

Feedback Practices in Health Information Systems

*A case study of feedback practices in the
healthcare system of Tanzania*

Jonas Roppestad Sandstad



Thesis submitted for the degree of
Master in Informatics: Programming and System
Architecture
60 credits

Department of Informatics
Faculty of Mathematics and Natural Sciences

UNIVERSITY OF OSLO

Spring 2023

Feedback Practices in Health Information Systems

*A case study of feedback practices in the
healthcare system of Tanzania*

Jonas Roppestad Sandstad

© 2023 Jonas Roppestad Sandstad

Feedback Practices in Health Information Systems

<http://www.duo.uio.no/>

Printed: Reprosentralen, University of Oslo

Abstract

Background: Due to poor data quality in health information systems located in developing countries, massive amounts of data are not being used. Feedback has been identified as a key component in order to improve data quality and promote data usage in health information systems.

Aim: The aim of this master thesis is to 1) understand the current feedback and data usage practices within the country of Tanzania, and 2) see how these practices can be improved using the concept of transformational feedback as presented by Christon Moyo in his PhD dissertation.

Method: This master thesis presents the case of an interpretive case study performed in the local context of the healthcare system of Tanzania.

Findings: The findings presented in this thesis cover several parts of the data usage and analysis present at the district and health facility level in Tanzania.

Conclusion: The thesis provides a theoretical contribution and insight into what the current existing feedback and data usage practices are within Tanzania and how they can be improved upon by introducing the conceptual framework of transformational feedback.

Acknowledgements

Firstly, I would like to thank my supervisors, Johan Ivar Sæbø and Silvia Masiero, for their support and supervision of the work that has taken place these past two years in writing this master thesis. In addition, I would like to thank HISP Tanzania for their help and hospitality during the fieldwork in Tanzania.

Secondly, I would like to thank my family and my friends for their support during the years I have spent studying here at the University of Oslo (UiO). There have been several ups and down during these past years, which even included the COVID-19 pandemic which made me lose motivation to study and led to me dropping out. My family and friends were a tremendous help in order to regain confidence and motivation to start studying again and I will forever be grateful for that.

Thirdly, I would like to express my gratitude to the excellent and ever-friendly student association community present at the Department of Informatics here at the University of Oslo. Through my engagement in the student associations, Designforeningen ved Institutt for Informatikk (DEFI), IFI-DAGEN (dagen@ifi), and readLine, as well as countless social events hosted by the student association community, I have met many wonderful people and taken part of many great moments and experience that I will remember dearly.

Jonas Roppestad Sandstad

Contents

Abstract	i
Acknowledgements	ii
List of Figures	vi
List of Tables	vii
Abbreviations	viii
1 Introduction	1
1.1 Motivation	1
1.2 Research questions	2
2 Background	4
2.1 Health Information Systems Programme (HISP)	4
2.2 District Health Information System (DHIS2)	5
2.3 Tanzania	7
2.3.1 Introduction to Tanzania	7
2.3.2 The healthcare system in Tanzania	8
2.3.3 The History of DHIS2 in Tanzania	11
2.3.4 The District of Excellence (DoE) project	13
3 Related research & literature	16
3.1 Health Information Systems	16
3.2 Challenges with HIS and HMIS in developing countries	18
3.3 Feedback	19

3.3.1	Defining the concept of feedback	19
3.3.2	The purpose of feedback	20
3.3.3	The conventional feedback model and its limitations	20
3.4	Transformational feedback	21
3.4.1	The three dimensions of transformational feedback	22
4	Methodology and research approach	25
4.1	Interpretive research	25
4.2	Case study	26
4.3	Data collection methods	27
4.3.1	Survey	27
4.3.2	Interviews	29
4.3.3	Observation	31
4.4	Fieldwork	32
4.4.1	Timeline	33
4.4.2	Data collection during the fieldwork	35
5	Findings	39
5.1	Practices at health facilities	39
5.1.1	Data usage practices	39
5.2	Practices at the district level	41
5.2.1	Data usage practices	41
5.2.2	Data review meetings	42
5.3	DHIS2 & GoT-HoMIS	43
6	Discussion	45
6.1	Answering the first research question	45

6.2	Answering the second research question	47
6.3	Limitations	48
7	Conclusion	51
	References	52

List of Figures

1	The logo of DHIS2 (“dhis2-logo-rgb-positive”, n.d.)	6
2	DHIS2 in use at the Mtitaa Health Center in Tanzania	6
3	The flag of Tanzania (“File:Flag of Tanzania.svg”, 2018)	7
4	An illustration of the regions of Tanzania (“Tanzania”, 2023)	8
5	Meeting with officials from Bahi District Council	9
6	Illustration of the administrative pyramid of the Tanzanian healthcare system	10
7	MTUHA books at Mtitaa Health Centre	13
8	Conventional feedback model as defined in (Moyo, 2016, p. 17)	20
9	Interviewing staff at Lukali dispensary in Bahi	36
10	Different charts hung up on the wall	41

List of Tables

1	Overview of all data collection and analysis activities performed during the duration of the fieldwork	35
---	--	----

Abbreviations

- CC** City Council (as in Dodoma City Council)
- DC** District Council (as in Bahi District Council)
- DHIS** District Health Information System
- DHIS2** District Health Information System 2
- DoE** District of Excellence
- GoT-HoMIS** Government of Tanzania-Hospital Management Information System
- HC** Health Centre
- HIS** Health Information System
- HISP** Health Information System Programme
- HMIS** Health Management Information System
- IPD** Inpatient department
- IS** Information System
- KEC** Kibaha Education Center
- MoH** Ministry of Health
- MTUHA** Mfumo wa Taarifa za Uendeshaji Huduma za Afya
- NGO** Non-Governmental Organisation
- OPD** Outpatient Department
- PHC** Primary Health Care
- PO-RALG** President's Office, Regional Administration and Local Government Tanzania
- UiO** University of Oslo
- WHO** World Health Organization

1 Introduction

The following chapter is divided into two sections. The first section will give insight into the motivation behind the case study and fieldwork presented in this thesis. The second section will present the research questions that will be explored throughout the thesis.

1.1 Motivation

Health information systems situated within the context of developing countries are implemented with the purpose of generating quality data meant to be used to plan, allocate resources, develop strategies, and other decision-making tasks (AbouZahr & Boerma, 2005). The data that is present in these health information systems are poor and therefore the usage of it is quite limited especially at the district and at the health facility level within the countries (Manya et al., 2015).

Low-quality data and limited usage are therefore one of the major challenges that health information systems are facing in developing countries today. Healthcare workers at the health facility see the primary purpose of data collection to be for reporting to higher levels, such as district or regional, rather than improving the quality of healthcare provided locally at the health facilities (Simba & Mwangi, 2005).

Feedback has been highlighted by several researchers as a way to improve data quality and health information systems (Bradley, 2004). However, the dominant view of feedback is quite limited due to the conventional feedback model and its one-way transmission of information between a sender and a

recipient (Sadler, 2010).

Christon Moyo, a former PhD candidate at the University of Oslo (UiO), introduced the concept of *transformational feedback* in his PhD dissertation "*Transformational Feedback: Breaking the vicious cycle of information use in Health Information Systems-A case from Malawi*", in order to address the shortfalls and limitations of the conventional feedback model. The conceptual framework of transformational feedback and its dimensions will in this master thesis be used in order to see how the feedback and data practices of the Tanzanian healthcare system can be improved upon to further promote data usage and quality.

1.2 Research questions

The aim of this master thesis is to 1) understand the current feedback and data usage practices within the country of Tanzania, and 2) see how these practices can be improved using the concept of transformational feedback as presented by Christon Moyo in his PhD dissertation. The thesis will be centred around and seek to answer the following research questions:

RQ1: *How does transformational feedback fit within Tanzania's current feedback and data usage practices?*

RQ2: *How can transformational feedback help improve data usage and data analysis in Tanzania?*

The thesis will answer these research questions by presenting an interpretive qualitative case study performed in the context of the country of Tanzania and its healthcare system, outlining the current existing feedback and data usage practices of the different administrative levels in the administrative pyramid.

2 Background

The following chapter is divided into three sections. The first section of this chapter aims to provide an introduction to the background and history of the Health Information Systems Programme (HISP) and its purpose. The second section introduces the District Health Information System (DHIS2). The third section introduces the country of Tanzania and an overview of the health care system and the ongoing District of Excellence (DoE) project.

2.1 Health Information Systems Programme (HISP)

The Health Information Systems Programme, known as HISP, was started as a post-apartheid project in South Africa in 1994/1995 as a collaborative research and development project consisting of three universities (the University of Oslo (UiO) from Norway, the University of Western Cape and the University of Cape Town from South Africa) together with national and provincial departments of health in South Africa together with several NGOs (Stoops et al., 2001). The aim of the project was to create and provide an integrated and decentralised health system in order to reconstruct the fragmented South African health sector by creating a district-based health system that was to be supported by a district health management information system (Adu-Gyamfi et al., 2019). The strategy that was adopted in order to achieve this was through *tools and data standardisation, the development of essential data sets and a software application to support its implementation.* (Adu-Gyamfi et al., 2019). This led to the development of software with the name District Health Information System (DHIS) which was introduced on

a national scale in 2001. The software was considered a huge success and set off similar initiatives in countries like Botswana and Sierra Leone.

The overall goal of HISP is to enable and support countries to further strengthen their health information systems. Today, the HISP initiative consists of 20 regional and independent HISP groups around the world in addition to the HISP Centre located at the University of Oslo and creates with a wide variety of ministries of health, NGOs, donors, and policymakers a global network (Adu-Gyamfi et al., 2019). HISP is currently actively developing and supporting the successor to the DHIS software known as DHIS2.

2.2 District Health Information System (DHIS2)

The District Health Information System 2, more commonly known as DHIS2, is a web-based and open-source platform most commonly used as a health management information system (HMIS). The DHIS2 system is today used in over 76 low and middle-income countries located primarily in the global south. With approximately 3.2 billion people living in these countries, it is safe to say that the DHIS2 system is considered to be the most used health management information system in the world today (“About DHIS2”, n.d.). One of the key features of DHIS2 is its open-source nature. DHIS2 is released to the public as free and open software. Anyone with an interest is able to access, modify and redistribute the software and source code freely as long as one upholds the requirements for the terms of usage in the BSD-3-clause license (“The 3-Clause BSD License”, 2011).

Due to the usage of DHIS2 in so many different parts of the world and its



Figure 1: The logo of DHIS2 (“dhis2-logo-rgb-positive”, n.d.)

rapid growth, DHIS2 is designed to be an abstract system and therefore the system can be quite generic as it is not designed for any specific use case or context (Gizaw et al., 2017). In creating a generic core software, the implementation and configuration of the DHIS2 system are left to the local contexts (Li & Nielsen, 2019). This allows the software to be widely adopted in a wide range of possible use cases and local variations.

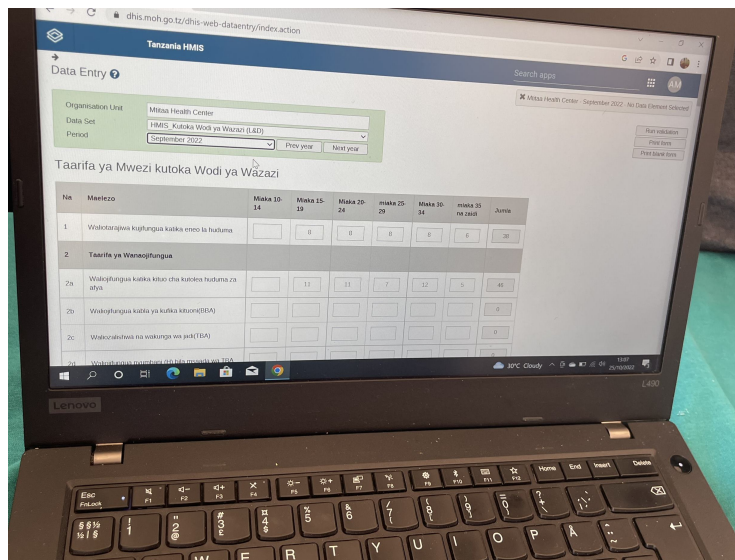


Figure 2: DHIS2 in use at the Mtitaa Health Center in Tanzania

2.3 Tanzania

2.3.1 Introduction to Tanzania

The case study in this thesis took place in the nation of Tanzania, officially known as the United Republic of Tanzania. Tanzania is a tropical country, formerly a German and later British colony, located on the eastern shore of the African continent, just south of the equator line (“Brief History — Tanzania Embassy in Berlin, Germany”, n.d.). Tanzania is bordering several other countries such as Burundi, the Democratic Republic of the Congo, Kenya, Malawi, Mozambique, Rwanda, and Uganda (Hem & Benjaminsen, 2023). Tanzania is home to both of Africa’s largest lakes, Lake Victoria, and the highest mountain on the African continent Mount Kilimanjaro.

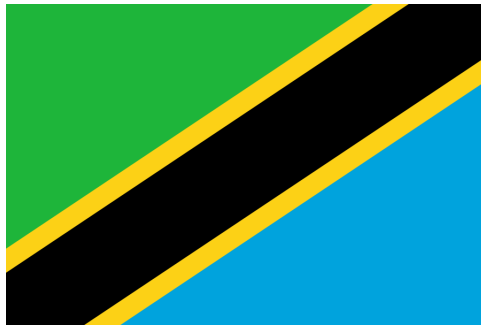


Figure 3: The flag of Tanzania (“File:Flag of Tanzania.svg”, 2018)

According to a new census published by the National Bureau of Statistics in October 2022, Tanzania is home to over 61.7 million people, with almost 60 million living on the Tanzanian mainland with just short of 2 million living on the island of Zanzibar (“Census Information Dissemination Platform”, 2022). Tanzania is split into 31 regions as depicted in Figure 4. The nation’s capital, as of 1996, Dodoma is located centrally in the country with the most

populous city and former capital Dar es Salaam, located to the east along the shore. There are approximately 130 languages spoken in the country even though the official languages are Swahili and English (Hem & Benjaminsen, 2023).



Figure 4: An illustration of the regions of Tanzania (“Tanzania”, 2023)

2.3.2 The healthcare system in Tanzania

The healthcare system in Tanzania is organized hierarchically into 4 levels, ranging from national levels at the top, then regional levels, district levels, and then finally the health facility level. The national level is the responsibility of the Ministry of Health (MoH), located centrally in the capital of Dodoma, and their main goal is to ensure that Tanzania has a *“healthy society with improved social well-being that will contribute effectively to individual*

and national development” (“Mission and Vision—Ministry of Health”, n.d.). Underneath the MoH, is the regional offices. The regional offices’ role is to ensure a good healthcare system in the districts of the region.



Figure 5: Meeting with officials from Bahi District Council

Beneath the regional offices, there are the districts. The role of the district level is to oversee and manage the different health facilities located within the district. The healthcare system in Tanzania is largely decentralized, and therefore the districts are empowered to set priorities and are responsible for the implementation of health services in addition to supervising the individual health facilities on a monthly basis (Manzi et al., 2012). The district level is the main operational unit responsible for the implementation of primary

health care (PHC) and acts as the hub for the flow of collected health data from the health facilities and all the way to the MoH at the national level (Kimaro & Nhampossa, 2004). Each district is supposed to have a district hospital, but in areas where this is not in place then NGO or faith-operated hospitals are usually designated as the district's hospital. At the bottom of the administrative pyramid are the health facilities themselves, referring to both health centres and dispensaries. The tasks and services provided at these two types of health facilities are similar, but the health centres provide more services to the surrounding community compared to a dispensary.

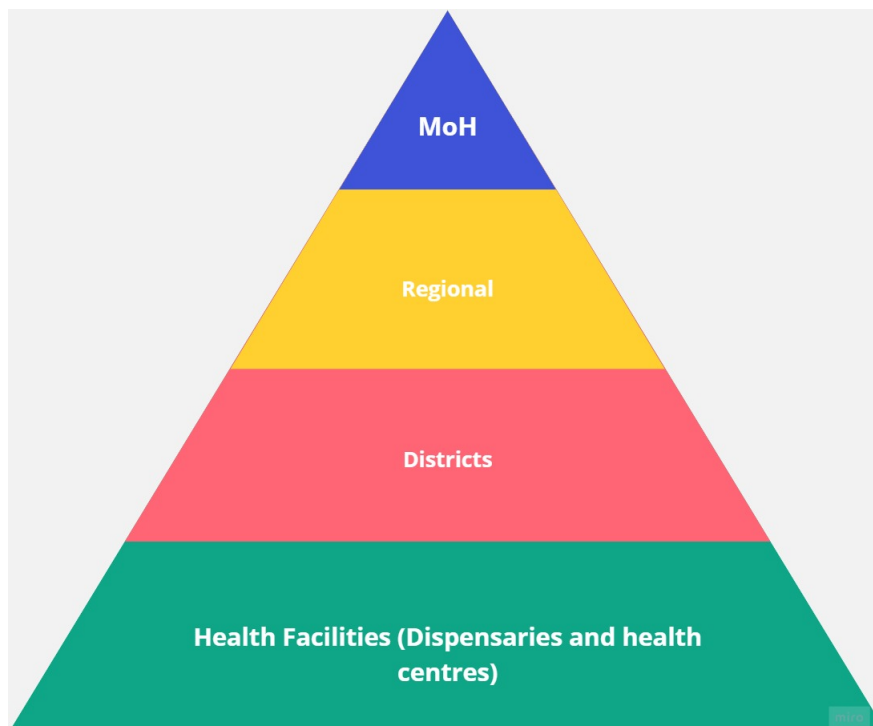


Figure 6: Illustration of the administrative pyramid of the Tanzanian health-care system

A dispensary is typically situated in more rural environments in remote vil-

lages and delivers the most peripheral service delivery for approximately 5.000-10.000 people (Manzi et al., 2012). The services provided at dispensaries are typically outpatient treatment (OPD), vaccination and immunization, child health, family planning, child delivery, and antenatal and postnatal care. At dispensaries, there are not any medical doctors present, and the staff typically consists of a handful of nurses and clinicians. A health facility is more centralized in its location than a dispensary and is typically expected to serve approximately 50.000 people from the surrounding communities (Manzi et al., 2012). Health centres provide all the services of a dispensary. However, the main differences are that health centres have the possibility for inpatient care through their inpatient department (IPD), health centres can often provide more specialized services such as dentistry and have a higher number of trained staff including medical doctors at their disposal.

2.3.3 The History of DHIS2 in Tanzania

During the 1990s, the Tanzania Mainland's first health information system (HIS) started out as a paper-based and electronic system and was used at health facilities and the district offices ("Tanzania Integrated Health Information Architecture", n.d.). The system was known by the Swahili name "Mfumo wa Taarifa za Uendeshaji Huduma za Afya" (MTUHA), and was developed by a company based in the city of Dar es Salaam (Nguyen & Mahundi, 2019). The system consisted of a set of 12 books for registering and reporting (Wilms et al., 2014). Due to the surge in demand for a HIS, the MoH was put under strain, which led to a lack of coordination resulting

in several vertical projects running side by side. This was not a sustainable situation and it caused efforts to be duplicated as the results of the efforts were not converged with each other (“Tanzania Integrated Health Information Architecture”, n.d.). The MTUHA system was simply not flexible enough to handle the changing requirements of the Tanzanian health sector (Nguyen & Mahundi, 2019).

In 2010, the MoH alongside several other implementing partners such as UiO, created the Monitoring and Evaluation Strengthening Initiative. The vision of the Monitoring and Evaluation Strengthening Initiative was to “...*have a comprehensive platform for health information, evidence-based decision-making, and accountability for results.*” (Simba et al., 2022). The key objective was to introduce DHIS2 into the Tanzanian healthcare system. DHIS2 was introduced in 2010, and during a timeframe of three years at the end of 2013, the DHIS2 system was implemented in all the districts in Tanzania and collecting and processing all the routine aggregate health data that had been collected from both public and private health facilities on a monthly basis (Simba et al., 2022). Even though DHIS2 has phased out the MTUHA software, the MTUHA paper books are still frequently used by health facilities in the districts that don’t have access to reporting to their respective district through the DHIS2 system and therefore have to report using the books. Only certain health centres have this possibility due to access to a computer or tablet and usually have one person that has received training for data entry in DHIS2

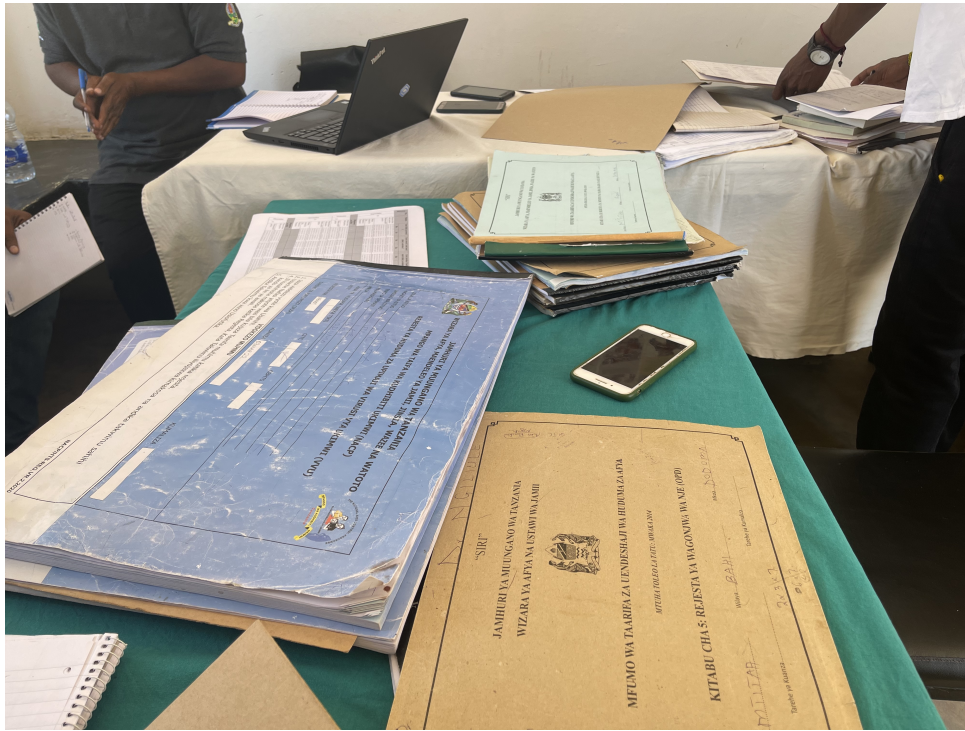


Figure 7: MTUHA books at Mtitaa Health Centre

2.3.4 The District of Excellence (DoE) project

An ongoing project in Tanzania is the District of Excellence (DoE) project. The project is a collaboration between HISP Tanzania, MoH, and the President's Office, Regional Administration and Local Government Tanzania (PO-RALG) and began in January 2022. The main objective of the DoE project is to *"strengthen Tanzania HIS through establishing a learning environment where approaches and products will be developed and tested, collaboratively by stakeholders, test experiences, share knowledge and skills generation"*.

The DoE project was initiated due to the lack of venues for testing different approaches after the national rollout of DHIS2 back in 2014. Therefore the

DoE project was created in order to test, implement, and extract useful knowledge from different initiatives. There have been identified four thematic areas for the DoE project: *data management and information use, digital innovation, capacity development, and research and documentation.*

The area regarding data management and information use is driven forward by HISP Tanzania, MoH, and the PO-RALG by striving to enhance data management and use for decision-making in the health sector at different levels through revising approaches and processes as well as developing and customizing digital solutions. For digital innovation, the aim is to improve the service delivery, management of data, and the usage of information for decision-making at all levels in the administrative pyramid. In order to achieve the desired level of data management and usage by managers and health service providers to further build on the capacity development, two sets of capacity-building training sessions on digital solutions and on the different tools and procedures. Research and documentation will be done by working closely with local and international universities and research institutions (such as UiO) to best examine existing tools and approaches, proposing new appropriate ones and then documenting the best practices for further development. This will be done through applied research and through documentation and knowledge dissemination.

During our visit to Tanzania, we visited the two chosen districts for the DoE project, namely Dodoma City and Bahi District. It is in these two districts all of the data collection for this thesis was performed. The Dodoma City district is located within the city of Dodoma and serves a more urban population, while the Bahi District is situated a couple of hours of driving to the

east of Dodoma and is a rural district serving people living in villages. The districts were chosen based on primarily two factors, location and performance. Firstly, having districts close to the location of the MoH was useful in order to better monitor the districts. Also, having one district be urban and the other rural, they can test out different approaches as an approach made for urban districts might not have the same effects in rural districts and vice versa. Secondly, the two districts had scored quite high on performance charts for a long time and it showed that Dodoma City and Bahi were doing things correctly and therefore already had good practices that other districts and regions could learn from in order to strengthen their local healthcare service delivery.

3 Related research & literature

This chapter is divided into four sections exploring the related literature and research surrounding the concept of information systems and feedback. The first section will look into the history and what information systems are. The second section will explore the challenges that health information systems in developing countries are facing. The third section will go in-depth into what feedback is, and what feedback is used for. It will also explain the simple feedback model. The fourth section of this chapter will introduce the concept of transformational feedback and its dimensions.

3.1 Health Information Systems

The research field concerning the study of information systems (IS) has roots all the way back to the 1960s and can be viewed as a collection of several different research fields such as computer science, management and organization theory, operations research, and accounting (Hirschheim et al., 2012). According to the World Health Organization, an information system can be defined as a *"... system that provides information support to the decision-making process at each level of an organization"* (World Health Organization. Regional Office for the Western Pacific, 2004, p. 3). It is important to remember that even though the research field itself didn't really exist before the 1960s, information systems have existed for several thousand years back to the Roman times and are not directly connected to the invention of computers (Watson, 2014). An information system can generally be defined as a sociotechnical system created in order to collect, process, store, and distribute

information and consist of both human and technical elements. Information systems need to be understood from both a technical and a social perspective due to the fact that information systems consist of such elements as the technical specifications of data systems and the practices and cultural differences between the humans working within the information system itself. The technical and human elements can not be studied by themselves as they do not exist within a vacuum, but need to be understood as a part of a wider sociotechnical context in which they exist.

A health information system (HIS), or alternately a health management information system (HMIS), is a form of information system concerned with the collection, processing, storing, and distribution specifically of health information. As mentioned earlier in this thesis, the DHIS2 system is a form of health management information system. The World Health Organization (WHO) defines a health information system (HIS) as a *"... system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services"*(World Health Organization. Regional Office for the Western Pacific, 2004, p. 3). WHO also defines a health management information system as *"... information system specially designed to assist in the management and planning of health programmes, as opposed to delivery of care"*(World Health Organization. Regional Office for the Western Pacific, 2004, p. 3).

3.2 Challenges with HIS and HMIS in developing countries

There are a lot of expectations placed upon a health management information system, especially in the case of developing countries. Health management information systems in developing countries need to be robust in areas with lacking infrastructure and needing to tackle several different diseases and natural catastrophes and disasters. In areas and settings that are considered *poor in resources*, a good health management information system is crucial to the health of the population (Wilms et al., 2014). Growing population rates and the abundance of different diseases in these areas cause ever-increasing demands and expectations of these systems paired with funding that has stagnated or even decreased, leading to a situation that is unsustainable (Wilms et al., 2014).

"It is not because countries are poor that they cannot afford good health information; it is because they are poor that they cannot afford to be without it." (AbouZahr & Boerma, 2005, p. 582)

Expanding upon the funding, health information systems in developing countries see increased fragmentation due to the introduction of new health information systems as a result of donor funding targeting specific areas rather than the broader picture, causing several health information systems to be created that are not integrated with each other (J. Braa et al., 2007). This can lead to overlapping efforts and poor use of resources that could have been

avoided.

Health information systems located in developing countries also face challenges tied to poor infrastructure in the country. The challenges can be technical such as lack of electricity and an internet connection, to more general infrastructure problems that impact the society as a whole such as lack of a good road network and poor transportation options.

3.3 Feedback

3.3.1 Defining the concept of feedback

The concept of feedback has existed for a long time and spans multiple research fields such as education, (Hattie & Timperley, 2007) and (Shute, 2008), and organizations and management, (Ilgen et al., 1979) and (London & Smither, 2002). As the concept of feedback is present in so many different fields, there can be several definitions of feedback as a concept. From the perspective of management and organizations, Ramaprasad defined the feedback concept as *"... information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in some way."* (Ramaprasad, 1983, p. 4). This highlights the importance of feedback in order to align the actual level and the reference level closer to each other. Also from the organizational perspective, London and Smither conceptualize feedback as *"... part of a longitudinal performance management process influenced by, and contributing to, the individual's feedback orientation and the organization's feedback culture."*(London & Smither, 2002, p. 81). From an educational perspective, Hattie and Timperley conceptualize feedback as

a piece of information that one receives from an *agent* (such as a teacher) regarding one's understanding or performance (Hattie & Timperley, 2007).

In information systems (IS) literature, feedback is viewed as a key component (Baker, 1995). However, the literature that is available regarding the design and the implementation of health information systems (HIS) focuses largely on the collection and the analysis of data, but rarely on feedback in order for improving these health information systems (Lippeveld et al., 2000).

3.3.2 The purpose of feedback

According to Hattie and Timperley, the main goal and purpose of feedback are to *"...reduce discrepancies between current understandings and performance and a goal."*(Hattie & Timperley, 2007, p. 86). This can be alternately viewed as how we can improve our performance of a task from our current performance of it to the desired performance. Feedback is what helps us understand how we can improve and in which areas we are lacking in order to close this gap further.

3.3.3 The conventional feedback model and its limitations

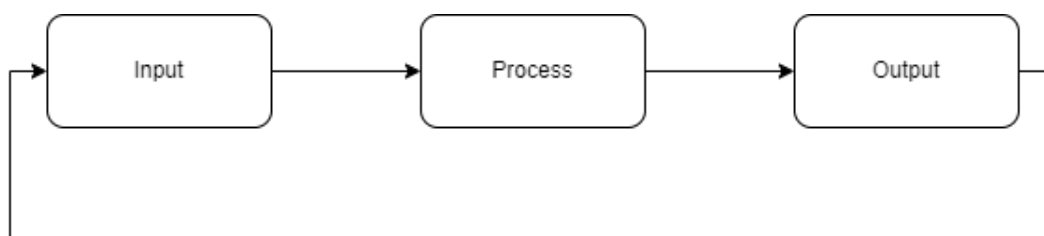


Figure 8: Conventional feedback model as defined in (Moyo, 2016, p. 17)

The view of feedback that is dominant in organizations today is what can

be viewed as the "simple feedback model". (see Figure 8). This model can be explained as a one-way transmission of information from a sender to a recipient regarding their performance (Moyo, 2016). The sender creates an input that is sent to the recipient who processes the input and generates an output which is sent back to the original sender in order to create a new input and therefore creates a cyclical process.

This conventional view on feedback has been challenged by several researchers due to the limitations caused by the one-way transmission of data between a sender and a recipient. According to Sadler, 2010, feedback should not be this one-way transmission, but it should rather create new forms of actions and interactions between the sender and recipient with the aim of sharing both experiences and observations with each other (Sadler, 2010).

3.4 Transformational feedback

Christon Moyo, a former PhD candidate at the University of Oslo (UiO), introduced the concept of *transformational feedback* in his PhD dissertation "*Transformational Feedback: Breaking the vicious cycle of information use in Health Information Systems-A case from Malawi*", in order to address the shortfalls and limitations of the conventional feedback model. Moyo defines *transformational feedback* as the following:

"...a process of creating changes in group and/or organizational performance by increasing information transparency to improve relevance, accessibility and accuracy of data; promoting two-way dialogue leading to mutual conversation and participation among

actors; and establishing networking for learning to develop skills and practices.” (Moyo, 2016, p. 26)

The concept of transformational feedback is then broken down into three dimensions that are fundamental to ensuring transformational feedback.

3.4.1 The three dimensions of transformational feedback

Moyo describes transformational feedback as consisting of three dimensions: *the information transparency dimension, the two-way dialogue dimension, and the network for learning dimension.*

The information transparency dimension is defined as:

”... information transparency concerns making relevant and accurate information accessible; interpreted and understood by the users. It is not only about the availability of information, but also the active participation of stakeholders in identifying the information they need.” (Moyo, 2016, p. 30)

This dimension is concerned with the availability and accessibility of information. Having these attributes is key to making information and processes transparent. The most important of the two is the attribute of accessibility. Good accessibility of information for the users of the information is key to making the information used in a wider capacity as it is able to be understood by its users and therefore they are more likely to engage with said information. Accessible and available information is fundamental in stake-

holders being able to identify and understand what information is relevant for them and their work and thus promoting the usage of information.

The two-way dialogue dimension sees feedback as:

”... a dialogical and two-way process that involves interactive engagement among actors within a shared context of understanding. The two-way dialogue is adopted as an attempt to deal with the limitations of the one way transmission of feedback.” (Moyo, 2016, p. 32)

The dimension of the two-way dialogue focuses on the interaction and participation among peers in the form of open communication in order to increase their understanding and solve common problems. This is to specifically address the one-way transmission of information that is present within the conventional feedback model, and through communication that goes both ways it limits this from happening. Two-way dialogue is also important in one getting feedback from their peers and this provides further skills acquisition and feedback dialogue.

Moyo defines the network for learning dimension as:

”The networking for learning dimension of transformational feedback is concerned with strengthening the networks among the various actors. It builds capacities for learning by supporting skills development in problem solving, team building and networking

as well as strengthens behavior at organizational level. It also encourages interaction and collaboration based on the common interest of the actors with emphasis on organizational or group performance.”(Moyo, 2016, p. 34)

This dimension is focused on creating and facilitating networks for learning. Networks among people promote and facilitate learning processes, sharing knowledge and experiences among the participants of the network. Networks for learning build trust and relationships between individuals as well as organizations. Networks promote dialogue between the participants and it enables the sharing of information among them leading to information transparency through making information accessible and available. Networks for learning also encourages collaboration between actors based on common interest or problems.

4 Methodology and research approach

This chapter will focus on the methodological approach and the empirical research process performed in this case study. The first section will detail the research strategy that was adopted. The second section will focus on the methods used for data collection and analysis techniques. The third section will detail the data collection in practice during the fieldwork.

4.1 Interpretive research

The approach and the application of research methods presented in this thesis are based upon the interpretive research paradigm (Walsham, 2006). In the realm of the interpretive research paradigm, the researchers "... *assume that access to reality (given or socially constructed) is only through social constructions such as language, consciousness, shared meanings, and instruments.* (Myers, 2013, p. 67). The interpretive research paradigm seeks to gain an understanding of phenomena through the meanings people assign to that phenomenon through *inter-subjective understanding* that is generated and developed over the course of the fieldwork that the researcher takes part in (Verne & Bratteteig, 2018). Therefore, interpretive research does not view the world and our knowledge of it as objective, but through our own understanding of it through our own lens and is more subjective in its nature. One could say that in interpretative research, one seeks to interpret the meaning of someone else's interpretation of a phenomenon through the actions and descriptions provided by them. As in this thesis, we seek to understand the human aspects and understandings, and therefore basing the research in

this thesis on a positivist research paradigm would be inappropriate, as the positivist paradigm considers the understanding of the world to be objective in its nature and can be described independently of the researcher (Verne & Bratteteig, 2018). That makes the positivist approach typically seen in natural sciences to be inappropriate in situations concerning human beings as we all interpret different situations in different ways and therefore there can't be an objective understanding of the situation at hand (K. Braa & Vidgen, 1999).

4.2 Case study

The topics and themes which will be investigated in this study are best suited to be based on a form of qualitative and interpretive case study. A case study can be defined as the following: *"A case study is a bounded study of a phenomenon in its real context. The researcher often studies a naturally occurring setting using the methods of interview, observation and document analysis for data collection"* (Verne & Bratteteig, 2018, p. 94) While DHIS2 is used in over 76 different countries, the implementation and usage differ from country to country depending on the local context and their demands and needs of a health management information system. This study will therefore be in-depth and focus on a singular country's implementation of DHIS2 and the data usage practices and how they are adapted to fit this local context, making the study suitable to be a case study. Since the fieldwork part of the study was only around 1 month, it makes the study not very suitable for an ethnographic study as it typically takes a longer time in order to fully submerge into the local context.

4.3 Data collection methods

4.3.1 Survey

Surveys are a form of quantitative data collection methods. This form of data collection is suitable to collect a lot of data from a lot of people in order to create a large sample size (Myers, 2013). However, the main downside of quantitative data collection is that the social and cultural aspects are lost in the process. Since this thesis seeks to understand the human element, qualitative research methods were used the most, but we found a survey to be an appropriate first step in gaining a generalized understanding of DHIS2 and metadata package use due to the ability to receive several answers in a short time frame.

A survey was the first form of data collection that was conducted during this study and took place in late spring 2022. Surveys as a method allow us to contact and receive replies from several relevant respondents that can give us more knowledge on how DHIS2 and metadata packages are currently being used in different countries. The fact that one can collect data from many respondents at the same time, makes this method suitable for the first method of data collection.

Those who were invited to respond to this survey are people who do work related to DHIS2 and the implementation of the metadata packages in relevant countries that we know are using the metadata packages to some degree. We believed these were the correct people to begin talking to as they are the closest with DHIS2 and the metadata packages implementation, so they were likely to have answers to the questions we have created for this first round

of data collection as the questions revolve around the implementation side of things.

The survey was created and hosted using the Nettskjema service offered by the University of Oslo (UiO). The reasoning behind using this service is several. Firstly, as students at the University of Oslo, we have free access to this service. Secondly, the service is very well suited for collecting and storing data in a safer way in regard to privacy compared to other more popular services for creating surveys such as Google Forms. Thirdly, Nettskjema offers a wide range of user guides for ensuring that the respondent's privacy is kept intact and their personal information, should there be any that is relevant to the study, is collected, stored, and deleted in a proper way with regards to applicable laws and regulations.

By conducting this survey, we hoped to gain some answers on how the DHIS2, the metadata packages, and any potential changes they have made have been implemented. Since we at this point in time know little about how the metadata packages are currently implemented and used, the questions in the survey are exploratory in nature. The surveys begin very briefly with some information regarding the respondent and their role. Then there are questions regarding the background of the implementation of DHIS2 and the metadata packages. For each installed metadata package there will be questions regarding data capture, training and capacity building, and support.

The questions in the survey are comprised of several different types of questions that can be found in the Nettskjema service as described earlier. The ones used in this survey are free text, multiple choice, and yes/no questions

depending on how we want the respondents to answer the questions as some are suited better for certain questions than others. The survey is set up in a way that some respondents will get more questions than others. This will be based on the answers that the respondents give. If one respondent answers that they are in fact using the metadata package for tuberculosis (TB), then they will get extra questions related to that specific package. If another respondent answers that they are not using the package, then they won't be asked any extra questions related to that specific package as it is not relevant.

4.3.2 Interviews

The most used form of qualitative data gathering used in this case study has been qualitative interviews. Specifically in the form of semi-structured interviews. Interviews allow us to gather rich data from the participants that are located in various roles and situations (Myers, 2013).

Semi-structured interviews are a form of interview that allows the researcher to be able to follow pre-set questions or themes in order to guide the conversation between the interviewee and the interviewer. However, because of one advantage to using the semi-structured interview format, the interviewer is able to ask different questions that may not be a part of the current pre-set interview guide in order to gain further insight into topics and themes that may come up during the interview that could be interesting to follow up (Myers, 2013). This advantage could also be seen as a disadvantage when it comes down to comparability and generalizing two or more interviews, due to the fact that if the interviewer asks the interviewees different questions,

the comparability between them is lowered.

This method was mainly used when gathering data from people developing and implementing DHIS2 in Tanzania and with others who have a role with more oversight and is more managerial in nature which is typically found in higher positions within Tanzania's administrative health pyramid. These groups of individuals provide information on how the packages might have been changed in order to i.e., comply with local laws, whether all the data collected in the specific packages are relevant to Tanzania's local context, or if there are other reasons for adapting the packages. Since they are also higher up in the system, they can provide insight into if the packages do promote increased data usage and quality for decision-makers and maybe how decision-makers act on the information provided by the metadata packages.

However, semi-structured interviews were also used to gather data from people in lower positions in the administrative health pyramid who is typically closer to the individual patients themselves like health workers who might use the DHIS2 system for data entry locally at the health facilities themselves. The insight these people provide was interesting in order to gain some insight into whether the DHIS2 system has been changed in any way in order to accommodate potential issues they experience on the health facility level. By interviewing people both high and low in the administrative health pyramid, we get an interesting dynamic between a group that collects data in accordance with the rules and guidelines from people higher up in the system, and the group that receives and analyses the data from the lower groups and uses it to make new laws and regulations in addition to new rules and guidelines for how the lower group collects the data.

4.3.3 Observation

Another qualitative method that was used in addition to interviews was observation. We used both regular observations in addition to participant observation. The differences between the two can be defined as regular observations involving little to no participation from the researchers during the activity that is being observed, where participant observation does include this form of intervention (Myers, 2013).

In interviews, the interviewee might tell the interviewer how they perform a specific task within the system. However, we don't know whether or not they are performing the specified task correctly or as the interviewee explained. Including observation in the data collection allows us to see exactly how people interact with the system, we can see how specific tasks are performed and can get an understanding of what they are struggling with when interacting with the system.

The groups of people that were observed were people placed lower on the administrative health pyramid who typically work at health facilities/clinics and collect and enter data into the DHIS2 system, but we also observed data review meetings and other meetings held at the district level. Observing can help give more context to the answers in the semi-structured interviews done with the same group of people. It allows us to see the data collection and entering in an actual setting. During our interview and observation sessions with healthcare workers at the health facilities, we typically practised participant observation with them performing tasks in DHIS2 while explaining to us the steps they're taking and us asking further questions as well as showing

them additional functionality within DHIS2. We also performed participant observations during a 2-day conference held by HISP Tanzania where we together with representatives from the districts worked on and discussed topics in relation to the ongoing DoE project in Tanzania and the current results and plans for the future. Regular observations were held when we participated in weekly and quarterly data review meetings hosted by the districts as we wanted to gain an understanding of how these meetings functioned in practice.

4.4 Fieldwork

In collaboration with four other master students from the University of Oslo also doing research on the usage of DHIS2 in Tanzania, we travelled down to Tanzania in the autumn of 2022. Simultaneously, 3 students travelled to the nearby country of Rwanda to research similar topics as we did in Tanzania. The fieldwork conducted in Tanzania happened over a time frame spanning from the beginning on the 16Th of October 2022 until its conclusion 29 days (4 weeks) later on the 14Th of November 2022. The fieldwork happened quite early in the research process. As a consequence of that, the scope of the data collection was rather broad. In addition, our group of five students were actually two groups of 3 and 2 students combined, both researching similar and related, yet different topics. This broadened the scope of data collection even further. This allowed us to explore a wide variety of topics related to the health system and DHIS2 usage in Tanzania, such as how DHIS2 is implemented, how training of health care personnel is conducted, and how is the data flow between the district level and the health centres.

The main goal of conducting the fieldwork was to get a first-hand understanding of the usage of DHIS2 and the healthcare system in Tanzania. In order to achieve this goal, we met and interacted with a number of representatives such as implementors of the DHIS2 system, nurses and doctors in health centres, and high-level officials from district management and the Ministry of Health (MoH) This was done in order to get an understanding of the tasks and issues these people face in their daily work. Each of our visits to either health centres, city councils, and district management consisted of activities such as interviews and observations. Several times during the fieldwork, we gathered to compare our notes and thoughts with our travel partners.

4.4.1 Timeline

During the fieldwork in Tanzania, we had several scheduled meetings as detailed in the following table below. The table contains the activities we performed, what the purpose of the activity was, where in the health care system of Tanzania the meeting/data collection took place, the location, and the date on which the activity was performed.

Timeline of Activities				
Activity	Type	Level	Location	Date
HISP TZ Introduction	Meeting	HISP TZ	Dar es Salaam	18.10
Meeting with MoH	Meeting	MoH	Dodoma	19.10
Group meeting 1	Meeting	N/A	Dodoma	20.10
Regional Office	Meeting	Regional	Dodoma	21.10

Bahi DC	Meeting	District	Bahi District	21.10
Dodoma CC	Meeting	District	Dodoma City	21.10
Regional Office	Meeting	Regional	Dodoma	22.10
Lukali Dispensary	Data collection	Dispensary	Bahi District	24.10
Mudemu HC	Data collection	Health Centre	Bahi District	24.10
Mtitaa HC	Data collection	Health Centre	Bahi District	25.10
Nkhome Dispensary	Data collection	Dispensary	Bahi District	25.10
Group meeting 2	Meeting	N/A	Dodoma	26.10
HISP TZ Conference	Conference	HISP TZ	Dodoma	27.10
Group meeting 3	Meeting	N/A	Dodoma	27.10
HISP TZ Conference	Conference	HISP TZ	Dodoma	28.10
Group meeting 4	Meeting	N/A	Dodoma	29.10
Mkonze HC	Data collection	Health Centre	Dodoma City	31.10
Kikuyu Dispensary	Data collection	Dispensary	Dodoma City	31.10
Data Review meeting	Meeting	District	Dodoma City	01.11
Chamwino Dispensary	Data collection	Dispensary	Dodoma City	02.11
Makole HC	Data collection	Health Centre	Dodoma City	02.11
Group meeting 5	Meeting	N/A	Dodoma	03.11
Group meeting 6	Meeting	N/A	Dodoma	07.11
Group meeting 7	Meeting	N/A	Dar es Salaam	10.11
HISP TZ	Meeting	HISP TZ	Dar es Salaam	10.11
HISP TZ	Data collection	HISP TZ	Dar es Salaam	11.10

Table 1: Overview of all data collection and analysis activities performed during the duration of the fieldwork

4.4.2 Data collection during the fieldwork

Over the course of the fieldwork, we had several scheduled activities together with health officials, doctors/nurses, and members from HISP Tanzania. On the health facility level, we visited four health centres and 4 dispensaries spread across the two districts of Bahi and Dodoma City.

During our visits to the different health centres and dispensaries located in both Bahi District and the Dodoma City Council District, we mostly focused on gathering data from the doctors, nurses, and assistants at those facilities. The main tasks for this group were to receive patients and make a diagnosis of what the problem is or could be, and treat the patient accordingly before recording the patient data either directly into the DHIS2 system or in specific specialized logbooks designed by the MoH. We identified this as a key group in understanding the data and feedback flow from the upper levels in the districts and down to the lower levels which are the health facilities such as health centres and dispensaries.

When interviewing this group, we focused on a couple of themes to guide the conversation. These topics were the patient data collection process, workload, training, and feedback from upper levels in the health care system. The interviews were held as group interviews with all five of us from the University of Oslo and one or two representatives from HISP Tanzania. The healthcare

workers at these facilities typically only spoke Swahili, but sometimes a bit of English if they felt that they could understand and answer the questions. Therefore, one of the representatives from HISP Tanzania had to be present for translation and for the sake of practicality, the interviews were held by the whole group together. The health facilities were typically represented by 2-4 members of the local staff.



Figure 9: Interviewing staff at Lukali dispensary in Bahi

After and during the interviews, we conducted observations. Observations were, in this case, used in order for us to gain further understanding of how the healthcare workers perform their day-to-day tasks and how they interact with the tools provided for the upper levels such as DHIS2 and the logbooks

for recording patient data. We wanted to see for ourselves how healthcare workers interacted with the tools and not just base our understanding on what was said during the interviews. This proved useful several times during the data collection process. Firstly, as mentioned earlier, there is a language barrier between us and the healthcare workers. The healthcare workers spoke primarily in Swahili and sometimes a little bit of English. This resulted in some of the representatives from HISP Tanzania translating for us. This has the unfortunate side effect that important details and key distinctions could be lost in translation. Secondly, it is not always as easy to describe how one performs a task compared to demonstrating it. Lack of the correct words to describe the performance can result in misunderstandings and by demonstrating you can ensure that the information is being transmitted as intended to the recipient.

In addition to using the observation method during the interview sessions, we also go to participate in several meetings held by the district-level management such as weekly and quarterly data review meetings. Observation proved useful here as we could then get a closer look at how the meetings were typically held without us interrupting the process. The meetings were also typically held in a mix between Swahili and English, depending on what language the participants felt the most comfortable using, but the slides containing the presented data were written in English.

The data collected was collected by writing down notes in a notepad during the interviews and observations. The presence of many participants speaking multiple languages during the interviews and observations made recording them for later analysis difficult. The presence of some sensitive information

at the locations in addition to the patients visiting the health facilities made it more considerate to write down notes instead.

5 Findings

The following chapter will present the findings of the fieldwork and research conducted into the feedback practices in the Tanzanian healthcare system during our four-week stay.

During our four weeks of fieldwork in the Dodoma City and Bahi districts of Tanzania, we found quite a bit regarding feedback practices within the Tanzanian healthcare system.

5.1 Practices at health facilities

5.1.1 Data usage practices

As mentioned earlier, the health facilities, such as health centres and dispensaries, are primarily focused on treating patients through outpatient care, child delivery, and family planning as well as inpatient care and more specialized services at the health centre locations. The health facility's task is to see the patient and make a diagnosis of what is causing issues for the patient. Then the patient data and diagnosis, along with prescribed medications, are logged in MTUHA books at most dispensaries and health centres that will be handed to the district officials at the end of the month. Some health centres with the necessary training and access to the DHIS2 systems are able to enter the data directly into DHIS2 and submit the data to the district officials through that system instead of filling out the MTUHA books.

When it comes to data usage practices at the health facility level, the usage of the data is limited. The data that is used the most is data concerning

the stock of medicine and medical equipment at the health facility in order to order more in case of a shortage. Data usage and analysis regarding patients and diagnoses, such as how many were diagnosed with malaria this past month compared to the month before, is limited. This type of data is typically sent to the district level and comes back to the health facility through charts that have been developed by the district and hung up on the wall for the workers to read. However, in some cases, the health facilities use the data, such as if the number of pregnancies in the surrounding area has been higher than expected, the health facility will talk with the community while promoting contraception and visiting the health facility for antenatal care and family planning. When it comes to the analysis of the data collected, most of the staff does not have adequate training in order to analyse the data. Most of the staff have been trained in some charts and graphs through their studies to become a nurse, but lack the competence to prepare these charts and graphs themselves. In addition, the lack of or heavily limited access to computers makes analysis difficult for health facilities., even though some of the health centres we visited made some simple line graphs in order to track some data related to child delivery.

As mentioned, there is a lack of staff with the knowledge of how to use the DHIS2 system. These types of knowledge are typically gained by participating in training sessions hosted at the district level, and the health facilities typically send one representative to attend due to a shortage of staff at most of the health facilities. We learned through talking with a programme manager from the Dodoma City Council that some health centres have not received official training held by the district, but rather learned it from people



Figure 10: Different charts hung up on the wall

located at other health centres.

5.2 Practices at the district level

5.2.1 Data usage practices

The usage of data collected at the health facilities from the patients is way more used in this level of administration. This is where the main analysis of that data happens. The district officials are people with data analysis skills and a technical understanding of how to use computers and the DHIS2 sys-

tem. The data from the health facilities are collected by a programme manager, for such fields as malaria, tuberculosis, maternal and child health and several others, for the verification of the data submitted. If the programme manager spots errors in the reported numbers, the programme manager will discuss this with the health facility in order to rectify the issue. When the data have been verified, the data is then entered into the DHIS2 system for registration of the data and for analysis. For health centres that submit their data directly through the DHIS2 system, the programme manager will review the submitted data through DHIS2. When the data have been entered, it is ready to be analysed. Then the data is ready to be discussed in data review meetings.

5.2.2 Data review meetings

The district officials host two types of data review meetings. The first meeting happens among the district officials on a weekly basis. In these meetings, the district officials look at selected key indicators from a selection of health facilities in the district. Based on the information that is presented and if the numbers are not where they are expected to be, a plan of action will be discussed in order to normalise the numbers to the expected levels. This will include a visit by the programme manager to the health facility in question in order to solve the issue.

The second form of data review meetings happens on a quarterly basis and includes the district officials, as well as representatives from all the different health facilities located within the district. During these meetings, data collected from the health facilities in the past quarter is discussed in a ple-

nary session. The data presented is related to key indicators for different programmes and whether the numbers from the different health facilities are below, above, or at the expected or targeted level. If a health facility is performing abnormally in accordance with the expectations, that could be explained by the health facility representative i.e. people from other communities visiting the health facility and therefore the numbers are above the expected level. During these plenary sessions, the health facility representatives are able to discuss with each other, regarding their experiences in their community. While these meetings are supposed to be held every quarter, we found that this is not always the case. The meeting we participated in was supposed to be held last quarter but was instead held later than expected.

5.3 DHIS2 & GoT-HoMIS

During one of our visits to one of the health centres, we learned of a system called "*Government of Tanzania-Hospital Management Information System*" (GoT-HoMIS). This is a system that is primarily being used by hospitals in Tanzania, but several health centres also need to do reporting through this system. The GoT-HoMIS system was created by the President's Office – Regional Administration and Local Government (PO-RALG), the Kibaha Education Center (KEC), as well as Mzumbe University in 2015 in order to improve health care delivery provided at public health facilities (Edward & Sukums, 2022). The purpose the system serves seems to be similar to many of the purposes of the DHIS2 system. This has caused some frustration among healthcare workers at the health centres and officials at the district level. Registering the diagnosis of a patient typically have to be entered into both

systems, but there were differences between the two systems when it came down to entering the data. We were told that in case of registering a malaria diagnosis, the GoT-HoMIS system was a bit more specific compared to the implementation of the DHIS2 system, as you could enter more specified types of malaria, whereas, in DHIS2, the diagnosis would be a bit more generic. The healthcare worker and district official told us that they were also frustrated having to deal with two separate systems for registering patient data, where they have to deal with both the GoT-HoMIS system owned and operated by the PO-RALG and the DHIS2 owned and operated by the MoH together with HISP Tanzania. They would preferably see the DHIS2 system expanded further in order to only have to deal with a singular system as the DHIS2 system contains quite a bit more data than compare to the GoT-HoMIS system. The GoT-HoMIS system is highlighted here as there are no ongoing plans of merging the two systems into one, as there are with systems related to tracking vertical programmes such as immunization and malaria.

6 Discussion

This chapter is divided into three sections which will look into how the feedback practices of the Tanzanian healthcare system fit with the conceptual framework of transformational feedback as presented by Christon Moyo in his PhD dissertation. The first section of this chapter will discuss the first research question. The second section will answer the second research question. The third section will discuss the limitations that have been present during the research for this thesis.

6.1 Answering the first research question

RQ1:

How does transformational feedback fit within Tanzania's current feedback and data usage practices?

Referencing back to section 3.4, regarding the introduction of transformational feedback and the three dimensions of information transparency, two-way dialogue, and networks for learning, the feedback and data usage practices in the Tanzanian healthcare system fits somewhat with the dimensions of transformational feedback.

In terms of the information transparency dimension, I would like to highlight the charts that are hung up on the walls of the health facilities as in figure 10. Despite either a partial or complete lack of computers and DHIS2-trained

staff at the health facilities, they have still managed to make the information present in DHIS2 regarding their health facility, available and accessible to the healthcare workers. Healthcare workers are able to get access to information that is relevant and that has an impact on their day-to-day work despite the limitations.

Regarding the dimension of two-way dialogue, the weekly data review meetings hosted by the district officials are a great example of this. The different programme managers come together to discuss common issues that are present within their district. When an action plan is outlined for a health facility, the programme manager travels to the health facility in order to discuss this plan with the healthcare workers present at the health facility. This shows that there is not a one-way transmission of feedback to the health facility, as the healthcare workers are able to discuss the plan with the programme manager in order to best execute the action plan in accordance with their circumstances. I would also like to highlight that the health facility often discusses certain issues with their communities. This is important so that the population in the community is knowledgeable regarding the services that are being offered and the health facilities see a greater understanding of why things are the way they are. This shows that the health facility is a part of the surrounding community which builds trust among the surrounding population.

When it comes to the network for learning dimension, I would highlight the quarterly data review meetings specifically. These plenary sessions bring together representatives from both the health facilities and the district level in order to discuss issues regarding common interests and goals. The health

facility representatives are able to discuss their experiences and share their knowledge with their colleagues that are stationed at different health facilities within the same district.

6.2 Answering the second research question

RQ2:

How can transformational feedback help improve data usage and data analysis in Tanzania?

Despite the presence of some of the dimensions of transformational feedback in the Tanzanian healthcare system, there are still certain parts that would be required to improve upon.

With regard to information transparency, ensuring that the healthcare workers at health facilities have the necessary training and equipment in order to interact and understand the DHIS2 system themselves is key to improving information transparency. While the charts on the wall as presented in figure 10 are a good step on the way to the goal, the information presented in these charts can become old and no longer relevant to the work that the health facility is currently engaging in. Being able to access up-to-date information at any time would be a tremendous benefit, even though the cost and time commitment in order to train and equip the health facilities are high and difficult. I would like to present some mitigation to these issues in the next two dimensions.

In the two-way dialogue dimension, I would like to see some improvements in the feedback loop between the districts and the health facilities. Currently, the feedback loop fits with the conventional feedback model presented in figure 8. Having more cross-level communication regarding the issues that they are facing would lead to a better understanding of each other.

Regarding the network of learning dimension, as mentioned earlier, a couple of the health centres located in the district of Dodoma City were able to learn how to use DHIS2 from other health centres even though they had not been receiving official training from the district. I would argue that creating a network for learning for the DHIS2 system among the health facilities would reduce the cost and the time commitment in order to provide this at the district level. Today, training is expected to be handled at the district level by requiring representatives from the health centres to travel to a location, sometimes far from their health facility, in order to participate in the training. By training certain users to become superusers of the DHIS2 system, these people would be able to travel to the individual health facilities and provide training to the healthcare worker where they are stationed. Training some people at the health facility so that they can further train and be of assistance to other healthcare workers present at the health facility, instead of travelling far to participate in a training session.

6.3 Limitations

The first and main limitation that has been present during the research for this thesis has been the lack of enough time. The case study presented in this thesis took place over a time frame of only four weeks. Due to only

being present in the country for this short amount of time, we were not able to truly immerse ourselves within the context of the Tanzanian healthcare system. This also led to us being able to visit health facilities located in only two districts of the many districts that Tanzania consists of. We also had to spend some of our already heavily limited time dealing with the bureaucracy of the Tanzanian healthcare system getting the necessary permissions and attending several courtesy meetings required by all the different levels of the administrative healthcare pyramid in order for us to visit the health facilities.

The second limitation I would argue, is a case of sample bias. As mentioned, we only got to visit and talk to healthcare facilities located within two districts and one region. The Dodoma City district is an urban district, while the Bahi district is a more rural one, but still has a somewhat proximity to the Dodoma City district. This makes generalizing our observations and applying them to other parts of the country impossible. We can not know how exactly the practices of an even more rural district than Bahi can be compared to those we visited and observed. Also, as mentioned earlier, the Dodoma City and Bahi districts were chosen to become part of the District of Excellence (DoE) program due to their excellent performance and results over several years. Not having the experience of visiting one of these lower-performing districts and regions makes us blind to the practices of those areas that might be more representative of the status quo in the rest of the Tanzanian healthcare system.

The third limitation concerns the lack of a common language between the healthcare worker and us as the researchers. As already mentioned, few healthcare workers were fluent in English, and the other way for us, as

we didn't speak any Swahili to communicate with each other. Therefore, the presence of a translator during interviews and observations was always needed. This caused limitations in several ways. Due to typically only having a single translator present during the interviews and observations, we were limited as we could not interview potential subjects one-on-one, but rather as a group interview consisting of all five of us students and a selection of healthcare workers from the health facility. We also ran into issues concerning mistranslations and misunderstandings throughout our data collection work that could have been mitigated through a common language between the parties.

7 Conclusion

This thesis began highlighting the issues regarding data usage in health information systems in developing countries. It then presented the history of the HISP programme and the DHIS2 system, in addition to presenting the local context of the country Tanzania with the history of DHIS2 and health information systems in the country alongside the introduction of the newly established District of Excellence (DoE) programme. After that, the thesis presented the many definitions of information systems and health information systems, as well as the issues that they face in developing countries. The thesis then defined the concept of feedback and its purpose, before introducing the concept of transformational feedback as presented in the PhD dissertation of Christon Moyo. The thesis then presented the interpretive qualitative case study and fieldwork on which it is based, before presenting the findings of said case study. Lastly, the thesis answers the research questions that have guided this thesis.

This thesis provides a theoretical contribution and insight into what are the current feedback and data usage practices that are present within the healthcare system of Tanzania today. It also gives insight into exactly how the current feedback and data usage practices can be improved upon, by using the conceptual framework of transformational feedback, as presented by Christon Moyo consisting of three dimensions information transparency, two-way dialogue, and networks for learning.

References

- The 3-clause BSD license* [Open source initiative]. (2011, May 22). Retrieved April 27, 2023, from <https://opensource.org/license/bsd-3-clause/>
- About DHIS2* [DHIS2]. (n.d.). Retrieved April 27, 2023, from <https://dhis2.org/about/>
- AbouZahr, C., & Boerma, T. (2005). Health information systems: The foundations of public health. *Bulletin of the World Health Organization*, 83(8), 578–583. Retrieved May 15, 2023, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626318/>
- Adu-Gyamfi, E., Nielsen, P., & Sæbø, J. I. (2019). The dynamics of a global health information systems research and implementation project.
- Baker, B. (1995). The role of feedback in assessing information systems planning effectiveness. *The Journal of Strategic Information Systems*, 4(1), 61–80. [https://doi.org/10.1016/0963-8687\(95\)80015-I](https://doi.org/10.1016/0963-8687(95)80015-I)
- Braa, J., Hanseth, O., Heywood, A., Mohammed, W., & Shaw, V. (2007). Developing health information systems in developing countries: The flexible standards strategy [Publisher: Management Information Systems Research Center, University of Minnesota]. *MIS Quarterly*, 31(2), 381–402. <https://doi.org/10.2307/25148796>
- Braa, K., & Vidgen, R. (1999). Interpretation, intervention, and reduction in the organizational laboratory: A framework for in-context information system research. *Accounting, Management and Information Technologies*, 9(1), 25–47. [https://doi.org/10.1016/S0959-8022\(98\)00018-6](https://doi.org/10.1016/S0959-8022(98)00018-6)

- Bradley, E. H. (2004). Data feedback efforts in quality improvement: Lessons learned from US hospitals. *Quality and Safety in Health Care*, 13(1), 26–31. <https://doi.org/10.1136/qhc.13.1.26>
- Brief history — tanzania embassy in berlin, germany.* (n.d.). Retrieved April 27, 2023, from <https://www.de.tzembassy.go.tz/tanzania/brief-history>
- Census information dissemination platform.* (2022). Retrieved April 27, 2023, from <https://sensa.nbs.go.tz/>
- Dhis2-logo-rgb-positive.* (n.d.). Retrieved April 27, 2023, from <https://dhis2.org/wp-content/uploads/dhis2-logo-rgb-positive.svg>
- Edward, L., & Sukums, F. (2022, June 27). Adoption and users experience of government of tanzania-hospital management information system in meru district hospital, arusha, tanzania: A qualitative study. <https://doi.org/10.2139/ssrn.4147066>
- File:flag of tanzania.svg [Page Version ID: 852854508]. (2018, July 31). In *Wikipedia*. Retrieved April 27, 2023, from https://en.wikipedia.org/w/index.php?title=File:Flag_of_Tanzania.svg&oldid=852854508#filelinks
- Gizaw, A. A., Bygstad, B., & Nielsen, P. (2017). Open generification [eprint: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/isj.12112>]. *Information Systems Journal*, 27(5), 619–642. <https://doi.org/10.1111/isj.12112>
- Hattie, J., & Timperley, H. (2007). The power of feedback [Publisher: American Educational Research Association]. *Review of Educational Research*, 77(1), 81–112. <https://doi.org/10.3102/003465430298487>

- Hem, M., & Benjaminsen, G. (2023, April 3). Tanzania. In *Store norske leksikon*. Retrieved April 27, 2023, from <https://snl.no/Tanzania>
- Hirschheim, R., Klein, H., & State University of New York. (2012). A glorious and not-so-short history of the information systems field. *Journal of the Association for Information Systems*, 13(4), 188–235. <https://doi.org/10.17705/1jais.00294>
- Ilgen, D. R., Fisher, C. D., & Taylor, M. S. (1979). Consequences of individual feedback on behavior in organizations. [Publisher: US: American Psychological Association]. *Journal of Applied Psychology*, 64(4), 349. <https://doi.org/10.1037/0021-9010.64.4.349>
- Kimaro, H. C., & Nhampossa, J. L. (2004). The challenges of sustainability of health information systems in developing countries: Comparative case studies of mozambique and tanzania. *ECIS 2004 Proceedings*, 91. http://aisel.aisnet.org/ecis2004?utm_source=aisel.aisnet.org%2Fecis2004%2F91&utm_medium=PDF&utm_campaign=PDFCoverPages
- Li, M., & Nielsen. (2019). Making usable generic software. a matter of global or local design? [Publisher: Unpublished]. <https://doi.org/10.13140/RG.2.2.31514.49603>
- Lippeveld, T., Sauerborn, R., Bodart, C., & Organization, W. H. (2000). *Design and implementation of health information systems* [ISBN: 9789241561990 number-of-pages: 270]. World Health Organization. Retrieved May 1, 2023, from <https://apps.who.int/iris/handle/10665/42289>
- London, M., & Smither, J. W. (2002). Feedback orientation, feedback culture, and the longitudinal performance management process. *Human*

- Resource Management Review*, 12(1), 81–100. [https://doi.org/10.1016/S1053-4822\(01\)00043-2](https://doi.org/10.1016/S1053-4822(01)00043-2)
- Manya, A., Braa, J., & Sahay, S. (2015). A socio-technical approach to understanding data quality in health information systems: Data quality intervention in kenya. *2015 IST-Africa Conference*, 1–7. <https://doi.org/10.1109/ISTAFRICA.2015.7190582>
- Manzi, F., Schellenberg, J. A., Hutton, G., Wyss, K., Mbuya, C., Shirima, K., Mshinda, H., Tanner, M., & Schellenberg, D. (2012). Human resources for health care delivery in tanzania: A multifaceted problem. *Human Resources for Health*, 10(1), 3. <https://doi.org/10.1186/1478-4491-10-3>
- Mission and vision—ministry of health*. (n.d.). Retrieved April 28, 2023, from <https://www.moh.go.tz/mission-and-vis>
- Moyo, C. M. (2016, December). *Breaking the vicious cycle of information use in health information systems-a case from malawi* (Doctoral dissertation). University of Oslo.
- Myers, M. D. (2013). *Qualitative research in business & management* (2nd). SAGE Publications Ltd 1 Oliver’s Yard.
- Nguyen, S. P., & Mahundi, M. H. (2019). The dynamics of national ICT ecosystems. *The Electronic Journal of Information Systems in Developing Countries*, 85(1), e12058. <https://doi.org/10.1002/isd2.12058>
- Ramaprasad, A. (1983). On the definition of feedback. *Behavioral Science*, 28(1), 4–13. <https://doi.org/10.1002/bs.3830280103>

- Sadler, D. R. (2010). Beyond feedback: Developing student capability in complex appraisal. *Assessment & Evaluation in Higher Education*, 35(5), 535–550. <https://doi.org/10.1080/02602930903541015>
- Shute, V. J. (2008). Focus on formative feedback [Publisher: American Educational Research Association]. *Review of Educational Research*, 78(1), 153–189. <https://doi.org/10.3102/0034654307313795>
- Simba, D., Sukums, F., Kumalija, C., Asiimwe, S. E., Pothepragada, S. K., & Githendu, P. W. (2022). Perceived usefulness, competency, and associated factors in using district health information system data among district health managers in tanzania: Cross-sectional study. *JMIR Formative Research*, 6(5), e29469. <https://doi.org/10.2196/29469>
- Simba, D., & Mwangu, M. (2005). Quality of a routine data collection system for health: Case of kinondoni district in the dar es salaam region, tanzania. *SA Journal of Information Management*, 7(2). <https://doi.org/10.4102/sajim.v7i2.262>
- Stoops, N., Williamson, L., Heywood, A., & Hedberg, C. (2001). Health information systems programme (HISP) – the success story of a development project in south africa.
- Tanzania [Page Version ID: 1150948416]. (2023, April 21). In *Wikipedia*. Retrieved April 27, 2023, from <https://en.wikipedia.org/w/index.php?title=Tanzania&oldid=1150948416>
- Tanzania integrated health information architecture*. (n.d.). Retrieved April 28, 2023, from <https://docs.dhis2.org/en/topics/user-stories/>

tanzania-integrated-health-information-architecture/architecture.html

- Verne, G., & Bratteteig, T. (2018). Inquiry when doing research and design: Wearing two hats. *Interaction Design and Architecture(s)*, (38), 89–106. <https://doi.org/10.55612/s-5002-038-005>
- Walsham, G. (2006). Doing interpretive research. *European Journal of Information Systems*, 15(3), 320–330. <https://doi.org/10.1057/palgrave.ejis.3000589>
- Watson, R. T. (2014). A personal perspective on a conceptual foundation for information systems. *Journal of the Association for Information Systems*, 15(8), 514–535. <https://doi.org/10.17705/1jais.00368>
- Wilms, M. C., Mbembela, O., Prytherch, H., Hellmold, P., & Kuelker, R. (2014). An in-depth, exploratory assessment of the implementation of the national health information system at a district level hospital in tanzania. *BMC Health Services Research*, 14(1), 91. <https://doi.org/10.1186/1472-6963-14-91>
- World Health Organization. Regional Office for the Western Pacific. (2004). *Developing health management information systems : A practical guide for developing countries* [Section: vi, 54 p.]. WHO Regional Office for the Western Pacific. <http://iris.wpro.who.int/handle/10665.1/5498>

