FACTORS INFLUENCING ACCESS AND UTILIZATION OF DISTRICT HEALTH INFORMATION SYSTEM: A CASE STUDY OF WAJIR COUNTY

BY

Abdirahman Ibrahim Adan

Registration number: H57/8473/2017

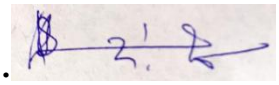
Contact: man.abdirahman@gmail.com

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PUBLIC HEALTH

July 2022

DECLARATION

I declare that "**Factorsinfluencing access and utilization of district health information system (dhis2): a case study of Wajir County"** is my original work and that all resources and materials I have used or quoted have been indicated and acknowledged by means of reference.

Signature: ……  **….. Date: ……16/10/2022……...**

Abdirahman Ibrahim Adan

College of Health Science

School of Public health

SUPERVISION DECLARATION

This Dissertation has been submitted to the University of Nairobi with our approval as supervisors:

Signature: …… Date: …26th October 2022.

Dr Pamela Miloya Godia

Department of Public Health and Global Health, Faculty of Health Science,

University of Nairobi

Signature: …… Date: …26th October 2022.

Prof Joyce M. Olenga.

Department of Public health and Global Health, Faculty of Health Science,

University of Nairobi

DEDICATION

I dedicate this work to my beloved parents, Mrs Mumina Muhmmed Hassan and Mr Ibrahim Adan. May lord, have mercy on them, as they raised me when I was a child. Quran 17:24.

ACKNOWLEDGEMENT

All thanks to almighty Allah, exalted are you; we have no knowledge except what you have taught us.

Wholeheartedly, I thank the University of Nairobi for offering me the opportunity to pursue my studies in their institution. I express my sincere appreciation to my supervisor Dr Pamela Miloya Godia, for her unwavering guidance, timely support, and advice during proposal development, fieldwork, and organizing the final report.

I also appreciate the Director, School of Public health, University of Nairobi, and the entire School of Public Health staff for their guidance and support. Mr Kennedy, the department administrator, you are a very kind man and with much encouragement.

I Thank my noble sister Dr Fatuma Ibrahim, brother Mohamud Ibrahim (Mzee Mudi), and my family in equal measure. You were there for me throughout my life and fortified me in all aspects, including supporting my family financially while a student. May Allah rewards you and your parents.

A big thanks to all my classmates, particularly Alice Taurus, Florence, and Dr logan, for encouraging me to sustain my commitment to accomplishing this task.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DHIS	District Health Information System
DHIS2	District Health Information System 2
EHR	Electronic Health Record
EMR	Electronic Medical Record
KNBS	Kenya National Bureau of Statistics
HISP	Health Information System Programme
HIS	Health Information System
HMIS	Health Management Information System
WHO	World Health Organization
RHIS	Routine Health Information System
TAM	Technology Acceptance Model
USAID	United States Agency for International Development
UTAUT	Unified Theory of Acceptance and Use of Technology

ABSTRACT

Introduction: District Health Information System (DHIS2) is a platform designed to collect, process, and report data and trends regarding health to aid the health decision-makers in making health-related decisions. It is pertinent that decision-makers such as county government health managers, departments, non-government organisations, and stakeholders utilise credible information from Routine Health Information Systems DHIS2 for Enhancing health-related outcomes and addressing inequities. A quality decision is particularly crucial in Wajir county, one of the country's poorest counties and the top 15 counties ranking on the maternal and perinatal burden. There exist low accessibility and utilisation of the health information collected in DHIS2. Most health decision-makers such as public health, policymakers, and healthcare organisations do not often consider the DHIS2 data appropriate for guiding their decisions.

The low utilisation of DHIS2 has been a challenge in improving the health sector performance.

Broad Objective: To establish the factors affecting access and utilization of the DHIS2 in Wajir County.

Specific objectives: The study focused on influence of data infrastructure, staff technical capacity, available resources, and county health organizational support and how they influence the access and utilization of the DHIS2.

Methodology:A cross-sectional study was carried out among the Wajir County health sector managers from June to August 2021. The study adopted a convergent mixed-method research design that blended quantitative and qualitative data collection and analysis approaches. The target population was managers from the Wajir County health department. A sample size of 95 was drawn from 125 managers of Wajir Health departments. Additionally, the study also inquired from 10 key informants(KIs) drawn from the health sector. Systematic sampling was employed to select managers from the various health departments. Self-administered questionnaires and an interview guide collected the primary data to determine the factors influencing access and utilization of DHIS2 in Wajir County. The Quantitative data were analysed using STATA version 11.2 to make descriptive and inferential statistics to understand the data and further presented in bar charts and tables. Descriptive statistics produced mean, standard deviation and frequencies of the responses, while inferential statistics, namely correlation and linear regression, showed the relationship between independent and dependent variables. The qualitative data was organized using themes and content analysis and discussed in narratives.

Results: According to descriptive study results, there was varying perceptions or views regarding the quality of data infrastructure. From inferential analysis, data infrastructure has beneficial effects on DHIS2 access and utilization. In addition, descriptive statistics revealed that staff technical capacity limits the utilization of DHIS2. Some areas lacking quality include the employee ability to handle and interpret health data and DHIS2 customization despite many of them having a high level of education. The regression results showed that staff technical capacity positively influences access and utilization of DHIS2. Similarly, few available resources limit the use and utilization of DHIS2. According to inferential analysis, available resources positively influence utilization and access of DHIS2. Finally, the study revealed that county health organizational support has positive effect on access and utilization of DHIS2.

Conclusion: The study concludes that DHIS2 data infrastructure, staff technical capacity, available resources and county health organizational support are key determinants of access and utilization of DHIS2.

Recommendation: To facilitate the use of DHIS2, this study recommends the departments of health at Wajir County conduct more training and workshops to impact all the health workers with knowledge and skills needed to operate DHIS2 and make use of it in decision making.Besides, Wajir County should allocate appropriate funding to all health departments, as well as partner with non-governmental organizations to help in funding some health functions.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

District Health Information System (DHIS2) is a platform designed to collect, process, and report data and trends regarding health to aid the health decision-makers in making the health-related decisions (Karuri *et al.*, 2014). According to (Shiferaw *et al.*, 2017), DHIS2 generates information that is used to inform decision-makers. It also helps increase efficiency and improve the health status and operations (Dehnavieh et al., 2018).Kimani and Kenyatta (2018) noted that DHIS2 is pertinent to decision-makers such as government health institution workers, county health department, non-government organizations and media, in monitoring and controlling health-related issues towards achievement of vision 2030 and Sustainable development goals.

Adoption of Health Information Systems (HISs) is a key component of national/jurisdictional healthcare initiatives in developed nations such as England, Australia, Canada, and the United States.There is a widely held opinion that HIS may significantly raise the standard of care when appropriately implemented and utilized by doctors. In England HIS has shown advantages include increased productivity, better care coordination, patient safety, healthier results, lower costs, and easier access to healthcare(Faisal et al., 2013).A Benefits Evaluation (BE) Framework from Canada Health Infoway was released in 2007 (Lau et al., 2011), and it was modified from the Information System (IS) Success Model from DeLone and McLean (1992, 2003). Aconceptual framework for comprehending the value, application, and overall advantages of HIS adoption within healthcare companies was provided by the BE Framework(Shahar, 2009).

Despite the benefits it provides, the system has faced several challenges, both in terms of access and use depriving the health care system of a vital resource. Regionally, the health information

deployment and use in decision making has been alarmingly poor at 10% to 54%(Shiferaw *et al.*, 2017). In Ethiopia, health data remain of low quality and utilization has been low especially in district levels which has primary responsibilities for managing health situations. Thus, most managerial decisions regarding health are not data-driven leading to a lacklustre performance of health programs (Shiferaw *et al.*, 2017).

Ashton *et al.*, (2019) observed that the staff working in health departments in Southwest Ethiopia were unable to login into DHIS, customize data, analyse, and interpret and present the data. Such challenges of access prevents the health decision-makers to utilize the information to plan, prioritize, strategize on health development, develop policies and create efficiency in public health administration and management (Hagel et al., 2020). When health data is lacking, or not utilized, the consequences are lower-quality services, weak infection prevention and control responses, lack of skilled health workers available where they are needed, and weak supply chains for drugs and equipment contributing to poor health outcomes of the people (Gesicho et al., 2020).

In Sub-Saharan Africa, Kenya was the first country to deploy DHIS2, but there is little proof to show that DHIS2 is widely accessible and utilized to make decisions regarding health at all levels. According to Bernadette, Anthony, Ngaira and Pepela (2019) ministry of health policy brief, at county levels, the county assemblies which are obliged to make county health decisions and policies have not shown their effectiveness in utilization of DHIS information. The counties are supposed to provide an institutional arrangement for management and administration of health services. However, as it stands all the counties are still lagging, given the poor health conditions in Kenya.

The Kenya constitution 2010 backed for devolution in critical sectors, including healthcare. The intention was to empower Counties to design highly impactful, context-specific health models with interventions based on their needs. However, studies by Kimathi (2017), found little evidence to show improvements five years into devolution. Karuri et al. (2018) observes that health workers make many decisions including the treatments offered, decisions on prevention of diseases, care plans and other public health decisions. Thus, the providing of the right information to the health workers is crucial in making effective decisions. However, given the magnitude of health problems the Kenya health workers face is a clear indication of poor health information or lack of access or utilization of good health information(Karuri et al., 2018).

In Wajir County, there is no evidence on the level of access and utilization of District health information System (DHIS2). According to the County director for research, there are many challenges on the utilization of DHIS2 either at the level of feeding data or accessing such data for other decision-making events. The county director confirmed the existence of the use of other data software for data management and DHIS2 was only used because it was a national requirement to feed in Health data. At all levels, there is a clear disconnect between the need for information and the ability to respond to that need, this is because health care did not make any improvement albeit the health system decentralization (Ministry of Health, 2017). This attributes to the low service coverage, challenges on commodities management, disease surveillance, staffing levels, and many unmet developmental indicators on health. Given the lack of research on factors influencing DHIS2 access and utilization, there is an urgent need to assess the factors determining the access and utilization of routine data for decision-making on health in Kenya and Wajir County.

Many studies have established the factors hindering or facilitating the access and utilization of DHIS2 which include data infrastructure, staff technical capacity, available resources, and county health organization support. According to Leon et al. (2020) who evaluated the performance of Routine Information system management (PRISM) identified three main factors which influence the performance of health information system and reporting namely behavioural determinants (individual character and orientations towards access and utilization of DHIS2), technical determinants (system design, data collection process and reporting systems and methods) and organization determinants (information culture, structure, roles and responsibilities of key contributors).

In a recent study in Kenya by Kuyo and Muiruri, (2020)organizational determinants on utilizing DHIS2 in Uasin Gishu include:The availability of resources(computers, internet connectivity).Availability of staff with technical capacity(educational level, technical skills training, data literacy) and Legislations (support, utilization). This study adapts the determinants of Kuyo and Muiruri (2020) to establish how DHIS2 data infrastructure, available resources, staff technical capacity and county health organizational support influences the access and utilization of DHIS2 in Wajir County.

According to Bernal-Delgado and Estupiñán-Romero, (2018), access and utilization of health data is attributed to the data infrastructure in place. They defined data infrastructure as a digital network that promotes data consumption and sharing. The scope of the data infrastructure ranges from DHIS2 design, data collection process to health information reporting methods. In that regard, the effective data infrastructure implies validity, data comprehensiveness, accuracy and fitness for use among other dimensions (Ahanhanzo *et al.*, 2014).

Additionally, evidence from several pieces of research suggests that organization staff technical capacity influences the access and utilization of health information data (Asemahagn, 2017; Kuyo & Muiruri, 2020). Organization staff technical capacity entails the ability of the staff to handle the data and interpret it to make informed health decisions (Somi, Isaac, *et al.*, 2017). According to Asemahagn, (2017) lack of technical and computer skills, lack of data knowledge, management and use and working experience contributed to low HIS information utilization in Ethiopia. Lack of training for healthcare workers and particularly at managerial levels contribute to low access and utilization of DHIS2 in Kenya, Uasin Gishu (Kuyo & Muiruri, 2020)

Further, available resources entails the capacity and ability of all health departments to provide with the needed materials to facilitate the organization objectives or policies influences the access and utilization of information (Karuri et al., 2018). Resource availability dimensions such as lack of technical support, DHIS2 funding, inadequate reporting tools attribute to low use of health data in management and health administration (Hagel et al., 2020).

Also, organizational support factors have been pointed out by researchers as dimensions which influence the utilization of DHIS2. Health organization factors refer to those variables that facilitate or hinder the development of DHIS2, data quality and utilization of DHIS2 to make decisions. According to a study conducted by Obwocha *et al.*, (2016) health system organization factors such as lack of electronic resources, inadequate health information specialists, lack of management support, and limited financial resources compromised the access and utilization of health information in Kisii County in Kenya. To help address the challenges of health system in Wajir County, this study sought to study how these factors namely data infrastructure, staff

technical capacity, available resources, and county health organization support affect the access and utilization of DHIS2 in health decision making.

1.2 Statement of the Problem

The DHIS2 aimed toenhance decision-making on health by all stakeholders tomake informed decisions, prepare, organize, and prioritize health matters. In that regard, the method of data presentation and customization in DHIS2 should allow easy access to the information and sufficiently be descriptive and accurate enough for use and reliability (Somi, Matee, *et al.*, 2017).

Despite the implementation of DHIS2, there is little evidence on access and utilization of the health information leading to inefficiency in health decision making. As a result, health decision-makers have been making poor decisions, leading to poor health management at all levels, namely county and sub-county levels. Also, the high disease burden in Wajir County due to poor health and persistent diseases such as Malaria, TB, and malnourishment may be because of poorly informed decisions at all levels.

According to the Kenya National Bureau of Statistics [KNBS] (2019) report, Wajir County is among one of the poorest counties in Kenya, where 62 people in every 100 of its population are struggling to survive. The KNBS (2019) report also reveal county health low performance, and the Life expectancy level is 51 yearscompared national target of 66.95). However, the county lacks the necessary equipment, drugs, and specialistto manage and treat these common illnesses. In the health facilities, there is little evidence that DHIS2 is routinely utilized to detect drug stock-outs and track other health-related issues to manage and improve the health status of the county residents.

Further, poor health status in Wajir County could be attributed to ineffective policies made by public health officials, the county government and other supportive non-state actors, which is a

clear indication of lack of access or utilization of the right health information.Therefore, there is a need to study the factors that determine the access and utilization of DHIS2 information in Wajir County.

1.3 Purpose of the Study

This research sought to establish the factors affecting access and utilization of the DHIS2 in Wajir County.

1.4 The Objectives of the Study

Specifically, the research objectives were:

i. To determine the influence of data infrastructure on the access and utilization of the DHIS2.

ii. To assess the influence of staff technical capacity on the access and utilization of the DHIS2.

iii. To establish the effect of available resources on access and utilization of the DHIS2.

iv. To examine the influence of the county health organizational support on access and utilization of the DHIS2.

1.5 Research Questions

The key research questions were:

i. What is the influence of data infrastructure on the access and utilization of the DHIS2?

ii. What is the influence of staff technical capacity on the access and utilization of the DHIS2?

iii. What is the effect of available resources on access and utilization of the DHIS2?

iv. What is the influence of the county health organizational support on access and utilization of the DHIS2?

1.6 Significance of the Study

Quality decision on health requires accessing and utilizing quality health information. Therefore, understanding the determinants and barriers to accessing and using health information in DHIS2 for quality health intervention is crucial, mainly in Kenya's post-devolutions healthcare delivery in a rural setting where resources and decisions are devolved. This research sought to establish the factors affecting access and utilization of the DHIS2 in Wajir County.

The study might be beneficial to many stakeholders. First, the health workers such as the staff in the county health department, health administrators, private hospitals, and health lobbyists, among others, can benefit from this study by gaining insights on what hinders or facilitates the access and use of DHIS2 and strategize on how to strengthen the access and use. This is in line with the national requirement and mandatory for all decision-making on health by the government to be evidence-based and get value for all the human and financial resources invested in Routine Health Information System (RHIS). The study will also benefit the national level Ministry of Health, since,from time to time, the ministry undertakes a review of the national Health Management Information System (HMIS) guidelines to set new standards and targets.Finally, the academicians will stand to benefit from the findings of the study. The study will lay the foundation for future studies. It will contribute theoretically to the development of DHIS2 in Kenya, and thus future scholars may use the study's theoretical and methodological foundation to extend research on DHIS2 in Kenya.

1.7 Assumptions of the Study

This research assumed that all the data needed from the respondents was available within the stipulated timeframe and budget. Also, the research assumed that respondents honestly answered the questions in research instruments.

1.8 Limitations and Delimitation of the Study

The study envisages that the respondents may not truthfully respond to the questions. This could be attributed to the fact that they don't want to disclose sensitive informationand their technical capacities. The study mitigated this problem by asking the study participants for their consent and assuring that the responses would be of educational use only.

Additionally, the key respondents may be challenging to reach and get them to freely give information due to their other commitments. This was addressed by frequent follow up as well as setting appointments.

1.1 Definition of Key Terms

Access: This is the ability to obtain or retrieve data from storage to make use of it. In the context of the study, it is the ability to login to the system, customize information to fit the use, be able to interpret the data and methods in which it is presented.

Availability of funds: That is exposure for an individual or company to funds and other tools that can be relied on to operate efficiently.

Data Infrastructure: is a digital network architecture promoting data sharing and consumption.

Data Utilization: Refers to the use of DHIS2 platform to enlighten picking best alternative during decision-Making, inform procedures and policies, monitoring progress and evaluations of interventions impact aimed at improving patient management and health care outcomes.

Decision Making: this is how to achieve a goal by selecting the right alternatives, and here refers to the process of making DHIS2/information driven: - right policies, right implementing strategies to realize better health(goal).

District Health Information System (DHIS2): It is an open-source data processing platform that is employed to collect, evaluate, and present health data.

Employee capacity: refers to the capacity and authenticity of the employee regarding training and other qualifications.

Health System Organization refers to the organization preparedness on data generation, data access and utilization using tools and various support strategies such as the provision of technical expertise among others.

Staff technical capacityrefers to the capacity of the staff working under institutions to handle, access and utilize the DHIS2 data.

Wajir County: - this is one of the 47 Kenya Devolved administrative counties and in the Former North-eastern province of Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Key words: Access and utilization of DHIS2, Decision-making.

This section discussed the existing literature that informs the study. The literature reviewed is aimed at developing an understanding of factors associated with access and utilization of DHIS and the extent of DHIS2 use in Kenya. The chapter also covers the theoretical model that anchors the study. Additionally, the chapter outlined the conceptual framework that guided the interactions of the variables. Finally, the summary section summarizes the main contributions of the literature to the study.

2.2 The Concept of District Health Information System

Essentially, there are two major Health Information Systems (HIS),including; - 1)the Electronic Health Record(EHR) and Electronic Medical Record (EMR), which are designed for individual health data, and 2) the District Health information system (DHIS2) system, a platform for gathering data for information management and decision making. DHIS was initiated in 1994 by the department of informatics at the University of Oslo, and by 1996 it was implemented in the Republic of South Africa by Health Information System Program (HISP). DHIS2, a java web-based system, started in the year 2005, and the following year DHIS2 was rolled out in India(Sahay et al., 2020). The focus of HISP is on user engagement and action research. It allows allusers to customize it to fit their requirements and improve local expertise and design, computer, data usage, and handling skills. The fact that the program can be customized and its immediate success in South Africa to suit different backgrounds led to the adoption of the system

in other countries such as Tanzania, Mozambique, Kenya, Cuba, Ethiopia, Mongolia, Vietnam and India (Kimani & Kenyatta, 2018).

Kenya was the first country to implement an online system of DHIS2 as a national platform for running a central data warehouse in East Africa in 2011(Githinji *et al.*, 2017). The DHIS2 version improved the previous system to enhance data usageenabling interactive reporting's that cover all reporting needs for health services and enhancing health decision-making (Karuri *et al.*, 2018). DHIS2 aimed at utilizing modern technology to integrate databases and independent web-based platforms with the ability to function offlineimproving the efficiency and effectiveness of health management at all levels.

In India, DHIS was introduced in 2002 through district health and family management. According to Sahay et al. (2020), despite many initiatives to improve the health system using different collaborations, the state of health in India is weak. The awareness levels and poor perception of the system to provide practical usefulness in strategic management and planning have led to low employment of the system by health policymakers (Krishnan *et al.*, 2017). This realism underlines the importance of organization and government support in achieving success in the DHIS system.

In Africa, Tanzania, alongside Kenya, happened to be among the earliest nations to deploy DHIS as an improvement from the previous systems (Mbelwa*et al.*, 2019). DHIS's success in Tanzania is attributed to several factors, includingintegrating the national data warehouse framework, hence creating an environment that enables different health stakeholders to interact to improve the national health system (Ashton *et al.*, 2019). Additionally, the health departments provided an enabling environment through training and workshops to critique and discuss the presentation and use of health data. Hence, DHIS was reformed and simplified, resulting in the

integration of databases and high data submission rates with increased quality and capacity for analysis and interpretation of data.

The DHIS2 database infrastructure for Kenyaaligns with the current devolved governance administrative model that consists of 299 sub-counties in the 47 counties. It is a free and open-source database and application for collecting, processing, and analysing health information. It is evident that the DHIS2 system has presented an unprecedented potential for Kenya to move from the era of unreliable and fragmented manual HIS system to the ideal situation of availability and use of quality health information for rational decision making (Bernadette et al., 2019). Each health facility does its monthly reporting (service delivery, commodity management, and disease reporting) to DHIS2. All health facilities must first use the standard paper-based registers and tally sheet to capture actual monthly data and transmit it to their respective sub-county level for entering the DHIS2 database. DHIS2 database provides a log-in system where users and stakeholders can access data and information (Githinji *et al.,* 2017). Policymakers, planners, and implementers(stakeholders) can customize DHIS2 output based on their health information needs without going through formal training for its technical programming languages. (Manoj *et al.*, 2013).

The successful deployment of the DHIS2 system provided a solid foundation for development in Health as a unified, country-led, and country-owned health information system. The Kenya constitution (2010), the vision 2030 developments blueprint, and the national health policy (2014-2030) conducted a deliberate infrastructural investment in health Information and Communication to enhance service delivery (Ministry of Health, 2017). The ambition led to a transition from DHIS to DHIS2; however, despite the transition, the intention of DHIS2 has not

been realized since there is inadequate evidence of access and use of the system by health and non-health decision-makers (Somi *et al.,* 2017).

2.3 Access and Utilization of DHIS2

According to Somi *et al.*, (2017), dimensions of access include information availability, ability to login and customize the data and dissemination of the data, and the quality of the data, are essential aspects for the health decision-makers in utilizing DHIS2 to make data-informed decisions. However, gathering and using health data in Kenya does not occur at all levels of the system. This problem is attributed to poor system handling and inadequate skills and knowledge to access and utilize the data. Additionally, the data is not always available to decision-makers in their health decision making due to technical issues (Gesicho et al., 2020).

Research conducted in South Africa on DHIS evaluation revealed that the data collected volume is massive. However, its quality is low, making the DHIS less useful in decision making (Dehnavieh et al., 2018). In that regard, the DHIS do not add the intended value and utilization of low-quality information would lead to poor health decisions.

Few studies conducted in Kenya regarding the utilization of DHIS2 show little evidence on the use of the system to inform decisions. Karuri *et al.,* (2018) state that despite the high demand for health data, poor integration of DHIS has led to deficient timeliness, quality and low level of analysis that makes the utilization low. There are still challenges reported regarding data quality and the capacity of various health workers to analyse and use DHIS2 information and deficient levels of data demand and use by the targeted users in Kenya. Lack of standardization and uniformity due to different EHR software programs that are installed, these software programs are incompatible with each other and with DHIS2 because of different platform and data format

or types. This leads to poor integration which results to poor electronic information interchange (Bernadette et al., 2019).

2.4 Data Infrastructure of Health Information Systems and Access and Utilization of DHIS2

The data infrastructure provides the methods for analysis and delivery of health information to health practitioners. However, one of the challenges reported by Medicare survey (2013) is the lack of common dataset. Once the performance indicators, dimensions, type of data, data tools, data analysis algorithm and methods of analysis have been decided, the system also has to establish the best way of data presentation. However, studies have not conducted in Kenya in the context of data collection and analytics infrastructure in different districts. This could influence the data and information quality rendering it useless (Corley *et al.*, 2015).

According to Corley *et al.*, (2015), data infrastructure entails many aspects such as data source including demographic attributes, socioeconomic attributes, geographic factors, hospital characteristics and patient history. In that regard, data infrastructure must have a way to standardize the different sources to make the information reliable. The process of standardization entails several operations that enable comparability of the raw data. However, there is paucity of the studies in Kenya to examine the relevance of data origins, data tools used, coding and algorithms and their influence on data quality or health data access and utilization.

Straton, Mukkamala and Vatrapu (2017) found that there is significant influence of data infrastructure on data quality. He defined quality as the overall attributes that influence the utilization of the data such as timeliness, relevancy, and understandability. Some of the dimensions of data infrastructure such data sources influence the relevancy of the information/data for health-related decision making. Additionally, the type of tools used in data

analysis and analytics algorithm affects the reliability, understandability as well as timeliness of the information. His study revealed that the extent to how the data infrastructure generates a blend of quality attributes namely performance, usability, Simplicity, reliability, and security which holistically determines the system's level of utilization and overall success.

Straton, Mukkamala and Vatrapu (2017) findings were in line withGarises (2018), They established the aspects of data infrastructure that affect data quality and utilization, including the accuracy of the information and accessibility, comprehensiveness, consistency, current, validity and timeliness of the information. In her study context, those factors ascribe to data quality which is a prerequisite for decision-making. However, her study noted that the management must support to set a suitable utilization of the information.

Dehnavieh *et al.*, (2019),Who conducted desk review research on utilization of Health information systems, indicated that the development of DHIS2 was created based on open data, given to all health levels, including the external users. Due to the nature of DHIS2, data collated by different users at the county/district level can be deleted or altered by users from different localities. His study recommended improved data security, especially in DHIS2. However, the study did not quantitatively establish the effect of data security on access and utilization of DHIS2.

The reviewed literature implies that data infrastructure is among the critical factors affecting the access and utilization of DHIS2 information towards effective health decisions and policymaking. However, the connection between data infrastructure and access and utilization of DHIS has not been explicit. This is because most of the literature reviewed has focused on the effects the data infrastructure has on information and data quality. Owing to the scanty literature

in th context, there is a need to examine how the data infrastructure in HIS affect the access and utilization of DHIS in Kenya.

2.5 Staff technical capacity Access and Utilization of DHIS2

Staff technical capacity is a prerequisite in every organization that makes impacting decisions. In that regard, to ensure consistent demand foraccess and use of the information in informing decisions, the staff individual ability in that department is pertinent. The ability involves core competencies in handling data and using the data such as customization of the data to fit particular needs, synthesis, interpretation, presentation and developing recommendations informed by the data. However, data users in both non-health and health decision making departments often struggle due to an underdeveloped capacity to manage, handle and use data to make programmatic recommendations (Gathua, 2016). In addition to skillset, there is also a gap between perceived ability to carry out DHIS2 tasks and the actual ability for conducting the tasks assigned to them in accessing and using the data to make decisions.

Most non-health and health sectors such as county assembly, health lobbyists and other departments dealing with health directly or indirectly do not have competent individuals capable of dealing with health data. Kimani and Kenyatta (2018) asserted that staff working in health decision-making departments are only trained to handle easy staff such as interpretation of the data but are not qualified to handle health care data. Among the staff technical capacity factors identified in their study were Education level, knowledge in computers, staff attitude towards data and the system, age and data analytics skills which influenced the access and use of an electronic system and consequently the services delivered.

Based on Karuri *et al.*, (2018) assertions, inadequate skills in monitoring and evaluation of health care negatively influence data quality anddata reliability. However, the authors noted that the ability to handle health data could be improved through various trainings. However, the ability to apply the data into policy and programmatic contexts is a skillset that is never addressed by trainings and workshops. In that regard, training on how to use health information may improve its use at facility levels, promoting good health service.

Sahay (2018), in their study in India, revealed that insufficient data analytic use and skills were the frequent constraints facing the health workers. Additionally, respondents agreed that data was of poor quality for decision-making, resulting from severe duplication and inconsistencies in the data gathering process. In that regard, the study advocated for the decentralization of health information systems management to enhance the use of health data at all levels.

Additionally, a study conducted in Zambia by Okelo (2017) found that HMIS, where staff handling the data are trained according to the internationally documented practices, improves the data quality to support decision making. The study recommended workshops and training in data usage to enhance the capacity of health workers at all levels of health management for better health services.

Another study conducted by Kagasi on antecedents' factors affecting the quality of data in TB program in Namibia revealed that health care staff trained on data management was most likely to achieve high accuracy data free of inconsistencies and errors which would then encourage data use in decision making. Similarly, in research conducted in Malawi, Kivuti(2019) revealed that job training and technical support significantly influence data quality and data use. The study asserted that crucial measures such as ensuring that staff is equipped technically, and availableresources are pertinent in enabling data-led decision-making in any organization that

uses data. For instance, the study revealed that females are regularly faced with computing challenges, which affect their morale and motivation to use data in the nursing care fraternity.

The reviewed literature suggests that employee capacity is one factor that influences the access and utilization of DHIS. However, the significance of that influence has not been unearthed, especially in regions where the employee capacity is low such as Wajir. Therefore, there is a need to examine how the employee's technical capacity influences the access and utilization of DHIS in Kenya Counties.

2.6 Available Resources and Access and Utilization of DHIS2

Resources are crucial in optimizing the performance of DHIS2 and enhancing the development of the health sector. (World Health Organization, 2018) asserts that investing in HMIS is a resource that generates multiple benefits in the health sector. However, to reap the benefits of DHIS2, other resources such as the availability of funds, technical support and tools are essential in facilitating the operations of DHIS2.

A study conducted in the UK by Tae Hoi (2018) revealed that DHIS was not sufficient to provide knowledge about the management. The research indicated the factors that affect the use of DHIS thereby reducing the efficiency of the management of healthcare services. These elements included: insufficient DHIS infrastructure, primarily due to lack of funding, detailed research into critical knowledge, suitable information presentation techniques and lack of technical expertise.

A study conducted by Nabukenya & Ashaba (2020) in Uganda found that one of the biggest challenges in effectively implementing DHIS2 is the availability of resources required. The DHIS2 administration had to contend with the limited technical staff, limited financial resources

and limited data handling and management tools. The study noted that one DHIS2 training program planned for tendays duration got condensed to five days due to lack of trainers and technical staff to offer the training. Besides, the study reported that the resource challenges extended to include the lack of reporting tools, lack of computers and poor sources of internet and interrupted power supply as well as computers and designated officer space.

Research by van de Pas *et al.*, (2016) in North Viet Nam suggested that resource availability would affect the motivation to use the HIS including financial and non-financial matters. Financial issues can relate to salaries and other remunerations, while non-financial challenges involve satisfaction and stability of the jobs.

In his study, Karuri *et al.*, (2018), indicated that some of the reasons for poor implementation and utilization of HIS were:- poor infrastructural, the regional difference in terms of access to infrastructural resources that would have strengthened usability of the system, shortened time duration required to repair any system breakdown, undertaking an evaluation of data quality, undertake advanced data analysis in areas close to the data sources(generation) so that timely utilization can be achieved.

A study by Sahay et al. (2020) on the utilization of DHIS revealed that data was undesirable due to poor surveillance that was not by WHO criteria. Their study revealed other additional challenges faced in implementing and utilizing health information system including the lack of inherent systematic utilization of the information to inform decisions.

The literature reviewed suggests that there is limited research on how resources affect access and utilization of DHIS2. Although most reviewedliterature revealed the influence of resources on the realization of the DHIS2 andhaving cited the resources as among the major hindrances for effective implementation, the studies have not unearthed how resources affect the access and

utilization of DHIS2, especially in Kenyan context. This necessitates the need for further research to uncover the association between available resources and access and utilization of DHIS2.

2.7 County Health Organizational Support and Access and Utilization of DHIS2

Dehnavieh et al. (2018) elucidate that whereas appropriate and well-timed information helps Health Decision-makers make smarter decisions, extraneous information complicates decision-making, creates uncertainty, and affects the organization's efficiency. To this end, it is critical for managers be cognoscente to the information they will need, method of collating, analysis, and application to maximize its use to sail and prosper in the conventional information-intensive environment. Begum et al. (2019) noted that organization factors have a significant effect on the functioning of the HIS. According to USAID (2010), there is little resource allocation for publications and the distribution of periodic reports, let alone investment in information production, research and knowledge management to promote learning and sharing of best practices and experiences. Therefore,this illustrates the need to research how HIS institutions are organised and how they support HIS use.

Hagel et al. (2020) explains that informed decisions can be contrasted with politicallydriven decisionsor are based on intuition or experience. Without a good understanding of what is happening in the health system or health facility, it is impossible to develop strategies to influence health policy behaviours or overall aims if there is no technical support from the organization.

According to a study conducted by Osiyo *et al.* (2017) on determinants of HIS success found that technical support by the health organizations is critical. The study revealed outside technical

support such as from NGO support the areas, they are interested in. However, the study found a significant association between technical support from the organization and the success of HIS.

Another study conducted by Nielsen and Kimaro, (2019) on the organizational factors found that organizational support significant influences DHIS utilization. According to the study, data is submitted to the community, county level, and the ministry of health. These support levels significantinfluence the utilization of the routine generated HIS data. Additionally, the study found that the frequency of sending the data to various levels also has a significant association with the utilization of the information.

According to Karuri et al. (2018), feedback to the facilities is important in HIS and the frequency is also critical to ensure that the relevant health information is used. The study found that health facilities get their feedback from the community, the district office, and the ministry of health. Additionally, the study found that district support supervision team does not frequently visit health facilities. However, the study did not show the statistical significance of feedback to the facilities and district support supervision team in association with access and utilization of DHIS.

Reviewed studies show that there is paucity of information regarding the effect of health institutions organizational support with access and utilization of DHIS2. Additionally, the studies have determined the association between technical support, feedback to the facility and use of DHIS2. Frequency of sending the data to various levels, district support supervision team and utilization of DHIS. However, the studies have not looked at other organizational support dimensions such as funds allocation, monitoring and evaluation among others. Therefore, this research intends to fill this informational gap and determine what are the influence of county health organizational support on access and utilization of DHIS2 in Wajir County.

2.8 Theoretical Framework

In elucidating the utilization of DHIS2, many authors bring forth two rational theories to review extensively on the existing on pieces of literature information Technology use. these are the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technological Acceptance Model (TAM) which thought to be imperatively applicable in this study. To predict behavioural intent towards acceptance and utilization of Information technology, (Venkatesh & Davis, 2000) utilized UTAUT in his modelling.

Essentially, four ideas of UTAUT illustrates technology adoption and Technology usage which are: Social Influence (SI), performance expectancy (PE), Facilitating conditions (FC) and Effort expectancy (EE). In the acceptance setting of the Health Information System (HIS) for employees and managers, TAM indicates that workers and organizations are more likely to embrace the Information Technology(HIS) is considered easy to understand, easy to comprehend, easy to operate and has accompanying paybacks, including optimizing their productivity, performance and consumer satisfaction as well as reducing the time to complete (Venkatesh & Davis, 2000). Because of the well-designed user interface for health information systems, health manager tends to believe its use is effortless. Often, since it has a useful function for the health information system, health workers including managers are likely to think that the system equally valuable for their job purposes.

TAM acceptance model can be linked to the study by utilizing it to predict the level of acceptance of health workers in describing the mindset and enthusiasm to use DHIS. Resources availability and organizational considerations may also determine the role, values, and perceived

usefulness of health workers. Factors such as data infrastructure can be used to illustrate how useful DHIS is to health facilities.

2.9 Conceptual Framework

Conceptual framework as defined by Varpio et al., (2019) is a conjectured model categorizing the subject under study and the association concerning the Explanatory variable and Responding variable. Figure 2.1 is the study Conceptual framework.

As per the figure, the Explanatory variables of the study are data infrastructure, staff technical capacity, available resources and county health organizational support. The data infrastructure dimensions include data origin, data collection and procedure, data quality, comparability and data security. These dimensions were measured using a Likert scale of 1 to 5. The indicators for staff technical capacity include staff education levels, technical skills, computer literacy and data literacy. Also, these indicators were operationalized and measured using a Likert scale of 1 to 5. Additionally, available resources indicators include funding, technical staff, reporting tools and computers and internet were operationalized and measured using a Likert scale of 1 to 5. Further, county health organizational support indicators include technical support, feedback to facility, frequency of visits to facilities by the county support team, sending data to various levels and monitoring and evaluation. These indicators are operationalized and measured using a Likert scale of 1 to 5. The dependent variable of the study is access and utilization of DHIS2 which are operationalized and measured using a categorical scale of 1 to 5.

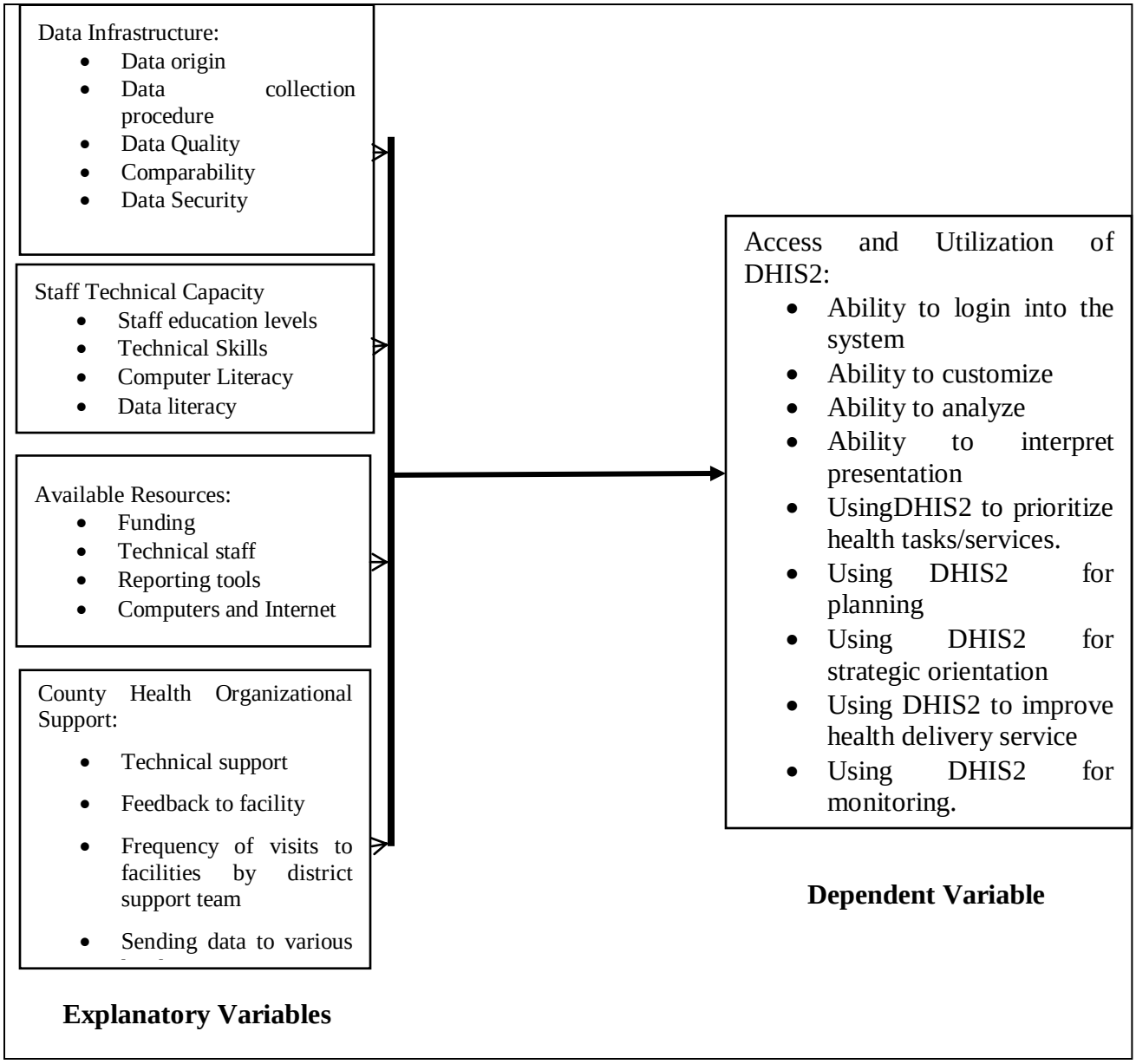


Figure 2.1 the study Conceptual Framework

Source: PRISM tools adopted from measure evaluations(FMoH, 2010)

2.10 Summary

The health information system (DHIS2) faces several challenges during implementation as well as during use. The health workers, healthcare facilities, and other infrastructural matters can cause these difficulties. The reviewed literature implies that data infrastructure is one of the main factors affecting the access and utilization of DHIS information for effective health decisions and policymaking. However, the connection between data infrastructure and access and utilization of DHIS has not been explicit. This is because most of the literature reviewed has focused on the effects of data infrastructure has on information and data quality.

Additionally, staff technical capacity is another factor that influences the access and utilization of DHIS2. However, the significance of that influence has not been unearthed, especially in regions where the employee capacity is low such as Wajir. The reviewed literature has also revealed the influence of resources on DHIS2 implementation, and resources are among the major hindrances for effective implementation. However, the studies have not unearthed how resources affect the access and utilization of DHIS2, especially in the Kenyan context.

Further, there is paucity of information regarding the effect of county health organizational support with access and utilization of DHIS2. Studies have determined technical support, feedback to the facility, frequency of the sending the data to various levels, district support supervision team as the main organization challenges facing utilization of DHIS.

Most of the studies reviewed have not focused on the DHIS in the Kenyan context. Besides, due to the scanty literature and inconclusive results generated by the literature review, this research intends to fill theidentified informational gap. The study emphasized the factors affecting the access and utilization of DHIS2 in Wajir County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology focuses on the process of developing information and knowledge in a study. This chapter presented the research design, the target population for the study, sample size and sampling procedure expected to be used, the data collection instruments, the method for data analysis, and the data presentation expected to be used in the study.

3.2 Research Design

A planned outline for action that works as the channel between research questions and their accomplishment is known as the research design. There are various research designs such as descriptive, explorative, and mixed methods, among others (McClintoc, 2018). Mixed methods, a design and a method of inquiry with philosophical assumptionswere applied in the present study guided by (Creswell *et al.*, 2011). The study employeda convergent mixed method research design whereby the quantitative and qualitative strands of the research are performed independently, and their results triangulated in the overall interpretation(Creswell, 2011). Quantitative approach was used to establish explanatory variables on explained variables through inferential analysis methods, while qualitative information was used to help garner perceptive information that the quantitative approach cannot capture.

3.3 Target Population

The study targeted the Wajir County public health departments and key informants derived from various health departments who utilize health information to make decisions. There are 25 health departments in Wajir County (Appendix I), however, the study targeted the managers working under each department. The reason behind the choice of managers and no other working staff is

because they possess understanding and knowledge regarding health decision making and DHIS2 data access and utilization. The total number of managers working under public health departments in Wajir County is 125 managers.

3.4 Sample Size and Sampling Procedure

There are two sampling methods, namely probability and non-probability methods (Kothari, 2017). Kothari (2017) defines probability sampling as a process where there is a known likelihood that each member of the population was chosen as part of the sample.The study employed probability samplingfor the first population set to systematically sample the targeted managers from the health departments in Wajir County listed in Appendix I.

Additionally, the study employed non-probabilistic to purposively select the key informants for the second population. The non-probabilistic methods of sampling include purposive sampling, convenience sampling and snowballing sampling. This study utilized purposive sampling to select 10 key informants purposely.

3.4.1 Sample Size

I. Main Respondents Sample Size

According to Etikan and Bala (2017), sampling is the act, procedure, or technique of selecting a suitable sample from the target population to determine the characteristic of the whole population. Because the health workers & the non-health workers population is heterogeneous, the study selected different samples to represent the two sets of the target population. The sample size for the public health departments managers was obtained from 125 using Yamane (1967) formula as illustrated by equation 3.1.

$$n = N/1 + Ne^2 \qquad (3.1)$$

$$95= \frac{125}{1+125*(0.05)^2)}$$

Where:

n=Sample size, N=Population size, e= Margin of error

From the Yamane (1967) formula, the sample size of health workers working at county public health departments will be 95 as determined by Yamane formula.

II. Key Informants Sample Size

The study also engaged ten key informants from different health departments who provided specific information regarding the access and utilization of DHIS2. The key informants were purposively selected from Wajir County public health department managers.

3.4.2 Sampling Procedure

The study adopted systematic sampling to select 95 respondents (managers) from the Wajir County public health departments. Systematic sampling is a type of probabilistic sampling technique that will ensure that no manager is picked twice, and every manager will have a chance to be selected. Additionally, the study employed a purposive sampling technique to select key informants from different health departments. Purposive sampling is a type of non-probability sampling technique that focuses on sampling techniques where the units that are investigated are based on the judgment of the researcher. Purposive sampling ensured that the selected 10 key informants have specific information on DHIS2 utilization in their area of focus.

3.5 Instruments for Collecting Data

There exist several approaches for collecting primary data, including questionnaires, interviews, and observation. Semi-structured questionnaires were preferred to gather primary data on the

hypothesized factors influencing access and utilization of the District Health Information System (DHIS2) in Wajir County. Questionnaires were selectively applied to selected public health departmental managers in Wajir County.

Questionnaires are used in this study because they are an easy and cheap way to collect quantitative and qualitative information concerning study objectives. Additionally, they save time in that a large number of respondents can fill them compared to other methods like interviews. Besides, McClintock (2019) argued that self-administered questionnaires enable participants themselves and at their own pace to answer questions. By allowing them time to reflect on their responses, they ease therespondent burden.

Interviews were used to collect qualitative information from selected key informants using an interview guide. The use of interview to collect data from the key informants who make health-related decisions was appropriate since they are aware of the specific information about the functioning, access, and utilization of DHIS2. Additionally, interview allowed capturing information that cannot be captured in the questionnaire since respondents tend to elaborate their responses (Kothari, 2017).

3.5.1 Pilot testing

According to Hunziker and Blankenagel (2021), a pilot study is a mini-study or trial study used to test the feasibility of the study, consistency/reliability as well as the validity of the study instruments. Kothari (2017) accounts that 10% of the sample size is adequate to conduct a pilot study. The 10% of the sample size (95) is 9.5, which when rounded off to the nearest complete number is 10. Therefore, this study conducted a pilot study using a sample of 10 managers who were not included in the main study.

3.5.2 Validity of the Research Instruments

Kothari (2017) defines validity as the capacity of the instruments to meet the soundness of content by requesting similar answers from a range of respondents (Kothari, 2017). The study employed content validity to check for the logical flow of the statements in the questionnaire. This was done by discussing the research instruments with the supervisors who in this case were the experts who examined the tool on how it embodies attributes of the research intent.

3.5.3 Reliability of the Research Instruments

Reliability is defined as the degree to which instruments yield results constantly in recurrent measures. Hunziker and Blankenagel (2021) aver that reliability aids to bring forth the degree for a test score remains independent from dimension errors. The study administered a questionnaire using Cronbach alpha to measure for internal consistency. According to Manerikar (2018), an alpha coefficient of less than 0.5 is considered unreliable, while an alpha coefficient greater than 0.5 is considered reliable while an alpha coefficient of more than 0.7 is considered very reliable. Based on this assertion, the questionnaire was deemed reliable. as shown in Table 3.1 below.

Table 3.1 Reliability Test Results

Variable	No. of items	Cronbach Alpha	Decision
Data Infrastructure	8	0.844	Very Reliable
Staff technical capacity	6	0.758	Very Reliable
Available Resources	6	0.702	Very Reliable
County health organization support	7	0.763	Very Reliable
Access and Utilization of DHIS2	7	0.737	Very Reliable

3.6 Data Collection Procedure

A letter from the school of public health was obtained andapproval from KNH Ethical committee for data collection by the researcher. The research was employed and trained on data collection procedures. The first step was the selection of study participants. Prior to administering the questionnaire and interview session, the participants were required to fill the ethical form and give consent to participate in the study. The study employed a drop-and-pick method of data collection. A self-administered questionnaire(hardcopy) was given to selected managers of the selected Departments. The questionnaires were collected after seven days and kept in a safe place for data entry and management. Additionally, interview sessions with the study key informants were arranged through appointments at a particular place such as coffee restaurants or the respondents' place of work. Interview sessions lasted between 25 to 30 minutes, which allowed the researcher to capture relevant information.

3.7 Data Analysis Techniques

Hunziker and Blankenagel (2021) state that data analysis is the assigning of value to the obtained data. According to McClintock (2018) quantitative data was gathered from the research data, then coded and inputted into the Statistical Package for Social Science (SPSS) analysis software. According to (Cresswell, 2011)quantitative analysis of data involves using descriptive statistics to understandthe data as well as inferential statistics such as correlation and regression analysis togenerate inferences from the data. The study employed descriptive statistical analysis namely mean, standard deviation and percentages to describe the data and responses. However, to make inferences between the study variables and answer the research questions, the study employed inferential statistical analysis namely Chi-square, and multivariate regression analysis. Before inferential analysis, diagnostic analysis was conducted to identify whether the assumption of

regression holds. The regression assumptions that were tested include normality, linearity, heteroscedasticity, and multicollinearity.

McClintock (2018) asserts that qualitative data analysis methods involve thematic as well as content analysis. Responses from interview sessions were recorded for later transcription. Qualitative data from questionnaires open-ended questions and the transcribed responses from interview sessions wereanalysed thematically. The themes established from the responses were discussed in narratives.

3.8 Ethical Consideration

According to Fleming (2019), ethics includes studying good and bad conduct. This study ensured that the information provided by the respondents was confidential. In addition, relevant permits were sought from the appropriate authorities leading up to the study initiation. Such authority includes the permission from the university, ethical approval from the relevant authority and the Wajir County Administration Office leading up to data collection from the population targeted. The researcher informed the respondents of the purpose of the study and gave them an official assurance that the data collected would be utilized for academic research purposes only. To increase the level of trust between the respondents, no personal identification specifics was asked from the respondents.

CHAPTER FOUR

RESULTS AND INTERPRETATIONS

4.1 Introduction

This section presents the analysis results, interprets, and discusses them in line with the study objectives. Data analysis was performed using Stata Version 16 that generated both descriptive and inferential analysis presented in tables and figures. Descriptive statistics describe the respondents' profile and show the general trend of the respondents. Correlation and regression analysis under the inferential analysis infers meaning between the study variables. At the same time, diagnostic tests were conducted to test the robustness of the regression model and ensuring that the findings were reliable.

4.2 Response Rate and Respondents' Demographic Analysis

4.2.1 Response Rate

Questionnaires were distributed to all the 95 Health Workers working at Wajir County Public Health Department. Out of 95 administered questionnaires,85 was fully filled and returned, accounting for an 89.5 per cent response rate as shown in Table 4.1.

Table 4.1 Response Rate

Questionnaires	Number	Percentage
Questionnaires Sent	95	100%
Questionnaires fully filled and returned	85	89.5%

Source: Data Processed.

That response rate is a sufficient representation of the total population, according to Mugenda and Mugenda (2003), who avers that a response rate of more than 70 per cent is adequate and more than 50% is good. The number of observations(85) is also deemed sufficient to conduct inferential analysis. According to Gujarati (2003), the minimum required observations is 30 for

simple linear regression models.However, some models, such as time series related would require more than 150 observations.

4.2.2 Respondents Bio-Data Information

The respondents' demographic information features the age in years, gender and education level as shown in Table 4.2 below. The the major findings were:

- Majority of the respondents were middle-aged (21 to 45 years at 67%),
- Majority of the respondents were male (72%),
- Most of the respondents had undergraduate level of education (64%).

Table 4.2 Respondents Bio-Data Statistics

Respondents' Age	**Freq.**	**Percent**
18-20 years	23	27
21-45 years	57	67
46-60 years	4	5
Over 61 years	1	1
Total	**85**	**100**
Respondents' Gender		
Female	24	28
Male	61	72
Total	**85**	**100**
Education		
College Level	23	27
Post Graduate	8	9
Undergraduate	54	64
Total	**85**	**100**

Source: Data processed.

As shown in Table 4.2, the majority, 67% (57) of the respondents, were between age 21 to 45 years, followed closely by the respondents aged between 18 to 20 years at 27% (23). The results suggest that the majority of the department managers are between 21 and 45 years of age. This age group is the most productive since it can combine skill and energy to drive the access and use of DHIS2 in decision making in various health departments. In relation to the study, the results imply that the respondents come from the most productive age groups, hence the information supplied is helpful and in line with the study objectives.

In addition, the results suggest that (72%) of the participants were male and 28% were female. This indicates the uneven distribution of gender at the managerial levels of the Wajir County Public Health departments. However, it can be argued that at 28% females, the managerial levels of public health departments at Wajir county have qualitatively achieved the one-third gender employment rule. The lacking 2% to fully achieve the rule can be attributed to several factors such as gender choice of profession and cultural and educational factors. In regard to this study, the gender distribution is deemed enough to eliminate any gender bias.Hence the results can be said to be reliable.

Moreover, the majority (64%) of the respondents had an undergraduate level of education and 9.41% had a postgraduate level of education. This implies that the managers occupying the managerial positions at various health departments in Wajir County are sufficiently educated and qualified to handle the requirements of DHIS2 and make the appropriate data-informed decisions. This also implies that they possess a good understanding of this study questions hence are reliable sources of information.

4.2.3 Respondents Work Profile and Access and Utilization of DHIS2

The respondents were asked details regarding their work and whether they access and utilize DHIS2. The following results show the crosstabulations of the respondents work profile and access and utilization of DHIS2. The main results revealed that for the last six months.

- Majority of the managers(62%) have access and utilize DHIS2, while the majority of those were middle level managers at 29%.
- There is no significant association between managerial position and access and utilization of DHIS2 (Chi-square P-value =0.412 > 0.05).
- There is no significant association between duration at managerial position and access and utilization of DHIS2 (Chi-square P-value =0.105 > 0.05).
- There is no significant association between the type of responsibility and access and utilization of DHIS2 (Chi-square P.value = 0.447 >0.05).

Table 4.3 Respondents Work Profile and Access and Utilization of DHIS2

	Access and Utilization of DHIS2		χ^2
Work Position	**No**	**Yes**	
Middle Level Manager	21 (25%)	25(29%)	
Top Level Manager	4(5%)	12(14%)	
Unit Head Manager	7(8%)	16(19%)	0.412
Duration Managerial Position	**No**	**Yes**	
Below 2 years	9 (11%)	13(15%)	
3 to 7 years	11(13%)	8(9%)	
8 to 11 years	7(8%)	23(27%)	
Over 12 years	4(5%)	8(9%)	0.105
Responsibilities	**No**	**Yes**	
Ground service	5(6%)	11(13%)	
Policy	4(5%)	11(13%)	
Program	23(27%)	31(36%)	0.447

Source: Survey Data (2021)

Table 4.3 shows that the majority (25% + 29% = 54%) of the respondents are middle-level managers. From the results, 25% of the respondents were middle-level managers and indicated that they were not able to access or utilize DHIS2 in the last 6 months. This implies that the respondent probability of working as a middle manager and not being able to access or utilize the DHIS2 is high at 0.25. In addition, 29% of the respondents were middle-level managers and were able to access and utilize DHIS2 in the last 6 months, implying that the probability of working as a middle manager and being able to access and utilize DHIS2 is 0.29. Top-level managers who were able to access and utilize DHIS2 accounted for 14% of the entire sample. In comparison, unit head managers who were able to access and utilize DHIS2 accounted for just 19% of the total respondents. However, the chi-square test of associationshows that there is no significant association between managerial level and utilization of DHIS2 at Wajir County health departments (p-value = 0.412).

Additionally, Table 4.3 reveals that most 30(35%) of the respondents have been at their respective managerial position for 8 to 11 years. 27% of the total respondents have been in their managerial position for 8 to 11 years and are able to access and utilize DHIS2. This suggests that the probability that the individual has been at a particular managerial position for the period between 8 to 11 years and is able to access and utilize DHIS2 is high at 0.27. In addition, respondents who have less than 2 years at their managerial position but were able to access and utilize DHIS2 accounted for 15% of the total sample population. Still, the relationship between duration at the managerial position and access and utilization of DHIS2 is insignificant as revealed by the chi-square p-value of 0.105.

Furthermore, the results indicate that the majority (63%) of the respondents' responsibilities were program. However, respondents who had program responsibilities and access DHIS2 accounted

for 36% of the total sample population and those who did not access and utilize DHIS2 accounted for 27% of the total sample population. The association between respondents' responsibilities and access and utilization of DHIS2 is also insignificant, as revealed by the p.value of 0.447.

4.3 Descriptive Statistics of Study Variables

The study checked for the general trend of the responses using descriptive statistics, namely percentages, mean and standard deviation. In this section, the study also conducts the chi-square test of association statistics regarding respondents' work profile in and access and utilization of DHIS2.

4.3.1 Descriptive Statistics of Data Infrastructure

Different questions were asked regarding data infrastructure. The first sets of questions were categorical questions that aimed at identifying whether data infrastructure and quality hindered the access and utilization of DHIS2. The second set of the questions were statements regarding data infrastructure, while the third set of questions were open-ended questions which analysed qualitatively and presented in themes. The key findings were.

- Majority (62.65%) of the respondents were concerned about the DHIS2 data quality in the last 6 months,
- Majority (83.14%) of the respondents indicated that it was difficult to use DHIS2 in the last 6 months.
- The relationship between data quality concerns and use of DHIS2 was not significant (Chi-square P-value = 0.093 >0.05) in the last 6 months.

- Majority of the respondents agreed with the statement regarding data infrastructure (Aggregate mean = 3.75, SD = 0.911).

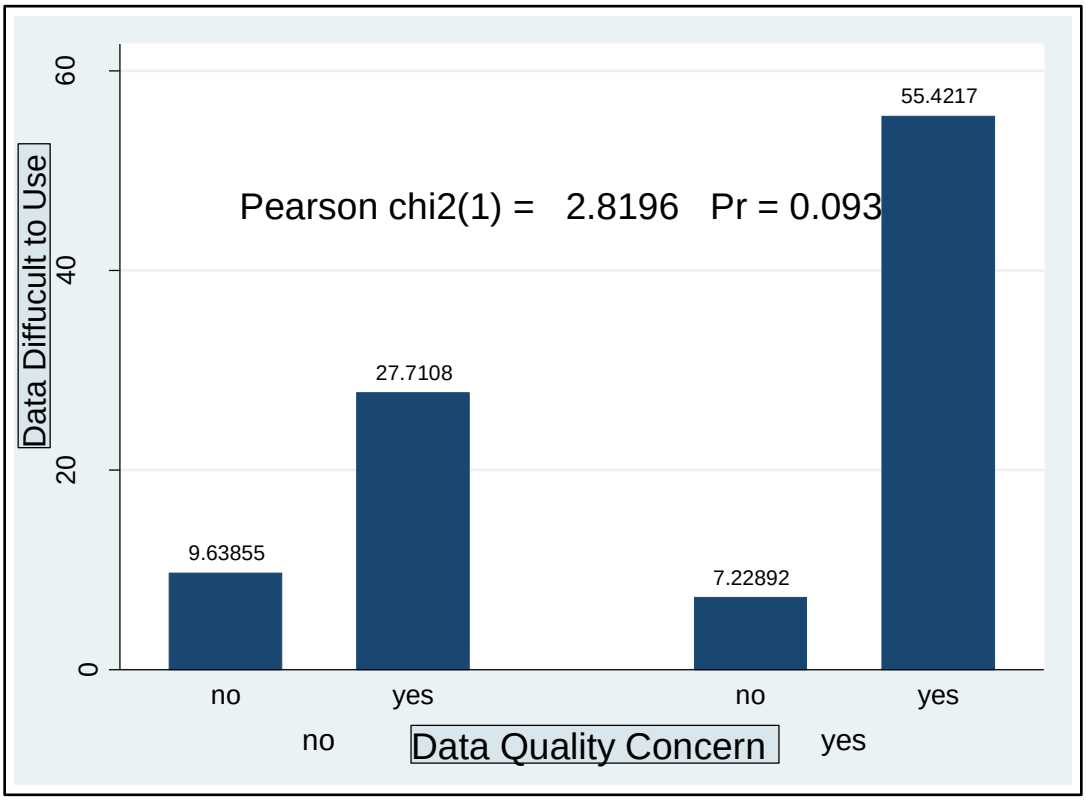


Figure 4.1 DHIS2 data quality and data use

According to figure 4.1, the majority of the respondents (55.42 + 7.22 = 62.65%) indicated that they were concerned about the quality of the data/information being used in the last 6 months. Out of the total respondents, 55.42% indicated that they were concerned about the quality of the data and that concern made it difficult to use the DHIS2 data. This implies that the joint probability of respondents facing data concern difficulties and failing to use the DHIS2 data is high at 0.55. However, the relationship between data quality concerns and use of DHIS2 is not significant as revealed by the chi-square test of association p.value of 0.093. The respondents were asked how they would have gone about preventing the situation of poor data quality and

improve the use of DHIS2. The most prominent themes were training and data collection capacity building, as well as, conducting data audits at all departments.

In addition, the respondents were asked to indicate the extent to which they agreed on statements constructed to measure the quality of data infrastructure. Table 4.4 shows the summary of the results.

Table 4.4 Data Infrastructure Descriptive Statistics

	SA	A	N	D	SD	Mean	Sd
1. DHIS2 design allows capturing of all the health Data	7.2%	64.6%	9.4%	13.2%	5.60%	4.1	0.98
2. Data origin captures the relevant health information needed to make health decisions in our department.	10.2%	23.9%	13.0%	47.6%	5.30%	2.7	1
3. There is sufficient detail in DHIS2 data collection	5.60%	22.6%	5.9%	59.3%	6.60%	3.2	0.97
4. The data collection frequency is high.	6.40%	57.2%	5.8%	27.5%	3.10%	4.33	0.78
5. Data collection is done in a timely manner and is presented in an easy way to understand.	14.6%	58.3%	3.6%	18.8%	4.70%	4.25	0.82
6. There is high comparability of the DHIS2 data from different sources	10.8%	43.30%	14.1%	28.6%	3.20%	3.67	0.95
7. DHIS2 data security is high and reliable	7.80%	69.80%	9.5%	10.3%	2.60%	4	0.88
Aggregate						3.76	0.91

No of obs = 85, Disagreement (strongly disagree + Disagree), Agreement (Strongly Agree + Agree). Sd (Standard deviation).

Source: Survey Data (2021

As shown in Table 4.4, the majority (71.8% = SA + A) of the respondents were in agreement that in the last 6 months there was a limited scope that captures all the health data (Mean =4.1, sd =0.98). However, the majority (52.9%) of the respondents were in disagreement with the statement that data origin captured the relevant health information needed to make health decisions in their department in the last 6 months (Mean = 2.75, sd= 1.00). Moreover, 65.90% of

the respondents disagreed that there was sufficient detail in DHIS2 data collection (Mean = 3.20, sd = 0.97), while 63.5% of the respondents agreed that the data collection frequency was high in last 6 months. Furthermore, 72.90% of respondents were in agreement that data collection was done in a timely manner and was presented in an easy way to understand in the last 6 months (Mean = 4.25, sd =0.82), while 54.10% of the respondents also agreed that there is high comparability of the DHIS2 data from different sources. Overall, the results revealed varying perceptions or views regarding the quality of data infrastructure in the last 6 months.

In addition, respondents were asked about their concerns on data infrastructures of DHIS2 that are of great concern and that influence the ability to make decisions. The most common issue was how the data is packaged and disseminated. In addition, the respondents indicated that they would like the data to be analysed at the department level to enhance understanding and usability while other respondents advocated for frequent surveys to ensure that the information is available when required.

Majority of key informants noted that the data reported is sometimes plagued with errors and wrong information which may impact the decisions made. Therefore, it is the duty of data users to evaluate the information, determine whether it is wrong or right, and do data management and cleaning for useful use. In addition, the quality of DHIS2 data is affected by challenges around the feedback mechanism that delays the DHIS2 reporting. This finding is similar to that of Karuri *et al.*, (2014) who asserted that inadequate skills in monitoring and evaluation of health cares do not only negatively influence data quality but also the reliability of the data. One of the key informants, forty-six years Deputy Director Clinical services, said.

> *"Yes, most of the time, the, as I say to there are many challenges. The feedback mechanism might not be as appropriate as it is supposed to be. Yes, DHS is there, and*

you are supposed to access, but probably the lack of knowledge or lack of trainings makes the information reported to be less reliable and a cause of concern."

Moreover, the key informants were asked whether they think the way DHIS2 is built affects its utilization. The responses suggested that DHIS2 is easy to use but it may be perceived otherwise, hence it may influence utilization in both ways. However, for the people who have used it, they find it is easy and useful in decision-making.The County TB program manager, a 51-year KI, said.

"*DHIS2 is only big in the name but it is easy to use and that it takes short time to learn how to use it, and get the information that you need"* Respondent 1

4.3.2 Descriptive Statistics of Staff Technical Capacity

Different questions were asked regarding staff technical capacity. The first set of questions were categorical questions which aimed at identifying whether health departments have the technical capacity to produce reliable information without a lot of external technical assistance and secondly is whether the technical capacity is able to ensure that access to and availability of reliable health data. The second set of questions sought to understand the level to which respondents agreed with the questions regarding staff technical capacity. The key findings are as follows.

- Departments have enough technical capacity to produce reliable information without relying on the external technical support.
- Staff and health departments have the technical capacity to ensure access to reliable health data.
- Respondents had varying perceptions regarding the statements on staff technical capacity.

- Some respondents believed that Wajir County health departments' staff exhibit high technical capacity, while others believed that health departments' staff possess low technical capacity.

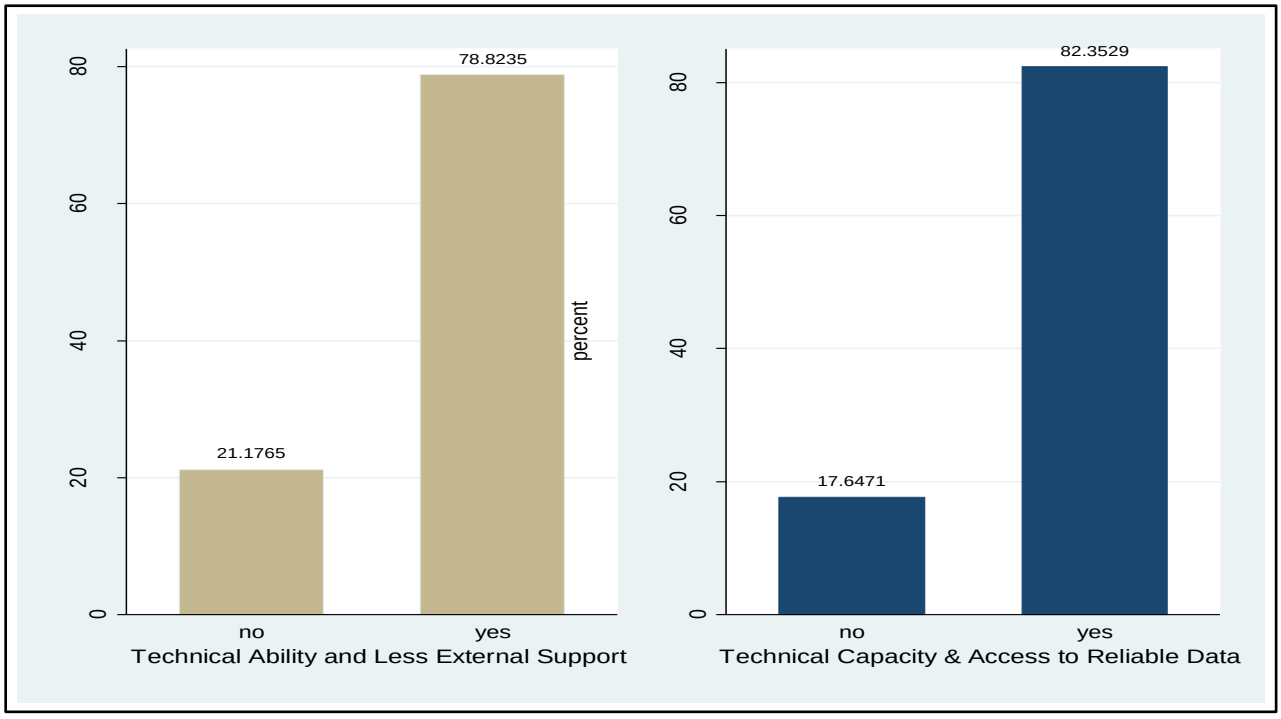


Figure 4.2 Staff Technical Capacity

As shown in Figure 4.2, the first chart, majority (78.82%) of the respondents indicated that they their departments had enough technical capacity to produce reliable information without relying on the external technical support in the last 6 months. In addition, the result show that majority (82.35%) of the health departments in Wajir County had the technical capacity to ensure access to reliable health data in the last 6 months. The study rated the respondents' perceptions on staff technical capacity using Likert-Scale of 1 to 5 and the results were summarized as either agree and disagree as show in Table 4.5

Table 4.5 Staff Technical Capacity Descriptive Statistics

	SA	A	SD	D	Mn	Sd
1. Our department employees have high education	5.8%	51.8%	2.1%	33.18%	3.3	1.4
2. Our staff have adequate understanding of DHIS2 relevant in health policies	4.4%	39.2%	1.0%	31.91%	3.1	1.2
3. We have high number of staff with technical skills who assist in handling and customizing DHIS2 data to fit our departmental needs.	7.8%	31.0%	4.0%	40.68%	2.9	1.2
4. Our staff computer literacy increases access and utilization of DHIS2 in our department.	18.7%	43.7%	2.3%	18.87%	3.5	1.3
5. Our department has high number of data literate staff who help in DHIS2 customization.	11.3%	26.3%	5.4%	39.34%	2.9	1.2
6. We have good number of staff who are highly trained to handle data interpretation and are qualified to handle health data	10.2%	23.9%	6.6%	44.02%	2.7	1.3
Aggregate					3.07	1.27

No of obs = 85, Disagreement (strongly disagree + Disagree), Agreement (Strongly Agree + Agree). Sd (Standard deviation).

Source: Survey Data (2021)

According to the output in Table 4.5 above, 57.60% of the total sample population were in agreement that their department employees have high education (mean= 3.3, sd= 1.4). On whether the staff have an adequate understanding of DHIS2 relevant in health policies, 43.50% were in agreement (mean= 3.1, sd= 1.2). However, 44.70% disagreed that they have a high number of staff with technical skills who assist in handling and customizing DHIS2 data to fit departmental needs (mean= 2.9, sd= 1.2). Moreover, 62.40% agreed that staff computer literacy increases access and utilization of DHIS2 in the department (mean= 3.5, sd= 1.3). while only 44.70% disagreed that the department had a high number of data-literate staff who help in DHIS2 customization (mean= 2.9, sd= 1.2). However, a good number of respondents 50.60%

disagreed with the statement that employees are highly trained to handle data interpretation and qualified to handle health data, (mean= 2.7, sd= 1.3).

The respondents were asked how staff technical capacity influences access and use of DHIS2 in health decision making and they were asked to highlight some of the limitations that hinder the access and utilization of DHIS2 and what can be done to address the limitations. They indicated that staff technical capacity would affect the input of data, timely & completeness of data, data accuracy, analysis of data, data retrieval, and decision making. This proved the staff limitation in terms of ability to access DHIS2, navigate the software and interpret the data to make relevant information specific to their department needs. As a result, respondents noted that there is need address those human capital shortcomings by advocating for training and workshops from the ministry of health.

The key informants were askedwhether their departments have the technical capacity to access reliable information without a lot of external technical assistance? They pointed that majority of the staff were not well trained or equipped to handle DHIS2 functions and make right decisions. Due to lack of adequate training, most health workers in Wajir county health departments face challenges on health data analysis. In regard as to whether the departments have the technical capacity without over-relying on the external assistance, majority of the key informants agreed that at least they have two or three people who are well equipped in handling DHIS2 and health data issues.

In addition, the respondents were asked whether data quality concerns or technical capacity of the employee's concerns made the health decision makers difficult to utilize data. According to the responses, at the county level health decision makers find it especially difficult to use information from new staff members handling matters relating to data especially if there is no

sufficient information and skills cascade or when the team absorptive capacity is low. Similarly, the study by Krishnan (2017) revealed insufficient data analytic use and skills were the frequent constraints facing the health workers. One of the key informants said.

> *"Yes, but not always. For example, a staff who is working with only one staff who is technically able, and he or she decides to leave that facility, getting quality information can be sometimes difficult"* (Head of unit -Monitoring and Quality Assurance - wajir County)

The key informants argued that the DHIS2 reporting was always late due to poor technical capacity of the employees, which prompted the training programs. Besides, the DHIS2 was used to show the workload at particular facilities and therefore inform decisions related to employee deployment and resource distributions. One of the respondents said.

> *"Yes, the decisions of course, the database will show you the workload in terms of how many people were screened and also the number of staff that are on duty at a given time. This is the information that we need to use when let's say when we want to make restocking or from either essential materials or essential medicines. So, these are the type of information that we normally use to make such decisions."* (Chief Officer health-Medical services)

4.3.3 Descriptive Statistics of Available Resources

The study sought to determine how the available resources affects access and use of DHIS2. The responses were rated using a five-pointLikert scale and the results were summarized as either agree and disagree as show in Table 4.6. The key finding was.

- There is low availability of resources that limits the use and utilization of DHIS2.

Table 4.6 Available Resources Descriptive Statistics

	SA	A	N	SD	D	Mean	Sd
1. Our department has adequate funding for health-related matters.	3.1%	20.4%	8.3%	0.7%	67.5%	2.7	1.4
2. Our department has high number of technical staff which inhibits utilization of DHIS2	2.0%	20.4%	8.2%	8.3%	61.1%	2.6	1.3
3. Our department has adequate reporting tools to facilitate utilization of DHIS2 information	0.9%	45.0%	12.9%	4.5%	36.7%	3	1.3
4. Our department has enough computers that allow access and utilization of DHIS2	0.2%	23.3%	14.1%	2.5%	59.9%	2.5	1.3
5. Our department has high internet and network connection	2.1%	15.5%	7.1%	1.5%	73.8%	2.9	1.2
6. Our department has high number of technical staff capable of handling DHIS2	0.9%	21.5%	18.8%	1.8%	57.0%	2.5	1.2
Aggregate						**2.7**	**1.3**

No of obs = 85, Disagreement (strongly disagree + Disagree), Agreement (Strongly Agree + Agree). Sd (Standard deviation).

As shown in Table 4.6, 68.20% disagreed that their department had adequate available resources for health-related matters in the last 6 months (mean= 2.7, sd= 1.4). Furthermore, 69.40% of the sample population were in disagreement that their department had a high number of technical staff which inhibited the utilization of DHIS2 in the last 6 months (mean= 2.6, sd= 1.3). However, 45.90% agreed that their department had adequate reporting tools to facilitate the utilization of DHIS2 information in the last six months (mean= 3, sd= 1.3). On matters concerning computers, 62.40% disagreed that they had enough computers that allowed access and utilization of DHIS2 in the last 6 months (mean= 2.5, sd= 1.3). Similarly, there was a disagreement with the rate of 58.80% on the statement that the department had a high number of technical staff capable of handling DHIS2 (mean= 2.5, sd= 1.2). However, 72.90% agreed that their department lacked adequate funds to implement health-related policies in the last 6 months (mean= 3.9, sd= 1.2).

From the qualitative analysis, among the concerns raised were inadequate funding, low number of technical staff to handle DHIS2, and poor network connection. Additionally, respondents were

asked about the challenges that affected the access and utilization of DHIS2 and how available resources are used to facilitate access and utilization of DHIS2. Respondents highlighted prioritization, logistics, and training as some of the resource challenges that affect access and utilization of DHIS2.

Moreover, the key informants when asked what the challenges are hindering the utilization of DHIS2 utilization to make health related decisions, they claimed that resource is a major hindrance. According to some of the respondents, the low utilization of DHIS2 is because there is not enough resources to train all the stuff. In relation to how the departments are addressing the challenges of inadequate resources, the key informants averred that the departments get some funding from the county governments and that also they are seeking to partner with non-government organizations such as UNICEF.

4.3.4 Descriptive Statistics of County Health Organizational Support

The study sought to determine how county health organizational support affects access and use of DHIS2. The responses were rated using a five-point likert scale and the results were summarized as either agree and disagree as show in Table 4.7. The key finding was;

- County DHIS2 team does not provide sufficient support towards utilization of DHIS2.

Table 4.7 indicates that 56.50% were in agreement that county DHIS2 support team provided adequate technical support to facilitate access and utilization in the last 6 months (mean= 3.2, sd= 1.3). However, 45.90% disagreed that there was a high rate of feedback to the facilities from different sources to improve DHIS2 relevancy in the last 6 months (mean= 2.9, sd= 1.2).

Table 4.7 County Health Organizational Support Descriptive Statistics

	SA	A	N	D	SD	Mean	Sd
1. County DHIS2 team provides adequate technical support to facilitate access and utilization.	6.2%	50.3%	11.7%	28.3%	3.50%	3.2	1.3
2. There is high rate of feedback to the facilities from different sources which improves DHIS2 relevancy	1.3%	41.1%	11.7%	44.5%	1.38%	2.9	1.2
3. There is high frequency of sending the data to various levels and district support supervision team	0.2%	24.5%	14.1%	60.6%	0.61%	3.5	1.3
4.There is high frequency of visits to facilities by county DHIS2 support team	0.6%	14.7%	8.2%	73.4%	3.06%	2.8	1.1
5.Monitoring of DHIS2 by the support team and technical experts is high.	0.8%	20.4%	16.4%	59.9%	2.50%	2.6	1.3
6.The DHIS2 evaluation intervals are large	2.2%	51.9%	18.8%	26.0%	1.08%	3.4	1.2
7.The health organizations support training in regard to DHIS2 processes.	1.0%	30.8%	16.4%	50.2%	1.55%	2.7	1.2
Aggregate						3.01	1.23

No of obs = 85, Disagree (strongly disagree + Disagree), Agree (Strongly Agree + Agree). Sd (Standard deviation).

Source: Survey Data (2021)

In addition, 61.20% disagreed that there was a high frequency of sending data to various levels which reduced DHIS2 relevancy in the last 6 months (mean= 3.5, sd= 1.3). Additionally, 76.50% disagreed that there was high frequency of visits to facilities by the district support team in the last 6 months (mean= 2.8, sd= 1.1). Moreover, 62.40% disagreed that monitoring of DHIS2 by the support team and technical experts was high in the last 6 months (mean= 2.6, sd= 1.3). From the sample population, 54.10% of the respondents were in agreement that DHIS2 evaluation intervals were large (mean= 3.4, sd= 1.2) and 51.80% disagreed that the health organizations support training in regard to DHIS2 processes in the last 6 months (mean= 2.7, sd= 1.2).

The responses from open-ended questions: - training, sustainable support from the county health DHIS2 team, supervisors, strict timeliness, quarterly review meetings, availability of necessary

tools, and regular mentorship ranked high among the county health organizational factors that can be leveraged to improve access and utilization of DHIS2. The respondents advocated for hiringtechnical staff alongside training the existing staff on DHIS2. In addition, they asked for more funding to facilitate availability of other resources such as computers and to improve network, communication and connectivity between departments.

In regard, to access of DHIS2, the key informants were asked to explain the factors that helped access. According to the responses, they availability of resources especially the office computers, and personal computers as well as internet connectivity facilitates the access. In addition, the staff ability to use computers and interpret DHIS2 data is of great influence. The Head of Port health- wajir International Airport, a KI said.

"At the county level, almost all the staff members have their computers and personal computers. They are also well trained on how to access the DHIS2."

4.3.5 Descriptive Statistics of Access and Utilization of DHIS2

The study assessed the access and utilization of DHIS2. The findings are presented below in figures 4.3 and Table 4.8. The key findings were.

- Majority (62%) of the respondents were able to access DHIS2 in the last 6 months,
- Majority (63%) of the respondents claimed that they applied DHIS2 in health decision making in the last 6 months.
- In the last 6 months, the main barrier of DHIS2 access and utilization was mainly because respondents' did not think it was their responsibility, followed by the concern that the data was not well presented.

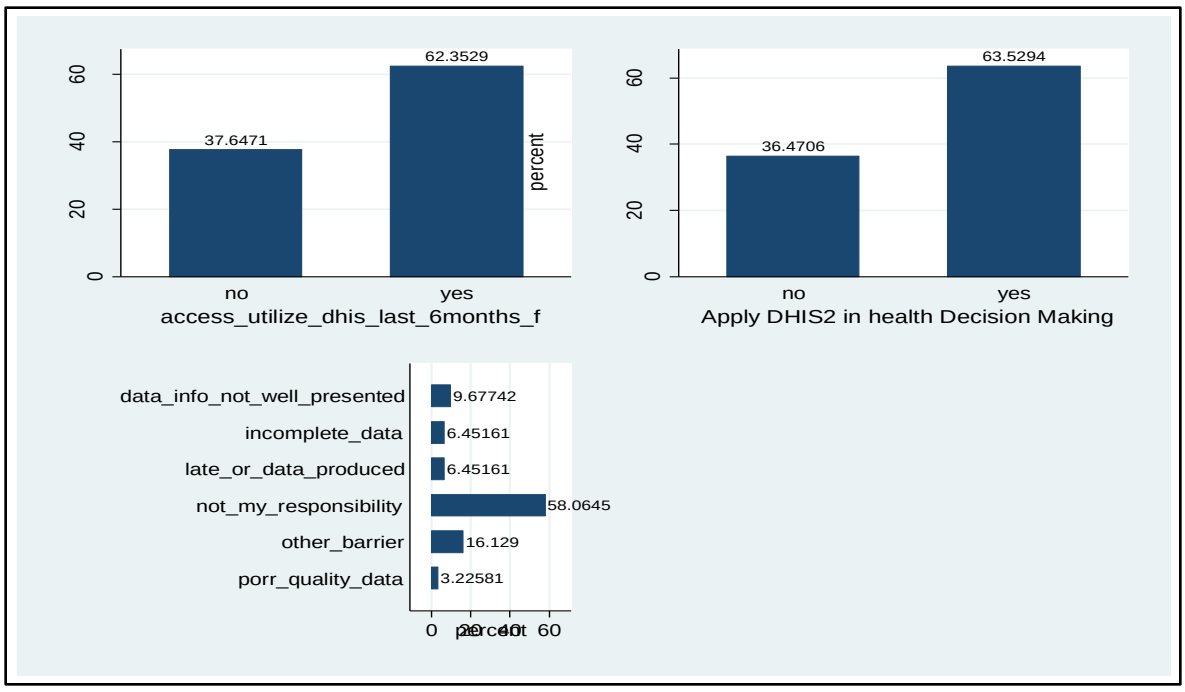


Figure 4.3 Access and Utilization of DHIS2

As shown in Figure 4.3, majority (62.35%) of the respondents said their department had access of DHIS2 and 63.52% of the participants said their department applied DHIS2 to make decisions at the departmental level in the last 6 months. The participants who said that they were not able to access and utilize DHIS2 indicated that it is not their responsibility to make health decisions. A good percentage (9.6%) of the respondents said that the data information was not well presented, while others indicated that the data reported was late or incomplete (both 6.45%) in the last 6 months. For the departments that utilized DHIS2, the respondents indicated it was utilized in various situations. Among them is planning for supplies, staffing, planning on training, reviewing job package and salaries, promotion, and scale diagnostic. In addition, DHIS2 was utilized to distribute resources like staff and drugs, improving immunization coverage and mapping hotspots of outbreak and nutrition needs.

Table 4.8 Access and Utilization of DHIS2 Descriptive Statistics

	SA	A	N	D	SD	Mean	Sd
1.Our departmental staff are able to login into the DHIS2 system and access relevant information.	0.8%	41.6%	16.4%	37.5%	102.5%	3	1.4
2.Our staff are able to access and customize the DHIS2 data to fit our data analysis methods and needs.	3.6%	29.3%	14.2%	50.3%	79.7%	2.7	1.3
3.Our department is able to analyse the DHIS2 data and generate useful inferences	6.1%	49.2%	15.3%	29.1%	100.9%	3.3	1.3
4.Our department is able to interpret the data analysis results and present the result in a manner that is easily understandable.	6.2%	41.4%	24.2%	25.7%	84.3%	2.7	1.1
5.Our staff is able to generate useful insights from the data that are used to inform health decisions in our department.	1.8%	43.5%	24.1%	30.0%	90.0%	2.3	1.2
6.Our department uses DHIS2 regularly to prioritize health tasks/services	5.7%	37.8%	18.9%	36.8%	53.2%	3	0.9
7.Our department frequently uses DHIS2 for health-related policies and planning.	4.1%	37.1%	24.7%	31.4%	98.6%	3.1	1.3
8.Our department uses DHIS2 information to inform the strategic orientation or positioning.	5.5%	40.4%	22.3%	28.9%	91.1%	3.2	1.2
9.Our department frequently uses DHIS2 to improve the county health delivery service	1.1%	55.4%	16.4%	24.1%	105.9%	3.4	1.3
10. Our department makes frequent use of DHIS2 to monitor the county health status.	3.3%	52.0%	15.3%	28.5%	101.5%	3.4	1.3
Aggregate						**3.01**	**1.23**

No of obs = 85, Disagree (strongly disagree + Disagree), Agree (Strongly Agree + Agree). Sd (Standard deviation).

Source: Survey Data (2021

From table 4.8 above, 42.40% of the total respondents were in agreement that their department staff were able to log in to the DHIS2 system and access relevant information, however, 41.20% of the respondents also noted that their staff were not able to access DHIS2 system in the last 6 months. Moreover, 52.90% disagreed that staff were able to access and customize the DHIS2 data to fit data methods and needs while, 55.30% agreed that their department was able to analyse the DHIS2 data and generate useful inferences in the last 6 months. Of the total respondents, big proportion, that is 47.60% agreed that their department was able to interpret the data analysis results and present the results in the manner that was easily understandable in the last 6 months (mean= 3.3, sd= 1.3). In addition, 45.30% of the staff were able to generate useful insights from the data that was used to inform health decisions in their department and only 43.50% agreed that their department used DHIS2 regularly to prioritize health tasks/services in the last six months.

From open-ended questions, the respondents highlighted some of key hurdles which lack of adequate resources as well as few staff who are well trained to handle DHIS2 and data. Thus, they advocated for staff training on how to handle the program, provide resources required for the utilization of DHIS2, and provide sustainable staff support.

Moreover, the study sought to investigate whether their health workers faced challenges of accessing DHIS2. The common theme is that at low health organization levels, there are some challenges which are associated with employee capacity. When the trained employees are not available, it becomes problematic to get access and use DHIS2. One of the key informants, the Deputy Director, County health Human resources Department said,

"*At county level, I don't think there are any significant challenges. But then there's lower levels, and some of these officials from time to time go for transfers and all over sudden there is limited capacity to utilize and access DHIS2*."

The respondents said that DHIS2 is used to solve a number of problems at the health facilities. For example, in the department of quality assurance and monitoring evaluation, uses DHIS2 to map out when there is lack of drugs and lack of services in particular hospital facility. The overall Director of health, who was a key informant also said.

"So some of the decisions that are made using the DHIS2 system include allocating resources, as well as filling the gaps in terms of staff shortage,supplies and any other materials. Especially, at this time of COVID-19 the procurement of PPS and other materials is based on decisions informed by DHIS2 data."

Additionally, DHIS2 is used in major decisions related to policies and programs made at various health departments. The key informants said that from the DHIS2 use and access, they introduce training programs as a policy to improve their capabilities on using and employing DHIS2 in decision-making. In addition, the latest health decisions as regards the statistics related to spread of Covid-19 virus and acquisition of relevant materials such as vaccines, staff deployment and PPS, which are all informed by the DHIS2 data.

Additionally, the respondents were asked how the DHIS2 meet the departments' needs for information. According to the responses, the information is used and helpful in a number of health department functions. For instance, DHIS2 information is used for quantification of commodities in terms of health products, what goes to the health facilities, health facilities services among others. However, there are also cases of incomplete information and reporting

delays, which makes it difficult to make data-informed decisions, A senior manager, pharmacist and working in the County Health Chief officers stated that: -

"Of course, most of the time the information is correct and help meet most of the needs of our department. But there are some challenges in terms of the timeliness of the information or the completeness of the information. However, we believe that whatever report that goes to the DHIS is adequate enough to help us make our, our decisions."

Moreover, the respondents were asked about the extent their departments were able to access and utilize the DHIS2. Majority of the key informants said that they were able to fully access DHIS2. One of the key informants said.

"One hundred percent"

The respondents were asked about the frequency of making health decisions using DHIS2. It appears that at county level use of DHIS2 is prominent and information are always informed by the DHIS2 information. A senior pharmacist said.

> "*At the county level all decisions are based on data. From the number of pharmacists to quantifying the amount of funding required at particular facility. DHIS2 is the most important source of data at county levels."*

To understand the extend and frequency of DHIS2 use, the key informants were asked how the department supports the necessary information to make decisions. The respondents claimed that they have bi-monthly meeting to discuss the use of data and programs. If there is a decline in a particular program, the department finds ways to address the decline and the DHIS2 is placed into full use. This is confirmed by the health Monitoring and evaluation department who said: -

"We have a bi-monthly meeting where we discuss all the health indicators and programs. So, if this is a decline, the officer concern has to find ways to improve or address the decline"

According to the responses, every critical department must make sure that their staff are trained. In addition, the advisory committee evaluates all the health departments, using monitoring, and evaluation strategies they are able to recommend areas of improvement and especially in relation to the staff training.

Conversely, the key informants were asked to explain what kind of adjustments on DHIS2 would make it more impactful. According to the responses, the DHIS2 infrastructure is good but the utilization could be higher if the staffs are well trained, and the issues of internet and connectivity sold. One of the respondents replied.

"The DHIS2 has no problem but the issue of getting internet for the setting is a big problem. Besides training of all staff in a department could eliminate the issue of low data frequency and delays" Respondent 2.

In matters regarding changes that would facilitate timeliness, relevance, understandability and comparability of DHIS2 information, the key informants highlighted data auditing, sanctioning and motivating the staff who are responsible to do reporting and generally providing the appropriate resources such as computers. The respondents emphasized on data audit to improve the relevance, comparability, and understandability of DHIS2 information. For the respondents who are trained on using DHIS2, but their absorptive capacity is low, one of the key informants noted that they are assigned a mentor or a tutor who will help them out to understand the information and make useful use.

4.4 Diagnostic Tests

Prior to regression analysis, diagnostic tests were conducted to ensure that the regression model was Best Linear Unbiased Estimator (BLUE). The study tested for normality, linearity, heteroskedasticity and multicollinearity.

4.4.1 Normality Test

Histogram was used to check the distribution of residuals, which were normally distributed as shown by the bell shape curve in Figure 4.4.

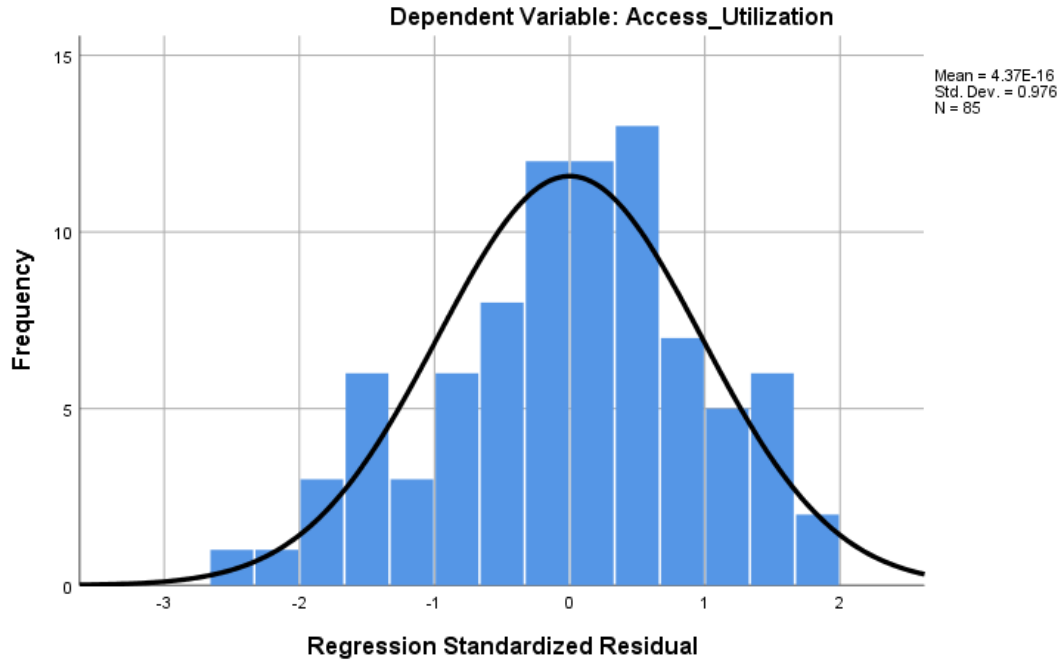


Figure 4.4 Normal Plot using Residuals

4.4.2 Linearity Test

The purpose of linearity testing is to decide if the association between independent and dependent variable is linear or not. This study employed ANOVA test of linearity and the findings summarized in Table 4.9.

Table 4.9 Test for Linearity

		Sum of Squares	df	Mean Square	F	Sig.
DHIS2 Accessand Utilization vsCounty Health organizational support	Deviation from Linearity	25.038	20	1.252	1.345	0.186
DHIS2 Accessand Utilization vs Available Resource	Deviation from Linearity	13.33	19	0.702	0.625	0.873
DHIS2 Accessand Utilization vs Staff technical capacity	Deviation from Linearity	15.877	18	0.882	0.84	0.648
DHIS2 Accessand Utilization vs Data Infrastructure	Deviation from Linearity	23.729	25	0.949	0.873	0.637

Source: Stata Results

The null hypothesis of ANOVA test of linearity states that the variables do not deviate from linearity. If the ANOVA p-value is less than critical p-value, the null hypothesis of ANOVA is rejected, and the assumption of linearity is deemed to be violated. However, as shown in Table 4.9, there is linear relationship between independent variables and dependent variable as revealed by p.values (sig.) greater than standard threshold of 0.05. Thus, the assumption of linearity has been adhered to.

4.4.3 Multicollinearity Test

This study checked for the serial multi-collinearity using variance inflated factors as shown in Table 4.10.

Table 4.10 Multicollinearity Test

	VIF	**Torelance**
Staff technical capacity	1.687	.593
Data Infrastructure	1.652	.605
County Health Organizational Support	1.592	.628
Available Resources	1.487	.673
Mean VIF	**1.604**	**.**

Source: Stata Results

As shown in Table 4.10, there was no serial multicollinearity problem. On aggregate, a VIF of less than 3 indicates absence of multicollinearity, while a VIF of greater than 3 indicates the presence ofmulticollinearity. VIF greater than 10 suggests there is serial multicollinearity according to Barker and Shaw (2015), hence there is no serial collinearity between the study independent variables.

4.4.4 Heteroskedasticity Test

The presence of heteroskedasticity inflates the standard errors and consequently makes the t-statistics values small giving a wrong impression that the regression coefficients are not reliable. This study tested the absence of heteroskedasticity using Breusch Pagan and Cook Weisburg test. The test results reported the chi-square value of 6.38 and respective p-value of 0.0116. The null hypothesis states that there is no heteroskedasticity. Since, the p-value is less than the standard threshold of 0.05, the study rejected the null hypothesis and concludes that there is heteroskedasticity. To address the problem of heteroskedasticity, the study applied robust standard errors in the final regression model.

4.5 Inferential Analysis

Inferential analysis namely correlation and regression analysis were conducted, and the results presented in the following sections. The

4.5.1 Correlation Analysis

Correlation shows a linear relationship between variables in question. This study employed a pairwise Correlation of moments and the findings are summarized using the correlation matrix in Table 4.11. The key findings were.

- Access and utilization of DHIS2 has positive and significant correlation with county health organization support (r=0.571).

- Access and utilization of DHIS2 has positive and significant correlation with available resources (r=0.626).
- Access and utilization of DHIS2 has positive and significant correlation with staff technical capacity (r=0.698).
- Access and utilization of DHIS2 has positive and significant correlation with data infrastructure (r=0.585).

Table 4.11 Correlation Matrix

Variables	**1**	**2**	**3**	**4**	**5**
1. Access and utilization of DHIS2	1.000				
2.CountyHealth organizational support	0.571***	1.000			
3. Available Resources	0.626***	0.056	1.000		
4. Staff technical capacity	0.698***	0.286***	0.559***	1.000	
5. Data Infrastructure	0.585***	0.601***	0.086	0.339***	1.000

**** p<0.01, ** p<0.05, * p<0.1*

As shown in Table 4.11, independent variables namely county health organizational support, available resources, staff technical capacityand data infrastructure have positive and significant correlation with DHIS2 access and utilization (r=0.571, 0.626, 0.698 and 0.585 respectively). This implies that positive improvements in organizational support, available resources, staff technical capacityand data infrastructure coincides with positive improvements in access and utilization of DHIS2. Hence, these independent variables may have effect on DHIS2 access and utilization.

4.5.2 Regression Model Results

As revealed in correlation analysis, there is positive correlation between independent variables and dependent variables. To investigate the causation and the effect of independent variables on access and utilization of DHIS2, this study conducted a regression model, and the results are presented in Table 12. The key findings were.

- Data infrastructure had significant and positive effect on access and utilization of DHIS2 (β =0.298, p-value = 0.000).
- Staff technical capacity had significant and positive effect on access and utilization of DHIS2 (β =0.334, p-value = 0.002).
- Available resources had significant and positive effect on access and utilization of DHIS2 (β =0.561, p-value = 0.000).
- County health organizational support had significant and positive effect on access and utilization of DHIS2 (β =0.386, p-value = 0.000).
- Among the variables, available resources had the biggest effect on access and utilization of DHIS2.

Table 4.12 Regression Results

Access Utilization	**Coef.**	**Robust St.Err.**	**t-value**	**p-value**	**[95% Conf**	**Interval]**	**Sig**
Data Infrastructure	.298	.076	3.93	0.000	.147	.449	***
Staff technical capacity	.334	.106	3.15	0.002	.123	.544	***
Available Resources	.561	.096	5.86	0.000	.37	.751	***
County Health Organizational support	.386	.078	4.96	0.000	.231	.542	***
Constant	-2.033	.372	-5.47	0.000	-2.772	-1.293	***
R-squared		0.796	Number of obs			85	
F-test		57.451	Prob > F			0.000	

Akaike crit. (AIC)	118.113	Bayesian crit. (BIC)	130.326

*** p<.01, ** p<.05, * p<.1

Source: Data Processed (STATA version 16)

Table 4.12 concurs with correlation coefficients. According to the regression results, all the independent variables had positive and significant effect on access and utilization of DHIS2. County Health organizational support had a positive and significant influence on access and utilization of DHIS2 (β =0.386). This implies that a unit increase in organizational support from county DHIS2 team, access and utilization will improve by 0.386. The findings reveal that resources are of the utmost importance in DHIS2 access and utilization. According to the results, a unit increase in available resources, that is human resources, financial resources and physical resources that facilitate the use of DHIS2, would result into an increase in access and utilization of DHIS2 by 0.561. Similarly, a unit increase in staff technical capacity would result in increase in access and utilization of DHIS2 by 0.334, while a unit increase in data infrastructure would improve access and utilization of DHIS2 by 0.298. Overall, the independent variables are significant predictors of DHIS2 access and utilization as shown by the adjusted R-squared of 0.796, which suggests that the independent variables explain 79.6% variations in DHIS2 access and utilization.

CHAPTER FIVE

DISCUSSION OF THE FINDINGS

5.1 Introduction

The chapter presents the summary of the findings anddiscusses study findings as per the objectives,andfindings.

5.2 Summary of the Findings

The study's objectives were to establish the impact of data infrastructure on DHIS2 access and utilization, the impact of staff technical capacity on DHIS2 access and utilization, the impact of available resources on DHIS2 access and utilization, and the impact of the County health system organization on DHIS2 access and utilization. The key findings are.

- Data infrastructure had significant and positive effect on access and utilization of DHIS2 (β =0.298, p-value = 0.000).
- Access and utilization of DHIS2 has positive and significant correlation with data infrastructure (r=0.585).
- Access and utilization of DHIS2 has positive and significant correlation with staff technical capacity (r=0.698).
- Staff technical capacity had significant and positive effect on access and utilization of DHIS2 (β =0.334, p-value = 0.002).
- Access and utilization of DHIS2 has positive and significant correlation with available resources (r=0.626).
- Available resources had significant and positive effect on access and utilization of DHIS2 (β =0.561, p-value = 0.000).

- Access and utilization of DHIS2 has positive and significant correlation with county health organization support (r=0.571).
- County health organizational support had significant and positive effect on access and utilization of DHIS2 (β =0.386, p-value = 0.000).
- Among the variables, available resources had the biggest effect on access and utilization of DHIS2.

5.3 Discussion of the Findings.

As per the descriptive analysis,Data infrastructure is a cause of concern that hinders the access and utilization of DHIS2. Overall, the results revealed varying perceptions or views regarding the quality of data infrastructure. There are concerns about the scope of information captured by DHIS2, the relevance of the data, and the detail in capturing the correct data. However, on a positive note, the data collection frequency is high, data security is high, and the comparability function is also high, making it is easier for the health departments to put it into proper use. This is in tandem with Dehnavieh *et al.*, (2019), who indicated that the development of DHIS2 was created based on open data given to all health levelsincluding external users. Their research found that DHIS2 data quality was low due to poor data infrastructure and recommendedimprovement in data securityand data collection and reporting plans and systems. Conversely, there were varying responses on the timeliness of data. The results show that timeliness of reporting was identified as one of the challenges facing DHIS2 access and utilization, which was also noted by Straton, Mukkamala, and Vatrapu (2017), who established the aspects of data infrastructure that affect data quality and utilization, including the accuracy of the information and accessibility, comprehensiveness, consistency, current, validity and timeliness of the information. However, aconsiderable percentage of managers thought there was

timely reporting of health information. This variation could be due tothe small sample size of the key informants.

From the inferential analysis, the correlation analysis revealed a positive and significant correlation between data infrastructure and DHIS2 access and utilization. Although correlation does not imply causation, the regression results lend support to the findings by showinga positive and significant causal effects of data infrastructure and DHIS2 access and utilization. Specifically, according to regression results, a unit improvement in data infrastructure would increase DHIS2 access and utilization by 0.298. Straton, Mukkamala, and Vatrapu (2017) suggested that improveddata infrastructure results in a blend of quality attributes such as performance, usability, simplicity, reliability, and security which gradually determines the utilization level of DHIS2 and overall success of the program.

In regard to the influence of staff technical capacity on access and utilization of DHIS2, the descriptive statistics revealed varying results regarding staff technical capacity. Although most of the respondents had high education and thus possessed adequate understanding of DHIS2, it was however, revealed that most of them lacked the capacity and skills to facilitate the use and access of DHIS2. In addition, there is an over-reliance ona few numbers of technical people who can make the DHIS2 function. Although the key informants claimed that there is continuous training on matters relating to DHIS2, the descriptive results suggest that health departments do not have sufficient employees who can handle health data, right from the data collection stage to data interpretation and use stage. This could be due to the low absorptive capacity of the health workers at Wajir County or poor cascading of information or skills to the lowest levels of health workers. The findings were in line with those of Gathua (2016), who observed that data users in both non-health and health decision-making departments often struggle due to an

underdeveloped capacity to manage, handle and use data to make programmatic recommendations.

The inferential analysis revealed that there exist positive and significant correlation between staff technical capacity and DHIS2 access and utilization. This is supported by regression results which showed a positive and significant causal effect of staff technical capacity on DHIS2 access and utilization. More specifically, the results revealed that a unit improvement in staff technical capacity will increase the access and utilization of DHIS2 by 0.334. Similarly, Karuri *et al.*, (2018) asserted that inadequate skills in monitoring and evaluating of health care negatively influence data quality andreliability. They observed that the ability to handle health data could be improved through various trainings. The finding was also supported byKimani and Kenyatta, (2018) who averred that trained workers are qualified to handle health care data. HMIS, where staff handling the data are trained in accordance with the internationally documented practices significantly, improves the data quality necessary to support decision-making (Okelo, 2017).

In regard to the influence of available resources on access and utilization of DHIS2, descriptive statistics revealed that availability of resources is critical to access and utilization of DHIS2. More specifically, the key informants pointed out that lack of resources such as physical infrastructure and human capital resource are one of the challenges that hinder access and utilization of DHIS2. In particular, funding, technical staff, computers and internet and connectivity are limiting the functionalities of DHIS2. Overall, there is low availability of resources that limits the use and utilization of DHIS2. The research finding was in line with that of Omar (2019) who revealed that DHIS was not sufficient to provide knowledge about the management. The research indicated the factors that affect the use of DHIS thereby reducing the

efficiency of the management of healthcare services. These challenges are also observed in other countries. For instance, Omar (2019) revealed that DHIS was not sufficient to provide knowledge about the management. The research indicated the factors that affect the use of DHIS thereby reducing the efficiency of the management of healthcare services. Similarly, in UK Tae Hoi (2018) indicated that insufficient HIS infrastructure, primarily due to lack of funding, detailed research into critical knowledge, suitable information presentation techniques and lack of technical expertise affected the affect the use of HIS thereby reducing the efficiency of the management of healthcare services.

The correlation analysis shows that available resources havepositively and significant correlates with DHIS2 access and utilization. This is confirmed by regression coefficients, which show that available resources have a positive and significant influence on access and utilization of DHIS2. Specifically, a unit increase in resources would increase in DHIS2 access and utilization by 0.561. Also, van de Pas *et al.*, (2016) confirms the study findings that resource availability influences the use of DHIS2. In their study they found that resource availability would affect the motivation to use the HIS including financial and non-financial matters.

On the influence of county health organizational support on access and utilization of DHIS2, the results suggest that health organization system does not provide sufficient support towards utilization of DHIS2. This is revealed by low rate of feedback to the facilities from different sources, low frequency of visits to facilities by the county support team and low levels of DHIS2 monitoring by thesupport team and technical experts. However, the key informants noted that there is high support at the county level. There are advisors who monitor and evaluate matters regarding health, health decisions and data. These advisors have a bi-monthly meeting in which they evaluate various health issues. However, somehow this is not the same feeling held by

health department managers who indicated less support from the health organization system, which can positively influence DHIS2 access and utilization. This study sides with the department managers, given the raised concerns of timeliness, lack of technical support, funding, andother data quality issues. Overall, the results suggest that the county DHIS2 team does not provide sufficient support for the utilization of DHIS2. This is revealed by low the rate of feedback to the facilities from different sources, low frequency of visits to facilities by the county support team and low levels of DHIS2 monitoring by thesupport team and technical experts. This challenge remains a concern yet to be addressed, as noted by Osiyo *et al.* (2016) who found that there was little technical support by the national ministry of health and county government to support adequate access and utilization of DHIS.

Therefore, it is expected that an improvement in county health organizational support would significantly benefit the access and utilization of DHIS2 at department level. Begum et al. (2019) noted that organization factors have a significant effect on the functioning of the HIS. This is true from the results and as established by correlation analysis, the county health organizational support has a positive and significant correlation with DHIS2 access and utilization. This correlation is confirmed by regression results which reveal that county health organizational support positively influences DHIS2 access and utilization. From the results, a unit increase in county health organizational support will increase DHIS2 access and utilization by 0.386. This is supported by Osiyo *et al.* (2017) who found that DHIS2 can only be successful if there is enough technical support by the health organizations.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

Based on the discussions in the previous chapter, this chapter provides conclusions and recommendations in line with the research questions.

6.2 Conclusions

The study concludes that data infrastructure has a beneficial influence on the access and utilization of DHIS2. The reason is that data infrastructure improves the quality of the information,making the DHIS2 data more reliable, credible and necessary for informinghealth decisions.

In addition, thestaff's technical capacity positively affects the access and utilization of DHIS2.In essence, enhancing the quality of staff would have a beneficial effect on DHIS2 access and usage. Furthermore, staff are the ones who operate DHIS2 and uses the DHIS2 information.Hence improving their operation and use capabilities can improve the DHIS2 access and utilization.

The study also concludes thatresources have beneficial effects on DHIS2 access and utilization. As resources become more available, it is expected that staff will be well equipped to conduct all the functions of the DHIS2 and improve its access and utilization. Besides, the key informants noted thatthe availability of working tools,i.e., computers, funding human capital development would lead to better utilization of DHIS2.

Similarly, that county health organizational support positively affects the access and utilization of DHIS2. This is becausethe county ministry of health and DHIS2 team support would help eliminate bottlenecks such as poor data infrastructure, quality, andtimeliness of reporting and

improve resource availability. These factors have been proved to be the catalyst or prerequisites of DHIS2 data access and utilization. Therefore, improvement of County health system organization support would result in improved access and use of DHIS2 in health decision-making.

6.3 Recommendations

Based on the study's findings, various recommendations for the access and utilization of DHIS2 were made.The study discovered that data infrastructurepositively influences the use and utilization of DHIS2. DHIS2 is a nationwide program; hence thecounty-level health department should devise waysto cascade the importance of DHIS2 and transfer the required skills to the users and handlers of DHIS2 information.

More importantly, DHIS2 should improve the quality of health decisionsat the county health department level. Therefore, to facilitate its use, the department of health at Wajir county should organize and conduct more training and workshops to impact all the health workers with the knowledge and skills needed to operate DHIS2 and make use of it in decision making.Besides, Wajir County should make resources such as appropriate health funding available to health departments and partners with non-governmental organizations to helpfund some health functions.

Regarding data reliability,quality and timeliness of reporting, the health departments should devise ways to improve the data quality and ensurereliable information. This study recommends continuous staff training data audits as well to improve the quality of the data.

6.4 Recommendations to Future Studies

Given that the predicting variables explain 79.6 percent variation in DHIS2 access and utilization, this study recommends future studies to researchother factors that affect DHIS2 access and utilization. SinceDHIS2 is a form of innovation, this study recommends future studies to look at factors influencing the adoption and utilization of DHIS2 guided by the Unified Theory of Acceptance and Use of Technology.

REFERENCES

Ahanhanzo, Y. G. et al. 2014. 'Factors associated with data quality in the routine health information system of Benin'.*Archives of Public Health*, Vol 72, No 1, pp-25-34.

Asemahagn, M. A. 2017. 'Determinants of routine health information utilization at primary healthcare facilities in Western Amhara, Ethiopia', Cogent Medicine. C*ogent*, Vol 4, No 1, pp. 1–11.

Ashton, R. A. et al.2019. 'Use of Routine Health Information System Data to Evaluate Impact of Malaria Control Interventions in Zanzibar, Tanzania from 2000 to 2015', *EClinicalMedicine*, Vol 12, pp. 11–19.

Begum, T., Khan, S. M., Adamou, B., &Ferdous, J. 2019. Perceptions and experiences with district health information system software to collect and utilize health data in Bangladesh: A qualitative exploratory study. Biomed Central, Vol 40, No 3, pp. 576-592.

Bernadette, A., Anthony,, K., Ngaira, D., & Pepela, W. 2019. Enhancing Health Information System for Evidence based decision making in the Health Sector. Ministry of Health.

Bernal-Delgado, E. and Estupiñán-Romero, F. 2018. 'A data infrastructure for the assessment of health care performance: Lessons from the BRIDGE-health project', *Archives of Public Health. Archives of Public Health*, Vol 76, No 1, pp.89-109, pp. 234-256.

Corley, D. A. 2015 'Building Data Infrastructure to Evaluate and Improve Quality: PCORnet', *Journal of Oncology Practice*, Vol 11, No 3, pp. 204–206.

Creswell, J. W. 2011. Controversies in mixed methods research. *The Sage handbook of qualitative research*, Vol, 7, No 4, 269-284.

Dehnavieh, R. et al. 2019. 'The District Health Information System (DHIS2): A literature review and meta-synthesis of its strengths and operational challenges based on the experiences of 11 countries', Health information management .J*ournal of the Health Information Management Association of Australia*, Vol 48, No 2, pp. 62–75.

Etikan, I., & Bala, K. 2017. Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, Vol 5, No 6, pp. 28-49.

Fleming, J. 2019. Experimental Research Methods in Language Learning : Research Methods in Linguistics. *International Journal of Work-Integrated Learning*, Vol 14, No 3, pp.320-345.

Gathua, P. 2016. *Assessment of Data Use of the District Health Information System (Dhis2): a Case Study of Nairobi County Patriciah Wanja Gathua a Research Project Submitted To the Population Studies and Research Institute in Partial Fulfilment for the Award of the Degree.* [Unpublished Masters Dissertation, University of Nairobi].

Gesicho, M. B., Were, M. C., & Babic, A. 2020. Data cleaning process for HIV-indicator data extracted from DHIS2 national reporting system: A case study of Kenya. *BMC Medical Informatics and Decision Making*, Vol 20, No 1, pp.55-87.

Gilner, J. A., & Morgan, G. A. 2000. *Research methods in applied settings: An integrated approach*. Mahwah, NJ: Laurence Erlbaum.

Githinji, S. et al. 2017. 'Completeness of malaria indicator data reporting via the District Health Information Software 2 in Kenya, 2011-2015', Malaria Journal. *BioMed Central,*Vol 16, No 1, pp. 1–11.

Hagel, C., Paton, C., Mbevi, G., & English, M. 2020. Data for tracking SDGs: Challenges in capturing neonatal data from hospitals in Kenya. *BMJ Global Health*, Vol 5, No 3, pp.21-38.

Horn, L. V., & Monsen, E. R. 2008. Steering through the research continuum. Research: successful approaches, Vol 8, No 3, pp.788-801.

Hunziker, S., & Blankenagel, M. 2021. *Research design in business and management: A practical guide for students and researchers.* Springer Gabler.

Karuri, J., Waiganjo, P., & Orwa, D. 2018. Factors influencing the strategic implementation of change management in the devolved public health services in Kenya: A case of Nakuru provincial General Hospital. International Journal of Science and Research (IJSR), Vol 5, No 4, pp.1707-1713.

Kiberu, V. M. et al. 2014. Strengthening district-based health reporting through the district health management information software system: the Ugandan experience.' *BMC medical informatics and decision making,*Vol 4, No.1pp. 40.

Kimani, J. and Kenyatta, J. 2018. Factors Affecting the Utilization of Health Information Technology Projects in Nairobi County.' *Journal of Public Health*, Vol 57, No 2, pp. 286–315.

Kivuti, L. W. 2019. Dynamic simulation model for socio-economic impact of e-health tools in cervical cancer management in Kenya. *BMC medical informatics and decision making,*Vol 7, No.1pp. 1230-1245.

Kothari, C. 2017. *Research methodology methods and techniques by CR Kothari*. Published by New Age International (P) Ltd., Publishers.

Krishnan, A. et al. 2017. Evaluation of computerized health management information system for primary health care in rural India.*BMC Health Services Research,*Vol 10, No 7, pp.78-89.

Kuyo RO, Muiruri L, N. S. 2020. Organizational Factors Influencing the Adoption of the District Health Information System 2 in Uasin Gishu Sub County Hospitals, Kenya Kuyo', World Journal of Medical Education and Research, 6(1), pp. 1–15. Available at:

https://www.indianjournals.com/ijor.aspx?target=ijor:ijmrhs&volume=7&issue=10&article=004.

Leon, N., Balakrishna, Y., Hohlfeld, A., & Odendaal, W. A. 2020. Routine health information system (RHIS) improvements for strengthened health system management. *Cochrane Database of Systematic Reviews,* Vol 20, No 8, pp.89-105.

Manoj, S. et al. 2013. Implementation of District Health Information Software 2 (DHIS2) in Sri Lanka', Sri Lanka.*Journal of Bio-Medical Informatics,* Vol 3, No 4, pp 98-109.

Mbelwa, J. T., Kimaro, H. C., & Mussa, B. 2019. Acceptability and use of mobile health applications in health information systems: A case of eIDSR and DHIS2 touch mobile applications in Tanzania. *IFIP Advances in Information and Communication Technology*, Vol 13, No 9, pp. 579-592.

McClintock, C. 2018. Research design and quantitative analysis. *Oxford Scholarship Online*, Vol 20, No 2, 43-67.

Ministry of Health. 2017. Health Information System Policy. Retrieved from Ministry of Health website: https://extranet.who.int/countryplanningcycles/sites/default/files/country_docs/Kenya/health_information_system_policy.pdf

Nabukenya, J., & Ashaba, J. 2020. An exploratory study on the evaluation of eHealth interventions in Uganda: Practices, challenges and insights. *Research Square*, Vol 23, No 2, pp. 89-105.

Nielsen, P. and Kimaro, H. C. 2019. Information and Communication Technologies for Development: Strengthening Southern-Driven Cooperation as a Catalyst for ICT4D', I5th IFIP WG 9.4 International Conference on Social Implications of Computers in Developing Countries. Springer International Publishing.

Obwocha, W. et al. 2016. Utilization of Healthcare Information Among Healthcare Workers in Gucha Subcounty, Kisii County, Kenya. *Journal of Health Education Research & Development*, Vol 4, No 4, pp.89-103.

Raeisi, A. R. et al. 2013. District health information system assessment: A case study in Iran.*Acta Informatica Medica*, Vol 21, No. 1, pp. 30–35.

Sahay, J., Sahay, S., & Mukherjee, A. S. 2020. Sustainability qualifiers of health management information systems implementation: Case study of DHIS2 in India. *IFIP Advances in Information and Communication Technology,* Vol 32, No.9, pp. 194-206.

Shiferaw, A. M. et al. 2017. Routine health information system utilization and factors associated thereof among health workers at government health institutions in East Gojjam Zone,

Northwest Ethiopia', BMC Medical Informatics and Decision Making. *BMC Medical Informatics and Decision Making,*Vol 17, No 1, pp. 1–9.

Somi, G., Isaac, M., et al. 2017. Analysis of Data Dissemination and Use Practices in the Health Sector in Tanzania : Results of desk review and interviews with key stakeholders. *Journal of Medical Health,* Vol 15, No 8, pp. 79–89.

Somi, G., Matee, I., et al. 2017. Analysis of Data Dissemination and Use Practices in the Health Sector in Tanzania: Results of desk review and interviews with key stakeholders. *Journal of Health Inform Africa,*Vol 4, No 1, pp. 79–89.

Straton, N., Mukkamala, R. R. and Vatrapu, R. (2017) 'Big social data analytics for public health: Comparative methods study and performance indicators of health care content on Facebook', Proceedings – 2017.*IEEE International Conference on Big Data, Big Data 2017, 2018-Janua,* Vol 12, No 4, pp.2772–2777.

Tae Hoi, H. 2018. A comparative study of parliamentary oversight of intelligence in the United States, the United Kingdom and Republic of Korea. *Dispute Resolution Studies Review,* Vol 13, No 1, 121-147.

van de Pas, R. et al. 2016. Human resources for health. *The Lancet*, Vol 45, No 17, pp. 2993–2994.

Varpio, L., Paradis, E., Uijtdehaage, S., & Young, M. 2019. The distinctions between theory, theoretical framework, and conceptual framework. Academic Medicine, Vol 95, No 7, pp.989-994.

Venkatesh, V. and Davis, F. D. 2000. Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies.*Management Science*, Vol 46, No 2, pp. 186–204.

World Health Organization (WHO). 2019. *Policy Statement on Data Sharing by the World Health Organization in the Context of Public Health Emergencies*. Available at: http://www.who.int/ihr/procedures/SPG_data_sharing.pdf.

APPENDICES

Appendix I: List of Health Departments in Wajir County

a. Health Sector

1. Special programs (TB program)
2. Special programs (HIV program)
3. Special programs (Malaria program)
4. Division of Family Health (Nutrition)
5. Division of Family Health (Reproductive health)
6. Division of Family Health (Child Health)
7. Division of Family Health (immunization)
8. Division of clinical service (Nursing department)
9. Division of clinical service (Laboratory department)
10. Division of clinical service(Medical theatre)
11. Division of clinical service(Maternity)
12. Division of clinical service(Clinical department)
13. Division of clinical service(Physiotherapy department)

14. Division of clinical service (Occupational health Department)
15. Division of clinical service (Maintenance department)
16. Division of Environmental (Public Health Department)
17. Division of Environmental (Communication and Awareness Department)
18. Division of Environmental Quality Control and M & E division
19. Health Management and Information System Department
20. Product and commodity management (Pharmacy & Central Drug Store)
21. Disease Surveillance department
22. Human Resources department
23. Private hospital
24. KMTC
25. Port Health

AppendixII: Consent Form

KNH-UoN/ERC/FORM/IC01

KNH-UoN ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: ttps://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC ttps://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL (KNH)
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

PARTICIPANT INFORMATION AND CONSENT FORMSAMPLE ADULT CONSENT FOR ENROLLMENT IN THE STUDY

(To be administered in English or any other appropriate language e.g Kiswahili translation)

Title of Study: FACTORS INFLUENCING ACCESS AND UTILIZATION OF DISTRICT HEALTH INFORMATION SYSTEM: A CASE STUDY OF WAJIR

Principal Investigator\and institutional affiliation: Abdirahman Ibrahim Adan

Co-Investigators and institutional affiliation: Dr Pamela Miloya Godia

Introduction:

I would like to tell you about a study being conducted by the above listed researchers. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal

iii) Refusal to participate in the research will not affect the services you are entitled to in this health facility or other facilities. We will give you a copy of this form for your records.

May I continue? YES / NO

This study has approval by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee protocol No. _____

WHAT IS THIS STUDY ABOUT?

The researchers listed above are interviewing individuals who make health related decisions. The purpose of theinterview is to find out factors influencing access and utilization of District Health Information System. Participants in this research study will be asked questionsabout access and utilization of DHIS2.

There will be approximately 95 participants in this study randomly chosen. We areasking for your consent to consider participating in this study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

If you agree to participate in this study, the following things will happen:

You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately 25 to 30 minutes. Theinterview will cover topics such as DHIS2 data infrastructure, resource availability, staff technical capacity, organization of district health system and utilization of DHIS2.

After the interview has finished the researcher will code the responses for further analysis and generation of insights regarding access and utilization of DHIS2.

We will ask for a telephone number where we can contact you if necessary. If you agree to provide your contact information, it will be used only by people working for this study and will never be shared with others. The reasons why we may need to contact you include: arranging for interview appointments and information regarding the study results.

ARE THERE ANY RISKS, HARMS DISCOMFORTS ASSOCIATED WITH THIS STUDY?

Medical research has the potential to introduce psychological, social, emotional and physical risks. Effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you.

Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview.

ARE THERE ANY BENEFITS BEING IN THIS STUDY?

There are no tangible benefits such as monetary benefits. However, the researcher may share the study findings and insights regarding DHIS2 access and utilization.

WILL BEING IN THIS STUDY COST YOU ANYTHING?

Participants willing to take part in this study will spend 20 to 30 minutes. This is expected to be less costly in terms of productive hours. There will be no other costs associated with participating in the study.

WILL YOU GET REFUND FOR ANY MONEY SPENT AS PART OF THIS STUDY?

You will not spend any money to take part of this study.

WHAT IF YOU HAVE QUESTIONS IN FUTURE?

If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page.

For more information about your rights as a research participant you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke.

The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

WHAT ARE YOUR OTHER CHOICES?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM (STATEMENT OF CONSENT)

Participant's statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counselor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my personal identity confidential.

By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

I agree to participate in this research study:	**Yes**	**No**
I agree to have (define specimen) preserved for later study:	Yes	No
I agree to provide contact information for follow-up:	Yes	No

Participant printed name: _____

Participant signature / Thumb stamp _____ **Date** _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's Name:Abdirahman Ibrahim Adan **Date**: _____

Signature _____

Role in the study: _____*[i.e. study staff who explained informed consent form.]*

For more information contact _____ at _____ from

_____ to _____

Witness Printed Name (*If witness is necessary, A witness is a person mutually acceptable to boththe researcher and participant*)

Name _____Contact information _____

Signature /Thumb stamp: _____ **Date**; _____

Appendix III: Questionnaire

SECTION A: GENERAL INFORMATION

1. Age in Years:

18 – 30 Years ☐

31 - 45 Years ☐

46 – 60 Years ☐

Over 61 Years ☐

2. Gender:

Male ☐ Female ☐

3. Work position

Top Level Manager ☐

Middle Level Manager ☐

Unit head Manager ☐

4. How long have you been in that managerial position?

Below 3 years ☐

4 to 7 years ☐

8 to 11 years ☐

Over 12 years ☐

5. How long have you been in the government service?

10 years or less ☐

11 to 20 years ☐

21 to 30 years ☐

Over 31 years

6. Kindly indicate the division that you work in.

Division of ……

7. What is the specialization of your department (*check all that apply).*

Population, health and Nutrition ☐

Child Survival ☐

HIV/AIDS ☐

Other (*Specify)*……

8. What is your highest level of education**?**

Secondary Level ☐

College Level ☐

University (Bachelors Level) ☐

Postgraduate Level ☐

9. What2are your responsibilities**? (PICK ONLY ONE)**

Policy ☐

Program ☐

SECTION B: DATA INFRASTRUCTURE

This section covers information regarding the technical infrastructure of DHIS2. Kindly answer the questions correctly.

10. Have you ever been concerned about the quality of the information/data being used?

Yes ☐

No ☐

11. If yes (above) what is your concern on the information/data being used?

……
……
……
……

12. Has there been occasion when data quality made it difficult for you to use information in decision making?

Yes ☐

No ☐

13. Has there been occasion when technical capacity made it difficult for your to se information in decision making?

Yes ☐

No ☐

14. If yes, how would have you gone about preventing this situation?

……
……
…….

15. The following statements capture the influence of DHIS2 data infrastructure on DHIS2 data quality, access and utilization. On a scale of 1 to 5, kindlyrateyouragreementlevelswiththefollowingstatements where; 1 is Strongly Disagree, 2 is disagree, 3 is not sure, 4 is agree and 5 is strongly agree

	Statement	**1**	**2**	**3**	**4**	**5**
1	DHIS2 is design allows capturing of all the health Data					
2	Data origin captures the relevant health information needed to make health decisions in our department.					
3	There is sufficient detail in DHIS2 data collection					
4	The data collection frequency is high.					
5	Data collection is done in a timely manner and is presented in a easy way to understand.					
6	There is high comparability of the DHIS2 data from different sources					
7	DHIS2 data security is high and reliable					

16. According to you, what are other data infrastructures of DHIS2 that are of great concern and that influence the ability to make decisions?

……

……

……

17. Kindly explain how data timeliness, comparability, relevancy and understandability of the data influence DHIS2 utilization in health decision making.

……

……

……

SECTION C: STAFF TECHNICAL CAPACITY

This section covers information regarding the staff technical capacity in your department. Kindly answer the questions correctly.

18. Does your department have the technical capacity to produce reliable information without a lot of external technical assistance?

Yes ☐

No ☐

19. Does your department have the technical capacity to ensure access to and availability of reliable health data?

Yes ☐

No ☐

20. The following statements capture the various constructs of staff technical capacity. On a scale of 1 to 5, kindly rate your agreement levels with the following statements where; 1 is Not at all, 2 is strongly disagree, 3 is disagree, 4 is agree and 5 is strongly agree

	Statement	**1**	**2**	**3**	**4**	**5**
1	Our department employees have high education					
2	Our staff have adequate understanding of DHIS2 relevant in health policies					
3	We have high number of staff with technical skills who assist in handling and customizing DHIS2 data to fit our departmental needs.					
4	Our staff computer literacy increases access and utilization of DHIS2 in our department.					
5	*Our department has high number of data literate staff who help in DHIS2 customization.*					
6	*We have good number of staff who are highly trained to handle data interpretation and are qualified to handle health data*					

21. According to you, how does staff technical capacity influence the access and use of DHIS2 in health decision making?

……

……

……

……

22. What are some of the staff limitations that hinder the access and use of DHIS2 in your department and what can be done to address them?

……
……
……
……
……

SECTION D: AVAILABLE RESOURCES

This section covers information regarding the availability of resources in your department. Kindly answer the questions correctly.

23. Does your department have the right resources to produce reliable information?

Yes ☐

No ☐

24. The following statements capture the different factors on availability of resources. On a scale of 1 to 5, kindly rate your agreement levels with the following statements where; 1 is Not at all, 2 is strongly2disagree, 3 is 2disagree, 4 is agree and 5 is strongly agree

	Statement	**1**	**2**	**3**	**4**	**5**
1	Our department has adequate funding for health related matters.					
2	Our department has high number of technical staff which inhibits utilization of DHIS2					
3	Our department has adequate reporting tools to facilitate utilization of DHIS2 information					
4	Our department has enough computers that allow access and utilization of DHIS2					
5	Our department has high internet and network connection					
6	Our department has high number of					

	technical staff capable of handling DHIS2					

25. What are some of the resource challenges that affect the access and utilization of DHIS2 in your department?

……

……

……

……

26. Kindly explain how available resources in your department are used to facilitate access and utilization of DHIS2 in your department.

……

……

……

SECTION E: COUNTY HEALTH ORGANIZATIONAL SUPPORT

This section covers information regarding the health system organization in your department. Kindly answer the questions correctly.

27. Does your department support the necessary information to make decisions?

Yes ☐

No ☐

28. Does your department support training of staff for using and making health decisions?

Yes ☐

No ☐

29. The following statements capture factors on organization of district health system. On a scale of 1 to 5, kindlyrateyouragreementlevelswiththefollowingstatements where; 1 is Not at all, 2 is strongly disagree, 3 is disagree, 4 is agree and 5 is strongly agree

	Statement	**1**	**2**	**3**	**4**	**5**
1	County health departments provides adequate technical support to facilitate access and utilization.					
2	There is high rate of feedback to the facilities from different sources which improves DHIS2 relevancy					
3	There is high frequency of sending the data to various levels and district support supervision team					
4	There is high frequency of visits to facilities by county DHIS2 support team					
5	Monitoring of DHIS2 by the support team and technical experts is high.					
6	The DHIS2 evaluation intervals are large					
7	The health organizations support training in regard to DHIS2 processes.					
8	County health department provides adequate technical support to facilitate access and utilization.					

30. What are some of the organization factors of district health system that influence the effectiveness of DHIS2?

……

……

……

……

31. What are some of the ways do you think that district health system can employ to improve the timeliness, relevancy and understandability of DHIS2?

……

……

……

……

……

SECTION F: ACCESS AND UTILIZATION OF DHIS2

This section covers information access and utilization of DHIS2 in your department. Kindly answer the questions correctly.

32. Have you been able to access or utilize the DHIS2 in the last 6 months?

Yes ☐

No ☐

33. If No, what were the barriers?

Not my responsibility ☐

Incomplete data ☐

Poor quality data ☐

Incomplete data ☐

Data was produced late or not at all ☐

Data information was not well presented ☐

Other (*specify)*……

34. Does your department apply DHIS2 to make health decisions?

Yes ☐

No ☐

35. If Yes (in 31 above) kindly specify the type of health decisions made in the last 12 months……
……
……
……..

36. If No, kindly explain why you have not used DHIS2 in the last 12 months……
……
……

37. List four key decisions that were made in your department?

.....

.....

.....

.....

.....

.....

.....

38. What data/information was used to inform the (above) key decisions?

……

……

……

……

……

39. The following statements capture the access and utilization of DHIS2. On a scale of 1 to 5, kindlyrateyouragreementlevelswiththefollowingstatements where; 1 is Not at all, 2 is strongly disagree, 3 is disagree, 4 is agree and 5 is strongly agree

	Statement	**1**	**2**	**3**	**4**	**5**
1	Our departmental staff are able to login into the DHIS2 system and access relevant information.					
2	Our staff are able to access and customize the DHIS2 data to fit our data analysis methods and needs.					
3	Our department is able to analyze the DHIS2 data and generate useful inferences					
4	Our department is able interpret the data analysis results and present the result in a manner that is easily understandable.					
5	Our staff is able to generate useful insights from the data that are used to inform health decisions in our department.					
6	Our department uses DHIS2 regularly to prioritize health tasks/services					
7	Our department frequently uses DHIS2 for health-related policies and planning.					
8	Our department uses DHIS2 information to inform the strategic orientation or positioning.					
9	Our department frequently uses DHIS2 to improve on the county health delivery service					
10	Our department makes frequent use of DHIS2 to monitor the county health status.					

The End

Thank You.

Appendix IV: Interview Guide

1. What are some of the health decisions that are informed by use of DHIS2 in your department or organization?
2. What was the last major decision related to policies or programs that you made?
3. What information did you use to make this decision?
4. How did you use information to make this decision?
5. How do health information systems meet your needs for information?
6. Have you ever had an experience while making a policy- or program-related decision when you were concerned about the quality of the information being used?
7. Does your agency have the technical capacity to access reliable information without a lot of external technical assistance?
8. Has there been an occasion when data quality or local technical capacity made it difficult for you to use information in making a decision?
9. To what extent do you say that your department or organization is able to access DHIS2 system?
10. What are the main factors do you think are facilitating the access of DHIS2 system in your department or organization?
11. What are the main challenges of access of DHIS2 system in your department or organization?
12. How frequently do you use DHIS2 to make health related decisions in your department or organization?
13. How does the county support having the necessary information to make decisions?
14. How frequently are staff trained on skills for using information in decision making?

15. What are the challenges hindering the utilization of DHIS2 utilization to make health related decisions?
16. As a department or organization, how are you addressing these challenges?
17. Do you think that the way DHIS2 is built is negatively or positively influencing access and utilization of DHIS2?
18. What kind of changes would you recommend on the infrastructure of DHIS2 to make it more impactful?
19. Does your staff possess the capabilities that are relevant and that can improve access and utilization of DHIS2 in your department or organization?
20. What are some of the changes would you suggest for the district health system to facilitate timeliness, relevance, understandability and comparability of DHIS2 information?
21. Are there risks associated with sharing information? If so, what are they?

We've discussed a variety of different barriers to data use. Are there any that I have not mentioned that you would like to discuss?

Appendix V: Declaration of Originality Form

Name of student: ……. Abdirahman Ibrahim Adan

Registration Number: ……H57/84/73

Collage: ……...Health Science

Faculty/School/Institute: -……...School of Public health

Course name: ……. Master of Public Health (MPH)

Tittle of the work: ……..…… FACTORS INFLUENCING ACCESS AND UTILIZATION OF DISTRICT HEALTH INFORMATION SYSTEM (DHIS2): A CASE STUDY OF WAJIR COUNTY.

1. I understand what Plagiarism is and I am aware of the university's Policy in this regard.
2. I declare that this dissertation is my original work and has not been submitted elsewhere for examination, award of degree or publication. Where other people's work or my own work has been used, this has been acknowledged and reference in accordance with the university of Nairobi requirements.
3. I have not sought or used the service of any professional agencies to produce this work.
4. I have not allowed and shall not allow any copy of my work with the intention of passing It of as his/her own work.
5. I understand that any false claim in this respect to this work shall result in disciplinary action in accordance with University Plagiarism policy

Signature: ……... Date: ……...

Appendix VI: Ethical Approval Form

UNIVERSITY OF NAIROBI (UoN)
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KENYATTA NATIONAL HOSPITAL (KNH)

P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

KNH-UoN ERC

Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: ttps://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC

ETHICS RESEARCH COMMITTEE

KNH-UoN ERC APPLICATION FORM

Submit one copy of this form with original inked signatures.**Handwritten and /or incomplete forms** will not be accepted. All relevant appendices e.g. consent forms, questionnaires, instruments, drug information summary, data collection forms, debriefing statements, advertisements, etc.) must be included at the back of the proposal.

I. PRINCIPAL INVESTIGATOR: Provide the information requestedbelow:

LastName: **Adan** Firstname: **Abdirahman I**.

Academic degrees: **Master's in Public Health**

Professional titles and/or work position within your homeinstitution:

Student

Home institution(s) and/or department (s) approving this research project.

University of Nairobi, College Health Science, School of Public Health

Mailing address, telephone and fax numbers, and email address

UON-SPH, P.O. BOX 30197, TEL: 318262. NAIROBI, Website: www.uonbi.ac.ke

All correspondence shall be addressed to the Principal Investigator. Research Administrators may have delegated signatory authority only when listed as Co-investigators.

PROJECTTITLE: **FACTORS INFLUENCING ACCESS AND UTLISATION OF DISTRICT HEALTH INORMATION SYSTEM (DHIS2): A CASE STUDY OF WAJIR COUNTY**

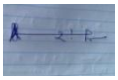
As the Principal Investigator in this research, I declare that:

1) Any change to this protocol and/or procedure shall be notified to and effected onlyafter approval by the KNH-UoNERC.

2) I shall notify the KNH-UoN ERC of intended publication, or any other formof dissemination of results of this study and provide the

draftcontents.

3) Other members of the research team are bound by 1) and 2)above.



_____ _____ Date1/10/2020_____ Principal Investiga

III **RESEARCH PERSONNEL**. Please provide the information requested below forresearch administrators, co-investigators and collaborators in this researchproject.

Adan.	**Abdirahman I.**	**Master's in public health**
Lastname	Firstname	AcademicDegrees

FACTORS INFLUENCING ACCESS AND UTLISATION OF DISTRICT HEALTH INORMATION SYSTEM (DHIS2): A CASE STUDY OF WAJIR COUNTY

_____ _____Date

1/10/2020_____ Research

Administrators' Signature

_____Date_____ Co-Investigators'Si

_____Date_____ Collaborator'sSigr

REQUIRED

ATTACHMENTS

1. Letters of Study Approval from the Principal Investigator's Home Institution(Department).
2. One copy of the Curriculum Vitae of each member in the research team describing their research qualifications andexperience.
3. Research Personnel Information (Roles and responsibilities in the research project).

IV FUNDINGINFORMATION

No current grant. The research is self-funded.

DESCRIPTION OF RESEARCHPROJECT

Please provide an executive summary of this research project including, in non-technicallanguage, the following information:

Background and Purpose of Research

V. *Despite the implementation of DHIS2, there is little evidence on access and utilization of the health information leading to efficiency in health decision making. As a result, non-health and health decision-makers have been making poor decisions which have led to poor health management at all levels namely county and sub-county levels. Also, the high disease burden in the community due to poor health and incessant diseases such as Malaria, TB, and malnourishment may be as a result of poorly informed decisions at all levels. Given the paucity of research studies in this area, as well as, poor disease control in Wajir County this study seeks to establish factors affecting the use of DHIS2 to benefit the health stakeholders.*

VI. *A number of published research have attempted to investigate the issue of DHIS*

utilization. Straton, Mukkamala and Vatrapu (2017), Dehnavieh et al., (2019), Karuri et al., (2014), Krishnan (2017), Okelo (2017), Kivuti (2019), Kiberu et al., (2014), van de Pas et al., (2016) and Raeisi et al., (2013) have studied the antecedents factors that influence the use of DHIS. There is paucity of information regarding the effect of organization factors with access and utilization of DHIS2. The studies have determined technical support, feedback to the facility, frequency of the sending the data to various levels, district support supervision team as the main organization challenges facing utilization of DHIS.

VII. *Majority of these studies revealed have not focused on the DHIS in the Kenyan context. Besides, owing to the scanty literature and inconclusive results generated by the literature review, this research intends to fill the informational gap identified. The current study will emphasis on the factors affecting the access and utilization of DHIS2 in Wajir County. The findings will be crucial in shedding some light about the implementation of DHIS2 in one of the poorest counties in Kenya.*

a) Specifically, the research objectives are:

To determine the influence of data infrastructure on the access and utilization of the DHIS2

To assess the influence of staff technical capacity on the access and utilization of the DHIS2

To establish the effect of resources available on the access and utilization of the DHIS2

To examine the influence of the organization of the district health system on the access and utilization of the DHIS2

b) The key research questions will be:

What is the influence of data infrastructure on the access and utilization of the DHIS2?

What is the effect of staff technical capacity on the access and utilization of the DHIS2?

What is the influence of resource availability on the access and utilization of the DHIS2?

What is the effect of the District Health System Organization on the access and utilization of the DHIS2?

2) ResearchEthics

One of the ethical issue is licking of confidential information provided by the respondents. This study ensures that the information provided by the respondents is confidential.

The researcher will inform the respondents of the purpose of the study and give them an official assurance on the data collected would only be utilized for research purposes and that strict confidentiality will have to be observed. To increase the level of trust between the respondents, no personal identification specifics will be considered for questionnaires.

Research Methodology andProcedures

a) The study research design will adopt mixed methods research design.
b) Research Procedure

A letter from the school of public health will be obtained as well as Approval from KNH Ethical committee for data collection by the researcher. A research assistant will be employed and trained on data collection procedures. The first step will be the selection of

study participants. Prior to administering the questionnaire and interview session, the participants will be required to fill the ethical form and give consent to participate in the study. The study will employ a drop-and-pick method of data collection. A self-administered questionnaire (hardcopy) will be given to selected managers of the selected Departments. The questionnaires will be collected after seven days and kept in a safe place for data entry and management.

Additionally, interview sessions with the study key informants will be arranged through appointments at a particular place such as coffee restaurants or the respondents' place of work. Interview sessions will last 15 to 20 minutes to capture relevant information and avoid inconveniencing the selected participants.

3) **Human participants in the project** (number and type of participants, inclusion/ exclusion criteria and the recruitment strategy).

The study targeted Wajir County public health departments. The study included managers working under each department. The reason behind the choice of managers and not other working staff is because they possess understanding and knowledge regarding health decision making and DHIS2 data access and utilization. The total number of managers working under public health departments in Wajir County is 125 managers.

4) **Study location:** Include a statement about the sites (s) where the study will takeplace. Attach letters ofcooperation.

The study will be conducted in Wajir County. In Wajir County, there is no evidence on the level of access and utilization of District health information System (DHIS2). According to the County director for research, there are many

challenges on the utilization of DHIS2 either at the level of feeding data or accessing such data for other decision-making events.

Risks and benefits of thestudy

The study anticipates zero risks. The study will prove to be beneficial to many stakeholders. First, the health workers such as the staff in the county health department, health administrators, private hospitals, and health lobbyist among others will stand to benefit from this study by gaining insights on what hinders or facilitates the access and use of DHIS2 and strategize on how to improve the access and use.

5) Potential adverse events and proposedinterventions

Please provide the information requested below in an attachment formatted as shown by the requested information.

a) **Nature and Degree of Risk**: The study anticipates privacy risk only. The respondents will be probed to reveal the information they may not want to reveal.

b) **Minimization of Risk**: *To minimize the above risk, the researcher will maintain respondents anonymity and confidentiality.*

c) **Unknown Conditions**: *This study is about organization of the hospital setting and utilization of DHIS2. It will not involve discovery of any health issues among participants.*

d) **Benefits:**

No benefits to the participants. However, the study will be significant to a number of stakeholders. First, the health workers such as the staff in the county health

department, health administrators, private hospitals, and health lobbyist among others will stand to benefit from this study by gaining insights on what hinders or facilitates the access and use of DHIS2 and strategize on how to improve the access and use. The second group of stakeholders that will benefit from the study is the non-health but essential decision-makers on health such as media, department of finance and economics, department of lands and housing, department of Agricultures and livestock services and county assemblies among others.

e) **Adverse Events Treatment**: N/A.

f) **Adverse Events Facilities**: *No facilities will be required.*

g) **Financial Responsibilities**: *The research will not cause any physical or mental harm to the respondents. However, in the case of any harm, the researcher will be financially responsible.*

6) Confidentiality of research data (how to deal with direct identifiers, datastorage, access anduse).

The researcher will maintain anonymity of the research respondents by creating pseudonyms. Data will be stored and encrypted in Microsoft spreadsheet and word.

7) Ethical consideration:

One of the ethical issue is licking of confidential information provided by the respondents. This study ensures that the information provided by the respondents is confidential.

The researcher will inform the respondents of the purpose of the study and give them an official assurance on the data collected would only be utilized for research purposes and that strict confidentiality will have to be observed. To increase the level of trust between the respondents, no personal identification specifics will be considered for questionnaires.

8) **Additional information.** *There will be audio recordings from the interview participants which will be stored in an encrypted file*

9) Consent /assent forms and waiver (Justify whatapplies):

- Written, *the consent will be written to allow for documentation of research procedures.*
- Oral

- Waiver