HEALTH DATA CONSISTENCY AND MANAGEMENT:

Case Study of Maternal Health Data in Malawi.

By

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Declaration

I, Ansley Samuel Kasambara declare that this research work titled *Maternal Health Data Consistency and Management in Chikwawa District*, is my original work, except where due acknowledgment has been made. It is being submitted for the award of the degree of Master of Philosophy at Strathclyde University and it has not previously been submitted for any degree or diploma at this or any other university.

Abstract

Good quality data is vital. It informs decision making in a wide range of sectors, at all levels. Accuracy, completeness, consistency, timeliness and standard-based are the properties of good quality data. Data which satisfies these properties is deemed fit and appropriate for its intended use. Data lacking these qualities poses challenges in operations, decision making and planning.

The Millennium Development Goals (MDG), specifically MDG number 5- the reduction of maternal mortality by two-thirds between 1990 and 2015- now succeeded by Sustainable Development Goal (SDG) number 3 - has led to a significant need for reliable maternal health data. Accurate data is needed on the levels of (and trends in) maternal death in developing countries in order to address and improve maternal health and survival. The health care system in Malawi lacks vital registration systems which are rich and valuable sources of health data, including maternal health. Malawi had a health information system that did not produce reliable data, and therefore could not be used for decision making in terms of planning and management with respect to maternal health. In 1999, after reviewing the Health Management Information System (HMIS), Malawi developed a new system based on the strengths of the old system while addressing its weaknesses.

This study aimed to use maternal health data to investigate management processes and procedures within the HMIS from data collection by different entities, transitioning through the hierarchy from the community to the point of use at district level. The study also assessed the consistency of the data itself as it transitioned through this hierarchy. Transitions of data were explored, and difficulties in maternal health data collection were assessed among stakeholders including community members, government health staff and non-governmental organisations (NGOs). Monthly and annual data collected and compiled by various personnel over one year, was also tested for consistency using chi-square test.

The study was carried out in three phases. The first was done in the Southern Region of Malawi (Phase 1). The second one was done in three health facilities which had interventions (Phase 2) in terms of training, infrastructure and provision of resources in maternal and neonatal health. The third one was conducted in six health facilities (three with (as in Phase 2) and three without intervention (Phase 3). Ten HMIS officers

and 10 data users (programme coordinators at the District Health Office (DHO)) were selected for Phase One since they were involved in data management and decision making processes respectively given the data. For Phase Two participants included 14 Secret Women, 16 Health Surveillance Assistants (HSAs), Three Village Health Committees (VHCs) and two Health Personnel. Phase Three participants included 17 Secret Women, 42 Chiefs, 40 Health Surveillance Assistants (HSAs), six Health Personnel and also one Safe Motherhood Coordinator, one Community Based Maternal and Neonatal Health Coordinator, one NGO and one HMIS Officer chosen from the District Health Office, all of whom are involved in the data management process until the data is sent to the users.

Cross-tabulations, frequency tables and graphs were used to assess data management processes, procedures and problems among the personnel. Testing data uniformity was achieved using the Chi-square test of homogeneity to compare monthly data and annual data aggregates for the groups of personnel to check for data quality.

The results showed that data management was compromised by problems faced by data collection personnel such as lack of transportation affecting timeliness of data submission, lack of basic needs (e.g. proper housing and low salaries for HSAs and Health Personnel) which affected their motivation to work, and lack of reporting forms and writing materials which led to data gaps and missing information. Discrepancies arose in compilation and transfer of information since some information was forgotten or not recorded during the process. Furthermore, lack of supervision coupled with lack transportation and stationary led to inconsistent, incomplete, inaccurate and unreliable data.

The quantitative analysis showed that there were significant differences, thus no consistency, in the monthly and annual data for the selected variables i.e. new pregnancies, births, live births among the groups of personnel. Monthly data for maternal and neonatal deaths also showed differences among the personnel, with annual aggregates also showing differences.

Important resources such as stationary and reporting forms should be provided in good time (and in adequate numbers) to ensure that there are no data gaps. In addition, the study strongly recommends the use of eHealth/mHealth in rural communities to reduce errors and data gaps during entry, so as to increase accuracy, reliability, consistency,

completeness and timeliness. It also recommends training for new officers, and refresher courses for those already in the system to instil procedures and for the purpose of review (supervision) of work that has been completed.

Key words: Accuracy, Consistency, Maternal Health, Data Management, HMIS

Dedication

I dedicate my dissertation work to my lovely wife- Chikondi Kasambara, and wonderful son- Ansley Chikondi Kasambara (JJ).

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List of Abbreviations and Acronyms

CBDA - Community-Based Distribution Agent

CBMNH - Community-Based Maternal and Neonatal Health

CHIP - Committee for Health Information Policy

CH - Chiefs

DHMT - District Health Management Team

DHIS - District Health Information System

DHO - District Health Office

EHP - Essential Health Package

eHealth - Electronic Health

FP - Facility Personnel

HMN - Health Metrics Network

HIMTC - Health Information Management Technical Committee

HIS - Health Information System

HMIS - Health Management Information System

HSA - Health Surveillance Assistant

HSSP - Health Sector Strategic Plan

ICT - Information and Communication Technology

IMCI - Integrated Management of Childhood Illness

IS - Information System

MSCE - Malawi School Certificate of Education (O-level Equivalent)

MoH - Ministry of Health

MoHP - Ministry of Health and Population

mHealth - Mobile Health

NSO - National Statistics Office

PMTCT - Prevention of Mother to Child Transmission

PMIS - Patient Management Information System

PoC - Point of Care

PoW - Program of Work

SHSA - Senior Health Surveillance Assistant

SCHI - Scotland Chikwawa Health Initiative

SDG - Sustainable Development Goals

SMC - Safe Motherhood Coordinator

SMP - Safe Motherhood Programme

SW - Secret Women

SWap - Sector Wide Approach

T/A - Traditional Authority

TBA - Traditional Birth Attendant

WHO - World Health Organisation

Chapter One: Introduction

This section provides an introduction to the problems associated with health management information systems in developing countries, focusing on Malawi.

1.1. Introduction

In developed countries such as the United Kingdom (UK), Canada and the United States of America (USA), health management information systems (HMIS), including vital registration schemes, are a rich and valuable source of health data (Mahapatra, et al., 2007), but this is not the case in developing countries such as Malawi where the systems are not efficient (Immpact, 2007). Before 1999- when a review of Malawi's HMIS was undertaken as with many other developing countries, the system had unreliable data which could not be used for decision making in terms of planning and management (MoHP, 2003; Mosse & Nielsen, 2004). This meant that in some cases there was no improvement in the quality of health service delivery (Mueller, et al., 2011).

When the results of the 1999 HMIS review in Malawi were presented to stakeholders it was agreed, in-line with the Malawi National Health Plan, to develop a new system which would capitalise on the strengths of the old system and overcome its weaknesses (MoHP, 2003; Chaulagai, et al., 2005). The HMIS to be created had to have the capabilities of providing information to users at different levels such as community, health facility, district and national (Chaulagai, et al., 2005; UNICEF, 2011).

The new system was adopted across Malawi in 2002. The new system included a computer program which stores, processes and produces reports (MoHP, 2003). The new HMIS had different avenues of disseminating outputs in terms of wall charts, bulletins, and quarterly/annual review meetings (Chaulagai, et al., 2005).

The new HMIS was rated to be the best in Africa in a review conducted after its conception in 2002 (MoHP, 2003; Chaulagai, et al., 2005). However, following a comprehensive assessment of Malawi's operational HMIS by the Health Metrics Network (HMN) in 2009, the system was found to be poor in data management, with most of the other deliverables being average (Figure 1.1) (Government of Malawi (MoH) & HMN, 2009).

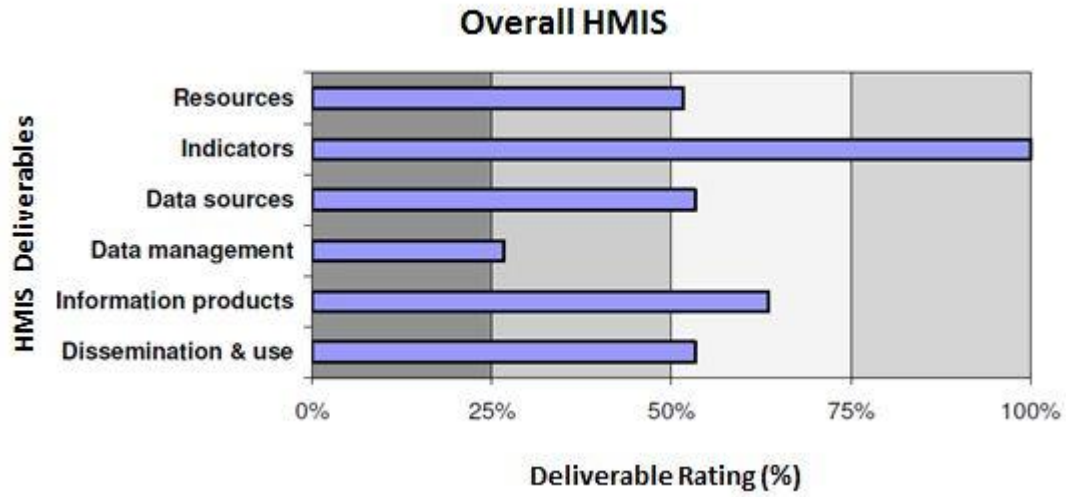


Figure 1.1: Overall HMIS performance. *Source*: Government of Malawi (MoH) and HMN (2009) report.

In addition to concerns regarding data management, the new system was not integrated with the parallel introduction of the Sector-Wide Approach (SWAp) which guided a Program of Work (POW) centring on the Essential Health Package (EHP). The SWAp involves donors and lenders collectively contributing to fund the entire health sector in developing countries (Garner, et al., 2000). The Government of Malawi introduced the POW in 2004 which later evolved into the Health Sector Strategic Plan (HSSP) (Department for International Development, 2010; Bowie & Mwase, 2011; MoH, 2011). Despite the implementation of SWAp interventions, there has been difficulty in measuring outcomes since Malawi does not have a vital registration system (Bowie & Mwase, 2011), and most of the indicators required to measure the impact of these interventions were not included in the new HMIS system because it was created prior to SWAp. This has resulted in the creation of parallel systems for the management of specific health sectors.

An example of a parallel data management system within the health sector is that developed by the Safe Motherhood Programme created in response to Millennium Development Goals (MDG) number 5. MDG 5 target was the reduction of maternal mortality by two-thirds between 1990 and 2015. The setting up of MGD 5 has led to a significant need for reliable maternal health data (Graham, et al., 2008; UNFPA, 2008) (MDG 5 has been succeeded by Sustainable Development Goal 3 (Improved health and wellbeing)). There is a need for accurate data on the levels of, and trends in, maternal death in developing countries or regions in order to improve maternal

health and survival (Graham, et al., 2008; Mistiaen, 2012). The lack of accurate and reliable data leaves decision makers with difficult choices in allocating scarce resources, how to run programs and policy priorities (Chaulagai, et al., 2005; UNFPA, 2008). Information on the risks of maternal death, for example in remote and urban communities, between the rich and poor countries, is also important for comparisons, but unfortunately reliable and comparable data are scarce (Graham, et al., 2008). A comment was made by the MDG Africa Steering Group (2008) to the effect that most African countries have inadequate data with pathetic and poorly funded HMISs.

The presence of parallel data management systems raises concerns on the effectiveness of the current HMIS in terms of completeness and consistency of captured data, and as such usefulness of the system for making appropriate decisions in planning and management (Kimaro & Nhampossa, 2004; Graham, et al., 2008; Government of Malawi (MoH) & Health Metrics Network, 2009;). In order for data to be used for effective planning, data completeness and consistency must be assured. Completeness and consistency of data is the product of the process of collecting, handling and storing the data, while ensuring data accuracy (Execution-MiH, 2013). Pre-defined procedures and measures need to be put in place to make sure that data is accurate from the point of collection, in handling through different personnel, until it is stored and ready for processing to give the required information (Cappiello, et al., 2004). The data from the HMIS has to be complete and consistent, but the data completeness and consistency has to start from the point of data collection (Lederman & Paxton, 1998).

This study targeted maternal health data to investigate data management processes and procedures within the HMIS, as well as data consistency from the data collected by different entities transitioning to the point of storage. Maternal health data was the chosen case study in achieving the objectives of this work for a number of reasons: (1) MDG number five (succeeded by Sustainable Development Goal (SDG) number 3 (United Nations, n.d.)), and (2) the introduction of the SWAp and HSSP, where improvement in maternal health outcomes has been one of the key area for the health sector in Malawi. However, improvements can only be quantified from an effective data collection system. This means that the source of data must be accurate, and reporting channels clear and effective to ensure complete and consistent information,

the existence of which is reportedly lacking in Malawi (Chaulagai, et al., 2005; UNFPA, 2008).

1.2. Problem Statement

Data gaps/missing data in a HMIS, as evidenced in most developing countries including Malawi, leads to irrelevant and/or poor quality data (Cameron, 2012; Higgins, 2013). The consequences of this are poor decision making processes which leads to poor and uniformed planning, poor allocation of resources, and a lack of reliable data, for example in measuring maternal and neonatal morbidity and mortality.

Health indicators in the HMIS were adequate to provide information for decision making (Figure 1.1). However, the HMIS assessment reported that most of the requirements for an optimum system were just above 50%, but data management, which was slightly above 25%, was a key problem with the system (Figure 1.1) (MoH and HMN, 2009). If data management is not adequate, then data may also not be consistent (MDG Africa Steering Group, 2008).

Therefore, further examination of the factors that lead to poor data management as it transitions through different entities from the community to the District Health Office is needed to understand the issues leading to inconsistent data.

1.3. Purpose of the Study

The study sought to determine the consistency of maternal health data and how the same data is managed by different entities involved in maternal health care. The study provides recommendations on how to effectively manage data to enable improvements in planning, allocation of resources and ultimately in reducing maternal and neonatal morbidity and mortality.

1.4. Aim of the Study

This study aimed to employ maternal health data to investigate management processes and procedures, as well as consistency, within the HMIS from data collection by different entities transitioning through the hierarchy from the community to the point of use at district level.

1.5. Objectives of the Study

The study specifically investigated the following objectives to obtain the required outcome for the corresponding research questions in Table 1.1;

Table 1.1: *Objectives and Research Questions*

	Objective	Research Question
1	To determine how data is managed and used from health data officers and data users respectively.	i. What are the perspectives of health data officers on data collectors and their attributes? ii. What are the challenges faced in data collection? iii. Is the health management information system achieving objectives? iv. Does the health management information provide all the required data? v. Is the data used for making appropriate decisions?
2	To establish how different entities collect, compile, store and send maternal health data to the next level.	i. How is data collected? ii. How is the data compiled and stored by different entities? iii. Is there proper communication between and among entities? iv. What are the challenges faced that could affect data quality?
3	To assess the uniformity/similarity in maternal health data at different levels.	i. Are monthly data aggregates for some indicators similar among and between different entities? ii. Are annual data aggregates for some indicators similar among different entities?

1.6. Significance of the Study

This study is significant for the following reasons:

1. Measuring attainment of MDG number five, (SDG number three to date), requires accurate and reliable data, which is often unavailable in developing countries, including Malawi. Hence the study provides recommendations that will aid in the pursuit of quality data to enable improvement in allocation of resources, planning of health programmes and policy priorities. This would eventually lead to achievement of SDG number three.
2. It will reveal inconsistencies in the hierarchy of information flow and flaws in data collection which lead to poor data. The outcomes of this study should prompt a review of the current system, and policy in handling of data. The study also provides recommendations for resolving the current systems problems.
3. The study will provide stakeholders (such as Malawi Government, Ministry of Health, Non-governmental Organisations which fund system development) with information on where the health management information system needs improvement, changes which need to be implemented and enable the stakeholders to devise methods of how to successfully handle data from the community and remote area health facilities.

1.7. Publications in this Dissertation

Kasambara, A., Kumwenda, S., Kalulu, K., Lungu, K., Beattie, T., Morse, T Masangwi, S. and Ferguson, N. (2016). *Assessment of Implementation of the Health Management Information System at District Level in Southern Malawi.* Malawi Medical Journal.

1.8. The Outline of the Thesis

This thesis is comprised of seven chapters as follows:

Chapter 1 introduces the study in relatively general terms discussing the problem of inconsistent health data including maternal health data; such issues hinder the

achievement of goals related to maternal health, i.e. Millennium Development Goal 5 and Sustainable Development Goal 3.

Chapter 2 provides relevant literature for the study such as the background on data quality which is an important aspect for data use, data quality for Malawi's HMIS and maternal health data have been discussed.

Chapter 3 discusses the research design as a case study design which was divided into three cross-section design phases. The personnel involved in the study are discussed in this section with regards to how they were sampled and the kind of data which they provided. Data collection techniques such as the questionnaire and interviews are also discussed. Methods of data analysis are provided in this section.

Chapter 4 presents the findings, results and discussions for Phase 1, on data management as perceived by HMIS Officers and views of data users at district level. Furthermore, there are also results and discussions for Phase 2 on data management from three health facilities in the intervention area.

Chapter 5 discusses the findings, results and discussion for Phase 3, on data management obtained from Chapananga Area which covered a catchment area of six health facilities. A comparison of the results with those from Phase 2 is also presented in this section.

Chapter 6 provides findings, results and discussion for Phase 3 on the comparison of data to test for consistency while Chapter 7 provides conclusions on the results from Phase 1 through 3 with respect to the discussions and provides appropriate recommendations on the outcomes emerging from the results.

Chapter Two: Literature Review

This section contains the necessary reviews pertaining to the study on health management information systems and data quality.

2.1. Data Quality

Data quality, which is also known as information quality, refers to data that has a number of properties. These include accuracy, completeness, consistency, and timeliness and standards-based (Abate, et al., 1998; Juran & Blanton, 1998; Alshawi, et al., 2003). If the data satisfies these properties, then the data is deemed fit and appropriate for its intended use (Juran & Blanton, 1998; Alshawi, et al., 2003). Data of varying quality poses challenges in operations, decision making and planning, which can be the case with maternal health data (Juran & Blanton, 1998; Chao & Alkema, 2013).

2.1.1. Data Accuracy and Reliability

Accuracy can be defined as the degree of correctness (Scannapieco & Catarci, 2002), or the degree of measure to a standard or a true value (Eppler, 2003). English (2009) agrees, stating that data accuracy is the level of precision or detail. Furthermore, data accuracy can also be defined as "the closeness of agreement between a measured quantity value and a true quantity value of a measurand" (Metrology, 2008). All these definitions yield the same outcome that the collected data needs to be comparable to what is being measured. This study therefore defines data accuracy as degree of correctness of the measurand, since maternal health data measurements have to be as close as possible to the true values. Reliable data is the evidence you can trust and the evidence is data that is relevant (Pierce, 2007). Reliability is also referred to as "the extent to which we can rely on the source of data and therefore the data itself" (Pierce, 2007). Data which is a quantity or quantities measured, needs to be accurate so that it is dependable, trustworthy, authentic and reputable, hence maternal health data has to be accurate thereby proving to be reliable (Pierce, 2007). This is not always the case, because of scarcity of accurate data, for instance on maternal mortality, especially in developing countries (Chao, et al., 2013).

2.1.2. Data Completeness and Consistency

One of the properties of quality data is completeness, which is a state of availability of data from the sources (Biswas, et al., 2006; Tyagi & Philip, 2012). Data completeness is when a set of data has been collected and all the required elements are available (Reiter, et al., 2007). In other terms, data completeness can be referred to as expected completeness, since the data may not comprise of all the required elements in a data set, but if the users' expectations are met with the available elements then the data is considered complete (Tyagi, et al., 2012). The data also has to conform to the certain degrees of information quality in which the data is comparable in redundant or distributed databases (Chisholm, 2010). This is a quality of data called consistency (Alshawi, et al., 2003), and it is the main measure of the reliability of data (Pierce, 2007). According to Brohman, et al. (2003) and Douglas, et al. (2005), paper-based forms of data collection, which are used in most rural areas in Malawi and partially at district hospitals, have no mechanisms to ensure that all fields are completed. This leads to data gaps and missing values thereby affecting completeness. Data collected using paper-based forms needs to be entered into a computer system for analysis, and this can be a source of some data errors (Douglas, et al., 2005). In a study on "Improving completeness, accuracy and timeliness of HIV voluntary counselling and testing client data using touchscreen computers" conducted in Malawi, the authors found that one quarter of paper-based forms had one or more incomplete fields, and one third of entered data had one or more errors introduced during entry (Douglas, et al., 2005). Thus the maternal health data that is available needs to meet user expectations and also be consistent among the different entities handling and using the data.

2.1.3. Timeliness and Data Use

Timeliness of data is a property of quality data which enables proper planning, decision making and operations (Alshawi, et al., 2003). Douglas, et al. (2005) further adds that timely data is used in monitoring and evaluation processes. The data is useful when decision makers get the data in time (Tayi, et al., 1998). It is however noted that with paper-based forms, for all data not just maternal health data, there is dormancy between data capture, data transfer to supervisors who recompile the data, which may lead to errors, and subsequent entry into a computer system leading to delays (Douglas,

et al., 2005). Considering that timeliness is important, Douglas, et al. (2005) discuss the introduction of real-time data entry, which not only potentially increases timeliness of data, but also accuracy and completeness. Touchscreen technology can be used to achieve the real-time entry process and can enable forced adherence to entry in all fields, thereby accomplishing completeness, considerable reduction of subsequent data entry errors and there will be no waiting time between data collection and entry, thereby attaining timeliness (Douglas, et al., 2005). The use of this technology has boosted data quality for the Malawi Aids Counselling and Resource Organisation (MACRO), and it could help in all sections of health monitoring, including maternal health data (Douglas, et al., 2005).

2.2. Roles of Data in Health

Data, which is just a measurement or measurements, leads to information after it is processed and analysed (Victorian Quality Council, 2008; Thornes, 2011). The information then provides knowledge that is used in decision making and the decision made leads to action being taken (Mosse & Nielsen, 2004). Health data also follows this basic principle, summarized in Figure 2.1.

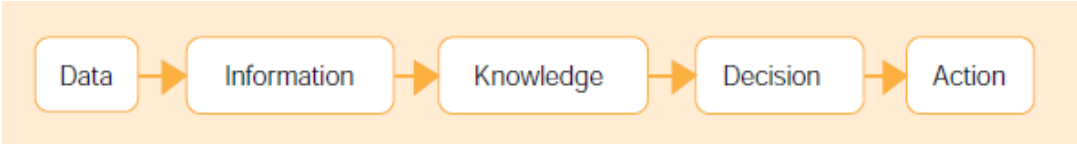


Figure 2.1: Roles of data principle. *Source:* Victorian Quality Council (2008).

Data that is of good quality, irrespective of field of application, can specifically be used in improvement of service quality, evaluation of processes already existing and identification of improvement opportunities, formulating and prioritising interventions, measuring the impact of projects and sustenance of improvements already done (Hogan & Wagner, 1997).

In quality improvement, the Victorian Quality Council (2008) stated that data works in two ways, such that it aids in identifying and analysing problems, while on the other hand identifying and analysing opportunities. Figure 2.2 shows that data can be used to push for quality improvement, as well as pull for quality improvement.

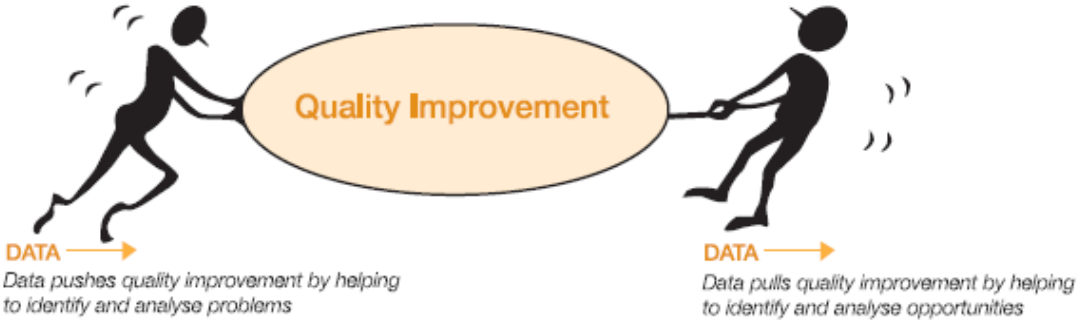


Figure 2.2: Quality improvement. *Source:* Victorian Quality Council, 2008

Hogan & Wagner (1997) explain in more detail in terms of health, that quality health data can be used in patient care, clinical research, management of health systems, planning of health service, total quality improvement, risk management and reporting to government, all of which agrees with the Victorian Quality Council (2008) roles of data. However, if the data is inaccurate, a number of problems can occur, for example errors in treatment, underestimation of disease prevalence, and standards of care compliance may also be underestimated.

2.3. Data Quality in Malawi

Health data in Malawi has been cited as being of varying quality and provides difficulties for health managers in operations, decision making and planning of different programmes (Juran et al., 1998; Chao & Alkema 2013). As such, the health data does not conform to data accuracy. This study defines data accuracy as degree of correctness of the measurand. The data is accurate so that it is dependable, trustworthy, authentic and reputable, (Pierce, 2007). Timeliness was another attributes which was not achieved (Douglas, et al., 2005).

2.4. Maternal Health Data

According to Chao, et al. (2013) and a World Health Organisation report published in 2005, assessment of the progress of Millennium Development Goal number five, has been difficult (WHO, 1996; WHO, 2005; Chao, et al., 2013). One of the key challenges is the lack of data on maternal mortality. This also corresponds with an old WHO report from 1996, that measuring maternal health data is difficult and complex

mostly in developing countries (WHO, 1996; WHO, 2005). A number of factors dictate the difficulty in measuring maternal mortality. One key factor is missing information on the death of women of reproductive age, cause of death, and status of whether pregnant or not (WHO, 2005; Sombie, et al., 2007). Another factor is the lack of a vital registration system, which is evident in most developing countries, and leads to unrecorded maternal deaths, as well as cause of death (WHO, 2005; Immpact, 2007). WHO (1996) also stated another factor as non-existence of death certificates, which means more difficulty in measuring maternal mortality. Another issue hindering measurement of maternal mortality is that less than 50% of births are attended by skilled health personnel, and this in turns leads to lack of data to monitor maternal mortality reduction progress (WHO, 2005). The small amount of data collected is usually incomplete and most times unavailable, which leads to under reporting, and hence inaccurate data (Graham, et al., 2008).

The problem increases as it is not just the lack of data, but also the need for accurate data to quantify the trends and levels of maternal deaths (Graham, et al., 2008). Graham, et al. (2008) further stated that the demand for reliable data for maternal health estimates is due to the existence of the MDG's, but according to Boerma (1987) reliable data on maternal health is scarce mostly in developing countries. In order to develop programmes, policies, setting priorities and advocacy to achieve MDG number 5, both Immpact (2007) and Graham, et al. (2008) discuss the availability of reliable data for decision makers. Graham, et al. (2008) added that reliable data enables proper allocation of resources.

Alternative ways for obtaining reliable data on maternal health, according to Boerma (1987), are to involve health facilities and other sources, such as the community, to complement the incomplete vital registration systems (Hussein, 2007). Graham, et al. (2008) also stated that there is a need to increase the capacity for comprehensive reporting of births and deaths, as well as an increase in result based financing by donors, as an incentive to improve data reliability. Hussein (2007) also talked about clinical death audits, maternal death reviews and confidential inquiries in health facilities and the community as probable ways of obtaining reliable information.

Maternal health data cannot be relied on because of it lacks accuracy, completeness and consistency (Sachs & McArthur 2005). Furthermore, timeliness is another big

problem with maternal health data (Douglas, et al., 2005). Hence there are discrepancies.

2.5. Information and Communication Technology (ICT) Initiatives

Paper-based systems have a lot of challenges which affect data quality such as completeness, consistency, accuracy and timeliness (Douglas, et al., 2005). However, using Information and Communication Technology (ICT), data quality and availability is increased thereby improving decision making and health care services, hence ICT can improve the paper-based data collection systems (Mosse & Nielsen, 2004). Specifically, ICT (in the health sector termed eHealth/mHealth) enables development of HMIS that are supposed to enhance analysis and use of health data, managing resource allocation, planning and health delivery, increase efficiencies, reducing workload and increasing productivity (Ranjini, n.d.; Kimaro, et al., 2004; Kaplan & Maxwell, 2005).

Although ICT can improve paper-based communication, in most developing countries, e.g. Mozambique, Tanzania and Malawi, this technology has had minimal impact on how health care is delivered in local communities because information within the system is not accurate nor delivered in time (Smith, et al., 2008). This is as a result of manual data collection at community level using paper-based collection tools, which has to be entered into the computer system (HMIS) at the district level either on a monthly or quarterly basis (Douglas, et al., 2005; Ngama, et al., 2005; Smith, et al., 2008). Douglas, et al. (2005) commented that manual data collection incurs errors both during collection and computer entry, resulting in incomplete and inconsistent data, and delay in moving data from one level to the next affecting timeliness. This defeats the purpose of the HMIS for enabling decision making that is effective and informed (Littlejohns, et al., 2003; Kimaro, et al., 2004; Ngama, et al., 2005).

The quest to obtaining quality data in all health sectors including maternal health, requires a HMIS using ICT initiatives that are well developed and adopted by the user in sections of data collection, compiling reports and decision making (Mbananga, et al., 2002). Thus a HMIS would be deemed a success, but otherwise the HMIS is a failure.

2.6. Health Management Information Systems Success, Failure and Adoption

The purpose of a HMIS is to allow accurate collection and management of data in terms of increasing information quality, quantity and speed which allows decision makers to allocate resources effectively and efficiently (Braa, & Hedberg, 2002; Mbananga, et al., 2002; Smith, et al., 2008). Braa & Hedberg, (2002) add that the other purpose of a HMIS is to provide information for surveillance and statistics. Unfortunately, HMIS in many developing countries fail to provide this support to health care management staff (Lippeveld, et al., 2000); Heeks (2002) when reviewing HMIS in developing countries, classified many as totally failing or partially failing. Indeed, Lippeveld, et al., (2000) noted that data from HMIS is not used for decision making due to incomplete, inaccurate, untimely and obsolete data. However, not all HMIS fail in the provision of appropriate data; attributes for success are reviewed below.

2.6.1. Attributes required for HMIS Success

HMIS success depends on a number of characteristics. Smith, et al. (2008) and Al-Mamary, et al., (2014) detail these characteristics as technology characteristics, project and organisation characteristics, user and social characteristics, and task characteristics. Sander, et al. (2005) and Smith, et al. (2008) both state that these characteristics also require the inclusion of epidemiological characteristics to be integrated for a functional HMIS. A successful HMIS, which has these characteristics, has improved client/patient follow up rate and clinical efficiency since there is sound interaction among the different characteristics (Mbananga, et al., 2002; Vital Wave Consulting, 2009). In addition, the success of a HMIS is partially dependent on technology to enhance effectiveness and efficiency (Sander, et al., 2005; Vital Wave Consulting, 2009). Furthermore, sophisticated technology enhances the collection and use of reliable data (Vital Wave Consulting, 2009). Curlee & Tonn (1987) and Belkhamza & Wafa (2012) both stated that the technology used as part of a HMIS, is there to improve productivity of an organisation, but may however lead to failure if the technology is inadequate.

The system users play a major role for system success hence where users are productive, they need to be rewarded so that they are encouraged to effectively and efficiently use the system (Belkhamza & Wafa, 2012). Most importantly, system users

need to be involved in the system planning, designing and implementation in order to realize system success (Mbananga, et al., 2002; Belkhamza & Wafa, 2012).

A successful HMIS, according to Vital Wave Consulting (2009), requires structure, an example of which is given in Figure 2.3 to achieve its intended objectives.

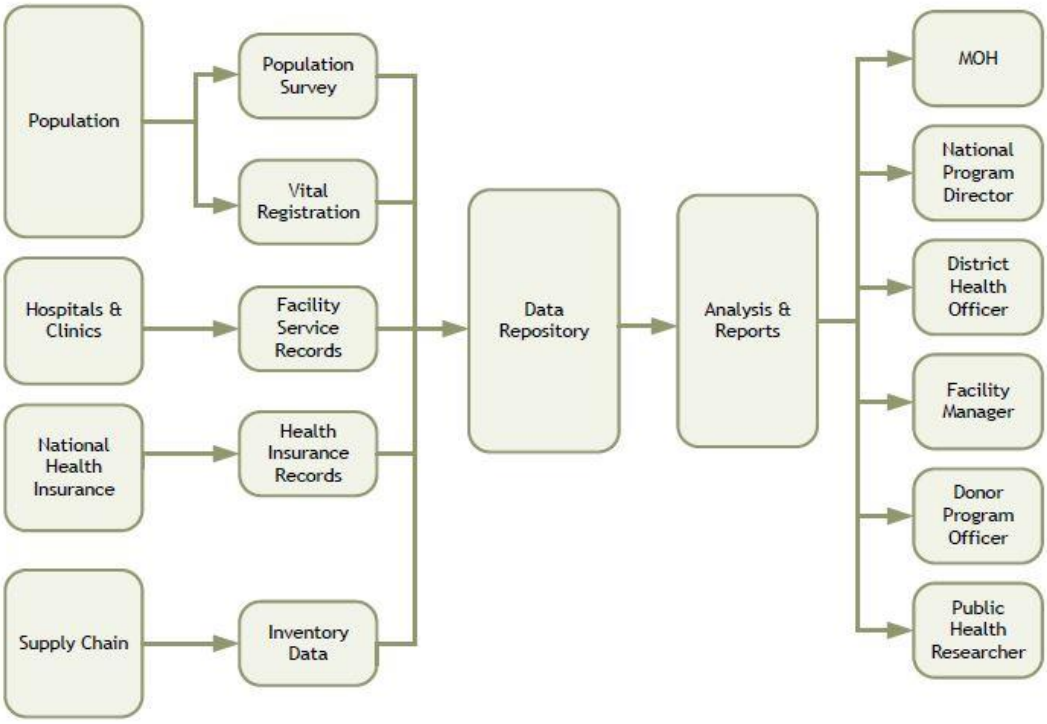


Figure 2.3: Typical HMIS Structure (Vital Wave Consulting, 2009).

The HMIS structure for Malawi is shown in Figure 2.4 (MoHP, 2003; Chaulagai et al., 2005; MoH & HMN, 2009). The main concern related to this study in Figure 2.4, highlighted by a red border, is the structure from the Village Health Committee (VHC) / Traditional Birth Attendant (TBA) / Community Based Distribution Agent (CBDA), HSAs (also known as Community Health Workers), Hospitals / Health Facility, Private health facilities to the District Health Office (DHO), District Health Management Team (DHMT). These entities constitute the sources of data and it is where data manipulation is mostly done through compiling. These different entities collect data on health related issues including maternal health data in their community in order to aid in the development of better health care (Chaulagai et al., 2005; MoH & HMN, 2009).

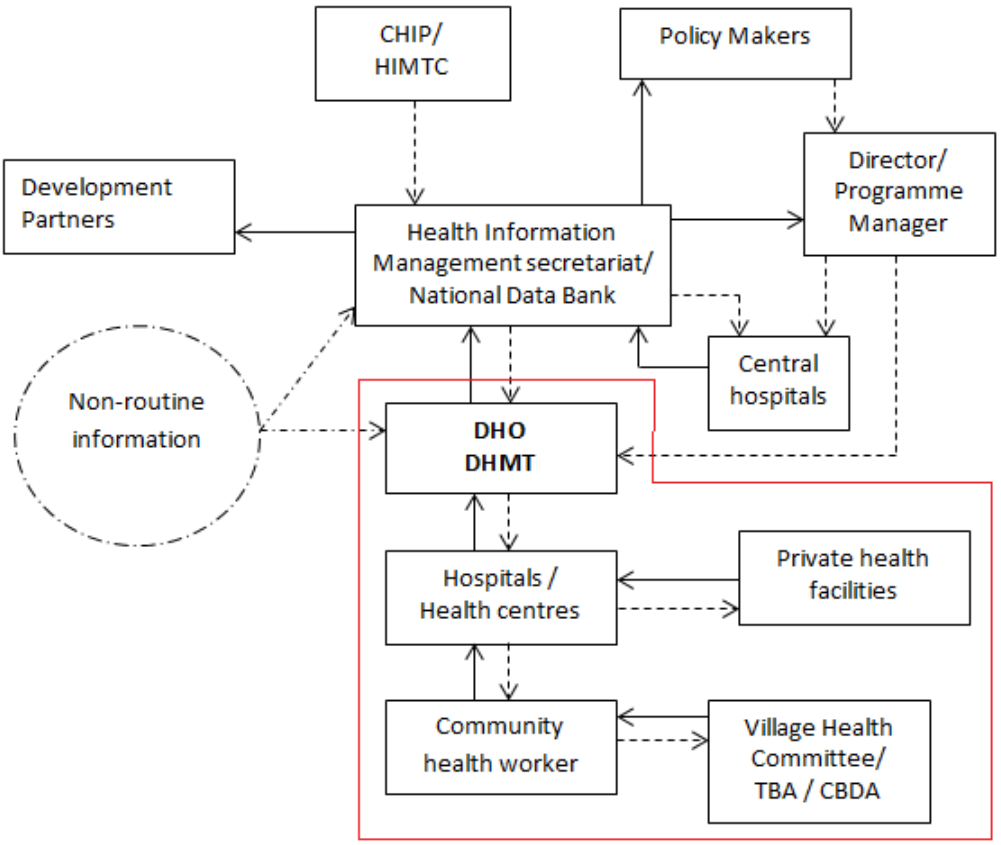


Figure 2.4: HMIS Structure for Malawi (MoHP, 2003; Chaulagai et al., 2005; Republic of Malawi & HMN, 2009)

Key: CHIP - Committee for Health Information Policy; HIMTC - Health Information Management Technical Committee; DHO - District Health Office; DHMT - District Health Management Team; TBA - Traditional Birth Attendant; CBDA - Community-Based Distribution Agent

However, Smith, et al. (2008) consider an underlying conceptual framework which would enable the structure of the HMIS to be achieved. Vital Wave Consulting (2009) also agrees with Smith, et al. (2008) on the need for a conceptual framework before the HMIS is implemented.

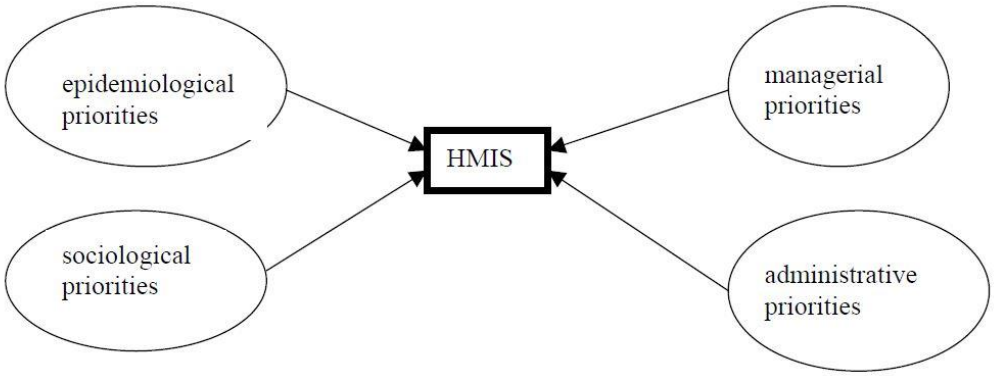


Figure 2.5: HMIS Conceptual Framework (Smith, et al., 2008)

Thus from the conceptual framework and properly laid out structure, a HMIS that is successful should be realized (Heeks, 2002). As such most stakeholders are able to attain their major goals through the HMIS (Heeks, 2002; Archangel, 2007). The specific considerations for success are system quality, information quality, use, user satisfaction, individual impact and organisation impact (DeLone & McLean, 1992; Kivinen & Lammintakanen, 2013). However, the characteristics of a successful HMIS stated above are usually neglected, leading to system failure (Al-Mamary, et al., 2014).

2.6.2. Attributes involved in HMIS Failures

Curlee & Tonn (1987) cited in Belkhamza & Wafa, 2012 observes that most HMIS manage to effectively use the organisation and behavioural parameters or characteristics which are required before developing the conceptual framework. However, system developers fail to realize the actual conceptualization using these underlying conceptual/theoretical frameworks of the HMIS (Belkhamza & Wafa, 2012). Braa & Hedberg (2002) differ. They state that reasons for failure are organizational structure, scale of the HMIS and cultural differences among different areas. Mbananga, et al., (2002) adds that political influence may also hinder the success of a health management information system.

The specific issues and factors leading to system failure, which are as a result of neglecting the important characteristics, include system quality, information quality, service quality, top management support, end user training, technology self-efficacy and end-user experience (Sander, et al., 2005; Belkhamza & Wafa, 2012; Al-Mamary, et al., 2014). Vital Wave Consulting (2009) specifies failures of the system as pertaining to four factors:

Data duplication – where government, donors and implementing partners collect the same data/information independently (Lippeveld, et al., 2000).

Difficulty in using the HMIS since it is not developed by those providing the health care service.

Service delivery is burdened by data collection procedures which leads to poor data quality. If the issue of data collection is not addressed properly, data quality remains poor (Lippeveld, et al., 2000). Organisations may therefore need to address labour availability constraints on input to the system (Belkhamza & Wafa, 2012).

Lack of integration among system blocks, which obstructs data sharing and efficiency of the system. The specific case of the Pacific Islands HMIS, as described in section 2.6.4, also noted and experienced the challenge of data sharing and integration (Lum On, et al., 2009).

Belkhamza & Wafa (2012) refer to HMIS user divergence as another source of failure because there might be system underutilisation or misuse at different levels from those collecting data to those in decision making. Another crucial factor for system failure in most developing countries was 'differences'/mismatch in priorities between users, the organisation and purpose of the newly developed HMIS (Heeks, 2002; Belkhamza & Wafa, 2012). Mbananga, et al. (2002) and Archangel (2007) further discuss computer incompetence among users as also a major threat to system success.

A HMIS failure can be categorised into two parts: total failure, where no implementation of an initiative took place, and partial failure, where implementation was done but major goals were not attained (Heeks, 2002). Due to these failures, HMIS have not made any major influence on health-care delivery for local communities in developing countries, although huge investments are made towards development (Smith, et al, 2008). This is the case with the HMIS in Malawi (Chaulagai, 2005).

2.6.3. Attributes required for successful System Adoption

A number of factors are attributed to successful adoption of a HMIS. Vital Wave Consulting (2009) and Al-Mamary, et al. (2014) state that a management information system has to provide accurate, reliable and complete information, as the performance

of a HMIS depends on reliable data so that managers can devise, execute and measure health interventions (Vital Wave Consulting, 2009). Thus therefore managers have to get this information in an easily accessible and understandable format (Al-Mamary, et al., 2014). Al-Mamary (2014) and Vital Wave Consulting (2009) further articulate that information has to be available in a timely manner and promptly flow between departments thereby reducing face to face meeting.

Adoption of a management information system also depends on the data management process. The Health Department in the Republic of South Africa (RSA, 2011), divides the data management process into three sections. The first part being data collection tools, which should be up to date and easy to use, but this is not the case in most developing countries. The second part is setting deadlines for data flow processes and the third is enforcing timeliness thereby eliminating the significant delays in data collection, transmission, compilation, analysis and presentation of data (Lippeveld, et al., 2000; Health Department, 2011). Data accuracy, reliability, completeness, coherence and comparability would be the qualities of data if most developing countries had information systems embracing the data management process (Health Department, 2011). Despite data being of poor quality, Lippeveld (2000) states that there is usually some useful information which can be extracted and used for decision making.

System users are a crucial consideration in system adoption, hence success and as such, there is need for increased participation and awareness of the system among users (Archangel, 2007). Archangel (2007) also recommends highlighting the benefits the system might bring to the users and their organisation to encourage easy system adoption.

2.6.4. Case Studies in implementation of HMIS

While literature on the implementation of the HMIS in Malawi is limited, parallels can be drawn with implementation in other countries. Lum On, et al. (2009) reported on the HMIS in the Pacific Islands, where the geographical location of certain areas is very isolated (Lum On, et al., 2009). The challenges faced by these isolated areas in the Pacific Islands are the same as those faced in most areas in Malawi, specifically Chapananga area where the study on maternal health data management took place.

Lum On, et al. (2009) recognize the challenges of such areas as variable costs, timeliness, security, power and connectivity.

Tanzania developed HMIS with two key roles which were stated by Smith (2008) as improvement of resource allocation and setting up priorities. These priorities are the same as those for the HMIS in Malawi (Moyo, 2005) and also the Pacific Islands (Lum On, et al., 2009).

Just as in Malawi, Tanzania embraced a decentralized approach to building their HMIS (Smith, et al., 2008). The objectives of having a decentralized system were decision making being close to the community, improved accountability and informing local decision making (Lum On, et al., 2009). However, there were no substantial and long term impacts after the HMIS was introduced at local level (Smith, et al., 2008).

The HMIS in Tanzania was expected to provide accurate data in a timely manner but six years after inception, the HMIS could not deliver its promised objectives (Smith, et al., 2008). The HMIS faced a number of problems which hindered its' success, for example:

i. Perceived performance where data quality ranged from good to poor, as data collection was considered a burden; these were also sentiments expressed by Vital Wave Consulting (2009) for system failure.
ii. In order to get increased funding, data in HMIS could not be revised downwards even if data was inaccurate.
iii. Repercussions due to past improper data recording also disincentive proper data recording.
iv. Donor funding emphasis was on managerial agenda and not HMIS.
v. Lack of funding and other resources in developing countries.
vi. Lack of integration among system components; again this was also highlighted by Vital Wave Consulting (2009).

Since the system was decentralized, not all districts failed and those successful districts attributed success to donor support, adequate funding and better transportation infrastructure (Smith, et al., 2008).

The successful implementation of a HMIS in some areas in South Africa has encouraged countries such as Mozambique, India and Malawi to obtain the same type

of HMIS, adapt it and further develop it according to their needs (Braa & Hedberg, 2002). Even though the system was adapted by these countries, there were drawbacks such as differences in organizational structures, magnitude of the project and cultural differences (Braa & Hedberg, 2002). There were also other problems that were adopted together with the system which included (Braa & Hedberg, 2002):

i. Vast amounts of collected data are not used especially at lower levels and requires developing computing resources to analyse the data.
ii. Difficulty in integration with vertical data from donor driven programs which Malawi still faces to date.

The Health Department (2011) in South Africa adds on to the list of challenges and problems which the health information system in South Africa faced and also faced by the majority of developing countries including Malawi. The challenges are as follows:

i. The alignment of goals and objectives of the health sector was limited.
ii. Program managers at district level were not adequately involved in data validation, analysis, reporting, feedback and use which ensures quality and compliance to reporting requirements (Lippeveld, et al., 2000).
iii. There was a lack of governance and standardization of District Health Information System in streamlining of indicators, which was also the case for the Pacific Islands (Lum On, et al., 2009).
iv. Scarcity of Information officers with experience.
v. Inadequacies in Information and Communication Technology (ICT) infrastructure development (Archangel, 2007; Lum On, et al., 2009).
vi. Lack of /limited basic materials for paper-based data collection tools.
vii. There was usually no control of basic software which also needs be standardised system wide (Archangel, 2007).

As a result, the health information system in South Africa, despite having successes, there were also partial failures which were costly and little to no use of data obtained (Heeks, 2002). Heeks (2002) also refers to other information systems with partial failure such as that of China and Thailand, where failure cases seemed normal. Heeks (2002) further reports that there is a high rate of management information system failure from developing countries.

The case of Gambia's health information system does not differ much from that of South Africa, India, Tanzania, Mozambique, China, Thailand, Malawi and other developing countries (Sander, et al., 2005). Gambia's partial or total system failure also rises from factors similar to the countries mentioned above (Sander, et al., 2005). The reasons for failure also included:

i. Lack of understanding of the operational, human and physical environment
ii. Poor use of ICT system and lack of infrastructure.

However, Sander, et al. (2005) explains that Gambia also noted important elements for success which were providing training to human resource in using the system and that users had to be committed to adapt to new working procedures. Archangel (2007) agrees with providing training for users and also emphasizes on investing more time in trainings for data interpretation, management and on the job training.

2.7. Enhancing Data Quality

This section discusses eHealth/mHealth initiatives which would probably aleviate the data quality challenges. The eHealth/mHealth systems have their own drawback but they provide a better alternative to enhancing data quality.

2.7.1. eHealth/mHealth alternative

An alternative to paper-based documentation is the use of mobile health (in short *mHealth*) (Noel, n.d.). Mobile health is a subset of eHealth which is the use of both electronic communication and information technology to deliver quality health care (Della Mea., 2001). Specifically, mHealth refers to "medical and public health practice supported by mobile devices, personal digital assistants (PDAs) and other wireless devices" (WHO, 2011). The mHealth initiative has the potential to change the health service especially in low and medium income countries (Kaplan, 2006; Blaya, 2010; Garai, 2011; WHO, 2011). Mobile health intervention is essentially cost effective for rural health facilities with little or no communication and bad terrain, due to the growth of mobile networks (Cole-Lewis, 2010; Mahmud, 2010; WHO 2011). Advantages of eHealth/mHealth surpass the paper-based in that there is increased data quality, removal of costs in transporting paper-based documents, no more manual data entry

after data collection which is time consuming, and decreased delay in transmission of data (Blaschke, 2009). Therefore, mHealth provides consistent and timely data transmission, as well as timely feedback (Noel, n.d.).

Touch-screen input technology is another dimension of eHealth where data is captured electronically at the point of contact (Vota, 2009). The touch-screen interface is user-friendly which enables individuals with low computer literacy to capture data (Douglas, et al., 2005). Advantages of this technology are similar to those for mHealth, which implies that there is real-time data collection which is able to eradicate challenges in data completeness, accuracy and timeliness (Douglas, et al., 2003; Vota, 2009). Douglas et al. (2005) further states that users prefer touch-screens from paper-based data entry because it is easier and faster. A computer system installed at Lilongwe Central Hospital that uses touch-screen technology has proven to be a successful Patient Management Information System (Douglas, 2003).

The use of eHealth and mHealth could be beneficial in collection of maternal and neonatal health data as it would improve quality of service, as well as increase usage of maternal health services due to accurate, timely and complete data compared to the paper-based data collection (Noordam, 2011).

- *Evaluation of Some eHealth/ mHealth Systems*

Mobile health has advantages in easy data entry and available data backup. Some of the active eHealth/ mHealth platforms are (i) Dignitas International which collects information using patient data cards (Phiri, D. 2015, pers. comm., 17 September), (ii) Clinton Health Access Initiative Malawi, refered to as the Point of care connectivity solution using a CD4 machine when the health personnel is with the client and (iii) DHIS2 mobile run by the MoH to collect a wide range of health data (Douglas, et al., 2005). These mHealth systems are beneficial in that data quality is improved because from the data, for example, stock required can easily be quantified (Christopher Mwase. 2015, pers. comm., 28 September).

The potential benefits offered by eHealth/mHealth in Malawi have resulted in around 45 operational mHealth services; Table 6.8 shows some of those currently in operation. The services operate in different districts in Malawi and most having a specific use in Maternal, Neonatal/Newborn and Child Health.

Table 2.1: Summary of Some eHealth/mHealth in Malawi

Name	Organisation Funding	Specific Use	Area Operational
DHIS2 – Tracker	Not Specified	Reproductive, Maternal, Newborn and Child Health	Dowa District
Mobile InverVA4 (MIVA)	UCL and MaiMwana Project	Impact of the Pneumococcal Conjugate Vaccine and Rotavirus Vaccine	Not Specified
Village Reach - Health Care by Phone	Concern Worldwide, IWG and Seattle International Foundation	Reproductive, Maternal, Newborn and Child Health	Balaka, Ntcheu, Nkhotakota and Mulanje Disricts
DTree - Community case Management	Catholic Relief Services (USAID funded IMPACT Project)	Maternal and Child Health	Lilongwe, Ntcheu, Zomba
UNICEF – RemindMI	UNICEF	Maternal and Child Health and Nutrition	17 out of 28 districts in Malawi
UNICEF – Results160	Donor Funded (UNICEF)	Child Health	All Districts in Malawi
UNICEF – Anthrowatch	UNICEF	Child Health and Nutrition	16 Districts
CHAI – SMART	Clinton Health Access Initiative (UNICEF Funded)	Child Health	Nationwide
CHAI – Patient Follow-up	Clinton Health Access Initiative, MoH	Maternal, Neonatal and Child Health	Mangochi and Salima Districts
JSI cStock	Bill and Melinda Gates Foundation (pilot phase), IWG Grant for scaling	Supply Chain, Reporting and Resupply System, and District Product Availability Team Meeting	Nkhotakota-deployed a 10 month pilot
Global Hope Mobilization – Project Tendai	Sarpam	Maternal, Neonatal and Child Health and Supply Chain	Dowa, Ntchisi and Lilongwe Districts
Global Hope Mobilization	None	Maternal, Neonatal and Child Health	Dowa, Ntchisi and Lilongwe Districts
Millennium Promise	Millennium Villages Project – multiple funders and donors	Maternal and Child Health	Zomba District
VERSE – mWomen	VERSE	Women's health, child care, and other content	National
eHMIS (AFYAPRO)	Nkhoma CCAP Hospital	Patient Registration, Diagnosis and Treatment, Reproductive and Child Health, InPatient Management,HIV/ART, Stock and Inventory, Billing, Laboratory and Reporting.	Lilongwe District
Point of Care Connectivity Solution	MoH and Clinton Health Access Initiative	CD4 Testing	Not Specified
Centralising ART Patient Level Data	Dignitas International	ART Data	Zomba District

Although mHealth would be a solution to attaining data quality, they tend to have their independent database. Hence there is no electronic link between mHealth and the current system. Furthermore, there is need to address the link between HSA and Secret Women who exchange data as this also has an effect on the data to input in the

eHealth/mHealth. Another drawback of mHealth is the high cost of mobile access which can be a hindrance. Therefore, these limitations need to be addressed to ensure data quality.

2.7.2. Ministry of Health HMIS Development Partners

The MoH has a HMIS development partner called Baobab Health Trust, which helps in developing a system that enables district hospitals to collect accurate, reliable, complete and consistent data. Baobab Health Trust is a non-governmental organisation which is implementing eHealth technologies that use touch-screen technology in government hospitals.

The Baobab Health regional manager for the southern region stated that the system is built using MoH guidelines and protocols to ensure that work flow continues (Chimango Munthali, 2012, pers. Comm., 7 May).

The data collection and entry is done at the same time, at the Point of Care (PoC), reports can be generated for four targeted groups as system users; doctors, nurses, clinicians and hospital management, instantly for decision making. Data accuracy, reliability and completeness is achieved by functions that check anomalies (such as double entries) and data consistency. For instance, a male cannot be registered for antenatal care. The Point of Care (PoC) mechanism removes the problem of transcription errors as well.

The computerised system has not yet been targeted for the rural health facilities, hence the use of paper-based registers in these areas. As such, there is no electronic data collection for maternal health in Chikwawa both at health facility and district level. However, there is a lot of data that is captured using registers at community level (village to health facility level), but it usually ends up lost or not used.

If an investment is made on the systems developed by Baobab Health in order to speed up development and incorporating more districts, the quest to obtaining quality data would be achieved.

Conclusion

Data quality is of utmost importance if decisions are to be made from information. Data quality implies that the data adheres to characteristics of accuracy, reliability, completeness, consistent and timeliness in order to be used by management for decision and evaluating productivity. Data plays a major role in health as managers can use the data to plan, execute and measure interventions, for disease surveillance and allocation of resources. Basically service quality can be improved in health with quality data.

The lack of quality data is wide-spread in health systems of most developing countries. Thus maternal health is one of the areas with deficient data for decision making. Data in maternal health is of particular importance as measuring MDG number five/ SDG number three relies on the same data. Furthermore, areas without or lacking comprehensive data on maternal health have difficulties in devising interventions and making decisions, as well as measuring indicators of interest. Malawi being one of the countries which lacks comprehensive data on maternal health, employs both the paper-based systems for health facilities and computerised systems at the district level.

Case studies of general management information systems and other health management information discuss attributes which lead to system success or failure and easy system adoption. As this study investigates Malawi's health management information on maternal health, it should also implicitly determine system success/failure and level of adoption as Malawi possesses some of the characteristics with other HMIS.

Lastly, eHealth/mHealth have characteristics that may be the probable solution to data quality issues in HMIS's by improving data accuracy, reliability, consistency, completeness and timeliness.

Chapter Three: Methodology

This section covers the methodology of the study.

3.1. Study Design

The study was a case study design, which comprised of a threefold cross-sectional design demarcated into three phases. The phases are defined as follows:

Phase 1

The study was a cross-sectional survey which collected qualitative data from HMIS Officers and Health Managers; these roles are defined in Table 3.2. This involved an assessment of data management and use from the perspective of HMIS Officers and Health Managers respectively in the southern region of Malawi. The main focus of the study was the data management process (generation, analysis, storage and retrieval), human capacity within the HMIS and use of HMIS data in order to develop tangible reports to make decisions that influence policy and plan for the future. The study collected data on the qualification of the data custodians at District Health Offices (DHO) at the district hospital, length of service, sources of data, accuracy and reliability of the data, reporting from the system, objectives of the system and suggestions on how to improve the data collection process and the system in order to get better output. Data users at district level were also involved in Phase 1 to give their perceptions on the quality of data from the system, and opinions on whether data from the HMIS is useful in the decision making process.

Phase 2

The outcome of Phase 1 influenced Phase 2, which was also cross-sectional. Phase 2, conducted in Chapananga area in Chikwawa District, investigated maternal health data management among the different community members (Secret Women, VHC and HSA, as defined in Table 3.2) and Health Personnel from three health facilities (Chithumba, Gaga and Chang'ambika in Changoima zone). The data collected was on how data is managed by different structures, the problems faced in data collection and the information recorded by each entity. Phase 2 was conducted to get clarifications on the results obtained from the HMIS and Data Users on how data is managed from the community through the hierarchy to HMIS Office.

Phase 3

Phase 3 was also a cross-sectional study which was developed as a result of Phase 2 and was conducted for three reasons:

- To consider data management processes and procedures for a larger area.
- To check consistency in data management processes and procedure, given on-going intervention by the Healthy Settings health improvement programme the Scotland Chikwawa Health Initiative (SCHI; further details can be found in Section 3.3: Table 3.2) in part of Chapananga area, and then
- To test the consistency in the data collected by the different entities.

Hence Phase 3 was both qualitative and quantitative. Qualitative data was collected in understanding the data management process and procedure by different entities, and was conducted six months after Phase 1. The data management processes and procedures were compared for Phase 2 and Phase 3 to assess adherence to set processes and procedures. Quantitative data was collected from the actual data record sheets for maternal health indicators by the different entities for a period of 12 months from April 2012 to March 2013. The quantitative data was collected for over a period of 1 year, in equal time intervals (monthly), in order to assess data consistency.

These study phases can be summarised as shown in Table 3.1.

Table 3.1: Summary of Study Design Phases

	PHASE 1 (Data Management & Use)	PHASE 2 (Data Management)	PHASE 3 (Data Management and Consistency)
District	*HMIS Officers* *Data Users*	---	*HMIS Officer* *CBMNH Coordinator* *Safe Motherhood Coordinator* *SCHI*
Facility	---	*Health Personnel (Medical Assistant, Nurses/Midwives)*	*Health Personnel (Medical Assistant, Nurses/Midwives)*
Community	---	*VHCs* *Secret Women* *HSAs*	*Chiefs* *Secret Women* *HSAs*

3.2. Study Setting

3.2.1. Maps

The study was conducted in the southern region of Malawi which comprises of thirteen districts with diverse cultures. In order to understand and acquire more detailed information in the research area, the study specifically settled for Chikwawa district in Traditional Authority Chapananga Area (Phase 2 and 3) where SCHI was carrying out interventions in maternal and neonatal health. SCHI conducted interventions in the rural remote health facilities to provide improved health care. Figure 3.1 shows a map of Chikwawa district and inset a map of southern region of Malawi (green in colour). The districts included in the study (Phase 1) were Balaka (16), Blantyre (17), Chikhwawa (18), Chiradzulu (19), Machinga (20), Mangochi (21), Mulanje (22), Mwanza (23), Neno (it was initially part of Mwanza hence not yet shown on map), Nsanje (24), Thyolo (25), Phalombe (26) and Zomba (27). The health facilities in the study are labeled in boxes. Chapananga area is purple coloured and the health facilities are Chithumba, Gaga, Chang'ambika, Kakoma, Misomali and Chapananga (first 3 facilities included in Phase 2, all in Phase 3).

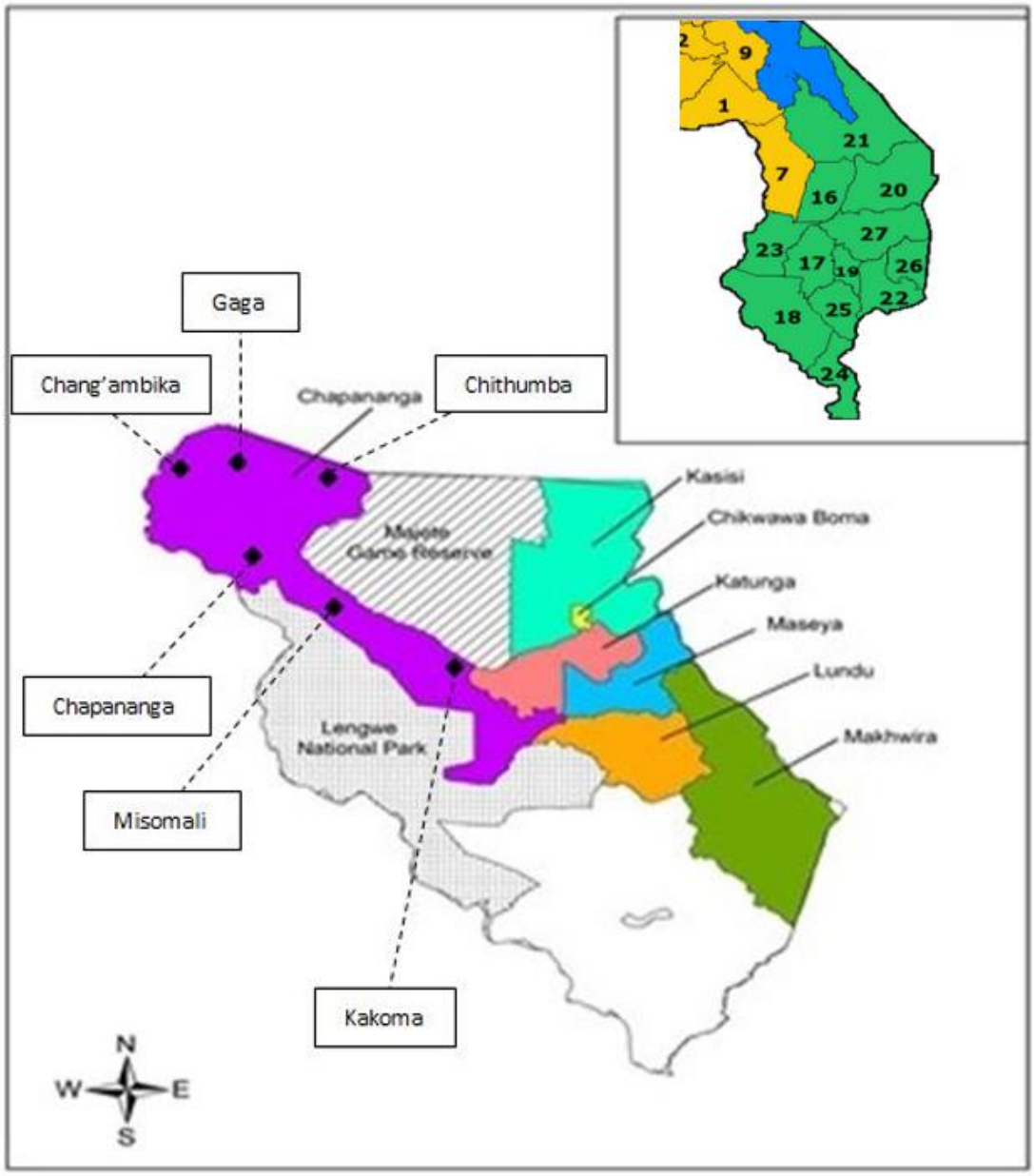


Figure 3.1: Map of Chikwawa showing health facilities labeled in boxes (Courtesy of the SCHI) and Map of Southern Region of Malawi inset (Kadale Consultants, n.d.).

3.3. Study Populations, Samples and Data Measures

Table 3.2 describes the population from which samples were obtained and the required samples for the three phases. The sampling technique for each population is discussed. The data collected from the different entities has been summarised in the data measures column and the respective data collection method.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study.

Population	**Phase**	**Samples number**	**Sample Description**	**Sampling Technique**	**Data Measures**	**Data Collection Tool**
HMIS Officers (n=13)	1, 3	n = 13, n = 1	*HMIS Officers:* based at the DHO and responsible for compiling data from different health facilities and the district hospital. They analyse the data, and then produce reports for the district.	Phase 1: All HMIS Officers in the Southern region were to be involved in the study *Convenience Sampling* - Phase 3: Only the HMIS Officer for the district under study was selected.	They provided the following information: ▪ information on their qualifications ▪ length of service ▪ a list of their data collectors ▪ perceptions on accuracy and reliability of the data, reports from the system ▪ objectives of the system ▪ give an account of the transition of information ▪ responsible personnel in the process of data movement. ▪ suggestions on how to improve the data collection process and the system ▪ problems in maternal health	*Interview* (Appendix 2) – This method was to enable probing for more information where required. *Document review* – to collect already compiled data.
Data Users	1	n = 13	*The District Environmental Health Officers (DEHO) and/or Programme Coordinators:* These personnel use the data from HMIS to make decision in terms of resource allocation and planning of interventions.	*Convenience Sampling* - One data user from each district was to be involved in the study.	They provided the following information: ▪ usability of data from HMIS ▪ adequacy of data from HMIS ▪ perception on accuracy and reliability of the data ▪ perception on reports from the system ▪ problems they faced as data users.	*Questionnaire* (Appendix 3) – This method made data collection and analysis more manageable considering the magnitude of the data.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study *continued . . .*

Safe Motherhood Coordinator	3	n = 1	*Safe Motherhood Coordinator:* responsible for maternal health programmes, coordination of maternal death audits, compiling data and producing reports for the programme.	*Purposive Sampling* – There is only one Safe Motherhood Coordinator at a district.	▪ They provided copies of the information compiled by the sampled Medical Assistants or Midwife/ Nurse and HSAs to their offices.	*Interview* (Appendix 2) – This method was to enable probing for more information where required.
CBMNH Coordinator	3	n = 1	*CBMNH Coordinator:* located at the district hospital and responsible for planning of outreach programmes to sensitise communities on health issues especially maternal and neonatal health. They also compile maternal and neonatal health data collected by HSAs, Medical Assistants and Nurses/Midwifes within the communities.	*Purposive Sampling* – There is only one CBMNH Coordinator at a district	▪ They provided copies of the information compiled by the sampled Medical Assistants or Midwife/ Nurse and HSAs to their offices.	*Interview* (Appendix 2) – This method was to enable probing for more information where required.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study *continued . . .*

Scotland Chikwawa Health Initiative (SCHI)	3	n = 1	*SCHI:* a non-governmental organisation which was operating in Chapananga area in Chikwawa (conducting an intervention project in maternal and neonatal health) in conjunction with the district health office.	*Purposive Sampling* – it was the organisation working maternal and neonatal health in the area hence the inclusion.	They provided the following information: ▪ number of pregnancies ▪ new births ▪ live births ▪ number of maternal and neonatal deaths	*Document review* – to collect already compiled data.
Health Personnel (Medical Assistants and Midwifes/ Nurses)	2, 3	n = 2, n = 6	*Health Personnel:* They are based at the health facility (miniature hospital) where community members have access to primary health care including maternal health issues.	*Convenience Sampling* – Most rural remote health facilities do not have health personnel present. As such, in both phase 2 and 3, there were a few health personnel at the facilities hence the sampling method.	They provided the following information: ▪ number of pregnancies ▪ new births ▪ live births ▪ number of maternal and neonatal deaths ▪ reasons for deaths ▪ information on data collection procedures and responsible personnel at the health facility including where data is sent. ▪ problems faced in maternal health.	*Questionnaire, Questionnaire* (Appendix 1c) – This method was appropriate due to the large quantities of data they were to provide. The questionnaire made data collection and analysis more manageable considering the magnitude of the data.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study *continued . . .*

Health Surveillance Assistants (HSAs)	2, 3	n = 16, n = 29	*HSA:* They are employed by the Ministry of Health (MoH) as a link between the community and formal health service delivery. They live in the villages among the communities. Basic tasks done by HSAs are immunization, growth monitoring, disease investigation, water and sanitation, health education/community mobilization and service delivery during child health days. Apart from these duties, they also collect data on maternal and neonatal health.	*Convenience sampling* - phase 2 included all HSAs that were available at a particular health facility. *Simple Random Sampling* – in phase 3 simple random sampling was used to select HSAs to participate in the study so that there was equal chance in the selection. A sample of 29 HSAs was calculated with a power of test of 0.90 and the significance level of 0.1 using a formula for proportions.	They provided the following information: ▪ number of pregnancies ▪ new births ▪ live births ▪ number of maternal and neonatal deaths ▪ reasons for deaths ▪ where the deaths occurred ▪ copies of the reports which they compile ▪ information on data collection procedures ▪ responsible personnel at the health facility and where data is sent. ▪ problems faced in maternal health	*Interview* – This method was to enable probing for more information where required in Phase 1. *Questionnaire* (Appendix 1a) and *document review* – This method was appropriate due to the large quantities of data they were to provide which made analysis more manageable. Then document review was used to collect already compiled data.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study *continued . . .*

Secret Women	2, 3	n = 14, n = 17 (determined after snowball sampling)	*Secret Women:* Trained under SCHI to aid in safe motherhood issues. This Secret Women concept was borrowed from other projects such as Mai Mwana and Children First. (Colbourn, et al., 2006). They conduct the following duties; ▪ identifying pregnant women ▪ encourage them to attend antenatal clinics and provide advice ▪ in constant communication with HSAs on maternal health issues	*Convenience Sampling* – Phase 2 included all Secret Women that were available at a particular health facility. *Snowball Sampling* – in Phase 3 HSAs were used as the reference point to select only those Secret Women who provide them with information.	They provided the following information: ▪ information on the number of pregnant women ▪ state of pregnancy ▪ number of women attending antenatal care ▪ number of women not attending antenatal care ▪ number of maternal and neonatal deaths ▪ reasons for the deaths ▪ type of support they offer to pregnant women ▪ information regarding data collection procedures ▪ data transition ▪ problems in maternal health	*Interview*, *Interview* (Appendix 1b) – This method was to enable probing for more information where required and because most of the Secret Women have low literacy levels.

Table 3.2: Study Populations, Samples and Data Measures for each phase of the study *continued . . .*

Village Health Committee (VHCs)	2	n = 3	*VHC*: This is usually a group of six to eight individuals who are responsible for general health, particularly hygiene of the community.	*Purposive sampling* – where only active VHCs were selected at a health facility.	They provided the following information: ▪ information on pregnant women ▪ whether women delivered at the hospital or not and reasons ▪ maternal and neonatal deaths ▪ problems in maternal health	*Focus Group Discussion* (Appendix 1d) – This method was appropriate as the VHCs operate as a group.
Chiefs	3	n =42 (determined after snowball sampling)	*Chiefs/T.A. and Village Headmen:* They head different sections at village level and oversee all aspects of village life including adherence to rules and good practices. For instance, enforcing hospital delivery for pregnant women.	*Snowball Sampling* – HSAs were used as the reference point to select only those chiefs within their catchment areas.	They provided the following information: ▪ information on pregnant women ▪ whether women delivered within the community and reasons ▪ maternal and neonatal deaths within their communities ▪ problems faced in maternal health	*Interview* (Appendix 1d) – This method was chosen because most of the Chiefs have low literacy levels.

3.4. Data Collection Tools Pretesting

The data collection tools, found in Appendix 1, 2 and 3, were checked by supervisors and pretested on the personnel (Chiefs, VHCs, Secret Women, HSAs, Medical Personnel, HMIS Officers and Data Users) to ensure that the required data was collected. Feedback on the data collection tools was primarily implemented in Phase 3 of the study.

3.5. Data Management and Analysis

3.5.1. Data Management

After the data collection process was completed, transcription was done for qualitative data. Then coding of the data was done in preparation for data entry; the data was coded using the code book shown in Appendix 1. Furthermore, another process of identifying and removing errors, as well as inconsistencies from the collected data (data cleaning) was completed; this process is essential to improve data quality before analysis (Rahm, 2000). Then data transcription was carried out by writing summaries of the focus group discussions and interviews recordings and then themes were derived and grouped from the summaries. Generation of data summaries began after the data cleaning process was finished.

3.5.2. Data Analysis

Data cleaning and initial analysis, which does not intend to answer the study questions (Ader, 2008), were carried out and data summary results can be seen in Appendix 5. The data analyses for the phases are as follows:

3.5.2.1.Phase 1, Phase 2 and Phase 3: Qualitative Data Analysis

Qualitative data had to be sorted and grouped together to draw conclusions using content and thematic analysis (Tuckett, 2005; Elo & Kyngäs, 2008). Frequency tables and bar graphs were used to present the results. Cross tabulations were also used to summarise and describe characteristics in a tabular format (Zwillinger, 2000). Transcribing of interviews and summaries of questionnaires was done whereby themes were derived from the information obtained. The analysis for the qualitative data was conducted in order to investigate the data management process and procedure.

3.5.2.2.Phase 3: Quantitative Data Analysis

3.5.2.2.1. Chi Square Test

The chi-square test for homogeneity of proportions was used to investigate whether proportions in different classifications were the same for all the populations (Devore, 2005 & 2007). This study conducted chi-square tests for proportions of data collected by the Chiefs, Secret Women, HSAs, Health Personnel, Safe Motherhood Programme, HMIS, SCHI and CBMNH, which was collected over a period of twelve months from April 2012 to March 2013.

There are two conditions which allow the use of a chi-square test. According to Devore (2005), data should be in a two-way contingency table where:

i. The population of interest (I), corresponds to different rows of a table and each population classified into some categories (J).

ii. Otherwise there could be a single population from which each individual is categorised with respect to two different factors; I categories for the first factor and J categories for the second factor.

Thus, the number of individuals belonging to both category i for factor 1 and category j for factor 2 is entered in the cell in row i and column j (i = 1,. . .,I; j = 1, . . .,J). The study data falls in a contingency table with the first condition where the population of interest corresponds to different rows (April, 2012 – March, 2013) of a table and the population classified into some categories Chiefs, Secret Women, HSAs, Health Personnel, Safe Motherhood Programme, HMIS, SCHI and CBMNH (Devore, 2005).

Pallant (2005) states chi-square, which is a non-parametric test, makes a few assumptions on data. The assumptions considered are samples must be random, observations must be independent and at least 80% of the cells must have an expected frequency of 5 or more (Pallant, 2005). The validity of these assumptions was done during analysis.

The Chi-square test for homogeneity was carried out on variables such as new pregnancy, births, and live births. The participants who provided this data for this test were HSAs, Facility Personnel, Safe Motherhood Programme, CBMNH and HMIS

since they had monthly data aggregates for their respective areas. Bar graphs were also used to visually portray whether there were differences. Similarities for maternal deaths and neonatal deaths were evaluated using bar graphs, since there were not many data points to conduct a chi-square test for homogeneity. The chi-square test for homogeneity was used to test the uniformity or consistency in the monthly data collected from the different entities.

3.5.2.2.2. Cross tabulations, Chi-Square Test and Graphs

Annual data which comprised aggregates of data from the Chiefs, Secret Women, HSAs, Facility Personnel (FP), SCHI, HMIS and CBMNH with respect to the Health Facilities was summarised using cross tabulation. Pallant (2005) stated that when a variable has more than two attributes, cross tabulations can be used to represent the data in a table for easy summarisation of results. The annual data on maternal health had two categories which were the health facility and the personnel who collected the data, hence the use of cross tabulation. This enabled comparisons of the data among the personnel by each facility. Graphs were also used to present pictorial differences in the data among the personnel. The chi-square test for homogeneity was also used to test the consistency in the annual aggregated data collected from the different entities.

The annual data aggregates were pooled according to whether or not an area participated in SCHI interventions on Maternal Health. The personnel groups were also categorised into three sections namely the Community (Chiefs, Secret Women, HSA and SCHI), Health Facility (Medical Assistants and Nurses/ Midwives) and District Health Office (DHO) (Safe Motherhood Programme, CBMNH and HMIS). These categorises were chosen depending on the location where data was obtained during this study. The mode was chosen for each category for the groups of personnel within the category so that a single figure was obtained for a category (for instance "Community"). This enabled the study to get valid results when the Chi-square test was conducted.

3.6. Ethical Consideration

The participants were asked for their consent before engaging with the research. All information on participants and the data obtained were confidentially stored. Furthermore, approval to conduct the study was obtained from the District Health Officer (DHO), as well as the chiefs in Chapananga area.

3.7. Limitations

The samples of Secret Women were only obtained in three facilities (Chithumba, Gaga and Chang'ambika) because the other facilities did not have SCHI interventions; hence there were no Secret Women.

Chapter Four: Maternal Health Data Handling, Transition and Use

This chapter of the study presents the results obtained and a discussion on the reported results in Phase 1 and Phase 2.

4.1. Phase 1: HMIS Officers Data Management and Data Users Perspective

This section discusses results on the assessment of the health management information system at district level in the Southern Region of Malawi in terms of data management, human capacity within HMIS and data users' perspectives on decision making using data from the system.

4.1.1. Demographics

The first phase of the study was carried out from March to April 2012, with data collected from ten HMIS Officers and ten data users (7 District Environmental Health Officers (DEHO) plus 3 Programme Coordinators (2 Safe Motherhood Coordinators and 1 CBMNH Coordinator)). Three of the thirteen districts (Mangochi, Neno and Nsanje) were excluded from the study due to logistical challenges, hence 10 HMIS Officers and 10 data users. The interview sessions with HMIS Officers and the completion of questionnaires by the data users, took place in their respective district health offices. The data collection tools are in Appedix 2 and 3 respectively.

The qualifications for the HMIS Officers were Malawi School Certificate of Education (n=2), Diploma in Management Information Systems (n=1), Certificate in Statistics (n=2), Advanced Certificate in Statistics (n=1), Diploma in Statistics (n=1), Advanced Certificate in District Health Information System (n=1), Ordinary Level Statistics (n=1) and Master of Science in Biostatistics (n=1), while the data users had a minimum of a Bachelors' degree.

4.1.2. Data management

4.1.2.1. Sources of data for HMIS Officers

The HMIS Officers indicated that data for the system was generated by a number of data collectors as presented in Figure 4.1 and Table 4.1.

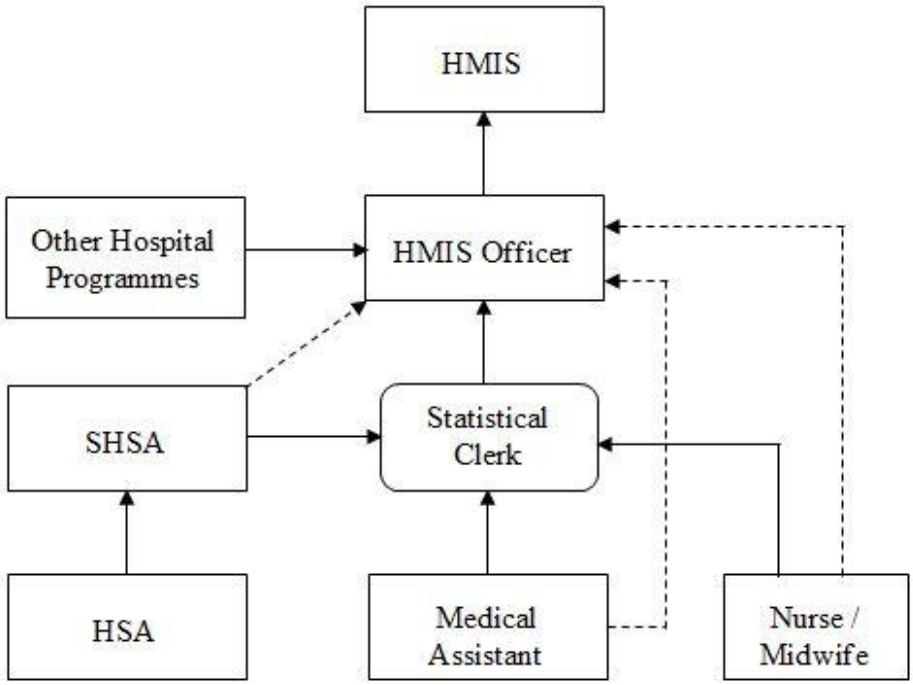


Figure 4.1: Data flow process as described by HMIS Officers.

Key: ⟶ *= Theoretical data flow;* ⇢ *= Actual data flow; HSA = Health Surveillance Assistant; SHSA = Senior Health Surveillance Assistant; HMIS = Health Management Information System*

HMIS Officers indicated that the primary data collectors were HSAs, Midwives/Nurses and Medical Assistants. They also indicated that these data collectors were getting information from different sources. For example, HSAs provide data from the communities, whereas the Midwives/Nurses and Medical Assistant provide data at the health facility level.

HMIS Officers were asked to give their interpretation of data collectors' reliability in providing data for HMIS. Reliability was measured on a scale of 1 to 5 (1= very reliable, 2= reliable, 3= neutral, 4= slightly reliable, 5= not reliable) and an average reliability was calculated for every cadre of data collector. Table 4.1 shows the data collectors mentioned by the HMIS Officers and their respective reliability. The HMIS Officers also gave time intervals in which the data collectors had to submit data which they collect. Data collectors submit their data monthly, and the data was compiled and forwarded to the HMIS office quarterly by statistical clerks for health personnel, and the CBMNH Coordinator for HSAs. The HMIS Officers further stated challenges

which they thought entities who collect data, which feeds to the HMIS, faced (Table 4.1). The main challenges were related to human capacity within the system which included:

- Lack of training, refreshers and review meetings, which were mentioned by different HMIS Officers for the different data collectors. The need for refresher courses was due to differences in understanding of indicators. This deficiency leads to other challenges such as inconsistent data and data gaps, which were a result of knowledge gaps among the data collectors.
- For HSAs and Statistical Clerks, the HMIS Officers stated that lack of training was a problem as these workers found difficulties in using the data collection tools. HMIS Officers suggested that this could be due to their level of education, hence the need for training, supplemented by constant supervision to develop competency. The HMIS Officers further explained that although supervision was important, it hardly took place due to lack of resources, hence personnel work with no or minimum supervision.

The HMIS Officers said these were the probable reasons why the data collectors did not provide quality data.

Table 4.1: Data Sources to the HMIS, their reliability and the challenges they faced, as mentioned by the HMIS Officers (n=10).

Source	Number of HMIS Officers who mentioned source (n=10)	Reliability of Personnel	Submission Interval	Challenges as reported by HMIS Officers
HSAs	10	Avg = 2 (range=1 - 2)	Monthly	▪ Delays - lack of transportation ▪ Lack of forms i.e. stationary ▪ Lack of review meetings ▪ Lack of training and refresher courses (Knowledge gaps) ▪ Data gaps/missing data ▪ Not enough resources ▪ Inconsistent data ▪ Form are forgotten to be sent ▪ Pressure of work ▪ Inadequacy of statistical clerks ▪ Committed on other duties ▪ HSA's do not have challenges, they just relax a lot
Statistical Clerks	10	Avg = 1 (range=0)	Monthly / As required	▪ Training for more knowledge i.e. Data gaps in statistical work ▪ Delays in getting data ▪ Not enough resources (fuel, stationary, health passports and STI registers) ▪ Overwhelmed by work ▪ Lack of statistical clerks
Nurses/ Midwives	4	Avg = 1 (range=0)	Monthly	▪ Pressure of Work - inadequate number of nurses ▪ Knowledge gap - Lack of training
Medical Assistants or Clinical Officers	6	Avg = 2 (range=1 - 2)	Monthly	▪ Pressure of Work - Shortage of clinicians which creates work overload ▪ Knowledge gap
Ward Clerks	10	Avg = 2 (range=0)	Monthly	▪ Lack of training and refresher courses ▪ Inadequate resources
Safe Motherhood Coordinator	2	Avg = 2 (range=0)	Monthly	▪ Delays in sending data ▪ Biasness in the data as the coordinator may change the data to suit requirements in their department

* Reliability was measured on a scale of 1 to 5 (1= very reliable, 2=reliable, 3=neutral, 4= slightly reliable, 5= not reliable)

The responses given by the HMIS Officers indicate that the data collectors were considered as reliable. However, the Officers had greater faith in the Nurses/Midwifes and Statistical clerks, despite the lack of these personnel at health facilities. It was also noted that there seemed to be a contradiction between the reliability of the personnel

which was reported by the HMIS Officers given the challenges mentioned. One would imagine these personnel would have a lower rank for reliability given the challenges which they face. Thus despite rankings of the data collectors' reliability being high, HMIS Officers still questioned the data due to these challenges.

4.1.2.2. Accuracy of Data from Sources

The HMIS Officers were asked whether data from their sources was accurate or not. They were also asked to rate the accuracy out of a hundred. Six HMIS Officers stated that the data was accurate and it was at an average of 85 out of 100. Those HMIS Officers who stated that the data was not accurate gave reasons for the lack of accuracy as follows:

(1) Incompleteness of data as values were missing from registers;
(2) Lack of training of data collectors. One HMIS Officer indicated that, "*Lack of comprehension of some terms by the statistical clerks or HSA who is compiling the data*" was another factor that leads to inaccurate data: and
(3) Private clinics do not submit data to the HMIS office leaving a gap in data from health services provided. This meant that there were shortfalls in data collection procedures, as well as adherence to proper channels of data collection. If HMIS Officers doubted the accuracy of the data, they are supposed to go and verify that the data was correct if resources were available.

Table 4.2 summarises the reasons for lack of accuracy. The HMIS Officers also responded that there are measures put in place to ensure that accurate and reliable data is collected (Table 4.2).

Table 4.2: Accuracy of data from sources with reasons for inadequacies and measures to improve accuracy.

Variable	Result
Is the data provided by the sources accurate (given out of 100)	▪ Yes (n=6; Average = 85 of 100) ▪ No (n=4)
Reasons for inaccurate data	▪ Missing values from registers ▪ Comprehension of some terms ▪ Lack of training ▪ Some private clinics do not submit data (private health facilities do not comply) ▪ Lack of review meetings
Measures to ensure accurate data is collected	Measures available include: ▪ Supervision – but does happen due to inadequate resources ▪ Monthly and quarterly forms have to tally ▪ Follow up are done by HMIS Office to verify data provided by data collectors ▪ Programme coordinators verify the data ▪ Quarterly reports checked by 3 people (Statistical Clerk, Medical Assistant and Programme Coordinator) ▪ Check the tools against reports sent

Most of the measures (data verification, follow-ups and checking reports) to ensure that the data was accurate were not carried out even though the HMIS Officers mentioned them, mainly due factors like transportation and work overload which the officers themselves had stated.

4.1.2.3.Data Entry into HMIS

Data entry into the HMIS was done by the HMIS Officer or a senior statistical clerk or a statistical clerk. The qualifications of these HMIS officers ranged from Malawi School Certificate of Education (MSCE) to a Master of Science in Statistics, whereas the qualifications of the statistical clerks given by HMIS Officer in a follow-up question, ranged from MSCE to certificate in Statistics.

The majority of HMIS Officers (80%) interviewed were qualified statisticians with a minimum of a certificate in statistics, which is an encouraging fact, while the remaining 20% (two officers) had a Malawi School Certificate of Education. These

two need to undergo training in statistics, as for someone to be able to manipulate data and conduct analyses, they must have at least a certificate in statistics. Despite the lack of proper qualifications, the HMIS Officer had an average experience of 7 years with on the job training hence being able to carry out their tasks. Overall 90% of the HMIS Officers did not meet the MoH minimum requirement of having a Bachelor's degree (in Information Technology (IT), Information Systems (IS) or Computer Science (CS).). Unfortunately, those with the required qualifications tend to go for better paying jobs in the private sector. This requirement restriction by MoH hinders those who have Bachelors' degrees in Statistics and alike, who are also capable of doing the same jobs. The lack of qualified personnel may affect the quality of information these officers produce.

Years of work experience as a HMIS Officer ranged from one to ten years. Six HMIS Officers had previous work experience, but only two officers had experience that was related to their current job. Thus the other HMIS officers required on-the-job training in order to conduct their daily duties. Even though most of these officers do not meet the minimum qualification, they were trained on how to use the system. The experience and on the job training obtained, enables them to do their job.

The HMIS Officers stated that it was easy to use the system to input data, suggesting the HMIS was user friendly. Since it was easy to input data, some HMIS officers had trained a Statistical clerk based at the District Hospital to help with the data entry process.

The HMIS Officers also gave challenges that they encountered in data management. The challenges were outlined as follows under three themes;

1. Forms/Capture Tools Challenges
    - The registers used to collect data by health workers (HSAs) have more indicators than those contained in the standard HMIS form (Form 15 - summary of hospital/health facility data) used by Statistical Clerks. As such, the data transferred for submission to the HMIS Office is less than the data being captured by the system at community level, which means large amounts of valuable data was lost.
    - Different data collectors generated data using different data collection tools. This was verified by examining and comparing the data collection tools for

HSAs, Health Facility Personnel and Programme Coordinators which were found to also define indicators differently. Some looked at number of new pregnancies recorded, whereas others specify the number of recorded new pregnancies in first trimester. This led to differences in interpretation of the indicators by the different personnel causing data discrepancies.

- Inadequate personnel at health facilities led to a number of pressures on a few people, including the collection of accurate HMIS data. Due to a lack of statistical clerks at health facilities, the responsibility for data collection often lies with health personnel such as nurses and medical assistants. As they were already overburdened with the number of patients they must attend to, HMIS work was seen as secondary to their curative duties.

2. Logistics Challenges
    - Untimely submission of reports, inconsistency of data and misplaced or fabricated data, were discrepancies which were commonly encountered when compiling monthly reports into quarterly reports. This untimely submission can be attributed to various factors. For example, health facilities in remote rural areas found it difficult for data collectors such as HSAs to send their data to SHSAs to compile and subsequently send their data to the HMIS office in a timely manner due to logistical constraints. Inadequate resources, in terms of transportation of collected data- from the field to the health facility, and eventually to the District Health Office, also contribute to the delays in compiling of the data in the system.
    - There were usually delays in data from the different vertical programmes (such as Safe Motherhood Programme), which provided a challenge in production of reports. In terms of safe motherhood, HMIS officers also indicated a concern that figures may be inflated for purposes of receiving more medication to a facility, thereby affecting the planning system and resource management.

3. Facilities/Equipment Challenges
    - Inability of the system to consolidate data from the different data collectors to eliminate duplication, reduce data loss and handle referrals. This was reported as a common problem, for example records of the same patient submitted by an HSA and Health Facility Personnel may be duplicated in the HMIS as two

different patients which leads to higher statistics than required thereby affecting resources.

- Power failure and faulty computers at District level which take a long time to be repaired by the Ministry of Health, were also cited by 70% of respondents as reasons for untimely submission of reports.
- Currently districts adapt databases to collect data according to their needs, as such they are not harmonized and this can lead to discrepancies. One HMIS Officer stated *"databases are different between the districts and they need to be harmonized".*

According to these challenges discussed, there was no relationship between the challenges and lack of qualification of these HMIS as none of the challenges were linked with knowledge of the HMIS Officers.

4.1.2.4.HMIS Objectives

The HMIS Officers were asked if they know and understand the HMIS objectives. The response by all officers indicated they understood the objectives of the HMIS, as summarised in Table 4.3. According to one HMIS officer, the objective of HMIS was "*analysis of data to check health indicators*", while another HMIS officer said, "*ensure completeness, consistency and timely reporting*". The HMIS Officers knew and understood the objectives of the system, as they were able to explain them in their own words.

Table 4.3: HMIS Officers knowledge and understanding of HMIS objectives.

Objectives of HMIS	▪ Collection, compilation, processing, analysis and dissemination of health data for planning purposes (n=1) ▪ Ensure completeness, consistency and timely reporting (n=3) ▪ Analysis of data to check health indicators (n=4) ▪ Provide information to help decision makers to plan accordingly – monitoring and evaluation (n=2)

All HMIS Officers, in their opinion rated out of 100, stated that the HMIS objective achievement ranged between 75 and 95, and was on average achieving 88 out of 100

of its objectives. The reasons they gave for the HMIS not achieving a 100 were delays in receiving data, corrupted files and software, lack of HMIS training, lack equipment and lack of interaction between departments. For example, an HMIS Officer indicated poor data sharing between their office and other health programmes. Two HMIS Officers stated that programme planning and decisions were made without reference to HMIS data, as health programmes such as the Safe Motherhood Programme collected their own statistics, and data collected by the different health programmes and HMIS were inconsistent.

The challenges mentioned by the HMIS Officers by far outweigh the objectives of the system. Thus the HMIS Officers seem to have a skewed perception regarding the objectives achieved by the HMIS.

4.1.2.5.Accuracy of Reports and Use of Reports from the HMIS

HMIS Officers were asked to give their interpretation of accuracy and reliability of information from HMIS. Accuracy and reliability was measured on a scale of 1 to 5 (1= positive extreme, 5= negative extreme). Table 4.4 shows the results of accuracy and reliability as well as a summary of use of information from HMIS.

Table 4.4: HMIS Officers' Perspective on Accuracy and Reliability, and Data Use (n=10).

Variable	Results
Accuracy and reliability of information on reports from the system produced by HMIS Office	▪ Yes; reports are accurate and reliable o All HMIS Officers rated accuracy and reliability at 2.
Use of data from HMIS and HMIS reports	▪ Producing reports in form of graphs (n=8) ▪ Provide information for situation analysis and to help decision makers to plan accordingly (n=10) ▪ Provides attendance of patients which enables to check overloads (n=2) ▪ To check health indicators: indicators are supposed to have a minimum of 80% by the world health standard (n=1) ▪ To Prepare District Implementation Plan (DIP) in terms of budgeting and work plan (n=10) ▪ Dissemination of information to zone office and head quarters (n=2) ▪ Data used for studies by different colleges (n=2) ▪ Policy formulation for different organisations (n=1)

The accuracy and reliability of reports produced by HMIS Officers did not agree with results in Table 4.2 and challenges encountered in data management. Since there were challenges that affected the data collection process, logistics and facilities/equipment, then data quality was not achieved. As such, the data sent to HMIS was not accurate and reliable hence the reports that were produced from the HMIS lacked data quality.

All HMIS Officers indicated that data should be used for a number of purposes, for instance data on registration of patients enables data users to determine the use and potential overloads at different health facilities. All HMIS Officers stated that data provides information which should help decision makers plan different activities. Furthermore, the information helps to check indicators by production of reports in the form of graphs for different programme coordinators, for instance the Community-Based Maternal and Neonatal Health Coordinator and Safe Motherhood Coordinator. However, it was mentioned that data from the system was not fully utilised; therefore, the HMIS was not used to its full potential. As such, programme planning and human resource / drug distribution did not fully utilize HMIS data in decision making. "*As a result, some departments' overestimate figures for drugs required based on their own estimates*", stated an HMIS Officer. This also points out the issue of data accuracy and reliability where biased figures sent to the HMIS Office by different departments but then the HMIS reports were considered accurate and reliable. Furthermore, the HMIS was rated highly in achieving its objectives; however, the same HMIS Officers stated that data users do not fully use the data from the HMIS to make decisions.

4.1.3. Perception of HMIS data from data users

Responses were recorded from 10 data users (3 programme coordinators and 7 DEHOs) about their perceptions on data quality and data use, using the questionnaire in Appendix 3.

The data users discussed HMIS data in terms of adequacy of data for making plans and decisions as users, adequacy of indicators in HMIS and problems faced by data users.

4.1.3.1. Adequacy of HMIS Data for Making Plans and Decisions as Users

The data users had different opinions on the adequacy of data from the HMIS. Three users (3 programme coordinators) said the data was not comprehensive or adequate

for effective planning and decision making due to the limited number of indicators for their specific programmes. The remaining 7 respondents felt the system was adequate: one suggested the data was very useful for general monitoring of service delivery, policy development and high level planning; four users stated the information was adequate for their specific programmes because it allows them to monitor trends on health service delivery and disease prevalence; and the final two claimed that various plans and decisions were being made depending on HMIS data reports which were circulated quarterly, these include creation of district health strategic plans, district annual implementation plans, disease outbreak response etc.

This result, where the majority of users (7 of 10) indicated that the data was used for various purposes, contradicts comment by the HMIS Officers that data from the HMIS was not used to make decisions. One concern here is that the data users may have given responses to indicate that they doing their job, merely to impress the researcher.

4.1.3.2. Adequacy of Indicators in HMIS

As mentioned above, three data users stated that the indicators in the HMIS were not enough for planning and decision making of their activities. Each health program requires a certain number of indicators for monitoring and evaluation, hence the need for specific program data collection. For example, in Water, Sanitation and Hygiene (WASH), HMIS only captures households with an improved sanitary facility. This one indicator cannot be used to fully monitor a WASH program. The three data users (all programme coordinators) indicated there was need to revise the HMIS indicators to include some essential elements which are currently missing i.e. HIV and AIDS indicators. The other seven data users stated that the indicators in HMIS were adequate because they would use the data for decision making.

It was noted by the study that the HMIS was intended to provide general integrated health data covering a wide range of health problems/conditions and health services, therefore some important indicators need to be considered for inclusion, for example, HIV and AIDS indicators as stated by some of the data users.

4.1.3.3. Problems Faced by Data Users

The ten data users defined the objectives of HMIS as similar to those indicated by the HMIS Officers in Table 4.3, and stated that these objectives of HMIS are met, although data quality was questionable. All data users expressed dissatisfaction on how HMIS

Officers ensure data quality and how reviews on different indicators were conducted both at the health facility level and the DHO. One user said *"though the system is not 100% accurate, it is able to provide evidence for decision making and helps during evaluation of programs"* which was contrary HMIS Officers opinion on data usage. On data accuracy, 40% of the data users indicated it is accurate because the HMIS data was collected at the point of service delivery and there was a system in place where health facility management teams collect data directly from the registers and compile the data in prepared HMIS collection forms. Another 40% said it is not accurate because of differences with the data collected through other parallel systems from the same source which causes data duplications e.g. disease surveillance data and routine immunization data. The other 20% of respondents were neutral.

Other reasons for data differences cited were as follows:

- The data from the different data collectors in Table 4.1 was collected on a monthly basis and compiled on quarterly basis thereby not being available for decisions when required quickly.
- HMIS data and information were compared with data compiled by other sources, which usually ended in inconclusive results since the information was usually different. In agreement with data users, HMIS Officers stated that in a comparison of data from HMIS and Safe Motherhood programme, there were differences where the Safe Motherhood programme used a parallel system which had more indicators and inflated figures when compared to the data in HMIS.

4.1.4. Discussion

4.1.4.1. Qualification

Most HMIS officers did not have the minimum MoH qualification but the on the job training, enabled them to do their job. However, the lack of a minimum qualification could have affected data quality (accuracy, reliability, consistency, completeness and timeliness) within HMIS because the Officers do not have enough knowledge to adequately fulfil their roles. This may help to explain the scepticism in the HMIS outputs expressed by some of the data users. With respect to qualifications, the HMIS Officers also noted that most of the statistical clerks did not have an educational

certificate in statistics, a minimum required by the MoH; the lack of statistical clerk training on how to conduct their duties may also be compounding the issue of data quality.

4.1.4.2.Data Collection

The HMIS Officers indicated that data was sourced from a number of different entities and recorded into registers at the Health Facilities and the District Hospitals by the statistical clerks, nurses and medical assistant, when present at these facilities. More information was obtained from the HSAs who collect their data from the community. The data provided by these data collectors, in the HMIS Officers opinion, was sometimes not credible as the HSAs may manufacture the data instead of going to the field to obtain the data. The HMIS Officers contradicted themselves by ranking these personnel as reliable which to an extent hinges on the qualification of the HMIS Officers. This was further evidenced by the alleged verification processes completed during follow ups by the HMIS Officer when they doubted the data provided by a particular HSA. There was no mention of any repercussions that were taken on HSAs who create information. The challenges met by the data collectors such as work overload, may lead to data that lacks quality. When the data was collected by the HSAs and health personnel, statistical clerks then compiled the data to monthly or quarterly report forms which were sent to the HMIS office for entry. The process of compiling the data can lead to errors such as missing data, data gaps and improperly recorded information which affect data quality (Douglas, et al., 2005).

4.1.4.3.Reliability and Accuracy

HMIS officers preferred data that was compiled by the statistical clerks despite not having a statistical qualification and no on the job training. This was probably because the HMIS Officers worked closely with the statistical clerks and supervised them. Even though HMIS Officers preferred data from statistical clerks, this data was obtained from HSAs whom the HMIS Officers did not regard highly, hence data from statistical clerks should also be questionable. Data provided by HSAs was queried in most cases and follow ups were needed where HMIS Officers visited the HSAs to verify authenticity of the data. As already stated, most of those handling HMIS data (HSAs and Statistical clerks), according to the HMIS Officers, had not been trained, which would result in knowledge gaps. Since the study did not assess competence, it can only be implied that comprehension of different terminologies and complicated

rare cases were difficult for these individuals to report accurately, hence data quality being compromised. Furthermore, HMIS Officers mentioned that the data collectors usually have inadequate resources to collect data which also affected the data quality.

4.1.4.4.System

The HMIS in every district comprised of two parts, the database in Microsoft Access which is linked to the second part Microsoft Excel for production of pivotal tables. The two parts of HMIS were usually adapted by the different districts to cater for their needs, which potentially lead to differences among districts. However, the system can be summarised in three key points as follows:

i. System Hardware and Software - The system was user friendly such that if an individual was given an orientation on data entry, they would be able to input data without a problem. As such, some HMIS officers had trained a Statistical clerk based at the District Hospital to help with the data entry process.

   Despite the system being user friendly, there was a drawback in the time taken to repair or replace broken computers which translated to a delay in production of reports, subsequently leading to incomplete reports.

ii. Indicators - The major drawback of the system was that it only allowed entry for a few indicators, hence the outputs (reports) also only had a few, and lacked other important indicators. The indicators from the system were for decision making processes, policy formulation by different quarters, and District Implementation Plans (DIPs), hence decisions were made on the basis of deficient information due to the limited number indicators within the system. In addition, data collected at community level had more indicators but due to limitations in the reporting form, this data was not transferred into the HMIS.

iii. Fit for Purpose - The HMIS Officers stated that the system did not quite fulfill its objectives because of the drawbacks mentioned above, but it was able to collect, compile, analyse and disseminate information. The data users had similar views, since the system did not have all the required information for decision making processes due to lack of adequate indicators. In addition, the data users were also skeptical about the data quality in HMIS.

Summary of Results and Discussion for Southern Region.

Results and Discussion for the Southern Region were summarised in Figure 4.2. Attributes of the entities at different levels are shown, to give information regarding that entity.

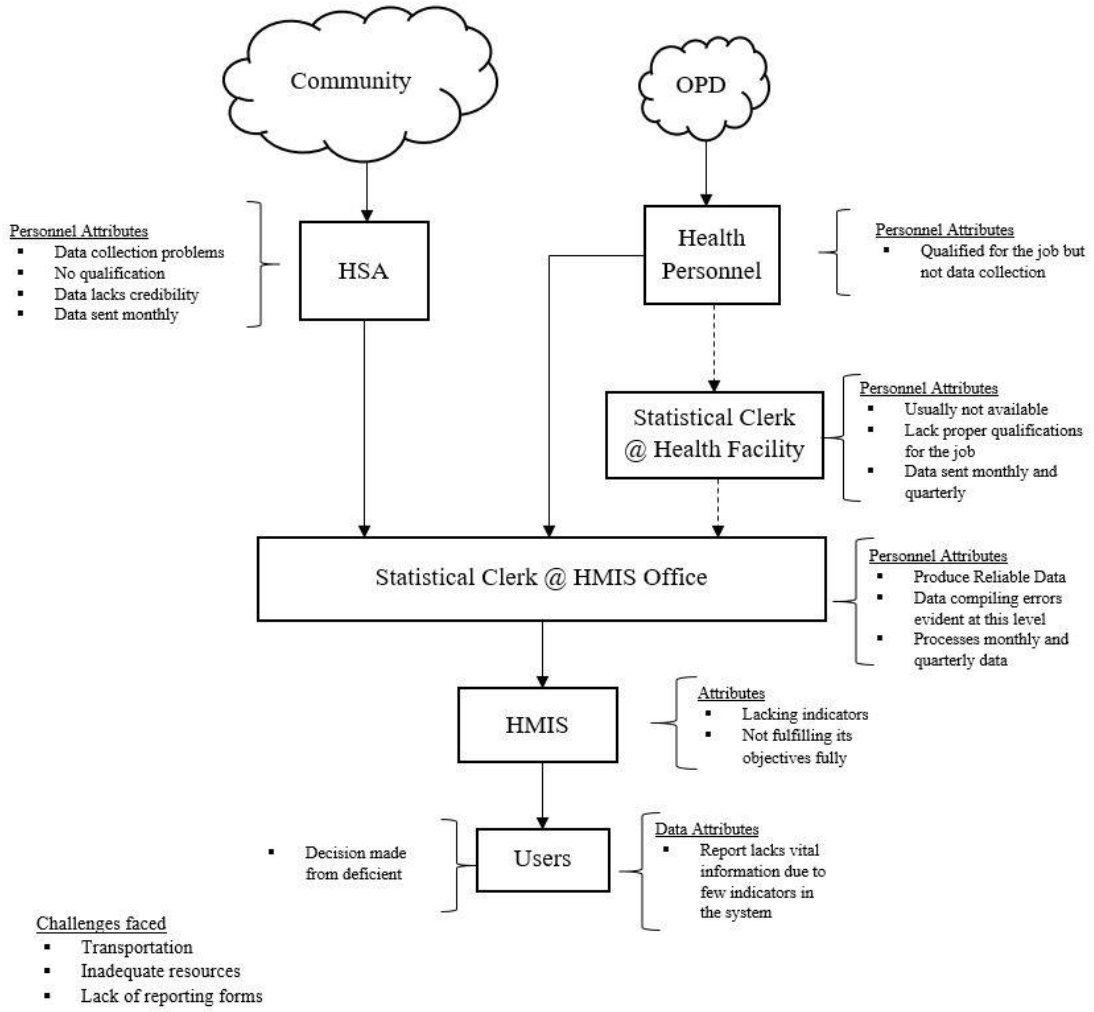


Figure 4.2: Summary of Results and Discussion for Southern Region.

Key: ⟶ = Actual data flow; ---► = Theoretical data flow; OPD = Out-Patient Department; HSA = Health Surveillance Assistant; Health Personnel = Medical Assistant and Nurse/Midwife; HMIS = Health Management Information System

Conclusions

- The HMIS Officers were not qualified for the job they were carrying out, but most of them had on the job training which enabled them to achieve their tasks.
- Lack of training for most of the data collectors and work overload challenge lead to data of poor quality. In the process of handling and transitions of data among different entities, data had to be compiled which lead to problems of data gaps and

missing data. Data accuracy and reliability was questioned because of such problems.

- In further complication, there were broken down system hardware which were barely repaired. There were also limited indicators in the system which did not provide data users with adequate information, but still strived to make decisions with the deficient data.

4.2. Phase 2: Maternal Health Data Management in Chapananga Area

While Phase 1 assessed data management procedures and drawbacks, Phase 2 could be considered a pilot study for the final phase, Phase 3, enabling the feasibility of the study to be checked and to make improvements on study design if necessary.

Since Phase 1 considered views and perception of HMIS Officers and data users, Phase 2 was conceived to actually deduce data handling and transition first hand from the catchment areas of three health facilities in Chapananga area.

4.2.1. Demographics

The data collection for Phase 2 ran from 29th June, 2012 to 3rd July, 2012 in the three health facilities, namely Chithumba, Gaga and Chang'ambika. These were part of the catchment area of the SCHI intervention project in MNH. Sixteen HSAs, two health personnel, fourteen Secret Women and three VHCs participated in Phase 2 of the study.

4.2.2. HSA Results

4.2.2.1. Qualification, Experience and Training

As can be seen in Figure 4.3, all HSAs had attended secondary school education, with the majority gaining the highest qualifications at this level, the Malawi School Certificate of Education (MSCE). The majority of the HSAs interviewed were male (n=14), with only 2 females interviewed.

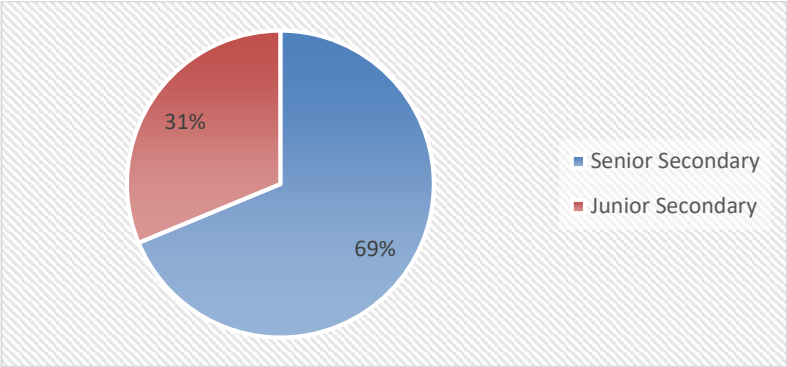


Figure 4.3: The levels of qualification of Health Surveillance Assistants (HSA) *(n=16).*

Eighty-one percent of the HSAs had worked for more than 4 years, there by implying that most were experienced in doing their job. Two HSAs indicated that they had been in the post less than a year, with the remaining HSAs having worked for between 2-4 years. Despite the time in-post, all HSAs had been trained in carrying out their tasks as an HSA. The HSAs had also received training in maternal and neonatal health (MNH), offered as part of the SCHI programme of interventions, and only one stated that he had not received all training requirements in this field.

The HSAs undertook training on a number of areas in MNH with the SCHI, as listed in Table 4.5. All HSAs mentioned that they were trained in antenatal care and 75% were trained in community mobilisation. The SCHI training was given to all HSAs, and although most of them could recall the topics of their training, they lacked application of the knowledge acquired, which would affect how they carry out their tasks (data collection inclusive).

Table 4.5: Areas in which HSAs are trained in maternal health *(n=16).*

Areas Trained in Maternal and Neonatal Health (MNH)		
	Number Trained	*Relative value (%)*
Antenatal	16	100
Postnatal	14	88
Complications	14	88
Family Planning	12	75
Community Mobilisation	12	75
Counselling	11	69
Integrated MNH	7	44
Prevention of Mother to Child Transmission (PMTCT)	7	44

4.2.2.2.Data Collection

- *Information Recorded by HSAs in MNH*

Table 4.6 shows the information which HSAs documented. All HSAs said that they recorded the number of pregnant women. However, none of them mentioned that they kept records of neonatal deaths.

Table 4.6: Information HSAs record on Maternal and Neonatal Health *(n=16).*

Information Recorded		
	Number	*Relative value (%)*
Number of Pregnant Women	16	100
Live Births	15	94
Antenatal Attendance	13	81
Maternal Deaths	13	81
Post-natal Data	11	69
Complicated Pregnancies	8	50
HTC / PMTCT	7	44
Family Planning	7	44
Tetanus	5	31

- *Additional Information Recorded by HSAs*

As can be seen from Figure 4.4, the majority of HSAs (62%) responded that HIV/AIDS voluntary counselling and testing was provided to pregnant women by the HSAs. The records of voluntary counselling and testing were kept by the midwife, explained the HSAs in a follow-up question which was confirmed by the health personnel, hence the records were not the responsibility of the HSA. However, 13 (81%) HSAs stated that they kept records on voluntary counselling and testing, which was more than the number of HSAs who stated that they conduct HIV/AIDS voluntary counselling and testing (n=10). It is possible that as the study was about data management, these HSAs wanted to seem as though they kept records, hence many (n=13) stated that they kept records on voluntary counselling and testing.

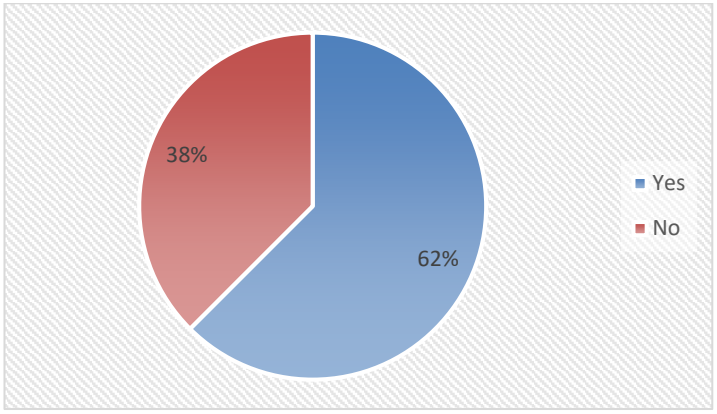


Figure 4.4: Provision of voluntary counselling and testing for pregnant women by HSAs *(n=16).*

Screening pregnant women for syphilis was not undertaken as stated by the majority of the HSAs (75%). The 25% of the HSAs who indicated that screening for syphilis was done, came from the health facility which had a midwife, as such the other health facilities did not have this service. The HSAs further explained that the records for syphilis screening were supposed to be kept by the midwife.

Twelve HSAs (75%) responded that some form of anti-retroviral drug was given to HIV positive pregnant women in order to prevent mother to child transmission of HIV. A detailed summary is given in Table 4.7 below. Records for Prevention of Mother to Child Transmission (PMTCT) were also kept by the midwife / nurse, hence there was no need for the HSA to keep the records.

Table 4.7: Medication for Prevention of Mother to Child Transmission (PMTCT) *(n=10).*

Medication		
Type	*Number*	*Relative value (%)*
Nevirapine (NVP)	9	56
5A - Antiretroviral Regimens	2	13
Antiretroviral (ARV)	1	6
Don't know	4	25

According to half of the HSAs, maternal death and neonatal death reviews were conducted. The personnel responsible for conducting these reviews were the nurse, medical assistant, SHSA and the HSA in attendance. However, two HSAs stated that a team from the district hospital does the review. After the review was done, a report

was compiled and kept by the nurse/midwife, then sent to the Safe motherhood coordinator.

Two HSAs stated that there had been maternal deaths in their areas and one of them said he did not know whether a review was done, but the other said it was conducted. The drawback was that there was no evidence to verify this information.

Twelve HSAs (75%) stated that they kept records on delivery places. They further stated that the individual responsible for such kind of data was the SHSA, as agreed to by 44% of HSAs (Figure 4.5). The confusion and lack of knowledge on who was supposed to keep records affected how data was managed thereby having consequences on data quality.

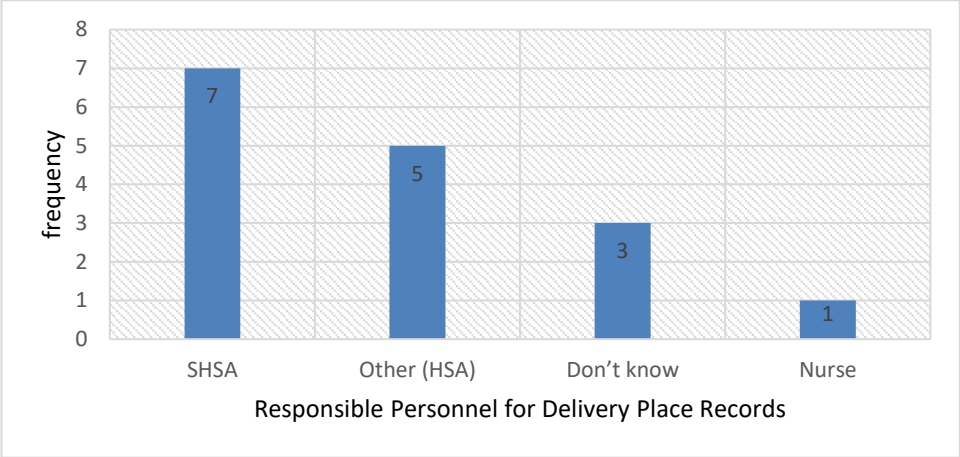


Figure 4.5: Personnel responsible for the delivery place records *(n=16).*

Sixty-three percent of the HSAs responded that they do not keep records on delivery methods (e.g. natural, caesarean, breech and vacuum extraction), however those who said they do keep the records, further responded that the individual responsible for such records is the SHSA, as mentioned by 40% of HSAs. Other individuals responsible included midwifes and HSAs (Figure 4.6). This proved that there was lack of consistency in the data management process.

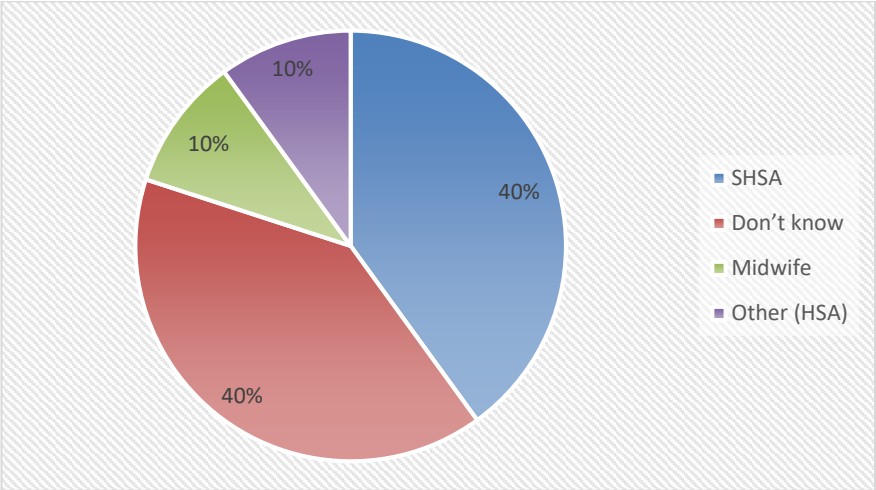


Figure 4.6: Personnel Responsible for Delivery Records *(n=16).*

The lack of medical personnel at two health facilities affected HSAs' data completeness. Data files provided by HSAs in the two health facilities had data gaps/missing data because their areas did not have at least one medical personnel. This was due to fact that some of the data HSAs collected was complete when concatenated with some data from the medical personnel.

- *Sources of Data for HSAs*

HSAs are the link between the community and the health sector. They deal with the community and bring information to the health facility. Therefore, their sources of data were in the community, with Secret Women (when available) as their aid in maternal and neonatal health. Figure 4.7 shows the different sources that HSAs stated they got their data from. Eighty-one percent of HSAs said they collected their data first hand from the community. The remaining HSAs gave other options as shown in Figure 4.7. It should however be noted that those collecting data from Secret Women, pregnant women, VHCs and chiefs were essentially collecting data from the community, since all resided within the communities.

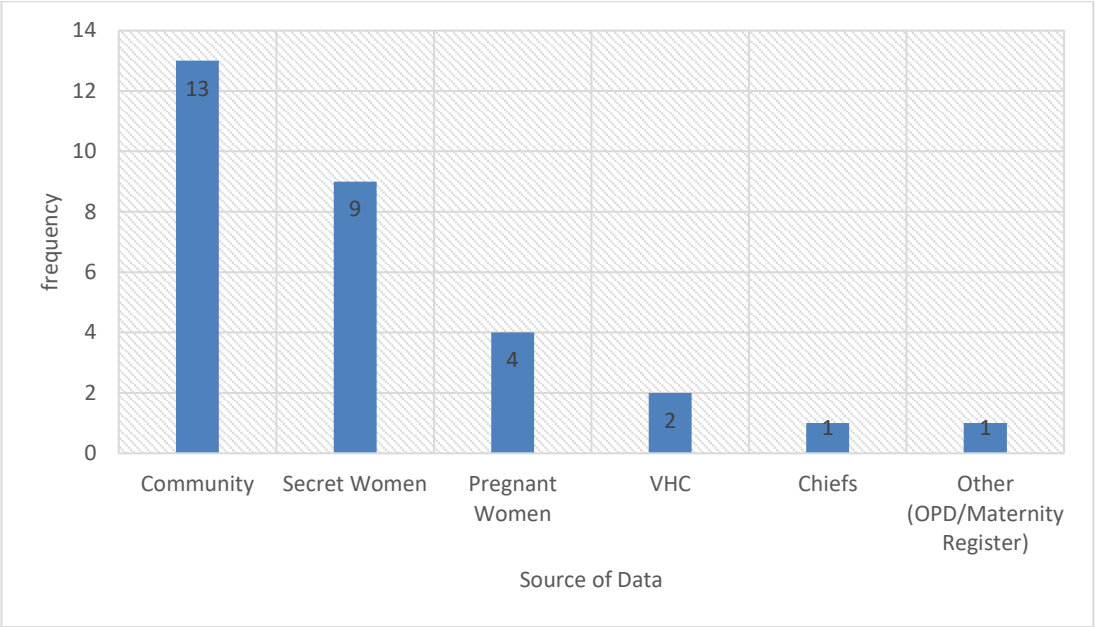


Figure 4.7: Sources of Data for HSAs *(n=16).*

4.2.2.3.Medium for Keeping Records

The HSAs were also asked how data was recorded and stored. Fifteen out of the 16 HSAs recorded and stored MNH data in forms which they got from the SCHI through the DHO. The forms ensured proper data inputting and an easy way to store the data. Contrary to the norm, 1 HSA indicated that they used a notebook to record data, arguing that they used them when they did not have forms (forms were out of stock). Before the SCHI intervention, the HSAs did not have proper records that were uniform among all HSAs. It is important to note that these forms provided by SCHI were MoH approved.

4.2.2.4.Data Compilation and Transition

All HSAs agreed that they sent the data they have collected to their supervisors (SHSA) monthly, who then compile data from all HSAs to a single report which was sent to the District Health Office.

The majority of HSAs (94%) indicated that the individual responsible for compiling data from all HSAs at health facility level was the Senior Health Surveillance Assistant. One HSA said the District Coordinator compiled their data which is not supposed to be case.

4.2.2.5.Data Accuracy and Reliability for HSAs

All HSAs stated that data from the community is important and that it gives a picture of their community to the District Health Office, as well as progress of their work. This was reflected by the results in Figure 4.8, where 94% of HSAs thought their data from the community was either accurate or very accurate. Only 6% remained neutral. The HSAs who indicated the data was very accurate added that they collected first-hand information from the community and it was what they actually found, hence their opinion. They were also able to verify data that was provided by Secret Women. These were half of the HSAs who stated that they collect data from the community in Figure 4.7 above. Those who responded 'accurate' said it was because sometimes they have missing data as people in the community may hide information. The neutral candidates based their argument on the principle that Secret Women may not give them accurate information since most of them do not have any formal education, so that they can write down their information to avoid forgetting or having inaccurate information.

Figure 4.9 shows that all HSAs thought their data was reliable to some extent, with 3 stating that it was very reliable. This is contrary to the fact that 50% of HSAs stated that the data they collect was very accurate, which should be the percentage that was very reliable as well.

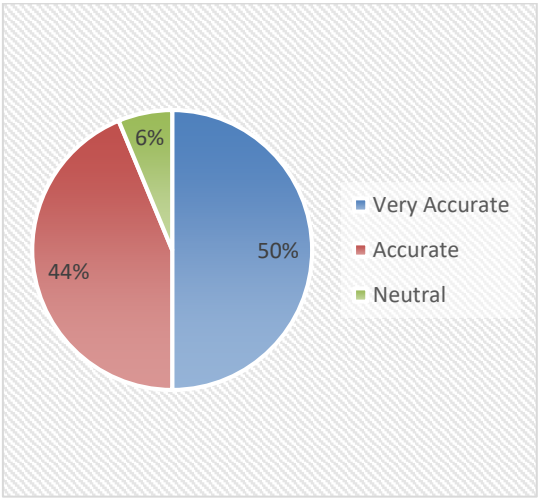


Figure 4.8: Accuracy of data from communities *(n=16).*

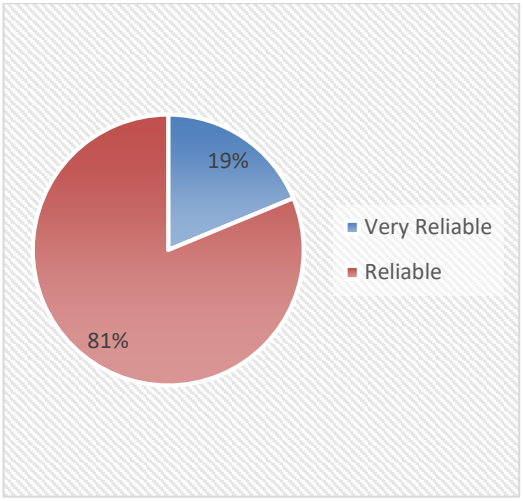


Figure 4.9: Reliability of data from communities *(n=16).*

The differences noted in Figure 4.8 and Figure 4.9 were further summarised in a cross-tabulation to extrapolate the contradictions among some of the HSAs. There was lack

of consistency in their responses which may infer lack of consistency in their data as well.

Table 4.8: Accuracy vs Reliability of Data from HSAs Cross-tabulation *(n=16).*

			Reliability					
			Very Reliable	Reliable	Neutral	Slightly Reliable	Un-reliable	Total
Accuracy	Very Accurate	Count	3	5	0	0	0	8
		% of Total	19%	31%	0%	0%	0%	50%
	Accurate	Count	0	7	0	0	0	7
		% of Total	0%	44%	0%	0%	0%	44%
	Neutral	Count	0	1	0	0	0	1
		% of Total	0%	6%	0%	0%	0%	6%
	Slightly Accurate	Count	0	0	0	0	0	0
		% of Total	0%	0%	0%	0%	0%	0%
	Inaccurate	Count	0	0	0	0	0	0
		% of Total	0%	0%	0%	0%	0%	0%
Total		Count	3	13	0	0	0	16
		% of Total	19%	81%	0%	0%	0%	100%

In order for an HSA to collect accurate and reliable data, they need to understand the data collection tools, i.e. MoH approved forms provided by the SCHI. The majority (88%) of HSAs stated that the data collection tools were easy to understand and easy to complete, whereas 6% said the tools are not easy to understand and complete, but this came from an HSA who had just been assigned to the area. The remaining 6% did not know one way or the other. Understanding of the data collection tools was only the first step in achieving quality data, and actually collecting quality data required adherence to set processes and procedures, as well as comprehension in the data to be collected.

4.2.2.6.Challenges Encountered by HSAs

Overall challenges faced by HSAs were summarised in Table 4.9. Other challenges mentioned were lack of housing for HSAs, transportation due to long distances within catchment areas, and difficulty to work during the rainy season due to lack of rain suits and gum boots. These challenges may not have directly influenced data collection, but they had an effect on the quality of data collected by the HSAs.

Table 4.9: General challenges faced as an HSA *(n=16).*

Challenges as HSA		
Challenge faced as HSA	*Number*	*Relative value (%)*
Inadequate resources (Forms and pens)	15	94
Workload	9	56
Lack of training	6	38
Knowledge gaps	2	13
Other (Late Reporting)	2	13
(Rain Suits and Gum boots)	2	13
(Housing)	3	19
(Transportation / Distance)	2	13

HSAs specifically mentioned challenges faced in MNH. Fifty percent of HSAs indicated that the secrecy of pregnancy in the initial stages and the lack of trained personnel at health facilities were significant challenges in implementing MNH in their workplaces. HSAs can be assigned to other tasks apart from the tasks detailed in their job description by medical personnel either at facility level or from the DHO and vertical programmes. This is called task shifting and results in a heavy workload for the HSAs, which affects their productivity in all aspects including data collection and management. Data collection was the least mentioned challenge, as shown in Table 4.10, despite the lack of adequate data, data gaps and poor data quality discussed in Phase 1.

Table 4.10: Challenges faced by HSAs in Maternal Health *(n=16).*

HSA Challenges		
	Number	*Relative value (%)*
Secrecy of Pregnant Women	8	50
Lack of Staff at Facilities	8	50
Cultural Beliefs	7	44
Pregnancy Complications	4	25
Data Collection	2	13

Table 4.11 lists the challenges faced by HSAs during their data collection. The most common challenge mentioned was lack of stationary which was influenced by logistical challenges, whereas late reporting was the least mentioned challenge. These challenges overlap with some of the general challenges faced by the HSAs. In contrast, with challenges in MNH mentioned in Table 4.9, these challenges concentrated on

data collection only. Most of the challenges mentioned were the same as those mentioned by the HMIS Officers in Phase 1.

Table 4.11: Challenges faced by HSAs in data collection *(n=16)* against challenges mentioned by HMIS Officers in Phase 1.

HSA Challenges (Phase 2)		HSA Challenges (Phase 1)
Challenge faced	*Number*	*Challenge faced*
Stationary	12	Lack of forms, Not enough resources
Transportation	11	Not enough resources, Delays - lack of transportation
Lack of reporting forms	11	Lack of forms
Workload	9	Form are forgotten to be sent, Committed on other duties, Pressure of work
Other (Late Reporting)	2	HSA's do not have challenges, they just relax a lot, Form are forgotten to be sent

4.2.3. Medical Personnel Results

4.2.3.1.Qualification, Experience and Training

The medical assistant interviewed had a Certificate in Clinical Medicine and the midwife had a Diploma in Midwifery. Both personnel were male and had work experience of between 2 and 4 years. These two medical personnel were the only ones in this rural remote area situated at Gaga health facility, there were no medical personnel at Chithumba and Chang'ambika health facilities.

The medical assistant did not have specific training on MNH, however the midwife had been trained in integrated MNH, counselling and community mobilisation.

- *Training in Data Collection*

The medical assistant responded positively when asked if a course on data collection would be of benefit, but stated he had never attended any courses on data collection and reporting for MNH. He had also never attended any training offered by the SCHI intervention since he was transferred to the area after the training had already been done, demonstrating the essential nature of frequent courses where you may have high staff turnover. Despite the lack of training in data collection and reporting for MNH, the medical assistant responded that training and refresher courses were important as they conduct their daily duties. The midwife responded that he had attended training

on data collection, as well as training on data collection and reporting for maternal health, but has not been on the training offered by the intervention. This was however contrary to information from the SCHI which provided training to medical personnel in this area.

- *Medical Personnel Comment on Training for HSAs, Secret Women and VHCs in MNH*

The medical personnel responded that HSAs were trained in MNH and they were trained by the Scotland Chikwawa Health Initiative (SCHI). However, the medical assistant did not know if the Village Health Committees (VHCs) were also trained. The midwife added that the VHC members were not trained in MNH. The medical assistant was not aware of the availability of Secret Women who were trained by the intervention to help in MNH within the communities. The midwife was aware of their presence but did not have any knowledge whether they were trained.

4.2.3.2.Data Collection

- *Information Recorded by Medical Personnel*

The medical personnel also record information on maternal health, such as number of new pregnancies, births, antenatal attendance, complicated pregnancies, family planning and maternal deaths where within each of these include a number of sub-variables.

- *Additional Information Recorded by Medical Personnel in MNH*

The medical personnel differed on whether their facility offered emergency obstetric care (EmOC). The medical assistant said the EmOC unit had not yet been constructed, whereas the midwife, who was responsible for the procedure, said they do offer Basic EmOC. The midwife said it was available, but some equipment (Vacuum set and resuscitation tables) was not available.

The medical assistant indicated that the medical supplement available for pregnant women at the health facility was Sulfadoxine/Pyrimethamine (SP). The midwife added that pregnant women sometimes had access to medical supplements such as iron/ folate, tetanus toxoid, and prophylaxis when available. The midwife was the one responsible for the records on medical supplements which agreed with information given by HSAs. Records on the access to medical supplements were also kept according to the midwife. They were kept in forms provided by the DHO, or on plain

note-paper if the forms were not available. Data compilation was the responsibility of the midwife since there were no statistical clerks. The midwife further commented on the importance of these records because they were used for ordering replacement supplements. Keeping data on plain note-paper was not an effective way of handling data, since plain note-paper can easily be regarded as useless, hence information can get lost.

The medical personnel responded that they conducted Human Immunodeficiency Virus (HIV) voluntary counselling and testing (VCT) for pregnant women. They further commented that pregnant women were also tested for syphilis. However, the midwife added that HIV Voluntary Counselling and Testing (VCT) and syphilis tests were not always done due to a lack of test kits. If the HMIS had accurate and reliable data, correct statistics on test kits would be available since planning would be done using quality data. The medical personnel stated that if a pregnant woman was found to be HIV positive, she was given Anti-Retroviral Therapy (ART) and / or Anti-Retroviral (ARV). They also stated that records on HIV Voluntary Counselling and Testing were collected and kept using forms provided by the DHO and/or plain note-paper when forms were not available.

Both the midwife and medical personnel said that records on delivery places and delivery methods were kept, then further commented that the midwife was responsible for these records.

The medical assistant responded that maternal death reviews were sometimes conducted, and that the midwife was the one who does the review and compiles the report. He further stated that the review report was kept by the midwife. However, he gave no response on neonatal death review and occurrence of neonatal deaths. The midwife indicated that maternal death reviews were conducted and the personnel who conduct the reviews were the Medical Assistant, Clinical Officer, Midwife, SHSA and the community. With regard to who gets the report, the midwife stated that the medical assistant, the midwife, Safe Motherhood Coordinator community and Ministry of Health get the report. During Phase 2 no maternal deaths occurred. The midwife also said they sometimes conduct neonatal death reviews and the process was done by the midwife, HSA and SHSA. He further commented that no neonatal deaths had occurred in the time referred to by the study.

- *Sources of Data for the Medical Personnel*

The medical personnel indicated their sources of data were the Out-Patient Department (OPD) registers. However, the midwife added other sources such as the community, pregnant women, chiefs, VHC, labour wards and other health registers. Despite a range of sources mentioned, the main source was the surrounding community which accesses different services offered by the health facility. Precisely people from the community go to the facility to seek help thereby the Medical Personnel collect data for their records.

4.2.3.3.Medium for Keeping Records

The medical personnel differed as to where their records were kept; the medical assistant stated that they use Health profiles and patient books, whereas the midwife stated that they use forms and plain paper to keep the information.

The medical personnel stated that the data collection tools were not easy to use, since the registers were huge and further commented on the need to use modern tools (such as computers) for collecting data. As much as this is the technology age, computers would not be properly utilised due to lack of electricity in this rural remote area.

4.2.3.4.Data Compilation and Transition

These individuals also differed as to the person who is responsible for compiling the data. The medical assistant mentioned the statistical clerk and the senior HSA, whereas the midwife mentioned statistical clerk, SHSA, HSA, midwife/nurse and medical assistant. This can cause confusion because there were so many people handling the data. Even though the statistical clerk was mentioned, there was none at the health facility, hence the medical personnel compiled their own data and sent to the DHO. The medical assistant stated that they send data on a monthly basis and the midwife further added that they also send data on a quarterly basis, and when the data was required.

4.2.3.5.Data Accuracy and Reliability for the Medical Personnel

The medical personnel stated that the data collected was important and it is used to keep records, and for decision-making. They stated that their data was accurate and reliable because they handle their own data. Furthermore, the medical personnel

commented on data collected from the community by HSAs. They said the data was also deemed important because it gave a picture of the community and a benchmark for decision making in dealing with challenges in the community. However, the accuracy and reliability of the data from the community was stated as just accurate by the medical assistant and neutral by the midwife, because they believed the information needed to be verified before any actions were taken.

4.2.3.6.Challenges Encountered by the Medical Personnel

- *Challenges in MNH*

These personnel stated that secrecy of pregnant women was a challenge for them to do their work, because most of the time pregnant women come to the Health facility when complications with the pregnancy were already present and they cannot help. The midwife also stated that cultural beliefs (i.e. not revealing and talking about pregnancy at earlier stages) were an issue of concern. This concurred with the comments from the HSAs.

In order to overcome these challenges, the medical personnel stated that awareness campaigns on safe motherhood were vital, especially the importance of early attendance at ante-natal clinics and civic education to all women of reproductive age on the dangers of such cultural beliefs.

- *Challenges in Data Collection*

The challenges faced in the process of data collection were lack of reporting forms and stationary. They also stated that transportation, lack of training, inadequate resources, heavy workload (handling patients and data collection at the same time), knowledge gap and resources were challenges which they met as medical personnel. In order to overcome these challenges, they suggested training and refresher courses, and provision of enough resources (e.g. continuous flow of stationary). Some of these challenges were basic needs for health personnel to carry out their job, which in turn may have an effect on data management and lead to poor data quality.

4.2.4. Secret Women Results

*4.2.4.1.*Qualification, Experience and Training

None of the Secret Women had attained education beyond primary school. Eighty percent of these women were initially Traditional Birth Attendants (TBAs) who assisted pregnant women to deliver. TBAs were never formally trained in child deliverly except from the knowledge and practices passed down by elders. Since the government banned delivery by TBAs, one of the interventions by the SCHI was to have TBAs take a new role as Secret Women who would spot pregnant women in the community, advise them on antenatal care and report to an HSA, who would visit the pregnant woman.

These Secret Women were trained by the SCHI intervention in identifying and approaching pregnant women so that they can earn their trust. The Secret Women were also trained how to advise pregnant women about antenatal care and also data collection.

4.2.4.2.Data Collection and Medium for Keeping Records

The Secret Women had not collected any data yet since they had just received notebooks through the intervention in which they were trained to record the name of the pregnant woman, date of visitation, birth of child, date of birth, and maternal as well as neonatal deaths. They were to report the recorded information to the HSA so that the HSA can follow-up and provide further advice to the pregnant women. According to the Secret Women, the data which they would collect was important because it will save lives of mothers and children.

4.2.4.3.Challenges for Secret Women

Their main challenge was moving about the communities for visitations to pregnant women since the areas they were assigned to serve were large. The other challenge was during rainy season; their notebooks would get wet. The Secret Women suggested that they be provided with bicycles and rain coats or umbrellas to alleviate their challenges.

4.2.5. Village Health Committee Results

Focus group discussions (FGD) were conducted with VHCs in Phase 2 of the study. The FGDs revealed the VHCs did not have activities to do with MNH, hence did not provide any tangible information except that data on MNH collected from the community was important. Furthermore, the women involved in this study were members of the VHC and were also Secret Women, as such VHC member did not participate in the FGDs except for the secret women.

4.2.6. Discussion and Conclusion

4.2.6.1. Qualification, Experience and Training

HSAs were responsible for collecting data on safe motherhood, as well as being community advisors on health. In order to achieve the MDG targets on maternal and neonatal morbidity and mortality, HSAs are to play an important role in giving proper advice on Maternal and Neonatal Health (WHO, 2010), in addition to collecting accurate and reliable data from the communities which they serve. They need the knowledge to carry out their task, which they get from training sessions which all confirmed attending. The HSAs were able to remember the content of the training, but lacked application of that knowledge. This implies that training has limited effectiveness and requires re-enforcing on how to use the knowledge.

The medical personnel had training and experience, which made them qualified for the job they were expected to carry out. However, they had a challenging task to serve in a remote rural area and being the only medical personnel available with the other health facilities having staffing difficulties, meant that they had to cater for three health facilities.

The medical assistant did not know whether they had Secret Women in their area, personnel responsible for the Secret Women, and if the health facility works with Secret Women on MNH. Thus, the medical assistant was not aware of the role which the Secret Women played in MNH. The medical assistant's ignorance might imply lack of interest in the activities at the health facility. The midwife however knew the presence of Secret Women in the catchment area and worked with them to improve MNH in this area.

4.2.6.2.Data Collection and Information Recorded

HSAs record a lot of data, however there were some areas which were not within their jurisdiction, for instance the data on EmOC, maternal and neonatal death reviews, medical supplements, VCT and delivery methods which were supposed to be kept by the Midwife. Most HSAs attributed the lack of other information to the unavailability of a medical assistant and midwife / nurse at their health facility. This meant that there were information gaps in the records for HSAs from the areas without health personnel. This was evidenced when individual HSAs provided their data files for verification of the data collected from them.

All entities involved in the study knew the importance of the data collected, whether from the Out Patient Department (OPD) register or the community, since they stated the data was used for decision making, and further stated that the data collected had to be verified before use which was an important process. The midwife at the health facility collected the data as he was the one trained in the field and he collected more data on MNH compared to the HSAs. HSAs and Medical Personnel collected data on MNH that was supposed to complement each other, but in-turn led to double counting as a patient referred to the health facility by an HSA was recorded as a new patient by the Medical personnel. Medical Personnel were based at the health facility where they met pregnant women, whereas HSAs found the pregnant women within their communities. Both their scenarios were challenging because the Medical Personnel were a few covering a very large catchment area which meant too much work for them, and the HSAs had to walk long distances within their communities as most areas were far apart which made their job tougher.

4.2.6.3.Data Compilation and Transition

The results suggest a number of factors that could cause differences in the data report, e.g. the amount of data collected for a lot of variables in MNH, the terminology used which was learned during training, but lacked application, base of operation (i.e. the midwife was stationary at the health facility, while HSAs go around the community), error due to fatigue (since the midwife has to attend to patients, as well as record patient data), problems in proper recording of patient data leading to double counting, and transition as to who gets the data after it was compiled. In addition, the medical assistant said that the midwife was responsible for the compiling of records, and on

the contrary, the midwife indicated that the statistical clerk, who was not available at the health facility, was the one responsible for compiling data. This would cause confusion in data management because data had to go to the responsible personnel so that data is not lost.

4.2.6.4.Data Accuracy, Reliability, Consistency, Completeness and Timeless

Data quality in terms of accuracy and reliability was compromised due to the factors mentioned in the previous section. The HSAs and Medical Personnel had conflicting responses on whether their data was accurate, as well as reliable. One would expect a positive correlation between data accuracy and data reliability.

The data also lacked completeness because of failure to use acquired knowledge in training to report certain variables and the data gaps which were a result of unavailability of facility staff. The differences in the indicators and sub-variables within the indicators among the different entities led to lack of consistency. Delays in data handling by the HSAs and Medical Personnel, and difficult transportation to this remote area affected the timeliness of data which also affected data use at the district and other higher authorities in health.

Data quality was also affected by the lack of statistical clerks at the health facilities whose job was data management thereby relieving the burden of data management from the Medical Personnel who currently combine roles. Thus Medical Personnel were overworked and fatigued which may have lead to compromised effectiveness especially in their secondary role of data management.

4.2.6.5.Challenges Encountered

The HSAs, medical personnel and Secret Women had problems in carrying out their job in MNH. The lack of staff at Health facilities and secrecy of pregnant women were their main problems. Since Secret Women had just been initiated on their roles of identifying pregnant women, the cultural belief of keeping pregnancy a secret was a drawback for the HSAs and Medical Personnel. Lack of resources was a major problem in the area of data collection since materials and/or reporting forms to record their data were not replenished in time. Resources required in such a remote area were vitally important, without resources such as forms and writing materials, HSAs, Medical Personnel and Secret Women were not able to record information. Others also

mentioned the need for rain coats, and gum boots during the rainy season so that they can easily carry out their tasks. The need for proper housing may not directly affect data collection, but since housing is a basic need, then it would have consequences on their job performance.

4.2.7. Summary of Chapananga Area (Phase 2)

Results and Discussion for Chapananga area were summarised in Figure 4.10. There are other personnel (Safe Motherhood Coordinator, Secret Women and VHCs) who emerged in this data flow, as well as OPD as a source of data as well. This data flow was also inconsistent with the data flow for HMIS officers and the data flow framework in Chapter two. The data flow further summaries data and personnel attributes which affect data quality.

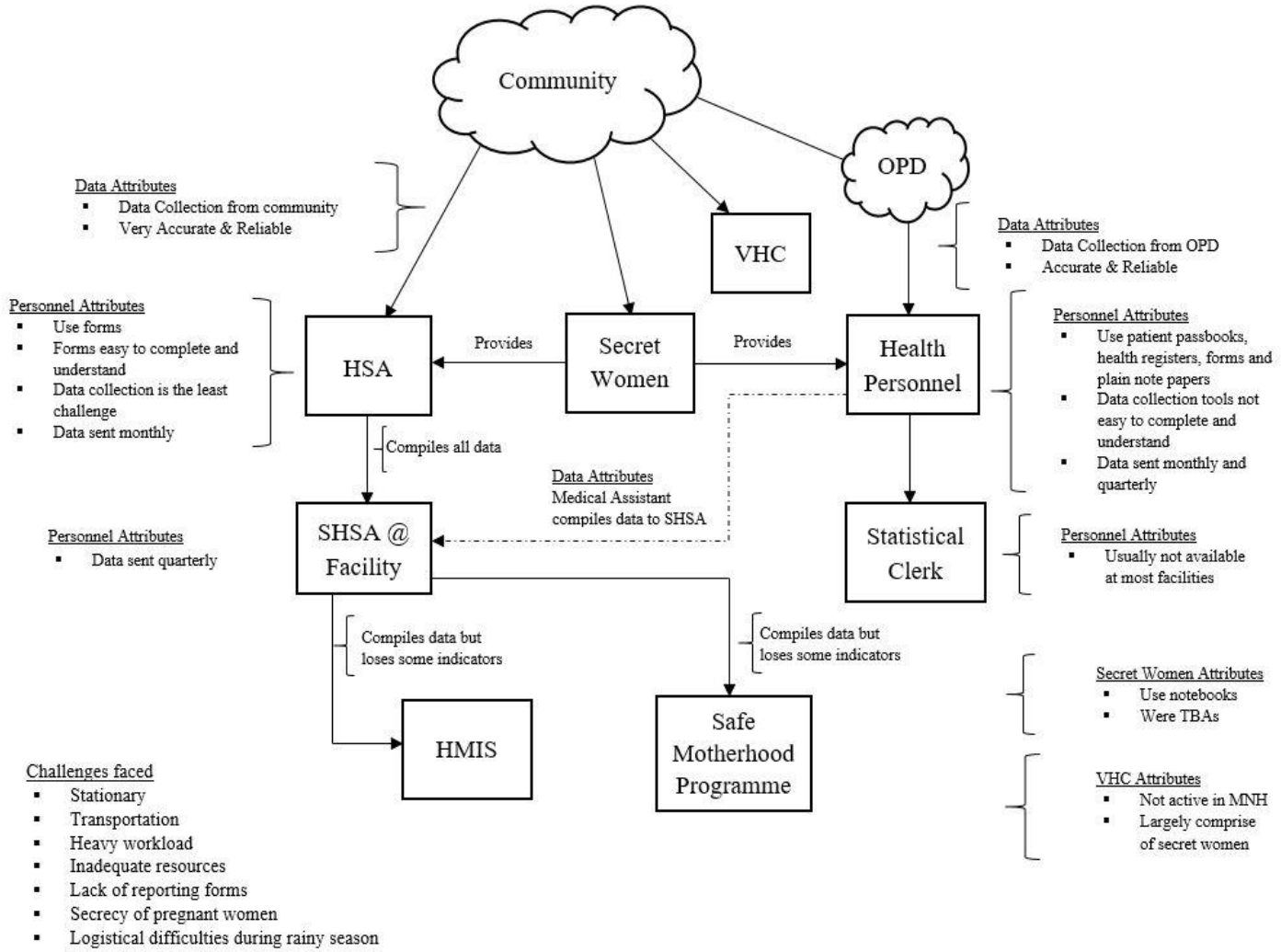


Figure 4.10: Summary of Results and Discussion for Chapananga Area

Key: ⟶ *= Actual data flow;*

- - -▸ = Theoretical data flow;

OPD = Out-Patient Department;

VHC = Village Health Committee;

HSA = Health Surveillance Assistant;

SHSA = Senior Health Surveillance Assistant;

Health Personnel = Medical Assistant and Nurse/Midwife;

HMIS = Health Management Information System

Chapter Five: Maternal Health Data Management in Chapananga

This chapter of the study presents the results obtained on qualitative data in Phase 3.

5.0.1. Adoption of Phase 3

The outcomes of Phase 2 came from only three health facilities which were deficient in personnel and also had interventions being conducted by the SCHI to improve maternal and neonatal health services through provision of training, equipment and infrastructure. As a result, Phase 3 was conducted to incorporate more personnel, hence adding three health facilities to substantiate the results; the health facilities incorporated in Phase 3 had no interventions, hence they acted as controls in relation to MNH. The addition of the three health facilities also enabled checking of the consistency in data management processes and procedures between health facilities with interventions and those without intervention. Phase 3 further tests data uniformity/consistency in Chapananga area among the different entities to triangulate with results obtained in data management; since consistent data is a consequence of consistent data management.

5.0.2. Amendment to Chapananga Study Phase 3 with Respect to Phase 2 Outcome

The second phase of the study resulted in some changes to the planning of Phase 3. The following changes were made:

- A number of variables were excluded from the study because they were not of substantial impact to the study objectives. The variables excluded were as follows: availability of emergency obstetric care (EmOC), data on EmOC, medical supplements, screening of syphilis, medication and record keeping on Voluntary Counselling and Testing (VCT).
- The VHCs were also excluded from the study because most of the VHC members did not participate during the focus group discussion, and those that did were also Secret Women, leading to duplication of results. Instead, Chiefs were included as most kept records on their community.
- The Safe Motherhood Coordinator and the Community Based Maternal and Neonatal Health (CBMNH) Coordinator were also included because they were involved in data

management of maternal health data, and consolidate and produce reports on maternal health.

5.0.3. Phase 3 Samples

Between April and May 2013 data was collected from community respondents and health personnel as outlined in Table 5.1. These were broken into intervention and non-intervention areas.

Table 5.1: Sampled Participants from Intervention and Non-intervention Areas in Chapananga.

Area	**Entity**	Secret Women		Chiefs		HSA		Health Personnel*		Total
	Health Facility	M	F	M	F	M	F	M	F	
Intervention	Chithumba	0	6	2	3	6	0	1	0	18
	Chang'ambika	0	5	3	1	4	0	0	0	13
	Gaga	0	6	3	2	7	3	2	0	23
Non-intervention	Kakoma	0	0	9	2	6	2	2	0	21
	Misomali	0	0	3	3	3	0	0	1	10
	Chapananga	0	0	10	1	5	4	0	0	20
	Total	*0*	*17*	*30*	*12*	*31*	*9*	*5*	*1*	***105***

*Health Personnel = Nurses / Midwives and Medical Assistant (there was supposed to be at least 1 Health Personnel per health facility), M = Male, F = Female

Data was also collected from the following key informants: 1 HMIS Officer, 1 Safe Motherhood Programme Coordinator, 1 SCHI Office and 1 CBMNH Coordinator.

5.0.4. Data Collection

Three data collection methods, as outlined in Chapter 3, were used:

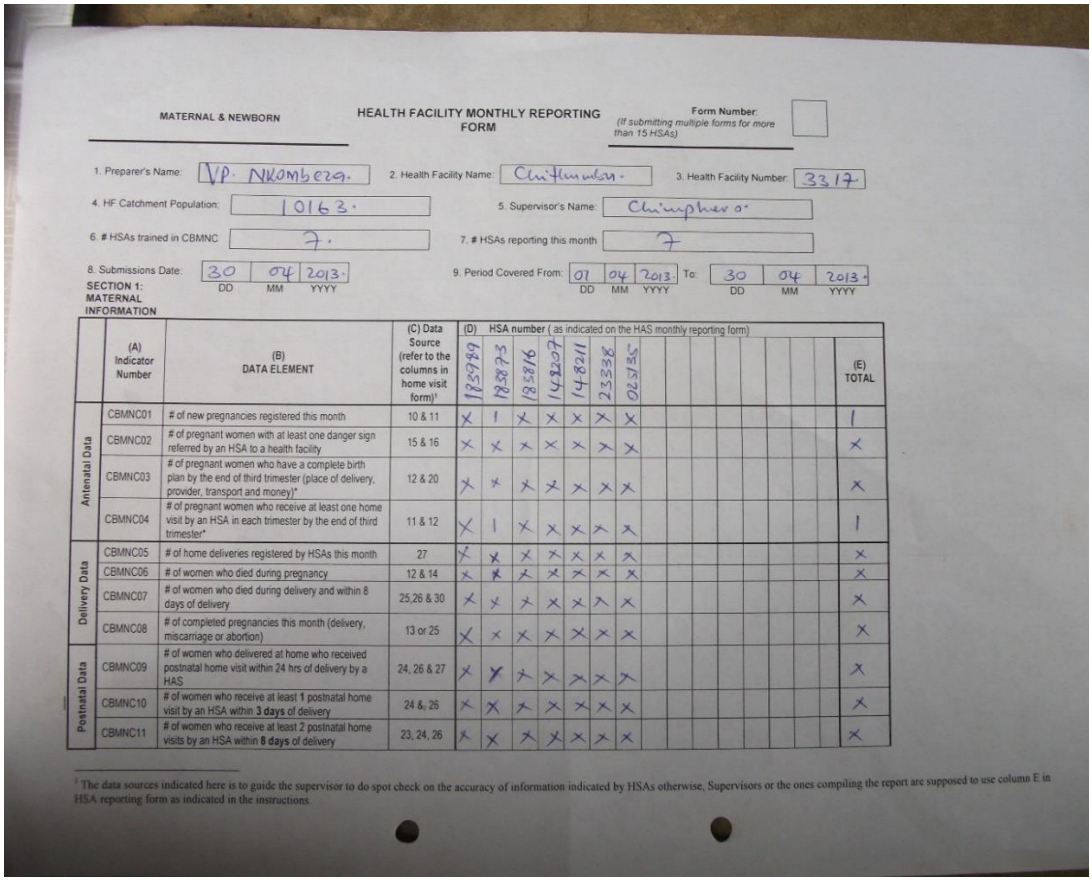
i. Face to face interviews with a structured questionnaire were used for Secret Women and Chiefs (Appendix 1b and 1d respectively).

   The interviews were conducted by Mr. Makumbi (a retired SHSA and SCHI Officer) and Mr. A. Kasambara (the researcher). Figure 5.1 and Figure 5.2 show Mr. Makumbi and Mr. A. Kasambara interviewing a Chief at Misomali and Chapananga, respectively.

Fig. 5.1: Mr. Makumbi interviewing a chief at Misomali.

Fig. 5.2: Mr. Kasambara interviewing a chief at Chapananga

ii. Self-completed questionnaires were used to collect data from HSAs and Health Personnel (Nurse/ Midwifes and Medical Assistants) with supporting evidence (Appendix 1a and 1c respectively). The data which they filled in on the questionnaire was verified by taking photographs (Figure 5.3) of their records to ensure consistency.



MATERNAL & NEWBORN HEALTH FACILITY MONTHLY REPORTING FORM

Form Number: (If submitting multiple forms for more than 15 HSAs)

1. Preparer's Name: VP. Nkombeza. 2. Health Facility Name: Chitumba. 3. Health Facility Number: 3317

4. HF Catchment Population: 10163. 5. Supervisor's Name: Chimphero.

6. # HSAs trained in CBMNC: 7. 7. # HSAs reporting this month: 7

8. Submissions Date: 30 (DD) 04 (MM) 2013. (YYYY) 9. Period Covered From: 01 (DD) 04 (MM) 2013. (YYYY) To: 30 (DD) 04 (MM) 2013. (YYYY)

SECTION 1: MATERNAL INFORMATION

	(A) Indicator Number	(B) DATA ELEMENT	(C) Data Source (refer to the columns in home visit form)[1]	(D) HSA number (as indicated on the HAS monthly reporting form) 183989	18873	18816	148207	148211	23338	023135	(E) TOTAL
Antenatal Data	CBMNC01	# of new pregnancies registered this month	10 & 11	X	1	X	X	X	X	X	1
	CBMNC02	# of pregnant women with at least one danger sign referred by an HSA to a health facility	15 & 16	X	X	X	X	X	X	X	X
	CBMNC03	# of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money)*	12 & 20	X	X	X	X	X	X	X	X
	CBMNC04	# of pregnant women who receive at least one home visit by an HSA in each trimester by the end of third trimester*	11 & 12	X	1	X	X	X	X	X	1
Delivery Data	CBMNC05	# of home deliveries registered by HSAs this month	27	X	X	X	X	X	X	X	X
	CBMNC06	# of women who died during pregnancy	12 & 14	X	X	X	X	X	X	X	X
	CBMNC07	# of women who died during delivery and within 8 days of delivery	25,26 & 30	X	X	X	X	X	X	X	X
	CBMNC08	# of completed pregnancies this month (delivery, miscarriage or abortion)	13 or 25	X	X	X	X	X	X	X	X
Postnatal Data	CBMNC09	# of women who delivered at home who received postnatal home visit within 24 hrs of delivery by a HAS	24, 26 & 27	X	X	X	X	X	X	X	X
	CBMNC10	# of women who receive at least **1** postnatal home visit by an HSA within **3 days** of delivery	24 &, 26	X	X	X	X	X	X	X	X
	CBMNC11	# of women who receive at least 2 postnatal home visits by an HSA within **8 days** of delivery	23, 24, 26	X	X	X	X	X	X	X	X

[1] The data sources indicated here is to guide the supervisor to do spot check on the accuracy of information indicated by HSAs otherwise, Supervisors or the ones compiling the report are supposed to use column E in HSA reporting form as indicated in the instructions.

Figure 5.3: Copy of Health Facility Monthly Reporting Form for Senior HSAs.

iii. Key informant interviews were also conducted with the HMIS Officer, Safe Motherhood Programme Coordinator and CBMNH Coordinator to enable probing for further information depending on the responses which they gave; the interview questions are in Appendix 2. Electronic data sheets on records for maternal health were obtained from these participants including SCHI Office to enable comparisons with data obtained from the other respondents.

5.1. Demographics

About two thirds of the participants in this study were male, which shows that males were more involved in health work in Chapananga than women (Table 5.1). The participants' (HSAs, health personnel and Secret Women) ages ranged between 26 and 56. The chiefs could not give and/or remember their ages.

The level of education for the participants is given in Table 5.2 and shows that the majority (74%) did not attain any formal education, particularly for the community members. Thirty-eight percent of the HSAs did not have the minimum qualification for an HSA required by MoH, however they had HSA job training, as well as experience which enabled them to do their job.

Table 5.2: Highest Learning Qualification.

		HSA	Health Personnel	Secret Women	Chiefs
	No Formal Education	1	0	5	31
	grade 1 – 4	0	0	4	11
	grade 5 – 8	1	0	8	0
	JCE*	13	0	0	0
	MSCE**	25	0	0	0
	Cert. in Clinical Med	0	4	0	0
	Dipl. in Clinical Med	0	2	0	0
	Total	40	6	17	42

*JCE = Junior Certificate of Education, **MSCE = Malawi School Certificate of Education

Seventy-eight percent of the participants responded that they had some form of training in health, with 61% (64 participants) noting that they had specific training in maternal and neonatal health. Forty-seven percent of the participants were from the intervention area. Figure 5.4. gives a summary of the details by personnel.

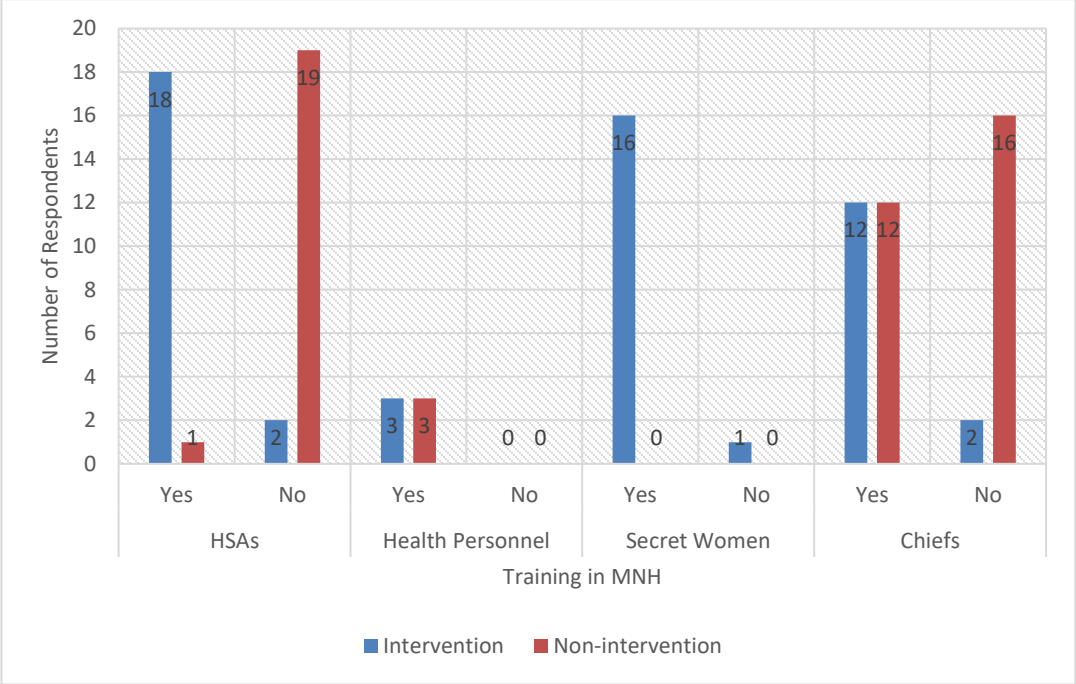


Figure 5.4: Training in MNH *(n=105; response rate = 100%; Chiefs n=42; Secret Women n=17; HSA n=40; Facility Personnel n=6).*

5.2. Chapananga Study - Phase 3: Maternal Health Data Management with Controls

This section presents results on maternal health data management within the community for Chapananga Area, and specifically discusses Data Collection, Data Transition, Accuracy and Reliability, Challenges Faced and Discussion on Data Management.

5.2.1. Data Collection

5.2.1.1. Availability of data collection tools

Fourteen respondents (13.3%) did not know whether they had data collection tools or not, and of the remaining 91 participants, as shown in Figure 5.5, only 20 (19%) stated that they had data collection tools, with a 3% difference between the intervention and non-intervention areas in those who had data collection tools.

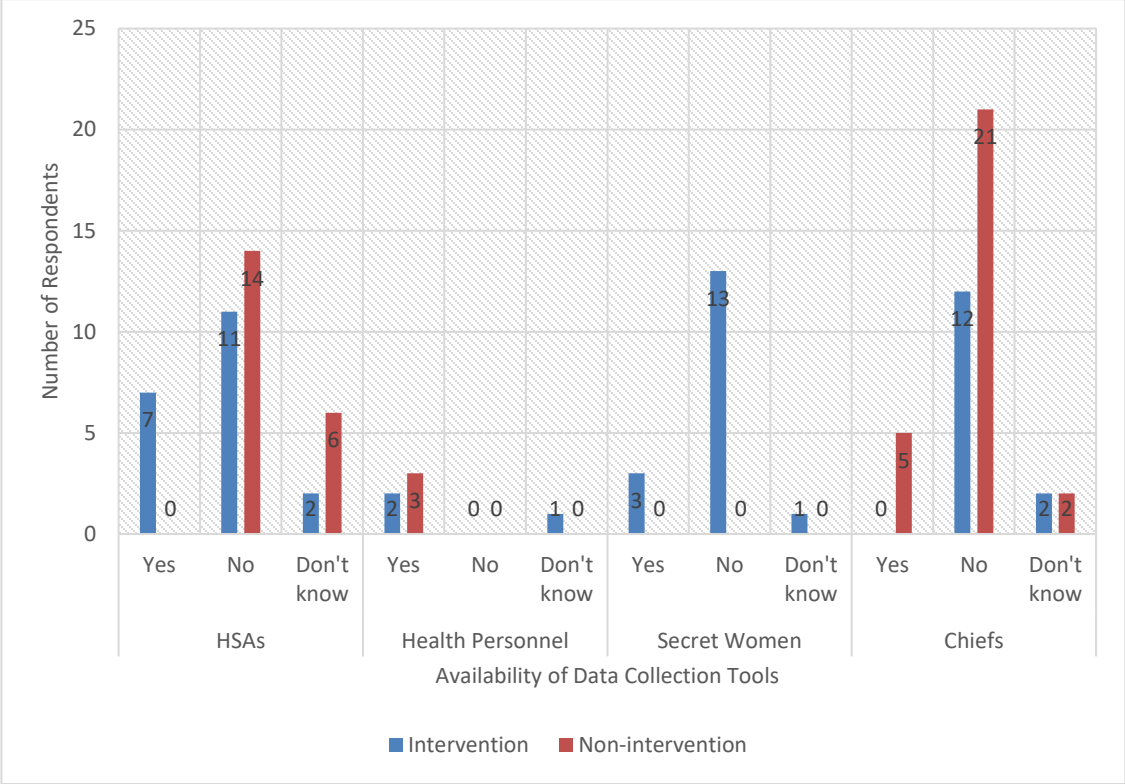


Figure 5.5: Availability of Data Collection Tools for respondents *(n=105; response rate = 100%; Chiefs n=42; Secret Women n=17; HSA n=; Facility Personnel n=5).*

5.2.1.2. Medium of keeping records

Figure 5.6 shows that standard reporting forms (conventional data collection tools) were mainly used to keep information, followed by plain-note paper (non-conventional data collection tools). Despite that only 18% of Secret Women stated they had data collection tools, 82% stated that they used plain note paper/ notebooks as a medium for keeping records. One third of the health personnel from the non-intervention area used forms, while one third of the intervention area used plain-note paper. Two HSAs (8.7%) and 2 Secret Woman (12.5%) stated they used a computer to keep their data which seems very unlikely for such a remote area.

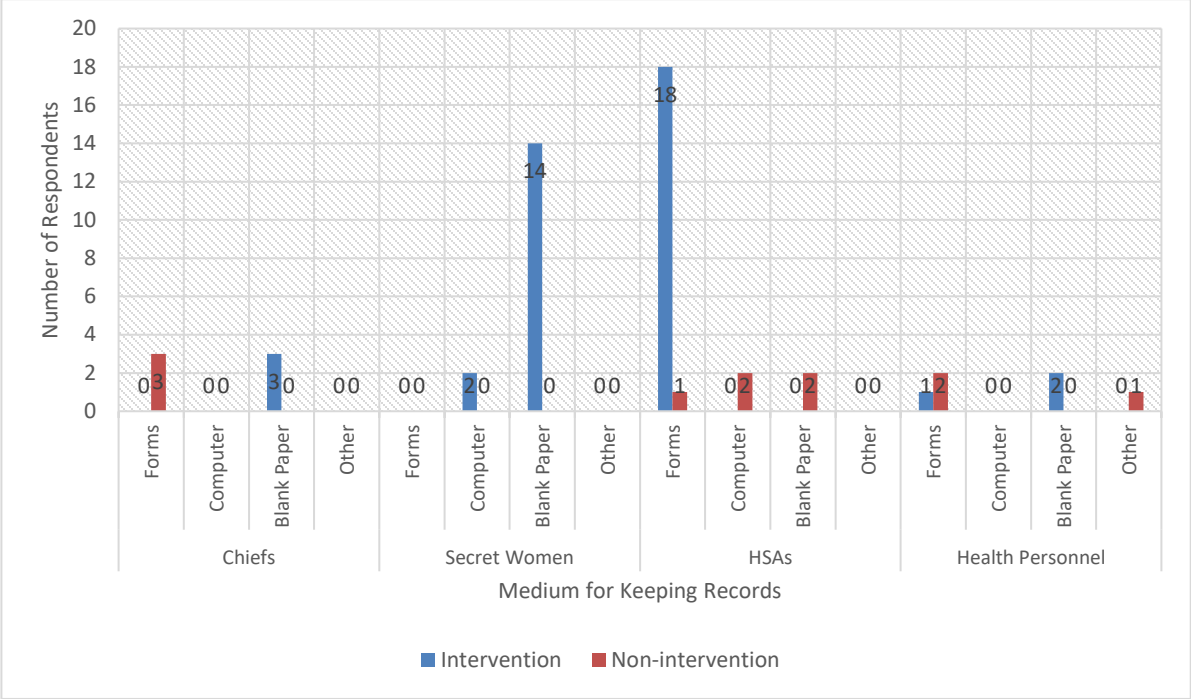


Figure 5.6: Medium for Keeping Records for Respondents - *(n=105; response rate = 48.6%; Chiefs n=6; Secret Women n=16; HSA n=23; Facility Personnel n=6).*

5.2.1.3. Sources of Data

Table 5.3 shows sources of data as stated by the different respondents. Data was collected from varied sources suffice to say that the data collectors, for instance HSAs, were contradicting each other on a particular source. The intervention area had larger contradiction compared to the non-intervention area. The variations in data sources might also provide room for data duplications since the same data is collected by a number of data collectors and some data collectors were also data sources. For instance, Secret Women were data collectors while at the sametime 40% of HSAs indicated that Secret Women were their source of data. Both OPD and Labour ward were indicated as sources of data for Facility Personnel (60%). The varied sources of data and different data collectors may pose problems in data consolidation as it would increase inconsistencies.

5.2.1.4. Information Recorded

Table 5.4 shows that the respondents from the intervention area recorded more information on MNH compared to the non-intervention area. Furthermore, Chiefs, who recorded information, kept information on number of pregnant women (11.9%) and live

births (9.5%), as did Secret Women (94.1% and 82.4%, respectively) and HSAs (50% and 52.5%), respectively. Five (83%) of the Facility Personnel reported collecting data on pregnant women, antenatal attendance, live births, tetanus, HIV Testing and Counselling/ Prevention of Mother to Child Transmission (HTC/PMTCT) and family planning. Secret Women mentioned other data which they record, e.g. dates of visitations, names and dates a pregnant woman attends antenatal. The information recorded on MNH lacked uniformity among the personnel which would likely lead to inconsistencies in the variables and in the actual data.

Table 5.3: Source of Data for the Different Personnel - *(n=105; response rate = 100%; Chiefs n=42; Secret Women n=17; HSA n=40; Facility Personnel n=6).*

Personnel		Source of Data (as a %)													
		Community		Pregnant Women		Secret Women		Chiefs		VHC		OPD		Labour Ward	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Chiefs	Intervention	0	33	0	33	33	0	33	0	33	0	33	0	33	0
	Non-intervention	0	67	0	67	67	0	67	0	67	0	67	0	67	0
Secret Women	Intervention	24	76	71	29	94	6	94	6	100	0	100	0	100	0
	Non-intervention	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSA	Intervention	20	30	25	25	13	37	33	17	43	7	50	0	50	0
	Non-intervention	47	3	45	5	47	3	45	5	19	1	50	0	50	0
Facility Personnel	Intervention	17	33	0	50	33	17	33	17	50	0	0	50	17	33
	Non-intervention	33	17	33	17	50	0	50	0	50	0	33	17	17	33
Total		32	68	40	60	83	17	90	10	96	4	96	4	96	4

Table 5.4: Information Recorded by the Personnel - *(n=105; response rate = 100%; Chiefs n=42; Secret Women n=17; HSA n=40; Facility Personnel n=6).*

		Information Recorded (as a %)																					
Personnel	Area	Pregnant women		Antenatal attendance		Complicated pregnancies		Live births		Post natal		Maternal deaths		Neonatal deaths		Tetanus		Syphilis		HTC / PMTCT		Family planning	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Chiefs	Intervention	31	2	31	2	31	2	33	0	33	0	33	0	31	2	33	0	33	0	33	0	31	2
	Non-intervention	57	10	67	0	67	0	57	10	67	0	67	0	65	2	67	0	67	0	67	0	67	0
Secret Women	Intervention	6	94	41	59	100	0	18	82	71	29	53	47	53	47	100	0	100	0	100	0	100	0
	Non-intervention	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSA	Intervention	8	42	25	25	20	30	8	42	10	40	15	35	15	35	40	10	42	8	30	20	25	25
	Non-intervention	42	8	40	10	42	8	40	10	48	2	35	15	42	8	45	5	45	5	45	5	30	20
Facility Personnel	Intervention	0	50	0	50	0	33	0	50	17	33	17	33	17	33	0	50	17	33	0	50	0	50
	Non-intervention	17	33	17	33	0	33	17	33	17	33	17	33	17	33	17	33	17	33	17	33	17	33
Total		56	44	71	29	81	19	58	42	75	25	70	30	70	30	90	10	91	9	86	14	77	23

5.2.1.5. Data Compilation

Data compilation is a process of bringing together data from different sources collected by the different entities. Data compilation is usually done at a central point by a senior individual and in remote rural areas such as this, health facilities are the central point. Seventy-three percent of the respondents indicated that they did not know who was responsible for data compilation at the health facility. Chiefs and Secret Women contributed to the high percentage, since their data was not sent for compilation; hence they were not aware of the next step in data compilation. It was important to know who compiles the data in case the immediate person who gets their data was not available.

Table 5.5 shows that 46.4% of HSAs that responded stated that a Senior HSA does the data compilation which is in line with MoH guidelines. As 6 health facilities were selected for this part of the work, there should only be 6 Senior HSAs who were to mention "myself" for data compliation, but more than six HSAs stated that they compile data (all from the intervention area). Since the HSAs aggregate their data before submitting, the additional three may have regarded this as data compilation. All health personnel from both the intervention and non-intervention areas were involved in data compilation, most especially because they are usually alone running a facility.

Table 5.5: Personnel Responsible for Compiling Data to the Health Facility *(n=46; response rate = 60.9%; HSA n=22; Facility Personnel n=6).*

			Who Compiles Data to the Health Facility		
			Myself	SHSA	Total
Personnel	HSA	Intervention	9	8	17
		Non-intervention	0	5	5
	Health Personnel	Intervention	3	0	3
		Non-intervention	3	0	3
Total		Count	15	13	28
		% of Total	53.6%	46.4%	100.0%

5.2.2. Data Transition

5.2.2.1. Data sent to supervisors

When data is collected by different entities such as HSAs and health personnel, it was supposed to be sent to their respective supervisors who compile the data from all HSAs, as well as health personnel. All chiefs and Secret Women (59; 56.2% of the total sample) did not send their data to their supervisors and they were not expected to do so. They would refer an HSA to a patient by by word of mouth.

Figure 5.7 shows that only 35 out of 105 (33.3%) answered the question on whether they send all their data to supervisors or not., Of the 35 respondents, 14 were from the non-intervention area. The response rate was low probably because Secret Women and Chiefs do not send their data to their supervisors.

Ten percent of the respondents (2 health personnel and 9 HSAs) did not give a response on sending data to their supervisor, possibly because they did not know their immediate supervisor. Seventeen (85%) HSAs from the intervention area and only two (10%) from the non-intervention area indicated that they send their data to their immediate supervisors. Four health personnel (2 from each area) responded that they send their data to their supervisors. Knowledge of the supervisor to get the data and sending the data to the supervisor has an implication in data management and subsequently data quality.

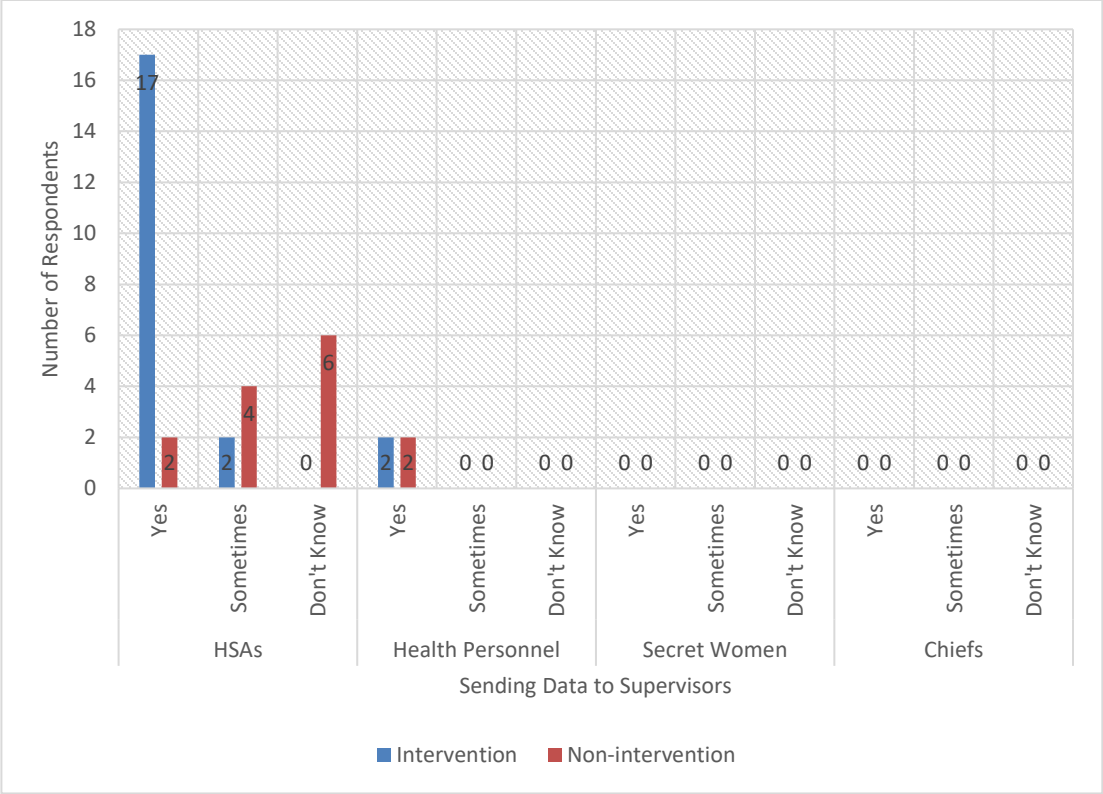


Figure 5.7: Sending Data to Supervisors for Respondents - *(n=105; response rate = 90%; Chiefs n=42; Secret Women n=17; HSA n=31; Facility Personnel n=4).*

5.2.2.2. Frequency of sending data

Table 5.6 shows that data was sent on a monthly basis to supervisors. However, senior HSAs mentioned that data was sent quarterly to the CBMNH Coordinator. The number of HSAs who who answered the question on the frequency of sending does not tally with those who sent their data to supervisors. Thus the HSAs might not know their immediate supervisor, hence the variations observed in the non-intervention area on the frequency of sending data. No responses were given by 13 HSAs (1 HSA from the intervention area) and 1 Health Personnel which would imply they do not send any data to their supervisors. If data was not sent by the respondents, there were data gaps and missing data in the consolidated records which would affect data use.

Table 5.6: Frequency of Sending Data to the Supervisor - *(n=46; response rate = 70%; HSA n=27; Facility Personnel n=5).*

			Frequency of Sending Data to the Supervisor			
			Monthly	Quarterly	When Required	Total
Personnel	HSA	Intervention	18	1	0	19
		Non- intervention	2	2	4	8
	Health Personnel	Intervention	3	0	0	3
		Non- intervention	2	0	0	2
Total		Count	25	3	4	32
		% of Total	78.1%	9.4%	12.5%	100.0%

5.2.2.3. Medium of sending data to supervisors

Figure 5.8 shows that 95% of HSAs and 100% of Health personnel from the intervention area reported using standard reporting forms to send data supervisors. Five percent of HSAs from the non-intervention areas also used standard reporting forms. The standard reporting forms were provided by the SCHI as part of their intervention in the three health facilities, and therefore the non-intervention area could not have had the standard reporting forms.

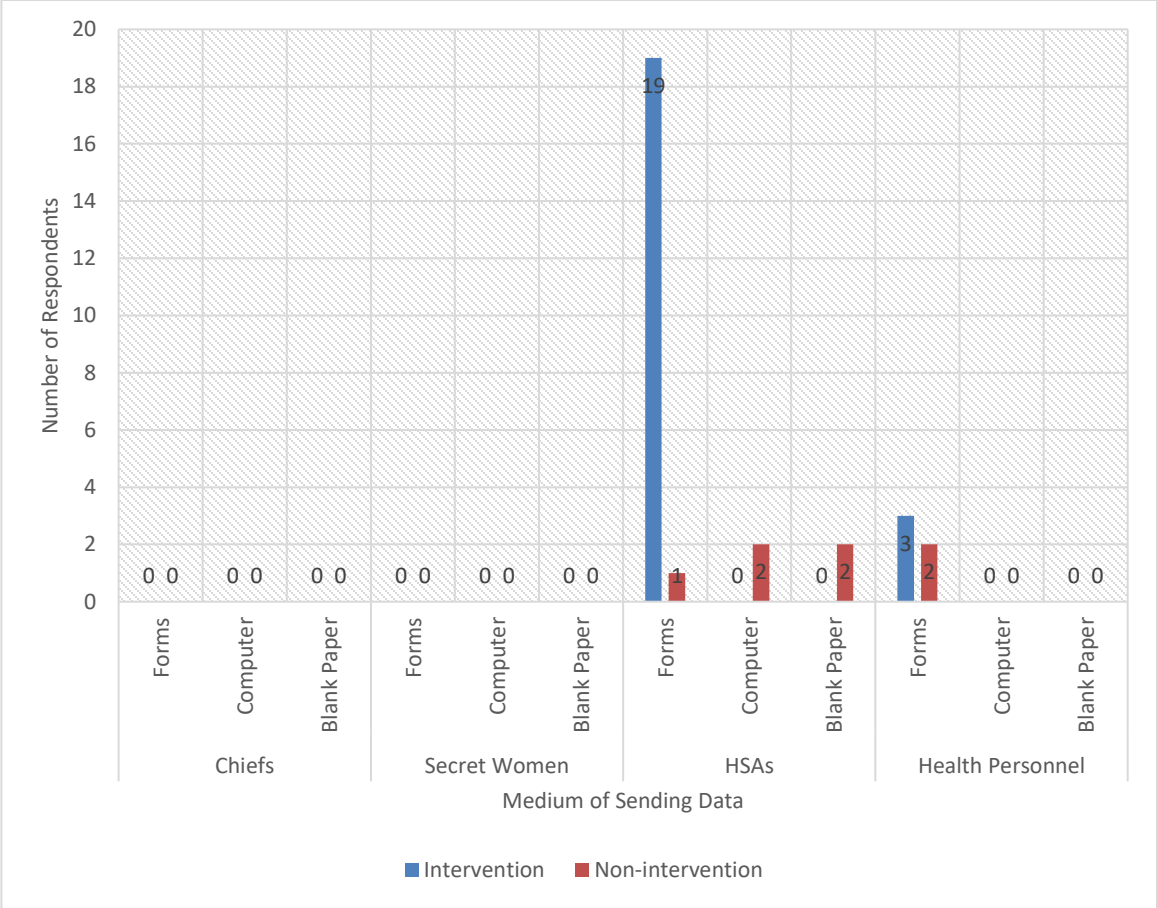


Figure 5.8: Medium of Sending Data to Supervisors by Personnel - *(n=46; response rate = 63%; HSA n=24; Facility Personnel n=5).*

5.2.3. Accuracy and Reliability

5.2.3.1. Accuracy of data

A comparison on perceived accuracy of data was conducted between the intervention area and non-intervention area. Sixty-one out of 105 (58.1%) respondents gave a response on perceived accuracy of their data. Table 5.7 shows that 57.3% of respondents in the intervention area perceived their data to be accurate compared to the non-intervention area where only 16.4% thought their data was acurate. This gives an indication of how the personnel themselves trust their data collection, compilation and personal data management.

Table 5.7: Perceived Data Accuracy by Area - *(n=105; response rate = 58.1%).*

		Perceived Data Accuracy				
		Very accurate	Accurate	Neutral	Slightly accurate	Total
Intervention Area	Count	16	19	8	3	46
	% of Total	26.2%	31.1%	13.1%	4.9%	75.4%
Non-intervention Area	Count	2	8	4	1	15
	% of Total	3.3%	13.1%	6.6%	1.6%	24.6%
Total	Count	18	27	12	4	61
	% of Total	29.5%	44.3%	19.7%	6.6%	100.0%

Figure 5.9 further classifies the perceived accuracy of the data with respect to the different personnel entities. Thirteen out of 17 (76.5%) Secret Women stated that their data was accurate while only 1 health personnel responded that the data is accurate. The data was questionable among the data collectors themselves which would be difficult for data users to trust the data quality.

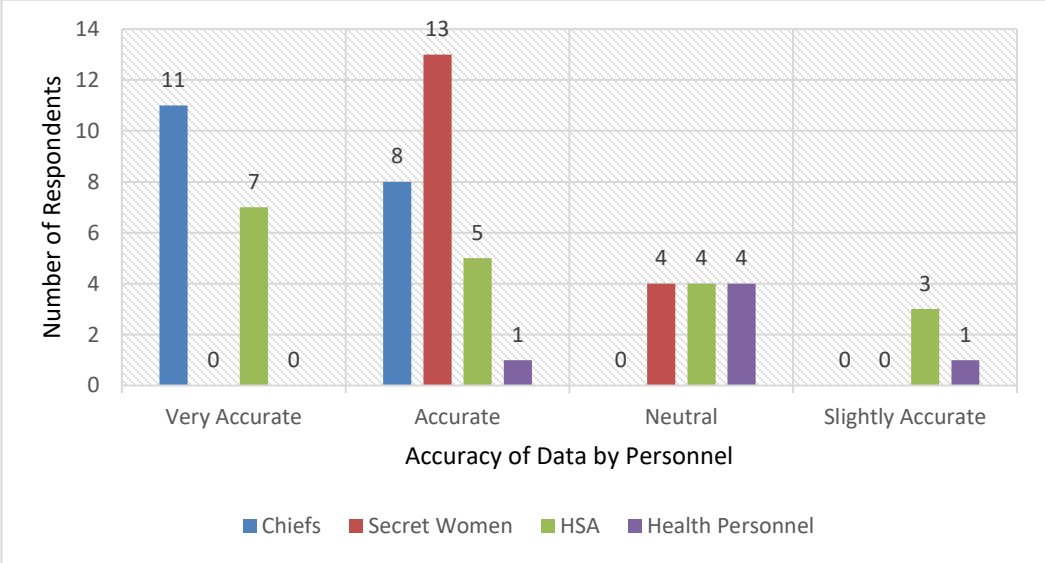


Figure 5.9: Perceived Data Accuracy Rated by Personnel *(n=105; response rate = 58.1%; Chiefs n=19; Secret Women n=17; HSA n=19; Facility Personnel n=6).*

5.2.3.2. Data reliability

Perceived data reliability was also compared in terms of whether a respondent was from the intervention or non-intervention area. Table 5.8 shows that 36 (57%) respondents from

the intervention area and 12 (19%) from the non-intervention area perceived their data to be reliable. The respondents in the intervention area were confident unlike those from the non-intervention area. The results on reliability in the areas agree with the results on accuracy with just slight differences.

Table 5.8: Perceived Data Reliability by Area - *(n=105; response rate = 60%).*

		Perceived Data Reliability				
		Very reliable	Reliable	Neutral	Slightly Reliable	Total
Intervention Area	Count	15	21	7	3	46
	% of Total	23.8%	33.3%	11.1%	4.8%	73.0%
Non-intervention Area	Count	3	9	3	2	17
	% of Total	4.8%	14.3%	4.8%	3.2%	27.0%
Total	Count	18	30	10	5	63
	% of Total	28.6%	47.6%	15.9%	7.9%	100.0%

Figure 5.10 shows the reliability of the data also classified with respect to the different personnel. Perceived data reliability was also slightly consistent with accuracy among the personnel. However, 9 out of 21 (42.9%) HSAs responded that their data was very reliable which was not consistent with their data accuracy.

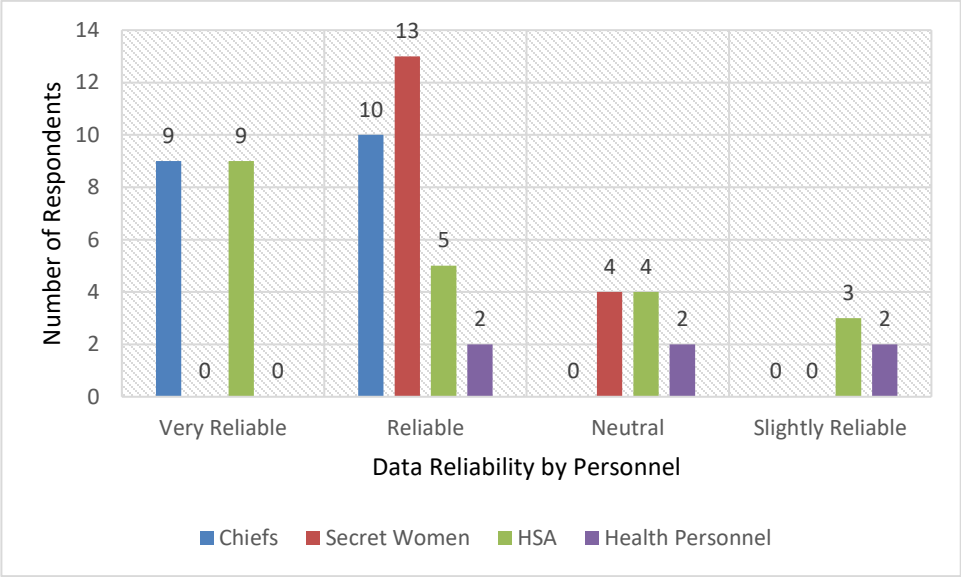


Figure 5.10: Data Reliability Rated by Personnel - *(n=105; response rate = 60%; Chiefs n=19; Secret Women n=17; HSA n=21; Facility Personnel n=6).*

If data is accurate then it should also be considered reliable. Table 5.9 summarises data accuracy versus data reliability to shows the number of individuals who were consistent in their responses. There are inconsistencies among data collectors with regards to how they perceive the dependability of the data. The same inconsistencies apply to the perception which the users have on the dependability of the data.

Table 5.9: Data Accuracy versus Data Reliability - *(n=105; response rate = 56.2%).*

Data Accuracy		Data Reliability				
		Very reliable	Reliable	Neutral	Slightly reliable	Total
Very accurate	Count	13	3	0	0	16
	% of Total	22.0%	5.1%	.0%	.0%	27.1%
Accurate	Count	2	24	1	0	27
	% of Total	3.4%	40.7%	1.7%	.0%	45.8%
Neutral	Count	0	3	7	2	12
	% of Total	.0%	5.1%	11.9%	3.4%	20.3%
Slightly accurate	Count	1	0	0	3	4
	% of Total	1.7%	.0%	.0%	5.1%	6.8%
Total	Count	16	30	8	5	59
	% of Total	27.1%	50.8%	13.6%	8.5%	100.0%

5.2.4. Challenges Encountered

The challenges faced in data collection were stated by 46 (43.8%) personnel (HSAs and Health Personnel) and challenges due their job in health (e.g. HSA, Medical Assistant, Nurse/Midwife and Secret Women) were stated by 63 (60%) personnel.

Lack of reporting forms was reported by 37.5% of HSAs, with 7.5% being from the non-intervention area, work overload at 30% with 2.5% from the non-intervention area, and transportation at 27.5% with 5% from the non-intervention area. The number of HSAs who had stated lack of reporting forms was less than those who reported using forms as medium for keeping records; hence not all HSAs faced this challenge, especially those in the non-intervention area.

Health Personnel mentioned that transportation (66.7%) to send data to the district was a problem which they face in the data collection process. Chiefs and Secret Women were not tasked by the Ministry of Health to collect data on health, hence data collection was not considered as an agenda that poses problems to them.

Table 5.10: Challenges Faced in Data Collection by the Personnel- *(n=46; response rate = 100%; HSA n=40; Facility Personnel n=6).*

Personnel		Challenges Faced in Data Collection (as a %)									
		Transporta-tion		Stationary		Work Overload		Lack of Reporting Forms		Other	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
HSA	Intervention	27.5	22.5	50	50	22.5	27.5	20	30	47.5	2.5
	Non- intervention	45	5	47.5	2.5	47.5	2.5	42.5	7.5	50	0
Health Personnel	Intervention	16.7	33.3	16.7	33.3	16.7	33.3	16.7	33.3	33.3	16.7
	Non- intervention	16.7	33.3	33.3	16.7	33.3	16.7	33.3	16.7	33.3	16.7
Total	Count	67.4	32.6	69.6	30.4	67.4	32.6	60.9	39.1	93.5	6.5

Furthermore, there were also general challenges pertaining to a respondent being a Secret woman, HSA and Facility personnel. Table 5.11 shows that inadequate resources (writing materials, notebooks, forms and files) and lack of training were the main challenges reported by Secret Women. Lack of training was also mentioned by both HSAs and Health Personnel.

The challenges were largely mentioned by the participants from the intervention area compared to the non-intervention area. All health personnel from the intervention area mentioned work overload as the main challenge.

Table 5.11: Challenges Faced in Designated Health Tasks - *(n=63; response rate = 100%; Secret Women n=17; HSA n=40; Facility Personnel n=6).*

Personnel		Challenges Faced in Designated Health Tasks (as a %)									
		Inadequate Resources		Work Overload		Lack of Training		Knowledge Gap		Other	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Secret Women	Intervention	47	53	100	0	65	35	94	6	47	53
	Non- intervention	0	0	0	0	0	0	0	0	0	0
HSA	Intervention	15	35	20	30	27	23	25	25	42	8
	Non- intervention	45	5	42	8	30	20	42	8	50	0
Health Personnel	Intervention	17	33	17	33	17	33	17	33	50	0
	Non- intervention	0	50	0	50	17	33	33	17	50	0
Total		52	48	68	32	57	43	73	27	81	19

HSAs and Secret Women who move within the community stated another challenge as mobility and one Secret Woman stated as follows, "*madela amene timayang'anira ndi kuyendera ali mutalimutali*" to mean the areas which they were in charge of, were far apart hence the difficulty in transportation.

Some of the respondents, specifically HSAs mentioned that they had other problems which included low salaries and poor housing facilities. Secret Women stated that they are challenged to conduct visitations during rainy season hence they needed rain coats and umbrellas.

The challenges mentioned by the different respondents have an influence on several factors that affect data quality. For instance, lack of resources (reporting forms) results in data gaps, meaning the data lacks completeness and consistency, and lack of knowledge which was observed in the non-intervention area would lead to inaccurate and unreliable data.

5.2.5. Discussion on Data Management

Management of data involves a number of activities such as collection of the data, movement of the data to different offices in a hierarchy for use in decision making, and information on progress to monitoring evaluation officers (Tayi, et al., 1998; Alshawi, et al., 2003; Mosse & Nielsen, 2004). In the process, there must be methods for ensuring data completeness, consistency and accuracy, so that the data is reliable (Biswas, et al., 2006; Pierce, 2007).

5.2.5.1. Data Collection

Data collection refers to a process of systematically gathering or capturing data (Cappiello, et al., 2004; WHO, 2005) using different tools such as observation, questionnaire, interview and a review of existing records according to WHO (2005). Reference.MD (n.d.) and BusinessDictionary (n.d.) further states that entry or logging data is part of the data collection process. Thereafter statistical data analysis is done to make sense of the collected data.

- *Availability of Data Collection Tools*

The non-intervention area had more respondents without data collection tools compared to the intervention area, but overall data collection tools were scarce (Health Department, 2011). As such, the respondents from the intervention area gave a negative response because at the time of the study they had not been provided with data collection tools.

Conventional and non-conventional Data Collection Tools were stated by the respondents and observed during visits to Chapananga area. The non-conventional data collection refers to note-paper and/ or notebooks used by Chiefs, Secret Women and sometimes used by health personnel and HSAs when the standard reporting forms were not available. Note-paper and notebooks do not have a well-established style of recording information compared to the forms used by HSAs and Facility Personnel. The disparity between the availability of data collection tools and the medium of keeping records implied that most of the respondents did not regard the forms and notebooks they were using as data collection tools, nor for keeping records.

- *Medium for Keeping Records*

The form of keeping records can either be electronic or paper-based (Della Mea, 2001; Blaschke, 2009), which can be referred to as the medium for keeping records. Since the study was in a remote rural area, standard reporting forms and plain note-paper/ notebooks were used as the medium for keeping records. The non-intervention area, specifically the HSAs did not have any forms or plain-note paper, thus rely on memory- an unreliable form of record keeping for a community. The respondents from the intervention area kept data using standard reporting forms, plain-note papers and notebooks. One respondent stated that, "*makope athu amatha kunyowa nthawi yamvula*" meaning "during rainy reason their notebooks/ documents get wet" thereby losing the recorded information which is a disadvantage of paper-based documents (Douglas, et al., 2005; Smith, et al., 2008).

- *Sources of Data*

The identification of sources of data correctly was the first step in achieving data quality in both the intervention and non-intervention area (LeMay & Bocock, 2012). Thus the data collected would be relevant. According to LeMay & Bocock (2012), there was a chance of collecting irrelevant data due to choice of data sources who might be difficult and provide unreliable data. The varied range of data sources providing data on the same variables would likely lead to inconsistencies and data duplication (Lippeveld, et al., 2000; Douglas, et al., 2005). Lippeveld, et al. (2000) discusses on planning (including identifying sources) for data collection which was another area that needed to be addressed in both the intervention and non-intervention areas.

Some of the mentioned sources, especially in the intervention area, were also entities that collect information. This meant the respondents (data collectors) would collect information from the required sources and also verify the data that has been recorded with the actual source.

- *Information Recorded*

It is very important that respondents know the information which they will be collecting and recording on maternal health from their sources to prevent collection of random and

unnecessary data which would be useless to the decision makers (MoHP, 2003; Mosse & Nielsen, 2004; Chao, et al., 2013). Information needs to be recorded on some kind of medium for preservation and safe keeping. The respondents from the non-intervention area had information which they recorded, but had no medium for keeping data and thus implying they rely on memory which affects data quality as they would not remember everything (Douglas, et al., 2005). However, the respondents from the intervention areas showed that they knew the information which they were supposed to record and this could be attributed to the training obtained.

5.2.5.2. Transitions of Data – Data compilation and Sending Data to Supervisors

Data compilation was another important milestone in data management since there was potentially room for errors when transferring between forms (paper-based system) due to fatigue or misreporting as expressed by Douglas, et al (2005). The personnel from the intervention area compiled the data themselves after they collect it from the sources. They then sent the data to their supervisor to compile a report for the whole area. Due to the different levels of compilation, data accuracy and consistency might be compromised thereby affecting decision making (Douglas et al., 2005; Smith et al., 2008). The challenge of accuracy and consistency could be eliminated by the use of mobile health (mHealth) where data is collected using a mobile phone and data is instantly transmitted to the central point through mobile phone network. The use of mHealth would enable instant data capture, removing the need for data entry and compilation (Douglas et al., 2003; Vota, 2009). The use of mHealth would also improve timeliness of data availability, as data will not be sent to supervisors for compilation which also consumes time (Vota, 2009).

Data is useful if it is sent within a specific time interval. Unfortunately, the respondents from the non-intervention area were not consistent with the time intervals for sending data. This would affect data quality, since the data might not reach the decision making personnel in time (Vota, 2008).

The respondents from both the intervention and non-intervention areas had challenges identifying their immediate senior person (supervisor) who was supposed to compile the data for their area. As a result, data sent to their immediate supervisor had a high

probability of being lost/misplaced. The chances of data being lost/misplaced were high in the non-intervention area since they did not even have proper data collection tools.

5.2.5.3. Accuracy and Reliability

Any data is important because it tells a story, but data that can be relied on needs to be accurate so as to enable critical decisions to be made from the data (Pierce, 2007; Noordam, 2011). Data accuracy was quantified highly from the respondents in the intervention area compared to the non-intervention area. This outcome might be due to that fact that the respondents in the intervention area had confidence in the data which they collected. Thus since they strived to follow the processes and procedures learned through the intervention, their perceptions were inclined to the fact that their data was accurate. The non-intervention area did not have data collection tools, hence do not have a formal way of keeping records and did not have any training which may lead to a perception of low accuracy in their data.

Reliability should be positively correlated with accuracy, therefore the respondents from the intervention area should have a high perception on the reliability of their data, as they thought their data was accurate (Bluman, 2012). The intervention area also had a higher perception of the reliability of their data compared to the non-intervention area. One of the issues was that the interpretation of the words *accuracy* and *reliability* might not have had a significant difference after questionnaires were translated to the native language (Chichewa). This might have skewed the results obtained. However, the perception of reliability from the intervention area showed that the respondents had more trust in the data which they collected.

Even though the respondents from intervention areas rated their data highly, there were still deviations observed in some instances, for example, a respondent would rate the data 'very accurate' and then rate the data 'reliable' instead of 'very accurate' and 'very reliable'. This could lead to questions as to whether these personnel actually collected data that can be used for decision making (Juran et al., 1998; Chao et al., 2013).

5.2.5.4. Problems / Challenges Encountered

The challenges faced by the respondents would have a great impact on data quality especially if the challenges are to do with resources (Juran et al., 1998; Douglas et al., 2005; Chao et al., 2013). The intervention area faced challenges such as stationary and lack of reporting forms, lack of training and knowledge which would all affect data quality. The result of these challenges would lead to data gaps, missing data and inaccurate information, hence lack of completeness and consistency (Brohman et al., 2003; Douglas et al., 2005). Despite the respondents in the intervention area perceiving their data as accurate, their challenges could lead to lack of accuracy.

The Health Personnel and HSAs had mentioned work overload as a challenge, but this could be attributed to the lack of providing integrated services as defined in the task shifting policy (MoH, 2014). Thus if an HSA is working on hygiene, the HSA should be able to conduct other tasks such as immunisation, data collection and provide maternal health services in their duty area. However multi-tasking would also lead to a heavy workload as the personnel would have a lot of tasks to handle.

The other challenges such as proper housing, salaries, rain coats/ umbrellas would aid in motivating the personnel to do their job enthusiastically which could indirectly affect data quality.

5.2.5.5. HMIS Success/Failure and Adoption

The HMIS in Malawi is likely to be a partial failure due to problems such as bad terrain which becomes worse during rainy season and affects data timeliness. This was also the case observed in the Pacific Islands (Lum On, et al., 2009).

The lack of adequate personnel in these rural remote areas was another cause for work overload, which made their job difficult, and the inclusion of data collection burdens their already overwhelming work schedule (Curlee et al., 1987; Lippeveld et al., 2000).

Data duplication was another cause for HMIS failure in Chapananga and on a larger scale Malawi, since there was no way of data verification. The same data can be collected by

two or more individuals, but there was no way to verify the data, hence the data appears as if there were more clients/patients (Lippeveld et al., 2000).

Lastly, HMIS adoption was another crucial aspect for HMIS success. The data management processes from data collection, transition and compilation while enforcing timeliness, analysis and presentation of data are important for HMIS adoption leading to success (Lippeveld, et al., 2000; Health Department, 2011). However the HMIS in Malawi, as evidenced in maternal health, lacks in the data collection process, timely transition and compilation of data which influences poor data analysis and presentation to decision makers. Thus it can be concluded that the system was poorly adopted by the users hence the HMIS is partially failing.

5.3. Comparison of Phase 2 and Phase 3

This section presents results on maternal health data management comparison between Phase 2 and Phase 3, for Chithumba, Gaga and Chang'ambika catchment areas. Specifically comparing and discussing Data Collection, Data Transition, Accuracy and Reliability, and Challenges Faced among HSAs, Health Personnel and Secret Women. Differences were expected due to the fact that some irrelevant variables were removed. Phase 3 was conducted about six months after Phase 2, hence differences would be expected due to interventions, such as training, infrastructure and provision of resources required in MNH, within that time period. Then lastly, the study discusses inclusion of Chiefs.

5.3.1. Health Surveillance Assistants (HSA)

5.3.1.1. Data Collection

All HSAs involved in Phase 2 stated that data collection tools were available, but only 35% of HSAs in Phase 3 indicated they had data collection tools. This inconsistency may have been due to training of HSAs by Phase 3 to appreciate forms as data collections tools. However, the forms may not have been available in some of the catchment areas during data collection, hence the negative response.

HSAs in both Phase 2 (88%) and Phase 3 (90%) found the data collection tools easy to understand. However, there was a discrepancy between Phase 2 (88%) and Phase 3 (80%) in terms of whether the data collection instruments were easy to complete, suggesting that some HSAs in Phase 3, despite indicating that the tools were easy to understand, had difficulty when completing them.

5.3.1.2. Sources of Data

There were differences between Phase 2 and 3 in the main source of data for HSAs, which was the community (44%) in Phase 2 but Secret Women (30%) in Phase 3. Secret Women were also mentioned as sources of data by 30% of respondents in Phase 2. There were other inconsistencies in data sources between Phase 2 and Phase 3, which could lead to inconsistent data with duplications in the data because a lot of sources were providing the same information.

5.3.1.3. Information Recorded

There was an improvement in the information recorded on MNH between Phase 2 and 3, e.g. 85% of HSAs stated that they recorded neonatal death in Phase 3, compared to zero in Phase 2. This correlates with the training conducted by the interventions in between Phase 2 and Phase 3.

5.3.1.4. Medium of keeping records

There was consistency in the medium for keeping records, i.e. form between Phase 2 (94%) and Phase 3 (95%).

5.3.1.5. Data Compilation

Data compilation between Phase 2 and Phase 3 showed inconsistencies in terms of personnel responsible for data compilation (100% in Phase 2 and 55% in Phase 3 stated SHSA).

5.3.1.6. Data Transition

Data transitions were not consistent between the phases because all HSAs in Phase 2 stated that they sent the data they have collected to their supervisors (SHSA) monthly,

who then compiles data from all HSAs to a single report which was sent to the District Health Office at the district hospital.

In Phase 3, HSAs indicated that they sent their data to the SHSA (55%) and Safe Motherhood Coordinator (30%). It was highly unlikely that data was sent straight to the Safe Motherhood Coordinator from an HSA. Such scenarios lead to missing data and overall inconsistent data in the HMIS.

5.3.1.7. Data Accuracy and Reliability

Data Accuracy

The perception of HSAs on data accuracy dropped between the phases (94% Phase 2 v 75% Phase 3). The HSAs in Phase 3 did not have as much confidence in their data. Since Phase 3 occurred after they had been trained by the intervention, their confidence in the data should have been more than in Phase 2, thus increased accuracy. However, this inconsistency might also be attributed to the fact that the HSAs had better appreciation of the lack of accuracy in their data after training.

Data reliability

Data reliability also dropped between the phases (100% Phase 2 v 75% Phase 3). Since accuracy and reliability should be positively correlated, there was consistency in the drop, but also lack of trust or probably better understanding of the lack of reliability in the data by the HSA. A drawback to the self-administered questionnaire in Phase 3 was that it was not possible to probe further on the drop in perceived accuracy and reliability after the interventions.

5.3.1.8. Challenges Encountered

The HSAs were asked about the challenges they met during data collection and also general challenges in doing their job.

The same challenges in data collection, e.g. transportation, stationary, workload etc, were evidenced in both phases, albeit at a slightly lower level in Phase 3. This suggests that despite the interventions, these challenges still persisted.

The general challenges were inconsistent between phases, with the main problems cited as lack of reporting forms (32% Phase 2 v 21% Phase 3) and inadequate resources (32% Phase 2v 25% Phase 3) in addition. Knowledge gap was noted more in Phase 3 (17% v 4% in Phase 2) suggesting that training may highlight to these staff the limited knowledge they have in relation to MNH e.g. family planning and HTC/ PMTCT.

5.3.2. Health Personnel

5.3.2.1. Data Collection

Health Personnel comprised of the medical assistants and nurses/midwifes. Phase 2 of the study had one medical assistant and one nurse/midwife, whereas Phase 3 had these two staff with the addition of another medical assistant. In both phases of the study, they stated that data collection tools were available except for the additional medical assistant in Phase 3, who did not respond. The health personnel in both phases stated that the data collection tools were not easy to use, since the registers were huge.

5.3.2.2. Sources of Data

In Phase 3, the health personnel were consistent with Phase 2 in their data sources.

5.3.2.3. Information Recorded

Additional data on post-natal data, neonatal deaths, HTC/PMTCT, tetanus and syphilis data were mentioned in Phase 3 incrementing on the data from Phase 2. The training offered by the intervention might be attributed to better knowledge of data recorded in Phase 3.

5.3.2.4. Medium for keeping records

There were inconsistencies between Phase 2 (health profiles/patient books & forms/plain paper) and Phase 3 (forms/registers and plain paper) in medium for keeping data; these

difference may be attributed to lack of comprehension of medium of keeping records. This was a drawback in the use of questionnaires to collect data hence no follow-up could be made for clarifications.

5.3.2.5. Data Compilation

All medical personnel in both Phase 2 and Phase 3 stated that they compile their own data which was required of the health personnel in the absence of a statistical clerk.

5.3.2.6. Data Transition

The intervals for sending data to the respondent's supervisor was consistent between Phase 2 and Phase 3, however the person to get the data from the health personnel varied from HMIS Officer, Safe Motherhood Coordinator to Statistical Clerk. This confusion of who gets the data may put it at risk of getting lost or a high probability of data duplication. This may imply that the training did not have any impact.

5.3.2.7. Data Accuracy and Reliability

There were some inconsistent outcomes of accuracy and reliability of the data between Phase 2 and Phase 3, however all the outcomes lean towards the data being questionable. The reasons for the discrepancies, given by the health personnel were that the data was not verified.

5.3.2.8. Challenges

Challenges faced by health personnel were consistent with those noted in Phases 2 and 3, i.e. transport, lack of forms etc, which suggests that these problems were not solved with the intervention. An added challenge in Phase 3 was work overload which was mentioned by all three medical personnel.

5.3.3. Secret Women

5.3.3.1. Data Collection

The Secret Women both in Phase 2 and Phase 3 of the study stated that they used notebooks to collect and store the information which they collect from the communities. The Secret Women were also consistency in their sources of data.

5.3.3.2. Information Recorded

The list of information recorded by Secret Women in both Phase 2 and Phase 3, e.g. name, date of visitation etc, was consistent despite the fact that they had not yet started collecting data during Phase 2.

5.3.3.3. Data Transition

The transition of data from Secret Women did not change between the phases, information on pregnant women was reported to the HSA.

5.3.3.4. Data Accuracy and Reliability

A comparison on accuracy and reliability for Secret Women could not be achieved as the Secret Women did not have any data during the second phase of the study.

5.3.3.5. Challenges

The Secret Women did not mention any challenges in data collection in both phases of the study. However inadequate resources (53%), lack of training (35%) and knowledge gap (6%) was mentioned in Phase 3 under challenges related to designated task, despite them being more relevant to data collection. The challenge of moving about the community was mentioned in Phase 2 in relation to their designated task, but not mentioned in Phase 3. The difference might have been because the intervention had taken care of the problem in training them how to effectively manage their communities.

5.3.4. Village Health Committees vs Chiefs

Village Health Committees (VHCs) were not fully active and those that would meet concentrated on matters other than maternal health. Furthermore, the VHCs mostly

comprised of Secret Women who would give the same responses which they gave above. It was therefore decided that VHCs should be excluded from the third phase of the study and replaced by chiefs who would provide basic information on maternal health about their community.

5.3.5. Discussion and Conclusion

The outcomes from Phase 2 and Phase 3 of the study had some differences when considering HSAs and Health Personnel. These personnel deviated from the information which they gave in Phase 2 of the study. Secret Women had slight deviations on some variables, but they were consistent in the information which they provided in Phase 2 and Phase 3.

There were positive deviations which were attributed to the interventions. The positive deviations were the ease to understand data collection tools and increase in reliability for HSAs, the reduction in challenges for Secret Women and information recorded by Health Personnel. The interventions included training in different aspects of their jobs, e.g. dealing with maternal health problems, case management and how to effectively collect data, as well as refresher courses on topics which these personnel already knew. SCHI also conducted evaluations periodically to assess whether their interventions were effective and these factors influenced better results.

The negative deviations were attributed to lack of understanding and knowledge of the respondents' job. As such those HSAs were not able to provide the required information. They either did not respond to questions or gave a response contrary to the situation on the ground which was a drawback of the use of a questionnaire. This aspect may explain some of the negative results attained in the third phase.

Challenges of work overload were observed in Phase 3, but this is not supposed to be the case with the requirement of using the integrated approach which relies on task shifting to provide better health services (MoH, 2014). However, vertical programmes such as WASH and SCHI-Interventions on MNH provide additional work to the personnel which still leads to work overload.

Summary for Chapananga Area

There were significant differences in the data management processes and procedures. The "Results and Discussion" summary data flow (Figure 5.11) for Chapananga area (Phase 3) was more complex compared to the data flow for Phase 2 and HMIS Officers. The complexity in the data flow resulted in more differences compared to the previous data flows summaries, implying inconsistencies in the data management processes and procedures. Although the data flow for Phase 3 was different, there were some similarities with that for Phase 2. The personnel and data attributes also had some similarities. The inconsistencies in data flows lead to poor data management processes and procedures, and poor data quality. The evaluation of data quality is presented in the following section (Chapter 6) to ascertain the consistency of the actual data managed.

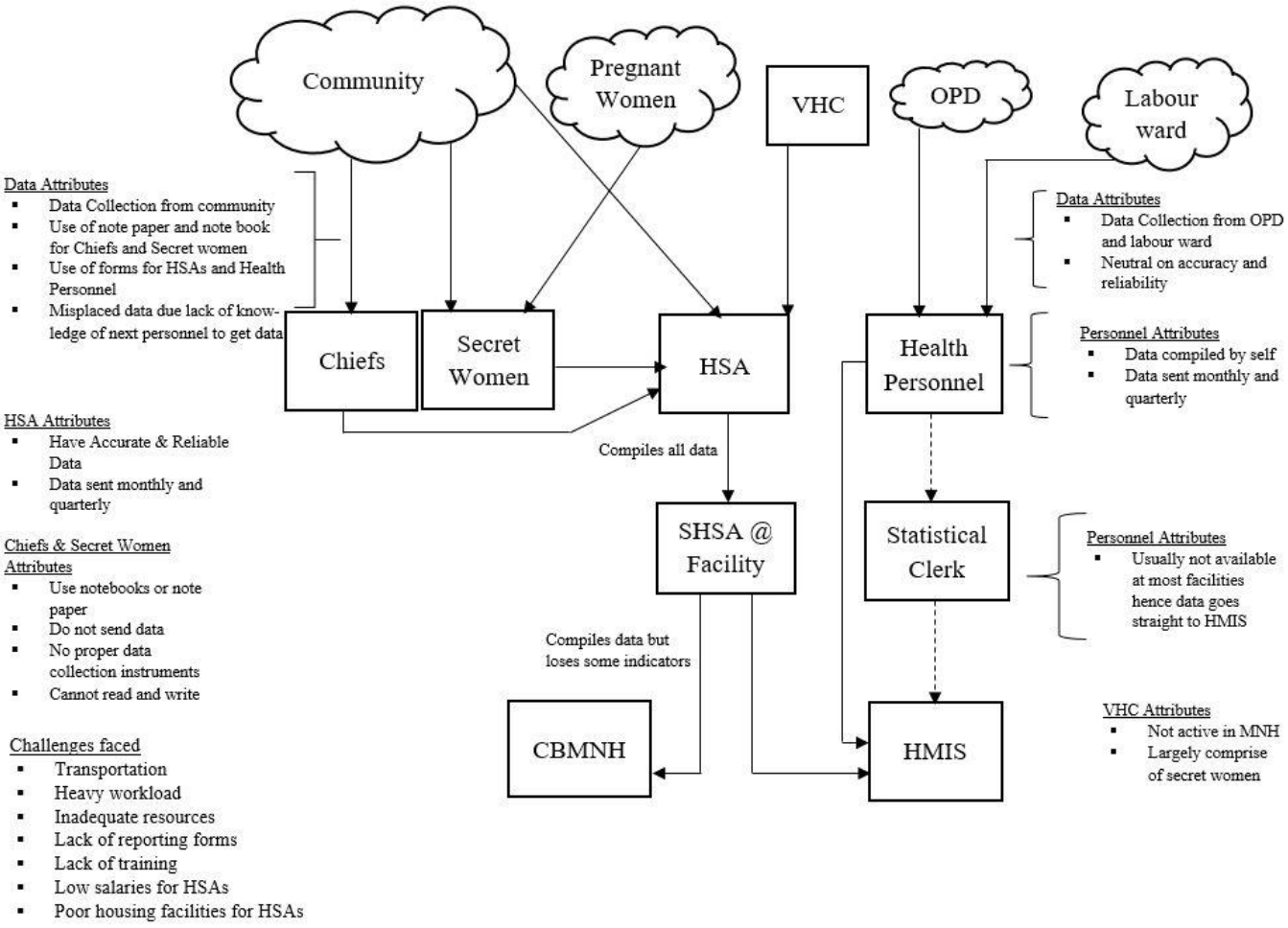


Figure 5.11: Summary of Results and Discussion for Chapananga Areas

Key: ⟶ = Actual data flow; ⇢ = Theoretical data flow;

OPD = Out-Patient Department;

VHC = Village Health Committee; HSA = Health Surveillance Assistant; SHSA = Senior Health Surveillance Assistant; Health Personnel = Medical Assistant and Nurse/Midwife;

CBMNH = Community-Based Maternal and Neonatal Health

HMIS = Health Management Information System

Chapter Six: Phase 3 - Comparative Analysis on Maternal Health Data

This section presents comparisons of maternal and neonatal data collected from the cadres defined in Section 6.0.1. below in Phase 3, to assess uniformity of the data for Traditional Authority Chapananga in Chikwawa District. Analysis of this data provides the opportunity to compare health workers' perceptions of the data, as discussed in Chapter 4 and 5, to the actual data found on the ground.

6.0.1. Phase 3 Samples and Data Collection

The same participants as described in Chapter 5 provided the data used for comparisons. The data was collected from health personnel, their corresponding HSAs working under them, and Chiefs and Secret Women working under the particular sampled HSAs. The HMIS, Safe Motherhood Programme (SMP), CBMNH and SCHI also provided data corresponding to the personnel sampled in the community.

Data was provided on new pregnancies, births, live births, maternal and neonatal deaths for a period of twelve months from April 2012 to March 2013. Some participants provided monthly and annual data, while others could only provide annual data, as summarised in Table 6.1.

Table 6.1: Monthly and Annual Data Provided by the Participants.

		Entity							
Area	*Facility*	*Secret Women*	*Chiefs*	*HSA*	*Facility Personnel**	*HMIS*	*SMP*	*CBMNH*	*SCHI*
Intervention	Chithumba	√	√	√√	√√	√√	√√	√√	√
	Chang'ambika	√	√	√√	√√	√√	√√	√√	√
	Gaga	√	√	√√	√√	√√	√√	√√	√
Non-intervention	Kakoma		√	√√	√√	√√	√√		
	Misomali		√	√√	√√	√√	√√		
	Chapananga		√	√√	√√	√√	√√		

√ - Annual Data Only; √√ - Monthly and Annual Data; *Health Personnel = Nurses / Midwives and Medical Assistant.

Secret Women, Chiefs and SCHI did not provide data for specific months; they only provided annual aggregates which were used in annual data comparisons.

Record sheets and data aggregates were collected from these personnel which made comparisons for uniformity possible. Monthly comparisons were carried out for the participants who provided monthly data and annual comparisons were also carried out to test uniformity on the annual aggregates.

6.1. Monthly Data Comparisons

The Chi-square test for homogeneity was carried out on the variables new pregnancy, births, and live births collected from HSAs (n=40), Health Facility Personnel (FP) (n=6), Safe Motherhood Programme (n=1), CBMNH (n=1) and HMIS (n=1) since they were able to provide monthly data. The HMIS, SMP and CBMNH Officers provided data on new pregnancies, births and live births for Chapananga area with respect to the HSAs and Health Personnel sampled.

Bar graphs were also used to visually portray whether there were differences. Similarities for maternal deaths and neonatal deaths were also evaluated using bar graphs, since there were not sufficient data points to conduct a chi-square test for homogeneity.

6.1.1. New Pregnancies, Births and Live Births

The following are hypotheses for the comparison with significance level $\alpha = 0.05$;

H_0: The distribution of *data* recorded with regard to months was similar (homogeneous) for the five groups (HSA, FP, HMIS, SMP and CBMNH)

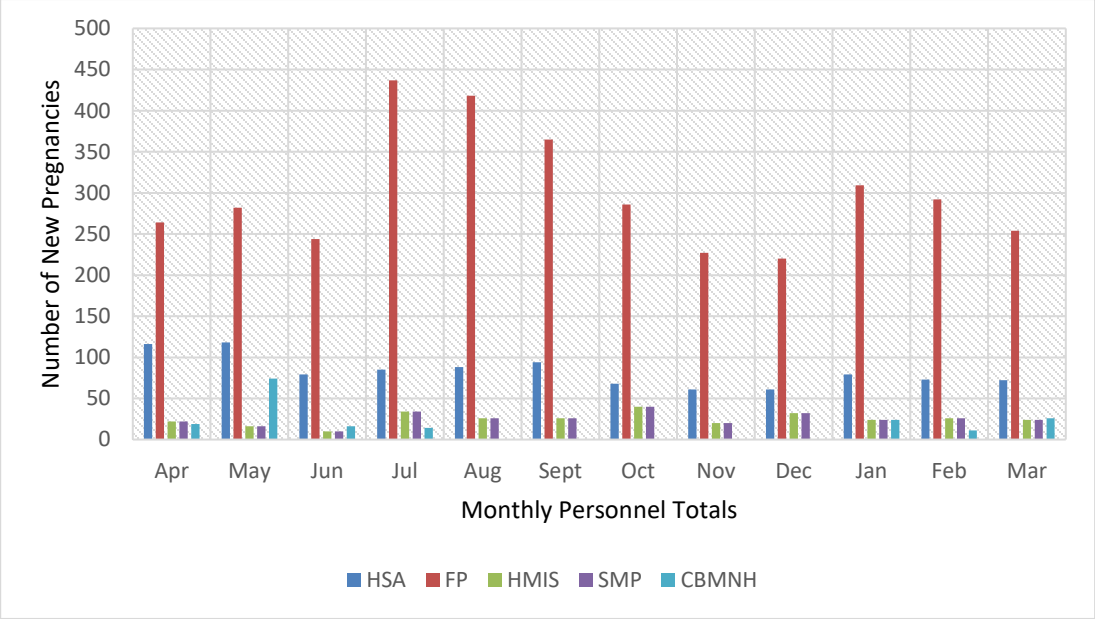
H_A: The distribution of *data* recorded with regard to months was not similar (heterogeneous) for the five groups (HSA, FP, HMIS, SMP and CBMNH),

- Where *data* = new pregnancies or births or live births.

Figure 6.1, 6.2 and 6.3 show differences in the recorded new pregnancies, births and live births respectively for the 12-month period. Variations in the recorded data were observed among all entities in data management with an exception of HMIS and SMP who use the

same database. There were differences in the data collected by different entities for new pregnancies, births and lives regardless of whether the data came from the intervention or non-intervention area.

The chi square test statistics for new pregnancies, births and live births, given in Table 6.2, further articulates and echoes the differences shown in the bar graphs. Since the P-Values were small for all the variables, it was therefore concluded that the distribution of new pregnancies, births and live births recorded with regards to months were not uniform among the different groups. Thus Chi-square test results concur with the bar graph which shows that there were differences in the data on new pregnancies.



Chi-Sq = 401.343, DF = 44, P-Value = 0.000

Figure 6.1: Monthly New Pregnancies: *HSA (n = 40), Health Personnel (FP) (n = 6), HMIS (n = 1), Safe Motherhood Programme (SMP) (n = 1) and CBMNH (n = 1).*

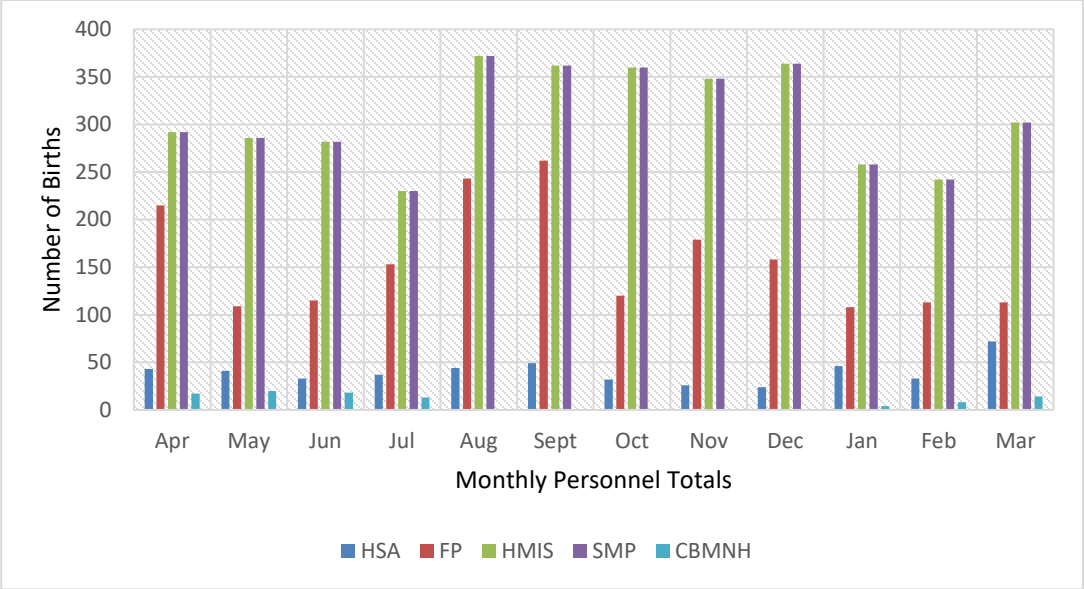


Figure 6.2: Monthly Births: *HSA (n = 40), Health Personnel (FP) (n = 6), HMIS (n = 1), Safe Motherhood Programme (SMP) (n = 1) and CBMNH (n = 1).*

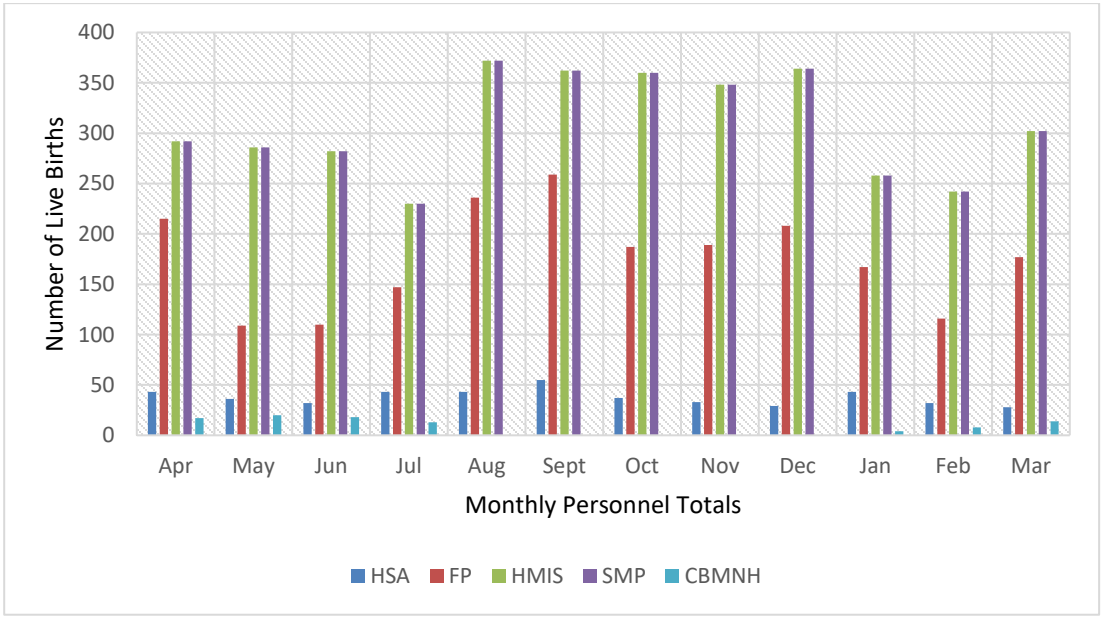


Figure 6.3: Monthly Live Births: *HSA (n = 40), Health Personnel (FP) (n = 6), HMIS (n = 1), Safe Motherhood Programme (SMP) (n = 1) and CBMNH (n = 1).*

Table 6.2: Chi-Square Test Statistics and P-Values.

Variable	*Chi-Sq*	*DF*	*P-Value*
New Pregnancies	401.343	44	< 0.0001
Births	282.801	44	= 0.000
Live Births	195.577	44	= 0.000

6.1.2. Comparison of Entities Two at Time

The comparisons were also done taking two groups of personnel at a time to check if at least some personnel's monthly data were similar. Table 6.3 shows the groups compared, chi-square value, degrees of freedom (DF), p-value and the remark of the comparison. The following hypotheses are generalised for all the comparisons with significance level $\alpha = 0.05$;

H_0: The distribution of *data* recorded with regard to months was similar (homogeneous) for groups *1* and groups *2*.

H_A: The distribution of *data* recorded with regard to months was not similar (heterogeneous) for groups *1* and groups *2*.

- Where *data* = new pregnancies or births or live births.

The null hypothesis was rejected comparing two entities for the three variables. There was no similarity/uniformity between any two groups of personnel compared for new pregnancies, births and live births. Thus monthly data sums were also not equal between two personnel groups selected which meant that there was no consistency in the data. The lack of consistency was observed in both the intervention and non-intervention area.

The initial steps in data collection occur within the community where the HSAs interact with Secret Women and Chiefs, hence they should have consistent data, but that was not the case. This might be due to lack of interaction/ communication between the entities which led to data duplication or miss-recording and affecting data uniformity.

Table 6.3: Comparing Two Groups at a Time for New Pregnancies, Births and Live Births.

			New Pregnancies		*Births*		*Live Births*		
groups 1	*groups 2*	*DF*	*Ch-sq Value*	*P-Value*	*Ch-sq Value*	*P-Value*	*Ch-sq Value*	*P-Value*	*Remark*
HSA	FP	11	50.617	<0.000	77.501	<0.000	23.032	<0.017	Reject H_0
HSA	HMIS	11	41.840	<0.000	51.923	<0.000	24.107	<0.012	Reject H_0
HSA	SMP	11	41.840	<0.000	51.923	<0.000	24.107	<0.012	Reject H_0
HSA	CBMNH	11	159.787	<0.000	72.097*	<0.000	84.023**	<0.000	Reject H_0
FP	HMIS	11	29.286	=0.002	93.021	<0.000	48.626	<0.000	Reject H_0
FP	SMP	11	29.286	=0.002	93.021	<0.000	48.626	<0.000	Reject H_0
FP	CBMNH	11	295.311	<0.000	123.017	<0.000	137.226	<0.000	Reject H_0
HMIS	CBMNH	11	180.015	<0.000	108.589	<0.000	108.586	<0.000	Reject H_0

*2 cells with expected count less than 5. **1 cell(s) with expected count less than 5.

The test comparing HSA and CBMNH for births and live births had 2 cells and 1 cell respectively with expected count less than 5. These cells in each case represent less than 20% of cells with expected count less than 5, hence the results were still valid (Pallant, 2005). Then we can conclude that the distributions of births recorded by *group 1* and *group 2* with regards to months was not similar for all groups compared which resulted in inconsistent data.

6.1.3. Maternal Deaths

Maternal death refers to the death of a pregnant woman during pregnancy or within 42 days of terminating the pregnancy without regard of where the death occurred (WHO, 2005). The cause of the death should be related to the pregnancy or the source of the death should be the pregnancy itself and also its management (WHO, 2005). Maternal death is also referred to as Maternal mortality, by definition in the MDG 5 objectives, which calls for a reduction in maternal mortality by 2015 (Sachs, et al., 2005; WHO, 2010).

Two deaths were reported in the 12-month period, one by an HSA in the month of April and the second in September by HMIS. The rest did not record any maternal death. Maternal deaths that occur within the community are usually reported by the HSA who alerts the Health Facility, whereas those at the Health Facility are reported by the Health Personnel and the information was passed to SMP, CBMNH and HMIS. In this case the death reported by an HSA, even if it might have occurred in the village, was not reported to the Health Facility which meant that there was no maternal death audit by the health personnel. The death reported by the HSA was also supposed to be report by the facility if the death audit had been carried out. The hierarchy of information was certainly not followed which may have lead to missing data hence lack of data quality. The data on maternal death was only provided by the personnel in the intervention area who were trained to report on such cases.

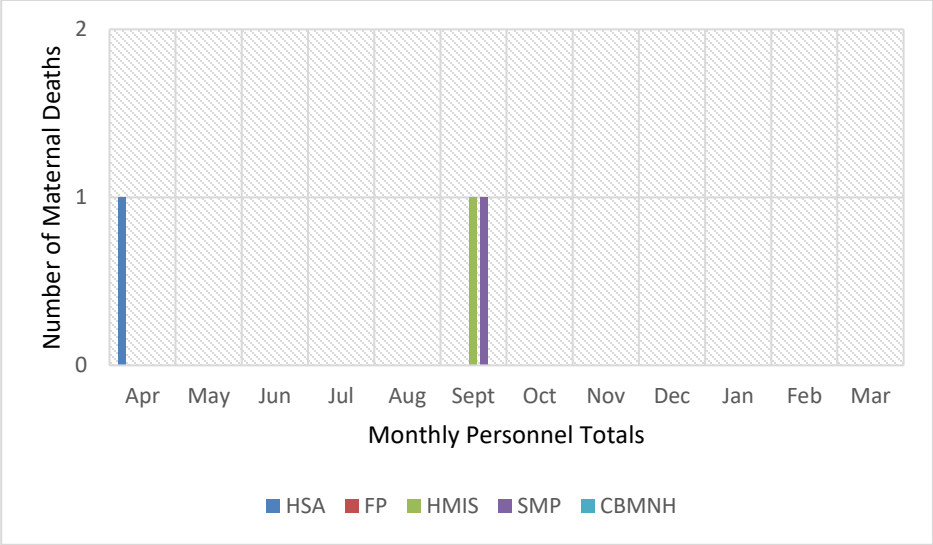


Figure 6.4: Monthly Maternal Deaths: *HSA (n = 40), Health Personnel (FP) (n = 6), HMIS (n = 1), Safe Motherhood Programme (SMP) (n = 1) and CBMNH (n = 1).*

6.1.4. Neonatal Deaths

Neonatal death, also defined as neonatal mortality, refers to the death of a new born baby within 28 day of the date of delivery (WHO, 2005; WHO, 2010).

HSA's reported six neonatal deaths and health personnel reported five neonatal deaths. The inconsistency observed could be as result of data duplication or one death had occurred within the community and never reported to the health facility. Furthermore, the rest of the entities did not record any neonatal death. HMIS lack of reporting can be attributed to the lack of timeliness of the data. The intervention area HSAs and Health Personnel had reported more neonatal deaths than those from the non-intervention area. This could be attributed to the recent training during the interventions hence they could easily classify and properly record neonatal deaths.

Monthly data on neonatal deaths lacks consistency which might have been due to lack of reporting forms and transportation, as discussed in Chapter 5, which affected timeliness of the data hence not reported by the district entities (HMIS, SMP and CBMNH) leading the differences noticed in Figure 6.5.

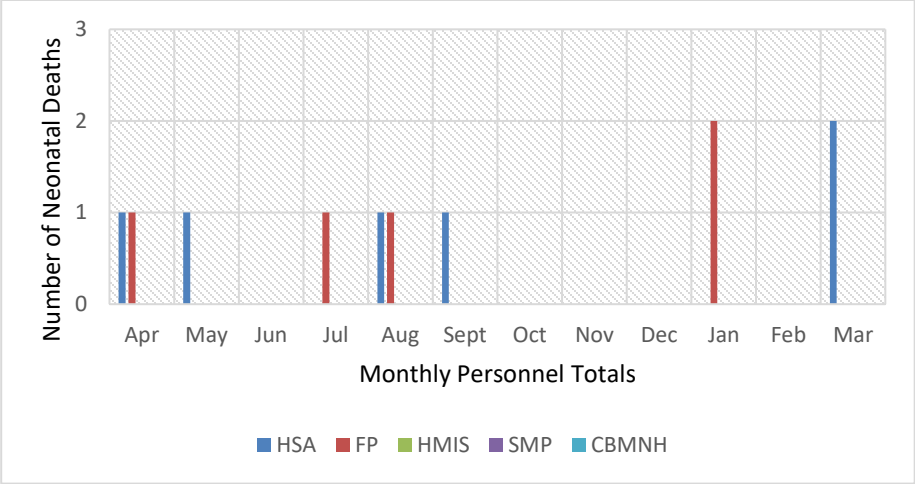


Figure 6.5: Monthly Neonatal Deaths: *HSA (n = 40), Health Personnel (FP) (n = 6), HMIS (n = 1), Safe Motherhood Programme (SMP) (n = 1) and CBMNH (n = 1).*

6.2. Annual Data Comparisons

Contingency tables, Chi-Square test and graphs were used on maternal health data (new pregnancy, births, and live births) in order to assess if there was uniformity in the data compiled annually. The personnel whose data was compared were Chiefs (n = 42), Secret Women (n = 17), HSA (n = 40), Health Facility Personnel (n = 6), HMIS (n= 1), SCHI (n = 1), Safe Motherhood Programme (n = 1) and CBMNH (n = 1) from Chithumba, Gaga, Chang'ambika, Kakoma, Misomali and Chapananga. Annual aggregates were available from Chiefs, Secret Women and SCHI, hence their inclusion for annual data comparisons. The similarities for maternal deaths and neonatal deaths were evaluated using frequency tables.

6.2.1. New Pregnancies, Births and Live Births Comparisons

Figure 6.6 shows that for Gaga Health Facility catchment area, the Facility Personnel registered 1576 new pregnancies in 12-month period. The other personnel groups registered lower numbers of pregnancies which were not consistent across the groups. Gaga registered a high number of new pregnancies because it was the only facility which had had a medical assistant and a midwife, hence pregnant women from the other areas

also attended antenatal care at Gaga. However, there was a risk that some women might have been counted in more than one month which increased the registered new pregnancies. The inconsistencies were also observed for births (figure 6.7) and live births (figure 6.8) in both the intervention and non-intervention areas.

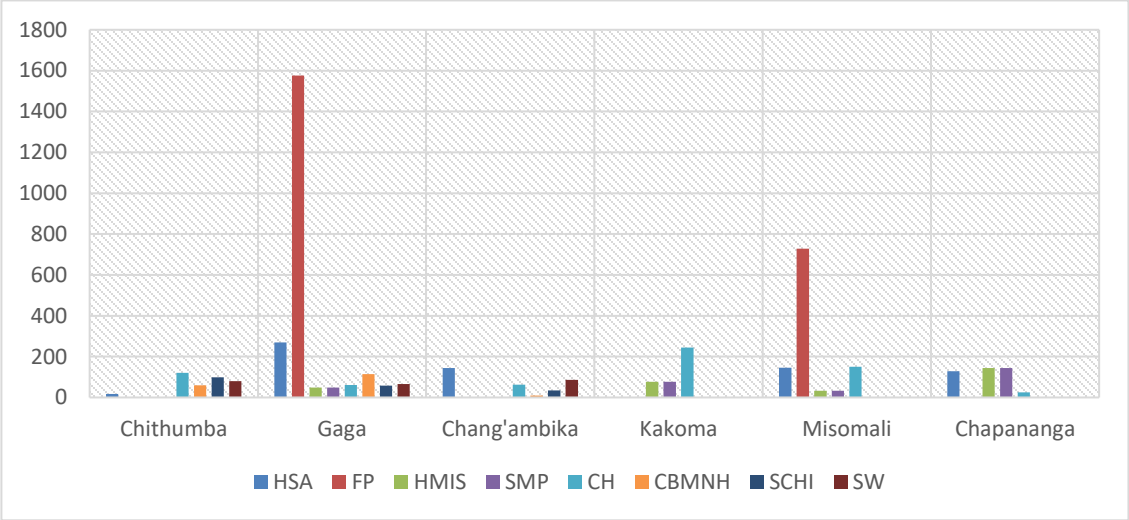


Figure 6.6: Annual New Pregnancy Aggregates by Health Facilities. *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

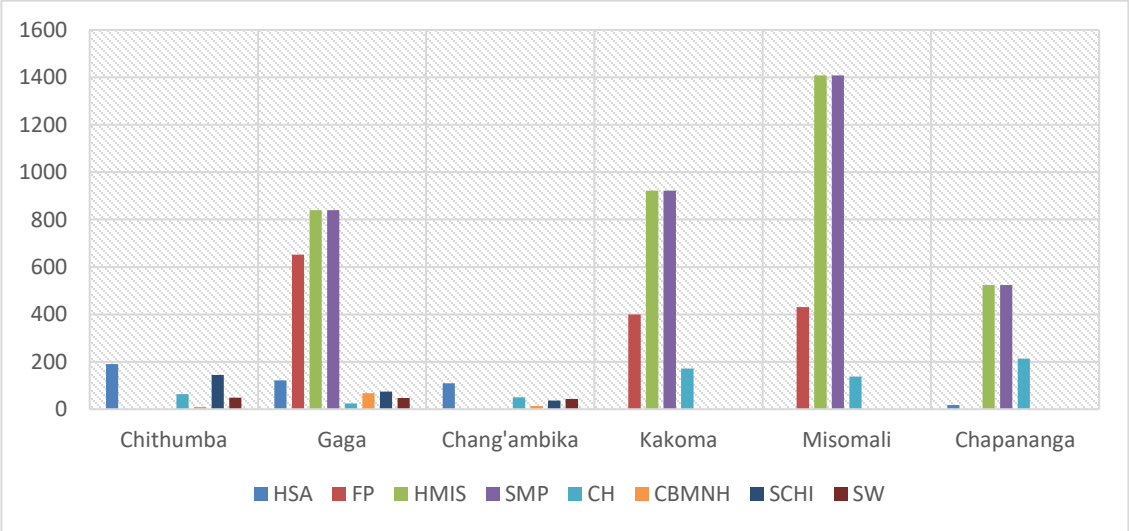


Figure 6.7: Annual Births Aggregates by Health Facilities. *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

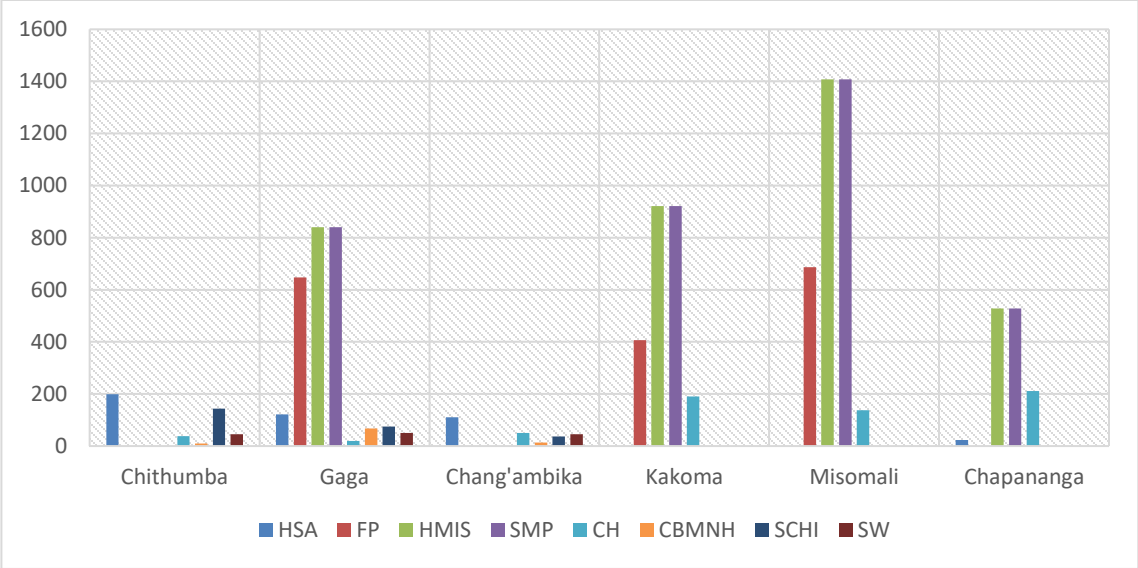


Figure 6.8: Annual Live Births Aggregates by Health Facilities. *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

6.2.2. Testing Similarities in Annual Data Aggregates

The Chi-Square test of homogeneity was also used to assess the similarities in the annual data aggregates for the new pregnancies, births and live births. The data was pooled in terms of intervention and non-intervention area. The entities of personnel were further categorised into three sections (Community, Health Personnel (FP) and District Health Office (DHO)). The results of the test were valid since the cross tabulation table did not have any cells with the expected count of less than 5.

The test was conducted at 5% level of significance and the tested hypotheses were as follows:

H_0: The distribution of *data* with regard to whether an area had interventions were similar (homogeneous) for the community, Facility Personnel and DHO.

H_A: The distribution of *data* with regard to whether an area had interventions were not similar (heterogeneous) for the community, Facility Personnel and DHO.

- Where *data* = new pregnancies or births or live births.

Table 6.4: New Pregnancies, Births and Live Births Data Comparisons by Area.

		New Pregnancies Data				Births				Live Births			
		Community	FP	DHO	Total	Community	FP	DHO	Total	Community	FP	DHO	Total
Intervention	Count	430	1576	184	2190	422	652	840	1914	431	647	840	1918
	% of Total	12.0%	43.9%	5.1%	61.0%	6.9%	10.7%	13.7%	31.4%	6.7%	10.1%	13.1%	29.9%
Non-intervention	Count	419	728	252	1399	523	831	2854	4208	540	1094	2858	4492
	% of Total	11.7%	20.3%	7.0%	39.0%	8.5%	13.6%	46.6%	68.7%	8.4%	17.1%	44.6%	70.1%
Total	Count	849	2304	238	3589	945	1483	3694	6122	971	1741	3698	6410
	% of Total	23.7%	64.2%	12.1%	100.0%	15.4%	24.2%	60.3%	100.0%	15.1%	27.2%	57.7%	100.0%

Where: Community – Chiefs, Secret Women, HSA, SCHI

FP – Facility Personnel (Medical Assistants and Nurses/ Midwives)

DHO – CBMNH, Safe Motherhood Programme (SMP), HMIS

Cell Contents: 0 cells have expected Count less than 5

0% of Total

Table 6.5: Chi-Square Test Statistics and P-Values for Comparisons by Area

Variable	*Chi-Sq*	*DF*	*P-Value*
New Pregnancies	156.11	2	< 0.000
Births	315.10	2	= 0.0001
Live Births	232.02	2	< 0.000

Since the P-Values for new pregnancies, births and live births were less than the Critical Value (0.000<0.05), the null hypothesis that the distribution of new pregnancies, births and live births were similar among the Community, Health Facility and DHO data, was rejected at 5% level of significance.

This therefore showed that the distributions of new pregnancies, births and live births for the Community, Health Facility and the DHO were significantly different regardless of whether it was the intervention or non-intervention areas. This agrees with the graphs above which show differences in a particular area among the groups of personnel.

6.2.3. Community Data Comparisons

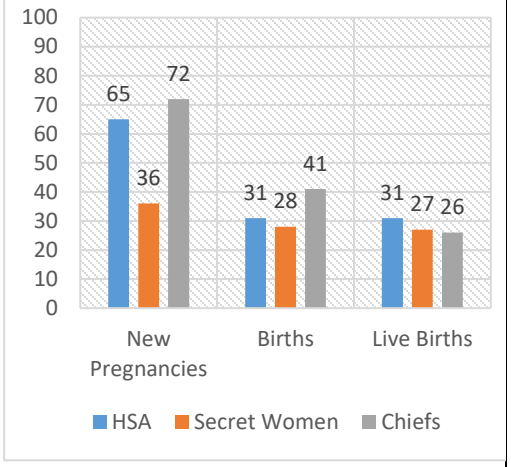
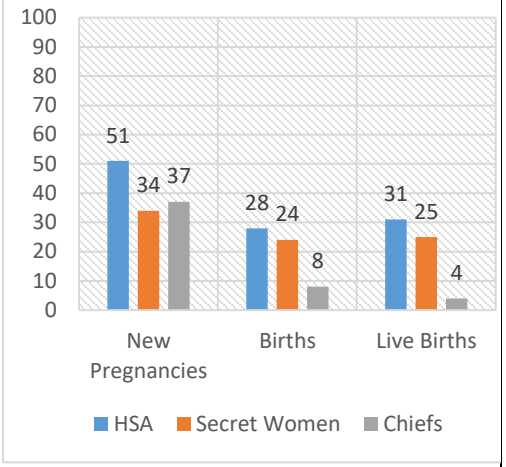
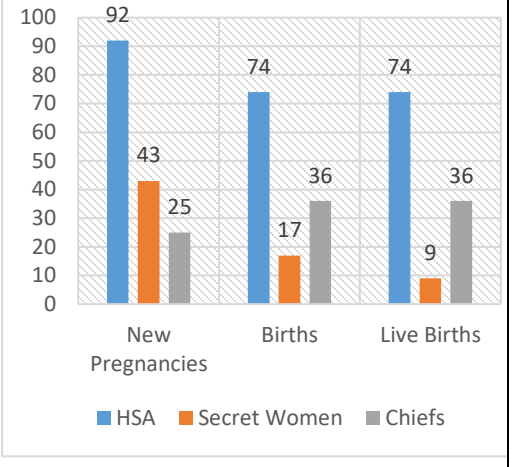
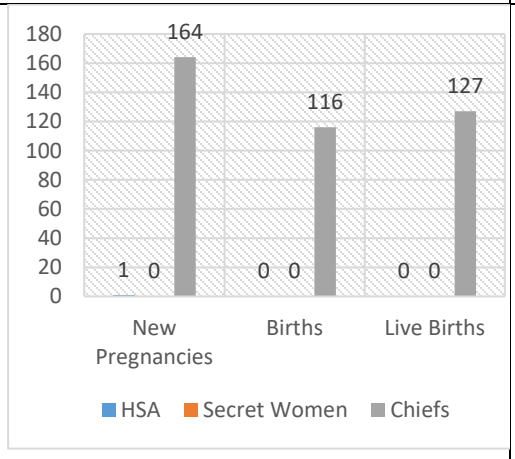
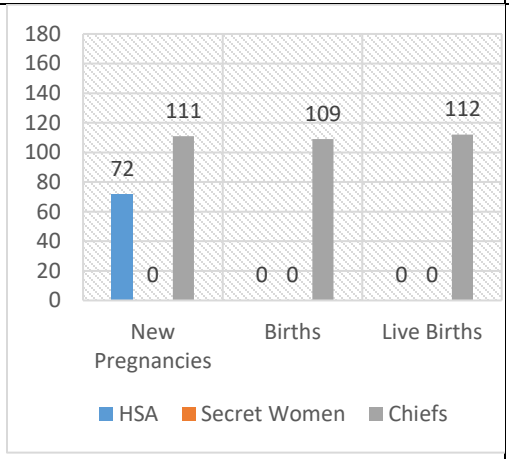
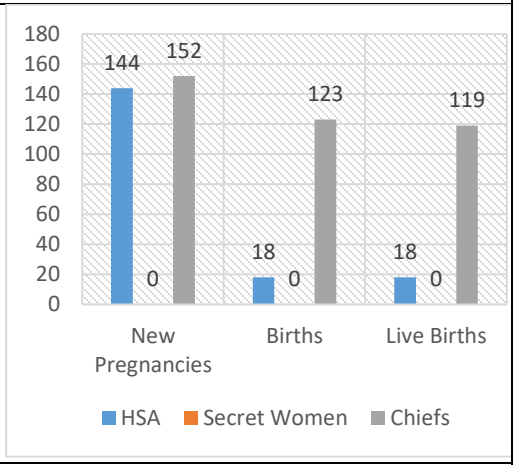
Data uniformity was further tested at community level among the cadres who collect data. An HSA was selected at random at each health facility and all chiefs and secret women in the HSAs catchment area were also selected in order to compare their annual aggregates. The comparisons were done for new pregnancies, births and live births in each of the health facilities.

Figures 6.9 – 6.14 show that there was a lack of uniformity in that data in all health facilities. Larger discrepancies were observed in the non-intervention area. There were fluctuations in the data among the personnel in the intervention area but the range was not too large. This could be attributed to the interventions that were conducted hence the reduced discrepancies.

6.2.4. Maternal Deaths

Aggregated information on annual maternal deaths by the different groups with respect to the intervention and non-intervention area shows that there were similarities for Chithumba on data collected and recorded by the HSA and SCHI. Another similarity was also noted for HMIS, SMP and Chiefs from Kakoma health facility. The other health facilities did not record any maternal death as seen in Table 6.6. The fact that other entities did not record any data poses a threat of data quality in terms of consistency, regardless of area.

Figures 6.9 – 6.14: Annual Aggregates Data Comparisons for Community Data Collection Personnel by Health Facility.

Intervention			
	Figure 6.9: Chithumba. *HSA (n=1), Secret Women (n=2) and Chiefs (n=2).*	Figure 6.10: Gaga. *HSA (n=1), Secret Women (n=3) and Chiefs (n=2).*	Figure 6.11: Chang'ambika. *HSA (n=1), Secret Women (n=2) and Chiefs (n=2).*
Non- Intervention			
	Figure 6.12: Kakoma. *HSA (n=1), Secret Women (n=0) and Chiefs (n=3).*	Figure 6.13: Misomali. *HSA (n=1), Secret Women (n=0) and Chiefs (n=2).*	Figure 6.14: Chapananga. *HSA (n=1), Secret Women (n=0) and Chiefs (n=4).*

6.2.5. Neonatal Deaths

Table 6.7 shows the aggregated annual neonatal deaths recorded by the different groups from the respective health facilities within intervention and non-intervention areas. For Chithumba, only the Chiefs stated that there were 4 neonatal deaths and for Kakoma, 16 neonatal deaths were reported by Chiefs. The neonatal deaths reported by chiefs may not have been reported to the health facility: they were not recorded by the health personnel. The other dimension could have been that chiefs may not have had a clear definition of a neonatal death, hence improper documentation of data. Similarities in neonatal death were noted among HSAs and health personnel at Gaga health facility. There were more neonatal deaths reported in the non-intervention areas compared to the intervention area and improper classification of the neonatal deaths could have led to the large numbers reported.

Table 6.6: Maternal deaths by Personnel in Health Facilities - *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

	Health Facility	HSA	FP*	HMIS	SMP	CH**	CBMNH	SCHI	SW***
Intervention Area	Chithumba	**1**	0	0	0	0	0	**1**	0
	Gaga	0	0	0	0	0	0	0	0
	Chang'ambika	0	0	0	0	0	0	0	0
Non-Intervention Area	Kakoma	0	0	**1**	**1**	**1**	0	0	0
	Misomali	0	0	0	0	0	0	0	0
	Chapananga	0	0	0	0	0	0	0	0

*Facility Personnel **Chiefs ***Secret Women

Table 6.7: Neonatal deaths by Personnel in Health Facilities - *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

	Health Facility	HSA	FP*	HMIS	SMP	CH**	CBMNH	SCHI	SW***
Intervention Area	Chithumba	0	0	0	0	**4**	0	0	3
	Gaga	**4**	**4**	0	0	0	0	0	1
	Chang'ambika	0	0	0	0	0	0	**1**	1
Non-Intervention Area	Kakoma	0	0	0	0	**16**	0	0	0
	Misomali	0	**1**	0	0	**2**	0	0	0
	Chapananga	**2**	0	0	0	**11**	0	0	0

*Facility Personnel **Chiefs ***Secret Women

Further exploration was done on the neonatal death by assessing the difference between births and live births from the data. Inconsistencies were expected. Major flaws in data quality were noticed since negative differences were obtained as shown in Figure 6.15. This inconsistence was likely due to improper classification of the births or carelessness when recording of the data leading to a wrong classification.

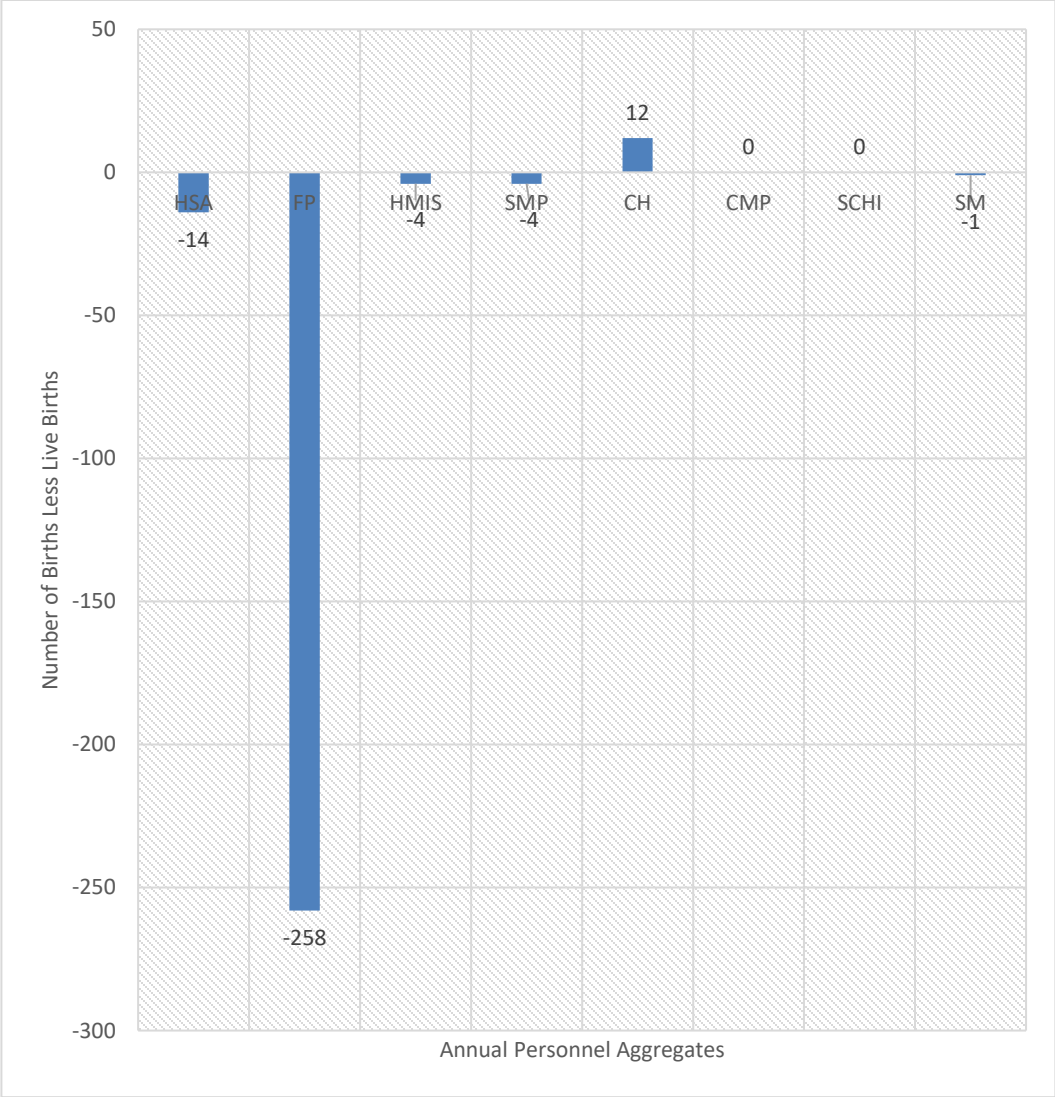


Figure 6.15: Difference of Births and Live Births - *HSA (n = 40), Health Personnel (n = 6), HMIS (n = 1), Safe Motherhood Programme (n = 1), CBMNH (n = 1), Chiefs (n=42) and Secret Women (n=17).*

6.3. Discussion and Conclusions

6.3.1. Data Quality

The data obtained for MNH in Chapananga did not satisfy data quality characteristics, making it difficult to use this data for planning maternal health progrmmes, monitoring and evaluating of existing progrmmes, and ultimately making target oriented decisions from the data (Juran, et al, 1998; Alshawi, et al., 2003; Chao, et al, 2013).

6.3.2. Accuracy and Reliability

A monthly comparison among all the groups (HSA, Secret Women, Health Personnel HMIS, SMP and CMP) on their figures for new pregnancies, births and live births showed they were significantly different. This means that the data collected from the groups were different and that it would be difficult to draw conclusions about information on new pregnancies, births and live births if all data from individual groups were tallied alongside each other.

Monthly data comparisons between two groups (e.g. HSA vs Facility Personnel) at a time also showed significant differences for new pregnancies, births and live births. This was also the case among personnel from the community such as Chiefs versus HSAs, Chiefs versus Secret women, and Secret women versus HSAs. According to the Southern Africa HIV and AIDS Information Dissemination Service (SAFAIDS) (n.d.) there are huge numbers of births as a result of adolescence pregnancies. The number of new pregnancies needs to be accurately recorded and should be reliable (Alshawi, et al., 2003; Pierce, 2007) among different groups so that proper decisions are executed (Graham, et al., 2008). On the contrary, the results obtained from Chapananga area in Chikwawa District show that the numbers of new pregnancies were different among Chiefs, Secret Women, HSAs, Health Personnel, Community-based Maternal and Neonatal Health programme, HMIS, Safe Motherhood Programme and SCHI. The results show that there were differences among the groups of personnel even after comparing annual aggregates of the data.

The number of births and live births also have to be accurate and reliable in order to be consistent (Pierce, 2007) within the different groups so that decisions made from this data

leads to appropriate actions being taken (Mosse & Nielsen, 2004). The data on births and live births from Chapananga area shows that the number of births and live births were different among Chiefs, Secret Women, HSAs, Health Personnel, Community-based Mobilisation programme, HMIS, Safe Motherhood Programme and SCHI. The results for births and live births were also different for the aggregated data among the personnel groups.

Maternal and neonatal deaths also have to be accurately reported such that the data is reliable and can be used in monitoring and evaluation of SDG's (United Nations, n.d.). There were significant differences in maternal and neonatal deaths data among the personnel (Chiefs, Secret Women, HSAs, Health Personnel, Community-based Mobilisation programme, HMIS, Safe Motherhood Programme and SCHI) in monthly as well as annual comparisons hence measuring maternal and neonatal death lacked accuracy and reliability.

The lack of accuracy and reliability of the data affected both the intervention and non-intervention areas. The differences in the data could arise for a number of reasons such as data gaps due to unavailability of data collection tool for HSAs, lack of knowledge on recording data, and lack of Health Personnel in most of the facilities to record data at facility level. The lack of proper referral system may have been another contributing factor. It was therefore questionable as to the accuracy and reliability of the data due to the differences, which means decision making and delivery of health care services were affected.

6.3.3. Consistency and Completeness

A comparison of monthly data among the HSAs, Health Personnel, HMIS, Safe Motherhood Programme and CBMNH Programme showed significant differences in new pregnancies, births, live births, maternal deaths and neonatal deaths. This means that the data that was collected in the community was significantly different among the community cadres that collect data and from that which was in the HMIS. Thus problems in data quality commence on data collection and transition up the chain to the DHO, hence the existence of data inconsistencies and incomplete data.

Annual data comparisons also showed differences in the data totals for Chiefs, Secret Women, HSAs, Health Personnel, Community-based Maternal and Neonatal Health programme, HMIS, Safe Motherhood Programme and SCHI. Furthermore, after pooling the data by categorising into Community, Health Facility and DHO data, differences were still found. Even if the data were consolidated for the whole year, completeness and consistency would still not be achieved.

The information on new pregnancies, births, and live births collected from all HSAs and corresponding personnel should have been the same or totals should have been the same from the community data moving up the hierarchy to HMIS, to indicate that inconsistencies had not occurred. However, data from the participants lacked consistency which was important with respect to the fact that decisions need to be made from the data (WHO, 2011). Further to the reasons on lack of consistency mentioned in the previous paragraph, mistakes made during data compilation which was done manually lead to errors and missing data/ data gaps. As recompilation was taking place at different levels in the hierarchy, there was a high probability of data loss leading to the difference evidenced.

Data on maternal deaths can be captured from different communities, public and private facilities, hospital wards, and is then reported to the HMIS (Abou-Zahr, 2003). The data has to be consistent or harmonized, such that upon production of annual reports, all groups provide the same figure thereby making decisions and district implementation plans an easy task (Hogan, et al., 1997). The data for Chapananga area shows a single death for the whole year which was noted by an HSA, which in comparison with annual data, there was an inconsistency since annual data showed that there were 2 maternal deaths recorded. A death was also noted by HMIS and SMP in the same month. It could be the same death reported by an HSA, but was recorded by HMIS late due to logistical problems of collecting data from the remote rural area. It might also be two different deaths noted differently. This showed that maternal death audits were not conducted to a certain the cause of the death and production of a report which would reduce the problem of double counting maternal deaths.

There were no differences in annual number of maternal deaths reported by HSAs, HMIS and Safe Motherhood Programme. For the period between April, 2012 and March, 2013, they all report a single death. Facility Personnel and the Community-Based Maternal and Neonatal Health Programme did not report any maternal death. This result of only one death occurring contradicts the monthly maternal death results which showed that HSAs reported a maternal death at a different time, prior to HMIS and Community-Based Maternal and Neonatal Health Programme which could imply that there were two deaths or there was a delay in the transition of data in the hierarchy.

These might not be the only maternal deaths, as some may not have been recorded because of lack of understanding of the definition of maternal death. Deaths which occur in the villages are usually hidden due to fear of repercussions or an HSA would not define the death as a maternal death in the absence of maternal death audits, hence missing or miss-recorded data. The inconsistencies observed between monthly data and annual data result in poor quality data that cannot be relied on during decision making processes.

Neonatal deaths are only supposed to be recorded by HSAs and Health Personnel. Both HSAs and Health Personnel recorded 6 and 5 deaths respectively, but with one similarity of the reporting in April 2012 and August 2012, whereas the other two deaths were reported in different months. Some areas had a death reported by an HSA, but not reported by the Health Personnel, which leads to differences in the data, thereby a source of discrepancy. The annual data showed the same figure for HSAs and Health Personnel, but with the inclusion of chiefs, entirely different figures were obtained. This was the case because neonatal death is difficult to classify by a layman.

The annual totals of neonatal deaths recorded were different among the personnel (Chiefs, Secret Women, HSAs, Health Personnel, CBMNH programme, HMIS, Safe Motherhood Programme and SCHI). Certainly there were some discrepancies which have led to distorted information on neonatal deaths. The number of neonatal deaths recorded may rise due to lack of comprehension of the definition of a neonatal health (WHO, 2010). This leads to inconsistencies in the data and decisions from such data would not provide the desired impact.

The deaths reported also bring questions when calculations of the differences between births and live births were done. It is expected that births should be equal to live births if there was no occurrence of neonatal death or else births should be more than live births if there occurred a neonatal death. However, births were less than live births which should not be the case. There was no data accuracy and consistency in the number of births and live births.

There were some instances where the number of neonatal deaths reported by chiefs was higher than stated by HSAs and Health Personnel. The most interesting scenario was the negative figures of the differences between births and live births, which imply that there were more live births than births. This could be attributed to the fact that live births were mis-recorded as births, by some personnel within the groups, which is normally the higher number.

In summary, the different personnel had different data, which suggests that the data was not complete for some personnel. Data completeness was another challenge in attaining data quality due to lack of data collection tools and transportation. The issue of data consistency and completeness was more likely to have a great impact in the non-intervention area other than the intervention area. However, both areas still faced data quality problems in terms of consistency and completeness.

6.3.4. Timeliness

The fact that some personnel reported more than others was an indication that data on new pregnancies, births, live births, maternal and neonatal deaths, may have not reached the other personnel in the hierarchy on time. Transition of data up the chain was usually delayed by late compilation by some personnel, unavailability of data collection tools and lack of transportation. The compiled data forms had to be physically carried to next personnel in the hierarchy from the remote area to the district and transportation was scarce. As such high levels in the hierarchy would not get the data in time which affected timeliness. The data transition in Chapananga lacked timeliness as the data moved up the hierarchy. Regardless of whether intervention or non-intervention area, timeliness was a drawback in the data transition. Timeliness affects use of the data as most times decisions

are time sensitive. Decisions were being made with inadequate information or without data.

Conclusion

The data comparisons on new pregnancies, births, live births, maternal deaths and neonatal deaths showed discrepancies among the different personnel. The comparisons were done on monthly and annual basis. The monthly data and annual data aggregates comparisons showed significant differences on the selected number of indicators in maternal and neonatal health as a result data quality was compromised. Data gaps, missing data, lack of transport and lack of data collection forms were the probable causes leading to the differences in the data. The data lacks consistency just as the data management processes and procedures also lack consistency as observed in flow charts seen in Chapter 4 and 5. The probable solution to the lack of data quality is to use eHealth / mHealth in data collection and management.

Chapter Seven: Conclusions and Recommendations

This chapter discusses conclusions and recommendations of the study.

7.1. Data Management and Data Consistency

Table 7.1 summarises attributes of Chapters 4-6 in order to draw out comparisons so that conclusions can be drawn and appropriate recommendations formulated.

Table 7.1: Data management and Consistency Synthesis

	Chapter 4: Phase 1 and 2	Chapter 5: Phase 3		Chapter 6: Phase 3
Data Attributes	Data was perceived accurate and reliable by the personnel (HMIS Officers, HSAs & Health Personnel) According HMIS Officers, measures to ensure accurate data was collected were in place, despite having challenges such as lack of reporting forms, MNH knowledge gaps, etc. Data gaps and Missing data from cadres evident.	Personnel still perceived data as accurate and reliable (more biased towards the intervention area). Challenges that would affect data quality were still observed i.e. lack of reporting forms, work overload, knowledge gaps, low salaries (low motivation). Data still had missing values and gaps among the personnel.		Five variables/ indicators in MNH (new pregnancies, births, live births, maternal deaths and neonatal deaths) were selected to test data uniformity/ consistency among community, health facility and DHO personnel Monthly and annual data comparisons were carried for data collected for 1 year. Contrary to perceptions in Chapter 4 and 5, data lacked accuracy and its reliability was questionable. Reasons: - Lack of comprehensions of indicators. - Lack of knowledge. - Fatigue due to heavy workload despite task shifting being encouraged. The data also lacked consistency and completeness Reasons: - Data compilation errors - Transition problems - Lack of report forms/ data collection tools Data did not achieve timeliness Reasons: - Logistical challenges - Delays in compilation by personnel - Unavailability of reporting forms
Data Collection	Some personnel were able to define data sources and information recorded. Data collection forms were easy to use for HSAs but not easy for Facility Personnel according to their perceptions. HMIS Officers did not have challenges with the data entry forms. Supervision on data collection was not adequate	A few personnel were also able to define data sources and information recorded, especially those in the intervention area. Intervention area personnel had data collection forms and recorded data on MNH. While non-intervention area did not have hence did not record any data.		
Indicators	Differences in indicators between data capture forms and data entry forms. Indicators were defined differently among data collectors. Indicators were lost during compilations (Data compilation affected data accuracy and consistency).	Data collection forms and entry forms had not changed hence differences in indicators still existed. Vital indicators were still lost in compilation		
Transition	Lack of knowledge of supervisors/ next person to get their data Delays in compilation affect timely data transition. Data was sent monthly and when required by HSAs and Health Personnel to HMIS.	Personnel still varied in the next person to get their data in the hierarchy. Data was compiled before sending hence that lead to errors. Data was still sent on monthly intervals by HSAs but quarterly intervals by SHSA and Health personnel. Logistical challenges still existed especially during rainy season.		
Data Use	Data was not adequate but it was still used for decision, according to data users. Reports lacked vital information due to a few indicators in the systems. HMIS achieving its objectives although data quality was questionable.	Challenges encountered posed a threat to data quality. This must have affected the use of data in decision making and monitoring and evaluation of programmes in MNH.		
Prognosis	Phase 1 and 2 had data that was perceived highly by the HMIS Officers and the cadres that collected data. However, the challenges faced and inconsistent data handling procedures indicated poor data quality. This agreed with some data users perceptions on the lack of data quality.	The issue of data handling inconsistencies were also evident in Phase 3 even after the interventions. However, the inconsistences were more pronounced in the non-intervention area. There were also inconsistencies in the flow of information as described in Phase 1 and 2 versus Phase 3. Most challenges that were described in Phase 1 and 2 persisted to Phase 3. Data quality was affected by these factors.		Due to the prognosis for Phase 1, 2 and 3 data management, actual data was collected and tested for uniformity. Maternal and neonatal health data in Chapananga lacked data quality. Reasons: - Challenges faced by personnel as expressed in Phase 1, 2 and 3. - Differences in the data flows among the phases imply inconsistencies in data management and therefore inconstancies in the actual data as seen in Chapter 6.

7.1.1. Data Management

The data to be collected from the community was defined by an excellent set of variables which concurs with those reported by HMN and MoH, which stated that the HMIS system had a set of variables that were rated highly (MoH & HMN, 2009). However, the study reveals that most of the data collectors did not have knowledge of the data to be collected despite training sessions which were provided by SCHI interventions on how to effectively collect data and the importance of the collected data. The interventions also trained the data collectors (HSA, Health Personnel) on how to compile the data in order to send it to their supervisor.

There has to be an effective transition to ensure that completeness, consistency and timeliness was achieved. Firstly, one has to ensure that no mistakes were made and there was no information left during the time forms move from one personnel to another, which is usually the case when the data is being compile to move the next personnel in the hierarchy. There was also lack of knowledge on the next person to get the data in the hierarchy which therefore leads to most HSAs just keeping the data or the data goes to the wrong individual thereby getting misplaced.

The data management process seemed to be passive within the hierarchy from the data collectors to the HMIS office since there was no adherence to process enforced on how data collection and flow of data should be conducted. This also had a bearing on the referral procedure where a patient was referred to the district hospital with just a piece of paper stating a patients' problem with no patients' history data. Thus there was no proper referral procedure backed by the patients' data. It was also noted that community data has minimal consideration which was evidenced by the lack of action on the inconsistent figures that were obtained.

Furthermore, the difference in responses by the participants in Phase 2 versus Phase 3 shows lack of consistency in how these personnel work. Even though some of the differences were changes in a positive way, these were usually out of chance as it would mean that given time for another survey, the responses would still differ. Given these differences in data management of the respondents, implied their actual data which they recorded also differed which also implied the lack of data quality for MNH data in Chapananga.

7.1.2. MNH Data Quality in Chapanaga

Data quality in Chapananga area was affected by the flaws in data management and challenges faced by the cadres in data collection. The monthly data comparisons were different for each entity (Secret Women, HSAs, Health Personnel, CBMNH, Safe Motherhood Programme/ HMIS). There were also differences in the data when two entities were compared at a time. Chi-Square test of Homogeneity was also used to compare annual data aggregates which also showed differences among the entities. Thus there was no data uniformity.

This meant that the data was of low and /or varying quality due to these differences. The quality of data was compromised because of a number of factors such as;

- Missing data / data gaps
- Incomplete reporting forms
- Lack of reporting forms
- Delays in data compilation
- Data compilation errors
- Transportation
- No and / or minimum supervision

7.1.2.1. Data Accuracy and Reliability

Accuracy of the data can barely be determined since the groups of personnel within their levels have significantly different data and it was therefore difficult to account for reliability of the data. Since some of the data was collected in the communities, accuracy needs to start with those who collect the data rather than guessing figures and filling the report forms. Since some HSAs felt that they had big workloads, they tend to forego data collection.

Data quality in this case specifically data consistency is affected by some of the factors discussed above and management of the data by those who are responsible for the data.

7.1.2.2.Data Completeness and Consistency

Data written on note-paper and in notebooks can easily be misplaced or destroyed leading to data gaps. One HSA had reported "*ma form anga anawonongeka pomwe nyumba yanga inagwa ndi mvula*", meaning that the reporting forms were destroyed during the rainy season because my house fell. This meant that the data from this HSA was lost and could not be retrieved. Data gaps for Maternal and Neonatal Health were due to reluctance of the personnel to fill in the questionnaire/ reporting forms which was also evidenced during data collection for this study.

Most of the reporting forms provided by HSAs and some by the Health Personnel were incomplete which means that there was some data missing from the forms which could be vital for the decision making processes.

The factors mentioned above such as missing data and data gaps, incomplete reporting forms and lack of reporting forms lead to incomplete data which can pose problems in monitoring and evaluation, and therefore poor decision making due to insufficient information. Data consistency was not observed as the data collected was significantly different (inconsistent) among all personnel groups and between personnel groups.

Furthermore, there are some challenges that affect data collection, accuracy, completeness and consistency, leading to low quality data. Reporting forms were not usually available which led to data gaps. The lack of knowledge on data to be collected and its importance resulted in some data missing after compiling the data. This meant that incomplete and inconsistent data records were sent to the next level in the hierarchy.

Inconsistencies were also as a result of compiling the data, where the data variables required in the compilation form were less than those on the reporting forms which means some data was left out. In addition to these challenges which led to low quality data in maternal health, report forms were difficult to store since paper degrades as times goes by and can easily get destroyed.

7.1.2.3.Timeliness and Transportation

Transportation was one of the vital elements since data should be moved to the DHO where managers would use it for planning and making decision for the area where data

has come from. Transport to and from these areas was scarce or not available at all, and the situation is worst during the rainy season. This affects the dispatch and collection of reporting forms to and from these health facilities. Furthermore, there are long distances from the health facilities to some villages as well as between villages and an HSA usually has a catchment area of a minimum of three villages (population of 1000 – 2000 people) which makes their job challenging.

Timeliness of the data was usually affected by the delay in provision and collection of reporting forms. Transportation contributed much on the timeliness of the data since the reporting forms had to be collected from the health facilities and lack of transport delays the movement of the reporting forms. Other HSAs delayed in compilation of their data contributing to the untimeliness of data. This then affects the data compilation at the health facility which delays data sending to the DHO. This was another reason for data inconsistencies in the monthly and annual comparisons.

Furthermore, the data was mostly not sent in time to the next level in the hierarchy. Delays that were observed from the data collectors led to delays in all levels in the hierarchy in which the data moves.

7.1.2.4.Supervision

Supervisors of the HSAs and Health Personnel are situated at the DHO and it is therefore difficult to conduct supervision on a daily basis due to the distance and transportation challenges to these health facilities. As such, HSAs and health personnel have a job for which one has to be self-motivated since they work under no or minimal supervision. However, these people were found to be demotivated because they have poor housing facilities and low salaries which affects their core job and lifestyle, and subsequently the data collection process. As a result, they provide poor and inaccurate data which is not reliable.

Another problem that surfaces due to no or minimal supervision was that some data collectors tend to be lazy and not collect data by taking advantage that no-one will supervise them resulting in data gaps.

7.2. Conclusion

The following points summarise the data management and data consistency in Chapananga;

- Data collectors did not have knowledge of the data to be collected despite the training through the interventions.
- There was lack of knowledge of the next person in the hierarchy to get their data.
- Personnel were reluctant to fill in reporting forms.
- Personnel did not adhere to data management processes and procedures and their responses showed lack of consistency in their work flow.
- There was no proper patient referral procedure backed by patient data.
- Community data had minimal consideration and hence was barely used for decision making.
- Actual data recorded differed among the personnel, hence the data was of low and/ or varying quality.
- Data quality was compromised due to missing data/ data gaps, incomplete reporting forms, unavailability of reporting forms, delays in compilation, data compilation errors, scarce transportation and no and/ or minimum supervision.
- Data on note-paper and in notebooks could easily misplaced or destroyed.
- Incomplete and inconsistent data posed problems in monitoring and evaluation leading to poor decision making.
- Transition of the data was a challenge due to lack of transportation and affected data timeliness.
- Data indicators on compilation forms were fewer than those on the reporting forms.

7.3. Recommendations

The recommendations of the study are as follows;

- There is need to provide important resources such stationary and reporting forms in good time and in adequate numbers to ensure that there are no data gaps because of unavailability of these resources; provision of supplies should be adequate to last through the rainy season.
- Provision of training in MNH to new officers and refresher courses to those already in the system to instill procedures, as well as review work that is being done.

- The recommendation is that there is need to provide basic needs (proper housing and a good salary) and probably an incentive (such as hardship allowance) for HSAs and health personnel so that they are well motivated to do their job.
- The use of eHealth/mHealth (phones for health workers, touch screen technology for health facilities) in data collection and transition could reduce inconsistencies, increase data completeness and improve timeliness of the data submission. The eHealth/mHealth platform should be built, and integrated with the patient management system used at district level, for the rural communities.
- Since data collection is done on forms, it is cumbersome to go through all the forms to check for the discrepancy which can easily be solved using eHealth/mHealth during entry (Douglas, 2005). Further discussion on eHealth/mHealth is in section 2.7.
- There is also need to consider the impact of training since the level of training content might not be appropriate as well as participants not suitable for training.

7.4. Further Study

Three concepts are recommended for further study:

- A replica of the same study should be carried out in a randomly selected district in the central and northern region of Malawi to assess data management and consistency in all regions.
- Development of an independent and streamlined data collection system using MoH guidelines ensuring proper referrals and transitions in the data to prevent discrepancies and carry out pilot study in a rural area such as Chapananga
- The study recommends creating an mHealth protocol for collecting data on maternal and neonatal health in the rural areas which would be linked with the health management information system at the district health office, then testing the effectiveness of the data management system on data quality.

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Appendices

Appendix 1: Data Collection Tools for the Community

Appendix 1a: Questionnaire for HSA on Maternal Health Data Management

I am Ansley Kasambara, a Staff Associate at the Malawi Polytechnic in Blantyre. I am working in conjunction the Scotland Chikwawa Health Initiative on a Safe Motherhood project. We are talking to Secret Women/ TBAs, HSA's, Midwives, Clinical Officers, Safe Motherhood Coordinators, and Health Management Information system (HMIS) Officers on Data management for maternal health.

You have been selected to fill this questionnaire by a chance selection process. I would like you to answer some questions on this questionnaire. You may leave blank some questions which you do not want to answer or choose not to participate in the study entirely. This will last approximately 30 - 45 minutes. The information we collect from you will not be shown to anyone outside this project.

If you have any questions about this study, we will leave you our contact details.

Part One A **QID: . . . . . .**

Monthly Information							
Data Element	**April '12**	**May '12**	**Jun '12**	**Jul '12**	**Aug '12**	**Sept '12**	**TOTAL**
1. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies registered each month?)*							
2. Kodi mwatumizapo amayi angati kuchipatala chifukwa cha chiopsezo ngakhale chimodzi chimene mwachiona chokhudzana ndi pakati pomwe iwo ali napo? *(What is number of pregnant women with at least one danger sign referred by an HSA to a health facility?)*							
3. Kodi ndi amayi angati amene amakhala atakonzetsera za kuberaka pakati pomwe iwo ali napo mu miyezi itatu yomaliza (za kumalo kumene iwo akaberekere, mayendedwe, komanso ndalama) *(What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money))*							
4. Kodi ndi amayi anagati amene mwawayendera ngakhale kamodzi kokha pa miyezi itatu ili yonse komanso makamaka miyezi itatu yomaliza ya pakati pamene iwo ali napo? *(What is number of pregnant women who receive at least one home visit by an HSA in each trimester by the end of third trimester)*							
5. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have registered for each month)*							
6. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							

7. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
8. Kodi mwezi uno mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
9. Kodi ndi amayi angati amene aberekera kunyumba amene inu mwawayendera pasanathe maola 24 chiberekereni? *(What is number of women who delivered at home who received postnatal home visit within 24 hours of delivery by a HSA)*							
10. Kodi ndi amayi angati amene mumawayendera kunyumba kwao pakatha masiku atatu chiberekereni? *(What is number of women who receive at least **1 postnatal home visit** by an HSA within **3 days** of delivery)*							
11. Kodi ndi amayi angati amene mumawayendera kunyumba kwao kokwana kawiri mmasiku eight chiberekereni? *(What is number of women who receive at least **2 postnatal home visits** by an HSA within **8 days** of delivery)*							
12. Kodi ndi amayi angati amene mwalembera kuti abereka mwezi uli wonse (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) registered by HSAs this month)*							
13. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) registered by HSAs each month)*							
14. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home registered by HSAs each month)*							
15. Kodi ndi ana angati ongobadwa kumene amene mwawayendera pasanathe maola 24 chibadwire? *(What is number of newborns born at home who receive a home visit by an HSA within 24 hours of delivery)*							
16. Kodi ndi ana angati ongobadwa kumene amene ali otsika sikelo (sikelo yosakwana 2,500g) amene mwawayendera pasanathe masiku eight chibadwire? *(What is number of newborns identified as LBW (<2,500g) by HSA within **8 days** of delivery)*							
17. Kodi mwatumizapo ana angati kuchipatala amene angobadwa kumene ndipo ali ndi chizindikilo ngakhale chimodzi chakuti ali ndi vuto? *(What is number of newborns with at least one danger sign referred by an HSA to a health facility)*							
18. Kodi mwatumizapo ana ongobadwa kumene komanso otsika sikelo (sikelo yosakwana 2,500g) angati ku chisamaliro chowonjezera ku chipatala? *(What is number of LBW newborns (<2,000 g) who are referred for additional care)*							

19. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku atatu chibadwire, ngakhale kamodzi kokha? *(What is number of newborns who receive at least **1 home visit** from an HSA within **3 days** of delivery)*							
20. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku eight chibadwire, ngakhale kawiri kokha? *(What is number of newborns who receive at least **2 home visits** from an HSA within **8 days** of delivery)*							
21. Kodi ndi ana angati omwe amabadwa olemera mopelewera (pakati pa 2000g ndi 2500g) omwe amayamba KMC. *(What is number of eligible LBW (between 2000g and 2500g) initiating community KMC)*							
22. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							
23. Kodi ndi amayi anagati amene amwalira ali oyembekezera pa mwezi uli wonse? *(How many maternal deaths occurred each month?)*							
24. Kodi kwachitika imfa zingati za ana ongobadwa kumene mwezi uli wonse? *(How many neonatal deaths occurred each month?)*							
25. Kodi ndi amayi angati amene akaberekera ku malo awa? *(How many women delivered at the following places?)* > Kuchipatala *(Health Center)* . . . . . ___ > Munjira *(In transit)* . . . . . ___ > Kwa zamba / kunyumba *(TBA / Home*) . . . . . ___ > Ku chipatala china.*(Other Health Center)* . . . . ___							
26. Kodi ndi amayi anngati amene abereka kupyolera mu njira zotsatirazi? *(How many women delivered through the following methods?)* > Kuchira bwinobwino *(Normal delivery)* . . . . . ___ > Mwana anakhala udyo *(Breech)* . . . . . ___ > *(Spontaneous vaginal)* . . . . . ___ > Mpeni *(Caesarean section)*. . . . . ___ > *(Vacuum extraction)*. . . . . ___							

Part One B **QID: . . . . . .**

Monthly Information

Data Element	Oct '12	Nov '12	Dec '12	Jan '13	Feb '13	Mar '13	TOTAL
27. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies registered each month?)*							
28. Kodi mwatumizapo amayi angati kuchipatala chifukwa cha chiopsezo ngakhale chimodzi chimene mwachiona chokhudzana ndi pakati pomwe iwo ali napo?							

(What is number of pregnant women with at least one danger sign referred by an HSA to a health facility?)							
29. Kodi ndi amayi angati amene amakhala atakonzetsera za kuberaka pakati pomwe iwo ali napo mu miyezi itatu yomaliza (za kumalo kumene iwo akaberekere, mayendedwe, komanso ndalama) *(What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money))*							
30. Kodi ndi amayi anagati amene mwawayendera ngakhale kamodzi kokha pa miyezi itatu ili yonse komanso makamaka miyezi itatu yomaliza ya pakati pamene iwo ali napo? *(What is number of pregnant women who receive at least one home visit by an HSA in each trimester by the end of third trimester)*							
31. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have registered for each month)*							
32. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							
33. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
34. Kodi mwezi uno mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
35. Kodi ndi amayi angati amene aberekera kunyumba amene inu mwawayendera pasanathe maola 24 chiberekereni? *(What is number of women who delivered at home who received postnatal home visit within 24 hours of delivery by a HSA)*							
36. Kodi ndi amayi angati amene mumawayendera kunyumba kwao pakatha masiku atatu chiberekereni? *(What is number of women who receive at least **1 postnatal home visit** by an HSA within **3 days** of delivery)*							
37. Kodi ndi amayi angati amene mumawayendera kunyumba kwao kokwana kawiri mmasiku eight chiberekereni? *(What is number of women who receive at least **2 postnatal home visits** by an HSA within **8 days** of delivery)*							
38. Kodi ndi amayi angati amene mwalembera kuti abereka mwezi uno (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) registered by HSAs this month)*							
39. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) registered by HSAs each month)*							

40. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home registered by HSAs each month)*							
41. Kodi ndi ana angati ongobadwa kumene amene mwawayendera pasanathe maola 24 chibadwire? *(What is number of newborns born at home who receive a home visit by an HSA within 24 hours of delivery)*							
42. Kodi ndi ana angati ongobadwa kumene amene ali otsika sikelo (sikelo yosakwana 2,500g) amene mwawayendera pasanathe masiku eight chibadwire? *(What is number of newborns identified as LBW (<2,500g) by HSA within **8 days** of delivery)*							
43. Kodi mwatumizapo ana angati kuchipatala amene angobadwa kumene ndipo ali ndi chizindikilo ngakhale chimodzi chakuti ali ndi vuto? *(What is number of newborns with at least one danger sign referred by an HSA to a health facility)*							
44. Kodi mwatumizapo ana ongobadwa kumene komanso otsika sikelo (sikelo yosakwana 2,500g) angati ku chisamaliro chowonjezera ku chipatala? *(What is number of LBW newborns (<2,000 g) who are referred for additional care)*							
45. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku atatu chibadwire, ngakhale kamodzi kokha? *(What is number of newborns who receive at least **1 home visit** from an HSA within **3 days** of delivery)*							
46. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku eight chibadwire, ngakhale kawiri kokha? *(What is number of newborns who receive at least **2 home visits** from an HSA within **8 days** of delivery)*							
47. Kodi ndi ana angati omwe amabadwa olemera mopelewera (pakati pa 2000g ndi 2500g) omwe amayamba KMC. *(What is number of eligible LBW (between 2000g and 2500g) initiating community KMC)*							
48. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							
49. Kodi ndi amayi anagati amene amwalira ali oyembekezera pa mwezi uli wonse? *(How many maternal deaths occurred each month?)*							
50. Kodi kwachitika imfa zingati za ana ongobadwa kumene mwezi uli wonse? *(How many neonatal deaths occurred each month?)*							
51. Kodi ndi amayi angati amene akaberekera ku malo awa? *(How many women delivered at the following places?)* > Kuchipatala *(Health Center)* . . . . . ___ > Munjira *(In transit)* . . . . . ___ > Kwa zamba / kunyumba *(TBA / Home)* . . . . . ___ > Ku chipatala china.*(Other Health Center)* . . . . ___							

52. Kodi ndi amayi anngati amene abereka kupyolera mu njira zotsatirazi? *(How many women delivered through the following methods?)*							
> Kuchira bwinobwino *(Normal delivery)*	___	___	___	___	___	___	___
> Mwana anakhala udyo *(Breech)*	___	___	___	___	___	___	___
> *(Spontaneous vaginal)*	___	___	___	___	___	___	___
> Mpeni *(Caesarean section)*.	___	___	___	___	___	___	___
> *(Vacuum extraction)*.	___	___	___	___	___	___	___

Part Two **QID: . . . . . .**

Section 1: Personal Information

1. Health Facility Name

2.Zaka za kubadwa (Age)

3.Highest Level of Education

4.Gender **M** **F**

Section 2: Professional Information			
Question	**Answers**	**Tick**	**GoTo**
1. Kodi mwagwira ntchito ya zaumoyo nthawi yayitali bwanji? *(How long have you been a Health Surveillance Assistant?)*	zaka zochepera chimodzi *(< 1yr)* . . . . . Pakati pa chaka 1 ndi 2 *(1<Yr<2)*. . . . .. Pakati pa zaka 2 ndi 4 *(2<Yr<4)* . . . . . . Zaka zoposa zinayi *(Over 4 years)*.	1 2 3 4	
2. Kodi munalandirapo maphunziro a ntchito yimeneyi ya zaumoyo? *(Have you had any training as a Health Surveillance Assistant?)*	Inde *(Yes)* . . . . . . Ayi *(No)*.	1 2	
3. Kodi munalandirapo maphunziro a umoyo wa amayi oyembekezera? *(Have you had any training on Maternal Health?)*	Inde *(Yes)* . . . . . . Ayi *(No)*.	1 2	5

4. Tchulani zimene munaphunzitsidwa zokhudzana ndi amayi oyembekezera *(State areas you trained in maternal Health)*	Sikelo ya amayi oyembekezera *(Antenatal)*. . . . . . Kusamalira mayi akangobereka *(Post-natal)*. . . . . . Kuona za mavuto amayi omwe amadza kamba kobereka *(Complications)*. . . . . . Kuona za umoyo wa amayi oyembekezera ndi ana ongobadwa kumene *(Integration of MNH)*. . . . . . Chilangizo *(Counselling)*. . . . . . Njira zolera *(Family planning)*. . . . . . Kuteteza mwana asanabadwe ku kachirombo koyambitsa edzi*(PMTCT)*. Community mobilisation . . . . . . Zina *(Other)*:_____	1 2 3 4 5 6 7 8 9	
5. Kodi ndi mavuto otani amene mumakumana nawo pa ntchito yowona za umoyo wa amayi oyembekezera? *(What are the Challenges you face in Maternal Health)* Fotokozani bwino bwino chifukwa chimene zinthu mwatchulazi zili mavuto? *(Explain more on how the stated above are challenges)*	Amayi kusunga chinsinsi *(Secrecy of pregnant women)* . . . . . . _____ Mavuto omwe amadza kamba kobereka *(Complications)* . . . . . . _____ Kalembera wolondola pa za umoyo wa amayi oyembekezera *(Data collection)* _____ Miyambo ya makolo *(Cultural beliefs)*.. _____ Kusowa kwa anthu ogwira ntchito nzipatala *(Lack of staff at facilities) . . .* _____ Longosolani njira zina *(Other)*: _____ _____ _____	1 2 3 4 5 6	
6. Kodi mukuganiza kuti tingachite chani kuti mavuto amenewa achepe? *(What can be done to improve on the challenges)* _____ _____ _____ _____			
7. Kodi mumalembera zinthu zotani mu zolembera za umoyo wa amayi oyembekezera? *(What information do you record on Maternal Health?)*	> Namabala ya amayi oyembekezera *(Number Pregnant Women)*. . . . . . > Nambala ya azimayi amene amabwera ku sikelo *(Antenatal attendance)*.	1 2	

	> Nambala ya mimba zimene zimakhala ndi mavuto *(Complicated pregnancies)*. . . . . 3 > Namabala ya ana amene amabadwa ali amoyo *(Live births)*. . . . . 4 > Nambala ya amayi amene amafa ali oyembekezera *(Maternal deaths)* . . . . 5 > Nambala ya amayi amene amasamalidwa akabereka kumene *(Post natal Data)*. . . . . 6 > Nambala ya imfa za ana ongobadwa kumene *(Neonatal deaths)*. . . . . 7 > Nambala ya amene akudwala matenda ouma ziwalo *(Tetanus)*. . . . . 8 > Nambala ya anthu amene ali ndi matenda achindoko *(Syphilis)*. . . . . 9 > Nambala ya amayi amene akulandira mankhwala oteteza mwana osabadwa kuti asatenge kachilombo koyambitsa edzi *(HTC / PMTCT)*. . . . . 10 > Nambala ya amayi amene akutsata njira zakulera *(Family planning)*. . . . . 11 > Longosolani zina *(Other)*: 12 _____ _____		
8. Kodi muli ndi zipangizo zosungilara zolembazi? *(Do You have instrument for collecting maternal health data?)*	Inde *(Yes)* . . . . . 1 Ayi *(No)*. 2		
9. Kodi zolembazi mumazitenga kuchoka kwa yani? *(Where do you get the data for records?)*	kumudzi *(Community)*. . . . . 1 Amayi oyembekezera *(Pregnant women)*. . . . . 2 Amayi achinsinsi *(Secret Woman)*. . . . 3 Mafumu *(Chiefs)*. . . . . 4 Komiti yoona za ukhondo mmudzi *(VHC)*. . . . . 5 Longosolani zina *(Other)*: 6 _____ _____		
10. Kodi mumagwiritsa ntchito njira yanji yosungira zolemberazi? *(What do you use to keep these records?)*	Pepala landondomeko *(Forms)*. . . . . 1 Pepala wamba *(Plain paper)*. . . . . 2 Njira zina zosungila *(Other)*: 3 _____		
11. Kodi mukuganiza kuti zolembera zomwe mumalemba kuchokera mmidzi ndizofunika? *(Do you think the data collected from the community is important?)*	Inde *(Yes)*. . . . . 1 Ayi *(No)*. . . . . 2 Sindikudziwa *(Don't Know)*. 3	12 12	

12. Perekani chifukwa chomwe mwayankhira choncho mu funso (11) liri pamwambali (*Give reason for your answer in (11) above)* _____ _____ _____			
13. Kodi zolembera zokhudzana ndi umoyo wa amayi oyembekezera zomwe mumatolera mmidzi ndizolondola bwanji? *(How accurate is the data collected from the community?)*	Zolondola kwambiri *(Very accurate)*. . . Zolondola *(Accurate)*. . . . . .. Pakati ndi pakati *(Neutral)*. . . . . . Zolondola pang'ono *(Slightly Accurate)* zolakwika *(Not Accurate)*.	1 2 3 4 5	
14. Longosolani chifukwa chomwe mwayankhira choncho mu funso (13) liri pamwambali? *(Explain the reason for you choice above (13)?)* _____ _____ _____			
15. Kodi zolembera zomwe mumatolera mmidzi ndizodalilika bwanji? *(How reliable is the data from the community?)*	Zodalilika kwambiri *(Very reliable)*. . . . zodalilika *(Reliable)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . . . Zodalilika pang'ono *(Slightly reliable)*. . zosadalilika *(Not reliable)*.	1 2 3 4 5	
16. Longosolani chifukwa chomwe mwayankhira choncho mu funso (15) liri pamwambali *(Explain the reason for you choice above (15)?)* _____ _____ _____			
17. Kodi zipangizo zimene mumagwiritsa ntchito polembera nkhani zokhudza umoyo wa amayi oyembekezera ndizosavuta kuzimvetsa? *(Are the Instruments for Collecting Data easy to understand?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . Sindikudziwa *(Don't Know)*.	1 2 3	
18. Kodi zipangizo zimene mumagwiritsa ntchito polembera nkhani zokhudza umoyo wa amayi oyembekezera ndizosavuta kugwiritsa nchito? *(Are the Instruments for Collecting Data easy to complete?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . .. Sindikudziwa *(Don't Know)*.	1 2 3	
19. Kodi mukuganiza kuti tingachite chayani kuti zipangizozi zikonzedwe? *(What should be done to improve the Data Collection tools?)* _____ _____			
20. Kodi mumatumiza zolembera zanu zonse kwa amene amakuyang'anirani? *(Do you send all your data to your supervisor?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Nthawi zina *(Sometimes)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3 4	 22 24 25

21. Kodi mumatumiza zolemberazi nthawi zochuluka bwanji? *(How often do you send the data to your supervisor?)*	Tsiku ndi tsiku *(Daily)* . . . . Mwezi ndi mwezi (*Monthly*). . . . . .. Kamodzi pa miyezi inayi *(Quarterly)*. . . Zikafunika *(When required)*.	1 2 3 4	
22. Kodi kawundula mumatumizayu amakhala atalembedwa potani? *(How do you send your information supervisor)*	Pa Pepala landondomeko *(Forms)* . . . . Pepala wamba *(blank paper)* . . . . Njira zina zosungila *(Other)*: _____ _____	1 2 3 4 5	
23. Ngati simutumiza, perekani chifukwa chake simutero? *(If **not**; Why?)* _____ _____ _____ _____			
24. Ngati mumatumiza mwakamodzikamodzi, perekani chifukwa chake mumatero? *(If **Sometimes**; Why?)* _____ _____ _____ _____			
25. Kodi ndi ndani amene amayika/ kuphatikikiza zolemberazi pamodzi zisanakaperekedwe ku chipatala? *(Who Compiles Data to the Health Centers)*	Ine mwini *(Myself)*. . . . . . Wamkulu wa zaumoyo *(SHSA)*. . . . . . Sindikudziwa *(Don't Know)*. . . . . . Woona zowerengera *(Statistical Clerk)* Win ndi ndani *(Other)*: _____	1 2 3 4 5	
26. Kodi amene amatenga kaundula wanu ndani mukamaliza kutolera? *(Who is the immediate person to get the data that you collect and record?)*	HMIS Officer . . . . . . Safe Motherhood Coordinator . . . . . . Statistical Clerk . . . . . . Medical Assistant . . . . . . Midwife / Nurse . . . . . . Senior HSA . . . . . . Win ndi ndani *(Other)*:	1 2 3 4 5 6 7	
27. Kuchokera kwa inu, kawundula amapita kuti ndipo kwa ndani? *(From you, where does the data go and who is responsible for the data at that location?)*	Health Facility – Senior HSA . . . . District Hospital – HMIS . . . . District Hospital – SMC . . . . . . Other: _____	1 2 3 4	

28. Kodi ndi mavuto otani amene mumakumana nawo mukalembera wanu? *(What are the Challenges you face in data Collection?)*	Ndalama zoyendera *(Transportation)*. . Mapepala *(Stationary)*. . . . . . Kuchuluka kwa ntchito*(WorkOverload)* Kusowa ma zolembera ma lipoti *(Lack of reporting forms)*. . . . . . Zina ndi chani *(Other)*: _____	1 2 3 4 5	
29. Kodi ntchito ya zolemberazi ndi yotani? *(What is the Use of the Data Collected?)* _____ _____			
30. Kodi ndi mavuto otani amene mumakumana nawo inu monga ogwira ntchito za umoyo? *(What are the challenges that you face as a Health Surveillance Assistant (HSA)?)*	Zipangizo zosakwanira *(Inadequate resources: Forms, Pens, etc)*. . . . . .. Kuchuluka ntchito *(Work overload)*. . .. Kusowa kwa maphunziro *(Lack of Training)* . . . . . . Kusadziwa zofunika zina *(Knowledge gap)*. . . . . .. Zina ndi Chani *(Other)*: _____	1 2 3 4 5	
31. Mukuganiza tikuyenera kuchita chiyani kuti tithetse mavuto amenewa? *(What should be done to overcome the challenges mentioned above?)* 1_____ 2_____ 3_____			
32. Kodi kauniuni wa imfa za amayi amachitika? *(Are maternal death reviews conducted?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Nthawi zina *(Sometimes)*.	1 2 3	35
33. Kodi ndi ndani amene amapanga kauniuniyu? *(Who conducts the review and compile the report?)*	Dokotala *(Clinical Officer)* . . . . . . Anamwino *(Nurse)* . . . . . . Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Wamkulu wa zaumoyo *(SHSA)*. . . . Ena ndi ndani *(Other)*: _____	1 2 3 4 5 6	
34. Kodi kauiuniyu amaperekedwa kwa yani? *(Who gets the maternal death review reports?)*	Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Mkulu woona za uchembere wabwino *(Safe Motherhood Coordinator)* . . . . . Ena ndi ndani *(Other)*: _____	1 2 3 4	

35. Kodi mdera lanu lino mwachitikapo imfa yili yonse ya mayi Oyembekezera kuyambira mwezi wa April, 2012 mpaka lero? *(Did any maternal death occur in the community from April 2012 to date?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	 40 40
36. Ngati ndi choncho, munawuza winaliyense wa zaumoyo? *(If "**YES**", was the death reported?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	38
37. Ngati simunawuze winaliyense kapena kuti simukudziwa, perekani chifukwa chake zili choncho (*If "**No or Don't Know**", why?)*	Sindinadziwe chochita *(Did not know what to do)* . . . . . . Sizoyenera kunena *(Not supposed to be reported)* . . . . . . Sindikudziwa kokanena *(Don't know who to report to)* . . . . . . China ndi chani *(Other)*: _____	1 2 3 4	
38. Kodi kauniuni wa imfa za amayi apakati anachitika? *(Was a maternal death review conducted?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	40
39. Ngati sichoncho, perekani chifukwa *(If "**No**", Why?)* _____			
40. Kodi kauniuni wa imfa za ana ongobadwa kumene amachitika? *(Are neonatal death reviews conducted?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Nthawi zina *(Sometimes)*.	1 2 3	 43
41. Kodi ndi ndani amene amachita kauniuniyu komanso ndi kulembera zotsatira? *(Who conducts the review and compile the report?)*	Dokotala *(Clinical Officer)* . . . . . . Anamwino *(Nurse)* . . . . . . Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Wamkulu wa zaumoyo *(SHSA)*. . . . Ena ndi ndani *(Other)*:	1 2 3 4 5 6	
42. Kodi zotsatira za kauniuniyu zimaperkedwa kwa ndani? *(Who gets the neonatal death review report?)*	Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Mkulu woona za uchembere wabwino *(Safe Motherhood Coordinator)* . . . . . Ena ndi ndani *(Other)*:	1 2 3 4	
43. Kodi ku dera lanu lino kwachitikapo imfa za ana ongobadwa Kumene kuyambira mwezi wa April, 2012 mpaka lero? *(Did any neonatal death occur in the community from April 2012 to date?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	 48 48

44. Ngati ndi choncho, munawuza winaliyense wa zaumoyo? *(If "**YES**", was the death reported?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	46
45. Ngati simunawuze winaliyense kapena kuti simukudziwa, perekani chifukwa chake zili choncho *(If "**No or Don't know**", why?)*	Sindinadziwe chochita *(Did not know what to do)* . . . . . . Sizoyenera kunena *(Not supposed to be reported)* . . . . . . Sindikudziwa kokanena *(Don't know who to report to)* . . . . . . China ndi chani *(Other)*: _____	1 2 3 4	
46. Kodi kauniuni wa imfa za ana ongobadwa kumene amachitika? *(Was a neonatal death review conducted?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	48
47. Ngati sichoncho, perekani chifukwa. *(If "**No**", Why?)* _____ _____			
48. Kodi mumasunga zolembera zokhudzana ndi kubereka/kuchira kwa amayi oyembekezera? *Are records of delivery places kept?*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Nthawi zina *(Sometimes)*.	1 2 3	 50 50
49. Ngati ndi choncho, ndi ndani amene ali ndi udindo wosunga zolemberazi? *(If "**Yes**", who is responsible for these records?)*	Dokotala *(Clinical Officer)* . . . . . . Anamwino *(Nurse)* . . . . . . Wamkulu wa zaumoyo *(SHSA)*. . . Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Woona zowerengera *(Statistical Clerk)* . Ena ndi ndani *(Other)*: _____	1 2 3 4 5 6 7	
50. Tchulani chifukwa chimene zolemberazi sizisungidwa kapena kuti zimasungidwa mwakamodzikamodzi. *(If "**No or Sometimes**", why?)* _____ _____ _____			

Section 3: SCHI Training Evaluation			
Question	**Answer**	**Tick**	**GoTo**
1. Kodi munaphunzitsidwapo ndi SCHI? *(Have you been on any training offered by the SCHI?)*	Inde *(Yes)*. . . . . . Ayi *(No)*.	1 2	

2. Ngati ndi choncho, tchulani mitu ya zimene munaphunzitsidwa? *(What areas were you trained in?)* 3. Kodi pamaphunzirowa, munaphunzirapo china chilli chonse chachilendo? *(What new knowledge have you obtained from the training?)*	_____ _____ _____ _____ _____ _____		
4. Kodi maphunzirowa anali ofunika? *(Did you find the training important?)*	Ofunikira kwambiri *(Very important*). . . . Ofunikira *(Important)* . . . . . . Pakati ndi pakati *(Neutral)* . . . . . . Ofunikira pang'ono *(Slightly important)*. Osafunikira *(Not important)*	1 2 3 4 5	
5. Tchulani chifukwa mwayankhira choncho mu funso liri pamwambali *(State the reasons for your choice above)* _____ _____ _____			
6. Kodi mukuganiza kuti maphunziro amenewa akuthandizani pa ntchito yanu ya za umoyo? *(Do you think this training will help you to do your job as HSA?)*	Inde *(Yes)*. . . . . . Ayi *(No)* . . . . . . Sindikudziwa *(Don't Know)*. . . . . . Zina*(Other)*:_____	1 2 3 4	
7. Perekani chifukwa cha yankho lanu limene mwasankha pa mwambapa *(Give reasons for your choice above)* _____ _____			
8. Kodi mungakonde kuphunzira zoonjezera zotani pambali pa zimene munaphunzitsidwa kale? *(What further training would you like to receive?)*	_____ _____		

Zikomo *(Thank you)*

Appendix 1b: Interview for Secret Women on Maternal Health Data Management

Part One A **QID: . . . . . .**

Monthly Information

Data Element	April '12	May '12	June '12	July '12	Aug '12	Sept '12	TOTAL
1. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies registered each month?)*							
2. Kodi mwatumizapo amayi angati kuchipatala chifukwa cha chiopsezo ngakhale chimodzi chimene mwachiona chokhudzana ndi pakati pomwe iwo ali napo? *(What is number of pregnant women with at least one danger sign referred by you to a health facility?)*							
3. Kodi ndi azimayi angati amene amakhala atakonzetsera za kuberaka pakati pomwe iwo ali napo mu miyezi itatu yomaliza (za kumalo kumene iwo akaberekere, mayendedwe, komanso ndalama) *(What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money))*							
4. Kodi ndi amayi anagati amene mwawayendera ngakhale kamodzi kokha pa miyezi itatu ili yonse komanzo makamaka miyezi itatu yomaliza ya pakati pamene iwo ali napo? *(What is number of pregnant women who receive at least one home visit by a Secret Woman / TBA in each trimester by the end of third trimester)*							
5. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have registered for each month)*							
6. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							
7. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
8. Kodi mwezi uno mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
9. Kodi ndi amayi angati amene aberekera kunymba amene inu mwawayendera pasanathe maola 24 chiberekereni? *(What is number of women who delivered at home who received postnatal home visit within 24 hours of delivery by a Secret Woman / TBA)*							
10. Kodi ndi amayi angati amene mumawayendera kunyumba kwao pakatha masiku atatu chiberekereni? *(What is number of women who receive at least **1 postnatal home visit** by a Secret Woman / TBA within **3 days** of delivery)*							

11. Kodi ndi amayi angati amene mumawayendera kunyumba kwao kokwana kawiri mmasiku eight chiberekereni? *(What is number of women who receive at least **2 postnatal home visits** by an Secret Woman / TBA within **8 days** of delivery)*							
12. Kodi ndi amayi angati amene mwalembera kuti abereka mwezi uno (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) registered by Secret Woman / TBA this month)*							
13. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) registered by Secret Woman / TBA each month)*							
14. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home registered by Secret Women / TBA each month)*							
15. Kodi ndi ana angati ongobadwa kumene amene mwawayendera pasanathe maola 24 chibadwire? *(What is number of newborns born at home who receive a home visit by a Secret Woman / TBA within 24 hours of delivery)*							
16. Kodi mwatumizapo ana angati kuchipatala amene angobadwa kumene ndipo ali ndi chizindikilo ngakhale chimodzi chakuti ali ndi vuto? *(What is number of newborns with at least one danger sign referred by a Secret Woman / TBA to a health facility)*							
17. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku atatu chibadwire, ngakhale kamodzi kokha? *(What is number of newborns who receive at least **1 home visit** from a Secret Woman / TBA within **3 days** of delivery)*							
18. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku eight chibadwire, ngakhale kawiri kokha? *(What is number of newborns who receive at least **2 home visits** from an Secret Woman / TBA within **8 days** of delivery)*							
19. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							
20. Kodi ndi amayi anagati amene amwalira ali oyembekezera pa mwezi uli wonse? (How many maternal deaths occurred each month?)							
21. Kodi kwachitika imfa zingati za ana ongobadwa kumene mwezi uli wonse? (How many neonatal deaths occurred each month?)							
22. Kodi ndi amayi angati amene akaberekera ku malo awa?							

(How many women delivered at the following places?) > Kuchipatala *(Health Center)* . . . . . . > Munjira *(In transit)* . . . . . . > Kwa zamba / kunyumba *(TBA / Home*) . . . . > Ku chipatala china.*(Other Health Center)* . . .	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___
23. Kodi ndi amayi anngati amene abereka kupyolera mu njira zotsatirazi? *(How many women delivered through the following methods?)* > Kuchira bwinobwino *(Normal delivery)* . . . . > Mwana anakhala udyo *(Breech)* . . . . . . > *(Spontaneous vaginal)* . . . . . . > Mpeni *(Caesarean section)*. . . . . . > *(Vacuum extraction)*.	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___

Part One B **QID: . . . . . .**

Monthly Information

Data Element	Oct '12	Nov '12	Dec '12	Jan '13	Feb '13	Mar '13	TOTAL
24. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies registered each month?)*							
25. Kodi mwatumizapo amayi angati kuchipatala chifukwa cha chiopsezo ngakhale chimodzi chimene mwachiona chokhudzana ndi pakati pomwe iwo ali napo? *(What is number of pregnant women with at least one danger sign referred by you to a health facility?)*							
26. Kodi ndi azimayi angati amene amakhala atakonzetsera za kuberaka pakati pomwe iwo ali napo mu miyezi itatu yomaliza (za kumalo kumene iwo akaberekere, mayendedwe, komanso ndalama) *(What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money))*							
27. Kodi ndi amayi anagati amene mwawayendera ngakhale kamodzi kokha pa miyezi itatu ili yonse komanzo makamaka miyezi itatu yomaliza ya pakati pamene iwo ali napo? *(What is number of pregnant women who receive at least one home visit by a Secret Woman / TBA in each trimester by the end of third trimester)*							

28. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have registered for each month)*							
29. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							
30. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
31. Kodi mwezi uno mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
32. Kodi ndi amayi angati amene aberekera kunymba amene inu mwawayendera pasanathe maola 24 chiberekereni? *(What is number of women who delivered at home who received postnatal home visit within 24 hours of delivery by a Secret Woman / TBA)*							
33. Kodi ndi amayi angati amene mumawayendera kunyumba kwao pakatha masiku atatu chiberekereni? *(What is number of women who receive at least **1 postnatal home visit** by a Secret Woman / TBA within **3 days** of delivery)*							
34. Kodi ndi amayi angati amene mumawayendera kunyumba kwao kokwana kawiri mmasiku eight chiberekereni? *(What is number of women who receive at least **2 postnatal home visits** by a Secret Woman / TBA within **8 days** of delivery)*							
35. Kodi ndi amayi angati amene mwalembera kuti abereka mwezi uno (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) registered by Secret Woman / TBA this month)*							
36. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) registered by Secret Woman / TBA each month)*							
37. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home registered by Secret Woman / TBA each month)*							
38. Kodi ndi ana angati ongobadwa kumene amene mwawayendera pasanathe maola 24 chibadwire? *(What is number of newborns born at home who receive a home visit by a Secret Woman / TBA within 24 hours of delivery)*							
39. Kodi mwatumizapo ana angati kuchipatala amene angobadwa kumene ndipo ali ndi chizindikilo ngakhale chimodzi chakuti ali ndi vuto? *(What is number of newborns with at least one danger sign referred by a Secret Woman / TBA to a health facility)*							

40. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku atatu chibadwire, ngakhale kamodzi kokha? *(What is number of newborns who receive at least **1 home visit** from an Secret Woman / TBA within **3 days** of delivery)*							
41. Kodi mwayenderapo ana angati amene angobadwa kumene koma sanathe masiku eight chibadwire, ngakhale kawiri kokha? *(What is number of newborns who receive at least **2 home visits** from a Secret Woman / TBA within **8 days** of delivery)*							
42. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							
43. Kodi ndi amayi anagati amene amwalira ali oyembekezera pa mwezi uli wonse? (How many maternal deaths occurred each month?)							
44. Kodi kwachitika imfa zingati za ana ongobadwa kumene mwezi uli wonse? (How many neonatal deaths occurred each month?)							
45. Kodi ndi amayi angati amene akaberekera ku malo awa? *(How many women delivered at the following places?)* > Kuchipatala *(Health Center)* . . . . . . > Munjira *(In transit)* . . . . . . > Kwa zamba / kunyumba *(TBA / Home*) . . . . > Ku chipatala china.*(Other Health Center)* . .	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___
46. Kodi ndi amayi anngati amene abereka kupyolera mu njira zotsatirazi? *(How many women delivered through the following methods?)* > Kuchira bwinobwino *(Normal delivery)* . . . > Mwana anakhala udyo *(Breech)* . . . . . . > *(Spontaneous vaginal)* . . . . . . > Mpeni *(Caesarean section)*. . . . . . > *(Vacuum extraction)*.	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___

Part Two **QID: . . . . . .**

Section 1: Personal Information					
1.Name		2.Village		3.	**Male** / **Female**
4. Age		5.Health Facility Name			
6.Highest Level of Educ.		7.TBA		or SM	

Section 2: Professional Information			
Question	**Answers**	**Tick**	**Go To**
1. Kodi mwagwira ntchito ya zaumoyo nthawi yayitali bwanji? *(How long have you been a Secret Woman?)*	zaka zochepera chimodzi *(< 1yr)* . . . . . Pakati pa chaka 1 ndi 2 *(1<Yr<2)*. . . . .. Pakati pa zaka 2 ndi 4 *(2<Yr<4)* . . . . . . Zaka zoposa zinayi *(Over 4 years)*.	1 2 3 4	
2. Kodi munalandirapo maphunziro a ntchito yimeneyi ya zaumoyo? *(Have you had any training as a Tradition Birth Attendant / Secret Woman?)*	Inde *(Yes)* . . . . . . Ayi *(No)*.	1 2	
3. Kodi munalandirapo maphunziro a umoyo wa amayi oyembekezera? *(Have you had any training on Maternal Health)*	Inde *(Yes)* . . . . . . Ayi *(No)*.	1 2	
4. Papita nthawi yayitali bwanji mutalandira maphunzirowa? *(When were you trained?)*	zaka zochepera chimodzi *(< 1yr)* . . . . . Pakati pa chaka 1 ndi 2 *(1<Yr<2)*. . . . .. Pakati pa zaka 2 ndi 4 *(2<Yr<4)* . . . . . . Pakati pa zaka 4 ndi 7 *(4<Yr<7)* . . . . . . Pakati pa zaka 7 ndi 10 *(7<Yr<10)* . . . .. Zaka zoposa khumi *(Over 10 years)*. . .	1 2 3 4 5 6	
5. Kodi anakuphunzitsani ndi ndani *(Who trained you in Maternal Health)*	Azamba anzanga *(Fellow TBA / Secret Woman)* . . . . . . Dokotala wa mkulu *(Medical Assistant)* . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Wamkulu wa zaumoyo *(SHSA)*. . . Alangizi a zaumoyo (*HSA)*	1 2 3 4 5	

6. Tchulani zimene munaphunzitsidwa zokhudzana ndi amayi oyembekezera *(State areas you trained in maternal Health)*	Sikelo ya amayi oyembekezera *(Antenatal)*. . . . . . Kusamalira mayi akangobereka *(Post-natal)*. . . . . . Kuona za mavuto amayi omwe amadza kamba kobereka *(Complications)*. . . . . . Kuona za umoyo wa amayi oyembekezera ndi ana ongobadwa kumene *(Integration of MNH)*. . . . . . Chilangizo *(Counselling)*. . . . . . Njira zolera *(Family planning)*. . . . . . Kuteteza mwana asanabadwe ku kachirombo koyambitsa edzi*(PMTCT)*. Community mobilisation . . . . . . Zina *(Other)*:_____	1 2 3 4 5 6 7 8 9	
7. Kodi ndi mavuto otani amene mumakumana nawo pa ntchito yowona za umoyo wa amayi oyembekezera? *(What are the Challenges you face in Maternal Health)* Fotokozani bwino bwino chifukwa chimene zinthu mwatchulazi zili mavuto? *(Explain more on how the stated above are challenges)*	Amayi kusunga chinsinsi *(Secrecy of pregnant women)* . . . . . . Mavuto omwe amadza kamba kobereka *(Complications)* . . . . . . Kalembera wolondola pa za umoyo wa amayi oyembekezera *(Data collection)* Miyambo ya makolo *(Cultural beliefs)*.. Kusowa kwa anthu ogwira ntchito nzipatala *(Lack of staff at facilities)* . . . Longosolani njira zina *(Other)*:	1 2 3 4 5 6	
8. Kodi mukuganiza kuti tingachite chani kuti mavuto amenewa achepe? *(What can be done to improve on the challenges)* _____ _____ _____ _____			
9. Kodi mumasunga kawundula wa umoyo wa amayi oyembekezera? *(Do you record information on maternal health?)*	Inde *(Yes)* . . . . Ayi *(No)*.	1 2	14
10. Kodi mumalembera zinthu zotani mu zolembera za umoyo wa amayi oyembekezera?	> Namabala ya amayi oyembekezera *(Number Pregnant Women)*.		

(What information do you record on Maternal Health?)	> Nambala ya azimayi amene amabwera ku sikelo *(Antenatal attendance)*. . . . . . > Nambala ya mimba zimene zimakhala ndi mavuto *(Complicated pregnancies)*. . . . . . > Namabala ya ana amene amabadwa ali amoyo *(Live births)*. . . . . .. > Nambala ya amayi amene amafa ali oyembekezera *(Maternal deaths)* . . . . > Nambala ya amayi amene amasamalidwa akabereka kumene *(Post natal Data)*. . . . . . > Nambala ya imfa za ana ongobadwa kumene *(Neonatal deaths)*. . . . . .. > Nambala ya amene akudwala matenda ouma ziwalo *(Tetanus)*. > Nambala ya anthu amene ali ndi matenda achindoko *(Syphilis)*. . . . . . > Nambala ya amayi amene akulandira mankhwala oteteza mwana osabadwa kuti asatenge kachilombo koyambitsa edzi *(HTC / PMTCT)*. . . . . . > Nambala ya amayi amene akutsata njira zakulera *(Family planning)*. . . . . .. > Longosolani zina *(Other)*: _____ _____		
11. Kodi muli ndi zipangizo zosungilara zolembazi? *(Do you have instrument for collecting maternal health data?)*	Inde *(Yes)* Ayi *(No)*		
12. Kodi zolembazi mumazitenga kuchoka kwa yani? *(Where do you get the data for records?)*	kumudzi *(Community)*. . . . . . Amayi oyembekezera *(Pregnant women)*. . . . . . Amayi achinsinsi *(Secret Women)*. . . . Mafumu *(Chiefs)*. . . . . . Komiti yoona za ukhondo mmudzi *(VHC)*. . . . . . Longosolani zina *(Other)*:	1 2 3 4 5 6	
13. Kodi mumagwiritsa ntchito njira yanji yosungira zolemberazi? *(What do you use to keep these records?)*	Pepala landondomeko *(Forms)*. . . . . . Pepala wamba *(Plain paper)*. . . . . Njira zina zosungila *(Other)*:	1 2 3	
14. Ngati simusunga kawundula, perekani chifukwa chake simutero? *(If **not**; Why?)* _____ _____			

15. Kodi ndizofunika kusunga kawundula wa za umoyo wa amayi oyembekezera? *(Is it important to keep records?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	
16. Kodi ntchito ya zolemberazi ndi yotani? *(What is the Use of the Data Collected?)* _____ _____ _____			
17. Kodi amene amatenga kaundula wanu ndi ndani mukamaliza kutolera? *(Who is the immediate person to get the data that you collect and record?)*	HMIS Officer . . . . . . Safe Motherhood Coordinator . . Statistical Clerk . . . . . . Medical Assistant . . . . . . Midwife / Nurse . . . . . . Senior HSA . . . . . . HSA . . . . . . Other: _____	1 2 3 4 5 6 7 8	
18. Kuchokera kwa inu, kawundula amapita kuti ndipo kwa ndani? *(From you, where does the data go and who is responsible for the data at that location?)*	Health Facility – HSA . . . . . . Community Hea;th Worker – HSA District Hospital – Medical Assistant . .. District Hospital – Nurse . . . . . . Other: _____	1 2 3 4 5	
19. Kodi ndi mavuto otani amene mumakumana nawo inu monga ogwira ntchito za umoyo? *(What are the challenges that you face as a Secret Woman?)*	Zipangizo zosakwanira *(Inadequate resources: Forms, Pens, etc)*. . . . . .. Kuchuluka ntchito *(Work overload)*. . .. Kusowa kwa maphunziro *(Lack of Training)* . . . . . . Kusadziwa zofunika zina *(Knowledge gap)*. . . . . . Zina ndi Chani *(Other)*:	1 2 3 4 5	
20. Mukuganiza tikuyenera kuchita chiyani kuti tithetse mavuto amenewa? *(What should be done to overcome the challenges mentioned above?)* _____ _____ _____ _____			
21. Kodi mumasunga zolembera za momwe amayi achirira? *(Are records of delivery methods kept?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Nthawi zina *(Sometimes)*.	1 2 3	 23 23

22. Ngati ndi choncho, kodi ndi ndani amene ali ndi udindo wolembera zimenezi? *(If "**Yes**", who is responsible for these records?)*	Dokotala *(Clinical Officer)* . . . . . Anamwino *(Nurse)* . . . . . . Wamkulu wa zaumoyo *(SHSA)*. Dokotala wa mkulu *(Medical Assistant)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Woona zowerengera *(Statistical Clerk)* . . . . . . Ena ndi ndani *(Other)*: _____	1 2 3 4 5 6 7	
23. Ngati sichoncho, tchulani chifukwa chimene zolemberazi sizisungidwa kapena kuti zimasungidwa mwakamodzikamodzi. *(If "**No or Sometimes**", why?)* _____ _____ _____			
24. Kodi mdera lanu lino mwachitikapo imfa yili yonse ya mayi Oyembekezera kuyambira mwezi wa April, 2012 mpaka lero? *(Did any maternal death occur in the community from April 2012 to date?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	 26 26
25. Ngati ndi choncho, munawuza winaliyense wa zaumoyo? *(If "**YES**", was the death reported?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	27
26. Ngati sichincho kapena kuti simukudziwa, perekani chifukwa chake zili choncho (*If "**No or Don't Know**", why?)*	Sindinadziwe chochita *(Did not know what to do)* . . . . . . Sizoyenera kunena *(Not supposed to be reported)* . . . . . . Sindikudziwa kokanena *(Don't know who to report to)* . . . . . . China ndi chani *(Other)*: _____	1 2 3 4	
27. Kodi ku dera lanu lino kwachitikapo imfa za ana ongobadwa Kumene kuyambira mwezi wa April, 2012 mpaka lero? *(Did any neonatal death occur in the community from April 2012 to date?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	 29 29
28. Ngati ndi choncho, munawuza winaliyense wa zaumoyo? *(If "**YES**", was the death reported?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	30

29. Ngati simumalembera kapena kuti mumalembera mwa kamodzi kamodzi, perekani chifukwa. *(If "**No or Don't know**", why?)*	Sindinadziwe chochita *(Did not know what to do)* . . . . . . Sizoyenera kunena *(Not supposed to be reported)* . . . . . . Sindikudziwa kokanena *(Don't know who to report to)* . . . . . . China ndi chani *(Other)*: _____	1 2 3 4	
30. Kodi muli ndi alangizi azaumoyo mdera lanu? *(Do you have HSA's in your area?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*.	1 2 3	
31. Kodi ndi ndani amene amayang'anira azamba kapena amayi a chinsinsi? *(Who is responsible supervising Secret Women?)*	Wamkulu wa zaumoyo *(SHSA)*. . . Alangizi a zaumoyo *(HSA)* . . . . . . Anamwino othandiza amayi apakati *(Midwife)* . . . . . . Anamwino *(Nurse)* . . . . . . Dokotala wa mkulu *(Medical Assistant)*	1 2 3 4 5	
32. Kodi mumagwira ntchito limodzi ndi alangizi a zaumoyo pa nkhani za umoyo wa amayi oyembekezera? *(Do you work with HSA's on MNH?)*	Inde *(Yes)*. . . . . . Ayi *(No)*.	1 2	
33. Nanga alangizi a zaumoyo amakuthandizani pa ntchito za umoyo wa amayi oyembekezera? *(Do HSA's support you with your work on MNH?)*	Inde *(Yes)*. . . . . . Ayi *(No)*.	1 2	
34. Ngati sichoncho, ndi chifukwa chain? *(If "**NO**", Why?)* _____			

Section 3: SCHI Training Evaluation			
Question	**Answer**	**Tick**	**Go To**
1. Kodi munaphunzitsidwapo ndi SCHI? *(Have you been on any training offered by the SCHI?)*	Inde *(Yes)*. . . . . . Ayi *(No)*.	1 2	
2. Ngati ndi choncho, tchulani mitu ya zimene munaphunzitsidwa? *(What areas were you trained in?)*	_____ _____		
3. Kodi pamaphunzirowa, munaphunzirapo china chilli chonse chachilendo? *(What new knowledge have you obtained from the training?)*	_____ _____		
4. Kodi maphunzirowa anali ofunika? *(Did you find the training important?)*	Ofunikira kwambiri *(Very important*). Ofunikira *(Important)* . . . . . . Pakati ndi pakati *(Neutral)* . . . . . . Ofunikira pang'ono *(Slightly important)*. . Osafunikira *(Not important)*	1 2 3 4 5	

5. Tchulani chifukwa mwayankhira choncho mu funso liri pamwambali *(State the reasons for your choice above)* _____ _____			
6. Kodi mukuganiza kuti maphunziro amenewa akuthandizani pa ntchito yanu ya za umoyo? *(Do you think this training will help you to do your job as Secret Woman?)*	Inde *(Yes)*. . . . . . Ayi *(No)* . . . . . . Sindikudziwa *(Don't Know)*. . . . . . Zina*(Other)*:_____	1 2 3 4	
7. Perekani chifukwa cha yankho lanu limene mwasankha pa mwambapa *(Give reasons for your choice above)* _____			
8. Kodi mungakonde kuphunzira zoonjezera zotani pambali pa zimene munaphunzitsidwa kale? *(What further training would you like to receive?)*	_____ _____		

Zikomo *(Thank you)*

Appendix 1c: Questionnaire for Medical Assistant / Midwife / Nurse on Maternal Health Data Management

Part One A **QID: . . . . . .**

Monthly Information							
Data Element	**April '12**	**May '12**	**June '12**	**July '12**	**Aug '12**	**Sept '12**	**TOTAL**
1. What is the number of new pregnancies registered each month?							
2. What is number of pregnant women with at least one danger sign referred by an HSA to a health facility?							
3. What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money)							
4. What is number of women who died during pregnancy?							
5. What is number of women who died during delivery or within 8 days of delivery							
6. What is number of completed pregnancies this month (delivery, miscarriage or abortion)							
7. What is number of women who delivered at home?							
8. What is number of births registered at the facility this each month							
9. What is number of live births registered at the facility each month							
10. What is number of newborns identified as LBW (<2,500g) within **8 days** of delivery							
11. What is number of newborns with at least one danger sign referred by an HSA to a health facility							
12. What is number of LBW newborns (<2,000 g) who are referred for additional care							
13. What is number of eligible LBW (between 2000g and 2500g) initiating community KMC							

14. What is number of early neonatal deaths (0-7 days after birth) occurred in the facility?							
15. How many women delivered at the following places?							
>Health Center							
. . . .	___	___	___	___	___	___	___
>In transit							
. . . .	___	___	___	___	___	___	___
>TBA / Home							
. . . .	___	___	___	___	___	___	___
>Other Health Center .							
. . . . .	___	___	___	___	___	___	___
16. How many women delivered through the following methods?							
>Normal delivery							
. . . .	___	___	___	___	___	___	___
>Breech							
. . . .	___	___	___	___	___	___	___
>Spontaneous vaginal .							
. . . .	___	___	___	___	___	___	___
>Caesarean section . . .							
. . . . .	___	___	___	___	___	___	___
>Vacuum extraction . . .							
. . . .	___	___	___	___	___	___	___

Part One B **QID: . . . . . .**

Monthly Information							
Data Element	**Oct '12**	**Nov '12**	**Dec '12**	**Jan '13**	**Feb '13**	**Mar '13**	**TOTAL**
17. What is the number of new pregnancies registered each month?							
18. What is number of pregnant women with at least one danger sign referred by an HSA to a health facility?							
19. What is number of pregnant women who have a complete birth plan by the end of third trimester (place of delivery, provider, transport and money)							
20. What is number of women who died during pregnancy?							
21. What is number of women who died during delivery or within 8 days of delivery							
22. What is number of completed pregnancies this month (delivery, miscarriage or abortion)							

23. What is number of women who delivered at home?							
24. What is number of births registered at the facility this each month							
25. What is number of live births registered at the facility each month							
26. What is number of newborns identified as LBW (<2,500g) within **8 days** of delivery							
27. What is number of newborns with at least one danger sign referred by an HSA to a health facility							
28. What is number of LBW newborns (<2,000 g) who are referred for additional care							
29. What is number of eligible LBW (between 2000g and 2500g) initiating community KMC							
30. What is number of early neonatal deaths (0-7 days after birth) occurred in the facility?							
31. How many women delivered at the following places? >Health Center . . . . . . >In transit . . . . . . >TBA / Home . . . . . . >Other Health Center	 ___ ___ ___ ___	 ___ ___ ___ ___	 ___ ___ ___ ___	 ___ ___ ___ ___	 ___ ___ ___ ___	 ___ ___ ___ ___	 ___ ___ ___ ___
32. How many women delivered through the following methods? >Normal delivery . . . . . >Breech . . . . . . >Spontaneous vaginal . . . . >Caesarean section . . . . . . >Vacuum extraction	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___	 ___ ___ ___ ___ ___

Part Two **QID: . . . . . .**

Section 1: Personal Information

1. Medical Assistant		Midwife		Nurse	
2.Home village		4.Age			
3.Highest Level of Education		5.Gender	**M**	**F**	

Section 2: Professional Information			
Question	**Answers**	**Tick**	**Go To**
1. How long have you been a Medical Assistant/ Midwife/ Nurse?	less than 1 year	1	
	Between 1 and 2 yrs	2	
	Between 2 and 4 yrs	3	
	Over 4 years	4	
2. Have you had any special training on Maternal and Neonatal Health (Apart from college training)	Yes	1	
	No	2	
3. State areas you trained in Maternal and Neonatal Health (Apart from college training)	Antenatal	1	
	Post-natal	2	
	Complications	3	
	Integration of MNH	4	
	Counselling	5	
	Family planning	6	
	PMTCT	7	
	Community mobilisation	8	
	Other :_____	9	
4. What are the Challenges you face in Maternal Health Explain more on how the stated above are challenges	Secrecy of pregnant women . _____	1	
	Complications . . . . . _____	2	
	Data collection . . . . . _____	3	
	Cultural beliefs _____	4	
	Lack of staff at facilities _____	5	
	Other:_____ _____ _____	6	

5. What can be done to improve on the challenges _____ _____ _____ _____			
6. What information do you record on Maternal Health? *(Multiple responses allowed)*	Number of Pregnant Women . . . . Antenatal attendance . . . . . . Complicated pregnancies . . . Live births . . . . . . Maternal deaths . . . . . . Post natal . . . . . . Neonatal deaths. . . . . . Tetanus . . . . . . Syphilis . . . . . . HTC / PMTCT . . . . . . Family planning . . . . . . Other:_____ _____ _____	1 2 3 4 5 6 7 8 9 10 11 12	
7. Where do you get the data for records? *(Multiple responses allowed)*	Community . . . . . . Pregnant women . . . . . . Secret Women . . . . . . Chiefs . . . . . . VHC . . . . . . OPD . . . . . . Labour Ward . . . . . . Other: _____	1 2 3 4 5 6 7 8	
8. Do you have instrument for collecting maternal health data?	Yes . . . . . . No	1 2	
9. What do you use to keep these records?	Forms . . . . . . Computer . . . . . . Blank paper . . . . . . Other: _____	1 2 3 4	
10. Who compiles the data at the health centre?	Statistical clerk . . . . . . HMIS Officer . . . . . . Senior HSA . . . . . . HSA . . . . . . Medical Assistant. . . . . . Self (Nurse/ Midwife) . . . . . Other: _____	1 2 3 4 5 6 7	

11. Do you think the data that is collected is important?	Yes . . . . . . No . . . . . . Don't know	1 2 3	
12. What is the use of the collected data?	Decision Making . . . . . . Keeping records . . . . . . Nothing . . . . . . Don't know	1 2 3 4	
13. Do you think the data collected from the community is important?	Yes . . . . . . No . . . . . . Don't know	1 2 3	
14. Give reason for your answer in (12) above _____ _____ _____			
15. How accurate is the data collected from the community?	Very accurate . . . . . . Accurate . . . . . . Neutral . . . . . . Slightly Accurate . . . . . . Not Accurate	1 2 3 4 5	
16. Explain the reason for you choice above (14)? _____ _____ _____			
17. How reliable is the data from the community?	Very reliable . . . . . . Reliable . . . . . . Neutral . . . . . . Slightly reliable . . . . . . Not reliable	1 2 3 4 5	
18. Explain the reason for you choice above (16)? _____ _____ _____			
19.			
20. Are the Instruments you use for Collecting Data easy to complete?	Yes . . . . . . No . . . . . . Don't know	1 2 3	

21. What can be done to improve the Data Collection tools? _____ _____ _____ _____			
22. Do you send all your data to the Statistical clerk?	Yes . . . . . . No . . . . . . Sometimes . . . . . . Don't know	1 2 3 4	 24 25
23. How often do you send the data to your supervisor?	Daily . . . . . . Monthly . . . . . . Quarterly . . . . . . When required	1 2 3 4	
24. If "***No***"; Why? _____ _____ _____ _____			
25. If "***Sometimes***"; Why? _____ _____ _____			
26. Who gets the data that you collect and record?	HMIS Officer . . . . . . Safe Motherhood Coordinator .. Statistical Clerk . . . . Midwife / Nurse . . . . . . Other: _____	1 2 3 4 5	
27. From the Health facility, where does the data who is responsible for the data at that location?	District Hospital – HMIS . . . .. District Hospital – SMC . . . . . Other: _____	1 2 3	
28. What are the Challenges you face in data Collection?	Lack of reporting forms . . . . . Transportation . . . . . . Stationary . . . . . . Work overload . . . . . . Other: _____	1 2 3 4 5	

29. What are the challenges that you face as a Medical Assistant/ Nurse/ Midwife?	Inadequate resources . . . . . . Resources (Forms, Pens, etc) Work overload . . . . . . Lack of Training . . . . . . Knowledge gap . . . . . . None . . . . . . Other: _____	1 2 3 4 5 6 7	
30. What should be done to overcome the challenges mentioned above?	Enough resources . . . . . . Training & Refresher course Employ more HSAs . . . . . . Other:_____ _____	1 2 3 4	
31. Are maternal death reviews conducted?	Yes . . . . . . No . . . . . . Sometimes	1 2 3	34
32. Who conducts the review and compile the report?	Medical Assistant . . . . . . Clinical Officer . . . . . . Nurse . . . . . . Midwife . . . . . . SHSA . . . . . . Other:_____	1 2 3 4 5 6	
33. Who gets the maternal death review reports?	Medical Assistant . . . . . . Midwife . . . . . . Safe Motherhood Coordinator Other:_____	1 2 3 4	
34. Did any maternal death occur in the community from April 2012 to date?	Yes . . . . . . No . . . . . . Don't Know.	1 2 3	 36 36
35. If "***Yes***", was the death reported?	Yes . . . . . . No . . . . . . Don't Know.	1 2 3	37
36. If "***No or Don't Know***", why?	Did not know what to do Not supposed to be reported Don't know who to report to Other:_____ _____	1 2 3 4	

37. Was a maternal death review conducted?	Yes . . . . . 1 No . . . . . 2 Don't Know. 3		39
38. If "***No***", Why? _____ _____ _____ _____			
39. Are neonatal death reviews conducted?	Yes . . . . . 1 No . . . . . 2 Sometimes 3		42
40. Who conducts the review and compile the report?	Medical Assistant . . . . . 1 Clinical Officer . . . . . 2 Nurse . . . . . 3 Midwife . . . . . 4 SHSA . . . . . 5 Other:_____ 6		
41. Who gets the neonatal death review report?	Medical Assistant . . . . . 1 Midwife . . . . . 2 Safe Motherhood Coordinator 3 Other:_____ 4 _____		
42. Did any neonatal death occur in the community from April 2012 to date?	Yes . . . . . 1 No . . . . . 2 Don't Know. 3		44 44
43. If "***Yes***", was the death reported?	Yes . . . . . 1 No . . . . . 2 Don't Know. 3		45
44. If "***No or Don't know***", why?	Did not know what to do 1 Not supposed to be reported 2 Don't know who to report to 3 Other:_____ 4 _____		
45. Was a neonatal death review conducted?	Yes . . . . . 1 No . . . . . 2 Don't Know. 3		47

46. If "***No"***, Why? _____ _____ _____			
47. Are records of delivery places kept?	Yes . . . . . . No . . . . . . Sometimes	1 2 3	 49 49
48. If "***Yes***", who is responsible for these records?	SHSA . . . . . . Medical Assistant . . . . . . Midwife . . . . . . Nurse . . . . . . Statistical Clerk.	1 2 3 4 5	
49. If "***No or Sometimes***", why? _____ _____ _____			

Section 3: SCHI Training Evaluation			
Question	**Answer**	**Tick**	**Go To**
1. Have you attended any course on data collection?	Yes . . . . . . No	1 2	
2. Have you attended a course on data collection and reporting for maternal health?	Yes . . . . . . No	1 2	
3. Have you been on any training offered by the SCHI?	Yes . . . . . . No	1 2	
4. What areas were you trained in?	_____ _____ _____		
5. What new knowledge have you obtained from the training?	_____ _____ _____		

6. Did you find the training important?	Very important . . . . . . Important. . . . . . Neutral . . . . . . Slightly important . . . . . . Not important.	1 2 3 4 5	
7. State the reasons for your choice above _____ _____ _____			
8. Do you think this training will help you to do your job as a Medical Assistant/ Midwife / Nurse?	Yes . . . . . . No . . . . . . Don't Know. . . . . . Other:	1 2 3 4	
9. Give reasons for your choice above _____ _____ _____			
10. What further training would you like to receive?	_____ _____		

Thank you

Appendix 1d: Interview Questions for the Chiefs / VHCs on Maternal Health Data Management

Part One A **QID: . . . . . .**

Monthly Information							
Data Element	**April '12**	**May '12**	**Jun '12**	**July '12**	**Aug '12**	**Sept '12**	**TOTAL**
1. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies recorded each month?)*							
2. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have recorded for each month)*							
3. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							
4. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
5. Kodi mwezi uliwonse mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
6. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of women who delivered at home)*							
7. Kodi ndi amayi angati amene abereka mwezi uliwonse (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) for each month)*							
8. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) for each month)*							
9. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home each month)*							
10. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							

Part One B **QID: . . . . . .**

Monthly Information							
Data Element	**Oct '12**	**Nov '12**	**Dec '12**	**Jan '13**	**Feb '13**	**Mar '13**	**TOTAL**

11. Kodi amayi amene akumatenga pakati mwezi ndi mwezi alipo ambiri bwanji? *(What is the number of new pregnancies recorded each month?)*							
12. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of home deliveries you have recorded for each month)*							
13. Kodi ndi amayi angati amene amwalira akubereka? *(What is number of women who died during pregnancy?)*							
14. Kodi ndi amayi angati amene amwalira pobereka kapena patangotha masiku eight chiberekereni? *(What is number of women who died during delivery or within 8 days of delivery)*							
15. Kodi mwezi uliwonse mimba zomwe zatha zilipo zingati? (kuthera kubereka, kupita padera kapena kutaya) *(What is number of completed pregnancies this month (delivery, miscarriage or abortion))*							
16. Kodi pa mwezi uli wonse mwalemberapo amayi angati amene achilira kunyumba? *(What is number of women who delivered at home)*							
17. Kodi ndi amayi angati amene abereka mwezi uliwonse (kuchipatala ngakhale kunyumba)? *(What is number of births (home or facility) for each month)*							
18. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo (kuchipatala ngakhale kunyumba) pa mwezi? *(What is number of live births (home or facility) for each month)*							
19. Kodi ndi amayi angati amene mwalembera kuti abereka ana amoyo kunyumba pa mwezi? *(What is number of live births delivered at home each month)*							
20. Kodi kwamwalira ana angati ongobadwa kumene (pasanathe masiku seven chibadwire) mu dera lanu lino? *(What is number of early neonatal deaths (0-7 days after birth) occurred in the community)*							

Part Two **QID: . . . . . .**

Section 1: Group Information	
1.Name of Village	
3.Health Facility Name	

Section 2: Professional Information			
Question	**Answer**	**Tick**	**GoTo**
1. Kodi munalandirapo maphunziro a zaumoyo? *(Have you had any training as on Health?)*	Yes . . . . . . No	1 2	
2. Kodi munalandirapo maphunziro a umoyo wa amayi oyembekezera? *(Have you had any training on Maternal Health?)*	Yes . . . . . . No	1 2	
3. Tchulani zimene munaphunzitsidwa zokhudzana ndi amayi oyembekezera *(State areas you trained in maternal Health)* (Multiple answers allowed)	Sikelo ya amayi oyembekezera *(Antenatal)*. . . . . . Kusamalira mayi akangobereka *(Post-natal)*. . . . . . Kuona za mavuto amayi omwe amadza kamba kobereka *(Complications)*. . . . . . Kuona za umoyo wa amayi oyembekezera ndi ana ongobadwa kumene *(Integration of MNH)*. . . . . . Chilangizo *(Counselling)*. . . . . . Njira zolera *(Family planning)*. . Kuteteza mwana asanabadwe ku kachirombo koyambitsa edzi*(PMTCT)*. . . . . . Community mobilisation . . . . . Zina *(Other)*:_____	1 2 3 4 5 6 7 8 9	
4. Kodi ndi mavuto otani amene mumakumana nawo pa ntchito yowona za umoyo wa amayi oyembekezera? *(What are the Challenges you face on Maternal Health in your community?)* Fotokozani bwino bwino chifukwa chimene zinthu mwatchulazi zili mavuto? *(Explain more on how the stated above are challenges)* (Multiple answers allowed)	Amayi kusunga chinsinsi *(Secrecy of pregnant women)* .. Mavuto omwe amadza kamba kobereka *(Complications)* . . . . Kalembera wolondola pa za umoyo wa amayi oyembekezera *(Data collection)*. . . . . . Miyambo ya makolo *(Cultural beliefs)* . . . . . . Kusowa kwa anthu ogwira ntchito nzipatala *(Lack of staff at facilities)* . . . .. Longosolani njira zina *(Other)*:	1 2 3 4 5 6	
5. Kodi mukuganiza kuti tingachite chani kuti mavuto amenewa achepe? *(What can be done to improve on the challenges)* _____ _____ _____ _____			

6. Kodi mumalembera zinthu zotani mu zolembera za umoyo wa amayi oyembekezera? *(Do you record any information on Maternal Health?)* (Multiple answers allowed)	> Namabala ya amayi oyembekezera *(Number Pregnant Women)*. . . . . . > Nambala ya azimayi amene amabwera ku sikelo *(Antenatal attendance)*. . . . . . > Nambala ya mimba zimene zimakhala ndi mavuto *(Complicated pregnancies)*. . . . > Namabala ya ana amene amabadwa ali amoyo *(Live births)*. . . . . . > Nambala ya amayi amene amafa ali oyembekezera *(Maternal deaths)* . . . . . . > Nambala ya amayi amene amasamalidwa akabereka kumene *(Post natal Data)*. . . . . > Nambala ya imfa za ana ongobadwa kumene *(Neonatal deaths)*. . . . . > Nambala ya amene akudwala matenda ouma ziwalo *(Tetanus)*. > Nambala ya anthu amene ali ndi matenda achindoko *(Syphilis)*. > Nambala ya amayi amene akulandira mankhwala oteteza mwana osabadwa kuti asatenge kachilombo koyambitsa edzi *(HTC / PMTCT)*. . . . . . > Nambala ya amayi amene akutsata njira zakulera *(Family planning)*. . . . . . > Longosolani zina *(Other)*: _____ _____	1 2 3 4 5 6 7 8 9 10 11 12	
7. Kodi muli ndi zipangizo zosungilara zolembazi? *(Do You have instrument for collecting maternal health data?)*	Inde *(Yes)*. . . . . . Ayi *(No)*	1 2	
8. Kodi mumagwiritsa ntchito njira yanji yosungira zolemberazi? *(What do you use to keep these records?)*	kumudzi *(Community)*. . . . . . Amayi oyembekezera *(Pregnant women)*. . . . . . Amayi achinsinsi *(Secret Women)*. . . . . . Mafumu *(Chiefs)*. . . . . . Komiti yoona za ukhondo mmudzi *(VHC)*. . . . . . Longosolani zina *(Other)*: _____ _____	1 2 3 4 5 6	
9. Kodi alangizi a za umoyo amazalembera za umoyo wa amayi oyembekezera? *(Do HSAs collect data from the community?)*	Inde *(Yes)*. . . . . . Ayi *(No)*	1 2	
10. Kodi mukuganiza kuti zolembera zomwe mumalemba kuchokera mmidzi ndizofunika? *(Do you think the data collected from the community is important?)*	Inde *(Yes)*. . . . . . Ayi *(No)*. . . . . . Sindikudziwa *(Don't Know)*. . . .	1 2 3	

11. Kodi zolembera zokhudzana ndi umoyo wa amayi oyembekezera zomwe Amatolera alangizi a za umoyo mmidzi ndizolondola bwanji? *(How accurate is the data collected from the community by HSA?)* Chifukwa *(Why?)* _____	Zolondola kwambiri *(Very accurate)*. . . . . . Zolondola *(Accurate)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . Zolondola pang'ono *(Slightly Accurate)* . . . . . . zolakwika *(Not Accurate)*.	1 2 3 4 5	
12. Kodi zolembera zomwe alangizi a za umoyo amatolera mmidzi ndizodalilika bwanji? *(How reliable is the data from the community by HSA?)* Chifukwa? *(Why?)*_____	Zodalilika kwambiri *(Very reliable)*. . . . . . zodalilika *(Reliable)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . Zodalilika pang'ono *(Slightly reliable)*. . . . . . zosadalilika *(Not reliable)*.	1 2 3 4 5	
13. Kodi zolembera zokhudzana ndi umoyo wa amayi oyembekezera zomwe Amatolera amayi a chinsinsi mmidzi nzolondola bwanji? *(How accurate is the data from the community by Secret Women?)* Chifukwa? *(Why?)* _____	Zolondola kwambiri *(Very accurate)*. . . . . . Zolondola *(Accurate)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . Zolondola pang'ono *(Slightly Accurate)* . . . . . . zolakwika *(Not Accurate)*.	1 2 3 4 5	
14. Kodi zolembera zomwe amayi a chinsinsi amatolera mmidzi ndizodalilika bwanji? *(How reliable is the data from the community by Secret Women?)* Chifukwa? *(Why?)* _____	Zodalilika kwambiri *(Very reliable)*. . . . . . zodalilika *(Reliable)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . Zodalilika pang'ono *(Slightly reliable)*. . . . . . zosadalilika *(Not reliable)*.	1 2 3 4 5	
15. Kodi ma Safe Motherhood Committee ndi ma VHC amagwira nawo ntchito yowona za amayi oyembekezera? *(Are Safe Motherhood Committees and VHCs active in Safe Motherhood activities?)*	Inde *(Yes)*. . . . . . Ayi *(No)*	1 2	
16. Kodi pali ubale wotani pakati pa uni ndi ogwira ntchito za chipatala mdera lino? *(How is your relationship with health workers?)*	Wabwino Kwambiri *(Very Good)*. . . . . . Wabwino *(Good)*. . . . . . Pakati ndi pakati *(Neutral)*. . . . Wabwino Pang'ono *(slightly Good)* . . . . . . Siwabwino *(Not Good)*.	1 2 3 4 5	

Section 3: SCHI Training Evaluation			
Question	**Answer**	**Tick**	**Go To**
1. Have you been on any training offered by the SCHI?	Yes No	1 2	

2. What areas were you trained in?	. . . .		
3. What new knowledge have you obtained from the training?	. . . .		
4. Did you find the training important?	Very important . . . . . . Important . . . . . . Neutral . . . . . . Slightly important . . . . . . Not important	1 2 3 4 5	
5. State the reasons for your choice above			
6. Do you think this training will help you in any way to do your job as a Chief / T.A and Village Headman?	Yes . . . . . . No . . . . . . Don't Know . . . . . . Other:	1 2 3 4	
7. Give reasons for your choice above			

Thank you

Appendix 2: Data Collection Tools for the Officers

Interview Questions for the HMIS Officer, SMC and CBMNH on Maternal Health Data Management

#	Question	Response / Answer
1	What is your qualification?	
2	Any other qualifications or training attained on this position?	
3	How long have you held the post?	
4	How long have you worked in this district?	
5	Which other districts have you worked in?	
6	Who are the sources that provide data to your office?	

	Source	Reliability Strong 1-5 Weak	Interval	Challenges	Other

7	Is the data provided by these sources accurate? If "YES" give accuracy as a percentage?	YES			NO		
8	If "NO" why is the data not accurate?						
9	Are there any measure put in places to ensure accurate data is collected?						
10	Who captures the data into the system?						
11	What are the challenges encountered during data entry?						
12	What are the objectives of the HMIS?						
13	i. How is the data used?	ii. How else could it be used?					
14	Is the HMIS able to achieve its objectives? If "YES" give a percentage of achievement?	YES			NO		
15	If not why?						
16	Is the information on the reports accurate and reliable?	YES			NO		
17	If not why?						
18	Any suggestions on how to improve the collection of data, data entry and the system in order to have valuable information.						
	Is the system User-friendly?						

Thank You

Appendix 3: Data Collection Tools for the Data User

HMIS Data Management and Use Questionnaire for Data Users

1. What are the objectives of the Health Management Information System (HMIS)?

   Do you think HMIS is achieving its objectives?
   - Yes
   - No
   - Don't Know

   Give reason(s) for your response.

2. Does the system collect accurate data?
   - Very Accurate
   - Accurate
   - Neutral
   - Slightly Accurate
   - Not Accurate

   Why?

3. Is the information from the system reliable?
   - Very Reliable
   - Reliable
   - Neutral
   - Slightly Reliable
   - Not Reliable

   Why?

4. As a user, is the information provided by HMIS enough for making decisions and deriving policies?
   - Yes
   - No

   Give reason(s) for your response.

5. How often do you get HMIS reports?
   - One a year
   - Quarterly
   - Monthly

   Other (Specify) …….

6. Give examples of decisions, plans and policies that you made using evidence from HMIS at your work place

7. Does HMIS have enough indicators for all programmes at district level?
   Yes
   No

   If “No”, which ones are missing?

   And why were they not included?

8. Do other programmes such as the Safe Motherhood Programme collect their own data apart from the data in HMIS?
   Yes
   No

   If “Yes”, why?
   ……
   ……
   ……
   ……

9. What are the strengths of HMIS?

10. What are the weaknesses of HMIS?

11. What can be done to improve the Health Management Information System?

THANK YOU

Appendix 4: Code Book

Continuous Data Variables

Variable	*Variable Name*	*Coding Instruction*
Identification Number	QID	Number assigned to each questionnaire
Age	Age	Age in years
New Pregnancies_01 – 12	Q1P1 – Q1P12	Number of monthly new pregnancies
Total New Pregnancies	Q1T13	Total number of pregnancies in a year
Home Births_01 – 12	Q5P1 – Q5P12	Number of monthly home births
Total Home Births	Q5T13	Total number of monthly home births
Died During pregnancies _01 – 12	Q6P1 – Q6P12	Number of women who died during pregnancy each month
Total Died During pregnancies	Q6T13	Total number of women who died during pregnancy
Completed pregnancies _01 – 12	Q8P1 – Q8P12	Number of completed pregnancies for each month
Total Completed pregnancies	Q8T13	Total number of completed pregnancies
Births Home & Health Facility_01 – 12	Q12P1 – Q12P12	Number of births at home or facility for each month
Total Births Home & Health Facility	Q12T13	Total number of births at home or facility
Live Births Home & Health Facility _01 - 12	Q13P1 – Q13P12	Number of live births at home or facility for each month
Total Live Births Home & Health Facility	Q13T13	Total number of live births at home or facility
Home Live Births_01 - 12	Q14P1 – Q14P12	Number of live births at home for each month
Total Home Live Births	Q14T13	Total number of live births at home
Neonatal Death_01 - 12	Q22P1 – Q22P12	Number of neonatal deaths for each month
Total Neonatal Death	Q22T13	Total number of neonatal deaths
Maternal Death_01 - 12	Q23P1 – Q23P12	Number of maternal deaths for each month
Total Maternal Death	Q23T13	Total number of maternal deaths
Delivery Place - Health Facility	Q25T1	Total number deliveries at the Facility
Delivery Place - In Transit	Q25T2	Total number deliveries in transit
Delivery Place - TBA/Home	Q25T3	Total number deliveries at home / TBA
Delivery Place - Other Facility	Q25T4	Total number deliveries at another Facility
Delivery Method - Normal	Q26T1	Total number of women with normal delivery
Delivery Method - Breech	Q26T2	Total number of women who delivered through breech

Delivery Method - Caesarean Section	Q26T3	Total number of women who delivered through caesarean Section
Delivery Method - Vacuum Extraction	Q26T4	Total number of women who delivered through vacuum extraction

Note: Q1P1 – Q1P12 means Question 1 part 1 to Question 1 part 12 (for 12 months)

3.7.1.2. Categorical Data Variables

Variable	*Variable Name*	*Coding Instruction*
Project Area	PJA	1 = Yes 2 = No
Health Facility	Health Facility	1 = Chithumba 2 = Gaga 3 = Chang'ambika 4 = kakoma 5 = Misomali 6 = Chapananga
Gender	Gender	1 = Male 2 = Female
Highest Learning Qualification	HLE	1 = standard 1 – 4 2 = standard 5 – 8 3 = Form 1 – 2 4 = Form 3 – 4 5 = Cert. in clinical Medicine 6 = Dipl. in clinical Medicine
Training in Health	Q2	1 = Yes 2 = No
Training in MNH	Q3	1 = Yes 2 = No
Area Trained: Antenatal, Post Natal, Complications, Integration of MNH, Counselling, Family planning, PMTCT, Community mobilization, Other	Q4P1 – Q4P9	0 = No 1 = Yes
Maternal Health Challenges: Secrecy of pregnant women, Complications, Data collection, Cultural beliefs, Lack of staff at facilities, Other	Q5P1 – Q5P6	0 = No 1 = Yes
Information Recorded: Number of Pregnant Women, Antenatal attendance, Complicated pregnancies, Live births, Maternal deaths, Post natal, Neonatal deaths, Tetanus, Syphilis, HTC / PMTCT, Family planning, Other	Q7P1 – Q7P12	0 = No 1 = Yes
Availability of Data Collection Instruments	Q8	1 = Yes 2 = No
Sources of Data: Community, Pregnant women, Secret Women, Chiefs, VHC, Other	Q9P1 – Q9P6	0 = No 1 = Yes
Medium for Keeping Records	Q10	1 = Forms 2 = Computer 3 = Blank papers 4 = Other
Is Data From the Community Important	Q11	1 = Yes 2 = No 3 = Don't Know
Data Accuracy	Q13	1 = Very Accurate 2 = Accurate 3 = Neutral

		4 = Slightly Accurate 5 = Not Accurate
Data Reliability	Q15	1 = Very Reliable 2 = Reliable 3 = Neutral 4 = Slightly Reliable 5 = Not Reliable
Are Data Collection Instruments Easy to Understand	Q17	1 = Yes 2 = No 3 = Don't Know
Are Data Collection Instruments Easy to Complete	Q18	1 = Yes 2 = No 3 = Don't Know
Do you Send All Data to the Supervisor	Q20	1 = Yes 2 = No 3 = Sometimes 4 = Don't Know
Frequency of Sending Data to the Supervisor	Q21	1 = Daily 2 = Monthly 3 = Quarterly 4 = When Required
How is the data sent to supervisors	Q22	1 = Forms 2 = Computer 3 = Blank papers 4 = Other
Who Compiles Data to the Health Facility	Q25	1 = Myself 2 = SHSA 3 = Don't Know 4 = Statistical Clerk 5 = Other
Who is the immediate person to get the data that you collect and record	Q26	1 = HMIS Officer 2 = Safe Motherhood Coordinator 3 = Statistical clerk 4 = Medical Assistant 5 = Midwife / Nurse 6 = SHSA 7 = Other
From you, where does the data go and who is responsible for the data at that location	Q27	1 = Health Facility – SHSA 2 = DHO – HMIS 3 = DHO – SMC 4 = Other
Challenges Faced in Data Collection: Transportation, Stationary, Work overload, Lack of reporting forms, Other	Q28P1 – Q28P5	0 = No 1 = Yes
Challenges Faced as per position: Inadequate resources, Work overload, Lack of Training, Knowledge gap, Other	Q30P1 – Q30P5	0 = No 1 = Yes
Are maternal death reviews conducted	Q32	1 = Yes 2 = No 3 = Sometimes 4 = Don't Know
Who conducts the review and compile the report	Q33	1 = Clinical Officer 2 = Nurse 3 = Medical Assistant 4 = Midwife 5 = SHSA 6 = Other

Who gets the maternal death review reports	Q34	1 = Medical Assistant 2 = Midwife 3 = Safe Motherhood Coordinator 4 = Other
Occurrence of Maternal Death	Q35	1 = Yes 2 = No 3 = Don't Know
Was the Maternal Death Reported	Q36	1 = Yes 2 = No 3 = Don't Know
Reason for Not Reporting	Q37	1 = Did not know what to do 2 = Not supposed to be reported 3 = Don't know who to report to 4 = Other
Was a maternal death review conducted	Q38	1 = Yes 2 = No 3 = Don't Know
Are neonatal death reviews conducted	Q40	1 = Yes 2 = No 3 = Sometimes 4 = Don't Know
Who conducts the review and compile the report	Q41	1 = Clinical Officer 2 = Nurse 3 = Medical Assistant 4 = Midwife 5 = SHSA 6 = Other
Who gets the neonatal death review report	Q42	1 = Medical Assistant 2 = Midwife 3 = Safe Motherhood Coordinator 4 = Other
Occurrence of Neonatal Death	Q43	1 = Yes 2 = No 3 = Don't Know
Was the Neonatal Death Reported	Q44	1 = Yes 2 = No 3 = Don't Know
Reason for Not Reporting	Q45	1 = Did not know what to do 2 = Not supposed to be reported 3 = Don't know who to report to 4 = Other
Was a neonatal death review conducted	Q46	1 = Yes 2 = No 3 = Don't Know
Are records of delivery places kept	Q48	1 = Yes 2 = No 3 = Sometimes
who is responsible for these records	Q49	1 = Clinical Officer 2 = Nurse 3 = SHSA 4 = Medical Assistant 5 = Midwife 6 = Statistical Clerk

Appendix 5: Data Summaries

Demographics

The study took place in Traditional Authority Chapananga in Chikwawa district where 3 of the health facilities had interventions in maternal health in terms of training in Maternal and Neonatal Health (MNH), provision of equipment and infrastructure by the Scotland Chkhwawa Health Initiative (SCHI). The other 3 health facilities did have any interventions from SCHI. A total of 105 respondents took part in the study.

Table 1 shows the number of personnel coming from either the SCHI project area or not and as for the HSAs, 20 were from the project area and 20 were not, giving a total 40 HSAs who took part in the study.

Table 1: SCHI Project Area

	HSA	Health Personnel	Secret Women	Chiefs
Yes	20	3	17	14
No	20	3	0	28
Total	40	6	17	42

Table 2 shows the number personnel who were involved in the study from each health facility and facility catchment area. There were 2 health personnel (clinicians) from Gaga health facility and no clinician at Chang'ambika and Chapananga health facilities.

Table 2: Health Facility

	HSA	Health Personnel	Secret Women	Chiefs
Chithumba*	6	1	6	5
Gaga*	10	2	6	5
Chang'ambika*	4	0	5	4
Kakoma	8	2	0	11
Misomali	3	1	0	6
Chapananga	9	0	0	11
Total	40	6	17	42

*Project area health facilities

Table 3 shows the number of males and females who took part in the study and 66 of the respondents were male and 39 were female.

Table 3: Gender

	HSA	Health Personnel	Secret Women	Chiefs	Total
Male	31	5	0	30	66
Female	9	1	17	12	39
Total	40	6	17	42	

The average ages of the respondents are shown in Table 4 below. The minimum age for the Secret Women was 0 because 2 of the secret could not provide their age but the maximum age for the Secret Women was 52. Most of the chiefs could not give and / or remember their ages.

Table 4: Age

	Statistic	HSA	Health Personnel	Secret Women
Age	Mean	34.85	33.33	33.47
	Minimum	26	26	0
	Maximum	56	39	52

The level of highest learning qualification was also collected. Table 5 shows that 1 HSA, 5 Secret Women and 31 chiefs did not have any formal education.

Table 5: Highest Learning Qualification

	HSA	Health Personnel	Secret Women	Chiefs
No Formal Education	1	0	5	31
grade 1 - 4	0	0	4	11
grade 5 - 8	1	0	8	0
JCE	13	0	0	0
MSCE	25	0	0	0
Cert. in Clinical Med	0	4	0	0
Dipl. in Clinical Med	0	2	0	0
Total	40	6	17	45

Table 6 shows the number of respondents who had training in health and 82 of the respondents had some form of training.

Table 6: Training in Health

	HSA	Health Personnel	Secret Women	Chiefs	Total
Yes	35	6	16	25	82
No	5	0	1	17	23
Total	40	6	17	42	

Despite training in health, some of the respondents were trained in MNH. 64 respondents stated that they had been trained in MNH.

Table 7: Training in MNH

	HSA	Health Personnel	Secret Women	Chiefs	Total
Yes	19	6	15	24	64
No	21	0	2	18	41
Total	40	6	17	42	

Table 8 shows the different areas of training in MNH where respondents whether or not they had been trained in a particular area.

Table 8: Area Trained

		HSA	Health Personnel	Secret Women	Chiefs	Total
Antenatal	No	24	2	3	20	49
	Yes	16	4	14	22	56
	Total	40	6	17	42	
Post Natal	No	25	2	13	38	78
	Yes	15	4	4	4	27
	Total	40	6	17	42	
Complications	No	22	2	10	35	69
	Yes	18	4	7	7	36
	Total	40	6	17	42	
Counselling	No	22	4	4	35	65
	Yes	18	2	13	7	40
	Total	40	6	17	42	
Integration of MNH	No	20	4	11	35	70
	Yes	20	2	6	7	35
	Total	40	6	17	42	
Family planning	No	15	4	10	26	55
	Yes	25	2	7	16	50
	Total	40	6	17	42	
PMTCT	No	31	2	17	35	85
	Yes	9	4	0	7	20
	Total	40	6	17	42	
Community mobilisation	No	24	4	17	35	80
	Yes	16	2	0	7	25
	Total	40	6	17	42	
Other	No	38	6	15	36	95
	Yes	2	0	2	6	10
	Total	40	6	17	42	

The respondents stated that they record information on maternal health and the information which they either record or do not record is in table 9 below. One HSA did not respond to whether they record information on Prevention of Mother to Child Transmission / HIV Testing and Counseling (PMTCT / HTC).

Table 9: Information Recorded on maternal health

		HSA	Health Personnel	Secret Women	Chiefs	Total
Number of Pregnant Women	No	20	1	1	37	59
	Yes	20	5	16	5	46
	Total	40	6	17	42	
Antenatal attendance	No	26	1	7	41	75
	Yes	14	5	10	1	30
	Total	40	6	17	42	
Complicated pregnancies	No	25	2	17	41	85
	Yes	15	4	0	1	20
	Total	40	6	17	42	
Live births	No	19	1	3	38	61
	Yes	21	5	14	4	44
	Total	40	6	17	42	
Maternal deaths	No	20	2	9	42	73
	Yes	20	4	8	0	32
	Total	40	6	17	42	
Post natal	No	23	2	12	42	79
	Yes	17	4	5	0	26
	Total	40	6	17	42	
Neonatal deaths	No	23	2	9	40	74
	Yes	17	4	8	2	31
	Total	40	6	17	42	
HTC / PMTCT	No	29	1	17	42	89
	Yes	10	5	0	0	15
	Total	39	6	17	42	
Family planning	No	22	1	17	41	81
	Yes	18	5	0	1	24
	Total	40	6	17	42	

Data management

Some HSAs stated that they collect information on MNH but however Table 10 shows that most of the respondents do not have data collection instruments.

Table 10: Availability of Data Collection Instruments

	HSA	Health Personnel	Secret Women	Chiefs
Yes	7	5	3	5
No	25	0	13	33
Don't Know	0	0	0	38
No Response	8	1	1	4
Total	40	6	17	42

Table 11 shows that 18 HSAs stated that data collection tools were easy to understand whereas 3 Health personnel stated that they were not easy to understand.

Table 11: Are Data Collection Instruments Easy to Understand

	HSA	Health Personnel	Secret Women	Chiefs
Yes	18	1	0	0
No	2	3	0	0
Don't Know	7	1	0	0
No Response	13	1	17	42
Total	40	6	17	42

Table 12 shows that 17 Secret Women stated that their data collection instruments were easy to complete and 3 3 Health personnel stated that the data collection instruments were not easy to complete.

Table 12: Are Data Collection Instruments Easy to Complete

	HSA	Health Personnel	Secret Women	Chiefs
Yes	16	1	17	0
No	2	3	0	0
Don't Know	10	1	0	0
No Response	12	1	0	42
Total	40	6	17	42

The respondents gave their sources of data on MNH and Table 13 shows that most HSAs source of data are Secret Women. Chiefs and Secret Women source of data is the community in which the live in.

Table 13: Source of Data

		HSA	Health Personnel	Secret Women	Chiefs
Pregnant women	No	28	2	12	42
	Yes	12	4	5	0
	Total	40	6	17	42
Secret Women	No	24	5	16	42
	Yes	16	1	1	0
	Total	40	6	17	42
Chiefs	No	31	5	16	42
	Yes	9	1	1	0
	Total	40	6	17	42
VHC	No	36	6	17	42
	Yes	4	0	0	0
	Total	40	6	17	42
Community	No	27	3	4	0
	Yes	13	3	13	42
	Total	40	6	17	42
OPD	No	40	2	17	42
	Yes	0	4	0	0
	Total	40	6	17	42
Labour Ward	No	40	2	17	42
	Yes	0	4	0	0
	Total	40	6	17	42

Table 14: shows the medium of keeping records by the respondents. HSAs (19) and health personnel (3) stated that they use forms to keep records.

Table 14: Medium for Keeping Records

	HSA	Health Personnel	Secret Women	Chiefs
Forms	19	3	0	0
Computer	2	0	2	0
Blank Paper	2	2	0	0
Notebooks	0	0	14	42
No Response	17	1	1	0
Total	40	6	17	16

Respondents were asked if they send all their data to supervisors and 19 HSAs, 4 health personnel and 17 Secret Women stated that they sent their data to their supervisors.

Table 15: Do you Send All Data to the Supervisor

	HSA	Health Personnel	Secret Women	Chiefs
Yes	19	4	17	0
Sometimes	6	0	0	0
Don't Know	6	0	0	0
No Response	9	2	0	42
Total	40	6	17	42

Frequency of sending data was collected from the respondents. Table 16 shows 16 Secret Women stated that they send the information to their supervisors when the information is required whereas 20 HSA stated that the information is sent monthly to supervisors.

Table 16: Frequency of Sending Data to the Supervisor

	HSA	Health Personnel	Secret Women	Chiefs
Monthly	20	5	0	0
Quarterly	3	0	0	0
When Required	4	0	16	0
No Response	13	1	1	42
Total	40	6	17	42

Data collected is sent to supervisors through a number of ways. Table 17 shows that 20 HSAs and 4 health personnel sent their data through forms. Chiefs and Secret Women did not give a response on how they send data.

Table 17: How is the data sent to supervisors

	HSA	Health Personnel	Secret Women	Chiefs
Forms	20	4	0	0
Computer	2	0	0	0
Blank Paper	2	0	0	0
No Response	16	2	17	42
Total	40	6	17	42

Table 18 shows that 13 HSAs stated that a senior HSA (SHSA) compiles data at the facility and the health personnel stated that a statistical clerk is responsible for data compilation at the health facility.

Table 18: Data Compilation at the Health Facility

	HSA	Health Personnel	Secret Women	Chiefs
Myself	9	1	0	0
SHSA	13	1	0	0
Statistical Clerk	0	3	0	0
No Response	18	1	17	42
Total	40	6	17	42

The respondents also gave the person who gets data once they collect it. SHSA were mentioned by HSAs as the immediate person who gets data from them. Table 19 shows that 10 HSAs stated that SHSA get the data which they record.

Table 19: Immediate person to get the data that you collect and record

	HSA	Health Personnel	Secret Women	Chiefs
HMIS Officer	1	1	0	0
Safe Motherhood Coordinator	6	1	0	0
Statistical Clerk	2	2	0	0
Midwife / Nurse	3	1	0	0
SHSA	10	0	0	0
HSA	0	0	17	0
No Response	18	1	0	42
Total	40	6	17	42

Table 20: shows that all 17 Secret Women gave their data to the community health worker (HSA) who resides within their communities. Health personnel (2) stated that their data goes to HMIS Office at the district hospital.

Table 20: From you, where does the data go and who is responsible for the data at that location

	HSA	Health Personnel	Secret Women	Chiefs
Community Health worker - HSA	0	0	17	0
Health Facility – SHSA	18	0	0	0
District Hospital – HMIS	2	2	0	0
District Hospital – SMC	0	1	0	0
Other	2	1	0	0
No Response	18	2	0	42
Total	40	6	17	42

Maternal health data

Table 21 below shows the averages of new pregnancies, minimum and maximum number of new pregnancies for HSAs, Health personnel, Secret Women and chiefs.

Table 21: Total New Pregnancies

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	24.85	599.67	13.59	21.38
Minimum	0	0	8	0
Maximum	114	1037	22	97

The average, minimum and maximum number of women who died during pregnancy records for the respondents are given in Table 22 below.

Table 22: Total Died During Pregnancy

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	0.03	0.00	0.06	0.02
Minimum	0	0	0	0
Maximum	1	0	1	1

The average, minimum and maximum numbers of completed pregnancies recorded by respondents are given Table 23.

Table 23: Total Completed pregnancies

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	10.08	326.33	6.59	14.64
Minimum	0	0	0	0
Maximum	74	643	16	97

Table 24 shows the average, minimum and maximum number of births both at home and facility.

Table 24: Total Births at Home and Health Facility

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	11.00	314.67*	8.18	15.71
Minimum	0	0	0	0
Maximum	74	452	17	97

Table 25 shows the average, minimum and maximum number of live births both at home and facility.

Table 25: Total Live Births at Home and Health Facility

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	11.35	353.33	8.24	15.43
Minimum	0	687	0	0
Maximum	74	0	19	100

Table 26 shows the average, minimum and maximum number of live births both at home.

Table 26: Total Home Live Births

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	3.58	0.00	1.35	3.33
Minimum	0	0	0	0
Maximum	28	0	10	16

The average, minimum and maximum numbers of neonatal deaths recorded by respondents are given Table 27.

Table 27: Total Neonatal Death

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	0.15	0.83	0.29	0.79
Minimum	0	0	0	0
Maximum	3	3	1	8

The average, minimum and maximum number of maternal deaths records for the respondents are given in Table 28 below.

Table 28: Total Maternal Death

Statistic	HSA	Health Personnel	Secret Women	Chiefs
Mean	0.03	0.00	0.00	0.00
Minimum	0	0	0	0
Maximum	1	0	0	0