WORKING PAPER

Creating a Culture of Data Use in Tanzania

Assessing Health Providers' Capacity to Analyze and Use Family Planning Data

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MEASURE Evaluation

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July 2019

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CONTENTS

TABLES

ABBREVIATIONS

ARV	antiretroviral
CHMT	council health management team
CPR	contraceptive prevalence rate
CTC	care and treatment clinic
CC	city council
DC	district council
DMO	district medical officer
DRCHCo	district reproductive and child health coordinator
FFARS	Facility Financial Accounting and Reporting System
FGD	focus group discussion
FP	family planning
HMIS	health management information system
IDI	in-depth interview
LGA	local government authority
MC	municipal council
MOH	ministry of health
MOHSW	Ministry of Health, Community Development, Gender, Elderly and Children (Tanzania)
MTUHA	Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya (Operating Information System for Health Services)
NBS	national bureau of statistics
OCGS	office of chief government statistician
OPD	outpatient department
PlanRep	Planning, Budgeting and Reporting (Tanzania's system)
PPP	public-private partnership
RCH	reproductive and child health

EXECUTIVE SUMMARY

Background: Tanzania has embarked on extensive health planning reforms that require all districts and selected health facilities to collect, process, analyze, and use data for informed decision making. To support these reforms, the Government of Tanzania, in collaboration with development partners, has invested heavily in strengthening its health management information system (HMIS) and connecting all local government authorities (LGAs) to DHIS 2, a web-based software for analyzing, reporting, and disseminating data for health programs. However, data quality issues continue to affect the planning process. The information used in priority setting for family planning (FP) and maternal and child health is incomplete or inaccurate (Chitama, et al., 2011), and staff capacity to analyze and set priorities is questionable. The main study objectives were to understand health providers' capacity to analyze collected FP data and to document available evidence of health service providers using the collected data in their planning processes.

Methods: The study employed a qualitative design to understand FP providers' experiences with analyzing and using FP data for decision making. Thirteen in-depth interviews (IDIs) and eight focus group discussions (FGDs) were conducted with facility in-charges, reproductive and child health (RCH) in-charges, data clerks, and FP facility-based providers. Nonparticipant observation was conducted in 12 health facilities in the FP service delivery room, in the offices of the health facility in-charge and RCH in-charge, and in other areas of the facility to identify evidence of data analysis. The study sites were located in the Arusha, Lindi, and Geita Regions of Tanzania.

Results: The study revealed mixed results regarding health providers' capacity to analyze and use FP data for decision making. For example, at two of the health facilities in Lindi and Geita Region, some of the study participants stated that they use the data they collect to evaluate the monthly services they provide, which helps them estimate what supplies and commodities are needed. In these facilities, several data analysis outputs were displayed on walls and noticeboards, providing evidence that the participants analyze the aggregated data and share those results with others. However, data quality assurance, particularly accuracy, was one of the major challenges in all the health facilities visited. This was attributed to excessive workload because of staff shortages and health providers not having enough time for data entry.

Most health workers (more than 73%) have insufficient skills for data analysis and computer use. Most of the health facilities have a weak culture of analyzing and using data in decision making. The study noted several factors that hamper health providers' capacity to analyze and use data in planning. These include lack of training on collecting, analyzing, presenting, and using data; poor or no Internet connectivity; and lack of equipment, such as computers, for data collection, analysis, and sharing. Health providers, particularly at lower-level health facilities, lacked Internet access, which limited their access to DHIS 2. Lack of data ownership led health providers to think that data cannot be used at the point of creation and that they should only concern themselves with data collection. They believed data generated at health facilities belongs to the council health management team (CHMT) and not the facilities, which explains why data analysis and use for decision-making are uncommon below the district level.

Recommendations: The government should prioritize capacity building programs for health professionals to strengthen their data skills. Frequent on-the-job and off-the-job trainings should be conducted in collaboration with other stakeholders such as the private sector, development partners, and nongovernmental organizations. This will gradually change the attitude of health providers towards data collection, analysis, and use in decision making and build a strong culture of data use for evidence-based planning. Joint efforts between the government and the private sector through public-private partnerships (PPPs) can help to address the challenge of shortage of equipment and Internet connectivity that enable data use and analysis.

INTRODUCTION

In Tanzania, all districts and selected health facilities, especially in Dar es Salaam Region, are required to collect, process, analyze, and use data for evidence-based decision making. The government and development partners have made significant investments to strengthen the country's HMIS (Karuri, Waiganjo, Daniel, & Manya, 2014). These investments include connecting all LGAs to DHIS 2—a web-based platform and powerful software for analyzing, reporting, and disseminating data for health programs. DHIS 2 and other specific program-based health information systems continue to generate information for decision making. Public health officials have been working through the process of rollout, implementation, use, analysis, interpretation, and visualization of data to inform national, regional, district, and facility health service delivery decisions, with the goal of improving health outcomes in the population.

Although DHIS 2 is used to aggregate routine service delivery data, financial data from public health facilities are captured in the Facility Financial Accounting and Reporting System (FFARS), which is under the Government of Tanzania's revamped Planning, Budgeting, and Reporting (PlanRep) System. Former versions of PlanRep were designed to prepare financial plans and budgets from the council level, which meant health facilities were not fully reflected in the system. The improved PlanRep, which is now accessible online, captures plans and budgets from the facility level to track budgets through expenditure allocations and service outputs. With the improved PlanRep, each service provider has the opportunity to monitor and evaluate their activities to ensure value for money and improve service delivery.

To provide high-quality FP services, health providers should be able to prepare good plans that are informed by quality data (Anasel, 2017). Multiple studies show that sound planning and management of health services depend largely on the availability of reliable, accurate, and timely data (Garner, Harpham, & Annett, 1992; Robey & Lee, 1990). In Tanzania, most health sector data, including FP data, are reported in the HMIS and other sources and imported into DHIS 2. When used properly, DHIS 2 provides feedback on facility performance at the facility, district, regional, and national levels (Lungo, 2008). DHIS 2 users can access baseline data for the health district planning process, track level of implementation, monitor major indicators of disease patterns, monitor routine and preventive services, and track physical resources (Karuri, et al., 2014).

However, there are practical problems with the amount and quality of information needed for prioritization during the planning processes. The information used in priority setting for FP and maternal and child health is inaccurate (Chitama, et al., 2011), and the capacity of staff to analyze and set priorities is questionable. This is supported by studies conducted outside Tanzania, such as Ham and Couter (2001) and Kapiriri and Martin (2007), which found that the priority setting process in developing countries is unpredictable and unclear owing to a lack of reliable information and weak institutional capacity in data analysis. Additionally, Tanzania's National Guidelines for Health Data Quality Assessment (Tanzania Ministry of Health, Community Development, Gender, Elderly and Children [MOHCDGEC], 2016) clearly state that despite health data improvements in Tanzania in the past 15 years, particularly after the introduction of DHIS 2, data quality audits conducted by a variety of programs and funders have highlighted concerns about the quality of the data collected through routine health information systems.

Study Objectives

The World Health Organization (2004) came up with a solution to improve the priority setting process by strengthening the capacity of health workers in service delivery. More than a decade later, our study sought to assess the capacity of health providers to analyze and use data for planning. The specific research objectives were to understand health providers' capacity to analyze collected FP data and to provide evidence showing that health service providers use the collected data in their planning processes.

METHODS

Study Setting

We chose three regions for the study to represent the 26 regions in mainland Tanzania: Lindi in the southwest, Geita in the northwest, and Arusha in the northeast. The regions were selected based on the contraceptive prevalence rate (CPR) data in the Tanzania Demographic and Health Survey (MOHSW, MOH, NBS, OCGS, & ICF International, 2016) which showed Lindi as the region with the highest CPR (52%) and Geita as the region with the lowest CPR (13%). Arusha was randomly selected among two other regions (Iringa and Rukwa), all with an average CPR (32%). The average was obtained by taking the highest CPR in the country, plus the lowest CPR, and dividing by two ([52 + 13] / 2 = 32.5).

Within each region, two LGAs were selected: Arusha City Council (CC) and Arusha District Council (DC) from Arusha; Lindi Municipal Council (MC) and Kilwa Masoko DC from Lindi; and Geita MC and Geita DC from Geita. Two public health centers were selected from each of the sampled LGAs. A total of 12 facilities participated in the study, and the sample of FP providers was drawn from these facilities.

Study Approach

To achieve our research objectives, a qualitative study design mixed with quantitative methods was performed to get the experiences of individual health service providers and groups of FP providers on how they analyze and use FP data. The data sources were the facility in-charges, RCH in-charges, data clerks, and FP facility-based providers in the selected facilities (Table 1). Facility observations were also conducted.

Data Collection

Three data collection teams were formed, each consisting of a maximum of two research assistants and one team leader. The team leader was responsible for data collection, supervising the team, and writing the field report; the research assistants were responsible for taking notes, taking photos, and transcribing the audio recorded IDIs and FGDs within 24 hours. Each team spent one day in each of the 12 facilities.

In-Depth Interview

We conducted IDIs with facility in-charges, RCH in-charges, data clerks, and FP facility-based providers to examine their capability in data analysis and how they use the FP data they collect. An interview guide was developed and translated into Swahili. During interviews, the researchers used different probes to gather relevant information from the interviewees. More probing was done when new insights emerged from a principal question. Because RCH in-charges and providers usually have tight schedules, prior appointments were made.

The researchers conducted interviews with at least four health providers in each LGA. The interviewees comprised one facility in-charge, one RCH in-charge, and at least two FP service providers or data clerks. However, in some facilities the RCH in-charges acted as the in-charge of the health facility and was also a provider. A total of 13 health providers were interviewed.

Focus Group Discussion

When three or more health providers were in the room, an FGD was conducted to get a group perspective. The thrust of the FGDs was to understand the health providers' capacity for data analysis and using data in the planning process. The interview guide was used for the FGDs. Two researchers were involved in conducting each of the eight FGDs with 24 participants total. One researcher moderated the discussion and the second researcher recorded all of the participants' behaviors in a

notebook, recorded audio, and drew a cobweb of the discussion flow. The moderator used probes to ensure the discussion flowed, and the FGD participants provided relevant information to address the research objectives. More probing was done when new issues or concepts emanated from the question not captured in the FGD guide.

Observation

Nonparticipant observation was conducted in all 12 health facilities in the FP service delivery room, offices of the health facility in-charge and RCH in-charge, and other areas of the facility. The observation protocol contained four criteria: content of displayed photos, displayed graphs and charts, displayed text, and table arrangements. Photos of displayed materials were taken for further analysis. The researchers asked who prepared the displayed material. When the displayed information was unclear, the researchers consulted with the responsible staff to seek additional information. The purpose of the observations was to see if there was an indication of data analysis that included observing displayed charts, graphs, and text.

Table 1. Study sites and participants

Region	LGA	IDI participants	FGD participants	Number of FGD	Facility observations
Arusha	Arusha CC	3	3	1	2
	Arusha DC	3	2	1	2
Lindi	Lindi MC	4	-	-	2
	Kilwa Masoko DC	2	6	2	2
Geita	Geita MC	0	7	2	2
	Geita DC	1	6	2	2
TOTAL		**13**	**24**	**8**	**12**

Data Analysis

A phenomenological data analysis captured individual experiences analyzing and using data, and a narrative data analysis elucidated common themes and shared stories. Content analysis was done to quantify the available materials that showed signs of data analysis. This enabled the researchers to conduct cross-case analyses to ascertain differences across regions. The quantified data were subjected to quantitative data analysis.

Qualitative Data Analysis

An interpretative phenomenological analysis was performed to explain individual practices of health providers with data analysis and its uses and to determine patterns of meaning across FP providers (Smith & Osborn, 2015). Thematic analysis was done to describe common themes arising from the providers. This was accompanied by content analysis to describe the information presented in the displayed materials, which would signify that the data were analyzed and reflected upon.

Recorded information was transcribed within 24 hours after the IDIs and FGDs. The transcriptions were in English while the interviews and FGDs were in English and Swahili. Multiple reviews of the transcripts cross-checked the accuracy and completeness of the data. Then, the transcribed texts and photos showing data analysis were imported into Atlas.ti.[1] Within the program, all data were coded inductively around the two main themes: health providers' capacity to analyze data with the evidence collected and using the data in the planning process. "Families" of content were created by grouping similar themes. Coding and creating families went hand in hand with the memo process where the researchers added their views and

[1] Atlas.ti is a qualitative data analysis software.

reflections on the coded concepts. The final report was written based on the outputs downloaded from the Atlas.ti software, which comprised codes, families, and memos.

Quantitative Data Analysis

Descriptive analysis was performed through observation and by quantifying data from the interviews. We conducted cross tabulation of the data and ran a Pearson chi-square test with frequencies and percentages to ascertain if there was a significant difference between the expected frequencies and observed frequencies in each category related to capacity for data analysis and using data in the planning process across regions and LGAs. However, because only four (33%) of the studied facilities showed signs of data analysis and use, the researchers opted to focus on a qualitative approach to gather insight and explore possible explanations for why few facilities showed evidence of data analysis and data use.

Ethical Considerations

The Directorate of Research, Publications, and Postgraduate Studies at Mzumbe University provided a letter to introduce the researchers to each region and LGA, then clearance letters were obtained from the President's Office of Regional Administration and Local Government Office in each region and LGA involved in the study. Written and verbal consent were requested from all study participants. Prior to the IDIs, FGDs, and observations in the health facilities, participants received clear information about the purpose of the study and were told that they could refuse to answer any question asked or withdraw from the study at any time without restriction. The study participants were assured that the information they provided would be used for the purposes of the study only. Participants were assured confidentiality and anonymity in the data analysis and reporting of the findings.

RESULTS

A total of 37 health providers participated in the IDIs and FGDs, with at least four in each LGA involved in the study. The highest level of education for most participants was a diploma (51%). Although only about a quarter (27%) of the study participants attended training on data analysis, more than half attended a training on DHIS 2 (54%), PlanRep (51%), and FFARS (51%). Most providers at Lindi MC, Arusha CC, and Arusha DC had been in their currents position for less than five years, and most providers at Kilwa Masoko DC, Geita MC, and Geita DC had been in their current position for 6–10 years. More than half (54%) of the participants were at least 40 years old (Table 2).

Table 2. Respondent characteristics

Characteristics	Lindi MC		Kilwa Masoko DC		Arusha CC		Arusha DC		Geita MC		Geita DC		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Age														
19–29 years	0	0	0	0	2	33	1	20	1	14	2	29	6	16
30–39 years	1	25	1	13	1	17	2	40	3	43	3	43	11	30
40 years and above	3	75	7	88	3	50	2	40	3	43	2	29	20	54
Marital status														
Married	2	50	8	100	4	67	3	60	5	71	6	86	28	76
Single	2	50	0	0	2	33	2	40	2	29	1	14	9	24
Gender														
Male	1	25	3	38	2	33	1	20	1	14	5	71	13	35
Female	3	75	5	63	4	67	4	80	6	86	2	29	24	65
Qualification														
Certificate	0	0	1	13	0	0	0	0	2	29	2	29	5	14
Diploma	3	75	4	50	1	17	4	80	4	57	3	43	19	51
Degree	1	25	3	38	5	83	1	20	1	14	2	29	13	35
Working experience														
0–10 years	1	25	2	25	3	50	2	40	3	43	5	71	16	43
11–20 years	2	50	1	13	2	33	2	40	3	43	2	29	12	32
21 years and above	1	25	5	63	1	17	1	20	1	14	0	0	9	24
Experience in current position														
0–5 years	4	10	2	25	4	67	4	80	2	29	2	29	18	49
6–10 years	0	0	5	63	1	17	1	20	5	71	5	71	17	46
11 years and above	0	0	1	13	1	17	0	0	0	0	0	0	2	5
Cadre														
Medical attendant	0	0	1	13	0	0	0	0	1	14	0	0	2	5
Trained nurse	0	0	1	13	0	0	1	20	2	29	2	29	6	16
Nurse midwife	2	50	3	38	1	17	2	40	0	0	2	29	10	27
Clinical officer	1	25	1	13	0	0	1	20	2	29	0	0	5	14
Assistant medical officer	1	25	0	0	0	0	0	0	0	0	0	0	1	3
Medical doctor	0	0	1	13	2	33	0	0	1	14	2	29	6	16
Health secretary	0	0	1	13	3	50	1	20	0	0	0	0	5	14
Data clerk	0	0	0	0	0	0	0	0	1	14	1	14	2	5
Training attended														
Data analysis	0	0	2	25	2	33	1	20	3	43	2	29	10	27
PlanRep	2	50	3	38	5	83	4	80	2	29	3	43	19	51
DHIS 2	2	50	3	38	3	50	4	80	4	57	4	57	20	54
FFARS	2	50	3	38	5	83	4	80	2	29	3	43	19	51
Direct health facility Financing	2	50	3	38	5	83	1	20	2	29	2	29	15	41
FP	2	50	3	38	1	17	2	4o	3	43	1	14	12	32

Data Reporting

At the facility level, FP data are normally collected in paper registers or books. Tanzania's national health information system, called Mfumo wa Taarifa za Uendeshaji Huduma za Afya (MTUHA) (translated to Operating Information System for Health Services) contains 16 books. They cover all the major data categories: surveillance systems, routine service reporting, administrative reporting, and vital registration (Wilms, Mbembela, Prytherch, Hellmold, & Kuelker, 2014). In most cases, FP data are collected by all service providers, depending on the number of clients and nature of the service provided, who then enter the data into the MTUHA books. As indicated in the quote below, health workers found this to be a burdensome and inefficient system:

> *Books are many, and sometimes you find out that you enter data in one book and say, maybe I will finish in other books later. Then you might forget completely, for example when you're attending a CTC* [care and treatment clinic] *client you need to enter data in five different books. You will have to enter data in register book, medicine book, the follow-up book, etc., and all these books are very big; they cannot fit on my desk. So, I sometimes lay them on this bed.* (IDI, facility) (As shown in the photo below)

Data collection tools at the facility level. Photographer: Mackfallen Anasel.

Some data collection tools were inadequate to comply with the needs at the facility level. For example, we observed that a tally sheet with circles that needed to be filled in to track the number of clients seen per day and type of services provided did not have enough circles to meet the data requirements at the facility.

As pointed out in the previous quote, another data reporting challenge for health providers was the number of books they were required to fill in with client data. Providers explained that they sometimes failed to fill in all the books or quickly try to record the data because of long queues of clients waiting for services. A provider from Kilwa DC said the following:

> *Inadequacy of books leads to the usage of extra pay for photocopying; and there are too many books, and they are too big. They occupy a big space, and handling them is difficult. This has led to confusion and* [we] *need a lot of time to fill them. Sometime there is multiple work . . . at the same time entering data to the multiple books after attending a client, which are all done by a single person. This is a reason for wrong data entry or missing some data.* (FGD, facility)

This was supported by another staff member who shared the following when asked about data reporting:

> *Yes, it is a challenge having to record data of all clients in many books, but it's manageable. The situation is slowly improving. Many staff are capable of filling almost all MTUHA books. Once they are directed, they capture and share such knowledge with others.* (IDI, facility)

Some facilities entered data they collected directly into DHIS 2,[2] whereas others submitted their data in paper copies to the district reproductive and child health coordinators (DRCHCos) on the fifth of every month. The facility in-charge, matron, RCH in-charge, and other heads of departments at the facility were responsible for aggregating the monthly data and checking the data quality before submitting it to the DRCHCo at the district level. The DRCHCo then entered the submitted data into DHIS 2, together with the MTUHA focal person. At the facility level, only individuals trained in data entry may enter data directly into DHIS 2.

Data Analysis

Respondents rarely reported data use at the facility level. One study participant stated, "Data analysis, in most cases, is not done. I have never done so, and even my fellows in my section, they never did it." About a quarter of providers (27%) claimed to conduct data analysis at their health facilities. They clarified that they perform data analysis at the end of the month to understand trends, such as number of FP clients receiving services at the health facility, and types of FP methods distributed. The aim is to use this information when ordering FP commodities, which one provider confirmed:

> *Maybe at the end of the month, before submission of report, we do data analysis to know* [which] *women attended, the ones given family planning service, methods given, and other issues which may help us during the planning and ordering.* (IDI, facility)

Those who did analyze data normally shared these analyses with those more knowledgeable about data analysis and placed the results on a blackboard in a public area for clients and other staff to see what was going on in the health facility. Data analysis was performed at facilities to understand the common ailments and leading diseases in a particular area, which in turn supported decision making and planning at the facility level. The provider described this analysis as follows:

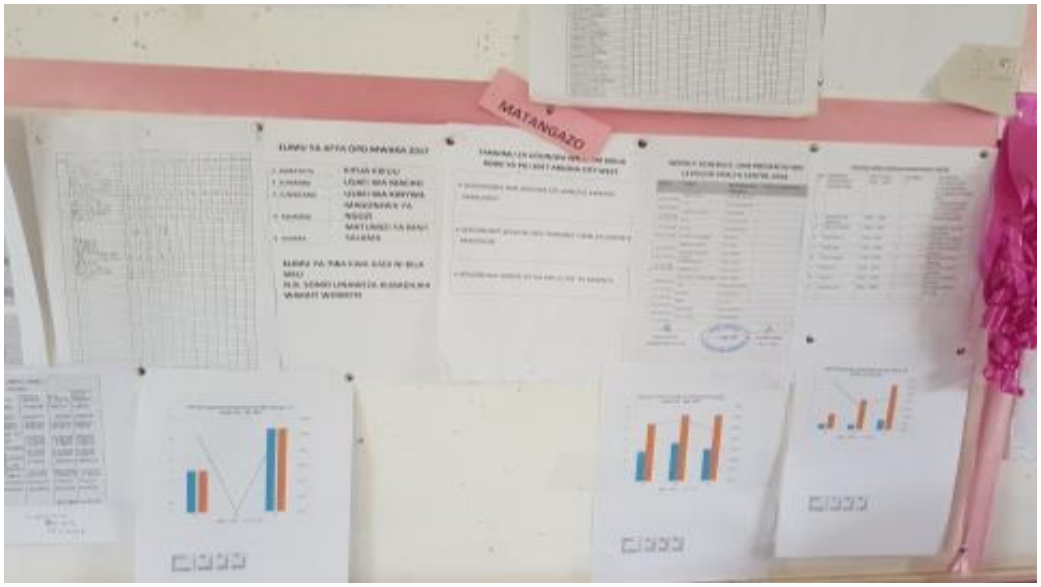
> *We do data analysis in our health facility to know the top diseases. In our area, pneumonia and coughing are common, as per the analysis, and we do consider this in our decision and planning. We also discuss* [with] *and inform our clients on what is going on in their area and come up with strategies to reduce the occurrence of those diseases at the community level.* (IDI, facility)

When analyzing CTC data, one participant found that the HIV-positive clients who had been on a certain medicine showed an undetectable viral load. Analysis of data allowed the participant to identify the cases. The participant described this event, which created alarm at the facility, as follows:

> *When I was with the person who entered data in the system, he told me, 'Dr., let's have a look.' My data indicated a surprising trend. 'Look to Clients 2, 4, and 6. This month showed zero detection. This is a very surprising performance for this kind of medicine! But the rest are not showing this kind of result. We need to make a serious follow-up because there must be something.' All this to me is data analysis—that the one who is dealing with data was able to go back and find different medicine for HIV people gives different results.* (IDI, facility)

Out of 12 facilities visited, only respondents at five (42%) declared that they conduct data analysis to inform their decisions. One facility was in Lindi, two in Arusha, and two in Geita. Some facilities had tangible evidence of data analysis, and researchers observed charts and graphs on display, as depicted in the photo below.

[2] The government's plan is to capacitate all health centers in Tanzania to enter data directly into DHIS 2. Currently, only some facilities enter the data directly into DHIS 2.



Displays of data analysis outputs in one health facility, Photographer: Idda Swai

Frequency of Data Analysis at the Facility and District Levels

Some participants at the facility level said they do data analysis at least once a month, especially before submitting data to the district level. Most of the facility-level participants said that they do data analysis daily, weekly, or monthly—when they want to plan, order medicine, or when there is an issue needing clarification. Sometimes, as two participants explained, they analyzed data with the DCHRCo when submitting monthly data to the district:

> *We normally do it in our CHMT meetings and discuss the trend of family planning, and we ask ourselves why there is a decrease. Where is the problem? Maybe one type of family planning is finished, so we find a way for one person to make follow-up for it. Or maybe CTC clients are few compared to last month, so we find out the reasons. Maybe the ARVs are finished. . . . So, we decide to send a representative to take the ARVs instead of waiting for the district office.* (IDI, district)

> *Yah, we are doing that, like we evaluate using the yearly percentage. Given from that, we see if we are doing well with meeting the goal. If we are not, we ask ourselves what should be done and we go further to encourage the community on this using various forums, such as village general meetings. This usually takes place on our hospital grounds. So, during the meetings, we go and educate on family planning, education of postnatal visits, and early prenatal visits. Even if the meeting is conducted during the working hours, one of us must be there for this purpose.* (IDI, district)

When the researcher asked whether the DRCHCo and health secretary analyze data the response was, "we are doing data analysis together with a person from the health facility when submitting and receiving data." They also perform data analysis when they conduct a supervision visit to see whether the facility is doing well. As stated by one participant, "Yes, we do data analysis but not frequently. We used to do that in our meetings and sometimes when receiving data from the health facilities."

Although the district- and facility-level health workers reported doing data analysis together, after further probing it was clear that at the DC level, they mainly checked the correctness of the data rather than analyzing it. When the participants at all levels were asked which data analyses they performed, they shared their experiences with data verification rather than data analysis. The majority (83%) of participants said they normally looked at their data to verify accuracy and completeness, checking whether there are missing data, data filled in wrong, or ambiguous data. On interviewee stated the following:

> *I think health workers at the health facility level do not know the value of the data, and they do not care to analyze them. Now, we at the district level have a challenge because at least we know what the data should look*

> *like. We have to sit with them or call them and discuss and correct their data while insisting that they must have their register. We do this until all data are filled out.* (IDI, district)

When further probed, the same participant declared that she never sees any indication of data analysis when she goes for a supervision visit:

> *When I go to most of the family planning provider rooms, I never see a sign that they do analysis of their data. Personally, I never see things like graphs or bar charts on the blackboard; then, how can I know that they do analysis? I think what we do is to correct the data and not analysis.* (IDI, district)

Capacity for Data Analysis

When the researcher asked if health facility workers used basic spreadsheets, such as Microsoft Excel, to analyze data collected at the facility level, the response was that this was done by some health workers who have the necessary data analysis and computer skills, but most do not. Most participants (75%) claimed that any data analysis was left to the MTUHA focal person, who has the capacity to do so. As expressed by one participant, "Mmhhh, MTUHA focal person, yes, he is good at that, and he can enter data in Excel and come up with charts, graphs, etc. . . . But the rest, no we cannot do that." The respondent affirmed the belief that recording was a sole responsibility regarding data: "As I said, we only focus on our register and monthly summary to see how our data looks like. I think that is the analysis we do."

Another respondent added that, although she could perform data analysis, she lacked the skills to conduct an analysis beyond a basic level. "As I said, we were doing data analysis, but I don't know to analyze data using Excel. I can calculate percentage, but I cannot use Excel to do it." The same views were shared at the district level, where most respondents declared that they cannot use Excel to analyze their data. "We do the analysis manually. We used to sit together and discuss the trend. This helped us in decision making, for example, with vaccination when we observe the increase or decrease in the vaccination data."

When the researchers inquired if the participants had done any descriptive analysis of their data, two of the respondents from Arusha DC and Lindi MC health facilities explained they have used simple descriptive analysis, such as graphs and flip charts, to plot data in the RCH unit. A participant from Lindi MC said, "Yes, we have used graphs for interpretation of data in QI [quality improvement], e.g., CTC and vaccination data." But again, the descriptive analyses were mainly conducted manually rather than using computer software.

When the participants were probed on whether they use graphs or flip charts when discussing and analyzing the data manually, one responded, "Mhhhhhh!! No, not done. We don't use Excel or plot graphs or flip chart to show the trend of our data, and we do not generate data from the system; we only do analysis manually, only discussing."

When the researchers asked if the participants have a culture of analyzing data by generating charts and reports from DHIS 2 or creating pivot tables, all the participant affirmed that they have never created pivot tables, and most said that they have never generated charts and reports from the system. One participant shared, "I am not aware of the system at all and I never thought of going there to generate anything. Even Excel—I knew it when we were doing the last budget, and still, I don't know how to use it."

The medical officer in-charges did not have the culture or capacity for data analysis, as explained by one medical officer:

> *There is this thing, like, to prepare a graph to show the trend of data in a certain month, I have some people here who can do that, but I have never tried to do the same, and I even don't know how to do it. And that is a reason I cannot tell whether the trend of family planning for a certain method has increased or decreased.* (IDI, facility)

In addition to lack of capacity for data analysis, lack of accreditation to perform data analysis in DHIS 2 is another barrier. One health facility worker stated the following:

> *Our access is data entry only, meaning we can submit data in the system, but we do not have access to do any analysis. This is normally done at the district level where the MTUHA focal person has all access to check and do all analyses.* (IDI, facility)

Another participant added the following:

> *We should have something which shows what we are doing here. When people like you visit us, we have some graphs for display, but the problem is that I can't produce something perfect that anyone can understand. I know at the district level there are people who can conduct analysis, for example, a MTUHA focal person is among the people with access to knowing that this health facility has this in terms of data.* (FGD, facility)

When the participants were asked about their ability to access data from DHIS 2 for further analysis using Excel, all responded that it was not possible because of a lack of computer skills. Furthermore, many claimed that, although they had access to the system to enter data, they lacked user privileges to retrieve data for further analysis.

The respondents reported that the health facilities with access to DHIS 2 do not send staff in person to submit their data to the district. At these facilities, the providers with access to the system can enter and retrieve data anytime. However, the participants at the district level reported that there are several issues with the data entered in DHIS 2 by the facilities. Sometimes they find the data are not at all clear, which requires action. Phone discussions with facility in-charges are needed to clarify data or to request a visit to the district office with their registers to discuss and address the data issues.

We found that it was common for the facility in-charges to have neither the skills nor the knowledge about data analysis, and most had never used their accreditation to enter data in DHIS 2, rendering impossible review of the data collected at the facility to assess its quality and observe outcomes and trends. This is further elaborated in the next sections.

Data Quality

The study investigated the quality of data collected in the study facilities. Most participants said they do not trust the data collected at the facilities because of widespread inaccuracies. The participants pointed out that the data quality, among other things, was affected by excessive workload, which is a result of staff shortages in health facilities. Most providers interviewed used outpatient department (OPD) data as an example of data that is usually inaccurate and inconsistent, with mismatching data across various register books. Only two clinicians may be working in the OPD. If one is called away for other official duties, the remaining clinician will likely defer the task of data entry to prioritize attending to patients and other pressing tasks. A staff member in Kilwa DC provided the following description of this situation:

> *Ensuring data accuracy is a little bit difficult here because of staff shortages. For example, you may be serving three or four units, or you have about 20 to 40 clients waiting outside at the same time you are attending other issues, like what we are doing now. . . . So, you find sometimes you are forced to move here and there then come back to patients. In such a situation, frankly speaking, you may find yourself postponing the issue of data entry and attend patients first or respond to a call from your boss.* (IDI, facility)

The motivation to collect and report data, as shared by the health providers, was simply to fulfill their tasks and finish the assignment. They were not committed to accurately collecting and reporting the data because they did not see the value of having high-quality data to refer to and use in the future. This is supported by the following account by one staff member in Nzega DC:

> *The staff availability in my section may not be a big problem, but when you are talking about the whole facility, there is a huge shortage. And because of that, people collect data for the sake of finishing the activity and not*

collecting quality data. [That is] *because of this shortage.* (IDI, facility)

Problems with staff qualifications present another challenge that has contributed to the current staff shortages. All study facilities had health provider(s) leave as a result of the certificate verification audit.[3] This resulted in serious staff shortages. Most providers in health facilities, particularly in dispensaries, are medical attendants[4] who are newly employed and have no training in data collection and analysis. One respondent described the situation as follows:

> *There is a problem with staff qualifications here, let alone the adequacy in number of staff. Analysis of data in almost all health facilities is a challenge because most of the staff in these facilities are medical attendants who have no idea of data analysis. Imagine, out of almost 57 health facilities we have, over 10 dispensaries are led by medical attendants.* (IDI, district)

We found that leadership plays an important role in creating a culture of data collection, analysis, and use at the facility level. This was supported by the views shared by a medical officer in-charge. She confirmed that engaged leadership improves data quality:

> *I called for a meeting to familiarize ourselves with data, and we agreed that this is the way the whole issue of data handling should go. Then, I asked if there were any doubts, and everyone said that they understood. I told them that now we want to see the outcomes, and I made follow-up, and now things really improved. I just do this after attending one workshop on data management and analysis.* (IDI, facility)

We also found inconsistencies in data resulting from limitations in the register books; many did not have enough fields or space to enter in all client data. Inconsistencies were especially common with FP data. The data in the tally sheet often did not match the data in the register, which consequently did not match the data in the summary report. For example, a summary report might indicate a certain number of clients using Depo-Provera, but this number might be different in both the register and tally sheet. As indicated by the following response, health providers often had to fix these discrepancies:

> *Data in the register may fail to match with those in the tally sheet. You may find 600 patients in the register, but when you look at the tally sheet you may find 400. This is due to the fact that the tally sheet book is small and we have decided to record in such system, we should add numbers as per the columns. Sometimes, you may find a patient who is recorded in the register is missing in the tally sheet. Probably there were some patients who were not entered in the tally sheet, but they are recorded in the register. This requires correcting the data by counting and recounting from 101, then 102, 103. . . . Then, you sum up and continue balancing until your correct figure is obtained. It is really a big challenge, especially here at the OPD, with regard to data management.* (IDI, facility)

Another provider added the following:

> *When we attend a family planning client and she is pregnant, for example, we have two books involved in this case: the register book and the tally book. So, you need to fill in these two books at the same time. So, before closing the report, you make sure that the data in the books match. So, in the event there is a mismatch, one of these two books helps in finding where the omission is. It requires you to start counting from the source book—not sure which one among the two finding out, for example, how many are registered under 20? How many over 40? And then you can see where the mismatch comes from.* (FGD, facility)

A participant from Masoko had the same view that lack of knowledge among health providers affects data use. It was further elaborated that facility workers had little or no understanding of how to fill in the registers and could not understand the value of filling all parts of the register.

[3] In 2017 the Government of Tanzania conducted a nationwide verification of academic credentials for all civil servants. Those who forged their certificate or used someone else's certificate were terminated from employment.

[4] Medical attendants have an ordinary secondary school education with a one-year training certificate in nursing courses. Their main duties are general cleaning of the ward and surrounding areas and patient care.

> *To start with the knowledge, I think this has shaken the procedure a lot. An example is filling the registers. We have about ten sections to fill in. But when you tell someone that all sections need to be filled, they do not understand why all parts need to be filled.* (IDI, facility)

Sometimes facilities submit wrong or incomplete data, which causes more work for those compiling data at the district level. They must follow up with the facilities, fill in the gaps, and reconcile the data. This was shared during the interview with one DRCHCo:

> *Some facilities might send wrong information. We correct them but sometimes we may forget* [and] *some data* [go] *uncorrected. If such a situation happens and we are not sure about the correct figure, we phone the responsible staff in the facility and ask him or her to check in the respective register for accuracy. We correct the data accordingly, and work continues as usual.* (IDI, district)

To address data quality challenges, the study participants noted that there are platforms for discussing and evaluating client data on a monthly and quarterly basis. As one DRCHCo noted, the exercise of checking to make sure the data are correct, complete, and consistent was a necessary undertaking before submitting it to a higher level:

> *What we normally do after finishing entries for the month is to check for accuracy before we send. There are other months which we happen to be so busy that we cannot check, . . . and that is the truth. When we have time, we go back to check if what we want to send is correct or not. . . . So, every quarter we sit and study our data before sending* [them]. *We go through, month by month, until we make sure they are correct, then we agree, . . . yes, these are the data we want to send, then we do so.* (IDI, district)

Another DRCHCo added the following:

> *Before going to the council, we sit together to correct and verify our report for submission. This is normally done with the CHMT or in a QI* [quality improvement] *meeting where we discuss the data entered, if they are correct, or not. We sometimes ask the one* [who] *entered the data to check the data, whether they are correct or not.* (IDI, district)

The findings captured in the two quotes above concur with what was observed in one of the facilities in Geita Region, where the DRCHCo and health providers were examining different data to ensure accuracy, consistency, and completeness, as shown in the photo below. The DRCHCo clarified that the facility normally displays the data in the office of the district medical officer (DMO) to check if there is a problem, and if so, the facility focal person may be called for clarification or correction.

Staff cross-checking data for quality assurance at a health facility in Geita Region: Photographer, Orest Masue

The health providers reported that they do not cross-check the data for correctness and consistency,

owing to time constraints. This was mentioned as one of the reasons for poor data quality. Another reason given for poor data quality issues, as reported in the IDIs with the health facility in-charges, relates to some clients' behavior. When clients (and their partners) fail to follow the appropriate protocol for what they should be doing at the health facility and in what order, it can lead to incomplete data, as one provider explained:

> *For example, here we face challenges like the difficulty of pregnant women failing to come with their spouses. Spouses, most of time, they are not coming together, hence, leading to incomplete data. For example, it is difficult to get the father's health status, especially their HIV status.* (IDI, facility)

The DRCHCo and health secretary pointed out that the data quality problem is much more pronounced in district hospitals than in dispensaries and health centers, which affects hospitals' ability to plan. Patients referred to the district hospital may be from rural areas or may be transient workers, moving from one place to another. This contributes to an unpredictable population and poses a challenge to estimating medicines and other essential medical supplies.

> *Since this hospital is taken as a referral point for all health facilities in the district, the issue of estimating the correct amount of medicine and other medical supplies, such as delivery kits, is a bit challenging. Not only that, but also pastoralists who came after government directive, fishermen, and peasants or farmers coming from other places increases the number of patients, which lead to mismatch.* (IDI, district)

This concurs with the views given at a health facility in a town center that serves many more clients than expected. Although people work and do their business in town during the day and go back to the periphery in the evening, when they need health services, they go to the facilities in town.

> *In fact, the work plan is not realistic, there is a big difference between the work plan and budget. As you can see, this center is in the central part of the town. We serve more people than anticipated. For example, the budget has been prepared for 3,880 clients, but we serve 10,000 clients. We normally claim for the same, but they ignore us because we don't have data. That's why I say that there is a big difference between work plan and budget; the main reason for this is lack of correct data.* (IDI, facility)

The health providers at the facilities that enter data direct to DHIs 2 reported that data quality is still an issue. The system cannot address double counting, undercounting, or falsified data. The providers expressed the opinion that these issues must be resolved at the point of data collection. Data quality issues at OPDs, with mismatched data in tally sheets, register books, and summary reports, persist.

An additional barrier, identified across nearly all the health facilities involved in the study, is the lack of a stable power supply, Internet connectivity, and data collection equipment, such as computers and accessories. Although some facilities are required to enter their data in DHIS 2, lack of Internet connectivity makes it impossible, and subsequently, some health facilities are not able to effectively use the system. Even health facility coordinators have problems accessing DHIS 2 owing to power cuts and lack of an Internet connection. This was reported as one of the biggest challenges compromising data quality and the use of DHIS 2, as explained by one of the staff in a peripheral health facility in Geita Region:

> *I think we need to have reliable power, but also, I can say we need more working tools such as printer and cartilage—because, I have a printer, but sometimes I fail to do some of the things because there is no cartilage. We also have only one computer, but the main issue here is power.* (IDI, facility)

Power cuts are much more common in the peripheral health facilities in Geita than in Arusha and Lindi. Study participants reported that lack of reliable power affects them more when they are on the night shift attending to a delivery in the labor ward. Backup power is temporary, so they must resort to creative solutions, as explained by a provider:

> *We do not have reliable power here. When you have a night shift you start thinking about power cuts. It happens*

> *in the labor ward. We sometimes attend delivering mothers using light from our mobile phones because our backup power can only sustain for a half hour after power cut. Imagine when a mother encounters a tear, how are you going to stitch it? We need to have a standby generator or solar power because it is very challenging indeed.* (FGD, facility)

Lack of basic resources, including a reliable source of electricity, not only compromises data collection and quality but is also life-threatening.

Culture of Data Use

We found varying degrees of data use at the facility level. A culture of data use was not prevalent in most of the facilities researched. A study participant in Lindi MC identified that the culture of data use has been changing since health facilities started realizing the value in using data for planning and budgeting. Practices show that before the establishment of district health facility financing, the budget for health facilities was prepared by the district, municipal, or city councils. Since the 2017/2018 financial year, facilities have been required to plan and budget for their own activities. They are required to prepare the budget according to the activities or services they offer and the number of people they serve.

> *Last year, the council helped to prepare our budget, but this year we prepared* [it] *ourselves, and the council checked what we did, cross-checked, and provided feedback. Nowadays, the health facilities receive funding according to the number of clients attended. The issue of ensuring that the data you have reflects such trend is important. If the data indicated low number of clients attended, then funding will also be low.* (IDI, facility)

Although these health facilities have a mandate to plan for their own activities, the plans and budgets are subject to approval by the council. However, it was noted that some facilities are periodically required to reduce their requested budget to meet the directives from the President's Office Regional Administration and Local Government offices, regardless of what the data suggest and what the implication is for the number of clients they serve.

Some of the facilities have not performed even a simple descriptive analysis of their data to evaluate whether their FP outcomes have improved and to identify areas for improvement. This was captured from several interviews, as expressed by one participant:

> *Charts, display? I have never seen that, and I had never heard about pivot table. Maybe MTUHA people may know that. . . . Ooh no, I have never done it, and I don't know how it looks like. . . . I have never prepared a graph, so I can't lie—I can't say whether the trend went high or low, because I have never done any analysis or display anything.* (IDI, facility)

Study participants from Geita and Katoro health centers pinpointed that they have been using the data they collect to evaluate monthly services. This helps them estimate medicine orders, especially for ARVs and FP commodities.

Data Ownership

Generally, health providers do not see the value of good data because they lack a sense of data ownership. In other words, providers think that the data generated at the health facility does not belong to them and is simply being collected for the sake of fulfilling a mandate and finishing the job. Several participants identified that they collected data because they were forced to, and because it was an order from the top, they had no option. Health facility workers regarded data collection as valueless to them and a burden on their workload, so they prioritized their time attending to clients instead. One provider gave the following explanation:

> *Every day we are being followed. People do not see the value of creating data; they see that data can't help them personally. So, someone is concentrating on her shift, what hours are finished, what patients were attended. The time is over, and off she goes. And at the end of the month, she gets her salary. What I can say here is that they*

only collect data because they are forced to do that. (IDI, facility)

A participant added that data generated by health facilities belong to the CHMT and not the facilities, which provides an explanation for why data analysis and use for decision-making start to take place at the district level. One DRCHCo explained the following:

> *So, at the district level, they have a clear picture that they are the owners of the data and not people from the facility, and people from the facility know as well that data does not belong to them. So, CHMT knows that they own the data. They know it well.* (IDI, district)

Other participants confirmed that health facilities generate data for the DMO's office and do not use data for their own use. After more probing from the researcher about facilities using the data they collect, a participant pointed out that because the DMO's office orders facilities to submit data on the third of each month, facility staff think data belong to the DMO and not the facilities. One DRCHCo said the following:

> *The data are for the DMO. They produce data because it's needed by the DRCHCo, and not for their personal use. That is the thinking of people from the facility. They are not aware that they need to use the data they collect for their own benefit. Just because DMO orders.* (IDI, district)

Data use was more evident at the district level than at the health facility level. The FGD with participants from one health facility illuminated this when they said that the charts and graphs displaying various types of data were more prevalent at the DCHRCo offices, signifying that data collected from the health facilities is used more at the district level.

The IDIs and FGDs revealed that health providers are not aware that the data generated can be analyzed at the facility level to help with their decision making, such as budgeting, ordering medicine and other commodities, and providing education to the community.

One participant working at the district level confirmed that some CHMT members are tasked with conducting data analysis activities. Thus, health providers and district-level staff have less opportunity and motivation to analyze and use data, even if they are involved in data collection, because the task remains the responsibility of the focal person or district AIDS coordinators. One responded described the situation as follows:

> *They leave data analysis and use to the ones responsible from the department. You know, CHMT is composed of four people and other eight co-opted members. So, they know that those who are responsible for data are Mr. So and So, and he has to examine and evaluate, and so they have to be careful with the data. Another person will be the focal person, another will be responsible for malaria, another for laboratory. So, CHMT are the one responsible for using the data. So, the health facilities submit the data to CHMT because they are the ones to use them.* (IDI, district)

A participant from Arusha shared that health workers do not like any activities having to do with data because they see it as an additional workload: "I think the health providers are not happy to fill the documents." Other participants confirmed, "They do it unwillingly," and "We are just doing it because we are ordered to do it." This norm makes it hard for health workers to appreciate good data and take the time to analyze and use the data for planning.

Data Sources for Planning

Participants were asked to name the sources of data they use during the planning and budgeting processes. Data sources ranged from MTUHA books to registers from the community. Respondents elaborated that data used for planning are primarily drawn from those previously uploaded to DHIS 2 Data from subgroups of the population are supposed to be captured in the plans, but the data are not collected at the health facility, requiring visits to the community. As one participant responded, "Oooh, it

is a must to visit the community to get some data which are only available at the community level, such as the data of the special groups, such as the disabled, the albinisms, and the people who suffer chronic diseases."

Most participants reported that they normally face challenges when they plan because of lack of sufficient and reliable data. As previously mentioned, the number of clients served does not match the number of clients recorded, which in turn produces unrealistic plans. As the following response indicates, the impact of poor data and undercounting clients served results in plans that are misaligned with the actual requirements of the facility:

> *What I can say is that what we have in the plan of our facility does not match the actual demand of the facility. This is because the data here is very poor. We are providing services, but we have no good documentation, and thus we cannot justify the same. You may find we have served ten clients, but what we have in our data is five or three clients.* (IDI, facility)

Data at the facility level are poorly prepared, which affects the planning process. The majority (83%) of health providers interviewed affirmed the ongoing move for health facilities to improve their data because it has a direct impact on the amount of money the facilities receive for their budgets. A facility in-charge pointed out the following:

> *We received little money in the previous financial year, and we went to ask the reason for that as we are serving people from different catchments including the center of town. We were told that the money we were given reflects our data. Now we know if we will not document all clients we are serving, we will be in trouble again; so, we are working to make sure our data reflect what we are doing, and we will use the same in our planning.* (IDI, facility)

Planning, budgeting, and ordering medical equipment and commodities should be based on the number of clients served, as documented by the health facilities. Yet, when health facility estimates are off because of incomplete data, health facility plans, budgets, and quality of health services are all negatively affected. The participants in all the facilities we visited affirmed that, for this reason, most facilities are working to accurately document what they do to improve the quality of their data to inform their plans.

Improving Data Use at the Facility Level

We found that leaders realize the problem of lack of commitment to data use among workers and have devised several mechanisms to rectify the situation. For instance, a facility in-charge said, "You need [to] use all means to make them fill the data. It's a chronic disease, but we shall continue to emphasize." She elaborated that leading by example and following up are some of the means by which they encourage workers to see the importance of collecting data and understand how easily they can do it with their daily activities. These strategies have helped, to some extent, and, as indicated by the following response, some health facility staff have started realizing that data can be meaningful and useful:

> *So, I showed them that when I am attending patients, I fill in data like this and this, so give like examples. I will not run from this, I will make sure that we are together in this. If you decide not to follow up* [with] *them, they return back again. But now, because of this, we are at least doing well.* (IDI, facility)

To impact data use, sometimes sanctions are used. This entails an in-charge withholding some of the workers' incentives to put more pressure on data collection.

Seminars and practical on-the-job training on data collection, analysis, and use have been used to encourage a data use culture. This was affirmed as an effective way to help change behavior towards data use in facilities. The participants suggested that the CHMT could conduct hands-on trainings during supervision sessions. This was reported by the participants in Kilwa health facilities, one of whom said the following:

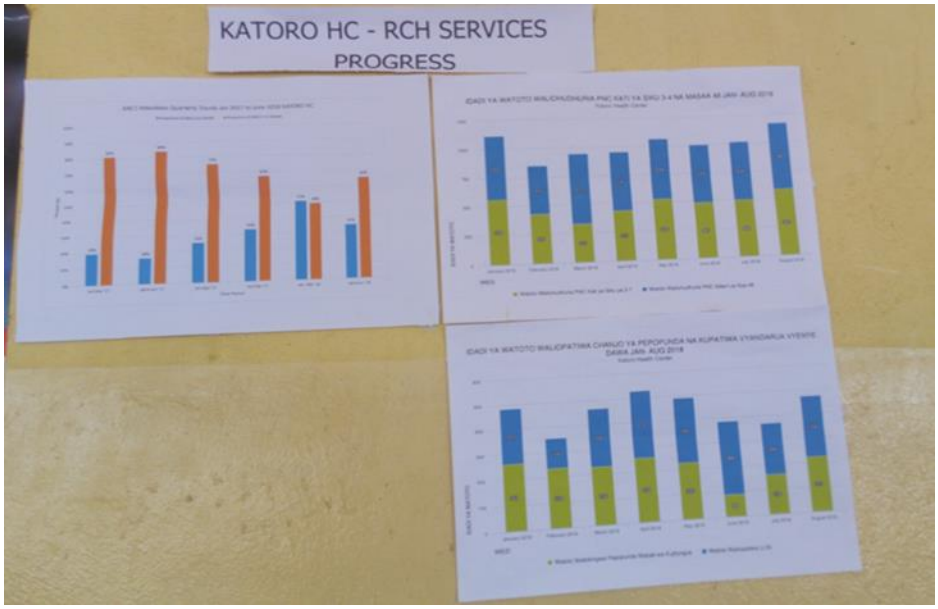
> *I think, on-job training and mentorship can help. For example, when the CHMT comes for supervision,* [he or she] *can train and mentor health workers. You know, currently, there is a very huge need of collecting data correctly and* [data] *use. For instance, few days ago, we were informed of a certain visit, people were distressed of the data, but if we have correctly collected data, there is no need of worrying.* (IDI, facility)

Likewise, the need for data analysis training was pointed out by the interviewees to address the challenge of staff inadequacy in terms of skills and qualifications. Besides training, the study participants recommended that the government should consider recruiting more staff to address human resource shortages. One respondent made the following suggestion:

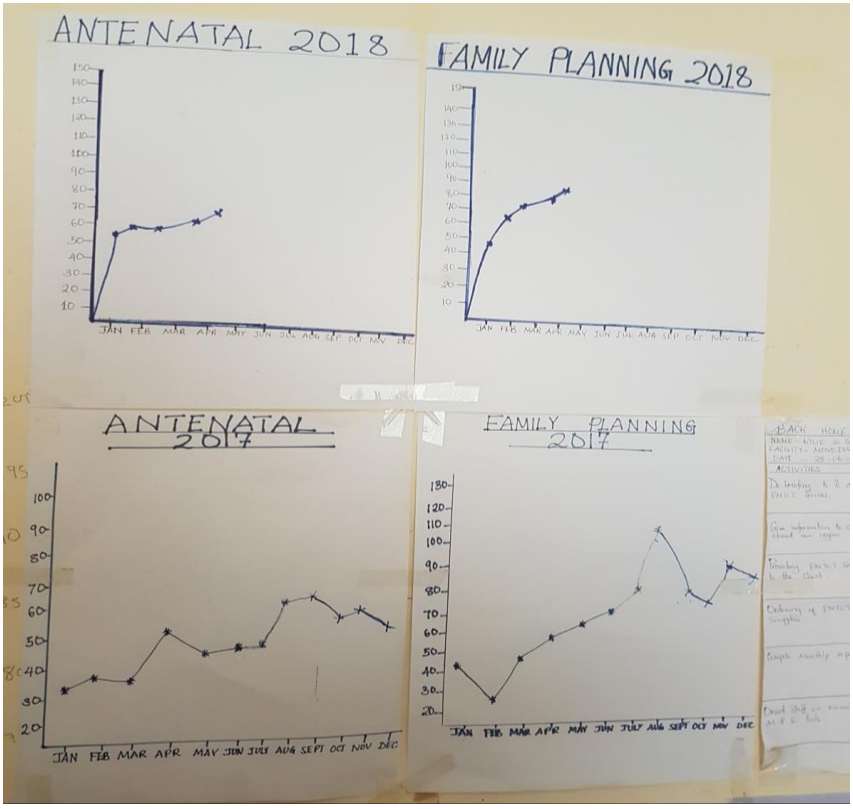
> *I would like to request the government to increase the number of employees, because we have a very big shortage of all staff members, especially skilled personnel. Secondly, they should provide us with monitoring and evaluation staff at the facility level to help us at the stations, because those are capable on data analysis compare to us.* (IDI, facility)

Evidence of Data Use

The study was particularly interested in documenting evidence of data analysis and use in the health facilities in terms of displaying graphs, charts, and text on facility notice boards. From our observations of displays in health facilities and responses from interviewees, we determined that only four (33%) facilities (two from Arusha Region and two from Geita Region) displayed graphs and charts (two photos below).



Data display of RCH services at Katoro Health Centre, Geita Region. Photographer Osrest Masue



Data display at Moivo Dispensary, Arusha Region: Photographer, Mackfallen Anasel

Some facility staff did not see the importance of displaying data on noticeboards, because they already submitted the data to the district level, where an aggregate analysis was done. This was confirmed by the quantity and diversity of displayed outputs from analyzed data observed at the council level compared to the facility level. Displays of outputs of analyzed FP data in the forms of graphs, charts and/or text were particularly scant or completely missing at the facility level in Geita MC, Arusha CC, and Arusha DC, even though they were available and informative in these locations at the council level.

Capacity Building for Data Collection, Analysis, and Use

Capacity building for data is infrequent and when offered, few are given the chance to attend. This was shared by the participants in all the facilities visited. One of the interviewed health providers affirmed, "Mmmh, capacity building is a challenge. It is not offered in a rotated manner to facilitate working capacity in this section. In most cases the people who attend [the] training are the same and they are not the ones responsible for data analysis."

Most health workers (73%) have no skills related to data analysis, nor do they have computer skills. This was reflected at both the facility and district level where most participants said they had never attended a course on data analysis.

> *Most of times, in-charges are the ones attending those trainings; lower-level workers hardly get such opportunities. Many people from the district level are getting such training opportunities, you know, when you talk about* [the] *district level, you mean the CHMT. But still, there is a problem of data analysis; people are getting back from school and* [are] *given a section that allows them to be a CHMT member, but you can find the same person is unaware of data analysis.* (IDI, district)

Although some participants claimed that health facility in-charges are being trained, the in-charges themselves claimed they had not been trained. When the in-charges were probed, they declared that the

recent trainings they had attended were for FFARS, DHIS 2, and PlanRep.

Most participants revealed that, although some health workers have attended training, these health workers cannot conduct data analysis because they do not have computers. One affirmed, "Yes, we have attended training on data analysis, but as you see, we do not have any computer. So, once we have computers, we will do the analysis."

The majority of participants reported that, in addition to never having attended any data analysis course, they had never heard of a data analysis course or were informed that they were supposed to attend one. One health secretary at the district level said that she was familiar with data collection courses but not any training on data analysis: "I think they are not trained on data analysis. We [are] regularly provided with data collection training and not data analysis, and so what we know is to collect data only. People are unable to interpret data."

Some FP service providers went further to share that not only have they not been trained on data analysis; they have also not received any refresher trainings on FP. The following is typical of responses we received:

> *I have never gone for training. I'm using experience even on family planning. I have to say it frankly because training is very important as it updates the existing knowledge, but I cannot stop providing services because I am not trained.* (IDI, facility)

All interviewed participants insisted that they should be trained on data analysis to make use of the data they collect in the health facility daily. The participants went further, clarifying that they wish to be taught specific skills, such as how to generate charts, graphs, and reports from DHIS 2; create pivot tables; and use Excel for data analysis. This was raised as an important issue at the facility and district levels.

To evaluate capacity-building initiatives that may have been in place to enable better data quality and use, the researchers probed about whether health facility workers had received training on data creation and use. The research findings provided mixed information. One participant from Kaloleni health center pointed out that there were some health facility workers who attended a special training on building capacity for data creation specific to DHIS 2. "Some people were chosen to go for training on DHIS 2 after realizing that we were supposed to enter the data in the system."

Other participants indicated that there have been no trainings on data creation, which affects data quality. More training is needed on how to collect, analyze, and use data to make the whole mission of data collection effective. This was evidenced by a participant from Ngaramtoni health centre who said the following**:**

> *I think the most important issue is to take people for training, because nothing is done nowadays in* [the] *absence of data. For someone to be perfect in doing anything, he/she needs training, like how to create data, how to analyze . . . everything related with data. Training is very important.* (IDI, facility)

The researchers also probed about whether health providers were trained on how to use data. Hardly any of the health providers had received any training on data use. Some participants added that they used their own experience to try to figure out how to make use of their FP data.

We found that very few health facility workers have been involved in capacity building training. Even those who benefitted from trainings were only trained on data creation and not data analysis and use.

DISCUSSION

The study sought to assess the capacity of health providers in Arusha, Lindi, and Geita Regions to analyze and use FP data for planning. The study specifically addressed two operational research questions: what is the capacity of health providers in analyzing FP data and what evidence is available to show that health service providers use the collected data in their planning processes? The study found mixed results related to the capacity of health providers to analyze and use FP data in planning activities. Although the results indicated an increasing trend of data analysis and use in some facilities, there are many facilities where FP data analysis is not done and, thus, data are not used for planning. This indicates a poor or nonexistent culture of data analysis and data use among health providers. This is because health providers think their task is only to collect data and submit it to the district offices for the CHMT to deal with. This lack of data ownership results in health providers thinking that data cannot be used at the point of creation. This belief is maintained at the district level where the CHMTs have specially assigned duties dealing with data. However, the findings revealed evidence that the culture for data use is slowly changing. This observation concurs with the findings from a study done by Ikonje (2014), who found that health providers in Tanzania lack a culture of data use. Most health facilities had no culture of analyzing and using data to make decisions for health service quality improvement.

The results of this study also support the findings of a study by Nutley & Li, (2018) that indicated a lack of skills among health providers in Tanzania regarding data management, data analysis, and data interpretation, while health personnel in Kenya were found to have minimal skills and competencies in these areas, hence, they were able to use the data for planning and decision making. The findings are supported by Karuri, et al. (2014) and Darcy (2017), who found that health workers had minimal skills and competencies in data analysis and interpretation which affected evidence-based decision making in public health facilities. Data use at the primary healthcare level is substandard because of health providers' limited skills and knowledge of how to interpret data. The same result was found in England, where healthcare workers and practitioners lacked data management, data analysis, and data use skills at the primary care level (Arenth, 2017).

Apart from limited skills to analyze and use data, the study identified factors that hamper health providers' ability to analyze and use data in planning. Limited training results from the tendency to focus more on building the capacity of staff in managerial positions, especially at the district level, at the expense of frontline workers serving at the facility level. This may have contributed significantly to health providers not using the data they collect to make decisions, which calls for more capacity building programs for data creation, analysis, and use. Availability of data trainings, the frequency of trainings, and offering the trainings to the appropriate employees are key to successful data collection, analysis, and use. Data analysis training for health workers both at the facility and district levels ought to be prominent to inform planning and decision making. It is through data analysis that health personnel will know whether they are on track to achieve their goals. When health personnel are capacitated to analyze their data, it can also help with improving data collection and data quality in the health facilities.

Lack of computers and computer skills hinder the ability of health staff to analyze and use data in planning. Most interviewees in this study confirmed that they were unable to use computers in most cases, and when they did have access, they could not access DHIS 2 because of no or poor Internet connectivity. This challenge is in addition to providers' poor skills in using DHIS 2 software. Lack of computers, power, and Internet connectivity affect data access and the capacity to use data from DHIS 2, leading to a loss of interest in data because staff are not able to practice the skills immediately after receiving training (Nutley & Li, 2018). Lack of skills for analyzing data collected with DHIS 2 is common among health workers in East African countries, who are unable to access and extract information from this software. Karuri, et al. (2014) found very minimal use of computers among health providers in

Nakuru, Kenya. This study found that more than half (52.6%) of the respondents had never used computers to type, conduct data analysis, present data, or access the Internet. Only 15.1 percent used a computer daily. Another study conducted in Ethiopia by Mulusew (2017) indicated that the minority of respondents in public health facilities (30%) had computers and even fewer (6%) had Internet access. Although the situation reported by this and other studies is dismal, there have been some improvements with Internet access in hospitals. Yet, the Internet connection is still a significant problem at health centers and dispensaries where Internet connectivity is only 26 percent and 8 percent, respectively (MOHSW, MOH, NBS, OCGS, & ICF International, 2015).

Despite several displays on walls and notice boards indicating that data had been analyzed in some health facilities, data quality, specifically data accuracy, was found to be a major barrier to using data in planning. Health providers have no trust in the quality of data at the facility and hesitate to use it during planning. This observation concurs with the findings of a study by Njoka (2015) who reported inaccuracy of data as the major hindering factor for using routine data in decision making. In the study, 60 percent of respondents indicated that they relied on sources other than routine data to make decisions.

One of the reasons given for poor data quality in the present study was excessive workload from staff shortages in the health facilities involved in our study. Despite the fact that Tanzania's MOHSW is committed to reducing the burden on health providers of reporting to the HMIS by prioritizing data elements and expanding the use of electronic tools (MOHSW, 2017), paper-based reporting and multiple data recording books still remain major challenges in health facilities. During the study, health providers were overwhelmed and frustrated with multiple big registers for recording patients' data. These bulky data collection tools make it easier to put off data entry to attend to patients. Postponing data recording often leads to missing data—one dimension of poor data quality. It was observed that inadequate and cumbersome data collection tools, and being too busy to prioritize record keeping, affect the whole data collection process and compromise data quality.

The main argument that the present study raises is that prioritizing data elements, together with frequent and short-term in-service trainings, supportive supervision visits, and on-the-job training and mentoring, can address some of the data quality challenges at the health facility-level. Creating electronic tools and registers for data collection that are linked to DHIS 2, as well as electronic medical records, will help to aggregate data from various sources, reduce health providers' reporting burden, and improve data quality.

It is important to involve health facility providers (the very people who collect and report facility-level data) in the process of improving data collection (e.g., updating data collection forms or tools; receiving training on data collection, analysis, and use; and engaging them in decision making). Training health providers will improve their knowledge, skills and attitudes toward high-quality data and build the culture of data use in decision making. This study argues, in line with Asiimwe (2016), that data quality can be improved when data are used frequently. Poor quality data often goes unnoticed when the data is not used. Thus, data quality and information use are closely linked in that data quality improves data use, and data use is improved when the data quality is good because data are used more when users trust the quality of data.

Changing health professionals' attitudes is important for improving data quality. The study noted that some health providers feel that working with data adds extra work. When data are reported simply to meet a directive from higher authorities, service providers tend to have a negative attitude towards data collection because they don't see its value to them. This observation was noted by Nutley & Li, (2018) who indicated a similar attitude among staff. This finding implies that there is a need for behavioral change among health staff as this has a crucial impact on the way health providers use information. Health providers and other health facility staff could be motivated to collect and use data if they were provided with various incentive packages, as proposed by Braa, et al. (2012). This suggests the need for CHMTs to educate facility in-charges on the importance of performing facility-level analyses and

displaying outputs on noticeboards to share performance results. In addition, providing timely, honest, and transparent feedback about a facility's performance immediately after data have been submitted to the higher authorities can positively affect the attitude of health care providers in that facility.

LIMITATIONS

One of the main limitations of this study is the number of participants and facilities it involved. The number of recruited participants and available data did not allow us to conduct the statistical test to come up with a significant level. Nevertheless, the study managed to describe in detail both the capacity of health staff to use FP data use for planning and the available evidence of data use. Evidence of data use was limited to displays of charts and graphs at facilities, though other sources could have been explored, such as meeting minutes, ordering of drugs and supplies, and administrative decisions made based on available data. The study focused on lower-level facilities (dispensaries and health centers) leaving out the district, regional referral, and national/specialized hospitals. This has left an information gap on whether the situation observed in the dispensaries and health centers regarding data analysis capacity and use of data in decision making has any variations and/or lessons to draw upon.

RECOMMENDATIONS

Based on our findings, we recommend the following:

- Institute a capacity building program through frequent in-service trainings to health professionals. This includes regular supportive supervision visits and cascade trainings so in-charges can train frontline service providers. Excel training should be given priority.

- More facilities should be given the authority to enter data directly into DHIS 2. This would decrease the reporting burden and increase data accuracy, because DHIS 2 has some programming incorporated into the system to catch data entry errors.

- Lower-level health facilities (health centers and dispensaries) should be given first priority by the government. This should involve collaboration between the government and other stakeholders, such as the private sector, development partners and nongovernmental organizations, especially for capacity building programs that require pooling of resources. This can ensure sustainability of the capacity building programs. Sustainable programs can gradually sharpen health providers' skills and change their attitudes toward data collection, analysis, and use, and in turn, build a strong culture of data use for evidence-based planning.

- Encourage the government to embark on joint efforts with the private sector through PPP arrangements to address lack of information technology equipment such as computers and accessories. Experience shows that shortages of equipment for data collection and analysis in health facilities in Tanzania is often a result of inadequate funding. Through PPPs, more financial resources can be mobilized to finance the purchase of electronic equipment for data collection. Moreover, through PPPs, oversight and control are effectively ensured.

- Establish effective instruments (registers) for collecting patient data as a short-term measure. During the study, facility-level health providers were discouraged by the multiple books used to record patients' data, which compromised their efficiency and effectiveness in attending patients and gathering data. The MOHSW should conduct an operational study to identify which books are really needed and find ways of reducing the number of registers by aggregating data elements, hence reducing the reporting burden on health providers. As a long-term measure, the ministry should make a concerted effort to move toward electronic medical record keeping.

- To address the issue of data ownership and encourage data use at the facility level, directives must be given to DMOs and CHMTs that the data are not for CHMT use only; service providers must also share a sense of ownership so they are motivated to use the data collected at their facility to identify their needs (e.g., request more staff, justify increasing their budget, planning for drugs and commodities). This could be realized if supervisors at the district level provide regular feedback on the data, help facilities analyze the data for their needs, and give providers the opportunity to explain their data at meetings.

- Facilities need basic resources to properly serve their clients. This includes a consistent and reliable power supply and adequate staff. Districts must prioritize these things, otherwise data collection and data quality will continue to be low on providers' priority list.

- Because of poor data collection and reporting, some facilities lacked evidence to support their requests for additional resources and did not receive sufficient funding. Facilities must keep

accurate data on the number of clients seen and commodities and supplies used. This will be the evidence to support their actual operating budget.

CONCLUSION

The study sought to assess the capacity of health providers to analyze collected FP data and to document available evidence showing health service providers' use of data to prepare health plans. We observed inadequacies in the following areas: health providers' data skills capacity; availability of data collection equipment and Internet connectivity, particularly at the lower-level health facilities; a sense of data ownership; and a culture of data use. To substantiate that health providers analyze and use data in planning, we observed displays of analyzed data on walls and notice boards in only 33 percent of the health facilities studied. Data quality concerns such as data accuracy and completeness were noted as major impediments to data analysis and use. Based on the findings, we concluded that some data capacity has been demonstrated by the health facilities in terms of staff competence in analysis and use of data in planning. A weak culture of data analysis and use in decision making exists at the lower-level health facilities. This was demonstrated by few or no displays of data outputs on the noticeboards and walls of the health facilities involved in the study and the tendency noted among health facility staff to feel that they collect data for higher authorities' benefit and not for their own use.

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APPENDIX A. INTERVIEW GUIDE FOR FACILITY AND RCH IN-CHARGES

1. Region _____, LGA_____, Facility name_____, Nature of facility: (i) Health centre (ii) Dispensary

2. Age_____, Marital status_____, Level of education _____, Cadre_____, Number of capacity building workshops/seminars attended in past three (3) years _____ (Specify the type of course.)

3. For how long have you served in your current position? (Probe: Was s/he is in the position through promotion or direct hire?)

4. How many staff do you have? (Probe: Is the number of staff commensurate with the required personnel level in terms of numbers and skills?)

5. How do you collect FP data at your facility/department? (Probe: What tools are used, frequency, who collects the data, when and what kind of data is collected?)

6. Have you and/or your staff attended a course on data creation, analysis and uses of data for decision making? (Probe: (i) What did you learn from the course? (ii) Did you learn about data collection? (iii) How do you enter data into DHIS 2? (iv) How do you generate charts and reports from DHIS 2? (v) Do you create charts manually or do you display data or show trends on a piece of paper? (vi) How do you conduct descriptive analysis such as frequency, mean, median, mode, range and standard deviation? (vi) How do you create tables using Excel or create Pivot tables? (vii) Do you use the generated information from DHIS 2 to make decisions at the facility level?)

7. How does your facility access DHIS 2 FP data? (Probe: (i) Is there a specific person who has access to DHIS 2? (ii) Is connectivity at the health facility reliable? (iii) Are there challenges other than reliability and connectivity that are associated with the use of FP data from the DHIS 2 national server? (iv) Are any reports produced from the DHIS 2?)

8. What is your understanding of the improved PlanRep with Facility Financial Accounting Reporting Systems (FFARS)/Direct Health Facility Financing? (Probe: How do you use this tool for planning?)

9. How do you use the improved PlanRep with FFARS/ Direct Health Facility Financing to track the budget and manage expenditures at your facility? (Probe: How many staff in your facility have skills to use the improved PlanRep with FFARS? Where do you get the data to enter into the system to inform planning at the facility level?)

10. How do you order contraceptives and supplies? (Probe based on previous order: Clients saved per each FP method or just by estimation?)

11. How often do staff at your facility get training/capacity building workshops on data collection, analysis and use for decision making? (Probe: (i) Can you tell me roughly how many of such capacity building workshops/seminars are conducted per year? (ii) What challenges do you encounter in ensuring that staff at your facility acquire the necessary skills in data analysis and use for decision making?)

12. Do you regularly analyze the data collected in your facility?

13. In general, what challenges do you face regarding enhancing the culture of data use for evidence-based decision making in FP at your facility? (Probe: What do you think can be done to address the situation?)

MEASURE Evaluation

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