



Submitted: Oct 22nd, 2022

Accepted: May 27th, 2023

Institutional Dynamics Shaping Data Use in Health Management at the District

Level in Malawi: Case of Selected District Health Offices

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Abstract

Background: While there has been overwhelming evidence of the importance of data use in health management, data use in Malawi's Health Management Information System remains low. This paper investigates how institutional dynamics are shaping data use in health management at the district level in Malawi Health Management Information System, focusing on four selected District Health Offices (DHOs).

Methods: This qualitative study applied semi-structured interviews, active participant observations and document reviews to collect data at selected District Health Offices in Malawi.

Results: The study findings have demonstrated that institutional dynamics' mechanisms shaping data use in health management at the district level are 1) District Health Office regulations and policy 2) organisational structures and partnership patterns 3) data management and data use, and 4) District Health Office collaboration with healthcare partner organisations in shared activities. These mechanisms provide an organisational context in which health managers' efforts deal rationally with constraints and uncertainty, resulting in a change process of established data use. While the Ministry of Health has stipulated regulatory policies to guide healthcare services delivery at District Health Offices, strong and supportive organisational leadership is crucial. The Ministry of Health's commitment to quarterly supervision visits motivates Directors of Health and Social Services at the District Health Offices. In turn, the District Health Officers provide supportive leadership in strengthening community-level organisation structures where data is collected for effective data use. The paper details how the definition of Programme Managers' norms, roles, behaviours, and inter-organisational interactive patterns, initiated a change process that led to improved data use at one District Health Office out of the four selected District Health Offices. The findings imply that, despite inadequate resources, these Programme Managers acted as a bridge between the District Health Office and the community level. Not only did the Programme Managers ensure that data was collected from the organisation structures at the community level but the Programme Managers also became a critical resource enabling timely District Health Management Team performance assessment data reviews at the District Health Office. District Health Management Team's performance assessment data reviews facilitated informed data use decision-making in planning and management of healthcare services delivery to the district health population. However, inadequate resources, weak community organisation structures, and lack of coordination and collaborations in shared activities and data use for sustainable healthcare organisation partnerships compromise effective data use in health management in most District Health Offices.

Conclusion: The study argues for a well-articulated definition of the District Health Offices' policy guidance from the Ministry of Health in mapping healthcare partner organisations' activities to ensure effective data reporting

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across the districts. Not only will the effective data reporting result in collaboration and coordination of shared healthcare activities but also strengthen informed data use in healthcare services delivery to the district health population.

Keywords: Institutional Dynamics, Data Use, Health Management, HMIS.

1. Introduction

This paper presents a case study of data use in health management decision-making, in four District Health Offices (DHOs) in Malawi. We particularly focus on interrogating the actions of Directors of Health and Social Services (DHSS) and District Health Management Teams (DHMTs). This is achieved by examining how institutional dynamics shape data use in the Malawi Health Management Information System (HMIS) at the district level. HMIS is an integration of data collection, analysis, synthesis and reporting for data use informed decision-making to improve healthcare services management and delivery across the healthcare system levels [1,2].

Despite the overwhelming evidence on the importance of data use in the health sector, research has shown that data use in the Malawi health sector is still in its infancy [3,4,5,6]. [5] argues that while the implementation of the District Health Information Software (DHIS2) in 2002, was meant to improve data use efficiency and effectiveness, data use remains a challenge in Malawi HMIS. Among other challenges, the study revealed that Malawi HMIS lacks the versatility to quickly adapt to institutional dynamics experienced both locally and internationally. In another study conducted in Malawi HMIS, [6] argues that despite successful technology implementation, there was a need for a critical assessment of the surrounding institutional context and institutional factors coupled with a supportive process, for the technology implementation to yield the expected data use benefits.

Data use is defined as a systematic process of collection, analysis, synthesis, interpretation, and review from multiple sources, in varying conditions and organisational contexts, to aid informed decision-making in planning, policy formulation, management, and healthcare services delivery [7,8,9]. Actions based on data use provide benefits and opportunities for informed decisions by healthcare stakeholders [10]; and generate useful input for improved HMIS development and performance [11]. The dynamic process of data use interpretation is shaped by individual characteristics and the social context of an organisation. Data use interpretation processes involve noticing and observing the data, to infer meaning, before constructing data action implications [9]. This interpretation process is applied at every level of the multiple healthcare organisation setup as individuals make informed decisions that either enact or restrain an action.

The interactivity among various conditions and organisational contexts is the concept of institutional dynamics. Institutional dynamics is defined as an assimilation process of different component parts, such as organisation stakeholders' roles, norms, behaviours, structures and interactive patterns that result in a change in the organisation and its context [12]. Therefore, the assimilation process involves a data use interpretation process which is applied at every point of organisational stakeholder interactions [9]. The dynamics in data use include accountability in which case data tends to be intertwined with power and its use may involve power and politics [9]. Power and politics are seen in multiple organisational interactions of multiple stakeholders. Studies on institutional dynamics and data use suggest that clearly defined roles, behaviours, norms, and healthcare organisations' interactive patterns and structures lead to effective data use. Structures such as functional management information systems encourage data use. In addition, continuous professional human capacity development is essential for data

collection, analysis, interpretation and data use [13,14]. Individuals with an optimistic attitude towards data use for informed decision-making are also critical resources for enabling effective data use [13,15]. Adding to the aforementioned factors, clearly stated organisational vision and goals and supportive leadership enhance data use effectiveness. Supportive, encouraging and strong organisational leadership motivates individual data use in the organisation [13,16]. Beyond the internal working of an organisation, partnership with supportive organisations who have technical expertise and resources, including a well-defined data-driven improvement process plan is recognised as an effective data use strategy [13]. It may be essential to invest in building supportive structures such as long-term collaborations for sustainable relationships with healthcare partner organisations in data use and shared activity strategies [17,18]. The absence of definite inter-organisational structures can bring a feeling of frustration, confusion, and anxiety to stakeholders [19].

[20] study on the socio-technical perspective of DHIS2 platform generativity in Malawi, provided insight into the usefulness of social and technological relationships in effective data use. For instance, DHIS2 data reports are presented using a variety of tools such as maps and Geographical Information Systems (GIS), charts, graphs, tables and pivot tables [21]. The various DHIS2 tools generate data reports following the DHOs' staff requirements, that is, embracing social dynamics, enduring social problems, and/or complex contexts [22]. Further, DHIS2 implementation in Malawi was configured in such a way as to get closer to satisfying the data users' social-technical contexts [20]. The more technology implementation gets closer to satisfying its data users, the higher its chances of success [25]. Therefore, [20] recommends further scrutiny of the social and organisational contexts of DHIS2 implementation in Malawi's HMIS.

Yet another study by [24] contends that while the League tables, built on top of DHIS2, support DHMTs data use in internal decision-making and planning, the League tables take little consideration of institutional contexts.

[4] argues that the use of knowledge obtained from localised data strengthens effective data use. System users are shaped by their surrounding contexts, such as characteristics, politics, culture, attitude, practices, interests and values [25]. Little consideration of situational analyses of these contexts, is among the major constraints encountered during the implementation of systems developed in a different context [4,24]. [4] and [26] agree that not only does a critical situational analysis of the contexts lead to technology implementation that meets intended purposes in health management, but also results in an outcome that represents reality on the ground.

This paper contributes towards filling knowledge gaps regarding institutional dynamics shaping data use in the health sector in developing countries, specifically in Malawi where there is a dearth of literature on how defined roles, norms, behaviours, structures and interactions among multiple organisations can provide organisational context for a change process. The paper details organisational contexts in which health managers' efforts in dealing rationally with constraints and uncertainty, lead to a change process of established data use. Understanding the roles, behaviours and inter-organisational interactions might lead to improved data use in health management at the district level in Malawi HMIS.

2. Subjects and Methods

2.1 Study design and setting

This is an interpretive qualitative research, with the purpose to gain in-depth understanding of how institutional dynamics are shaping health management in healthcare organisations. Interpretive qualitative

research allows researchers the perspective that knowledge as what is known is always negotiated within social settings and relationships between and among people. Applying this approach to the study helped the researchers to understand human thoughts and actions by learning people’s attitudes, behaviours, and perceptions towards data use in the health sector in Malawi’s HMIS.

The study was conducted in four District Health Offices (DHOs) of Malawi, namely, Blantyre, Zomba, Machinga, and Kasungu (see Table 3). The DHOs were purposively selected as administrative levels of the healthcare system in Malawi’s HMIS. DHOs oversee health service planning, delivery, and monitoring within a district. Malawi’s healthcare system is organised into the following levels: community, health facility, district, zones, and national level [27]. Forty two participants drawn from Malawi’s healthcare system stakeholder organisations, were interviewed during the study (see Table 1). The participants were chosen with the purpose to understand how institutional dynamics shape these stakeholders’ data use to enact or restrain actions in health management.

Table (1) Key Informants Interview

Position	Number of People
Ministry of Health Deputy Director of Planning	1
Ministry of Health Technical Working Group Representative	1
Ministry of Health ICT Systems Officer	1
Director of Health and Social Services	3
HMIS Officer/Statistical Clerk	4
Data Use Facilitator	1
District Health Management Team (DHMT)	9
Programme Coordinator	8
Health Partner	2
Ministry of Health Personnel	4
Health Surveillance Assistant Supervisor	2
Health Surveillance Assistant Supervisor	4
Health Facility in Charge	2

Data collection from the study sites was conducted from January 2022 to September 2022. The study used semi-structured interviews, participant observations, and secondary data review as data collection instruments. The interviews were guided by broad questions focusing on the role of the various offices in data collection, analysis, reporting, and subsequent data use. In addition, the study sought to understand how the offices ensure coordination of health programme(s)’ data use during performance reviews and challenges experienced.

Apart from interviews, we also conducted participant observations as shown in Table 2. This involved identifying data interactions amongst the healthcare stakeholders in their work environment, by attending data review meetings. Participant observations aimed to understand how the study participants use data for decision-making regarding healthcare service delivery. Health officers were observed interacting with data while preparing reports for data use during performance assessment review meetings. Not only did the observations enrich the researchers’ knowledge of the study participants’ roles and behaviours in data collection, analysis, and reporting processes but also in understanding the respective officers’ data use interactions in their daily work practices.

Table (2) Participant Observations

Activity	Number of Observations
Local Assembly Performance Assessment (LAPA) Review Meeting	1
Healthcare Partner Organisations' Planning Meeting	1
General HMIS Performance Review Meeting	1
DHMT Health Facility Supervision	1
Extended DHMT Health Facility Supervision	1
DHMT Supervision Performance Review Meeting	1
Healthcare Partner Organisations Assessment Review Meeting	4
Training Workshop	4
HMIS Officer/Statistical Data Clerks at the Workstation	3

The study also reviewed and analysed existing data-related documents such as reports, meeting minutes, strategy documents, standard operating policies, rules, and guidelines in Malawi HMIS. The analysis aimed at complementing key informants' interviews that were conducted.

Data analysis involved a systematic search and arrangement of audio-recorded interview transcripts, observation notes, and other non-textual materials gathered. Audio-recorded interviews were transcribed, initially using a manual process and, later, electronically using Otter.ai online application software. All notes and interview transcripts were compiled into one script which was kept in Microsoft Office Word. The script was thoroughly examined and reviewed to draw meaning out of the empirical data through thematic analysis, that is, classifying and categorising data into major and sub-themes. The thematic analysis involved going through the empirical data to identify information that was relevant to any of the following terms: 'data collection', 'data interpretation', 'data manipulation', 'data use', 'data reporting', 'data analysis' and 'data review'. After this process, the transcript was re-examined for such terms as 'organisation changes', 'changes in individual working environment', 'regulations', 'norms', 'roles', and any change-related phrases. From this process, the researchers conducted several iterative examining and reviewing of the empirical data to develop interpretive codes. Based on the interpretive codes, similar patterns of phrases were grouped into categories from which themes related to participants' opinions were put together.

3. Results

The study results indicate mechanisms of institutional dynamics, that are shaping data use in health management at the district level in Malawi HMIS. The following sections present results from the selected four DHOs based on these mechanisms termed 'data use mechanisms' as emerging from the study. The data use mechanisms are DHOs regulations and policy, organisational structures and partnership patterns, data management and data use, and DHO collaboration with healthcare partner organisations in shared activities.

3.1 DHOs Regulations and Policy

The study findings reveal that Medical Council of Malawi (MCM), Nurses and Midwives Council of Malawi (NMCM), and Pharmacy, Medicines and Poisons Board of Malawi (PMPBM) regulate the education and professional practice of medical doctors, nurses, and pharmacy professionals in Malawi, respectively. MCM, NMCM, and PMPBM support the Ministry of Health (MoH) to, among other issues, ensure that qualified personnel are recruited with appropriate professional credentials. While the regulatory bodies expect good conduct and behaviour of healthcare professional staff, MoH provides policy guidance in executing healthcare service delivery duties. Healthcare staff are expected to abide by

set documented standards of data use in the daily execution of their duties, as a Community Development Coordinator reiterated:

'When developing a District Implementation Plan (DIP), we make sure that all our activities are in line with [the] Health Services Strategy Plan II (HSSP II) which is expiring this year [2022] and at the same time, we ensure that activities align with the Essential Health Package (EHP). For example, a simple facility in Chileka, should ensure that all its activities are aligned with EHP and HSSP II.'

A Clinical/HIV & ART Coordinator had this to say in terms of policy use in daily work,

'Ok, every... programme has got a policy. So, whatever we are into, whether it is Maternal and Child Health, HIV, Malaria, TB, [or] whatever, there is a policy. So, whatever we're doing is guided by the policy... but we cannot be referring to it day after day. There are some of them [that] we have even forgotten where we put them... those that are on the website, we can Google and pick them.'

However, adherence to set documented standards' data use depends on the healthcare staff's behaviour. In some instances, healthcare staff deliberately neglect the Ministry of Health's (MoH) policy of compiling daily and monthly data reports in accordance to set essential standard datasets, indicators, and elements. Healthcare staff negligence to compile and submit data reports in accordance with set policy compromises DHOs data use. Data reports that are compiled according to set standard datasets, indicators, and elements support DHOs' data use in making informed decisions for improved healthcare services delivery.

In addition, the study findings reveal that MoH conducts quarterly visits to ensure that DHOs are supervising health facilities within their districts. At least once a quarter, DHOs are expected to supervise all health facilities across the district. One software solution that aids data use by all DHO DHMTs and Extended DHMTs across the four districts, is a CommCare-based solution for supportive supervision management. CommCare is used in collecting data for assessment and review of programmes performance to improve healthcare services delivery (Community Development Coordinator discussion excerpt below):

'...for each DHMT supervision visit, after they find issues for each facility, based on the 11 modules within the CommCare App, issues identified per module are reported on and these are filed at each facility, a copy of which is entered in CommCare App. These can be viewed at any level, nationally and internationally by anyone who wants to access CommCare App online.'

However, due to inadequate funding, MoH is not consistent with DHOs' expectations for supervision as MoH Deputy Director of Planning said,

'We usually pick the specific districts to supervise which may have challenges which we would like to go through... but usually, resources are not enough. So, we just [choose], say to supervise some districts which have challenges and visit those.'

The study determined that MoH conducts competitive yearly performance assessment data reviews, as mentioned by the Community Development Coordinator:

'...as a grouping, we are also assessed, for example: how many facilities have been supervised fully in a particular quarter? By the end of every financial year, we are supposed to supervise at least 80% of the total facilities in the district. Anything below 80%, you get a zero. Districts that are performing well, that is 1) there is drug availability in facilities; 2) you have improved the capacity of Health Centre Management Committees (HCMC)...; 3) DHMT plus Extended DHMT are doing their supervision. Based on these three core indicators, if you are doing [well], at the

end of the financial year, you get some incentives in monetary value from the government.'

Furthermore, the study revealed that MoH as a policy custodian (see summary in Table 3), designed a national health partner mapping data template that is emulated at the DHOs, as one DHSS reiterated that, *'...a partner mapping exercise at MoH... had mapped all the partners in the country on an Excel sheet... from that, you could filter out the DHO and have a picture of which partners have registered at MoH that are implementing activities in the district... We also started mapping the partners for the DHO, for each specific programme... We developed templates...'*

While at this DHO, healthcare partner organisations mapping data templates had been successfully implemented (see Table 3), other DHOs were still struggling to bring healthcare partner organisations' mapping data together. The struggle to bring healthcare partner organisations mapping data together was expressed by a District Environmental Health Officer from another DHO, who said,

'Since 2016, we were trying to bring all the partners together. So, we have a database of all the partners that we're working with. We were signing a memorandum of understanding (MoU) with each partner...we were reviewing and renewing those MoUs every year, [but] since 2019, we have been slowing down... because those partners' coordination meetings were being supported by the partners themselves. Since they were quarterly,...you would find that maybe one partner would just support us once a year...On updating our stakeholders' template... if you were to ask me today, I would tell you that we have 41, but I'm not sure if all the 41 are still in the district... because we stopped following them seriously, I think in 2019.'

Table (3) MoH Policy Guidance for DHO Operational Activities

Data Use Mechanism	Effect of DHO Data Use			
	Blantyre	Zomba	Machinga	Kasungu
MoH provides policy guidance to DHO operational activities (standard operating policies, rules & procedures)	Strengthen DHSS authority and power to enact data use at DHO.	Strengthen DHSS authority and power for leadership at DHO. However, data use is restrained due to inadequate resources, such as office stationery, data bundles and fuel to facilitate the coordination of data collection activities across the district.	Strengthen DHSS authority and power for leadership at DHO. However, data use is restrained due to inadequate resources, such as office stationery, data bundles and fuel to facilitate the coordination of data collection activities across the district.	Strengthen DHSS authority and power for leadership at DHO. However, data use is restrained due to inadequate resources.

3.2 Organisational Structures and Partnership Patterns

The study found that interactivity among multiple healthcare stakeholders across multiple levels involves formal, informal and subtle data use processes. Malawi HMIS is semi-computerised, with paper-based tools mainly utilised at the health facility level and computerised solutions used at district and national levels. The MoH adopted the use of DHIS2 as a formalised central data repository to strengthen data use at the district level. Consequently, to strengthen data use, DHIS2 requires effective data collection, analysis, interpretation, and compilation of data reports, as one Community Development Coordinator mentioned,

'...through HMIS we track each indicator per facility. Some of the indicators also appear on Local Assembly Performance Assessment (LAPA) form. All the programmes that are under LAPA

are the same programmes reported in DHIS2. LAPA is a consolidation of all indicators from all facilities at the district level which are entered in DHIS2. ...All facilities must report through DHIS2, [every month], e.g., ANC coverage report at the district level is a consolidation of all ANC coverage for all facilities across the district.'

The DHOs depend on data reports received from the community level. The DHO's mandate is to ensure that the community level which consists of organised structures is well-oriented, trained, and equipped. The organised structures support healthcare services delivery, as indicated by the Community Development Coordinator who said,

'A Health Centre Management Committee (HCMC) is composed of three members from a health facility, that is, the Health-[Facility]-in-Charge (secretary), environmental office representative, and nurses section representative and 15 members from the community, one ombudsman and one custodian of the pharmacy, making a total of 20 members.'

Among other roles of the DHO is to strengthen community-level structures (see Table 4). According to the Community Development Coordinator, the DHO is responsible for:

'Building capacity of the community structures for them to take part in day-to-day life activities... We also build capacity for the Health Centre Management Committee (HCMC) which coordinates health activities and acts as a bridge between the Health Centre Facility and the community. We also build the capacity of the Community Health Workers (CHWs), who are working in the communities, that is, Health Surveillance Assistants (HSAs) and Community Midwife Assistants (CMAs).'

However, the study found that inadequate resources constrain DHOs' efforts toward effective data use (see Table 4), as indicated by the Community Development Coordinator below:

'We also build the capacity of Assistant Developmental Officers who are the supervisors of HSAs [health system front liners in the data use process]. We ensure that all these have enough resources and materials including relevant training to support service delivery at the community level.'

One Director of Health and Social Servicesaid,

'...but due to lack of resources, the training [to build the community level human capacity] is being done in a piecemeal approach to cover the curriculum, that is, a few topics are delivered in a year or per quarter.'

As shown in Table 4, the study determined that in general, the DHOs have inadequacies in the human capacity for data collection, analysis, synthesis, and interpretation skills. Other resource inadequacies relate to the insufficiency of electronic gadgets, and financial resources to fund performance assessment data review meetings or provide data bundles to relevant staff, see Table 4. Poor communication infrastructure was also observed to negatively affect data use. This was reiterated by the MoH Deputy Director of Planning, who said,

'The ministry has inadequate electronic gadgets and infrastructure, data bundles, funding, and human capacity with skills and knowledge in data collection, analysis, synthesis, and interpretation.'

Table (4) DHO Organisational Structures and Partnership Patterns

District Health Office	District Structuring	Mechanism	Implications	Factors restraining effective data use
Blantyre	Defined partnership coordination and collaboration in shared healthcare activities through strengthened	Recruitment of Programme Managers who act as a bridge between the DHO, healthcare partner	Towards the establishment of effective data use	Inadequate funding; inadequate electronic gadgets; inadequate data bundles; lack of stationery and office supplies; intermittent network

	community-level structures	organisations and the community level.		availability.
Zomba	The lack of effective community governance structures.	The lack of sustainable funding to strengthen community structures	Lack of supportive capacity to enable effective data use.	Poor road networks; inadequately trained healthcare personnel; inadequate infrastructure.
Machinga	Heavily dependent on healthcare partner organisation funding.			Inadequate resources such as office stationery, data bundles and fuel to facilitate coordination of data collection activities across the district.
Kasungu	Weak community structures			Inadequate human and infrastructure resources to tackle disease outbreaks; inadequate government funding to necessitate data use process.

3.3 Data Management and Data Use

The study found that at one DHO, programme managers (PMs) worked closely with the healthcare staff at the community level (see Table 4) where data was collected to ensure that the data reports reflected the reality on the ground. This is what one PM said,

‘HCMC has been empowered to hold their monthly meetings and each time during those meetings, minutes are taken to keep track of all deliberations and these are kept by the secretary, the Health Facility-in-Charge. The deputy secretary is from the community. Now it is mandatory that when any member of the facility is going to a Drug Therapeutic Committee (DTC) meeting, ...the member should present challenges experienced at the facility level... They go to the DHO for a meeting and each facility is expected to bring minutes from previous Health Centre Management Committee meetings. This committee meets once a month and produces minutes that are shared with [the] DHO. At the DHO, there is a file for each health facility in which these minutes are filed each month when members come for DTC meetings. This file is a duplicate of what is kept at the health facility level as regards HCMC meeting deliberations.’

Furthermore, the study found that the DHIS2 database integrates data from subsystems across the healthcare sector. Data from subsystems that exist in multiple-level organisations, including healthcare partner organisations, converge at the district level to address both local district and national needs (Figure 1). DHIS2 has predefined essential standard datasets, indicators, and elements required for reporting and use at the district and national levels. Based on healthcare programme standard datasets, indicators, and elements, Community Health Workers collect data daily, using paper and/or electronically, in the course of delivering services at the community level (see Figure 1) as indicated below by an HMIS Officer,

‘[CHWs] and [Senior CHWs] collect data from the community and report at the facility level. Data is documented in the registers and summarised for submission to the DHO where the summarised reports are entered into DHIS2. Once this data is entered in DHIS2, the system does all the required analytics to produce the required reports. Data reports from health facilities are received either as hard copies or through WhatsApp. All HMIS-related staff are on both the HMIS forum and their programme coordinators’ forum.’

The data reports, for example, the HMIS15 form, received from the health facilities across a district are captured in DHIS2. The HMIS15 form captures data from multiple disease programmes and health services offered at a health facility. Once captured in DHIS2, data reports are accessible by all healthcare stakeholder organisations across the levels, see Figure 1. PMs use DHIS2 to analyse, synthesise and

interpret data into presentations that meet specific reporting requirements of multiple stakeholder data users, as the HMIS Officer continued to say,

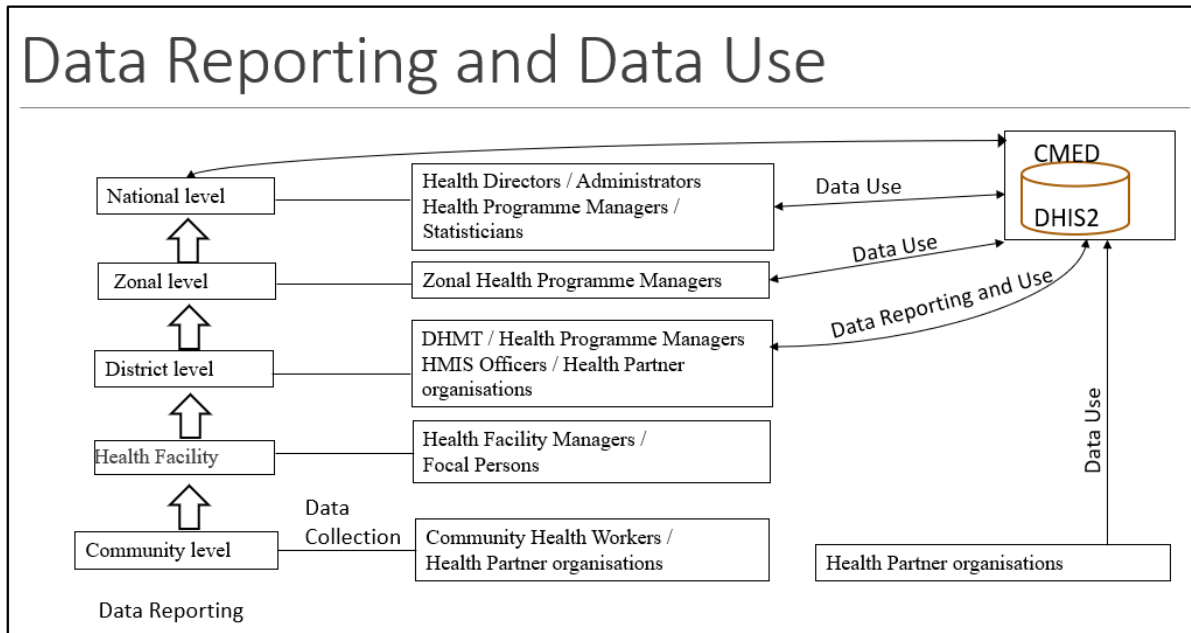


Figure (1) Data Reporting and Data Use in Malawi HMIS

‘Data is extracted through visualiser and pivot tables. They can tabulate the data as required for reporting to the specific managers i.e., programme coordinators [PMs] for use in informed decisions. HMIS Office also uses the same data to assess health facility performance as well as how the entire district has performed during the month. Once a month, HMIS officers present a report to DHMT through PowerPoint presentations, and thereafter data reports are shared with health managers electronically, who use the data reports for Local Assembly Performance Assessment (LAPA) data review meetings. Data is also used to request research funding. All district programmes’ data reports feed into the District Implementation Plan (DIP). Bottleneck Analysis (BNA) tool is used to identify gaps in performance for possible improvement.’

3.3.1 DHIS2 Data Reporting

DHIS2 data is in the custody of the Central Monitoring and Evaluation Division (CMED) under the MoH. Table 5 presents the monthly HMIS15 reporting rate for the financial years from July 2017 to July 2022 as captured in DHIS2 for the selected DHOs.

Table (5) Selected DHOs reporting rate performance for 5 years beginning 2017/18. (Source: <https://dhis2.health.gov.mw>)

DHO	Financial year				
	2017/18 (%)	2018/19 (%)	2019/20 (%)	2020/21 (%)	2021/22 (%)
Blantyre	52.3	41.9	32.7	63.1	94.1
Kasungu	36.2	30.9	30.5	41.4	58.8
Machinga	23.6	39.9	38	32.6	89.1
Zomba	63	78.3	52.2	59.6	83.5

In the financial year of 2017/2018, Zomba DHO had the highest reporting rate at 63%, followed by Blantyre DHO with a reporting rate of 52.3%, while Machinga DHO had the lowest reporting rate at 23.6%. Kasungu DHO registered less than 40% reporting rate in the first three consecutive financial years with a slight improvement of 41.4% in the financial year 2020/2021 and 58.8% in the financial year 2021/2022. The final year improvement of 58.8% is attributed to health partner funding support. Below is Figure 2, showing the performance of selected health facilities under Kasungu DHO. The lead author actively participated in an Integrated Community Health System (iCHIS) training session conducted at St. Andrews Community Hospital and Khola Health Centre in Kasungu DHO and hence, their selection. While the selection of St. Faith Health Centre and Mdunga Health Centre was based on their consistent progressive improvement in timely data reporting.

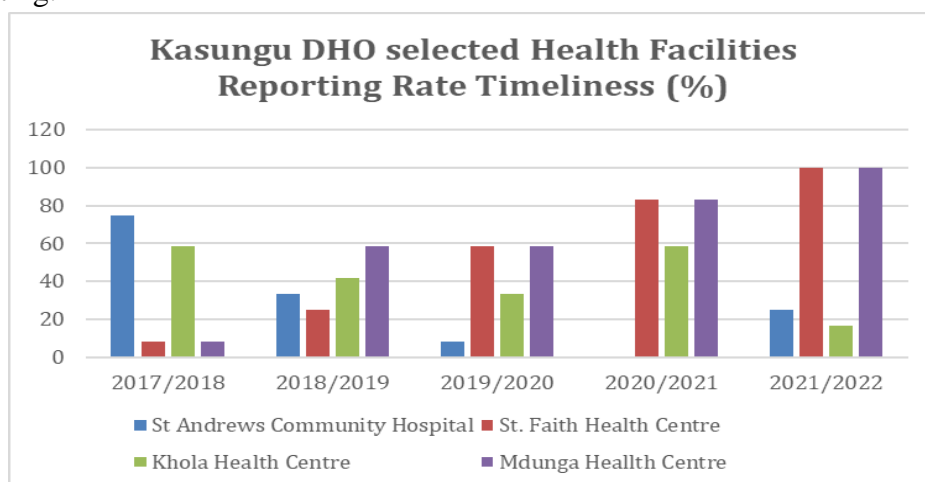


Figure (2) Kasungu DHO selected Health Facilities HMIS15 form Reporting Rate Timeliness (%). (Source: <https://dhis2.health.gov.mw>)

Similarly, Machinga DHO was not submitting data reports on time, registering a reporting rate of below 40% for four consecutive years. However, the financial year 2021/2022 data reporting rate highly improved to 89% due to supportive health partner organisations.

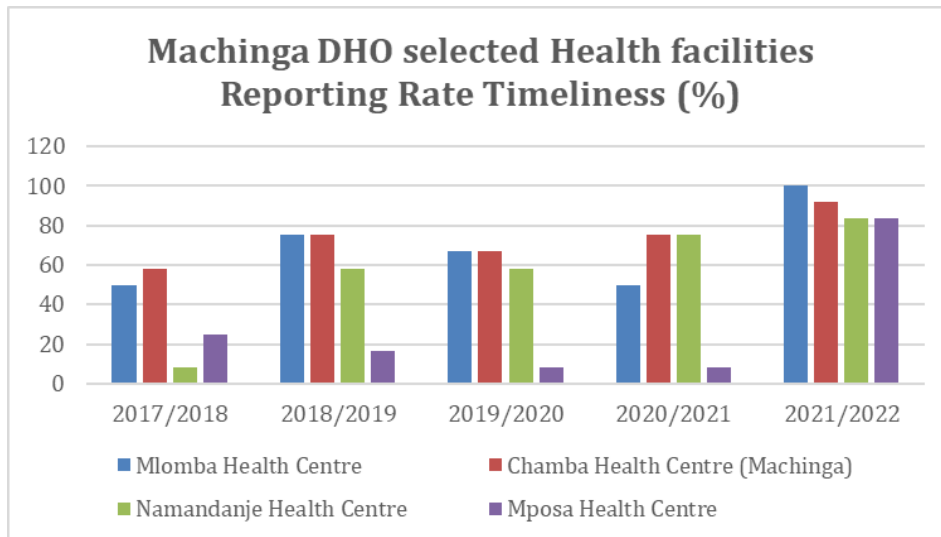


Figure (3) Machinga DHO selected Health Facilities HMIS15 form Reporting Rate Timeliness (%). (Source: <https://dhis2.health.gov.mw>)

Of the four sampled DHOs, only Zomba consistently registered above 50% reporting rate. However, the figure 4 below shows selected health facilities. The lead researcher actively participated in the health partner organisation end-of-project assessment review of Namikango, Chipini and Sadzi Health Centres, hence the targeted selection. The selection of Chisi Health Centre was because it had a persistently low reporting rate of less than 20% for the duration of the period except in the financial year 2021/2022 in which it reported above 60%.

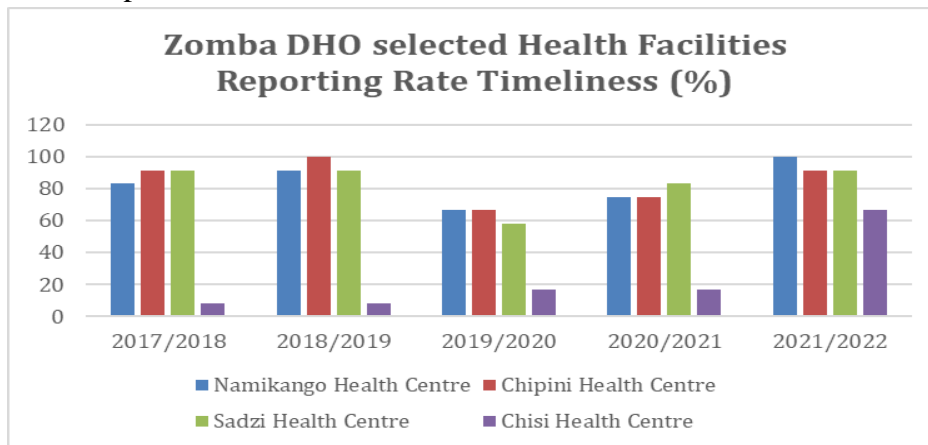


Figure (4) Zomba DHO selected Health Facilities HMIS15 form Reporting Rate Timeliness (%). (Source: <https://dhis2.health.gov.mw>)

The consistency in the Zomba DHO reporting rate is attributed to monthly supportive funding from health partner organisations, as reiterated by one HMIS Officer, who said,

'... [the] project is funded by USAID... So, when we go for supervision...because we're using their funding, they also need the data report of what has been done. So...we are compelled to make a data report... to be provided to USAID.'

In the financial year 2019/2020, Blantyre DHO had the lowest reporting rate and for the next two consecutive years, the reporting rate improved. Below is a figure depicting reporting rate timeliness improvement for 2 urban facilities and 2 rural facilities selected in Blantyre DHO. Bangwe Health Centre was selected as urban facility because the lead researcher actively participated in DHMT supervision. Dziwe Health Centre and

Lundu Health Centre’s selection as rural facilities was due to their progressive performance.

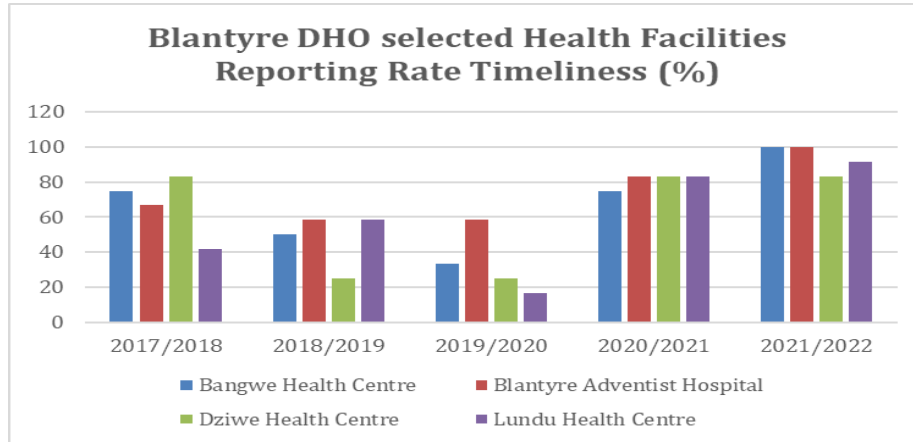


Figure (5) Blantyre DHO selected Health Facilities HMIS15 form Reporting Rate Timeliness (%). (Source: <https://dhis2.health.gov.mw>)

The contributing factors to the improvement are partly due to a gradual change in a structure that would improve efficiency and effectiveness in healthcare service delivery. The gradual change at Blantyre DHO involved the formation of new roles, attitudes and practices to establish legitimate recognition of the PM position whose responsibility was to coordinate issues about a specific programme, for example, the Malaria programme. A competitive internal gradual recruitment process for the PM position was conducted for the placement of eligible officers. Not only were the newly recruited PMs responsive to their job specifications but also contributed to improved data reporting rates in comparison to previous period performance. In the newly recruited PMs, Blantyre DHO had established consistent data reporting, hence subsequent data use, as reiterated by the DHSS who said,

‘... There was a kind of bridge between the central data office, which is the HMIS Office, and the data initiators, which is community level as well as the facility level. Now there is a tremendous improvement in terms of reporting rate.’

DHMTs rely on data reports to assess performance and make relevant decisions in planning, coordinating, and implementing health interventions in a district. Blantyre DHO ensures that data reports are properly managed and easily accessible to support data use at various points. For instance, data use eases follow-ups on supporting healthcare partner organisations that are not performing according to expectation. This is what the DHSS said,

‘Because if the partners are being elusive and they are not supporting [activities as agreed with PMs], then I need to take it up with the individual partner [organisations] and bring the health partner [organisations] to a round table and see how we can coordinate. The general idea is to ensure that there is coordination in terms of the players that are on the ground.’

Further, data reports are the basis of discussions at Blantyre DHO district-level weekly performance [data] review meetings as the DHSS continued to say,

‘...in terms of data use for top management, the approach taken...we have got at least one Monday in a month that we dedicate to discuss [specific] data reports and how the district is performing.’

To prepare these data reports, the PMs were taken through special training in crucial areas to ensure that they were well versed with the basic analytical skills and subsequent data use, as commented by the DHSS,

‘So, we have also conducted a series of training sessions, to teach them all these monitoring and evaluation (M&E) issues... and how to interpret data.’

On the contrary, a Community Development Coordinator from another DHO had a rhetorical question,

asking,

‘While data is collected daily at the community level and reports are compiled monthly for the DHO’s use, does the district level which meets every Monday, analyse these reports for data use?’

It is clear from the comment above that while the community healthcare staff compiles monthly data reports from the data collected daily, this data is rarely used in decision-making to inform planning for healthcare services delivery at some DHOs. Table 6 provides a summary of data management and subsequent data uses at the selected DHOs.

Table (6) Summary of DHOs’ Data Management and Data Use

Data Use Mechanism	Effect of DHO Data Use			
	Blantyre	Zomba	Machinga	Kasungu
Data management and Data use	Monthly HMIS Office data reporting through DHIS2 as a core data repository and feeder for all departments, supports weekly data use.	Monthly HMIS Office reporting through DHIS2 as a core data repository and feeder for all departments’ data use as per MoH and Health partner requirements.	Monthly HMIS Office reporting through DHIS2 as a core data repository and feeder for all departments’ data use as per MoH and health partner requirements.	Monthly HMIS Office reporting through DHIS2 which is the core data repository and feeder for all departments’ data use as per MoH and health partner requirements.

3.4 DHO Collaboration with Health Partner Organisations in Shared Activities

In as much as the presence of many healthcare partner organisations in a district signifies support in healthcare service delivery, it also has its challenges. Without a well-structured approach to health partnership coordination, the DHOs have challenges managing a mutual understanding amongst the healthcare partner organisations. Most of these healthcare partner organisations come with resources to finance activities as said by one DHSS,

‘You may be aware that MoH in general and the DHO in particular, most of the programmes are supported by partners, and about 40% of the needs are supported by partners. The government provides 20% of what we need and the other 20% is an unmet gap. We have got activities; we have got programmes but we have got no financiers.’

Healthcare partner organisations may come with invested power and authority. One way to control and ensure collaboration amongst healthcare partner organisations is as reiterated by the DHSS, who further said,

‘...there is also a Memorandum of Understanding (MoU) template that ensures that whatever they are doing is written and signed between the DHO and each health partner [organisation] in the district. This ensures that health partner [organisations] do not deviate from the agreed plans.’

Healthcare partner organisations mapping data templates strengthen data use in coordination and also collaboration in shared activities and data use among DHOs’ respective health partnership [organisations], as the DHSS continued to say;

‘...they have got to meet with the [PMs] and fill [data] in the templates with the activities that [health partner organisations] want to do.’

All the four DHOs sampled in this study acknowledged that District Implementation Planning data review and development was a crucial exercise. Not only is the District Implementation Planning data review exercise comprehensive and elaborate, but solely depends on the use of data reports from all programmes, both at the beginning of the financial year and all the way up until the financial year ends. DHOs’ use of programmes’ data reports in planning was reiterated by the District Implementation Planning Coordinator, who said,

‘...We ensure that before the financial year ends every year, we do the [District Implementation Planning data] review. This is normally done to reflect on the achievement of different indicators just to assess whether we are performing below or above the national target. If we are performing below the national target, we do the bottleneck analysis using the DHIS2 BNA App, for only those programmes appearing in the national indicators book... After finding out the root causes that is when we generate the activities based on the root causes. We take those activities [data reports] and put them in the District Implementation Planning [data] template and request for services. If we do not have enough resources that’s when we involve our health partner [organisations] in the district. Normally during [District Implementation Planning data] review, we are supposed to work closely together with our health partner [organisations] right from the start, going through the whole process, that is, the concerned [PM] works with the interested health partner [organisation]. The idea is that at the end of this process, the health partner [organisation] should be able to identify specific activities that they were able to fund... [Every] quarter, we therefore, need to track the performance of these activities if we are performing according to targeted expectations or not.’

Another District Implementation Plan Coordinator said,

‘We are also supposed to be assessing ourselves by having what we call quarterly [District Implementation Planning data] review meetings. But these, most of the time don't happen. So, what we do is, I just sit down with the HMIS officer, update our graphs in the [District Implementation Planning data] template, and then present it to the DHMT. Yeah. But all things being equal, we are supposed to be meeting even with the [PM], because they are the ones who implement the activities, not the DHMT.’

The District Implementation Plan Coordinator further explained that,

‘... Meeting the [PMs]... for us to do it, it’s expensive. So, most of the time we rely on partner [organisations]. When there are no partner [organisations], then we don’t conduct [District Implementation Planning data] review [meetings].’

Table 7 below summarises the DHOs’ collaboration with healthcare partner organisations in shared activities.

Table (7) Summary of DHOs Collaboration with Healthcare Partner Organisations

Data Use Mechanism	Effect of DHO Data Use			
	Blantyre	Zomba	Machinga	Kasungu
DHO collaboration with health partners in shared activities	Health partner mapping data template and a Memorandum of Understanding are used to control and manage collaborative activities in the district.	Lack of effective health partner coordination through mutual collaboration in shared activities with partners.	Working closely with health partners operating in the district though experiencing resource inadequacy for effective data use process.	DHO is the Secretariat of Health and Thematic Group at the district council level which facilitates partner coordination.

4. Discussion

The study found that regulatory bodies essentially regulate healthcare professional education and practice standards for effective, efficient, and equitable service delivery across the health sector in Malawi. Regulatory bodies such as the Medical Council of Malawi (MCM); the Nurses and Midwives Council of Malawi (NMCM) and the Pharmacy, Medicines and Poisons Board of Malawi (PMPBM) support MoH

in accomplishing its mandate to the health population. In addition, the MoH set standard operating policies and procedures, for example, HSSP II, EHP and National Health Indicators book to strengthen data use in healthcare services delivery at the district level. At the district level, DHSS is the holder of power who ensures MoH standard operating policies and procedures are guiding healthcare services delivery. The study found that while it was expected that healthcare staff use stipulated standard operating policies and procedures, some healthcare staff rarely recognised the need to use such policies and procedures in the execution of healthcare services. Consequently, the effectiveness of the stipulated standard operating policies and procedures was reduced in the circumstances where healthcare staff chose not to consult relevant stipulated standard operating policies and procedures as required in the execution of healthcare services. Reference to standard operating policies and procedures strengthens informed data use decision-making. Informed data use decision-making results in actions for improved interventions that meet real health population expectations. Ultimately, such results contribute towards effective, efficient, and equitable healthcare service delivery. On the contrary, a lack of healthcare staff reference to relevant stipulated standard operating policies and procedures in the execution of healthcare services leads to a lack of data use in decision-making. Lack of data use decision-making oftentimes results in unplanned healthcare services delivery which rarely satisfy the needs of the health population. Therefore, unplanned healthcare service delivery results in ineffectiveness, inefficiencies, and inequitable healthcare service delivery.

The study argues for MoH's consistent encouragement of DHOs to instil the use of stipulated standard operating policies and procedures in healthcare services delivery across health facilities from the district to the community level. This can be achieved through MoH's supportive and strong organisational leadership in conducting consistent supervision of the DHOs. The MoH presence at DHOs through supportive supervision motivates healthcare staff's use of relevant policies and procedures [13,16]. In turn, the DHOs must motivate healthcare staff to use policies and procedures in the execution of healthcare service duties through the provision of supportive supervision to the health facilities across the districts. Not only will supportive supervision encourage the use of policies and procedures in strengthening healthcare staff data use in informed decision making but also the healthcare staff becomes a critical resource for enabling data use effectiveness in healthcare services delivery [13,16].

While DHOs' provision of consistent supportive supervision at the community level is necessary for the healthcare managers at the DHO to collaborate with community healthcare staff, supportive supervision provides an opportunity to identify challenges and opportunities existing in the health population community. The challenges identified are compiled into data reports for informed data use in addressing the community health population's needs through the delivery of appropriate healthcare interventions. However, the identification of challenges to be addressed at the community level requires strong community-level organisational structures that are trained, well-oriented, and equipped with capacity built to support relevant healthcare activities [13,14]. Capacity building of community-level organisational structures requires resources and hence, some DHOs had weak community-level organisational structures due to resource constraints. The study argues that DHOs with weak community-level organisational structures should learn how DHOs with strong community-level organisational structures leverage the available scarce and critical resources for capacity building of such structures. Not only do strong community-level organisational structures facilitate effective data collection but also provide data that reflects reality at the community level for informed data use decision-making at the

DHOs. Effective data collection requires supervision which cannot be conducted without supportive healthcare partner organisations' funding. Yet, the absence of supportive funding from healthcare partner organisations in most DHOs weakens the effectiveness of the DHOs' data use mechanism.

The study found that DHSSs in DHOs used invested authority and power to recruit PMs. The DHSS of one DHO initiated a data use change process through the recruited PMs who acted as a bridge between the DHMT and the community level. Whereas sustainability of the DHSS' individually initiated change process was not yet assured at the time of data collection, at least these PMs ensured that consistent data reports were submitted to DHMT as received from the health facilities for effective data use in performance assessment reviews. Based on such informed data use reviews, healthcare managers were able to make informed decisions either to enact or restrain actions for improved healthcare service delivery.

However, the study found that while this particular DHO was progressively establishing a data use routine enabled by the PMs under the authority of the current DHSS, most DHOs' data use was restrained due to inadequate resources, consequently affecting some DHOs' selected health facilities' whose data reporting and timeliness rates were low. For the DHOs with improved data reporting rate and timeliness, the improvement was attributed to healthcare partner organisations' supportive data collection funding across the districts. Meanwhile, DHOs' dependence on healthcare partner organisations' supported data collection funding compromises DHOs' authority and effectiveness in the coordination of healthcare partner organisations' service delivery. For instance, some DHOs prioritised the funding healthcare partner organisations' data reporting requirements, foregoing the necessary routine MoH standard datasets, indicators, and elements data reporting requirements. In such cases, it becomes a challenge for some DHOs to control a healthcare partner organisation which is providing supportive funding for healthcare activities.

Further, DHOs' control of multiple healthcare partner organisations poses a challenge due to excessive inter-organisational data flows. The DHOs received excessive data flows in the form of data reports emanating from inter-organisational programme activities. Most of these data reports were captured in DHIS2 from which specific health programme aggregate data reports were disseminated for multiple healthcare organisations that use such data to inform healthcare planning and management [22, 20]. The study findings reveal that DHIS2 was yielding the expected benefits of its implementation [6]. Regardless of the semi-automated data collection, the benefits of DHIS2 implementation in Malawi HMIS were realised when data reports provided DHOs with the needed data use support, that helped in identifying healthcare services delivery gaps to the health population across the districts. However, performance assessment data reviews with the multiple stakeholders at the DHO necessitate a well-articulated strategy to ensure proper coordination and collaboration of shared activities and data use across the district.

One DHO used the MoH-recommended healthcare partner organisations' mapping data template with well-articulated partnership collaborations, not only in shared activities but also in data use across the district [18]. Not only was the DHO partnership with each healthcare partner organisation sealed by signing a Memorandum of Understanding (MoU) but the healthcare organisation was also attached to a PM who coordinated shared healthcare activities delivery in the specific areas of the district and shared data use in the activities. Moreover, the MoU served as a reference point for informed data use to confirm agreed activities. In addition, the MoU served as an affirmation of the healthcare partner organisation's

commitment to funding a specific programme for a sustainable period. However, other DHOs in the selected sample were still struggling to bring healthcare partner organisations' mapping data together for informed data use coordination, which in essence, restrained effective data use.

The study argues for a well-articulated definition of the DHOs' policy guidance from the MoH to bring healthcare partner organisations' mapping data together for informed data use in coordination and collaboration of shared activities and data reporting. While MoH has clearly stated its organisational vision and goals, strong and supportive organisational leadership is crucial. MoH's commitment to quarterly supervision visits motivates DHSS at the DHOs. In turn, the DHOs provide supportive leadership in strengthening community-level organisation structures where data is collected. The DHSS recruited PMs who act as a bridge between DHO and the community level, and are a critical resource, enabling data use effectiveness in decision-making for planning and management at the DHO [13,16]. Besides, PMs' collaboration with healthcare partner organisations who have technical expertise and resources to fund shared healthcare activities is an effective data use strategy [13]. While shared technical expertise and resources ensure the availability of functional information management systems that encourage data use, shared technical expertise and resources afford healthcare staff continuous professional human capacity development in knowledge and skills for data collection, analysis, interpretation and data use [13,14]. In addition, DHOs should invest in building supportive structures which include defined strong supportive strategic leadership of DHSS which is not only for the long-term but also sustaining data use effectiveness. Besides, collaborations in shared activities and data use coupled with a data-driven improvement process plan for sustainable relationships with each healthcare partner organisation, are key to data use effectiveness [17,18].

5. Conclusion

The paper sought to address the question 'How are institutional dynamics shaping data use in health management at the district level in Malawi HMIS?' The study findings have demonstrated that institutional dynamics' mechanisms shaping data use in health management at the district level are 1) DHOs regulations and policy 2) organisational structures and partnership patterns 3) data management and data use, and 4) DHO collaboration with healthcare partner organisations in shared activities. These mechanisms provide an organisational context in which health managers' efforts deal rationally with constraints and uncertainty, resulting in a change process of established data use. The paper details how the definition of PMs' norms, roles, behaviours, and interorganisational interactive patterns, initiated a change process that led to improved data use. The findings imply that, despite inadequate resources, one DHO out of the four selected DHOs' DHSS utilised invested power and authority from MoH to recruit PMs who acted as a bridge between the DHO and the community level. The PMs ensured that data was collected from the organisation structures at the community level and hence, PMs became a critical resource enabling timely DHMT performance assessment data reviews at the DHO. DHMT performance assessment data reviews facilitated informed data use decision-making in planning and management of healthcare services delivery to the district health population. However, the study argues for a well-articulated definition of the DHOs' policy guidance from MoH to bring healthcare partner organisations' mapping data templates together for collaboration and coordination of shared activities and informed data use in healthcare services delivery to the district health population.

One of the study's limitations is that it was not possible to cover all the twenty-eight districts in Malawi, as this would require more resources and time than were available. Notwithstanding this

limitation, the findings of this study can form a foundation for those intending to carry out further studies on how institutional dynamics are shaping health management's efforts on data use at the district level in Malawi's HMIS. The study recommends that further studies should cover more districts and health facilities for a deeper understanding of existing institutional dynamics. Besides, further study to interrogate how institutional dynamics are shaping the health management efforts on data use at the district level will be essential for the improvement of Malawi's HMIS data use.

6. Declarations

6.1 Conflict of Interest Statement

The authors have no conflict of interests to declare.

6.2 Funding Disclosure

Research funding was received from The University of Oslo and University of Malawi joint project under the NORPART-DEDICATED (Developing EDucation with Input from CoordinATED research students) Programme..

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