HEALTH WORKERS' EXPERIENCES WITH THE USE OF SMARTCARE FOR DECISION MAKING IN SELECTED HEALTH FACILITIES IN MONGU AND LIMULUNGA DISTRICTS OF WESTERN PROVINCE, ZAMBIA

By

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A dissertation submitted to the University of Zambia in partial fulfillment of the requirements for the Masters of Public Health (Health Economics, Policy and Management)

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DECLARATION

I, **Mutale, Mwango** declare that this dissertation submitted to the University of Zambia in partial fulfillment of the award of the Degree of Master of Public Health (Health Economics, Policy and Management) is my own work and has not been submitted either wholly or in part for another degree to this University or any other or Institute for Higher Education.

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CERTIFICATE OF APPROVAL

This dissertation by **Mutale Mwango** is approved as a partial fulfillment for the requirements for the award of the degree of Masters in Public Health - Health Economics, Policy and Management by the University of Zambia.

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ABSTRACT

The advancement of information technology in the health sector has given rise to demand for timely, reliable and accurate medical/health information to treat and manage patients. One of the ways to provide timely, reliable and accurate information is through the use of Electronic Health Records systems (EHRs). Zambia has adopted EHRs called SmartCare since 2005. However, in places where the roll out has taken place, only a few health facilities are using the system fully. The study objectives were; to explore health workers experiences and perceptions on the use of SmartCare system, to explore users' satisfaction on the benefits and challenges on using SmartCare compared to paper based record system and explore the usefulness of SmartCare system in decision making at health facility level.

A qualitative phenomological study design was used to collect data through in-depth interviews. A total of 16 respondents were interviewed on the use of SmartCare by health workers for decision making.

Health workers perceptions and experiences on SmartCare system were good. They pointed out that it was a good system, easier, efficient and more convenient way to store and retrieve patient files/records than paper records. However, the study also showed that, the SmartCare was not being used for decision making in all the health facilities visited due to inadequate number of health staff to manage and enter data, work overload, duplication of work, lack electric power to run computers, lack of support and regular maintenance of the equipment.

To enhance utilisation of the SmartCare for planning and decision making, it is important to strengthen health system related factors such as training and deploying specialised staff to help manage the SmartCare. It is also important to develop supportive infrastructure and other support systems in the health facilities

Keywords: health information, electronic health record system, information communication technology, paper record system

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ABBREVIATION AND ACRONYMS

DHIO	District Health Information Officer
DHIS2	District Health Information Software version 2
DMO	District Medical Officer
EHIT	Electronic Health Information Technology
EHR	Electronic Health Records
EMR	Electronic Medical Records
HIA 1	Health Information Aggregation Form 1
HIA 2	Health Information Aggregation Form 2
HMIS	Health Management Information System
ICTs	Information and Communication Technologies
MoH	Ministry of Health

CHAPTER ONE: INTRODUCTION

1.1 Background

With the advancement in technology, more and more medical information is required for health workers to treat and manage their patients. This medical information is essential for health workers to make informed decisions and inform policy. Health policy formulation also requires accurate and reliable information. According to Ahmad (2013), there is a critical need for health leaders to demand better data from their health information systems and to instil a culture of information use for policy-making. In this regard, clinicians' handwritings on health records can be viewed as insufficient to record adequate information required for treatment and management of patients in that, paper records have too many gaps and shortfalls. Among them include; the cost involved in printing these paper records, the demand for storage space and paper records easily tear off making it difficult to trace patient files. Qian Huang (2011) also affirms that, with the rapid development of medical technologies, the treatment process becomes more complex and the number of medical data files are in an explosive growth. He adds on that, doctors need to record much more information and a health record system based on handwriting cannot adapt to this rapid change in technology and health information systems (ibid). The only way to adapt to this change is through the use of health information systems such as Electronic Health Records (EHRs) or Electronic Medical Records (EMRs).

Electronic health records basically provide a longitudinal electronic record of patient encounters and patient health information, including patient demographics, progress notes, problems, medications, vital signs, medical history, immunizations, laboratory data and radiology reports (Simon et al., 2008). EHR is way of transitioning health facilities from heavy dependency on storing patient's records on paper and box files to electronic storage of these records for easy retrieval and decision making.

However, it is important to mention that the uptake of electronic health record systems throughout the world has occurred at different rates. According to Hasanain, Vallmuur and Clark (2014), globally the idea of recording patient health record electronically commenced during the 1960s. In the United States of America for example, the use of EHRs has increased rapidly and percentage of office-based

physicians using EHRs in 2013 was 78% compared to 18% in 2001 (House and Mishra, 2015). They add on that the government has indicated that EHRs are a key tool in improving the nation's healthcare and has put forth an incentive program to encourage the use of it for decision making and policy making processes.

In Cameroon, an electronic health record called MEDCAB, a locally designed for primary healthcare practitioners was piloted. According to Faustine and Suzanne (2008), MEDCAB was released at the beginning of 2003 and that the system consisted of many user interfaces with multiple functionalities including; users' administration, medical encounter, patient registration, appointment management, report generation, patient card generator, diagnosis, etc. After four months of implementation, there was a significant increase in best practices, i.e. 'system prompting for measurement of parameters and checking for unusual values (temperatures, blood pressures, etc.), reminders for conditions requiring special attention and making data from previous contacts readily available (Faustine and Suzanne, 2008). However, healthcare practitioners did not utilise the system for clinical decision-making and its use has since gone down drastically.

Zambia has also adopted an electronic health record system called SmartCare. SmartCare is a complete electronic health record system, designed in Zambia by Zambians and their international partners, to address some of Africa's most urgent health problems. It aims to provide continuity of care for all Zambians regardless of where they go for their health services. According to Ministry of Health (2008), SmartCare was chosen by the Zambian Ministry of Health in 2008 as the national electronic record system to be standardized across all health facilities nationwide. SmartCare has four main objectives: to provide greater continuity of clinic based care; increase the privacy of sensitive medical information (such as TB or HIV status); reduce the burden of paperwork on health staff and improve the quality of information and decision support for patients, while providing automated information flow into the government's existing Health Management Information System (HMIS) categories (MoH, 2008).

However, in places where the roll out has taken place, only a few health facilities are using the system fully due to a number of challenges such as reporting and administration. Additionally, most of the potential value of a national EMR is not

being realized through the SmartCare program, with little evidence of data use across the system (SmartCare Assessment Report 2015). The lack of policy on health information use and electronic medical records in general has also affected the use and implementation of EHRs in Zambia. It is against this background that this research will seek to explore health workers experiences with the use of SmartCare for decision making in selected health facilities in the Western Province of Zambia.

1.2 Statement of the Problem

In view of the inadequacies of paper medical records, electronic health record systems are among the innovations to make possible change the way health information is being stored. EHRs have shown to improve the flow of medical information, enhance the quality and continuity of care, reduce the time spent locating missing records and diminish the redundancy of data entry and duplicative testing (Retchin and Wenzel, 1999). By using electronic health record systems, health workers have the opportunity to enter specific items for the patient into the computer system which then improves patient interactions and is more precise than paper based record. Compared to electronic health record systems, paper record system is incapable of supplying health workers with all the patient information they need in a way that they can maximise decision making.

However, despite potential benefits regarding the value of electronic health record systems for patient care, improved clinical decisions making and ordering of drugs, adoption has been slow for many countries, including Zambia. As stated by Keshavjee et al., (2006), EMR implementations still face daunting odds and close to 50% of implementations fail, causing significant financial losses, lost opportunities for improved decision making, improved patient care and significant anguish for implementers, clinicians and senior managers.

In Zambia, MoH with support from cooperating partners have rolled out Smartcare to all the provinces and over 500 health facilities have implemented the system. Notwithstanding the massive investment in SmartCare in Zambia, most of the facilities have not used SmartCare to its full capacity as it was intended. SmartCare implementation has been low and meets resistance from health workers due to lack of policy on the importance of electronic health record system and generally the lack of monitoring and evaluation culture among health workers. The lack of policy has

also led to different SmartCare versions to run in different health facilities making it even more uncoordinated and difficult to extract data for decision making. In places were deployment has taken place, few health workers are using SmartCare for decision making. It is for this reason that this research will focus on health workers experiences with the use of SmartCare for decision making in selected health facilities in Western Province.

1.3 Justifications of the Study

From the time the Smartcare was rolled out and implemented in Zambia few studies have so far been conducted. It is not clear how the SmartCare works in most of the health facilities in Zambia, how useful it is to the users in these facilities and whether the SmartCare training heath workers get before start using it is enough or not. It is for these reasons that this research will attempt to find answers to the above questions and inform policy in terms of Smartcare use and decision making among health workers. It is expected that the research will enhance the use of SmartCare at health facility level and instil a culture of using electronic health record among health workers which will in turn aid them in managing patient files properly. This study will also serve as the basis for further studies in the introduction of electronic health record systems and other technologies in the health sector in Zambia and other developing countries. The author also wishes to use this study as an advocacy tool for national wide assessment and evaluation of the SmartCare system in the Zambian health sector.

1.4 Objectives of the Study

1.4.1 General objective

To determine health workers' experiences with the use of the SmartCare for decision- making in selected health facilities in Western Province of Zambia.

1.4.2 Specific Objectives

- To explore health workers' experiences and perceptions on the use of the SmartCare system.
- To explore users' satisfaction on the benefits of using the SmartCare compared to paper record system

- To explore users' challenges on using the SmartCare compared to paper based record system.
- To explore the usefulness of the SmartCare system in decision-making at health facility level.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The scientific literature on electronic health record systems has grown extensively in the recent past with most of the studies focusing mainly on adoption of electronic health records, barriers to the implementation of these electronic health records and the impact of electronic health records on quality of care. However, very few studies have documented the health workers experiences on the use of these electronic health records for managing patient information and clinical decision making. In this study, literature was sourced from the following; Google Scholar, PubMed and HINARI. The literature review section is presented from the global, then regional and then to local perspectives.

2.2 Electronic Health Records and its use

The main aim of electronic health records is to bring the patients' medical records and health information generated in the health facility into a computer system. By so doing, health facilities find it easier in locating and identifying the patient records. Some of the benefits associated with electronic health records include being able to easily access computerized records and doing away with inadequate hand writings on paper records, which was leading to wrong reading and misinterpretation of information. Noraziani, et al., (2013) also confirms that electronic medical records can curtail medical errors due to paper-based systems. The EMR is expected to replace paper-based medical records as the primary source of medical history for each person seeking health care, while still complying with all clinical, legal and administrative requirements (Janusz and Grzegorz, 2003). Enormous investment has gone into computerized hospital information systems worldwide. The estimated cost for each large hospital is about 50 million United States dollars per year and in most developed countries, yet the overall benefits and costs of hospital information systems have rarely been assessed (Friedman, 1997). However, different countries across the globe are at different levels of use and implementation of these electronic health records and users of these of these EHRs have shared different experiences and perceptions.

2.3 Perceptions on the use of EHRs

In a descriptive, cross-sectional study by Moody et al., (2004) on assessing the functionality of the current system and identifying nurses' perceptions, attitude and preferences for electronic documentation methods of clinical data was conducted in the United States of America found that; overall, a large percentage of the nursing staff held a positive view of the impact of EHRs on patient care: 81% indicated that EHR use for decision making was more of a help than hindrance to care; 75% thought it had improved documentation**.** Most participants, 76%, indicated they thought that in time, the EHR system would have a positive effect on improving patient care. The majority of nursing personnel, 64%, indicated they believed the EHR system had not decreased the nursing workload. More than half, 54%, perceived EHRs to be less a threat to privacy than the paper record (Moody et al., 2004).

However, the study by Moody et al., (2004), did not give much priority to the qualitative aspect of the research and making inferences largely on descriptive data did not fully reflect the nurses' experiences, perceptions, attitudes and preferences towards electronic health records documentation. As a result, it's very difficult to make inferences on health workers experiences with the use of electronic health record systems for decision making.

Furthermore, Bastani et al., (2014) in a qualitative study on Electronic Health in Perspective of Healthcare in South of Iran also shared the goals, gains, applications, challenges and other important issues related to success performance of electronic health. They stated that according to summation of the participants' opinions and words (25 participants/88%) four categories of main factors as the most affecting factors on electronic health were identified: The effect of health technology education on electronic health: With this explanation that health consumers who have been more educated in the field of information technology, they have more motivations to opt electronic health and use it to guide their decision making process. The effect of society illness rate on electronic health: If illness rate in a society is less and simultaneously that society awareness of electronic health is higher, the possibility of electronic health innovations acceptance increases. The effect of socio-cultural factors on electronic health: Considering cultural dimensions

is required in order to successful implementation of electronic health initiatives since socio-cultural factors would have moderating effect on electronic health initiatives in every country.

This study had a number of limitations as follows: lack of possibility in designing a mixed method study and triangulate the qualitative data with the quantitative one, lack of possibility in selecting various participants from the other parts of the country and also private sector like private hospitals (Bastani et al., 2014). In addition to the above limitations, the study did not place importance on the role of health workers and their perceptions on the use of electronic record system and how it affects decision making in their health institutions.

2.4 Implementation and use of EHRs

A study conducted by Maren, Morten and Jett (2008), in Denmark to assess the implementation practice of EMR in hospitals found in one of Denmark's five health care regions three years after deployed an electronic medication record (EMR), revealed that four of eight main system facilities were used consistently by only 3%-37% of the hospital wards. The results revealed that barriers to adoption and use of the EMR include system factors, such as the EMR being perceived as prohibitively time consuming to use, as well as human factors, such as lack of knowledge, information, and training among clinicians. One major limitation of this study was that it focused more on adoption that lived experiences among the users of the EMR.

In Fuji, a study was conducted by Ravindra et al., (2015) whose focus was on the status of electronic medical records and health information systems in Fijian hospitals and health centres. Here, grounded theory using exploratory approach was used for the study. The study started by trying to understand how users of information systems in Fijian Hospitals felt towards their information management practices, and to learn if they are currently using any EMR. Among the findings included: the lack of computers makes it difficult for most staff to do data entry or check records of the patient's medical history; therefore, they continue to use manual systems of folders and files.

Lastly, a case study by conducted by Rozenblum et al., (2011), to assess the effectiveness of the Canadian e-health plan and identifying ways of increasing

adoption of electronic health records found that despite Canada Health Infoway's investment of almost $1.6 billion toward more than 280 e-health projects in the past 10 years, Canada continues to lag behind other Western countries in adopting a system of electronic medical records. As of 2009, only 36% of Canadian physicians were using electronic medical records, as compared with more than 90% of physicians in Australia, the United Kingdom, New Zealand and the Netherlands (Ibid).

In this study, participants identified two main aspects of the e-health plan that were viewed as less successful namely; the absence of an e-health policy and non-implementation of the national infrastructure for electronic health records. The lack of a national policy to guide investment and adoption was seen as a problem coupled with inadequate attention to clinicians who are the key users of electronic health records. Furthermore, the aspect of the e-health plan viewed as being less successful and participants commented that stronger leadership was needed to implement national standards to address the challenges of migrating away from existing legacy systems. The above study focused on the policy and implementation framework established by senior leadership to enhance the adoption and use of electronic health records. The study did not focus on the expectations and experiences of health care professionals in the use of Canada Health Infoway (Rozenblum et al., 2011). Furthermore, the study did not highlight the importance electronic record system and it is this gap identified in the above study that this research will try to fill.

2.5 Use of EHRs in developing countries

In Africa, few studies have been conducted on the use of electronic health record systems. Musukwa (2011), conducted a study in Malawi on user perception on the effectiveness, efficiency, satisfaction, challenges and training of electronic data system in Malawi. This was an evaluation study that used both quantitative and qualitative study methods. Data were collected from three purposively selected Districts out of five Districts using Electronic Medical Records (EMR) in the central region.

The study findings showed that users preferred using the EMR than paper based records and that overall, found it more effective and efficient in making decisions concerning treatment and patient care in their hospital. The study results also

indicated that the training conducted to prepare potential users of EMR was not well structured and the support given after the training was not uniform and not enough. The study also showed that there were a number of activities that users expected Baobab Health Trust to consider, make sure the EMR is more user friendly and able to capture more information (Musukwa, 2011). The findings indicated that 71% (n=22) of participants thought that the quality of care and clinical decision making has improved significantly since the introduction of EMR while 26% (n=8) indicated that the quality of care has improved a little, only 3% (n=1) indicated that there was no change in the quality of care (Musukwa, 2011).

This study did not highlight the lived experiences by health workers who were using EMRs thus making it difficult to ascertain as to whether these health workers were using the information generated from these EMRs for effective decision making.

In another study by Berhanie (2014), who focus was on the challenges and solutions of Smart Care Electronic Medical Record Implementation in Hiwot Fana Specialized University Hospital Laboratory in Ethiopia found that the smart care electronic medical record was not serving the laboratory department and the professionals were not using it for the accomplishment of the Laboratory activities. He further went on to state that, as the project participants stated to the project manager the smart care EMR was implemented 3 years ago and majority of them were trained onsite by the Tulane University in conjunction with the Harari Regional Health Bureau. The participants of the project also indicated that they were using the smart care EMR during the first 2 and 3 months of implementation. However, the level of utilization of the smart care EMR was gradually decreased and ceased totally now (Berhanie, 2014).

This study only focussed purely on laboratory services where the SmartCare was deployed. It did not take into consideration the other service points like the Inpatient, Outpatient, Chest clinic, ART or Labour and Delivery service areas.

2.6 Use of EHRs in Zambia

In Zambia, not many studies have been conducted on the electronic health record systems and SmartCare. A study conducted by Mweebo (2014), focussed on security of electronic health records in a resource limited setting and this was a case of smart-

care electronic health record in Zambia. Mweebo highlights that maintaining privacy and confidentiality by ensuring that access to health information is restricted and only allowed to have access to patient information have access to this health data is still a major challenge. The addition of pin numbers for smart cards and staff access cards with passwords have improved security of the smart-care program in Zambia (Mweebo, 2014). Furthermore, the study found that some doctors operating in the private sector are hesitant to share health information about their patients with other individuals or hospitals if they perceive them as competitors. This study was basically concerned only with issues of security and confidentiality of patient records. It did not really point out any experiences or perceptions that health workers had with the SmartCare in terms of clinical decision making but rather focussed mainly on the operationalization of the SmartCare.

Despite efforts to adopt and use electronic health records in most developing nations, various challenges have been faced leading to low rates of adoption compared to developed countries. E-Health infrastructure pertinently affects adoption and use of eHealth and ICTs for decision making in Africa (Ouma and Herselman, 2008; Qureshi et al., 2013).

Therefore, from the literature reviewed in this section, it has been indicated that most of the studies have not focussed on the health workers experiences with the use of EMRs in decision making but rather on patient security, adoption and functionality of these EMRs. It is for this reason and many reasons given above that this research will try to unearth health workers experiences with the use of EMRs in decision making and how it affects management of health for decision making and ultimately policy making process.

CHAPTER THREE: METHODOLOGY

3.1 Study Design

This study was a qualitative study and phenomological study design was used. The purpose of the phenomenological approach is to illuminate the specific, to identify phenomena through how they are experienced and perceived by the actors in a situation (Stan, 1999). To be specific, the study used the transcendental phenomenology. Transcendental in this context means looking at the phenomenon with a fresh eye and open mind, resulting in acquiring new knowledge derived from the essence of experiences (Moustakas, 1994). The phenomena here was the use of the SmartCare by health workers for decision-making. It was for this reason that phenomenological approach was relevant and effective at bringing out the health workers experiences with the use of the SmartCare for decision-making in selected health facilities in Western Province of Zambia. It actually involved how heath workers perceived the use of the SmartCare and their experiences with the system in relation to paper based record system in decision making and management of health information in general.

3.2 Study Site

The study was conducted in two Districts of Western Province and these were: Mongu and Limulunga Districts. The rationale to select these Districts was that SmartCare was first deployed to Mongu and at that time Limulunga was also part of Mongu District before its creation in 2012. Therefore, by incorporating both Districts it gave the true picture of the original Mongu District which had received the first SmartCare equipment deployment, trainings and implementation before it was split into two Districts. Additionally, both Districts are supported by a good number of partners in all almost service areas which the SmartCare captures.

3.3 Study Population

The study population comprised of health workers working in the health centres which are running SmartCare. Administrative staff-based at the District level were also included in the study population because they are key stake holders in policy implementation at District and health facility level. The study therefore, included; active users of the SmartCare at health facility level, District Health Information

Officers (DHIO) who are the custodians of health information in the Districts and the District Medical Officers (DMO) who are the Managers and policy implementers in these Districts.

3.4 Study Size and Sampling Methods

This study comprised of 16 respondents, 12 health workers actively using the SmartCare, 2 DHIOs and 2 DMOs as indicated below in a table. Purposive sampling method was used in this study to arrive at the Districts and the respondents. The Districts were purposively selected because Mongu is the provincial capital of the Province and was the first District to have had rolled out and implemented SmartCare in the province. Furthermore, Mongu District was one District and had a first deployment, trainings and implementation before splitting District into Mongu and Limulunga. Both Mongu and Limulunga were purposefully selected because they were supported by co-operating partners in the management of health information and data management in general.

In terms of inclusion criteria, respondents were included in the study based on being a health worker and actively involved in the use of the SmartCare for decision making. Active users in this case meant a health worker who has been trained or oriented in the SmartCare, enters data, views and prints out reports and makes clinical decisions from those reports. Additionally, health workers were included in the study based on working at the health facility for at least 2 years or more.

As for the exclusion criteria, all health workers at the facility trained in SmartCare but with limited user rights like that of data entry only were not included in the study. Trained health workers in the SmartCare but not using the SmartCare system for managing health data were also not included in the study.

Below is the sample of respondents as depicted in the table;

Table 1: Sample size distribution

District	District Office	Health Facility (HF)	Grand Total
Limulunga	1 (DMO)	2 HFs running SmartCare	**4**
	1 (DHIO)		
Mongu	1 (DMO)	10 HFs running SmartCare	**12**
	1 (DHIO)		
Total	**4**	**12**	**16**

3.5 Data Collection Methods

In-depth interviews were used to collect data from 12 health workers who are health In-Charges in these facilities and the 4 key informants. The interviews were conducted per health facility with the health centre in-charge actively using the SmartCare system for management of data and decision making. For the health workers at health facility level the number of questions in the interview guide were 8, while for the DHIOs and the DMOs, there were 6 and 4 questions, respectively. The interviews for both health facility In-Charges and key informants were conducted in English which is commonly spoken by health workers. These were done with the aid of an interview guide and to avoid missing out some key information, a digital audio recorder was used to record responses from the respondents.

3.6 Data Analysis Methods

All audio interviews with the respondents were imported into Nvivo for data management and analysis and later transcribed the information into a verbatim which was reviewed thoroughly by the researcher. Thematic analysis was performed through the process of coding in six phases to create recognised, meaningful patterns. These phases are: familiarisation with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and finally producing the final report Braun and Clarke (2006). During this process, the researcher became familiar with the data by reading over and over the same data while paying critical attention to patterns and occurrence while focussing on the data that addressed the research question and by so doing, the researcher identified various codes.

The researcher took time to identify the major themes and categories which were considered within the data. This was done by writing down an analysis to identify the narration of each theme and its significance thereby assigning names of the themes. The researcher then reviewed the final themes, and the report was written according to the themes that made meaningful contributions to answering the research objectives. To ensure validation, the researcher presented typed scripts to the respondents to verify the content as accurate representation of what was said during the interview.

3.7 Ethical Considerations

This was a sensitive study which bordered on issues of health systems strengthening which has receives a huge share amount of resources from both donor and government. Researching on this could have brought about participants in the study to shy away for fear of being quoted. In order to avoid this, respondents were assured of their privacy and confidentiality in that no titles or names were reflected in the interview guide. The researcher also explained and emphasised to the participants that the data that was to be collected did not involve respondents private or personal, life stories and life experiences but basically focussed mainly on Smartcare. The findings of the study were reported by using codes to avoid identifying participants information or position, In terms of the benefits of this study to the participants were that they had a platform where they shared how they think the SmartCare system has worked since its implementation.

Lastly, ethical clearance and approval was sought from Excellence in Research Ethics and Science (ERES) and permission to conduct the study was sought from the Ministry of Health - Western Provincial Health Office. Oral and written informed consent were obtained from each participant after explaining the purpose, benefits and risks and how the information would be used and assuring them that the information would be held in confidence.

CHAPTER FOUR: STUDY FINDINGS

4.1 Introduction

This chapter starts with a brief description of the study participants followed by the presentation of themes; major themes, codes and categories that emerged from the primary data.

4.2 Description of Study Participants

The study had 16 participants, and all gave both verbal and written consent to participate in the study. The study took place in two Districts, namely Mongu and Limulunga. Table 1 below summarizes the description of participants that took part in the study.

Table 2: Description of Study Participants

District	**Key Informant**	**Health Facility**	**Total**
Limulunga	2	2	4
Mongu	2	10	12
Total	**4**	**12**	**16**

The study included health workers of different cadres and among them included; nurses, midwives, doctors, health information officers and others (EHTs, Psychosocial Counsellors) as summarized below in table 2;

Table 3: Social Demographic Characteristics

Category		**Number**	**Percent**
Gender	Male	10	63%
	Female	6	37%
Work Role	Nurse	5	31%
	Midwife	2	13%
	Clinical Officer	2	13%
	Medical Doctor	1	6%
	Health Information	2	13%
	Others(EHTs)	4	25%
Years of Service	0-5	6	37%
	6 to10	7	44%
	>10	3	19%

Among the participants of the study, 10 (63%) were males and the remaining 6 (37%) were females. In terms of study participants' profession or work role 5 (31%)

were Nurses, two were Midwives and another two were Clinical Officers representing (13%) for both. There was only one Medical Doctors in the study representing 6%.

As indicated in the preamble, the study findings have been categorised into major themes, categories and codes as they emerged from the in-depth interviews with the respondents both in Mongu and Limulunga Districts. Below is table 3 showing the major themes, categories and codes that emerged from the audio interviews with the respondents.

Table 4: Major, Categories and Codes on Experiences with the Use of Smartcare

Major Theme	Categories	Codes
Experiences and perceptions	**Workload**	• Its double work first paper then computer. Its work overload • Time consuming
	Human resource for health	• Few health workers in health facilities • Need a staff dedicated to data entry
SmartCare computers	**Capacity**	• No troubleshooting skills among health workers
	Equipment	• Few Computers • Old set of computers
Power Supply	**Efficiency of the system**	• Solar panels, inventor and batteries are not working • Health Facilities not connected to national power grid
User Satisfaction	**Simplicity of the system**	• Quickest way to retrieve data • Data security is there • Easier to trace patients
	Record keeping	• Registers tear off • Poor documentation in the registers
Usefulness of the SmartCare	**Relevance of data**	• SmartCare usefulness is very limited • Not useful because is just for data entry • Big volume of data required to input in the system

4.3 Health Workers Experiences and Perceptions on the Use of SmartCare System

The respondents from both Limulunga and Mongu Districts had different experiences and perceptions on the use of SmartCare system. From the research findings, the respondents appreciated the idea behind the SmartCare system and its role in providing continuity of care for patients. However, majority of the respondents are not using the system to aid them in decision making at both health facility and District levels. In terms of experiences and perceptions 2 categories emerged from this study and these were; challenges relate to work load and few human resources for health. These categories were further coded and have been discussed below.

4.3.1 Work Load

Health workers identified work load as something that has come along with SmartCare system. They stated that the work environment has changed with the implementation of this electronic health record system because there is more workload as compared to the paper records they have been using all along. This has further been discussed below;

4.3.1.1 SmartCare is work overload

Apart from the clinical work which health workers do such as attending to patients and dispensing of drugs, SmartCare system has been seen to be an additional responsibility among the health workers. The health facility staff saw the SmartCare as added work especially that during their profession training SmartCare was not part of the training package they underwent. It is considered not to be part of their core business. To summarise it all one of the respondent said;

> *"From the time, I was trained all was well, we used to enter data for ART and PMTCT. At least our data was kept safe there but there was a challenge though. The challenge is work overload, you would find that am the only one here at the health centre, i would do the antenatal booking and enter them in the SmartCare and go do the palpations. There was so much work over load*

and sometimes we would miss out entering clients because they were too many" (Respondent 004).

4.3.1.2 Time Consuming

Some respondents reported that entering data for patients in a computer requires time. Their point of was that the time spent on the computer is a lot and they can do much work on paper as opposed to punching buttons on the computer. The time you take to enter one patient in a computer cannot be equated to the time you spend writing in a file or register. One health worker plainly said that;

"It's a good system except is involving. The issue of entering data is quiet a process and it takes time. We are few who were trained in SmartCare at our facility, so it was a challenge to run the system" (Respondent 008).

4.3.1.3 Double work

In addition, respondents also stated that SmartCare has brought about double work. This is the sense that patient information must be recorded on paper then transferred to the computer. The process of running two parallel systems has proved to be double work among the health workers. This was even reported by officers who are charged to ensure policy implementation at both District and health facility level as one key informant clearly pointed out that;

"For most of the people, because of the big volume of work that has to be done they fill in the paper based system and then loads the data onto the computer, its double work and people don't have time for doing that. At best, they will fill in the important form and the rest of the forms they will not be filled in properly or updated adequately. SmartCare is something they will look at in their spare time" (KII 001).

4.3.2 Human Resource for Health

Coupled with the work load is the challenge of human resource for health. Most of the health facilities in both Limulunga and Mongu Districts were being manned by one or two qualified health workers. The staffing levels were low in both Districts and they pointed out that there was need to have data entry clerk to manage data for

SmartCare. The few available health workers have to manage data entry and attend to the patients. The key informant attested to this fact by saying;

> *"……The staff themselves say that their experience with SmartCare is that, this system requires more staffing, its an added work they are already over stretched, we want them to do paper work and then again go to electronic, they are being over worked that's their experience. But for those whose staffing levels are relatively fair like Sefula and Liyoyelo they are able to see the benefits of SmartCare. Ideally, if the policy of data clerks would have worked well because some of these facilities are high volume so because of this impact negatively entering data in the computer" (KII 003).*

4.3.2.1 Dedicated staff for data entry/Few health workers in health facilities

Additionally, the key informant stated that the health workers complain that they are few and there is need to have additional staff to be dedicated to data entry in SmartCare. Below are the verbatim from the key informant;

> *"……..where it is working well, there's a dedicated person who loads the data, so if you have a dedicated worker who does nothing else but loads data you will have an efficient use of the system and much easier. But where people having other responsibilities especially in our health facilities for example the use of SmartCare, it is updated irregularly, people have to wait when they have free time and the system is failing." (KII 001)*

One respondent also stated that;

> *"Some procedures take long and you have to take time on one client that way you will miss out on some patient data in SmartCare. And it is more challenging if the health facility has only 2 health workers to attend to patients. The other time we had 30 Antenatal clients but we only manage to enter 5 in SmartCare because we are few at the health centre. It's a challenge to provide a service and enter data in SmartCare, sometimes you find you are alone maybe the other staff has gone for a work shop or for salaries." (Respondent 003)*

4.4 SmartCare Computers

The other major theme that emerged from the research findings was the issue of availability of functional SmartCare computers and this was categorised into 2 categories namely; capacity to fix minor problems and availability of functional equipment.

4.4.1 Capacity and no troubleshooting skills

In terms of capacity, the respondents said that they lacked basic maintenance skills to troubleshoot faulty SmartCare computers. This has also affected the use of SmartCare for decision making at health facility level. Once the computer is down or not functional, the health workers must wait for the District staff to come and repair it and this usually took longer than it is supposed to be.

One health worker highlighted that;

> *"……The other challenge was that the machine broke down and reported to the District health office and nothing was done. We even lost skill because we were not practising anymore" (Respondent 004).*

Additionally, the training which health workers undergo does not include any troubleshooting skills to equip them for any possible malfunction of the equipment. The District health officials on the other hand are also aware of the limited capacity among health workers in terms of troubleshooting and one key informant said;

> *".....We have also sent some facility staff for the SmartCare training but we have noted a challenge were most of the people in the system don't have basic skills in computer applications so its takes time to apply their skills when they come back from the training. Because when they go for training it is assumed that they have knowledge in computer skills "(KII 002).*

4.4.2 Equipment

Availability of functional SmartCare equipment in the health facilities also came to light as a contributing factor to the non-use of SmartCare for decision making. Frequent breakdown of equipment and in adequate skills/ capacity to troubleshoot minor equipment faults all have contributed low utilisation of SmartCare in the

Districts. All health facilities in both Mongu and Limulunga had only one SmartCare computer each for data entry, retrieval and usage.

4.4.2.1 Few computers

The study revealed that most of the health facilities have limited number of computers to capture and manage health data. As a result of this, many health workers have resorted using patient paper files rather than entering data on a computer.

> *"Like now we have health facilities where there is backlog I also have to enter but the challenge has been few computers to enter data. If the computers were many at the facility 2 people can enter the reports." (KII 004)*

4.4.2.2 Old equipment

In addition, both Mongu and Limulunga Districts still have old set of computers running SmartCare in their health facilities. These computers have outlived their life span and have old specifications, which makes the SmartCare system not function very well. This results in frequent break down of these computers. One key informant said;

> *....." The other issue is the equipment itself, some of the equipment we have it was that very time when the system was rolled out it was brought in and there was no component of troubleshooting for facility staff even just even mere installing antivirus those issues were not taken care off that's why you find a lot of equipment breaking down because of antiviruses." (KII 004)*

One health worker put it this way;

> *"From the time SmartCare computer got damaged, we have not been using it up to now. We were told it cannot be fixed because there are no spare parts to replace the damaged switch" (Respondent 004).*

4.5 Availability of Power Supply

The study findings also revealed that constant power supply or availability of power supply in the health facilities was critical for the smooth running of the SmartCare

system. Only a few urban health facilities with Mongu and Limulunga Districts are connected to the national power grid and can run the SmartCare smoothly. In rural health facilities, there is no hydroelectric power but instead they use the Solar power to run the system. However, the availability of power in the rural areas is still a challenge because the solar equipment has never been serviced from the time they were installed. Most of the solar panels have out lived their life span meaning that they can no longer power the SmartCare computers because either the panels or inventors are no longer functional.

4.5.1 Efficiency of the system

The study findings revealed that SmartCare was not efficient when it came to operate the computers. This was so due to no functional solar systems in place and some health facilities not connected to power grid.

4.5.1.1 Health facilities not connected to power grid and no solar systems

One respondent summarised his opinion on the availability of power as follows:

"We have facilities which are SmartCare sites but their machines are not working because of power and this is because they depend on solar so they don't have the solar systems in place. These health facilities don't have solar panels, batteries to power the HFs" (KII 002).

4.6 User Satisfaction

User satisfaction was another major theme that arose from the research findings. User satisfaction in this case simply meant that if the users were happy with the SmartCare system compared to the paper based record systems. In other words, user satisfaction was in comparison between the benefits and challenges of using SmartCare system to the paper based record system. This major theme further gave rise to two categories namely; simplicity of the system and record keeping.

4.6.1 Simplicity of the System

In comparing the SmartCare system and the paper based system, respondents indicated that the SmartCare system was better off than the traditional paper record system. The respondents appreciated the idea behind the SmartCare system in that,

it's quick to trace patient records and easy to follow up those who have missed the clinical appointment. Others went on to state that SmartCare is smart as the health facility looks organised and no papers. Under this category, there were two codes that emerged namely; data security and easier to trace patients as presented below.

4.6.1.1 Data security

In comparing the SmartCare system to the paper records system, the health workers appreciated the SmartCare in terms of data security. They stressed that patient information was more secured in the computer because not all health facility staff have access to the computer. Below is one health worker who stated;

"I feel the SmartCare is just okay though, I feel if you are just concentrating on data entering on laptop it's even easier for data security and faster. It's even simpler to retrieve data in times of reports, its good and fast. Even data can be accurate. But we haven't been using it for decision making because we used it only for a month. It was not consistent. The way these registers are made some papers come out and we notice this during the compilation of the monthly reports" (Respondent 010).

4.6.1.2 Easier to trace patients

When it comes to accessing patients records and locating defaulting patients, SmartCare was seen to be more effective at tracing patients as one health worker phrased it this way;

> *…." It becomes easier to trace defaulters. It helps the clinic to follow up those who are late for clinical follow ups. SmartCare does not have a lot of papers. SmartCare is smart, it makes the office looks smart, you don't have a lot papers on the table. It becomes easier for the clinicians if there is something he wants to check for client, he just opens SmartCare other than looking for a file. It becomes easier for the in charge to make reports" (Respondent 005).*

4.6.2 Record Keeping

The study revealed that using SmartCare system to keep records was more convenient for the health facilities considering the inadequate space that exists in the health facilities. Furthermore, paper records are difficult to retrieve as compared to

the SmartCare system. Respondents applauded the SmartCare system to be a good record keeping system if all the records are being captured in the system.

4.6.2.1 Registers tear off

In terms of paper records, respondents categorically stressed that registers, tally sheets, cards and other paper record systems easily tear off and makes it more difficult to collate data. One respondent indicated that;

For paper records pages in the registers they get torn off and poor documentation by other staff members especially when its congested in the clinic. Storage of paper records is difficult because of lack space" (Respondent 010).

4.6.2.2 Security and confidentiality

In terms of security and confidentiality, the respondents specified that SmartCare ensures data security and data is treated as confidential.

Furthermore, the other respondent highlighted that;

> *"Like on the part of the client according to my experience, my clients were happy because that card is different form the hard copy. Someone can just see the information which is confidential but with the card there is security and confidentiality. Paper record is also good but it can be lost, SmartCare data can be kept in the system" (Respondent 012).*

4.7 Usefulness of the SmartCare system in decision making

From the study findings, there was an indication that SmartCare usefulness is very limited at all levels; that is at health facility level and District Health Office level. The system is not being used for decision making and guiding policy. In terms of usefulness, relevance of data for decision making was the major category that emerged from the research findings, and is presented below.

4.7.1 Relevance of data

Relevance of data simply implied the application and use of data generated from the SmartCare system for decision making. It also meant that health workers being able to analyse their patients at a click of a button, for instance, checking for treatment failure among their patients. From the findings of the study, the data generated from

SmartCare is not used for decision making due to the inadequate data input. All the facilities that were included in the study are not using the data for decision-making. Minimum usage and big volume of data are discussed below as emerging codes under relevance of data.

4.7.1.1 Minimum usage

The usage of the SmartCare is very minimal in all the health facilities in both Mongu and Limulunga Districts. The respondents pointed out that existence of the paper based alongside the electronic system has made it difficult for the health workers to make use of the system. A key informant from the interviewed said;

> *"In terms of the use of the SmartCare for decision making, it's very minimal at the District, we just depend on the routine paper based reporting tools which is the HIA1 and HIA2 which are uploaded in the DHIS2. Its like SmartCare has been parked and focussed on DHIS which everyone else in the District is able to compile and send to the District" (KII 002).*

4.7.1.2 Big volume of data

The study also revealed that the SmartCare requires a lot of forms to be filled in making it very difficult to capture and enter all the fields in the computer. Since the system requires to capture huge amounts of patient information, respondents stated that the input in SmartCare is not up to its full capacity. Health workers are only able to capture as much as they can to avoid long waiting time for patients. As stated by a key informant;

> *"As a Manager if the labs were very regular the system can signal that patient is failing on treatment or change regimen or this patient is defaulting, the potentials are there but because of the inability of system to be feed with all information at the right time its usefulness has become very limited" (KII 001).*

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter presents the discussion of the qualitative research findings of the study in relation to the literature reviewed in this protocol. The discussion will relate the objectives of the study to the findings of the research. The discussion will keep to the following order; firstly, health workers' experiences and perceptions on the use of SmartCare system, secondly, users' satisfaction on the benefits and challenges of using SmartCare system compared to the paper based record system and lastly, usefulness of SmartCare system in decision making at health facility level.

5.2 Health Workers' Experiences and Perceptions on the Use of the SmartCare System

The study findings on the health workers' experiences and perceptions on the use of the SmartCare system indicate that health workers described managing data in the SmartCare as additional responsibility and more work load for few available health workers. They categorically stated that SmartCare was not their core business and was not in line with the clinical work they did but just something that had brought additional work. The findings also indicated that some health workers have even vowed not use SmartCare simply they never learnt anything like that during their professional training.

Furthermore, using the SmartCare for managing data was involving and demands a lot of dedication and time. This is in the context that the health workers must attend to patients or clients and then find time to enter patient details in the computer. In an event that the health worker is alone at the facility, it's even more difficult to multitask, that is, to attend to patients and enter data in the SmartCare computer. The experiences and perceptions on using the SmartCare at health facility level is basically seen as a work overload because of the few available trained staff.

A study by Berhanie (2014) which focussed on the challenges and solutions of Smart Care Electronic Medical Record Implementation in Hiwot Fana Specialized University Hospital Laboratory in Ethiopia also shares similar findings. The study, found that participants described SmartCare as increased workload on the laboratory staff and absence of data clerk. As stated by the project participants, there was a high

pool of patients visiting the laboratory and difficulty of addressing the needs of the patients using the smart care electronic medical record since the laboratory staffs were not well adaptable with the system due to inadequate computer skills. There were no data clerks who serve as a bridge between the laboratory personnel and the smart care software. The laboratory professionals had given emphasis on the need for data clerks who mine the requested laboratory examinations from the smart care database and enter the data (laboratory information) into the database

Similarly, Hasanain, Vallmuur & Clark (2014 (Bah S, et al., (2011) noted the low percentage (15.8%) of EMR uptake among the surveyed hospitals and the reason mentioned in the study for the lack of uptake in some hospitals, was related to the workload of physicians. It was thought that busy physicians may have insufficient time to use the system.

Maren, Morten and Jett (2008), also that barriers to adoption and use of the EMR include system factors, such as the EMR being perceived as prohibitively time consuming to use, as well as human factors, such as lack of knowledge, information, and training among Clinicians.

5.3 Users' Satisfaction on the Benefits and Challenges of using the SmartCare system compared to the Paper Based Record system

In terms of user satisfaction, health workers were more satisfied with the SmartCare system when it comes to record keeping, retrieval of patient records and report compilation as compared to the paper based record system. Health workers indicated that paper is easy to lose and the hand writing of some health workers is difficult to read and thus making report compilation more difficult. Moreover, paper record systems are so prone to the mistakes than the SmartCare system. On paper record systems, health workers pointed out the wear and tear of the reporting tools. Many of the registers and patient files are of poor quality and with time the papers tear off easily and losing vital patient information. Additionally, storage of these paper records in many health facilities is a challenge because of lack of adequate storage space.

According to the findings of the research, health workers also appreciated the SmartCare system as compared to the paper based record system in that, there is security of patient records. Patient details are stored in a computer secured with a

password unlike the paper records that are kept in the file cabinets and anyone can have access to them.

The above findings are similar to what Musukwa (2011) found in his study on user perception on the effectiveness, efficiency, satisfaction, challenges and training of electronic data system in Malawi. The study findings showed that users preferred using the EMR than paper based records and that overall, found it more effective and efficient in making decisions concerning treatment and patient care in their hospital. The study also showed that there were a number of activities that users expected Baobab Health Trust to consider, make sure the EMR is more user friendly and able to capture more information (Musukwa, 2011).

5.4 Usefulness of SmartCare System in Decision Making at Health Facility Level

The usefulness of Smartcare in decision making at health facility level can be said to be very minimal. This is because the study findings showed that all the health facilities are not capturing data as the way it's supposed to be and thereby making the SmartCare system incomplete with data. The inability of system to be feed with all information at the right time has made the SmartCare usefulness to be very limited. From the study findings of this research, there is no evidence to show that the health workers are using the SmartCare for decision making, that is to say, they are not using it for of management of patients, tracing defaulters, record keeping or indeed for report compilation.

The study findings indicate that the lack of reliable power source, few staff, lack of computers, among other reasons, are a major contributing factor to non-utilisation of the SmartCare for decision-making in these health facilities. In terms of the use of SmartCare for decision-making at District level, it's non-existence as the District officials also rely heavily on the routine paper based reporting tools for report compilation and decision making. Furthermore, the idea that the health facilities are running two systems that is the SmartCare and the paper based, the usefulness of the SmartCare has not been realised. This is because the health workers have to manually enter patient details in the registers and when they have free time they enter in the SmartCare thereby making the SmartCare insufficiently updated making it difficult to extract data and make decision out of the data.

The findings of this study are very similar to those by Berhanie (2014) who focussed on the challenges and solutions of Smart Care Electronic Medical Record Implementation in Hiwot Fana Specialized University Hospital Laboratory in Ethiopia. The study found that, the smart care electronic medical record was not serving the laboratory department and the professionals were not using it for the accomplishment of the laboratory activities. The participants of the project also indicated that they were using the smart care EMR during the first 2 and 3 months of implementation. However, the level of utilization of the smart care EMR was gradually decreased and ceased totally at the present time (Berhanie, 2014). Similarly, a study by Ravindra et al., (2015) found that the lack of computers makes it difficult for most staff to do data entry or check records of the patient's medical history; therefore, they continue to use manual systems of folders and files. These findings are similar to that of this study.

On the contrary this study by, Musukwa (2011) found that despite the challenges with EMR use, they prefer using the EMR than paper based records; they also indicated that EMR is worth the time, effort and investment. One of the common reasons respondents gave for ranking the EMR higher than the paper based records was that with the ever-growing number of patients being enrolled in ART clinics and still facing the human resource challenges in the health sector, there is need for an efficient way of collecting data than the current paper based system. This will facilitate easy tracing of patients and quick to make decisions on clients missing out on appointments. However, this was not the case with health workers experiences in Mongu and Limulunga Districts.

Lastly, Moody (2004) shares a different view and found that large percentage of the Nursing staff held a positive view of the impact of EHRs on patient care: 81% indicated that EHR use for decision making was more of a help than hindrance to care; 75% thought it had improved documentation**.**

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The main goal of this research was to determine health workers' experiences with the use of the SmartCare for decision making in selected health facilities in Limulunga and Mongu Districts. The rationale was to find strategies to strengthen the use of the SmartCare for decision making among health workers by, exploring health workers' experiences and perceptions on the use of the SmartCare system, by exploring users' satisfaction on the benefits and challenges on using the SmartCare compared to paper based record system and the usefulness of the SmartCare system in decision-making at health facility level. From the study findings, a number of issues were identified.

From the study findings, the health workers in both Limulunga and Mongu Districts appreciated the SmartCare system in comparison to the traditional paper records. SmartCare helps organize, retrieve patient records faster than the paper record system. Basically, the health workers only see the SmartCare system as a good tool for data storage than a tool for decision making. The respondents perceived the SmartCare to be reliable when it comes to data storage than the paper record system. They strongly felt that paper is always lost, tear off and some health workers handwriting are not legible making it difficult to follow patient history.

However, the study revealed that the health workers felt that the SmartCare over burdens their work. It has been to be a good system but its additional responsibility for the health workers. Health workers clearly emphasised that they are already overwhelmed with the clinical work in the health facilities and the SmartCare has come to overload them with more work. In terms of their experience, they perceived the SmartCare system as involving, time consuming and needed a dedicated staff to manage the system.

Additionally, the SmartCare is not being used for decision-making at all levels due to the low or no data input. Due to insufficient input in the system, no dedicated staff to manage the data coupled with work overload, inadequate functional computers, unreliable power supply all have contributed to the inability of the SmartCare system for decision making. SmartCare usage is very limited in both Mongu and Limulunga Districts due to the above findings of the research.

To enhance utilisation of the SmartCare for planning and decision-making, it is important to strengthen health system related factors such as training and deploying specialised staff to help manage SmartCare. It is also important to develop supportive infrastructure and other support systems in the health facilities.

6.2 Recommendations

SmartCare presents a great opportunity for the health services in the enhancement of the quality of healthcare delivery through patient tracking, management of patient files, opportunity for analysis of disease burden in the health facilities/ district level, decision making and informing policy. It has so far not been able to offer such as revealed by this study and it has received very little attention from the district staff. For this reason and basing on the findings of this study, below are recommendations to the policy makers at MoH, provincial and district managers.

There is need to have a dedicated staff to be in charge of SmartCare data management. The Ministry of Health should lobby for a position of a data entry clerk from the Treasury to be based at the health facility level. This cadre will not only help in SmartCare data but also the overall health information at health facility level.

The Ministry of Health should come up with a clear scale up plan of SmartCare so potential sites and users are well prepared in advance and should have a clear and realistic time frame.

Power being at the cornerstone to the functioning of the computer, there is need to procure and replace non-functional solar panels in the health facilities.

Currently the SmartCare computers that are in the health facilities are old set of computers and they are always breaking down. Therefore, there's need to have functional computers to enable capture patient records and easy retrieval.

Related to the above, district staff and health information in particular should be offering regular maintenance schedule for faulty and servicing of the computers. This is also coupled with regular mentorship to the health facility staff who are managing the data in these health facilities.

6.3 Study Limitations

One of the major limitations of this study is generalizability of the findings. The study was conducted in only in two Districts of Western Province with a small sample of respondents to document experiences among health workers with the use of the SmartCare. For this reason, similar studies are therefore essential in other settings for comparability of research findings.

Another limitation was using an interview as a qualitative method of gathering information is that the respondents are not free to express their innermost feelings. The respondent might be fearful of how an interviewer might perceive them after the interview. In order to avoid this shortfall of hiding information, follow up and probing questions were asked after respondents gave their initial responses and in some cases questions were rephrased so as to ensure that the respondent did in fact state her view on the question.

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APPENDICES

Appendix 1: Informed Consent Document

Title: Health workers' experiences with the use of the SmartCare for decision-making in selected health facilities in Western Province of Zambia

Introduction: Hi. My names are Mwango Mutale an MPH student from the University of Zambia conducting a research on the: Health workers' experiences with the use of SmartCare for decision making in selected Health Facilities in Mongu and Limulunga Districts of Western Province of Zambia. I will read you a form that explains the research study you are being asked to join. Please, feel free to ask me any questions before agreeing to join. You may also ask questions at any time after joining the study should you choose to take part.

Purpose of Study: The main purpose of the study is to bring out health workers experiences with the use of SmartCare for decision-making in selected health facilities in Mongu and Limulunga Districts of Western Province of Zambia. The study will highlight how SmartCare works in most of the health facilities in Mongu and Limulunga Districts how useful it is to the users in these facilities in terms of clinical decision making. It is not clear whether Clinicians and other health workers' use the data generated from the SmartCare to make clinical decisions in managing the patients, planning and informing policy. It is for this reason this study will highlight how data generated from SmartCare is used for decision-making or not.

Procedures: You have been asked to join this study because we are looking for people who have been trained or oriented in Smartcare and are using the Smartcare system to manage data and use data for decision making. If you agree to be in this study, you will be interviewed with an aid of interview guide and digital audio recorder.

Risks / Discomforts: There are no physical risks involved in this study. You may feel uncomfortable answering some of the questions that will be asked regarding the use and experiences you have had with the Smartcare. You are at liberty to refuse to answer any questions that will make you feel uncomfortable. As a participant, you

can stop the interview session at any time and your responses will not affect you as a participant in any way.

Benefits: This study will produce information regarding the health workers experiences with the use of SmartCare for decision making in selected health facilities in Western Province. This study will also serve as the basis for further studies on the introduction of electronic health record systems and other technologies in the health sector of in Zambia and other developing countries. It will also inform policy regarding the use of electronic health record systems in managing health data. The researcher also wishes to use this study as an advocacy tool for national wide assessment and evaluation of the Smartcare system in the Zambian health sector.

Confidentiality: If you agree to be in the study the researcher will ask you some questions about Smartcare and how it's being used in this health facility for decision making. In order to make sure your identity is secret, none will know you by name in the study or after. The data that will be collected from this study will not involve respondents private or personal, life stories and life experiences. It will basically focus mainly on the Smartcare.

Voluntariness: Your taking part in this study is entirely up to you. You are free to stop at any time, for any reason. If you decide to leave the study, the information you have already given us will be kept in a confidential manner and will not be shared with anyone else to personally harm or affect you. This will not in any way affect you or your taking part in future studies. If you choose to leave the study, we will need to know why for future studies.

Re-imbursement: You will not be paid for taking part in this study neither will be given any snack to eat.

Contact: If you want to talk to anyone about this study, if you think you have not been fairly treated, or if you have any other questions about the study, you can call the following numbers;

1. Mr. Mwango Mutale 0976-448480
2. Dr. Bornwell Sikateyo 0978-781534
3. Dr. Joseph M. Zulu 0971-591388

4. **Chairperson Converge IRB, 33 Joseph Mwilwa Road Rhodes Park, Lusaka. Tel: +260 955 155 633, +260 955, 155 634, Email: eresconverge@yahoo.com**

If you agree to join the study, you will be given a signed copy of this consent form and a written summary of the study. Do you agree to join the interview/discussion?

Yes ___/ No___

Appendix 2: Statement of Consent

If you sign this form, it means that the information sheet has been read and explained to you orally. It also means you have read the aims of this study and you have been given the chance to ask any questions now or at a later time. If you voluntarily agree to take part, confirm this by signing below: I agree to take part in the study.

Print name of participant:

_____

Signature/Thumbprint of participant Date

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Signature of Researcher to Consent Process
Date

IF THEY DECIDE NOT TO PARTICIPATE, THEN THANK THEM FOR THEIR TIME AND RELEASE THEM.

Appendix 3: Interview Guide for in-depth interviews with Health Facility Staff

1. What is your profession or position at this facility…….

2. How long have you worked in this health facility? ……..

3. Explain your experiences and perceptions with the use of SmartCare for decision making at this health facility.

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4. What are some of the benefits of using the SmartCare for decision making as compared to paper based record system?

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6. What challenges have you faced with regards to the use of the SmartCare for decision making?

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7. Do you feel that the SmartCare use has been worthy or useful for decision making? Why or Why not?

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8. Suggest some of the solutions for improving the use and implementation of the SmartCare.

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Appendix 4: Interview Guide for Key Informants (District Health Information Officer)

1. How long have you worked in this health facility?

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2. What are your roles in SmartCare system?

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3. How has been your experience with the use of the SmartCare for decision making at District level?

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4. Explain the use and experiences of the SmartCare by health facility staff at health facility level.

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5. What challenges have you faced with regards to implementation and use of the SmartCare for decision making?

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6. What solutions or recommendations would you suggest to for the SmartCare use in decision making?

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Appendix 5: Interview Guide for Key Informants (District Medical Officer)

1. How do you explain the SmartCare use? In terms of experiences and perceptions by health workers in your District.

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1. To what extent are the health workers using the SmartCare for decision making? Briefly explain how the SmartCare is used for decision making in your District.

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2. Are there any challenges health workers face in the practice and use of the SmartCare for decision-making?

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3. What do you think should be done to improve the use of the SmartCare data for decision making in your District?

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