

**ASSESSING MATERNAL MORTALITY DATA: A  
LOOK INTO THE QUALITY OF MATERNAL  
MORTALITY DATA REGISTRATION IN  
KILIMANJARO REGION, TANZANIA.**

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**Masters in Public Health Dissertation**

**Muhimbili University of Health and Allied Sciences**

**October 2010**

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Masters  
of Public Health Degree of Muhimbili University of Health and Allied Sciences.

**Muhimbili University of Health and Allied Sciences**

**October 2010**

### CERTIFICATION

The undersigned certifies that he has read and hereby recommends for submission a dissertation entitled *Assessing Maternal Mortality Data: A Look into the Quality of Maternal Mortality Data Registration in Kilimanjaro Region, Tanzania* submitted in Partial Fulfillment of the requirement for the degree of Masters in Public Health at Muhimbili University of Health and Allied Sciences.



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I, *Lydia Hartsell*, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any degree award.

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## ACKNOWLEDGEMENT

First, I would like to express my sincere gratitude to my sponsors, Rotary International and Rotary District 6290, for allowing me to train in further public health studies in Tanzania. Without them, I would not have completed my MPH studies and learned so much about global public health. I would also like to extend thanks to the Rotary clubs of Dar es Salaam and District 9200 who have been more than welcoming and encouraging this past year.

Second, I would like to thank my research mentor, Dr. Kamazima, from the Department of Behavioral Sciences at MUHAS for his continued technical guidance and assurance.

In addition, I would like to offer my sincere appreciation to my MPH 2010 cohort who have made this intense year of study more than enjoyable. You all have been my Swahili teachers, Tanzanian culture professors, and most importantly, friends. Similarly, I would like to thank the teaching and administrative staff of Muhimbili School of Public Health and Social Sciences for their support, encouragement, and guidance.

Furthermore, I would like to thank the Regional Medical Officer of the Kilimanjaro Region and the District Medical Officers of Same and Moshi Rural districts for granting me permission to conduct this study. Similarly, I am grateful to all the health professionals and managers who took the time from their busy schedules to participate in this study.

Lastly, I would like to thank God, my almighty creator, whose grace and strength sustains me.

**DEDICATION**

This dissertation is dedicated to my family and Wes Viner. I love you all.



## ABSTRACT

Maternal mortality in Tanzania is high. The maternal mortality ratio stands at 578 maternal deaths per 100,000 live births. Initiatives to tackle high maternal mortality are underway in Tanzania and the Health Management Information System (HMIS) provides a routine mechanism to monitor progress made in reducing maternal deaths and other health indicators.

The quality of this HMIS data, however, is questionable. The HMIS is weak at all levels and comprehensive registration of maternal deaths is a challenge. International health statistics experts have stated that a focus on HMIS in developing countries is the answer for sound and up-to-date health statistics. The objective of this study, therefore, is to assess the quality of maternal death data registration in Tanzania. The results of this study provide insight into ways that the maternal death data collection and reporting process can be strengthened to improve the accuracy and reliability of maternal mortality statistics in Tanzania.

A qualitative, case study in the Kilimanjaro region was conducted during June 2010 to examine data registration for maternal deaths. Four levels within the national health system were investigated—health facility, district, region, and national. In-depth interviews with data management workers and health management staff took place at every level. Data analysis was performed qualitatively to answer the research questions and fulfill the study objectives.

It was found that maternal deaths primarily take place within the hospital setting and are registered through the maternal death reviews and additionally in the HMIS. The reviews in the Kilimanjaro region closely follow the nationally-recommended guidelines for maternal death review. Several factors were identified to promote (supervision and feedback, training, worker's perception of data collection, and mechanisms to capture community maternal death data) and other factors were found to limit (time taken to complete the report, data inconsistencies and errors, and shortage of staff) data registration. In all, implementation of the maternal death review has brought new hope that maternal deaths will be investigated thoroughly, recorded accurately, and prevented more effectively.

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**ABBREVIATIONS**

DMO	District Medical Officer
DNO	District Nursing Officer
HMIS	Health Management Information Systems
ICD	International Statistical Classification of Disease, ICD-10 is the latest version
IDWE	Infectious Disease Weekly Ending Report
KCMC	Kilimanjaro Christian Medical Center
MDG	Millennium Development Goals
MKUKUTA	Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania
MMR	Maternal Mortality Ratio
MOHSW	Ministry of Health and Social Welfare
MTUHA	Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya
MUHAS	Muhimbili University of Health and Allied Sciences
NRMSPARMNDT	National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania
RCH	Reproductive and Child Health
RMO	Regional Medical Officer
SMI	Safe Motherhood Initiative
TBA	Traditional Birth Attendant

TDHS Tanzania Demographic and Health Survey

WHO World Health Organization

## CHAPTER 1

### Introduction

#### 1.1 Background

Maternal mortality in Tanzania is pervasively high. In 2009, the World Health Organization (WHO) ranked Tanzania as 16 out of 193 countries with highest maternal mortality ratio (WHO World Health Report, 2009). Globally, Tanzania is one of ten countries that constitute 61% of the global burden of maternal deaths (National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania (NRMSPARMNDT), 2006-2010). Recognizing the need to drastically improve upon the health of the world's mothers, the Safe Motherhood Initiative began in 1987, and later Millennium Development Goal (MDG) 5 was adopted by 68 countries in 2000. MDG 5 directly targets maternal mortality and states a goal for countries to reduce maternal deaths by two-thirds from 1996 to 2015.

In Tanzania, the maternal mortality ratio (MMR) is 578 maternal deaths per 100,000 live births (TDHS, 2005). The WHO estimated Tanzania's maternal mortality to be 950 maternal deaths per 100,000 live births in 2005.<sup>1</sup> Despite the statistic, maternal mortality is high in Tanzania and has stabilized over the last decade. In addition, maternal deaths comprise a large majority of female deaths (aged 15-49 years), standing at 18% of all female deaths (TDHS, 1996). These statistics are alarming, considering that maternal mortality is an indicator of a country's development.

In 2000, Tanzania adopted its tailored set of goals that correspond to many of the MDG targets. The National Strategy for Economic Growth and Poverty Reduction or Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania (MKUKUTA) was the outcome, with a new report produced biennially. The latest report is from 2007. More specifically, the MKUKUTA Target 2.3 tackles the problem of maternal deaths by aiming to reduce maternal

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<sup>1</sup>The WHO also has its own estimate, but bases its ratio on the belief that indirect methods of measuring maternal mortality are largely underestimated by countries. WHO adjust its ratio using a calculation to inflate the original level of maternal deaths (Font et al, 2000).



mortality from 529 to 265 per 100,000 live births in 2010 (Poverty and Human Development Report, 2007).

In the first half of the previous decade, child mortality was tackled vigorously by the Tanzanian government, but little progress was made in reducing maternal deaths (Anderson, 2010). Recognizing the need to focus on maternal health, the Tanzania government developed a plan to tackle this lingering problem of high maternal mortality. In 2006, a four-year National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania was adopted. The aim of this plan is to direct and steer interventions and policy, and to meet set indicators, such as the MKUKUTA Target 2.3, for the reduction of maternal deaths. (NRMSPARMNDT, 2006-2010)

To track the progress made for maternal deaths and other health indicators, the Health Management Information System (HMIS) was put in place to collect routine data from health facilities. HMIS in Kiswahili is Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya (MTUHA). Under the management of the Ministry of Health and Social Welfare (MOHSW), the HMIS is the most up-to-date and encompassing registration system in Tanzania (Strengthen HMIS in Tanzania – Operational Plan, 2008). Despite its extensive reach in covering most health facilities, the quality of maternal mortality data that it provides is of concern. Register completeness is lacking and it fails to report those women who die during delivery outside of the health facilities (Simba and Mwangu, 2006). In Tanzania, only 46% of births are attended by a skilled birth attendant, leaving a large proportion of women unaccounted for in delivery outcomes. Currently, the TDHS is the most reliable estimate for maternal mortality (TDHS, 2005).

More recently in 2007, the maternal death review was put into place under the command of the Reproductive and Child Health Department of the Ministry of Health. With extension into the HMIS, the maternal death reviews provide a greater degree of investigation into the cause of maternal death. The maternal death review is meant to improve registration and accuracy in reporting the causes of maternal death.

## **1.2 Problem statement**

According to the 2005 Tanzania Demographic Health Survey (TDHS), “little is known about maternal and adult mortality in Tanzania.” This statement by the TDHS is shocking. It is confounding because the TDHS has been viewed as the most accurate estimate for maternal mortality in Tanzania (Boerma & Stansfield, 2007). With a foggy estimate, producing an accurate picture of maternal health is difficult.

Reliance on the TDHS to provide an accurate estimate for maternal deaths is also an issue. Conducted every five years in representative regions of Tanzania, the TDHS is an expensive and extensive endeavor making it difficult to complete on shorter time intervals. Tracking progress for the MDG 5 and the MKUKUTA target 2.3 is only possible every five years. Since it is a representative survey, it cannot provide insight on the local level. Furthermore, sampling errors for this estimate are high, making it unreliable to detect a significant change in maternal mortality (TDHS, 2005). Thus, the TDHS cannot be relied upon to provide up-to-date statistics for maternal mortality.

Additionally, many national and international reports on maternal health use statistics and figures whose quality cannot be fully supported (Boerma & Stansfield, 2007; Murray, 2007; Walker, et al, 2007). An important component of data collection and reporting is the validity of the data collected and confidence in its ability to provide useful information to government officials and those involved in health management and planning. “Sound statistics are a key component of evidence,” and evidence is vital to policy planning and setting national and local health priorities (AbouZahr, et al, 2007). Currently maternal death audits are being conducted in Tanzania to provide information on maternal mortality. In addition, maternal deaths are to be recorded through the Infectious Disease Weekly Ending Report (IDWE), maternal death review reports, HMIS, annual Reproductive and Child Health (RCH) reports, and the TDHS (NRMSPARMNDT, 2006-2010). The quality of the data collected is a growing concern due to several factors, such as surplus of report forms, unclear definition of maternal death, and lack of data management skill sets by health workers.

At all levels – national, regional, district, and facility – HMIS is weak. With a weak data collection and reporting system, the HMIS is limited in its ability to inform decision-makers (NRMSPARMNDT, 2006-2010). Health management and planning personnel are left with only “educated guesses” (Baiden, et al, 2006). Furthermore, the “variation in figures from year to year in the district hospitals maternal mortality ratios make them unacceptable as a valid estimate for the district” (Font, et al, 2000). Echoing an article from the *Lancet* that “better health statistics are possible,” greater attention and effort should be directed towards “improving quality and collection of data through revitalized health information systems” (Bahir, et al, 2006).

Currently, several studies have been carried out on health information systems in developing countries, but very few studies have examined the system and quality of data collection and management in Tanzania (Mutemwa, 2005; Simba & Mwangu, 2006). In looking at data registration for maternal deaths, even fewer studies have been completed (Songane & Bergstrom, 2002). Most studies assess the level of maternal mortality for a region using the available hospital records or by using a community based tool – the sisterhood method (Font, et al, 2000; Walraven, et al, 1994; Mbaruku, et al, 2003; Msiwa, et al, 2003).



### **1.3 Study rationale**

This research increases upon the level of baseline knowledge for maternal death registration and the HMIS in Tanzania and the developing world. A case study, using the Kilimanjaro region of Tanzania, was conducted to examine areas of interest in maternal death registration at various levels of the national health system in Tanzania. In using an explorative approach, a larger range of information was gleaned. First, this research increases understanding of factors promoting or limiting data registration for maternal deaths in Tanzania. Second, it points out areas for improvement for the reliability and accuracy of maternal death statistics for health management and planning. Lastly, it provides insight and recommendations to strengthen existing maternal death data registration systems.

#### **1.4 Research questions**

- 1.) How is the maternal death registration process carried out at four levels – National, Regional, District, Health Facility – within the national health system?
- 2.) How does the data collection process for maternal deaths compare with national standard guidelines?
- 3.) How do maternal death data sets among the different levels compare over a five year period (2005-2009)?
- 4.) What factors promote or limit data collection for maternal deaths at each level?

#### **1.5 Objectives**

##### ***1.5.1 Broad objective***

To assess the quality of maternal mortality data registration in the Kilimanjaro region, Tanzania.

##### ***1.5.2 Specific objectives***

- 1.) To establish the maternal deaths data registration process from the health facility level to the national level.
- 2.) To compare the data collection process for maternal deaths with national standard guidelines.
- 3.) To compare the maternal deaths data sets among four different levels (health facility, district, regional, and national) over a five-year period (2005-2009).
- 4.) To identify factors that promote or limit the data collection process of maternal deaths at the different health system levels.

## 1.6 Conceptual framework

The figure below identifies important factors that influence the quality of maternal death registration in Tanzania. The factors listed could operate in isolation or in some combination to influence the quality of maternal mortality data collection in Tanzania. For example, national and local health policies regarding identification of maternal death causes could be poorly communicated to the health facility level, leading to uninformed health workers who misreport a maternal death case. Additionally, health facilities could also define a maternal death differently than another health facility, causing ill-conformed registration of maternal mortality.

*Figure 1: Conceptual framework of factors that influence maternal mortality data*





## CHAPTER 2

### Literature review

#### 2.1 Definitions

From the perspective of the internationally-established definition, “a maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes” (ICD-10, 1992). In Tanzania, however, two definitions for maternal death arise. The NRMSPARMNDT uses the ICD definition stated above, but the TDHS extends the time period after delivery for a maternal death to occur. According to the 2005 TDHS, a maternal death is regarded as “any death that occurred during pregnancy, childbirth or within two months after the birth or termination of a pregnancy.” Both these definitions provide insight into a great difficulty of maternal death reporting—following up of women upon and after delivery to identify post-partum complications or death. In Tanzania, 46.3% of women deliver in health facilities, making it difficult to trace these women during or after delivery. (TDHS, 2005) Additionally, the WHO estimates that about 80% of maternal deaths take place during birth or immediately thereafter (NRMSPARMNDT, 2006-2010).

Quality of data is another term to consider. This term is important in ensuring accurate health statistics. Simba and Mwangi (2006) defined quality of data as the “degree to which the data or statistics measure what was intended to be measured when the data collection system was designed.” For the purposes of their study, they regarded completeness of outpatient attendance and the top ten diseases data books as synonymous with data quality. Using the purposes intended when the data registration system for maternal deaths was designed to analyze data quality, the guidelines and operational reports were thus used. The 2008 Operational Plan for Strengthening HMIS in Tanzania, the NRMSPARMNDT, and the Maternal and Perinatal Death Reviews Guideline site criteria that can be used to assess information use at the district and health facility level.

## **2.2 Mechanisms of maternal deaths data collection in Tanzania**

Several mechanisms for collecting maternal deaths are used in Tanzania. An understanding of the four most common methods (sisterhood method, maternal death review, TDHS, and health-service based statistics) is vital to the rationale of this study. Below the four methods are expounded upon to provide insight into the advantages and disadvantages of each.

*Sisterhood method:* The sisterhood method is one of the most accurate sources of maternal death data. It is used to determine the number of maternal deaths for a specific population. Considered “easier and more convenient than a prospective-based study,” this method makes use of family relations to identify women who have died in childbirth. Adults, generally over the age of 15 years, are interviewed about the outcome of their sisters’ pregnancies. With this method a small population is needed and it is relatively inexpensive, but its results cannot be translated to other regions. (Walraven, et al, 1994)

*Maternal Death Review:* Initiated nation-wide in Tanzania over three years ago, the maternal death review provides systematic in-depth investigation into each maternal death. There are five types of maternal death reviews: community-based maternal death review, facility-based maternal death review, confidential enquiries, survey of severe morbidity, and clinical audit. Tanzania employs the facility-based maternal death review approach. The WHO describes the maternal death review as a “qualitative, in-depth investigation of the causes of and circumstances surrounding maternal deaths occurring at health facilities” (WHO, 2004). In many areas, this review has improved performance of health professionals because it allows for in-depth analysis of each maternal death to identify the correct cause of maternal death and is generally cost-effective. (Maternal and Perinatal Death Reviews Guideline, 2006 and Dumont, et al, 2006)

*TDHS:* Conducted every four or five years, the TDHS is regarded as the most reliable source for health statistics in Tanzania and many developing countries (Boerma & Stansfield, 2007). Started in 1996, two demographic health surveys have been completed since its conception in Tanzania. Though a main source for data, the health surveys are costly, done in larger time

intervals, and require extensive effort to ensure data quality is maintained. It also cannot be translated to the local levels because it is a survey of selected sample areas.

*Health service-based statistics:* The HMIS collects routine data on maternal deaths at the health facility level in each region of Tanzania. The system was introduced in Tanzania in 1993. Health facilities and districts are able to utilize the collected data in order to inform management-level decisions and to provide disease surveillance on a local scale. Although this system collects data at the lower health facility level for the whole country, it does miss those maternal deaths that occur outside the health system at the community level (TDHS, 2005). Therefore similar to the TDHS, its data is not representative of the entire population. Furthermore, incompleteness and poor data quality negatively affect its use in health planning and management. Uptake in the private sector is also low. If strengthened, however, health service-based statistics can be produced in shorter intervals, providing a more convenient method to monitor current interventions. (Boerma & Stansfield, 2007).

### **2.3 Challenges in maternal mortality registration**

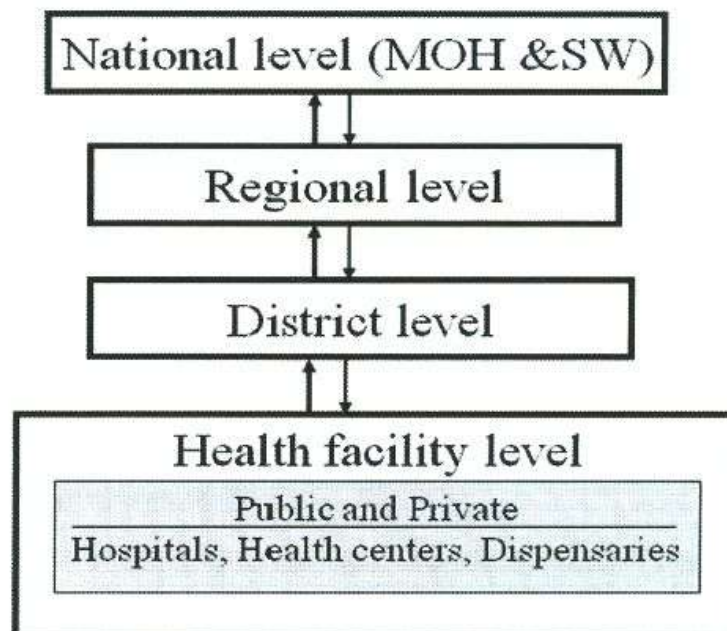
In general, maternal mortality is a difficult indicator to measure. (Font, et al, 2000). First, maternal deaths are a rare occurrence. Due to the infrequency of this event, a large population is needed to record a significant number of deaths and in turn analyze the magnitude of the problem (TDHS, 2005). Second, maternal deaths tend to be misreported (under- or over-reported) and the cause of death misclassified or poorly defined. One study found that maternal deaths tended to be sorely under-reported as 60% of women do not attend health facilities (Songane & Bergstrom, 2002). Other studies have shown, however, that many pregnancy complications and deaths occur at the health facilities, thereby increasing the proportion of maternal deaths (Font, et al, 2000; Walraven, et al, 1994). The WHO's suggested "gold standard" for recording deaths within the population is a national vital registration system (Rao, et al, 2010). The HMIS in Tanzania is the closest system to a vital registration system.



#### 2.4 Information flow in Tanzania – HMIS

The HMIS is the central system of registration for health data in Tanzania. It is managed by the MOHSW and decentralized to the regions, districts, and health facilities. Information flow is bidirectional between the health facilities and districts, districts and regions, and regions and MOHSW. Data collection in the form of health reports are sent from the lower level to the subsequent level and feedback from the reports flows back down to the previous level. Figure 2 provides a visual representation of this data management system.

*Figure 2: HMIS and information flow in Tanzania*



The 2008 Operation Plan to Strengthen the HMIS in Tanzania identifies different responsibilities at district and health facility levels. The plan appoints the responsibility of data management to an information officer at each of the two levels. At the management level, regional medical offices (RMO's) are in charge of the overall data collection and organization from the districts before sending it onto the national level. (Strengthen HMIS in Tanzania – Operational Plan, 2008)

## **2.5 National strategic roadmap outline of maternal health responsibilities**

In 2006, a four-year National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania was adopted. This plan recognizes that “when a woman undertakes her biological role of becoming pregnant and undergoing childbirth, the society has an obligation to fulfill her basic human rights and that of her child.” More specifically, the plan is intended to direct and steer interventions, policy, and indicators for the reduction of maternal deaths. (NRMSPARMNDT, 2006-2010) Data registration is one key aspect mentioned in the strategic plan. It assigns duties to the regional level to analyze maternal health data received from the districts and to send a report to RCH Services at the national level. At the district level, maternal death reviews are to be followed up from the health facilities and sent on to the regional level. At the health facility level, maternal death reviews are to be completed with assistance from the community. These important steps were investigated in the proposed research.

## **2.6 Studies on data quality improvement**

In a study conducted in South Africa, management level supervision and feedback were identified in to improve the practice of data collection for death audits (South Africa Every Death Counts Writing Group, 2008). Conversely, in a study conducted in the Dar es Salaam region of Tanzania, supervision and training in HMIS were shown to have no direct relationship with improved quality of data. The authors raised doubts as to whether the quality of supervision and training was the reason for little to no improvement. The study did find, however, a relationship between improved quality of data and the presence of a data focal person, a worker assigned specifically to data reporting and management. They suggested that further studies be conducted to assess the actual needs of health workers in training and supervision approaches. (Simba & Mwangi, 2006)

A study conducted in Mozambique investigated the quality of maternal death registration—it is one of the few studies in Sub-Saharan Africa. A prospective community-based study was used to assess the number of maternal deaths compared to civil register and hospital-based

maternal death statistics. Results showed that health facilities under-reported maternal deaths by as much as 86%, partly due to the fact that 60% of pregnant women do not attend health facilities. These statistics are similar to Tanzania where 46.3% of Tanzanian women deliver at home. The authors mentioned that the community-based study was labor-intensive and a more efficient way to monitor maternal death registration needs to be found. (Songane and Bergstrom, 2002) This study, therefore, investigates ways to improve the data registration process through strengthening national maternal death registration and its reporting of maternal deaths that occur within the community.



## **CHAPTER 3**

### **Methodology**

#### **3.1 Study design**

A descriptive, qualitative case study was conducted to assess the data registration process of maternal deaths for the four specified levels—facility, district, regional, and national. For the purposes of this study, an explorative study was carried out in the Kilimanjaro region in North Eastern Tanzania and at the HMIS headquarters and Office of the Safe Motherhood Coordinator in Dar es Salaam, Tanzania.

#### **3.2 Study area**

The study was conducted in the Kilimanjaro Region. The Kilimanjaro Region is located in northern Tanzania and consists of seven districts: Same, Hai, Rombo, Mwanza, Moshi Rural, Moshi Municipality, and Siha. Siha district was established in 2007. Moshi is the largest town and serves as the regional headquarters. The total population according to the Regional Office is 1,376,702. The major ethnic groups include the Chaga and the Pare. The Kilimanjaro region was selected based on its relative size and improved maternal health indicators. According to the TDHS, skilled birth attendance is 71% while antenatal care is 99%. In addition, the fertility rate (parity, 4.9) is lower than many other regions of Tanzania. (TDHS, 2005) The assumption made with this region was that higher maternal health indicators indicate a larger number of skilled staff for data registration. Thus, thorough examination of the data registration system for maternal deaths is possible in this region.

For purposes of this study, all levels of the national health system were addressed—health facility, district, regional, and national. Both private and public health facilities and hospitals were selected. In total, the region has 35 health centers. At the national level, key informants involved in health planning and management for maternal health from the Safe Motherhood Initiative (SMI) and the MOHSW were selected. At the Regional level, Kilimanjaro Christian Medical Center (KCMC) serves as a designated national referral hospital. This hospital

reports maternal deaths to Moshi Municipality district. Moshi Municipality has the highest maternal mortality in the Kilimanjaro Region because this district contains both the regional hospital and national referral hospital. These two hospitals attend to the majority of complicated pregnancies within the region and receive referrals from three different regions: Kilimanjaro, Arusha, and Tanga. The regional hospital is Mawenzi Regional Hospital. Management level staff, such as the RMO, regional RCH Coordinator and health workers involved in data management at the regional hospital were interviewed.

At the district level, two districts were selected—one of high and one of low maternal mortality. The districts were selected based on 2009 MMR information obtained from the Regional Office. Same district (MMR, 159) and Moshi Rural (MMR, 49) were selected to participate in the study (*Taarifa ya Mkoa ya Huduma za Afya ya Uzazi na Mtoto, Mwaka 2009*). According to regional data, Same district has a population of 211,738 people and Moshi Rural has a population of 401,369. In Moshi Rural, two designated district hospitals were selected. One hospital is located 15 km from the district headquarters and the other 40 km away. In Same, the district hospital is located within one kilometer of the district headquarters. District management level staff, such as the district RCH Coordinator, and health workers involved in data management were chosen to participate in the study.

At the health facility level, two health facilities from each of the selected districts were examined. The two health facilities chosen were selected based on sizable distance to the district office from different directions. In Moshi Rural, one health center was located 50 km from the district headquarters and the other 52 km away. In Same, one health facility was 32 km away from the district headquarters and the other health facility was located 30 km away. Within the hospitals and facilities, health workers involved in data management of maternal deaths and deliveries available at the day of the visit were interviewed.

### **3.3 Data collection methods**

#### ***3.3.1 Data collection tools and techniques***

##### **In-depth interviews**

In-depth interviews were conducted to collect information on the maternal death registration process within the healthcare system in the Kilimanjaro Region. An explorative approach was utilized in order to obtain detailed and comprehensive insight into the factors that limit or enable the quality of data collection and management and about the data process itself. Since maternal deaths are a rare occurrence, collection and management of deliveries was also examined to provide a more comprehensive look at maternal death registration. Management-level staff and those directly involved in the data collection and management were interviewed as key informants. Interviews were conducted in either English or Swahili, depending on the informant's preference. With guidance from the principal investigator, a trained research assistant performed the interviews in Swahili. The principal investigator carried out the interviews in English. At least one interview was conducted with a key informant at each of the selected healthcare institutions.<sup>2</sup> A total of 15 interviews were conducted.

##### **Observation**

An observation of register books, data management methods, and presence of a focal data person was performed at each health facility and hospital. The observation checklist aimed to include key methods and instruments of quality data collection and management based off the National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania (2006-2010), the Strengthen HMIS in Tanzania - Operational Plan 2008, and the guidelines for maternal health data

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<sup>2</sup> Refer to Interview Guides (English and Swahili) in Appendix A.



registration. The observation checklist was filled out by the principal investigator with added help from the research assistant.<sup>3</sup>

### **Documentation marking**

Secondary data was collected through comprehensive reviews of registers books and official health reports, either MTUHA or annual reports, from the facilities and district and regional offices. All reports related to maternal deaths or deliveries from 2005 to 2009 were examined to assess potential changes in maternal death registration since the start of the National Road Map Strategic Plan to Accelerate Reduction of Maternal and Newborn Deaths in Tanzania in 2006. Documentation marking of the registers and reports was performed by the principal investigator with assistance from the research assistant.

#### ***3.3.2 Pilot study***

The tools for data collection – interview and observation guides –were pre-tested at a health facility in Moshi Urban district. The pilot study was conducted by the principal investigator before the start of the actual data collection process.

#### ***3.3.3 Training of research assistant***

One male research assistant was recruited from Arusha town. He was selected based on his previous experiences as a research assistant for quantitative and qualitative studies. He was trained for one day to conduct interviews in Swahili, in the orientation of study objectives, research questions, and interview questions.

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<sup>3</sup> Refer to the Observation Checklist in Appendix B.

### **3.4 Data management and analysis**

Most interviews were carried out independently and all interviews, except one, were audibly recorded. The sole informant, who was not audibly recorded, refused to be audibly recorded. After collection, the interviews were transcribed in full text and the Swahili interviews were translated from Swahili into English. After transcription and translation, every interview was entered into the qualitative software program, QSR N6, and coded and analyzed according to the research questions and objectives.

Secondary data from the register books and official reports was entered and organized in Microsoft Excel and analyzed comparatively across each managerial level and for completeness.

### **3.5 Ethical considerations**

Ethical clearance for this study was granted by the Institutional Review Board of the Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct this study was obtained from KCMC, the regional office, district offices, health facilities, and village authorities. Informed written or verbal consent was sought from each participant and participation was kept voluntary.<sup>4</sup> Codes and fake names were assigned to study participants and locations to maintain confidentiality.

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<sup>4</sup> See Informed Consent Forms (English and Swahili) in Appendix C.

## **CHAPTER 4**

### **Results**

#### **4.1 Characteristics of study participants**

In this study 15 interviews took place and 17 individuals participated. All participants selected worked in data management or RCH activities within a health facility or health management office. All participants were between the ages of 30 to 60 years with the majority of respondents over 40 years of age. The majority (81%) of participants were females. Every informant had more than 2 years experience working at their respective facility with the average working experience being 12 years.

Each of the informants had an advanced degree or diploma in a healthcare field and worked as a healthcare worker at a healthcare facility or in a health management office. The majority of informants (75%) either worked as a nurse or had a degree in nursing. Other informants were clinical officers or doctors. At a glance, two dispensaries, two health centers, four district hospitals, two district offices, one regional hospital, one regional office, and two national offices were visited. Six informants worked in a health center and two participants worked in a dispensary. Four informants worked in a district hospital and one informant worked in the regional hospital. Two participants worked at a district office, two informants worked at the regional office, and two participants were employed at the national office.

#### **4.2 Location of maternal deaths**

In order to record and thus prevent maternal deaths, it is imperative to understand the location of these deaths. Many deliveries in Tanzania happen at home, leading to the assumption that many maternal deaths occur outside of the health facility. In the Kilimanjaro region, however, it was found that maternal deaths largely take place within the health facilities, primarily at the district, regional, and national referral hospitals. Across all four levels within the Tanzanian health system, the majority of informants identified the location of maternal deaths to be within the hospital setting. At each of the lower-level health facilities (health



centers and dispensaries), the health workers stated that if a complication arises during delivery or if the mother has been in labor several hours and not given birth, they will refer her to the nearest hospital. These lower-level health workers, with the exception of one, have more than six years experience at their respective facilities. These workers reported that pregnancy complications are dealt with at the hospital level and most maternal deaths occur in the health facility. The SMI Coordinator provided a convenient summary of this maternal death phenomenon in Tanzania:

Only 47% [national average] of mothers deliver in the health facilities, so I thought there would be many [more] mothers dying in the community than in the health facility. But that's not true. What has happened here is that many [women] will go to deliver at the Traditional Birth Attendants and when there is a complication, they will be rushed to the hospital and they will [sometimes] die [in the hospital]. Even with home deliveries, if there is any complication, they will be rushed to the hospital. Few [mothers] die at home. (Interview, MOHSW, July 5, 2010)

This statement by the SMI Coordinator explains, in part, why maternal death statistics show that a majority of maternal deaths occur at the health facilities. This increased understanding of the location of maternal deaths will assist health workers in preventing further deaths.

#### **4.3 Definition of maternal death**

At the national level, the standard definition for a maternal death comes from ICD-10<sup>5</sup>. The RMO and the SMI Coordinator clarified that the Kilimanjaro region and all other regions use the government's criteria for a maternal death. In examining the health workers operational definition of a maternal death, all health workers had an understanding of this definition. All hospital-based health workers, except one, narrated the nationally-supported definition – a death during pregnancy, delivery, or up to 42 days after delivery. One nurse, for instance, explained, "If a pregnant woman dies, it's a maternal death. If a woman dies...before or after

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<sup>5</sup> The ICD maternal death definition is written previously in the Literature Review.

she delivers it is a maternal death. A maternal death occurs before 42 days [after delivery]" (Interview, Moshi Rural District, June 14, 2010). It should be noted that these workers came from hospital facilities in which a maternal death had occurred in the last five years. These workers could have participated in the maternal death review process, becoming more informed of the maternal death definition. However, the other hospital health worker gave a definition that included, "a death 40 to 48 hours after delivery" (Interview, Moshi Rural District, June 10, 2010).

All lower-level health facility (health centers and dispensaries) workers, except one, stated that a maternal death is a death during pregnancy, delivery, and up to 40 days after delivery. For instance, one health worker reported that a maternal death is, "a death which occurs within 40 days after the delivery or during pregnancy" (Interview, Same District, June 11, 2010). These workers had had no or limited experience with a maternal death because for each pregnancy complication they refer the woman to the nearest hospital.

Most management-level staff were also familiar with the government recommended definition of a maternal death. Only one management-level staff member reported an incorrect definition of a maternal death: a death during pregnancy, delivery, and up to 40 days after delivery. Unfortunately, it was not clear from the interview why this officer reported this definition.

#### **4.4 Registration of maternal deaths**

One of the objectives of this study was to establish the maternal death registration system in the Kilimanjaro region of Tanzania. By describing the different ways that maternal deaths are reported and investigated, more insight can be gleaned into how workers establish a cause for a maternal death, how the maternal death is reported to management offices, and how the registration process is used to rectify provision-of-care practices to prevent maternal deaths.

When a maternal death occurs, it is audited and reported via the maternal death review and additionally documented in the HMIS monthly, quarterly, and yearly reports. According to a

national-level HMIS officer, maternal deaths are supposed to be reported using two systems: the maternal death reviews and the tools of the HMIS. Through observation and further interviews, maternal deaths were found to be primarily reported through the maternal death review process using the Maternal Death Notification Forms A and B.<sup>6</sup> Later on at the end of the month, quarter, and year the maternal death count is summarized in the HMIS reports. Through interviews and observation, it is concluded that maternal death registration is under the command of two different departments at the national level (Reproductive and Child Health Office and HMIS Office), but utilizes one primary tool – Maternal Death Notification Forms A and B – and is recorded additionally in the HMIS forms. The HMIS forms are a summary of maternal deaths per time period rather than actual in-depth investigation and registration. Due to this secondary nature in maternal death reporting, the HMIS reports are briefly covered in the findings of this study.

#### **4.5 Maternal death review process**

Before a maternal death is recorded into any registration system, the staff of a health facility investigates that death through a maternal death review process described below:

##### ***4.5.1 Health centers and dispensaries***

For each lower-level health facility visited, either health center or dispensary, the health workers stated that no maternal deaths have taken place in their facility over the last five years. For each pregnancy complication that occurs, the patient is referred to the nearest hospital which is either the district hospital or the regional hospital. A dispensary health worker reported, “If [the pregnant mother] comes here with very serious complications, we send her to the district hospital. If she dies [at the hospital] we are not concerned anymore” (Interview, Same District, June 9, 2010). When asked to explain a maternal death and the process she would go through to report a maternal death, the other dispensary worker explained that it was not her position to identify a maternal death. She explained, “That is the

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<sup>6</sup> Refer to Maternal Death Notification Forms A and B in Appendix D.



doctor's concern...When the maternal death occurs, I'll inform the doctor so that he can fill in the [maternal death] form" (Interview, Same District, June 9, 2010).

To refer a woman with pregnancy complications to the nearest hospital, all health facilities use a car. However, a large majority of health facilities do not have a facility-owned vehicle. Many health facilities rely on the patient's family to provide a vehicle or money to hire a private car. One nurse narrated:

Most times [when] we see a mother with a [pregnancy complication], we give her a referral so that she goes forward to a hospital...The family has to hire a car [with] their own [finances] to pick her up [from the health facility]...A nurse [escorts] the woman to the hospital. [This need to hire a car] affects the expectant mothers because we might find one woman whose family is poor. It comes to a point where we have to help that mother by donating money [to hire the car] to save her life. We have to donate because the relatives can't offer the support. (Interview, Moshi Rural, June 14, 2010)

Most maternal deaths take place on the way to the hospital or at the hospital; therefore, the large majority of maternal death reviews occur in the hospital setting.

#### ***4.5.2 District hospital and district medical office***

Initiated only three years prior to the study, the maternal death reviews were found to take place in the health facility and included joint efforts from the health facility staff and district medical office. Some of the informants stated that maternal death reviews were to be conducted immediately after death or within 24 hours after death. After a maternal death, a team of maternity ward staff, the doctor in charge, and hospital management sit together to discuss and identify a correct cause of death. A hospital health worker narrated, "We have a team for maternal deaths. When the maternal death occurs, [the team] will meet within 24 hours, discuss that maternal death, and fill in the form" (Interview, Same District, June 11, 2010).

To perform the maternal death review, the review team gathers the hospital records of the patient from the time of admission to the time of death. These documents are reviewed during the maternal death audit to help investigate the causes of maternal death. One nurse explained, “We discuss the causes of the death. Why did the mother die? What was her blood pressure level? We examine the mother’s antenatal card to see if it lists that she had hypertension or another [pre-existing] health problem” (Interview, Moshi Rural District, June 14, 2010).

After the cause of death is identified, the proceedings are analyzed to determine what measures could have been taken to prevent that maternal death and what corrective actions should be taken by that health facility. One maternity ward nurse narrated:

After a death occurs, we have to meet – all the staff – and discuss what things could have been done to avoid that death. If it is the healthcare provider’s fault, we as a hospital will have to make corrections. If it is not the fault of the provider, we will still meet and discuss how to tackle that problem so that it will not occur again for another patient (Interview, Kilimanjaro Region, June 17, 2010).

The medical officer in charge verifies the death, and with the help of the maternal death review team, Maternal Death Notification Form A is completed. The District Medical Office is then alerted of the maternal death by a phone call or in-person delivery of the Maternal Death Notification Form. The DMO travels to the site of the maternal death and meets with the key informants surrounding that death. After a secondary examination of the maternal death incident, the DMO will certify the cause of death. Maternal Death Notification Form B is completed with information distilled from Maternal Death Notification Form A. Form A remains in the health facility’s records. One nurse explained, “We fill out the [Maternal Death Notification B] form and send it to the DMO on the same day or the second day. Then the DMO will come and certify the death” (Interview, Moshi Rural, June 10, 2010). This report contradicted information given at the district health management office. A

representative from one of the District Health Management Teams stated, “We discuss the maternal death before 24 hours. We go to the [health facility] where the death occurred and discuss it as a team [with staff] from that facility” (Interview, Moshi Rural June 10, 2010).

On Friday of that week, the Epidemiology Department of the Ministry of Health and Social welfare is contacted regarding the incident of that maternal death. Maternal deaths in recent years have been added to the IDWE, according to the National SMI Coordinator. Whether or not a maternal death occurs, the Ministry of Health is contacted, either by phone, fax, or email, regarding the number of maternal deaths every week. The Maternal Death Notification Form B is sent to the national level at a later date by the district. A maternity ward nurse narrated, “Every week, we report to the district how many maternal deaths or complications have occurred. We [report] every Friday. We have to send this report every week, so that the district medical office is [updated] on what is going on in our health facility.” (Interview, Moshi Rural, June 14, 2010)

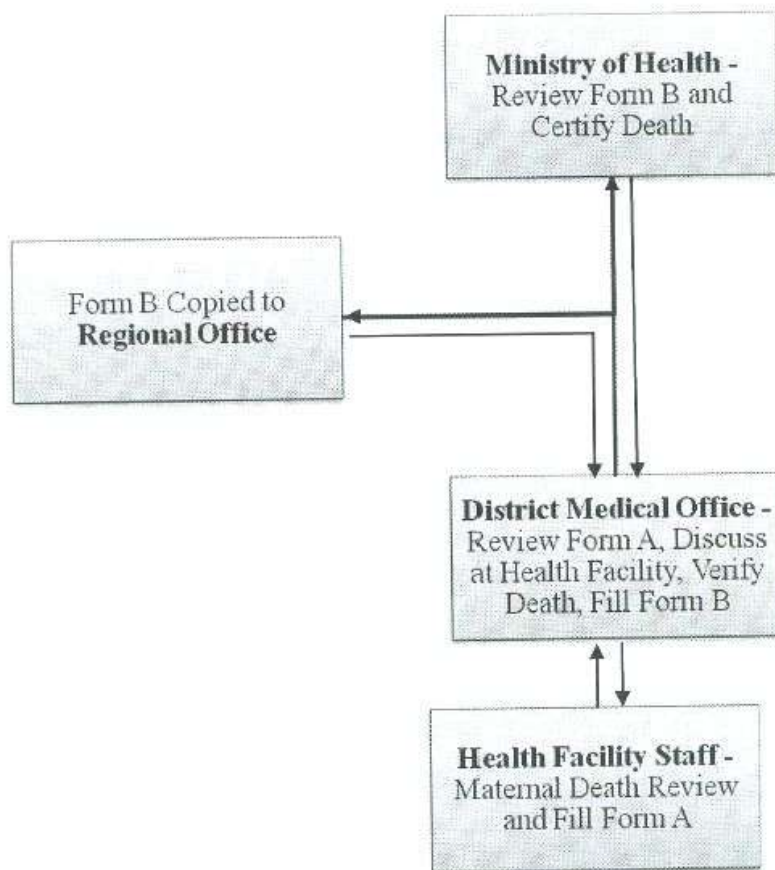
#### *4.5.3 Regional medical office and national offices*

At the final stages, the maternal deaths are reported every Friday directly to the Ministry of Health and Social Welfare from the district. To facilitate faster communication, the regions have been removed from data flow pipeline. At the national level, the Maternal Death Notification Form B is sent to the Ministry of Health and Social Welfare at a later date not specified in any of the interviews. A copy of this form is sent to both the districts and the regional medical offices. The national level is encouraging email use to submit Maternal Death Notification Form B. This notification form is then collected by the Safe Motherhood Office and analyzed by the SMI Coordinator to further verify the cause of maternal death. A HMIS officer explained, “Then the national level reviews [the form] as well. If they have any doubts about the form or the report, they will have an officer go and double check the data from within the community. [The officer checks] what has happened and reports [the findings]” (Interview, MOHSW, July 5, 2010). From analysis of these maternal death



notification forms, a national summary report is created, identifying the variables leading to the maternal deaths.

**Figure 3: Channel of information flow in maternal death review**



#### *4.5.4 Comparison to national guidelines*

According to national guidelines, the process of maternal death review includes the following steps (Maternal and Perinatal Death Reviews Guideline, 2006):

- 1.) Patient's records are gathered within 24 hours in preparation for the maternal death review:

This step was explained in several accounts; however, the time period of 24 hours was associated with completion of the maternal death review by the facility. In regards to document gathering, the health workers stated that the patient's files were collected and examined from point of admission until death. Other documents, such as the antenatal card, were also reviewed. One health worker narrated, "Now if the patient was in the ward and she was admitted before she died, we must determine the problem. We review the notes from the files from admission up until the time of death...[The files] will be [used] to identify the cause [of death]" (Interview, Moshi Rural, June 10, 2010).

- 2.) The records are examined during the review to understand the proceedings leading up to the maternal death:

This step was mentioned more than any other narration given by the health workers. It was repeatedly noted that the maternal death review was performed to determine the cause of death. The guidelines also list members from the district hospital that should be present during the maternal death review: Doctor-in-charge, nurse-in-charge, DMO, District Nursing Officer (DNO), District RCH (DRCH) Coordinator, nurse in charge of labor ward, clinical officer-in-charge, nurse in charge of gynecological ward, and representatives from the RCH clinic, laboratory, pharmacy, and operating theater. Very few health workers mentioned the members present in the maternal death review. Almost all health workers stated that a team sits and discusses the maternal death, but the types of members comprising that team were often left out.

Some health workers were able to describe a few of the members that make up the death review team. One health worker explained, “The maternal deaths will be reviewed to see the cause [of death] and most of the time there is a team [to perform the analysis]. The team consists of nurses and doctors. Also, anesthetists [are included] if it was a case involving an operation, such as a caesarean section” (Interview, Moshi Rural, June 10, 2010).

3.) The committee secretary keeps minutes of the maternal death review:

According to the guidelines for district hospitals, the nurse-in-charge should act as the committee secretary for the maternal death review. Although some health workers noted that the nurse-in-charge participates as part of the maternal death review committee, none acknowledged her role as secretary.

4.) The maternal death review discusses the possible shortcomings in the prevention of that death:

This part of the maternal death review was another step that was commonly stated. Almost all health workers that provided information regarding the maternal death review included a statement about discussing the cause of death and possible ways that they could prevent a similar death in the future. A nurse noted, “We [discuss] the cause of death and ways [in which] this woman could not have died. We want to find out the reason [for the death]. For example if the reason was that no drugs were given to the mother [during delivery], we must try to find ways to fix this” (Interview, Same District, June 11, 2010).

5.) An action plan is developed in response to the most-probable shortcomings identified:

About half of the health workers that discussed the maternal death review mentioned the importance of the review in establishing ways to implement corrective action. While discovering the cause of death was the focus of the informants’ descriptions,



strategies to improve upon their current performance were often overlooked. Many respondents stated that the health facility staff finds ways to rectify those actions, but these workers never explicitly stated what actions they may take.

6.) Form A is completed:

The guidelines continue further to explain that Form A is filled in after completion of the maternal death review meeting. Most health workers had a similar answer. The guidelines also describe Form A as “bulky.” Several respondents mentioned the amount of work needed to complete this form and others described this form as difficult to complete. A nurse explained, “The forms for [maternal] deaths have to be filled out with [assistance from] a doctor. [The Maternal Death Notification] Form B is the form that is complicated” (Interview, Moshi Rural District, June 14, 2010).

7.) The committee secretary completes Form B using information obtained in Form A:

Only two health workers from the same facility identified the secretary whose role is to complete Form B. The nurse-in-charge is designated in the guidelines as the temporary secretary for the hospital maternal death review committee and this particular hospital follows those established guidelines. If a person was identified by any other health worker, it was often the medical officer-in-charge or the DMO. The most common answer was that the maternal death review team completes Form B. About half of the respondents correctly described Form B being completed with information from Form A.

The guideline states that, “the fundamental principle of these processes is confidentiality” (Maternal and Perinatal Death Reviews Guideline, 2006). Only one nurse out of all informants, however, mentioned the confidential nature of this process and form. She stated, “Maternal Death Notification Form B form is confidential...[We are supposed to] keep the data secret and confidential. [We] keep it in a cupboard instead of here on the table [in the maternity ward] where everyone can read it.” (Interview, Moshi Rural, June 14, 2010)



Lastly, the maternal death review guidelines state the periodic meeting of district, regional, and national health management to discuss all maternal deaths which took place under their management for the specified time period. The second purpose of their meeting is to review the corrective actions that were taken to prevent a similar maternal death incident. The districts are guided to meet once per month, the regions once per quarter, and the national level twice per year. Two of the three meetings were described by the informants at all levels. The SMI Coordinator discussed the meeting that occurs twice a year where the maternal deaths are presented and discussed. This follows the guideline's criteria. Explaining the coordinator's role as committee secretary, the coordinator narrated, "They send all the [Maternal Death Notification] forms to me and I have the forms here. When the forms [arrive at my office], I go through them point by point before I bring them to the national committee that meets twice a year" (Interview, MOHSW, July 5, 2010).

The regional level also meets every quarter to discuss the maternal deaths which took place. This meeting takes place at the national referral hospital, KCMC, and involves hospitals from around the 7 districts of the Kilimanjaro region. None of the hospitals from one district that is situated far from KCMC attend. However, in a district that borders KCMC, all of the hospitals explained that they do attend. One health worker narrated, "Every 3 months there is a meeting at KCMC. Select staff from all the nearby hospitals [meet] to share the causes of maternal death within [their] region. If there are any patients who died during delivery, [the cases] will be presented. [The whole] panel will analyze the problem and how to tackle it" (Interview, Moshi Rural, June 10, 2010). Unlike the guidelines, however, most members of the regional health management team do not attend these meetings. Instead, the national referral hospital has taken on this responsibility outlined in the guidelines.

*Table 1: Maternal death review process from facility to national level*

<b>Organizational Level</b>	<b>Roles and Responsibilities</b>	<b>Guidelines Role and Responsibilities</b>	<b>Type of forms used</b>
<b>Health Facility</b>	<ul style="list-style-type: none"> <li>- Perform maternal death review within 24 hrs after death</li> <li>- Use patient's record to identify correct cause of death</li> <li>- Fill Maternal Death Form A</li> <li>- Fill Maternal Death Form B with info from Form A</li> <li>- Send Form B to DMO by Friday</li> </ul>	<ul style="list-style-type: none"> <li>- Patient's records collected for review within 24 hours</li> <li>- Use documents to learn death circumstances</li> <li>- Committee secretary records proceedings</li> <li>- Identify gaps in death prevention</li> <li>- Design action plan</li> <li>- Fill Maternal Death Form A</li> <li>- Fill Maternal Death Form B with info from Form A</li> </ul>	<ul style="list-style-type: none"> <li>- Maternal Death Form A and Form B</li> </ul>
<b>District Medical Office</b>	<ul style="list-style-type: none"> <li>- DMO certifies cause of death</li> <li>- Gives notification of death to MOH by IDWE report on Friday</li> </ul>	<ul style="list-style-type: none"> <li>- DMO, DNO, DRCH Coordinator serve as review committee members</li> <li>- Meet monthly as technical committee to discuss deaths</li> </ul>	<ul style="list-style-type: none"> <li>- Maternal Death Form A and Form B</li> </ul>
<b>Regional Medical Office</b>	<ul style="list-style-type: none"> <li>- Receives copy of Maternal Death Form B</li> <li>- Reports deaths in Annual Report</li> </ul>	<ul style="list-style-type: none"> <li>- Meet quarterly as technical committee to discuss deaths</li> </ul>	<ul style="list-style-type: none"> <li>- Annual Report</li> <li>- Maternal Death Form B</li> </ul>
<b>Ministry of Health</b>	<ul style="list-style-type: none"> <li>- Receives copy of Maternal Death Form B</li> <li>- Analyze forms and verifies deaths</li> </ul>	<ul style="list-style-type: none"> <li>- Meet twice per year as technical committee to discuss deaths</li> </ul>	<ul style="list-style-type: none"> <li>- Maternal Death Form B</li> </ul>

#### 4.6 Data consistency

Maternal death data sets were obtained for the past five years, from 2005 to 2009, for each health facility visited. Additionally, maternal death data was gathered from the districts, region, and national level to compare the same maternal death data recorded at different levels of the health system. It was observed that lower-level health facilities, such as dispensaries and health centers, reported zero maternal deaths within the last five years. These data sets matched up precisely with district data of those facilities.

The hospitals, unlike the lower-level facilities, did have at least two maternal deaths in the last five years, but never was the value greater than ten for any individual year. After receiving district data of those hospitals in order to compare, it was found that the numbers were also identical. The discrepancies, however, were observed in comparing the district data to the data provided from the region regarding the two districts under study. For both districts, at least one of the five years did not match up—a maternal death had been lost upon transfer from the district to the regional report. From regional to zonal, another district loses three maternal deaths in a 2007 report. At the national level, the HMIS Statistical Abstract 2008 reports a 2006 maternal death total of 76 for the Kilimanjaro region while the regional report for 2006 specifies 45 (Annual Health Statistical Abstract Tanzania Mainland 2008). Additionally, 2008 maternal death data obtained from the HMIS office is 14 for the Kilimanjaro region while the 2009 regional report gives a value of 42 maternal deaths for 2008 (Taarifa ya Huduma ya Afya ya Uzazi na Mtoto, Kilimanjaro, 2009). Furthermore, the health management members at each level stated that they record the hospital-based maternal deaths separate from those deaths that occur in the community. There should be no doubts as to whether the number of deaths is facility-based, community, or combined. The values compared above should all be facility-based maternal deaths and equal to their corresponding reported value.

Furthermore, report sheets were observed to have faults. A blank report form that summarizes delivery data, such as number of maternal deaths, deliveries, complications, etc, had a whole row missing for the month of May. Upon observation of completed reports by



some of the facilities, this error was not detected before distribution to the facilities and is now included in these reports. This defected form is still used by the facilities to submit their maternal health data to the districts.

#### **4.7 Factors that influence maternal death registration**

Several factors emerged from interviews with the informants that largely influence the maternal death review process. These factors include supervision and feedback, training in data management, health workers' perception of data registration, collection of maternal death data from the community, and other various challenges identified.

##### ***4.7.1 Supervision and feedback***

In the Kilimanjaro Region, there is comprehensive and consistent supervision at the district and regional level to the preceding level. The responses from informants about the supervision and the feedback that they received and provided were primarily positive and supportive. Many of the workers from the facilities and offices visited described the supervision as “supportive” or “helpful” or “good.” Only one nurse laughed and gave a sour look to imply that she really does not like the supervision, but she never actually stated her feelings verbally.

The supervision provided from the districts to the health facilities is supposed to occur once per month at each facility, according to national recommendations. Health facility workers from one district stated that they received supervision once a month, but all facility workers in the other district said they receive supervision every three months. Supervision scheduling is done using a matrix given to the districts by the region. This matrix ensures that all facilities are visited once each month. The supervision matrix was posted on the notice board at each of the district offices visited. One district health worker (who ironically works at the district that gives quarterly supervision to the facilities) explained this matrix:

Every month we visit every [health] facility. When we are there during supervision, we [provide] supportive supervision by having discussions at the facilities. We pass through all [the supervision materials and health facility



departments]. We have a tool [that we use] for supervision and it [encompasses] all activities within the district. We [use] that tool to discuss with [the health facilities] where we found the problem and how to solve it [using the resources] at the facilities. This is how we perform [supervision]. We also have a matrix which helps us [to organize] supervision. (Interview, Same District, June 11, 2010).

The district health management workers also use supervision tools designed by the Ministry of Health and Social Welfare to carry out monthly supervision at the health facilities. A HMIS officer stated that the district officials use a HMIS supervision checklist which looks at how the data is recorded. The checklist gives specific tasks to those that provide supervision to examine the register books and to observe how the health workers carry out their daily tasks. These workers also use tally sheets. The district officials look at how the data is summarized, the data is compiled in quarterly reports, and the indicators and data are used in planning. These district workers also look at and discuss the trends in the data and the difficulties and issues raised by the health facility workers.

On-the-job-training, coaching, and mentoring were also discussed by over half of all health workers. On the receiving end, a health facility nurse stated that during a supervision visit, “If there are any corrections [to be made], they will correct [us]” (Interview, Moshi Rural District, June 10, 2010). Health management members from the district, regional, and national level also described this process in a similar manner. A member from the regional management team said, “When [the health facility staff] are not doing things the way they are supposed to be done, we have to coach them to [understand the correct] way that it is supposed to be done. This is similar to on-the-job-training” (Interview, Kilimanjaro Region, June 18, 2010).

Supervision of the periodic reports also occurs within the districts and region. Almost all reports are delivered in person by a health worker from the facility or district. Once a report is brought to the district office, a member of the health management team will review the

report together, in-person, with the health worker for data inconsistencies and miscalculations or call them within several days to provide feedback about the report. A district health manager responded:

Sometimes when they bring the report to me, I meet with them and check the report together. When we find a problem, we discuss it, and correct it... If I find a problem during compilation of the report, I call the person [responsible] to [investigate] it. I ask him why this may have happened because he is the one who attended to the [patient] at the peripheral [facility]. (Interview, Same District, June 11, 2010)

From the perspective of the health facility worker, the report reviews were seen to positively influence performance in report writing and provision of care. The health facility workers appreciated the feedback received from management staff because it informed them if they had accurately completed a report. Additionally, the health workers saw the feedback as insight into improving the quality of health services offered. One worker from the health facilities described the feedback she receives:

When the feedback [is sent] to me, I reply to the feedback immediately. If I get feedback that my report is good, I am happy. I would like to get feedback that my report was clear or was not clear. If I get feedback that it was clear, I say thanks to God. If not, I correct my mistakes in order to make the [health facility] services better. (Interview, Moshi Rural District, June 14, 2010)

Supervision to each district is provided by the regional health management team on a quarterly basis for a total of 2 to 3 hours. Supervision provided from the national level includes supervision on a quarterly basis to select districts within each region. National-level management partners with members from the regional health management team to carry out this supervision.

Also, analysis of maternal death reports is performed at the national level to check the accuracy and consistency in reporting. One HMIS officer narrated, "In reporting it is difficult

to know the real cause of death because [the health facilities] may provide a secondary cause of death which is not the primary cause of death. For example, if a pregnant mother has malaria and dies, [the facilities] may report that [death] as malaria, even though [the pregnant mother] also had HIV/AIDS and died because of HIV/AIDS” (Interview, Ministry of Health, July 5, 2010).

#### *4.7.2 Training in maternal death registration*

About half of the health workers directly involved with data management had received some formal training on data collection and management in the form of a short-course or seminar or in their advanced degree education. About half of the workers received a short-course training regarding MTUHA or maternal health skills, such as emergency obstetric or focused-antenatal care training, but each course includes a portion on data management and collection for maternal deaths. If they had not received formal training, the workers had received on-the-job training during supervision visits. They were also willing to receive formal training in data management. One health worker narrated:

It would be better for me to [receive formal training] in order to become more familiar [with data registration]. Sometimes I am not as familiar with the data and [writing] reports as others. The data differs according to the type of form...Slowly, I am acquiring [knowledge] through on-the-job training, but if [formal training in data management] would happen, it would be best because it would be much easier to deal with this type of data. (Interview, Kilimanjaro Region, June 17, 2010).

Initially, the ministry provided training with new initiatives that were put in place, but now it is up to the districts and regions to come up with the funds to train more health workers or provide refresher training. A member of the regional health management team explained that initially the training had been provided for the whole county by the government, but now “the districts and regions are supposed to [allocate funds] into their budgets to retrain their people” (Interview, Moshi Rural District, June 14, 2010).



To ease the burden of the districts and regions, over five different development partners are working in the Kilimanjaro Region to provide more recent data management training through similar short-courses and seminars in maternal health issues. Jhpiego, Engenderhealth, Medicos del Mundo, Elizabeth Glasier Pediatric AIDS Foundation, and Family Health International were some of the organizations mentioned by the informants.

#### *4.7.3 Perception of data collection*

Two distinct themes of utility arose regarding the health workers perception of the importance of data collection and their role as data managers. One group of health workers focused on personal or facility-based use of maternal death data. These workers discussed how they use the data they collect to examine their facility's performance in prevention of maternal deaths and ways that they may further reduce pregnancy complications. One nurse stated, "When a mother dies due to post-partum hemorrhage, we analyze this so we know how to prevent post-partum hemorrhage in another patient" (Interview, Moshi Rural District, June 14, 2010). Other health workers emphasized how the data helps to identify the facilities' shortcomings. One nurse narrated:

It is good to gain an understanding of how to collect [maternal health] data and how to keep the data secret and confidential. We understand that by collecting data we will see how well we have been working and the number of women that [have visited] the health facility. We will be able [to compare] the total deliveries to total deliveries from previous years. If there are few deliveries this year, we ask ourselves what makes these women not come to the hospital to deliver. Then we can correct ourselves where we are wrong. By collecting data you understand where you are wrong. (Interview, Moshi Rural District, June 14, 2010)



Additionally, one health worker described how the facility's use and analysis of data facilitates a healthy environment for the pregnant mother, "To have a pregnancy is not a reason to die. We want [the mothers] to deliver safely and the babies to stay safe – that is our reason for collecting data. We want to [ensure] that women are not dying during pregnancy" (Interview, Same District, June 11, 2010).

Another group of health workers explained their impersonal connection to the data and the importance of data for use by upper-level management. They focused on their role in submitting information to the DMO and fulfilling their required tasks. One health facility worker stated, "We collect this data so that we ... know the information to take to the DMO... [My job] is to give correct information to the DMO" (Interview, Same District, June 11, 2010). One nurse went so far as to address the importance of data to the national-level government. When asked about her role in collection of maternal deaths, she replied, "My role [in data collection] is to help the nation" (Interview, Moshi Rural District, June 14, 2010).

#### *4.7.4 Registration of maternal deaths in the community*

The health facilities, districts, and region all seemed to have similar answers in discussing collection of the maternal deaths statistics from the community. They mentioned that through the use of Traditional Birth Attendants (TBAs) or village health workers, most maternal deaths and deliveries are collected and recorded by the health facilities. Delivery recording in the community provides some insight into the proportion of maternal deaths that are captured in the community. Since no maternal deaths were said to have occurred in the surrounding community, deliveries were additionally examined. A health worker narrated, "We use a phone and outreach clinics [to find out] where [the mothers] deliver. [Through this] we obtain information regarding those mothers who deliver at home" (Interview, Same District, June 9, 2010). Village health workers are also used to collect maternal health data from the community. A nurse explained, "We get the information [about maternal deaths] from the village health worker. These workers bring information about the maternal deaths which have occurred outside of this facility" (Interview, Same District, June 11, 2010). Members of the

district health management team also recognized the roles that village health workers play in creating a clearer picture of maternal health data in their district. One district officer reported, “We have TBAs who collect data. These [TBAs] bring the data to the hospital, so we know the total number of those who deliver at home and those who deliver in the health facility” (Interview, Same District, June 11, 2010). Other facilities gather information about deliveries or maternal deaths once the newborns are brought to the health facility a short-period of time later. One health worker narrated:

If [the mother] delivers at home, the child and mother come later to the health center [to receive post-natal care or vaccinations]...On the form that the mother of the newborn child fills out there is a place to write in where the delivery took place. Did [the delivery] take place in the home, on the way, or in the health facility? (Interview, Moshi Rural District, June 10, 2010)

Still some health workers responded that they do not have information regarding community deliveries and deaths. One health worker stated, “We don’t get the information if there is a delivery at home” (Interview, Same District, June 9, 2010). Without obtaining information from the community, these health facilities are only left with partial maternal death statistics for their catchment area.

Some initiatives are taking place to improve the accuracy of maternal health data and reduce maternal mortality within the region. On the health-facility level, several facilities mentioned ways in which their facility is educating the community on the importance of delivering at the health facility. One health worker narrated, “We have health education talks in the mornings. During a health talk, we discuss all the advantages and disadvantages of home deliveries, plus advantages of posting the delivery” (Interview, Moshi Rural District, June 10, 2010).

On the regional level, districts are now implementing community health registers to record births and deaths within the community. The village leader will manage the books and be in charge of reporting the information to the health facility. A member from the regional health management team remarked:

We [regional officers] came up with a strategy that is now being implemented. We make sure that village health workers are using the community [delivery and death registration] forms. On community days for maternal healthcare, we collect the data from the [community health workers] in order to get the [maternal] deaths and live births from the community. We combine the community data with the data of the health facility and we [calculate] one maternal mortality rate. Otherwise, if we miss one of the [calculation] variables from the community, we are able to only calculate using the health facility data. (Interview, Kilimanjaro Region, June 18, 2010)

On the national level, a new program called Phone for Health is being piloted in a select district of Tanzania. This program involves the community reporting the maternal death through use of the mobile phone and alerting the health facility. The health facility will in turn directly communicate that death to the Ministry of Health and Social Welfare through mobile phone. According to the head HMIS officer, this program is showing promising results.

Reporting at each level includes separate places within the report form to record the number of deliveries in the community. The districts, regions, and national level also report deliveries and maternal deaths according to location, either in the health facility, at home, or on arrival. Distinguishing between the different delivery locations helps to show where the majority of deliveries and maternal deaths are taking place. Regardless of this distinction in reporting, two national government authorities on maternal health data registration had opposing answers in describing the proportion of deliveries that occur at home versus the health facility. The SMI Coordinator stated that most maternal deaths occur in the hospital because most women are transported to the hospital by a TBA if a complication arises. The head of the HMIS office mentioned that most maternal deaths happen in the community and are not well recorded. This informant showed that maternal death registration is therefore lacking and needs vital improvement.



#### *4.7.5 Challenges*

About half of the health workers stated that they had no problems or challenges in the collection and management of maternal death data. A health worker summarized a common answer by explaining, “In report writing, I don’t have [many] problems because I have learned how to fill in the [reports] and [perform] data analysis” (Interview, Moshi Rural District, June 14, 2010).

Shortage of human resources was the number one problem cited by those workers involved in data management. This challenge was also identified at each level of the health system. One nurse narrated, “When there is a shortage [of staff], like today, it is a challenge [to write the reports] because I am the lone registered nurse with all the attendants” (Interview, Moshi Rural, June 10, 2010). Shortage of staff leads to problems in submitting the report on time. Some health workers admitted that because of health worker shortages they do not submit the reports on time. Writing reports sometimes conflicts with the health worker’s provision-of-care responsibilities. This was evidenced by the fact that time taken to write the report was another major challenge reported. One lower-level health facility worker explained, “It is difficult because I am the only one who writes [the reports] and it takes a long time” (Interview, Same District, June 9, 2010). Unclear records due to delays in recording the maternal death incident were another concern. Time-lag between registering the death and writing the report increased the time necessary to complete the report. A clinical officer narrated, “The report does not take a lot of time if you [write] it immediately. If you write [the report] on the spot, then it is no problem. However, if you wait and leave the [report writing] for tomorrow, then it becomes much more time-consuming.” (Interview, Moshi Rural District, June 10, 2010).

Other less-common challenges mentioned included poor recording of the maternal death forms by lower-level health workers, lack of data management training, poor organization, and absence of guidelines to assist in the completion of the report. One health worker narrated, “We have no guidelines for maternal death reports despite what we have learned



through our schools. In spite of MTUHA reports, we still do not know where to chart [the proceedings] of a maternal death...because we do not have guidelines” (Interview, Moshi Rural District, June 10, 2010).

## CHAPTER 5

### Discussion

#### 5.1 Capturing maternal deaths in the health facilities

The current perception is that hospital-based statistics fail to capture the majority of maternal deaths because most maternal deaths occur in the community (Songane & Bergstrom, 2002; NRMSPARMNDT, 2006-2010). While the skilled birth attendance in the Kilimanjaro region is higher than many other regions in Tanzania, it still has a large number of births that take place at home. Despite this, many women seek medical care in the facilities and hospitals if a pregnancy complication arises—a finding also reported from a study in the Gambia (Cham, et al, 2005). The act of seeking care in the case of pregnancy complications means that the majority of maternal deaths occur either on the way to or at the health facility. In the Kilimanjaro region it was found that a large number of maternal deaths take place within the health facilities.

Increased communication between the community and the healthcare providers appears to improve the number of women referred to the health facilities for pregnancy complications. Some TBAs have even been trained to refer women with specific obstetric complications to the health facilities and to encourage these women to return after delivery. Community health workers, TBAs, and village leaders are in charge of recording and reporting deaths and pregnancies to the health facility in the Kilimanjaro region. In doing so, more responsibility is placed on them to improve the outcomes that take place in the community and refer more women to the facilities for advanced obstetric care.

Since a large number of maternal deaths occur in the health facility, the health system is better adept to provide maternal mortality statistics than previously thought. In recent years, Tanzania has increased its use of health facility data; the health facilities currently use their maternal health data, alongside other data, to order medical supplies, drugs, and equipment from the central medical stores department. This good practice needs to be visible in subsequent levels where such data is used to inform RCH programs and policies. To do so,

however, data quality needs to be improved in order to influence those policies and programs accurately and effectively.

## **5.2 Maternal death registration**

Within the Kilimanjaro region, this practice of systematic maternal death review helps to identify with greater accuracy the correct cause of maternal deaths. In the maternal death review, a higher medical authority is called, such as a management-level staff member or a trained physician, to certify the death. This gives encouragement that maternal death causes will not only be carefully examined and reported, but also analyzed to implement corrective action to reduce further maternal mortality.

A study of facility-based maternal death reviews in Senegal concluded that this type of maternal death registration is practical in resource-poor settings with the integration of a few essential elements. Vital components of their maternal death reviews included: quality-controlled data collection and computerized patient records, a strong commitment to the project from the head of the maternity unit, a strong executive-coordination team and provision of annual written feedback to staff, support from health authorities and community representatives, and an equitable and successful cost-recovery system. (Dumont, et al, 2006) Findings from this study on facility-based maternal death reviews revealed some similar findings and additional ingredients that are critical to the success of maternal death reviews in the Kilimanjaro region of Tanzania. In order to continue upon the data quality improvements that the maternal death review has fostered, these vital components need to be maintained and the existing gaps need to be filled. The essential ingredients and existing gaps are expanded upon in the following sections.

### **5.3 Knowledge of importance in data reporting**

Most health workers have a strong grasp on the importance of data collection and management of maternal deaths using the maternal death review. They have a general understanding of the process and their descriptions of the maternal death review coincide relatively closely with the national guidelines. They also recognize that the data will help them to analyze their current performance, the existing gaps, and ways to improve their current practices. This finding parallels a previous study by Robey and Lee that found that the lack of appreciation for data by health workers contributed to poor quality of data (1990). The data quality in the Kilimanjaro region would not be classified as high quality, but at least the accuracy of maternal death registration seems to be improving with the implementation and practice of maternal death reviews.

Training in data collection and registration of maternal deaths seems to increase the health workers knowledge and appreciation for data. With continuing training, maternal mortality data quality will continue to progress leading to full comprehension of maternal death review guidelines, maternal death causes, and ways to use data to implement corrective action.

Also, the maternal death reviews have increased the ownership of the data collected by initiating a more intensive mode of registration at the health facility level. The health care providers are in charge of assessing the deaths and carrying out structured analysis in order to determine causes for those deaths. From that investigation, the staff of the health facility can devise a plan for corrective action. The district and national levels oversee the activities, but operational control belongs to the facilities themselves. In order to produce even higher data quality, health workers need to be empowered to utilize data to a greater extent.



#### **5.4 Data inconsistency and errors**

Maintaining data consistency across levels for facilities with no maternal deaths is an easy task. Since these lower-level facilities, health centers, and dispensaries always refer pregnancy complications to the nearby hospitals, the data is always zero – no maternal deaths to report. Recording the same number for each consecutive year facilitates data accuracy from almost any data manager.

The data quality is tested when the maternal death numbers fluctuate between years and facilities, and data is passed through the hands of more data managers. Discrepancies between the facilities, districts, and regions show that data accuracy decreases as data is passed from the facilities to the national level. All hospital staff interviewed recalled information about most of the maternal deaths that had occurred at their facility in the last year or several years ago. At the district level and the regional level, however, interviewees could only tell which facilities or districts had a higher or lower number of maternal deaths. For instance, these health officials were unable to distinguish the individual facilities or districts trends without consulting data records. This indirect knowledge of data makes it easier for a copying error to occur; the data manager will not be so quick to catch the error. The identification of several data inconsistencies in district, regional, and national reports, implies that either the facilities, districts, or regions are sending incorrect information or simple transcription errors are being made. If transcription errors are at fault, better review of data in reporting is strongly advised as an easy means of improving data accuracy through limiting human error. Use of computer reporting systems may also facilitate improved data accuracy.

### **5.5 Importance of supervision and feedback**

Periodic and consistent supervision has created a channel of communication for health facilities, districts, regions, and national level staff. Despite the resources that are needed to sustain it, supervision was found to positively influence data quality. A study focusing on factors influencing HMIS data quality in Dar es Salaam, Tanzania found that supervision did not have any significant effect on data quality, but the authors questioned the type of supervision being provided (Simba & Mwangu, 2006). It was discovered though that different effects on worker performance would occur with audit and feedback interventions. Generally, the effects would be positive, but not substantial. (Althabe, et al, 2008) In the Kilimanjaro region, districts supervise the health facilities and hospitals and provide on-the-job coaching and mentoring in order to fix problems and to cross-check doubtful data reports received from that facility. Management-level staff also review the reports they receive to analyze data accuracy. To do so, two district health management team members of different districts reported that they examine the numbers for discrepancies. This type of review is beneficial on a basic level, but it does not target the mistakes found in data transferring errors from registers to reports at the facility level. However, careful scrutiny of data sets by management superiors needs to take place in order to avoid calculation errors. The use of computers in constructing reports may help to reduce computation errors.

The in-person review process in which the reproductive and child health coordinator sits with the staff member from the lower-level health facility seems to be an important part in the supervision and feedback process. In this meeting, the coordinator and the health facility person can communicate the importance of bringing a report on time and the implications that a late report has on the district, regional, and national offices. Additionally, it is a mechanism to fix any errors that are observed on the spot, with the help of the informed person from that actual facility. It also eventually saves time in calling and tracking down the health facility person who wrote the report in order to inquire about a certain discrepancy in numbers and figuring out the best way to fix it.

### **5.6 Human resource challenges**

Shortage of staff was found to contribute to poor data quality (Shrestha & Bodart, 2000). In this study, lack of sufficient staff was reported to be the leading challenge for the health workers in data management of maternal deaths. Workers expressed frustrations in not having enough time to fill out the reports or to accurately record essential pieces of information during the time of the incident or immediately thereafter. Delaying the work of data collection and management only created gaps in data records and made it more difficult to complete the required forms. Additionally, to deliver the reports to the district or regional level, the data managers must leave the health facility for an extended period of time, although no longer than a day. This periodic delivery creates vacancies within the health facilities and adds increasing burden upon the workforce that is left behind to manage the facility.

### **5.7 Study limitations**

One limitation identified in this study is the strict use of qualitative methods instead of triangulation. Another limitation is that the findings from this study cannot be translated to other regions of Tanzania and East Africa because a case-study design was utilized by the principle investigator. Furthermore, poor organization of data and missing reports were common in most facilities. This data mismanagement created many challenges in the actual observation and examination of maternal death reports and the collection of maternal mortality data to compare across different levels of the health system.



## **CHAPTER 6**

### **6.1 Conclusion**

Many challenges still exist in maternal death data registration, but implementation of the maternal death review has brought new hope that maternal deaths will be investigated thoroughly, recorded accurately, and future deaths prevented efficiently. Currently, maternal death reviews closely follow national guidelines, with only a few discrepancies noted. Small numbers of inconsistencies in data sets and reports continue to persist and lower data quality. Likewise, shortage of human resource is a challenge that must be overcome to improve the quality of maternal death registration.

This in-depth qualitative study has helped to assess the factors that limit quality data registration, and it also has facilitated identifying good practices that promote quality maternal death registration. Comprehensive and consistent supervision and feedback of reports and performance is an overarching factor that influences many different parts of the registration process. Community outreach and communication to increase the number of pregnancy complications referred to the health facility has also led to increased numbers of maternal deaths being reported, and most importantly, prevented. Increasing health worker knowledge and ownership of data through trainings and encouraging analysis and use has also had positive impacts upon the data quality for maternal death registration.

### **6.2 Recommendations**

Supervision and feedback were found to have a positive influence on data accuracy and performance. It is also a practice that is well received by the health workers of the Kilimanjaro region. High levels of supervision and feedback should therefore continue, especially in regards to on-the-job coaching. More attention should be directed towards accuracy and consistency of data in report writing, timeliness of report delivery, and reports should be carefully analyzed upon completion in order to promote consistent data flow from register to report.



In Tanzania, health facility data is currently being used to order medical supplies, drugs, and equipment from the central purchasing store. This practice is placing greater responsibility on the health facilities to collect accurate data and in turn utilize it to effectively purchase supplies for their facilities. However, this utilization can be a double-edged sword. Strict supervision of data from the facilities needs to be in place to ensure that data sets are utilized properly to order medical supplies. Strengthening the supervision of data and increasing data use are two recommendations for improving collection of maternal deaths.

The last recommendation is for further research in quantitative analysis of data flow between the health facilities, districts, regions, and national level to identify the magnitude of these data inconsistencies. Furthermore, inconsistencies exist in identifying where most maternal deaths occur in the regions of Tanzania. Some studies have suggested most deaths occur in the community while other studies argue that the majority of maternal deaths are captured in the health facilities. Rigorous studies with sound designs are needed to shed more light on this research divide.

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