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Analysis of Data Dissemination and Use Practices in the Health Sector in Tanzania: Results of desk review and interviews with key stakeholders

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Background and Purpose: In this qualitative study, the Tanzanian Ministry of Health, Community Development, Gender, Children and Elderly (MoHCDGEC) used the Tanzania eHealth Strategy Framework to develop a draft of the national Data Dissemination and Use (DDU) strategy. The DDU strategy promotes dissemination and better use of health information to drive effective and evidence-based decision-making.

Methods: A desk review of national health-related protocols, standard operating procedures (SOPs), and other relevant policy, planning, and budget documents related to DDU and key informant interviews were conducted to develop the draft of the national DDU strategy. The aim was to gather information regarding guidelines for data collection, data management, data analysis, and data dissemination and use. Key informant interviews were conducted at the national, regional, district, health facility levels and in the community, targeting health decision-makers at those levels in the public and private sectors, and technical assistance experts and implementing partners. A semi structured interview guide was used during the interviews that provided an understanding of norms and practices in DDU, including implementation of protocols and SOPs and human capacity in implementing DDU across a range of health officials and workers to examine these DDU in different contexts in the health care system.

Results: The analysis was guided by the eight themes, which were identified during data collection and initial qualitative analysis and these eight themes were used in developing the DDU strategy strategic objectives. There is a large quantity of data being generated within the Tanzania health system from the public and private sectors. However, significant challenges exist regarding DDU in the health sector in Tanzania; human, technical, organizational, and behavioural factors affect data quality, which in turn limits DDU. There is also the lack of a national legal framework on health DDU. There is minimal use of data for decision-making, particularly at the level of the health facility. Dissemination of data is mainly used to support the upper levels of the health system, with minimal use in the primary facilities where it is generated.

Conclusions: The development of a draft of the national DDU strategy faces significant challenges. There is a need to engage data users and data producers to improve quality; increase availability (access, synthesis, and communication); build capacity in data use core competencies; and strengthen data demand and use infrastructure. The government of Tanzania needs to invest adequate resources in DDU and promote a culture of data use for decision-making.

Keywords: Data dissemination and use (DDU), data demand, data analysis, data use

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1   Introduction

Availability, dissemination, and usage of accurate, reliable, timely, and relevant health information is fundamental for informed public health action and effective management of health resources [1]. In Tanzania, however, data collection and use do not always take place at all levels of the health system [2]. This is mainly due to inadequate systems, processes, knowledge, and skills [3]. Health data are not always readily available to be used by Tanzania's routine Health Management Information System (HMIS) [3].

Overall, the situation with regard to health information in Tanzania, as described in these and other reports, is of a considerable amount of data that potentially are available from routine data collection and from population surveys and research, but access to reliable, timely, complete, and useful information has continued to be poor [3]. As a result, use of information for decision-making has been limited, and parallel but uncoordinated systems of data collection have been set up to meet specific needs. This has resulted in the need for further integration of the programs and systems into a broader health-sector data warehouse as a central source of information. The development of a health-sector data warehouse seeks to improve the collection, dissemination, and use of health data and to ensure that data are collected only once but are used many times [4]. The data collected routinely through the HMIS are widely regarded by stakeholders as unreliable and cannot be depended on for effective planning [2]. As a result, the health sector lacks the culture of information use for evidence-based decision-making (EBDM) at different levels—especially at the level of facilities, which are the primary sources of data.

In 2011, the Monitoring and Evaluation (M&E) Strengthening Initiative (MESI) was divided into eight work streams, one of which focused on Data Dissemination and Use (DDU) to ensure that the Tanzanian health sector has a culture that demands quality information at all levels to facilitate EBDM, transparency, and accountability to improve continuously quality of care and health services delivery. The Ministry of Health, Community Development, Gender, Children and Elderly (MoHCDGEC) initiated the DDU strategy development process to contribute to the objectives within the Health Sector Strategic Plan (HSSP III) and the National Strategy for Growth and Reduction of Poverty (NSGRP) and align with MESI, the eHealth Strategy Framework, and other health-sector programs and plans [5,6,7]. The strategic goal of the DDU strategy initiative is improved, promoted, and sustained dissemination, analysis, interpretation, and use of data for EBDM across the health sector that enables stakeholders, including policymakers, to optimize health-care services and coverage and to improve quality and, ultimately, health status and outcomes.

In 2013, MESI published the three core DDU objectives: (1) ensure regular detailed analysis and interpretation of existing data using best international practices, (2) improve data dissemination, and (3) institutionalize data use and EBDM within routine work practices, processes, and work culture throughout the health sector. We undertook analysis of data generation, dissemination, and use to provide information to be used in the development of the DDU strategy in Tanzania. This information is needed to comprehensively improve data-informed decision-making in the health sector in Tanzania.

Table 1. Eight themes that were used in the interviews with key stakeholders

Theme 1: Data generated within the health system at all levels
Theme 2: Current status of data quality (data collection, review, aggregation, entry, management, analysis and reporting)
Theme 3: Data Use to inform planning/policy decision and health service improvement
Theme 4: Current practices for data dissemination
Theme 5: Gathering and using feedback
Theme 6: Available human capacity for Data Dissemination and Use at all levels
Theme 7: Monitoring and reporting on Data Dissemination and Use at all level
Theme 8: The current legal and policy framework including guidelines and protocols

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2   Materials and methods

This paper provides analysis of the results of key informant interviews and the desk review report, which will inform the development of the draft DDU strategy. The analysis was based on using eight themes (Table 1) and the subthemes that emerged from the structured interview guide. This was done along with identifying strengths, weaknesses, opportunities and threats (SWOTs) in Tanzania. This analysis and the results from the desk review were combined into an overall set of findings and recommendations to be used to inform the draft DDU strategy. The DDU methods are completely described in the DDU methods 'Design of an Assessment Methodology to inform the Strategy [8].

2.1   Desk review

A desk review was conducted to provide information regarding the current technical, human, and institutional resources for DDU, content of technical guidelines for data analysis and DDU of national health-related protocols, standard operating procedures (SOPs), and other relevant policy, planning, and budget documents related to DDU. Specific questions that needed to be answered included the following:

1. What are the current legal and policy provisions, as well as guidelines and standards for dissemination and use of health data in Tanzania, including paper and electronic data, at national and other levels?
2. What main data are currently being generated at all levels of the health system in Tanzania?
3. What are the current legal and policy provisions as well as guidelines for DDU?
4. What main Strengths, Weaknesses, Opportunities, and Threats (SWOT) do you note in disseminating and using health data at your level of the health system?
5. Is there a national framework for dissemination and receiving feedback on quality health data?

2.2   Study settings and key informant interviews

A qualitative set of stakeholder interviews was conducted in various parts of Tanzania to assess the current practices in DDU. Purposive sampling was used to recruit key informants to be interviewed at all health system levels, and a total of 97 interviews (of planned 97) were conducted in Swahili [8]. We have published details on the design and implementation of this study [8]. At the central level, the key informant interviews involved MoHCDGEC units and departments and national stakeholders, the Tanzania Commission for AIDS, the National Bureau of Statistics, and academic and research institutions. At the regional level, two regions were selected for the purpose: Kilimanjaro, and the Coast region. The Coast region was selected because MoHCDGEC had already trained and rolled out the District Health Information System 2 (DHIS2) to the councils within this region so they had more experience with the improved HMIS. The Kilimanjaro region was selected because DHIS2 had not been rolled out to the councils in this region. Within each region, two districts were selected: the Mkuranga and Bagamoyo districts in the Coast region, and the Hai and Rombo districts in Kilimanjaro. The two districts in the Coast region were chosen because of the experience and knowledge gained by stakeholders in these districts in working with MESI in the national rollout of the improved HIMS (better known by its Kiswahili acronym, MTUHA) Version 3.0. In Kilimanjaro, the Hai and Rombo districts were selected as typical of more rural areas of Tanzania, with current practices and challenges in data collection, management, and use.

2.3   Data analysis

Data analysis was guided by the eight themes (and their subthemes), which were identified during data collection and initial qualitative analysis. Analysis involved the process of identifying codes and assigning texts to specific codes in the transcripts. Analysis was performed by the DDU assessment team iteratively during a 5-day workshop, with manual coding of data. Coded data were matched with specific themes and used to create sub themes. There was no intention to characterize site differences in the analysis. A few quotations were selected to illustrate key messages conveyed in each of the main themes and subthemes. New subthemes emerged during the process of analysis. The desk review was used to

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provide additional context for the themes and subthemes. Findings presented here represent the eight main themes that guided this study.

3   Results

3.1   Data generated within the health system (data available and missing data)

Stakeholders associated with health data mentioned different types of data they generated. The data-generating sources in health in Tanzania consist of routine systems (HMIS, demographic and disease surveillance) and non-routine systems (household surveys, research). However, others admitted to not generating data but rather receiving and using data from other departments. From this study, we found out that at least every department deals with data at some point in time. As it emerges from interviewing with one key informant, Dispensary in the Rombo District:

We do collect data from other sources, mainly by nurses of different sections. The nurse officer collects data about prevention of mother-to-child transmission (PMTCT) of HIV infection; a nurse assistant collects data about MCH [maternal and child health], and a clinical officer collects data about OPD [outpatient department]. After collection, we sit together to review data and make corrections or changes, if needed, before sending it to the next level.

Another important part of the study was looking at the missing data. Respondents discussed, at length, the issue of data that were supposed to be collected and made available but that were missing. One key informant commented, from Kibaha District.

Data that I have on HIV presents the picture of the prevalence of the disease but it does not give information about ARV uptake
.
The missing data mentioned included the following: Provider-Initiated Testing and Counseling for HIV infection, information on street children and those most at risk, data on HIV drug resistance, infant feeding, and antiretroviral uptake. For Vital Registration, the role of MoHCDGEC is not clearly stipulated, despite the fact that health facilities are involved in recording events like births and deaths. While some were able to mention data that are missing at the moment, most of the respondents alleged that the current system of data collection is sufficient and collects all the important data.

3.2   Data format

Respondents discussed in depth the format of the generated data and were able to mention the format that they prefer most. From the discussion, it was seen that most of the data generated on a daily basis were summarized and presented in tables and narratives. From the interviews conducted, it appeared that most of the respondents preferred tables (and, sometimes, graphs and short narrations) to make it easy for the reader to understand. Another participant insisted that it is not their preference that dictates the format of the data reporting but that sometimes it should suit the requirements of the consumers and nature of data to be reported. One key informant commented, from Muhimbili Hospital
Daily reports and data are normally generated in tables except the yearly report, which is prepared and presented in graphs and I prefer tables and graphs because they are all important
We found out that most data are presented as tables and graphs, but most health workers, especially at lower levels of the health system, face significant challenges in understanding and interpretation, thus limiting the data's use.

3.3   Inclusion of data from different sources

Generally, most of the respondents said they incorporated data from different sources mentioning different departments or sections within the same health facility. Others, especially those at the district and regional levels, include data from lower levels of the health system like health centers and

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dispensaries (both public and private). Other respondents said they normally receive data from all facilities and levels because they are at the national level. Those working at the lower levels of the health sector said they do not receive data from other sources rather than their department's data, as noted in this testimony from the Mawenzi District:

> *Yes, the data we collect we also get from private implementers for example on HIV/AIDS testing and counseling we have several NGOs working as partners. We include it on our data; it is easy because we give them the tools for data collection. This makes joining the data easy, they use standard tools. The data is reliable.*

3.4   Management of data generated

Another area that emerged was data management. Data Management includes data collection (paper and electronic), access, storage, archival and deletion. Specifically, who is actually responsible for data management? It was evident from the interviews conducted that, in most cases, the leader/person in-charge of the section or department is the one responsible for data management of that section or department. It was also noted that for research institutions, the principal investigator is responsible, while at the district and regional levels the health secretaries are responsible for data management. One key informant commented, from Mawenzi Hospital commented

> *In district and regional level health secretary is responsible for managing health data to make sure that all data are correctly filled and collected.*

We found significant variations. In some cases, it is the person in charge who usually is responsible for data management; in other cases, some sit and review data before circulating. In other cases, it was mentioned that everyone handling data should be responsible for proper data management. One key informant from a dispensary in Rombo District commented

> *As a clinical officer and in charge of the dispensary, I am the one who is responsible for managing health data and also responsible for data reporting. I store the data and submit to DMO on a quarterly basis.*

3.5   Challenges on health data accessibility

We found significant challenges with regard to accessing data. The most commonly mentioned challenges include lack of communication between centers and departments; high frequency of changing data collection tools; submission of incorrect data; incorrect copying and pasting of data from previous reports; lack of enough skilled personnel to deal with data collection, analysis, and report writing; HMIS/MTUHA books do not have some columns to fill in some data; lack of enough MTUHA books for data collection; lack of funds for quality data collection; and, last but not least, the lack of a special organ that controls data in the country. A frequently mentioned challenge was to do with quality and reliability of the data generated as well as financial difficulties hampering data collection and dissemination. Following are some of the quotes from respondents on access to data:

- *The process of collecting data is expensive—it needs a lot of money and resources. (Mawenzi District)*
- *Insufficient working tools; for instance, the government has stopped providing the guidebooks, hence making other centers to work in difficult environments. Lack of experience from the new staff hence are affecting quality of the data. (Rombo District)*
- *Still technologically is a big challenge because for data to reach [the] required destination on time, the assumption we use is that such [a] person in the office has a computer, he is computer literate and has internet access and is skilled in internet use. These are assumption[s] that we use, but you may call someone and find he has to find a third party to help him before he can reach you. (Pwani Region)*
- *There is need of transport to the remote areas to enable health providers [to] submit [the] report in time as it is supposed to be. (Kibaha District)*

Recommendations for improvement were mentioned, and these included the need to improve communication to allow easy data and report transfer from remote areas, provision of adequate tools by MoHCDGEC, and training of additional staff to increase skills on data handling. It was further suggested

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that whenever the MoHCDGEC plans to introduce a new system, it should involve data users from initial planning stages in order to incorporate views from different stakeholders.

3.6   The current status on data quality

We found the quality of data to be a very big challenge for most respondents. There are significant variations in understanding of importance of quality data and what this means. In some facilities, data are double checked before they are disseminated to the next level. In many cases, however, this is not the case. Some facilities hold meetings to review data and implement data cleaning, while others do not. In most cases, there is no identification of who is responsible for data collection, thus making it difficult to identify the person who can verify or make clarification in case of questions. As summed up by one health worker,

> You cannot even think that we have quality data or [that] we produce quality data because the issue of data is facing a lot of challenges, and nobody seems to take care about that. (Hai District)

Another important area that emerged was the qualifications of data managers in the health facilities or departments. Participants revealed that, in most cases, those who are given this important task possess qualifications other than those required (e.g., doctors, nurses, fourth form graduates, head of departments, information technology personnel). Some respondents said their data managers had the requisite qualifications. Two key informants commented

> People who are involved in data collection are the least trained and sometimes we don't use skilled people because it is expensive (Medical Stores Department)
> No one here is employed specifically for data. The RH incharge is responsible for data although she has other responsibilities. Her education level is first digree in nursing (Hai District)

Respondents said that nothing much was being done to ensure data quality and that this was one of the reasons for such poor-quality data. It is important to note that most of the respondents said they double-checked the data before disseminating. Some even reported going back to the sources to verify the data's authenticity. Another quality-improvement strategy involved is writing the name and contact information of data collectors so that whenever there was a problem or an inconsistency, staff could quickly contact the person to verify the data. In other instances, quality checks were done through meetings to verify the correctness of the data at hand, and other staff does data cleaning and sorting to eliminate discrepancies. Many respondents said that additional training is needed and that there should be more incentives for staff.

3.7   Data usage including policy and decision-making

In addition to using data to improve health services offered, data were also used for decision-making purposes, preparing work plans, policies and SOPs, and guidelines. In addition, data can be used in developing strategic plans and ordering of medical equipment and supplies at the right times and in the right amounts. Some reported that they did not use data collected at their facilities because of the lack of knowledge on data interpretations.

The use of data for policy and decision-making is very limited, especially in the lower level health facilities, due to limited knowledge on interpretation and use. In some cases, health workers indicated that reports are written in scientific language, so they cannot easily understand the reports. We also found out that donor funds specific data collection, and reporting and the government do not use these reports. Further, we noted that there is no forum for policymakers and researchers to share and discuss data issues. It was reported that the major conference for data dissemination is normally done once per year and that it involves policymakers, journalists, and researchers, but there is very little focus on policymakers. Regarding the benefits of sharing reports and the reasons as to why they do share reports, participants maintained that it improves their working environment because they can get feedback from others, that sometimes they get solutions of their problems from the experiences of others, that it helps learn new things, and that it is just because it is their responsibility to share or disseminate the report. We further

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noted that private hospitals do not share their learning in DDU practices with the district and that there is no policy on data dissemination available:

- *I don't use any data that are collected at the dispensary. I don't have the knowledge on data interpretation and use. What I know is to request the kind of medicine needed at the dispensary in case there is a shortage or in case of an outbreak such [as] cholera. (Kilimanjaro District)*
- *Policymakers are saying they cannot use our data because they are prepared in the scientific language not understandable to them. (National Institute for Medical Research)*

When responding on how to improve data usage, most of the staff recommended an increase in training for the health care providers on the data collection, analysis, and decision-making. They also recommended that health facilities like the Muhimbili Hospital should not work in isolation because they can share a lot of their health data practices with other facilities.

Data dissemination poses many challenges. In the interviews that were conducted in various places of the Tanzania mainland, this was another important area, and respondents stipulated a number of challenges that exist, including the lack of enough funds for data dissemination; poor feedback from upper-level staff, which demoralizes staff engaged in the data collection process; a smaller number of staff members to handle the workload; unqualified staff; and not having specific policy guidelines on data dissemination.

Regarding recommendations on report dissemination, stakeholders gave different views, which included use of an electronic data dissemination system, an increase in the number of trained personnel on data management, the development of an organ that will deal with data management, making the tools necessary for data collection available at all times, increasing funds in the departments responsible for data, and developing a stronger system of feedback.

3.8 Feedback

Most of the participants said they do not receive feedback; some, however, said they do receive feedback. Those participants who do receive feedback are mostly those who are working in the nongovernmental organizations (NGOs), but those from the government institutions say they either receive very minimal feedback or no feedback at all. While many confirmed that they did not receive any feedback, some of them alleged that they have received feedback and some gave examples on how they used that feedback.

Regarding the format in which the feedback is given, most of the respondents indicated it is through letters and reports. Nevertheless, these letters or reports were normally transferred using e-mails, meetings with stakeholders, workshops, or through telephone conversations.

Most respondents reported that feedback is often delayed, so it is difficult to follow up on their mistakes, and there are not enough funds to facilitate a workable feedback mechanism because sometimes people have to travel from one place to another to provide feedback, so without means of transport it is difficult to do so. Also, there are issues of ways in which to give feedback; it seems most people do not know how to give feedback in a constructive manner. Finally, there often is not enough time for those at the upper level to read and understand the report so as to give feedback in a timely fashion.

Several respondents commented on the issue of providing more training to health care providers on the importance of giving and receiving feedback and the ways of giving and receiving feedback. Others pointed out the issue of developing a constructive feedback system, which will facilitate feedback giving, mentorship of people who give and receive feedback, and supportive supervision after giving feedback; with the creation of such a system, most people would take feedback positively. As one staff member noted,

When we disseminate our data, we need feedback on time so that we can know where we did [make a] mistake and make changes before the next report; when we don't get feedback seriously, we get very demoralized. (Hai District)

3.9 Availability of human resources for data dissemination and use

Most of the government health facilities do not have qualified personnel for dealing with data; health care providers without any qualifications always handle data. In some institutions, people who deal with data

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have only been trained for the short term but are not qualified for DDU; furthermore, institutions are often understaffed. Most of the respondents in private institutions, semi-autonomous government agencies, or NGOs, however, have qualified personnel to deal with data. The following comments reflect workers' views on these issues:

- *The department doesn't have any professional worker or trained person for data management. The work is being done by doctors and nurses in the departments who also have other responsibilities. (Muhimbili Hospital)*
- *Inadequate personnel in data collection centers make the data collection process inefficient and inaccurate as data tend to easily get mixed up or lost. (Rombo District)*

Most participants mentioned that more funding is needed to motivate people, provide training, and assist in the transportation of data. Others said there must be special personnel who deal with data alone, and training more people in the health facilities was mentioned as another strategy that could improve human capacity.

3.10   Legal and policy provisions for dissemination and use of health data in Tanzania

There is currently no national policy on data flow and information use, making it easy for parallel subsystems to be established, depending on the interests of involved parties. This apparent lack of guiding policies necessitates the need for MoHCDGEC to develop such a policy and a corresponding national strategy for the Health Information System through the development of the DDU strategy.

3.11   Combining Desk Review and Qualitative Results

Using the information gathered in the desk review and the qualitative interviews, we found several key SWOTs of the current Tanzanian use and availability of health information, as summarized in Table 2.

Table 2. Strength, weaknesses, opportunities and threats (SWOTs) of the use and availability of health information in Tanzania

	STRENGTHS	WEAKNESSES
INTERNAL FACTORS	△ The government recognizes the value of sound health information system and is backing this up with appropriate financial and staff investment. △ Existence of an established structure that allows for the efficient flow of data from service delivery sites through the districts and regions to the national level. △ MoHCDGEC and PMORALG collaborate with multiple development partners under the SWAp structure and the M&E TWG △ MESI focus on data dissemination and use at every level of health services delivery △ Improved availability, and completeness of data	△ There is no national policy on data ownership, flow, dissemination and information use, making it easy for parallel subsystems to be established. △ Lack of coordination and sharing of data among electronic systems. △ Fragmentation in the collection and reporting of health information caused by strong vertical programs running their own reporting systems. △ Health research is often funded by donors and may not be a national priority. △ Lack of integrated framework, such as a data warehouse/repository, whereby data across data sources and types can be analyzed and correlated. △ Inconsistency between the data collected and the information required to support decision-making processes. △ The Supportive Supervision procedures are not formalized and feedback of supervision

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		△ visits are either done or not available for easy access
		△ Lack of mechanism to ensure that communities have access to data/reports
		△ No motivation scheme for staff involved in ensuring the quality and timeliness of data collection and reporting.
		△ Insufficient number of staff and inadequate skills for HMIS at all levels.
		△ Data are not analyzed, organized or presented in a user-friendly way.
		△ Recording and reporting tools (HMIS tools) do not have sufficient space to record data correctly and have challenges for hospitals to use
		△ Frequent shortage of data collection and reporting tools at facilities
EXTERNAL FACTORS	**OPPORTUNITIES**	**THREATS**
	△ Presence of partners who are willing to fund and collaborate with the MoHCDGEC in strengthening M&E △ Integration of health information systems △ Access to best practices and tools internationally (eHealth Strategy 2013-2018)	△ Sustainability of funding △ Conflicting donor DDU requirements

4   Discussion

This is the first study, in Tanzania, to interview a broad group of stakeholders about DDU after the national HMIS has been revised and DHIS rolled out in some regions. We gathered information covering regions using DHIS and regions that were not yet trained on DHIS. The in-depth analysis of data generation, analysis, dissemination, and use in the health sector in Tanzania provides valuable information to be used in the development of the health-sector DDU strategy, which is under review. This analysis was conducted based on data collected during the period from 2012 and 2013, before DHIS2 had been rolled out nationally. During the period from 2011 to 2014, MoHCDGEC strengthened the HMIS and introduced DHIS2, used at the district level for entering HMIS summary information monthly. MoHCDGEC reported an overall national form completeness rate of 95.7% and on-time rate of 90.3% [11] for July–September 2015 for the main HMIS reporting forms, which has improved from the October–December 2013 reporting rate of 67.9% (first quarter, with all 25 regions reporting) [12]. With the improvements in HMIS routine data collection and reporting, there is still a need to develop the culture of information use more broadly for EBDM at all levels of the health sector.

At the time we conducted this study, we found out that there is a large quantity of data being generated within the health system, both from the public and private sectors. However, there were a number of challenges associated with analysis, dissemination, and use of the data for EBDM in Tanzania. These included data quality, data transmission, and lack of feedback, limited resources, lack of national policy and a culture that does not support information sharing.

The quality of data is highly variable due to the lack of trained data handlers, the complexity of the data collection tools, and the inability to aggregate and appropriately transform data into usable reports and guidance. We found variations in the ways in which data are transmitted to the next level of the health sector, which may cause delays. In rural facilities that are difficult to reach, data often reach the district level beyond the set deadlines. Many facilities lack computers and reports are paper based,

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hindering electronic transmission to the next level. Furthermore, specific and comprehensive guidance to improve data demand and use is lacking.

We found low motivation among staff, not only due to low pay but also due to limited feedback and lack of recognition of their efforts. In addition, a lack of trust between health care personnel was mentioned as one of the big challenges in data supervision and monitoring. The unwillingness among some office bearers to share reports with other facilities limits the scope of peer learning. There is no national policy on data flow and information use, making it easy for parallel subsystems to be established. It is anticipated that this work will assist in developing such a policy during the development of the DDU strategy.

We found human resources to be inadequate both in numbers and skills. Frequently, many health care workers have other multiple tasks, and data are given very low priority. We recommend recruitment and training of staff to give them necessary competencies and skills in data analysis, interpretation, synthesis, and presentation.

What we learned during our research is that the assessment of organizational, technical, and behavioral factors that affect decision-making is necessary to diagnose where to intervene with activities to improve demand for and use of data. Any successful DDU strategy needs to take local factors into full consideration.

Accordingly, the outputs from this research were used to guide the development of the draft DDU strategy, which takes into account these issues and addresses them. The broader M&E SI II (2015-2020) team used the draft DDU strategy to identify priority DDU activities that were included in M&E SI II and the Health Sector Strategic Plan IV (2015-2020). In the HSSP IV period, major developments are expected using Information and Communication Technology (ICT), including web-based and mobile data transmission, that address the high- priority needs of the health sector to improve efficiency and effectiveness (e.g. DHIS-2, LMIS, HRIS, PlanRep). The linked health information systems will constitute the National Health Information System.

A key finding is that for consistent data use to occur, data need to be of high quality so that data users are confident that the data they are consulting are accurate, complete, and timely. Without quality data, demand for data drops, data-informed decision-making cannot occur, and program efficiency and effectiveness will suffer [9,10]. Data quality protocols need to be developed, communicated, and implemented, and training and retraining of health professionals on data quality techniques and approaches need to be instituted.

Finally, following the review of the current DDU practices, the development of a health-sector strategy for DDU in Tanzania has occurred and this will guide DDU activities in the country for at least the coming 5 years, and is integrated into the HSSP IV. One activity included in the MESI 2009–2015 strategy was the development of profiles at the regional, district, and facility levels. During MESI, MoHCDGEC supported the development of the District Health Profile (DHP) and worked with 36 districts to create their DHP. Upgrading of the DHP template to regional-level health profile template so that each region has data from all its districts for use in its planning should follow this. Finally, a national-level health profile template should be developed, which will assist national-level organizations with developing their annual health reports for dissemination in the Joint Annual Health Sector Review. The national-level template should include more details than the district-level template so as to address issues of data quality and the help plan the way forward. Fortunately, DDU activities have been included in HSSP IV to be used at a high level to inform activities in the broader health sector.

In conclusion, the DDU in the health sector in Tanzania faces significant challenges. In order to maximize the use of data, there is a need to engage data users and data producers to improve quality; widen availability (access, synthesis, and communication); build capacity in data use core competencies; and strengthen data demand and use infrastructure. The government of Tanzania should consider continuing to invest adequate resources in data management and use and to inculcate the culture of data use for decision-making at all levels in the health sector.

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Statement on conflicts of interest

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