 2014).

A. HMIS in Yobe State

In Yobe State, Nigeria, the Health Management Information System (HMIS) is intended to function as a comprehensive tool for supporting health service delivery across various levels, from community health workers to state health authorities. Despite significant efforts by the Yobe

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State government and various donor agencies, the HMIS has faced numerous challenges, particularly in managing the community management of acute malnutrition (CMAM) (Corbett, 2011).

Initial efforts to strengthen HMIS in Yobe State focused on supporting Local Government Area (LGA) staff at health facilities in collecting and consolidating weekly and monthly data on nutritional supplies and beneficiaries of the Outpatient Therapeutic Program (OTP) (Corbett, 2011). These initiatives aimed to improve data accuracy and timeliness, which are critical for effective CMAM interventions. However, challenges such as frequent stockouts of essential nutrition supplies, inconsistent data collection practices, and inadequate data harmonization between the State Ministry of Health (SMoH) and the State Primary Health Care Management Board (SPHCMB) have persisted (Nigeria Health Watch, 2019).

Recognizing these issues, the SMoH and donor agencies have collaborated to establish a more robust system for nutrition-related data collection and management. Extensive training sessions have been conducted for state nutritionists, LGA Nutrition Focal Persons (NFPs), and health workers to enhance their capacity for data management. Computers and other necessary tools have been distributed to health facilities and the SPHCMB, along with basic computer training and on-the-job mentoring (UNICEF, 2021; Action Against Hunger, 2020).

These efforts have led to noticeable improvements in handling nutrition data and managing RUTF supplies at the health facility, LGA, and SPHCMB levels. Monthly data collection has become standard practice, and information is regularly shared during coordination meetings (Nigeria Health Watch, 2019). Despite these advancements, challenges remain in ensuring timely delivery of supplies and comprehensive utilization of data for decision-making. Continuous training, infrastructure improvement, and systematic data management are essential for further strengthening the HMIS and enhancing health and nutrition service delivery in Yobe State (WHO, 2018).

A robust Health Management Information System (HMIS) is essential for improving health and nutrition service delivery, particularly in resource-limited settings like Yobe State, Nigeria. By integrating comprehensive health data and making it accessible to policymakers, providers, and service users, HMIS can significantly enhance the efficiency and effectiveness of health services, which will go a long way in addressing issue of malnutrition in Yobe state.

B. Malnutrition in Yobe State

In Yobe States, approximately 943,000 children under five are suffering from acute malnutrition, with 440,000 affected by severe acute malnutrition (SAM) and 503,000 by moderate acute malnutrition (MAM). The nutrition situation in these states deteriorated rapidly due to the crisis in 2015, peaked in 2017, and has since stabilized in 2018, though hard-to-reach areas mostly situated in northern Yobe continue to face challenges (Das et al., 2019). Recent nutrition surveillance conducted by UNICEF in collaboration with the National Bureau of Statistics (NBS) revealed global acute malnutrition (GAM) and SAM rates 12.0% and 1.3% in Yobe, respectively (NBS and UNICEF, 2018). In response the challenges of malnutrition and to reduce child mortality, An approach called Community Management of Acute Malnutrition (CMAM) was introduced in 2000 and has since been recognized by World Health Organization, UNICEF, and the World Food Programme because of its robustness in addressing community malnutrition (Fortnam et al., 2021).

C. Community Management of Acute Malnutrition (CMAM)

Community Management of Acute Malnutrition (CMAM) is a public health approach designed to treat acute malnutrition in children and other vulnerable groups at the community level (WHO, 2007). CMAM integrates community outreach, outpatient therapeutic programs (OTPs), and supplementary feeding programs to manage cases of severe and moderate acute malnutrition. This approach allows for early detection and treatment of malnutrition, thus preventing severe health complications and reducing mortality rates among children under five years old (World Health Organization, 2007; UNICEF, 2013).

1) Components of CMAM
a) Community Outreach

Community health workers and volunteers actively search for malnutrition cases by conducting regular screenings and home visits. They identify malnourished children and refer them to appropriate treatment facilities (Sphere Project, 2018).

b) Outpatient Therapeutic Programs (OTPs)

Severely malnourished children without medical complications are treated at home with ready-to-use therapeutic foods (RUTF). They visit health centers for regular follow-ups and monitoring(Concern Worldwide, 2022).

Ready-to-use therapeutic food (RUTF)

Ready-to-use therapeutic food (RUTF) provides essential nutrients to help malnourished children recover. The most recognized RUTF, Plumpy'nut, was created in 1996 by French pediatrician André Briend. Plumpy'nut is a peanut-based paste packaged in a portable, non-perishable foil pouch, making it easy for babies who are not yet ready for solid foods to consume (Concern Worldwide, 2022).

c) Supplementary Feeding Programs (SFPs)

These programs provide supplementary food to children with moderate acute malnutrition and those who are recovering from severe malnutrition to prevent relapse (Action Against Hunger, 2019).

d) Inpatient Care

Children with severe acute malnutrition and medical complications are treated in inpatient facilities until they are stable enough to continue treatment at home (World Health Organization, 2013).

D. How HMIS Can Help Address Malnutrition Issues

1) Accurate Data Collection and Monitoring

An effective Health Management Information System (HMIS) ensures the accurate collection and monitoring of malnutrition data, which is crucial for identifying trends and hotspots of malnutrition. By providing real-time data, HMIS helps health workers and policymakers understand the extent and severity of malnutrition in different regions, enabling timely and targeted interventions (Macharia & Maroa, 2014). Accurate data collection also facilitates the tracking of treatment outcomes, ensuring that children who receive care through CMAM programs are properly monitored and supported (WHO, 2007).

2) Resource Allocation and Management

Effective HMIS supports optimal resource allocation and management by providing detailed information on the needs and resources available at various levels of the health system. This ensures that essential supplies, such as RUTF and medications, are distributed efficiently and reach the children who need them most (Action Against Hunger, 2020). By minimizing stockouts and ensuring a steady supply of therapeutic foods, HMIS helps maintain continuous care for malnourished children and improves recovery rates (The Sphere Project, 2011).

3) Enhanced Decision-Making

HMIS enables data-driven decision-making, allowing health officials to plan and implement evidence-based strategies to combat malnutrition. By analyzing data on malnutrition prevalence, treatment coverage, and program performance, policymakers can identify effective interventions and areas needing improvement (WHO, 2007). This targeted approach ensures that resources are used effectively and that programs are tailored to the specific needs of different communities.

4) Training and Capacity Building

An effective HMIS includes training modules that enhance the skills and capacity of health workers in data collection, management, and analysis. Improved capacity ensures that health workers are proficient in using HMIS tools, leading to better data quality and more effective health service delivery (Aqil et al., 2009). Continuous training and support for community health workers ensure the sustainability of CMAM programs and the reliability of collected data.

5) Integration and Coordination

HMIS facilitates the integration and coordination of various health services, ensuring a holistic approach to managing malnutrition (World Health Organization, 2008). By linking CMAM data with other health services such as immunization, maternal health, and disease surveillance, HMIS promotes a comprehensive health system response to malnutrition. This integration helps address underlying causes of malnutrition and supports the overall health and well-being of children.

6) Monitoring and Evaluation

A robust HMIS provides a framework for continuous monitoring and evaluation of CMAM programs. This system allows health authorities to assess program effectiveness, identify gaps, and implement corrective actions as needed (Aqil et al., 2009). Regular monitoring and evaluation ensure that CMAM programs are responsive to changing conditions and are continuously improving to meet the needs of malnourished children.

III. RESEARCH METHODOLOGY

A. Study Design

The study employed a mixed-methods approach to comprehensively assess the Health Management Information System (HMIS) in Yobe State, Nigeria, with a specific focus on the community management of acute malnutrition (CMAM). This approach integrated both quantitative and qualitative methods to provide a comprehensive understanding of the challenges and opportunities within the HMIS framework (Creswell & Plano Clark, 2017).

B. Sampling Strategy

A purposive sampling method was used to select five out of the nine Local Government Areas (LGAs) implementing CMAM programs. The selected LGAs represented the three senatorial zones (A, B, and C), ensuring geographic diversity (Welch & Patton, 1992). Within each of these LGAs, three health facilities were randomly chosen, resulting in a total of 15 health facilities. This approach was designed to ensure a representative sample across the selected areas.

At each health facility, at least three responses were recorded, with participants primarily selected from CMAM data collectors, Monitoring & Evaluation (M&E) personnel, and/or the facility in charge.

C. Data Collection

1) Key Informant Interviews

Conducted by a lead researcher, supported by research assistants, these interviews aimed to gather in-depth insights into HMIS challenges, capacity gaps, and opportunities for improvement from key stakeholders, including health workers, LGA officials, and state-level managers (Kvale & Brinkmann, 2009).

2) Observation Methods

Real-time information on HMIS status was collected through on-site observations at health facilities, LGAs, and the State Ministry of Health (SMoH). This method provided a practical view of data collection, management, and reporting processes (Angrosino, 2011).

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3) Performance of Routine Information System Management (PRISM)

The PRISM framework was utilized to assess routine health information systems (Aqil et al., 2009). This involved evaluating key determinants such as data quality, performance, and technical aspects of HMIS (Hiwot Belay, Tariq Azim, 2013).

4) Focus Group Discussion (FGD)

Semi-structured FGDs were conducted with key informants, including top-level and middle managers from LGAs, SMoH, and the Yobe State Primary Health Care Management Board (YPHCMB). These discussions explored factors hindering information use, strategies to strengthen HMIS, and ways to bridge gaps in confidence and competency (Krueger & Casey, 2015).

D. Data Analysis

The collected data were analyzed using both quantitative and qualitative methods. Statistical analysis was performed on the quantitative data collected from health facilities and LGAs. This included evaluating data accuracy, timeliness, and completeness using standard metrics and statistical tests (Field, 2018). In addition, the qualitative data from key informant interviews and FGDs were transcribed and thematically analyzed to identify recurring themes and insights. This analysis provided context to the quantitative findings and highlighted the experiences and perceptions of stakeholders (Braun & Clarke, 2006). Furthermore, a triangulated approach was employed to integrate quantitative and qualitative findings, ensuring a comprehensive understanding of the HMIS landscape. This methodological rigor facilitated a thorough examination of both the strengths and weaknesses of the HMIS in Yobe State (Hancock, BevHancock, 2006).

E. Concent and Ethical Considerations

Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation. The study adhered to ethical guidelines for conducting research with human subjects, including respect for privacy and protection of sensitive information (World Medical Association, 2013).

By employing this robust methodology, the study aimed to provide a detailed and actionable assessment of the HMIS in Yobe State, offering valuable insights and practical recommendations for enhancing health and nutrition service delivery.

IV. RESULTS AND ANALYSIS

The analysis findings were comprehensively examined utilizing PRISM key determinants. These determinants encompassed various aspects, such as the level of HMIS data quality (including accuracy, completeness, and timeliness) and the performance of HMIS across behavioral, organizational, and technical factors. Additionally, interview outcomes were meticulously documented, alongside insights gathered from semi-structured focus group discussions. Furthermore, a triangulated approach was employed in the presentation of results, integrating both qualitative and quantitative methodologies. This methodological rigor facilitated a comprehensive examination of the HMIS landscape, shedding light on its inherent opportunities and challenges across various operational strata.

A. Data Accuracy

In the realm of data accuracy assessment, we focused on scrutinizing the accuracy of CMAM data elements within health facilities. This selection process was intentional, specifically aimed at evaluating data accuracy within the CMAM framework. To facilitate a comprehensive comparison, we assessed data from all visited health facilities and Local Government Area (LGA) Health Centers over a four-month period, from December 2020 to March 2021.

However, during the assessment conducted in June 2021, it became evident that many LGA facilities had not yet received CMAM reports for April 2021. This delay hindered the transmission of crucial CMAM data to the LGA health centers, forcing our analysis to rely solely on the information that was readily available from December 2020 to March 2021.

Our examination primarily concentrated on the accuracy of data summation within the monthly summary forms. We found that approximately 25% of the corresponding monthly reports contained inaccuracies in their calculations. Additionally, we noted significant aggregation issues during the assessment process.
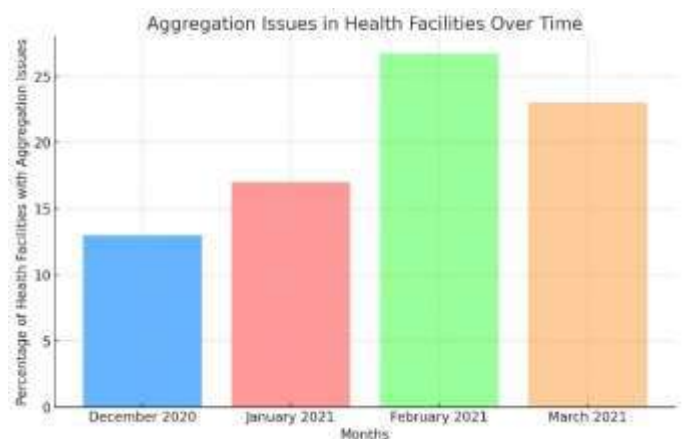

Figure 1. Data aggreation issues in HFs

Figure 1 illustrates the aggregation issues identified in sampled health facilities over time. In December 2019, approximately 13% of facilities reported these challenges. This issue showed a notable escalation in the following months, with aggregation challenges affecting 17% of facilities in November 2020. By July 2021, the percentage

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increased further to 26.7%. However, in August 2021, the issue persisted, impacting 23% of health facilities.

These aggregation discrepancies contributed to instances of both over and underreporting of cases, thereby potentially compromising the accuracy of critical metrics such as Total Admissions, Total Exits, and Total End of the Month figures. It is evident that addressing these data quality challenges is paramount to ensuring the integrity and reliability of health information systems.

B. Timeliness of Data

Figure 1. illustrates the percentages of responses regarding the timeliness of reports from respective Health Facilities (HFs). Respondents were surveyed using a Likert scale ranging from Agree to Disagree. Notably, no respondents disagreed with the statement that HFs are reporting on a timely basis, resulting in a disagreement score of 0%. The accompanying Figure 1 visualizes these responses in percentage form.
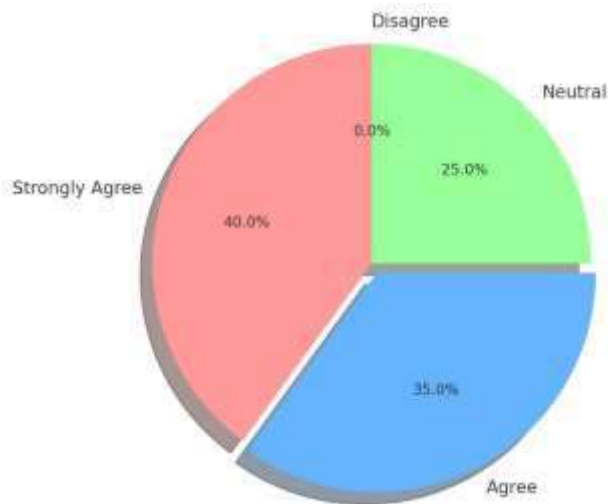

Figure 2. Timelines of Data reportage at HFs

Moreover, during the data collection phase, observations were made in certain Local Government Areas (LGAs) such as Gujba. It was noted that, at the time of data gathering, there was a complete absence of CMAM data reports for both visited HFs over the preceding four months. This lack of reporting coincided with the recent resumption of activities in Gujba due to the ongoing insurgency in the area.

C. Data Analysis Display at HFs

Most of the visited Local Government Area (LGA) health centers, Health Facilities (HFs), are equipped with charts, maps, catchment area delineations, and population targets. However, a clear display of facility utilization is lacking, and many indicators remain outdated. Additionally, there is a notable absence of charts outlining progress reports and action plans regarding the Community-based Management of Acute Malnutrition (CMAM) program. While summary reports for CMAM data collected from respective HFs are

present in all visited LGA health centers, there is no discernible evidence indicating that this information has been compared with data from other HFs.

D. Collections and Dissemination of Data

The Yobe State Primary Health Care Management Board, responsible for storing and distributing RUTF and other nutrition indicators to the respective LGAs, is not fully utilizing digital tools like the DHIS, which could expedite the process of obtaining information for resource distribution. This challenge appears to stem from an over-reliance on manual forms and parallel reporting systems, as indicated in Figure 2.

Additionally, CMAM data is missing in some LGAs within the DHIS, as observed during assessments. The DHIS has failed to capture critical information, such as RUTF stock reception and consumption, and instead focuses only on the number of admitted and defaulted clients, categorized by gender. As a result, manual submissions from all LGAs were required before the distribution of RUTF could take place.
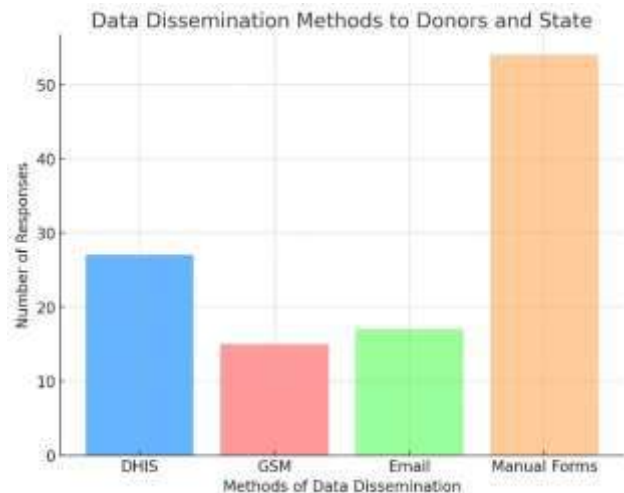

Figure 3. Data Dissemination Method to Donors and State Agency

The bar chart illustrates the methods used to disseminate health data to donors and the state. The chart emphasizes that manual forms dominate the data-sharing process, leading to inefficiencies in timeliness and accuracy when compared to digital methods like DHIS.

Although the Yobe Ministry of Health (YMoH) serves as the central point for health activities in the state, it lacks comprehensive nutrition and other health indicator information. The reliance solely on DHIS-generated data, which is often unreliable due to numerous unreported LGAs and health facilities, as observed during assessments, exacerbates this issue. Consequently, effective communication and sharing of nutritional health information between the two levels are nonexistent.

Key decision makers, particularly at the state level, are not receiving essential information due to underutilization of web-based data transmission mediums through DHIS in

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the sampled LGAs and HFs, as indicated in Figure 2. Various factors contribute to this ineffective dissemination of information, including but not limited to the absence of hardware, software, and trained personnel. Survey data revealed no significant association between the level of training and the mediums of information dissemination, contrary to ideal expectations, as evidenced by a Chi-Square test of independence (P = 0.971) at the 5% level of significance.

Consequently, all facilities rely on manual paper-based systems for recording health and nutrition information. Figure 4 illustrates that some healthcare workers (HWs) resort to using GSM for sending HMIS reports to donor organizations, resulting in parallel reporting and potential discrepancies in collected data due to accuracy issues identified at the HFs.

Moreover, achieving real-time data collection and timely submission of nutrition health information has become challenging. This poses difficulties for the central office in obtaining necessary information for effective decision-making and sharing accurate data with relevant sectors. Financial constraints hinder the transportation of data from HFs to LGAs and the Yobe State Primary Health Care Management Board (YPHCMB), while insufficient human resources and training deficiencies further compound the issue, leading to poor data quality and information integrity.

Table 1. Frequency Counts of Level of training on HMIS of the Sampled Respondents.

Level of Training	Frequency	Percent
Intense	5	14.7
Moderate	21	61.8
Not enough	3	8.8
Sub-total	29	85.3
Missing	5	14.7
Total	34	100.0

Only a small fraction, 14.7% of participants, showcased specialized skills in information or data management, highlighting a potential gap in this critical area.

Trained Personnel in Information Systems Management: Conversely, a promising 55.2% of Health Facilities boasted personnel trained in the intricate art of information systems management, signifying a positive trend towards bolstering data management capabilities.

Data Integrity Challenges: However, the accuracy of collected data faces potential compromise, primarily due to the methods employed for recording and transmission, particularly at the level of Health Facilities.

Methods for Compiling and Reporting Data: Upon inquiry into methodologies for compiling and reporting health, nutrition, and essential medications data, interesting insights emerged.

Preference for Manual Tools: A significant majority, 57.6% of respondents, admitted to relying on manual data

tools, perhaps indicative of entrenched practices or infrastructure limitations.

Embracing Computer-Based Tools: In contrast, a notable 42.4% opted for the efficiency and precision afforded by computer-based tools, reflecting a progressive approach towards modernization.

Reasons for Manual Tool Usage: Delving deeper into manual tool usage, varied reasons emerged:

a. *Hardware without Software:* A modest 53 respondents cited possessing hardware without the accompanying software tools, showcasing a tangible gap in resource provisioning.

b. *Lack of Training:* 29 respondents reported possessing both hardware and software but lacked the requisite training to fully leverage their potential, highlighting an overlooked aspect of capacity building.

c. *Absence of Hardware and Software:* Consequently, a staggering 33 respondents confessed to lacking both hardware and software tools altogether, signaling a systemic deficiency that warrants urgent attention.
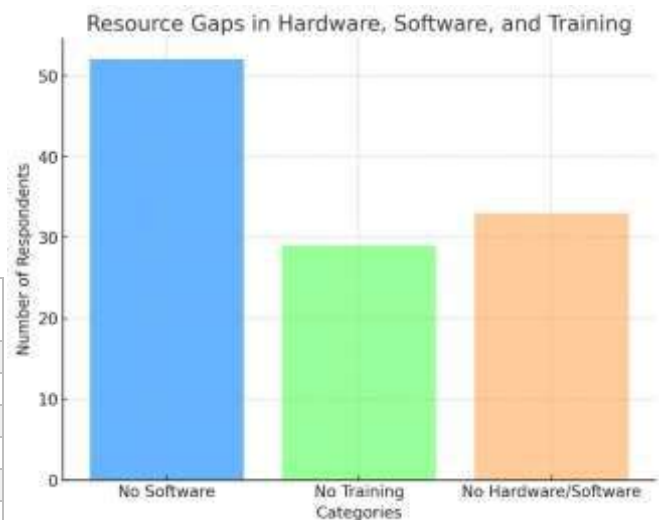

Figure 4. Resource gaps in Hardware, Software and Training

Performance Evaluation Determinant of HMIS Task

The Health Management Information System (HMIS) is designed to enhance and bolster localized performance monitoring, aligning with the Prism Assessment framework aimed at fortifying routine health information systems (Hiwot Belay, Tariq Azim, 2013). A pivotal aspect of this endeavor is the development of a prototype facilitating straightforward data reporting and prompt response to directives from authorities. This prototype plays a crucial role in analyzing and interpreting available data, enabling self-assessment and problem-solving. In light of these objectives, there arises a pressing need for regular reorientation and redirection of health workers across all levels to adapt to evolving approaches. This necessitates organizational process interventions aimed at fostering changes in values and practices, ultimately fostering a culture of evidence-based decision-making.

1) *Behavioral Determinants*

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The PRISM framework posits that the current level of training provided for the Health Management Information System (HMIS) may be inadequate. This hypothesis was assessed through self-administered questionnaires, which aimed to gauge the understanding and knowledge of health staff regarding data collection processes within the HMIS.

Only a mere 17% of respondents indicated receiving intensive training in HMIS, while 10% expressed dissatisfaction with the level of training provided, considering it insufficient. The majority, comprising 70%, reported that the training they received was of moderate adequacy, as highlighted in Table 1.

Upon observation of the completed forms, it was noted that data collectors encountered minimal challenges with calculations. However, a notable issue observed was the absence of percentage rates for indicators in most completed data forms. This observation suggests that data collection primarily serves reporting purposes rather than facilitating analysis or interpretation to inform decision-making processes.

2) Organizational Determinants

Managing a health information system is about management of resources and tasks to yield better outcomes (Nyamtema, 2010). This assessment observed the existence of tools for managing health information system (HIS) resources and functions for improved HMIS performance in the some selected LGAs of Yobe State. HMIS comprised of governance, training, support, and quality assurance tools. The scores of each aspect depended on the availability information at the time of this assessment. The governance of HMIS is measured by the existence of structural management, up-to-date organizational chart and availability of HMIS recent situation analysis report. The quality is assessed by the availability of HMIS standard guidelines (Hiwot Belay, Tariq Azim, 2013). The training is assessed by the presence of training components and planned training schedule. The support management was measured by the checklist supervisory.

3) Technical Determinants

The assessment revealed both challenges and opportunities aimed at enhancing the data collection system from health facilities to Local Government Areas (LGAs) and other pertinent sectors. Among the 18 health facilities (HFs), 2 satellite clinics (SCs), and 5 LGA centers sampled, less than 10% had access to consistent power supplies. Alarmingly, nearly 70% of the HFs lacked both training and electronic systems to support record-keeping and analysis. Remarkably, only the facilities within LGAs, State Primary Health Care Management Boards (SPHCMBs), and State Ministries of Health (SMoHs) were equipped with computers and had access to the District Health Information System (DHIS). The SCs possessed similar resources, except for access to the DHIS. Notably, dedicated units for Health Management Information Systems (HMIS) were exclusively found within the PHCMBs and SMoHs.

This assessment underscores the urgent need to address infrastructure deficits and enhance capacity-building efforts to strengthen the data collection system, particularly at the grassroots level.

V. FOCUS GROUP DISCUSSION

During the collection of survey data assessing HMIS performance, a semi-structured focus group discussion (FGD) was conducted with key stakeholders, including top-level and middle managers from LGA Health Centers, the State Ministry of Health (SMoH), and the Yobe State Primary Health Care Management Board (YPHCMB). This FGD aimed to delve deeper into strengthening the HMIS by incorporating qualitative insights. The discussion revolved around several key points:

Identifying Factors Hindering Evidence-Based Decision Making: Participants explored the factors impeding the utilization of information for evidence-based decision-making processes.

Addressing Limitations of the HMIS: Strategies to overcome the limitations of the HMIS were discussed, focusing on enhancing its effectiveness and efficiency.

Maximizing the Use of HMIS Data for Decision Making: Participants deliberated on methods to leverage HMIS data for quick and effective decision-making processes.

Exploring Reasons for the Gap between Staff Confidence and Competency: The discussion examined the underlying reasons for any disparities between staff confidence and competency in executing specific tasks within the HMIS.

Consequently, the nsights garnered from the FGD highlighted the perceived strengths and weaknesses of the HMIS. While participants acknowledged that the HMIS provided integrated and quality data, they also identified areas requiring improvement. For instance, shortages of recording materials at lower levels and the need for HMIS forms to be readily available at LGAs were highlighted as key challenges. The discussion also shed light on the current data collection process, wherein health facilities utilize manual forms that are aggregated monthly and electronically uploaded into the DHIS by Monitoring and Evaluation (M&E) personnel at LGA Health Centers. However, delays in submitting timely information and discrepancies between reported and stored data in the DHIS were noted, leading to reliance on manually submitted reports for essential drug distribution.

In addtition, Participants expressed appreciation for existing capacity-building efforts, particularly from donor agencies such as Action Against Hunger. However, they emphasized the need for additional capacity-building initiatives, especially at the grassroots level where a significant portion of nutrition data is gathered. Concerns were raised regarding the inadequate HMIS expertise among healthcare workers (HWs), lack of supervision and support, insufficient storage facilities, and shortage of human resources for data recording and information management.

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Areas for improvement highlighted included the development of comprehensive supervision schedules, strengthening HMIS supervision checklists, and enhancing feedback mechanisms. Additionally, the need for greater integration of HMIS reports and reduction of parallel reporting demands from health facilities were underscored.

Overall, the FGD provided valuable insights into the strengths and weaknesses of the HMIS, as well as actionable recommendations for its enhancement to better serve the needs of stakeholders at all levels of the healthcare system.

A. Data Quality

During the Focus Group Discussion (FGD), key informants outlined the primary causes of data discrepancies, citing various factors such as insufficient data forms, arithmetic errors, and the absence of data quality checks. These issues were identified as major contributors to data inaccuracy, ultimately compromising the overall quality of data. These claims were substantiated by the assessment findings, which revealed inadequacies in data tools across some health facilities and errors in aggregating monthly summary form data. Additionally, behavioral determinants, including a lack of awareness regarding the significance of data, excessive workload observed during site visits to health facilities, and a lack of motivation among HMIS focal persons in many visited facilities, were identified as further obstacles to achieving effective data quality and delivery.

These insights shed light on the multifaceted challenges undermining data integrity within the HMIS, highlighting the urgent need for targeted interventions to address both technical and behavioral barriers to ensure the reliability and accuracy of health data.

B. Information Usage

The FGD underscored the absence of regular review meetings and emphasized the necessity for frequent performance review sessions covering various aspects such as service utilization, data quality, timeliness, and completeness of reports. Participants suggested that these meetings should be conducted regularly to promote a culture of information utilization at all levels of the healthcare system. However, existing guidelines to facilitate such information usage were found to be lacking, with limited training on information utilization provided at health facilities. As a result, data collection predominantly serves reporting purposes, without significant emphasis on leveraging data for informed decision-making.

To address these challenges, it is imperative to establish individual performance reviews for both manual and electronic HMIS systems at all levels of the health system. These reviews would facilitate ongoing monitoring and evaluation of progress, ultimately leading to more effective service delivery. Moreover, the implementation of performance reviews would provide stakeholders with a structured platform to utilize information and make evidence-based decisions, thus fostering improved healthcare outcomes.

C. HMIS Confidence task vs. Competencies

FGD respondents highlighted a knowledge and experience gap among health workers when performing HMIS tasks. In many instances, stakeholders are not directly engaged in aggregating nutrition health and other indicators, nor are they involved in the subsequent analysis and interpretation of the data. Typically, these responsibilities fall solely on the HMIS focal person, who bears the burden of data analysis and management.

VI. DISCUSSION

The Focus Group Discussion (FGD) highlighted several critical issues affecting the effective utilization of information within the healthcare system. Firstly, it was observed that most Health Facilities (HFs) prioritize data collection for reporting purposes only, neglecting the crucial steps of interpretation and analysis. While the Health Management Information System (HMIS) emphasizes action-oriented monitoring and evaluation, the utilization of HMIS information for planning purposes remains minimal in many HFs across selected areas of Yobe state.

The lack of human resources dedicated to data analysis and interpretation poses a significant challenge, contributing to delays in report submission and compromising data timeliness and completeness. Although partial performance reviews have been observed in Local Government Areas (LGAs) Health Centers and Satellite Clinics (SCs), the utilization of information at LGAs Health Centers surpasses that of HFs. Additionally, discrepancies were noted between perceived confidence and observed competency among Health Workers (HWs) tasked with HMIS responsibilities, suggesting a need for improved training and support. Despite claims of quality assurance and active supervision, the reality in many HFs contradicts this assertion, with minimal visitation or supervision occurring in the past two months. The workload burden on facility managers and OTPs in charge further exacerbates these challenges. Moreover, there is limited stakeholder involvement from the State Ministry of Health (SMoH) in monitoring HMIS performance at lower levels, and there is no specific checklist for HMIS supervision, particularly regarding information usage and data quality checks.

To address these issues, a culture of information usage must be advocated, emphasizing its significance in facilitating informed decision-making, accountability, and transparency. Efforts should focus on educating HWs and nutrition focal persons on the value of information, promoting timely report submission, and streamlining data processing at LGAs Health Centers. Additionally, extending training resources and providing access to the DHIS at all levels will enhance data quality and facilitate effective information utilization for prompt decision-making.

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VII. RECOMMENDATIONS

The assessment outcomes centered on evaluating the performance of the Routine Health Management Information System (RHMIS), aiming to inform stakeholders such as the Yobe State Ministry of Health (YMoH), Yobe State Primary Health Care Management Board (YPHCMB), donor agencies, and policymakers at both local and federal levels. These findings shed light on the strengths and weaknesses of the HMIS concerning information usage and data quality assurance in selected areas of Yobe state. Subsequently, the following recommendations have been formulated based on these outcomes, to guide further discussions and actions during workshops:

Regular and Timely Supervision Practices: Implement regular supervision practices and develop scheduled supervisory checklists. Provide feedback on HMIS performance to all health facilities, focusing on data quality checks for CMAM and other indicators through effective data monitoring and review.

Extended Access to Computerized DHIS: Extend access to the computerized District Health Information System (DHIS) to all health facilities to facilitate timely dissemination and utilization of information for swift decision-making.

Creation of Storage Facilities: Establish storage facilities in all health facilities, such as pigeonholes and shelves, to ensure proper organization and maintenance of data records.

Establishment of Feedback Mechanisms: Establish feedback mechanisms between different levels of the healthcare system, utilizing the DHIS to generate automated reports that can be accessed and downloaded anywhere, anytime.

Involvement of Managers at All Levels: Engage stakeholders at all levels in the monitoring of HMIS performance, fostering high-level advocacy to key government decision-makers.

Enhanced Communication Among HMIS Staff: Provide call user group numbers and radio communication in areas with no GSM connection, facilitating improved communication and swift support to health workers.

Review and Update Training Materials: Review and revise training materials, providing training to health workers, especially at health facilities, on data analysis, interpretation, and utilization for decision-making.

Training and Re-Training of Personnel: Conduct training and re-training sessions for Nutrition Focal Persons (NFPs), Monitoring and Evaluation (M&E) officers, HMIS officers, and health workers on managing routine HMIS tasks effectively.

Integration of Data Demand for Essential Drugs: Ensure accurate utilization of HMIS data to generate timely reports for vertical programs, integrating RUTF stock information into the DHIS for easier access to distribution and consumption records.

Establishment of Periodic HMIS Assessments: Implement periodic assessments of HMIS performance focusing on data quality checks, data usage, and management functions.

Engagement of Donor Agencies: Identify donor agencies to support HMIS, allocating budgets to invest in technological interventions such as Information and Communication Technologies (ICT) to ensure the system's sustainability.

Promotion of Accountability and Transparency: Establish accountable procedures for health workers to address non-compliance with performance targets and timely data submission.

Motivation of HMIS Staff: Provide incentives to HMIS staff, covering costs related to data transportation, especially in geographically dispersed areas with limited access to good roads.

Investment in HMIS Human Resources: Boost HMIS resources by training health decision-makers on the significance of information usage and employing data managers capable of analyzing and interpreting nutrition health information data effectively.

These recommendations aim to address the identified challenges and improve the effectiveness and efficiency of the HMIS, ultimately enhancing healthcare service delivery and decision-making processes.

VIII. CONCLUSION

The assessment of the Health Management Information System (HMIS) in Yobe State underscores the critical role of robust health information systems in enhancing the management and outcomes of community management of acute malnutrition (CMAM). The findings reveal significant challenges in data accuracy, timeliness, resource allocation, and capacity building, which collectively hinder the effectiveness of health and nutrition service delivery. Improving data accuracy and timeliness through the implementation of digital data collection tools and enhanced training programs is essential for reliable decision-making and efficient resource management (UNICEF, 2018; WHO, 2018). Addressing these challenges can ensure that critical supplies such as Ready-to-Use Therapeutic Food (RUTF) are consistently available, thereby improving the continuity of care for malnourished children (Sphere Project, 2011; Action Against Hunger, 2020). Furthermore, integrating HMIS with other health services, such as immunization and maternal health, can provide a comprehensive understanding of child health and the broader determinants of malnutrition (UNICEF, 2013). This integration is vital for comprehensive health planning and the implementation of multi-faceted interventions to combat malnutrition (Nigeria Health Watch, 2019). The research also highlights the necessity of establishing a robust framework for continuous monitoring and evaluation of CMAM programs. Regular performance reviews and feedback mechanisms are crucial for identifying and addressing issues promptly, ensuring that CMAM programs are effective and adaptive to changing health needs (WHO, 2007). Therefore, strengthening HMIS in Yobe State through improved data management, resource allocation, capacity building, and integration with other health services can significantly enhance health and nutrition service delivery. These improvements are essential for achieving better health outcomes for malnourished children and

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ensuring the sustainability and effectiveness of CMAM programs. The insights and recommendations from this assessment provide a valuable roadmap for policymakers and health practitioners dedicated to improving health system performance in resource-limited settings.

IX. ACKNOWLEDGMENT

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