

**Signal Functions for Emergency Obstetric Care (EmONC) as  
an Intervention for Reducing Maternal Mortality: A Survey of  
Public and Private Health Facilities in Lusaka District, Zambia**

By  
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A dissertation submitted to the University of Zambia in partial fulfillment of  
the requirements for the award of the degree of Master of Science in  
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## **Declaration of Original Authorship**

I, Tannia Tembo, hereby declare that the study titled “*Signal Functions for Emergency Obstetric Care (EmONC) as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia*” and the intellectual content of this dissertation are the product of my original field research and have not previously been published or written by another person. The document does not contain materials which have been accepted for the award of a different degree, diploma or any other qualification at this or any other educational institution. The views expressed herein are my own and not necessarily those of the University of Zambia (UNZA) or the Department of Public Health. All information sources, literature, contributions made to or assistance rendered during the research have been referenced herein.

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I, the undersigned, hereby certify that this dissertation is the product of my own work and, in submitting it for the Degree of Master of Science in Epidemiology, further attest that it has not been submitted to another university in part or whole for the award of any program.

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I, the undersigned, having supervised and read this manuscript, hereby confirm that this is the original work of the author under whose name it is presented. I confirm that the work has been completed satisfactorily and is ready for presentation to the examiners.

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## **Certificate of Approval**

The dissertation entitled “**Signal Functions for Emergency Obstetric Care (EmONC) as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia**” by Tannia Tembo has been approved as partially fulfilling the requirements for the award of the Masters of Science in Epidemiology by the University of Zambia.

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**Examiner 1**

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**Examiner 2**

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**Examiner 3**

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## **Abstract**

**Background:** Between 2013 and 2014, Zambia's maternal mortality ratio was estimated at 398 maternal deaths per 100,000 live births. Successful aversion of deaths is dependent on effective use of signal functions-a clinical intervention- to treat direct obstetric complications. Staff must be trained and supplies and equipment must be valid and functional. There is minimal evidence of effectiveness of signal functions in urban settings as previous research has focused on rural settings. This research evaluates the availability, accessibility, usability and quality of signal functions for EmONC in public and private health facilities in Lusaka District.

**Methods:** A descriptive cross-sectional study was conducted at 35 public and private health facilities providing maternal and newborn care in Lusaka district. The Service Availability and Readiness Assessment (SARA) tool was administered to health facility in-charges and quantified signal functions, infrastructure, equipment, supplies and human resources using the UN process indicators. Data on deliveries and complications were collected from registers from June 2013 to May 2014 and analysed using Stata Version 11 with statistical significance set at  $p < 0.05$ .

**Results:** Only 22 (37% public and 26% private) of the 35 health facilities surveyed provided maternal and newborn care 24 hours a day, seven days a week. Lusaka district had a high unmet need for Basic EmONC services with approximately 27 % and 23% of health facilities being classified as BEmONC and CEmONC, respectively. Minimal performance of some signal functions was not synonymous with compromised quality and was attributed to infrequency of occurrence of complications causing health facilities to vacillate in status between BEmONC and CEmONC.

**Conclusion:** Pattern of availability and use of signal functions reveals the status of maternity care policies and practices and amendments of these policies can enhance performance of signal function.

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## **List of Abbreviations and Acronyms**

AIDS	Acquired Immuno-Deficiency Syndrome
AMDD	Averting Maternal Death and Disability
AMSTL	Active Management of the Third Stage of Labor
ART	Antiretroviral therapy
BEmONC	Basic Emergency Obstetric Care
CARMMA	Campaign for Accelerated Reduction of Maternal Mortality in Africa
CEmONC	Comprehensive Emergency Obstetric Care
EmONC	Emergency Obstetric Care
EmONC	Emergency Obstetric and Neonatal Care
ERES IRB	Excellence in Research Ethics and Science Converge Institutional Review Board
HMIS	Health Management Information System
HIV	Human Immunodeficiency Virus
HPCZ	Health Professionals Council of Zambia
LCDMO	Lusaka Community District Medical Office
MDG	Millenium Development Goals
MMR	Maternal Mortality Ratio
MCDMCH	Ministry of Community Development, Mother and Child Health
MoH	Ministry of Health
PMTCT	Prevention of Mother-To-Child Transmission of HIV
PMO	Provincial Medical Office
SARA	Service Availability and Readiness Assessment
SWAP	Sector Wide Approach

TBA	Traditional Birth Attendant
UNICEF	United Nations Children Emergency Fund
UNFPA	United Nations Population Fund Agency
UNZA	University of Zambia
WHO	World Health Organisation
ZDHS	Zambia Demographic Health Survey

## **Definition of Terms**

**Emergency Obstetric Care:** Emergency Obstetric Care refers to the functions necessary to save lives. It is the care of women and newborns during pregnancy, delivery and the time after delivery (WHO, 2004).

**Live Birth:** A live birth refers to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, for example beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles – whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered live born (WHO, 2004).

**Maternal Death:** Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental causes (WHO, 2004).

**Maternal Mortality Rates:** Maternal mortality rate is the number of maternal deaths in a given period per 100,000 women of reproductive age during the same time-period (UNFPA, 2012).

**Maternal Mortality Ratio:** Maternal mortality ratio is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period. It represents the risk associated with each pregnancy (UNFPA & WHO, 2012).

**Signal Functions:** Signal Functions are a short-list of nine clearly defined functions that are key medical interventions using basic standard medical procedures to provide emergency obstetric care and treat the direct obstetric complications that cause the majority of maternal deaths (UNFPA, 2009).

# **CHAPTER 1: INTRODUCTION AND BACKGROUND**

## **1.1 Introduction**

Maternal mortality is a health burden and affects women of reproductive age the world over and Zambia is no exception. It is most acute in developing countries, where complications related to pregnancy and childbirth are among the leading causes of severe disability, mortality and morbidity of women of reproductive age. Even though every region has advanced in reducing maternal mortality, levels remain unacceptably high in sub-Saharan Africa. Almost all of the deaths can be prevented as evidenced by huge disparities found between the richest and poorest countries. The lifetime risk of maternal death in industrialised countries is one in 4,000 versus one in 51 in countries classified as 'least developed'. Higher rates of deaths occur in women living in rural hard-to-reach areas in developing countries (UNICEF, WHO & UNFPA, 1997).

In 2013-2014, Zambia reported a maternal mortality ratio of 398 per 100,000 live births with most deaths associated to direct obstetric complications. Even though the 2013 statistics indicate a reduction per live births from 591 in 2007 and 729 per 100 000 in 2003, these mortality ratios are still too high as compared to mortality ratios of 16 per 100,000 live births in developed countries. In spite of the progress made over the years, Zambia still has to close a considerable gap to achieve its Millenium Development Goal 5 (MDG 5) target of 162 per 100,000 by 2015 (ZDHS, 2013-2014 and UNDP, 2013).

## **1.2 Background to the Study**

Maternal deaths occur as a result of direct or indirect obstetric complications. For an individual woman, the risk of maternal death is influenced both by the risk associated with pregnancy and by the number of times she becomes pregnant. Each time a woman becomes pregnant, she runs the risk of dying again, and the risk adds up over her lifetime. Therefore, several conditions must be encountered for a maternal death to occur. Firstly, the woman must become pregnant. Secondly, she must develop a medical problem and thirdly, in order for the woman to die, the complication must either be treated

inadequately (treated too late or not treated at all) or not treatable (Barnes-Josiah, et al, 1998).

An estimated 15 % of women who become pregnant are expected to develop life-threatening obstetric complications at any time during their pregnancy. Of these, 80 % could result into maternal deaths during pregnancy, delivery or in the postpartum period (Graham et al; Ronsmans & Graham 2006). Direct obstetric deaths occur as a result of complications that develop during pregnancy, delivery or postpartum periods whilst indirect obstetric deaths occur as a result of existing medical conditions that are made worse by pregnancy or delivery (WHO, 2009).

There are seven direct causes of obstetric death including; antepartum and postpartum hemorrhage, eclampsia and pre-eclampsia, postpartum sepsis, prolonged or obstructed labour and complications of abortions (Ronsmans & Graham 2006). In the postnatal period-the first 24hours post-partum-hemorrhage is estimated to be responsible for nearly 25 % of all maternal deaths. Additionally, indirect causes such as malaria, anemia, HIV/AIDS, and cardiovascular disease account for 20 % of maternal deaths (Kahn, 2006 & WHO, 2009).

Something can be done to stop maternal deaths and, in fact, a majority of the complications that lead to death can be avoided when women in need have access to quality preventive, diagnostic, and treatment services. Any proposed interventions that aim to reduce maternal mortality must, therefore, reduce the likelihood that a woman will become pregnant; that she will experience a life threatening complication during pregnancy or childbirth; and that the complication will not cause death. In addition, there must be skilled personnel, essential drugs, and equipment and referral facilities on hand to help treat the complication.

Successful prevention of maternal deaths must, therefore, focus on quality emergency obstetric care with adequate essential drugs, supplies, equipment and a working referral system. Consequently, interventions have been implemented by the Zambian Ministry of Health (MoH) to enhance the quality of care and reduce the likelihood of death, including; reducing unwanted fertility, risk screening during Antenatal Care (ANC),

training skilled health care workers in Emergency Obstetric Care (EmONC) and facilitating the provision of EmONC using a short-list of nine clearly defined signal functions (Ziraba, 2009).

Global health experts have identified EmONC as the most important and effective intervention that saves the lives of women who are in need of emergency treatment for obstetric complications during pregnancy, delivery or child birth and improves maternal and newborn survival in low and medium income countries. The EmONC intervention uses standard medical practices for treating the seven life-threatening complications that lead to maternal deaths and is provided through a set of services called signal functions which consist of parenteral antibiotics, anticonvulsants, uterotonics, manual removal of placenta and retained products, newborn resuscitation, assisted vaginal delivery, cesarean sections and blood transfusion. Availability and accessibility of EmONC depends on having in place four basic and one comprehensive EmONC for at least every population of 500,000.

A distinction of signal functions that must be performed in basic EmONC and comprehensive EmONC health facilities is provided in Table 1.

**Table 1: Signal Functions for Basic and Comprehensive EmONC Health Facilities**

<b>Basic EmONC Functions</b>	<b>Comprehensive EmONC Functions</b>
Parenteral Antibiotics	All Basic EmONC +
Parenteral Anticonvulsants	Cesarean Section
Parenteral Uterotonics	Blood Transfusions
Manual Removal of Placenta	
Newborn Resuscitation	
Removal of Retained Products	
Assisted Vaginal Delivery	

A basic EmONC health facility is one in which only seven of the signal functions are performed including; parenteral administration of antibiotics, uterotonic drugs, and anticonvulsants, manual removal of placenta and retained products, assisted vaginal delivery and neonatal resuscitation; whilst a comprehensive EmONC health facility is one in which all the basic EmONC signal functions are performed, in addition to surgery (cesarean delivery) and blood transfusions. Health facilities are considered EmONC, either comprehensive or basic, if they provide signal functions over a designated 3-month period. In addition, 15 % of women with complications should be treated in basic or comprehensive EmONC health facilities and at least 5 % to 15 % of births must be via cesarean delivery (WHO, UNICEF, The World Bank, 2010).

Access to quality and timely emergency obstetric care is crucial as most obstetric complications are unpredictable and yet life threatening. Often, the forgotten sub-populations of the urban poor encounter barriers to accessing obstetric care. Assessment of EmONC services offered at health facilities in Nairobi revealed that they were not optimal. Many facilities lacked essential equipment and many health providers did not have critical skills needed to conduct deliveries with minor complications and yet all professionally deployed staff were thought to be skilled enough to manage normal deliveries and obstetric complications (Ziraba et al, 2009).

In Pakistan, maternal mortality remains persistently high despite huge infrastructural and maternal health policy investments. The state of public sector obstetric facilities in terms of structure including, spatial distribution of EmONC facilities, staffing patterns, equipment, supplies, knowledge and management skills of process indicators has been hugely invested in (Fikree et al, 2006). In Zambia, an assessment of availability and distribution of, and geographic access to emergency obstetric care services in Zambia reported that only 135 (12 %) of 1131 health facilities provided Basic EmONC signal functions and had qualified health professionals available on a 24-hour basis. In addition, the health facilities were unevenly distributed (Gabrysch et al, 2011).

Emergency Obstetric Care services cannot be implemented in isolation. Other functions are as important in ensuring that mothers do not die whilst giving birth. For instance, at the level of basic EmONC facilities, administration of intravenous fluids can be

extremely helpful in stabilising a woman's condition before referring her to a hospital. At a Comprehensive EmONC facility, the ability to perform surgery entails a number of other important capabilities such as administering anesthesia.

Reducing maternal deaths therefore requires, besides essential obstetric care, timely access to effective, affordable, and appropriate EmONC services. Available evidence suggests that most maternal deaths occurring in developing countries could be reduced if all women had access to interventions for treating complications that arise during pregnancy, childbirth and postpartum. This evidence reinforces the centrality of EmONC in reducing maternal mortality. In addition, coordinated commitment and effort on the part of the government and other development partners can indeed lead to real, positive changes in policies addressing maternal mortality (Ziraba et al, 2009 and Orinda et al, 2005).

### **1.3 Statement of the Problem**

Even though EmONC services use basic standard medical procedures and can thus be incorporated into health systems, less is known about their availability and use as an intervention for improving maternal and neonatal health outcomes and their contribution to reducing maternal mortality in private and public health facilities in urban settings in Zambia. The UN stipulated minimum coverage of functioning basic and comprehensive EmONC facilities are not currently attained in many countries, including Zambia. Particularly, evidence shows that coverage of basic EmONC is low in many developing countries, while adequate coverage of comprehensive EmONC facilities does not always guarantee minimum acceptable population-based services such as cesarean section rates. The situation may be that health facilities are not able to provide emergency treatment and procedure as there may be inadequate infrastructure and transport to refer patients that are need, equipment may be available but needs repair, essential drugs may be in short supply, or indeed health care providers may not have capacity to provide the much needed emergency care.

Further, evaluating which interventions are most effective for reducing maternal mortality is challenging because of poor maternal death registries and inaccurate

attribution of causes of death. While many cross-sectional studies have been conducted to evaluate the capacity of health facilities to use signal function for EmONC, some recognised constraints are that these previous evaluations have focused on availability, utilisation and distribution of EmONC services in limited rural settings where the majority of health centres provide only one or two basic functions. In addition, these evaluations have been restricted to a small proportion of public health facilities. The results of these evaluations do not often provide enough evidence of most reliable interventions for reducing maternal mortality (Levine, et al, 2008).

#### **1.4 Rationale for the Study**

Saving lives of mothers and newborns is dependent on ensuring that health facilities have basic or comprehensive EmONC coverage, but that alone is not sufficient. For the EmONC intervention to be effective, it must also be performed. In order to provide good quality care, health care providers must be well trained and able to detect complications. They must be able to assess patients, make the right diagnosis and administer the correct drugs. Patients with complications must seek care if deaths are to be prevented. Considering that EmONC signal functions are key for the prevention of maternal deaths, it was important to conduct a health facility assessment so as to gather data from health facilities for ascertaining whether life-saving obstetric procedures are being performed in private and public health facilities in an urban setting.

The purpose of this research, therefore, was to determine to what extent signal functions are used for providing basic and comprehensive EmONC services for the detection and treatment of obstetric complications in private and public health facilities in an urban setting and particularly, in Lusaka district. The research findings provide evidence on the use of signal functions, including; detecting and treating obstetric complications and contributing toward the consequent reduction of maternal deaths that occur as a result of these.

#### **1.5 Significance of the Study**

This study conducted health facility assessments and collected information about infrastructure, human resources, emergency transport, equipment and essential drugs and

other supplies in private and public health facilities. Using the United Nations process indicators, this information was used to determine the availability, usability, accessibility and quality of EmONC in health facilities in Lusaka District. The results of this survey will contribute to evidence of availability, usability and quality of EmONC for the reduction of maternal mortality in urban settings in Zambia and possibly identify strategies to facilitate the achievement of the MDG 5 goal. The results are also a contribution to the evidence required to make decisions about resources needed for scale up and improvement of EmONC, its provision within the health care system and improvement of maternal health outcomes. The evidence generated from this research supports the use of signal functions for EmONC as an effective intervention for maternal mortality reduction.

## **1.6 Research Question**

To what extent are signal functions used for the provision of emergency obstetric care in private and public health facilities in Lusaka District?

## **1.7 Aim of the Study**

This study aimed to evaluate the effectiveness of signal functions for emergency obstetric care as an intervention for reducing maternal mortality in private and public health facilities in Lusaka District.

## **1.8 Objectives of the Study**

- 1.8.1 To determine the number of health facilities that provide basic or Comprehensive EmONC services.
- 1.8.2 To assess the geographical distribution of health facilities using signal functions for EmONC.
- 1.8.3 To evaluate the availability of infrastructural and human resources for the provision of EmONC services.
- 1.8.4 To determine the quality and use of signal functions in the provision of

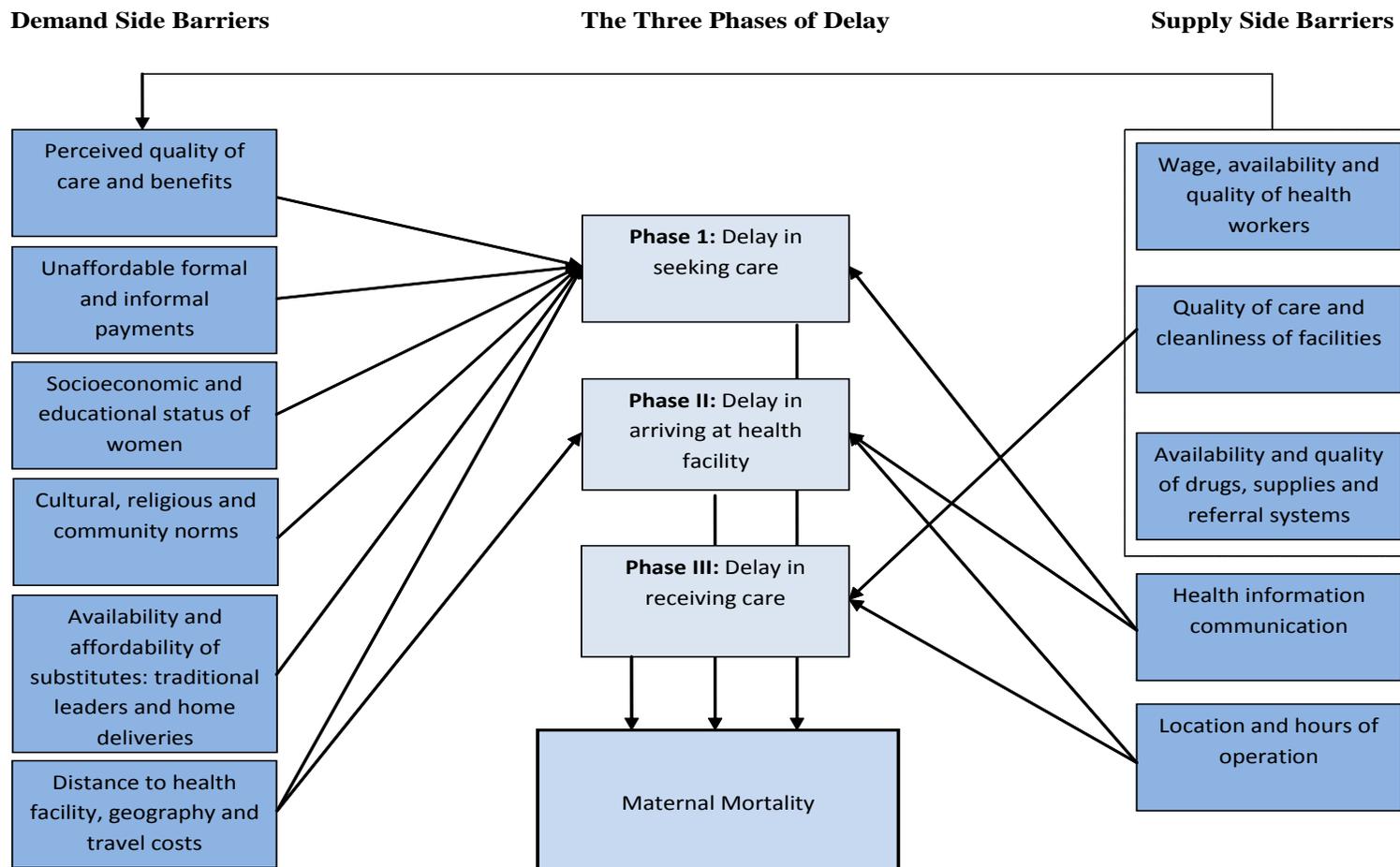
EmONC.

## **1.9 Conceptual Framework**

The Zambian MoH and MCDMCH have strong policy commitment towards improving maternal health outcomes with various initiatives that focus on medical and community interventions. These range from sensitisation of community leaders; use of trained and untrained traditional birth attendants; use of community action groups; strategic home visits for missed delivery and missed postnatal follow-ups to improving the quality of delivery health care, health systems strengthening; providing protocolized care for maternal and newborn emergencies.

While it is recognised that there are complex and interlinked issues which prevent pregnant women from accessing quality maternal care, it is important to have an understanding of concerns around maternal mortality reduction. Understanding these issues is a complex task, partly because maternal deaths are influenced by many different categories of events or conditions (McCarthy, 1997). The three delays model effectively predicts maternal health seeking behavior as it incorporates both individual elements and community theories. It also addresses the many levels of determinants, both from the demand and supply sides. The basic premise of the model is that there are three main phases of delay that prevent a woman from receiving appropriate maternal/child health care (Thaddeus and Maine, 1994). The phases are categorised as 1) Delay in decision to seek care 2) Delay in reaching care 3) Delay in receiving adequate health care. These phases are affected by a combination of factors as is seen in the conceptual framework (figure 1) which was adapted from the Johns Hopkins School of Public Health and the United Nations Population Fund (UNFPA).

**CONCEPTUAL FRAMEWORK- DEMAND-SIDE AND SUPPLY-SIDE BARRIERS TO ACCESSING CARE AND THE THREE PHASES OF DELAY**



**Figure 1: Conceptual framework adapted from the Johns Hopkins School of Public Health, 2008**

## **CHAPTER 2: REVIEW OF LITERATURE**

The literature was obtained by analysing systematic reviews that had been conducted and provided evidence-based results on availability, accessibility, usability and quality of emergency obstetric and neonatal care for reducing maternal mortality. The search process entailed using maternal health care related terms such as emergency obstetric care, EmONC, maternal mortality and signal functions and availed evidence from different studies conducted in high, medium and low-income countries. The process was useful for identifying the importance of signal functions for EmONC and issues regarding maternal health care. Searches were conducted using online databases including, Pubmed, Medline, Plosone, Google Scholar and WHO publications. Outcomes of interest were articles that had been published in the English language between 2006 and 2014 and provided evidence in the areas of infrastructure, essential drugs, equipment, human resources and signal functions for EmONC. The review resulted into a synthesis of literature to support the need to conduct a survey that would identify gaps in public and private health facilities in the provision of EmONC services in public and private health facilities in Lusaka District.

### **2.1 Maternal Mortality and the Millenium Development Goal 5**

Maternal death, as defined in the International Classification of Diseases and Related Problems, Tenth Revision or (OCD-10), 1992, is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental causes. Causes of death may direct or indirect.

Direct causes are well recognized and comprise those resulting from obstetric complications, from interventions, incorrect treatment, or from a chain of events resulting from any of the above. Direct cause include sepsis, hypertensive disorders (eclampsia and pre-eclampsia), obstructed labour and complications of abortions. Indirect complications are those complications that result into death from previous existing diseases or disease that developed during pregnancy and which was not due to direct obstetric causes, but was aggravated by physiologic effects of pregnancy. Indirect causes included conditions such as HIV/AIDs, anemia, malaria or cardiovascular diseases (WHO, 2005).

The Millennium Development Goal 5 (MDG), whose aim is to reduce by three quarters between 1990 and 2015, the maternal mortality ratio is set to expire in 2015. Through the implementation of various interventions, progress has been recorded with some countries indicating a reduced rate of maternal mortality. Among all MDGs, the least progress has been made toward this maternal health goal. Between 1990 and 2010, the global maternal mortality ratio declined only by 3.1 % per year, falling short of the annual decline of 5.5 % required to achieve MDG 5 (World Bank, 2011 & WHO, 2012). In 2014, Zambia reported a maternal mortality ratio of 398 per 100,000 live births and if efforts towards reducing maternal mortality continue at the same pace, it is unlikely that the country will meet its MDG 5 target of 162 deaths per 100,000 live births by 2015.

## **2.2 Issues Surrounding Maternal Mortality**

Pregnancy-related mortality is overwhelmingly due to delays and affects patients at intervals between the onset of an obstetric complication and its outcome (Biswas, 2005). An adverse outcome is expected if treatment is delayed but, prompt use of appropriate techniques to treat them can facilitate satisfactory results. There are different factors that influence a mother's decision to seek care. These factors are largely intertwined and spread across individual to institutional levels. It is, therefore, helpful to have a model that depicts the different levels and how they are connected to each so as to identify and adopt successful strategies that will help reduce maternal deaths.

Since 1994, the 'three delays' model has been adopted by many agencies working to address maternal mortality. The model reviews factors that affect the interval between the onset of an obstetric complication and its outcomes. It provides a means to categorise reasons as to why so many women do not receive the emergency care they need. The model categorises the 'three delays' into; 1) delay in deciding to seek care 2) delay in reaching care and 3) delay in receiving adequate care (Thaddeus and Maine, 1994). The conceptual model in this study helps to assess the factors that are associated to maternal mortality and use of emergency care including; social, economic, demographic and environmental factors as identified in other studies. The three delays model is appropriate for analysing the identified determinants.

### **2.2.1 Phase I Delays: Delay in Deciding to Seek Care**

Many individual and community factors including socioeconomic status, parity, past obstetric history, educational levels, marital status, employment and types of health care seeking behaviors during pregnancy have been associated with high maternal mortality. Even though social environments tend to determine the cultural and social practices which contribute to health seeking behaviors, the ability of a woman to seek care for an obstetric complication is determined by her socio-economic and marital status and educational and literacy levels as well as appreciation of medical necessities. If a woman is educated, she will have a higher economic status and her decision to seek care may be influenced by her ability to pay for medical services when required to, her ability to understand the risks of pregnancy, the importance of being attended to by a skilled health care provider and her past experiences with health care providers.

The poorer and less educated a woman is, the more likely she is to have high fertility. In addition, the more pregnancies a woman has, the greater her chances of experiencing pregnancy related complications and dying. Women in developing countries have on average many more pregnancies than women in developed countries, and their lifetime risk of death due to pregnancy is higher. A woman's lifetime risk of maternal death-the probability that a 15 year old woman will eventually die from a maternal cause- is one in 3700 in developed countries, versus one in 160 in developing countries (Garenne et al, 2003 and WHO, 2014).

Teenage pregnancies and obstetric fistula are also major risk factors of maternal mortality. The World Health Organisation (2014), reports that there is increased risk of death among adolescent girls under 15 years, women who are less than 24 and older than 35 years. A study conducted in Nepal found that maternal age and parity were contributing factors for maternal mortality; maternal age greater than 35 years was associated with a three-four-fold increase in mortality, whereas increased parity conferred increasing protection. In addition, maternal complications increased in women aged 40 years (Yego, 2014; Christian et al, 2008 & Jahromi et al, 2008).

### **2.2.2 Phase 2 Delays: Delay in Identifying and Reaching a Health Facility**

In many instances, even when a woman decides to seek care at a health facility, she will be inhibited by other barriers. It is often difficult to get to a health facility because of distance, cost, poor road networks or difficult geographical terrain. The availability and affordability of

substitute caregivers within a community influence where a woman decides to deliver. Home deliveries are common in communities where traditional birth attendants are readily available. Women are also likely to deliver at home if they live long distances away from health facilities and they have to make choices between finding and paying for transport versus availing a small token of appreciation for assistance rendered at home during a delivery.

Health facility operational hours influence women's health seeking behaviors. Some health facilities are not operational 24 hours a day, seven days a week. A woman in need of care will have to decide if it will be worth it to travel a long distance to a health facility and only to find it closed. With the availability of correct information, pregnant women can make good judgment about where to seek care in case of obstetric emergency. They will have information about what services they can access at particular health facilities and at what times. The availability of this kind of information facilitates for early decision making about where to go when there is an emergency. Other major influences are traditional beliefs and community policies that encourage women to seek care at health facilities. In some communities, women are not encouraged to announce a pregnancy in its early stages for fear of 'losing' it. As a result, women will not attend ANC early during pregnancy. Late ANC booking and home deliveries affect the early detection of complications and evidence shows that younger mothers are more likely to experience complications and to die from them as they are also less likely to seek antenatal care as the services provided are not youth friendly (ZDHS, 2007).

### **2.2.3 Phase 3 Delays: Delay in Receiving Care**

Some women who decide to seek and access care are still affected by the third delay-the delay to receive adequate and appropriate treatment. Key issues that have been identified as having an influence on the third delay are to do with poor health systems, inadequate or inadequately skilled staff to attend to complications, non-availability of essential drugs and equipment or bad staff attitudes (Hussein et al, 2012). A systematic review on human resources and the quality of emergency obstetric care in developing countries reports that human resources are key components in all the dimensions of EmONC services and determine their quality, particularly in clinical processes (Dogba, 2009).

The lack of transportation for emergency referrals is another contributing factor. Referring patients during an obstetric emergency is important because of the unpredictability of pregnancy

complications and their potential to progress rapidly into severe and sometimes, life threatening complications affecting both the mother and her unborn child. Maternal and neonatal deaths can be prevented if functional referral systems were in place to enable pregnant women with complications to reach health facilities such as hospitals with comprehensive EmONC services.

### **2.3 Concepts of EmONC for Maternal Mortality Reduction**

Overtime, several promising programmatic strategies have been defined and new interventions adopted to address the problem of maternal mortality. In 2010, the Zambian government initiated the CARMMA campaign and incorporated different stakeholders in its efforts to reduce the maternal mortality ratio. Efforts are targeted towards the development of new policies to improve the provision of maternal health care as well as the adoption of new interventions that have been said to curb maternal deaths. Agreed strategies to address the maternal mortality problem include reducing unwanted fertility by providing short-term and long-term contraception, risk screening during Antenatal Care (ANC) and ensuring skilled birth attendant. Others are ensuring the availability and accessibility of EmONC using a short-list of nine clearly defined Signal Functions. Interventions that have shown to directly reduce maternal mortality include; magnesium sulphate for eclampsia and pre-eclampsia; antepartum and intrapartum antibiotics; active management of third stage of labor, manual removal of placenta and assisted vaginal delivery (Festin et al, 2013). The focus of this research is medical interventions and particularly, the use of signal functions for EmONC which have been adopted to deal with complications that occur during pregnancy, child birth and after delivery and are likely to cause maternal and newborn deaths.

Although medical interventions needed to prevent pregnancy-related deaths exist, programs to reduce maternal mortality in developing countries have a mixed track record. On a "macro" level, the success in dramatically reducing maternal mortality of Sri Lanka over the past half century is evidence that long-term government commitment to broad, systematic improvement of health services for pregnant women can save lives effectively in a low-income country. On a "micro" level, however, rigorous evidence for the effectiveness of many seemingly logical interventions has not been found. There is evidence of effective clinical interventions that save lives, but less is known about the best strategies for accelerating the reduction of maternal mortality in developing countries, especially in Zambia.

At the centre of maternal health programs, more efforts are targeted at maternal health policy makers recognising the importance of EmONC for preventing death. Naturally, policy makers and implementers need to know that their efforts to improve the quality and coverage of emergency obstetric services are making a difference for women who experience life-threatening complications, hence the need to monitor obstetric services and provide evidence of effectiveness. EmONC is a clinical intervention whose clinical components are all standard medical practices used over the past five decades, so basic safety and effectiveness are addressed. However, improvements are still being made in protocols for treating specific obstetric complications. For example, there is now strong evidence that magnesium sulphate is more effective than diazepam in the treatment of eclampsia and severe pre-eclampsia; use of vacuum extraction, rather than forceps for assisted vaginal delivery reduces maternal morbidity and prophylactic use of antibiotics reduces the incidence of maternal infection after cesarean section (Paxton, 2004).

## **2.4 Framing the Research: Signal Functions for EmONC**

Emergency Obstetric and Neonatal Care has been identified as a package of medical interventions for treating the seven major direct obstetric complications including, hemorrhage, sepsis, obstructed labor, hypertensive disorders (pre-eclampsia and eclampsia) and complications of abortion. This intervention is about aiding the provision of treatment for life-threatening complications and a means of using interventions that will improve the quality, availability, accessibility and usability of services for the treatment of complications which may occur during pregnancy, childbirth and post-delivery. Emergency Obstetric and Neonatal Care is provided using a set of activities defined by the UN as signal functions. Signal functions are a shortlist of key life-saving obstetric interventions and have been used to assess the functionality of health facilities with respect to EmONC and to construct indicators of service provision (Gabrysch, 2012 & WHO, UNICEF and UNFPA, 1997).

Although the eight original obstetric signal functions do not form an exhaustive list, they were chosen because of the role they play in the treatment of the seven major causes of maternal death. The list provides indicators of the level of care that should be provided but does not include every service that ought to be provided to women with complicated pregnancies or to pregnant women and their newborns in general. Furthermore, some critical services are

subsumed within these signal functions. For example, the performance of caesarean sections in a facility is indicative that anesthesia and probably blood transfusions are being provided. Other items such as use of the partograph, AMSTL, availability of services 24 h/day, 7 days/week, intravenous fluids, anesthesia have been identified as crucial for the provision of emergency obstetric care. Use of the partograph and active management of the third stage of labor are both part of good obstetric practice and should be used for all women in labor to prevent prolonged, obstructed labor and any consequences that might occur as a result of these, for instance obstetric fistula. Availability of services 24 hours a day, 7 days a week is a function of management and planning rather than a life-saving skill but is essential for ensuring that emergency services are provided whenever there is need. Intravenous fluids are embedded in the signal functions that require parenteral drugs.

When clinically indicated, common obstetric interventions, such as cesarean section and operative vaginal delivery using vacuum or forceps extraction and induction of labor can greatly improve maternal and neonatal outcomes. For such complications to be successfully treated, treatments and procedures must be effectively performed. However, the UN stipulated minimum coverage of functioning basic and comprehensive EmONC facilities are not currently attained in many countries. Particularly, coverage of basic EmONC is low in many developing countries with high maternal mortality, while adequate coverage of comprehensive EmONC facilities does not always guarantee minimum acceptable population-based services such as Caesarean Section rates. For instance in the Southern Province of Zambia, while no health facility met all the criteria for BEmONC, results from an assessment of health facilities in Tanzania showed that at least five % (5 %) were BEmONC and 78 % were CEmONC. These results were similar to a study conducted in Kaduna State, Nigeria, where CEmONC health facilities were adequate (Ameh et al, 2012; Lutomski et al, 2014; Odogwu et al, 2009; Olsen, 2006 & Owens et al, 2015).

This was not the case in a study that was conducted in India to compare equity and access of EmONC between private and public health facilities. The study reported that overall, availability and distribution met the benchmark (5.9 per 500,000) even though the findings were lower than what was reported in China (11 per 500,000). The study also reported a greater number of private EmONC health facilities than government ones. In addition, private health

facilities were more likely to provide classified as EmONC than public health facilities (Mail et al, 2013).

Medical treatments (Parenteral administration of oxytocics, antibiotics and anticonvulsants) are more often available than the manual procedures (manual removal of placenta, removal of retained products and assisted vaginal delivery). In fact, a review of availability of life-saving obstetric services in 13 developing countries showed that either parenteral oxytocics or antibiotics were the most frequently provided signal functions in three months prior to the study. Parenteral anticonvulsants for preventing and treating pre-eclampsia are infrequently used (Bailey et al, 2006). Even though cesarean sections and blood transfusions are essential in the provision of life-saving services, they are often provided as a final solution for prolonged and obstructed labour. Many health facilities have inadequate or no infrastructure for cesarean sections and blood transfusion. Where there is infrastructure to conduct cesarean deliveries, the capacity to perform surgery is not indicative of the availability of blood products for blood transfusions.

A study conducted in six countries including Kenya, Malawi, Sierra Leone, Nigeria, Bangladesh and India between 2009 and 2011 revealed that of the 123 hospitals designated to provide comprehensive EmONC, only one hospital had provided the seven signal functions for BEmONC. In Uganda, 94 % of the health facilities expected to offer blood transfusion and cesarean section did not do so. Similarly, 80 % of the health units were not able to remove retained products and 95 % of them were not able to perform assisted vaginal deliveries (Ameh et al, 2012 & Mbonye, 2006).

A national survey of EmONC services in Addis Ababa, Ethiopia revealed that even though there were advances in infrastructure, medical supplies and personnel for EmONC provision, quality gaps still persisted in basic EmONC, mainly due to other resource constraints and poor competence among providers. In the Southern province of Zambia, inadequacies were not only identified in the capacity of staff but also in the infrastructure, supplies and adherence to the UN guidelines for EmONC. The total number of doctors, nurses and midwives registered in Zambia was less than half the benchmark suggested by the World Health Report (WHR).

A study conducted in Nairobi to assess the state of EmONC sheds light to the often forgotten sub-population of the urban poor who like the rural folks encounter barriers in accessing obstetric care. The evidence indicates that it is apparent that emergency obstetric services offered at the health facilities assessed were not optimal. Many facilities lacked essential equipment and many health providers did not have critical skills needed to conduct deliveries with minor complications and yet all professionally deployed staff are thought to be skilled enough to manage normal deliveries and obstetric complications. The recommended standard stipulates the need for four doctors and 20 midwives for every 3,500 births, while the World Health Report 2006 recommends a minimum of 2.28 professional care providers per 1,000 people to achieve 80 % skilled attendance at birth. Human resources for maternal healthcare include nurse-midwives and qualified doctors (Gabrysch et al, 2006; Mirkuzie et al, 2008; Owens et al, 2015; WHO, 2006 & Ziraba, 2009).

An important aspect of measuring utilisation is assessing access to EmONC. This is related to determining how much time it takes from the onset of an obstetric complication to the time treatment is provided or death occurs. Unfortunately, lack of technology such as digital maps and geographical information systems, coupled with inconsistent methodologies make it difficult to assess distribution of EmONC health facilities. However, calculation of radius, distance by road and travel time using the most common means of transport can help to evaluate geographical distribution. Despite these challenges, a study to assess availability and distribution of and access to EmONC in Zambia in 2005 showed that 86 % of the Zambian population was within 15km of a health facility that provided any kind of delivery care while only 48 % lived within 15km of and EmONC facility (Agatiani, 2008 & Gabrysch, 2006).

There are other indicators that have been developed to help measure the utilization, met need for EmONC and cesarean section deliveries as a proportion of all births. Using these indicators, studies have determined the proportion of all births taking place in health facilities, if the minimum acceptable level is met and whether a good proportion of women who experience obstetric complications are treated appropriately. Information drawn from these indicators does not provide details about the types of deliveries taking place in health facilities that are designated as either BEmONC or CEmONC. As a result, conclusions cannot be drawn about whether it is likely that all women who need emergency care are in fact receiving it. On the other

hand, a study conducted in Uganda revealed that the improvement in geographical accessibility at national level had not resulted in significant levels of utilization. The percentage of deliveries conducted is lower than the recommended institutional rate of 15 % and the met need for EmONC was less than 100 % (Agatiani, 2008 & Walunda, 2015).

It is often said that the lack of maternal and newborn health services is a ‘litmus test’ of the health system as a whole. EmONC signal functions have been used to assess the functionality of health facilities with respect to emergency care provided to pregnant or delivering mothers. For a facility to fully function as a Basic EmONC or Comprehensive EmONC facility, the health system as a whole must function. In particular, this includes the health policy for maternal health, physical infrastructure of facilities, human resources, procurement and distribution of equipment, drugs and supplies, referral systems, the Health Information System (HIS) and health care financing. Providing emergency obstetric care does not usually require building costly facilities (Kongnyuy et al, 2009).

## CHAPTER 3: RESEARCH METHODS

This chapter outlines the methodology used for this research, including the theoretical underpinnings, the study design and setting; the research participant selection and consent procedures; the data collection, management and analysis.

### 3.1 Research Method

The findings of this research were obtained through a health facility-based survey of public and private health facilities. The research involved quantitative observations, examination of registers and interviews with health facility staff and women who had experienced obstetric complications during pregnancy and delivery and were receiving maternal care at the health facility during the survey. Data were collected from registers for the period between December 2014 and February 2015.

### 3.2 Study Setting

Lusaka is the capital city of Zambia and constitutes a fair amount of the country's economic activities. Since it is an urban setting in which the majority of the citizens are in formal employment, many seek health care in private health facilities. But, the majority of the population in Lusaka district is medically serviced by government and public health facilities.

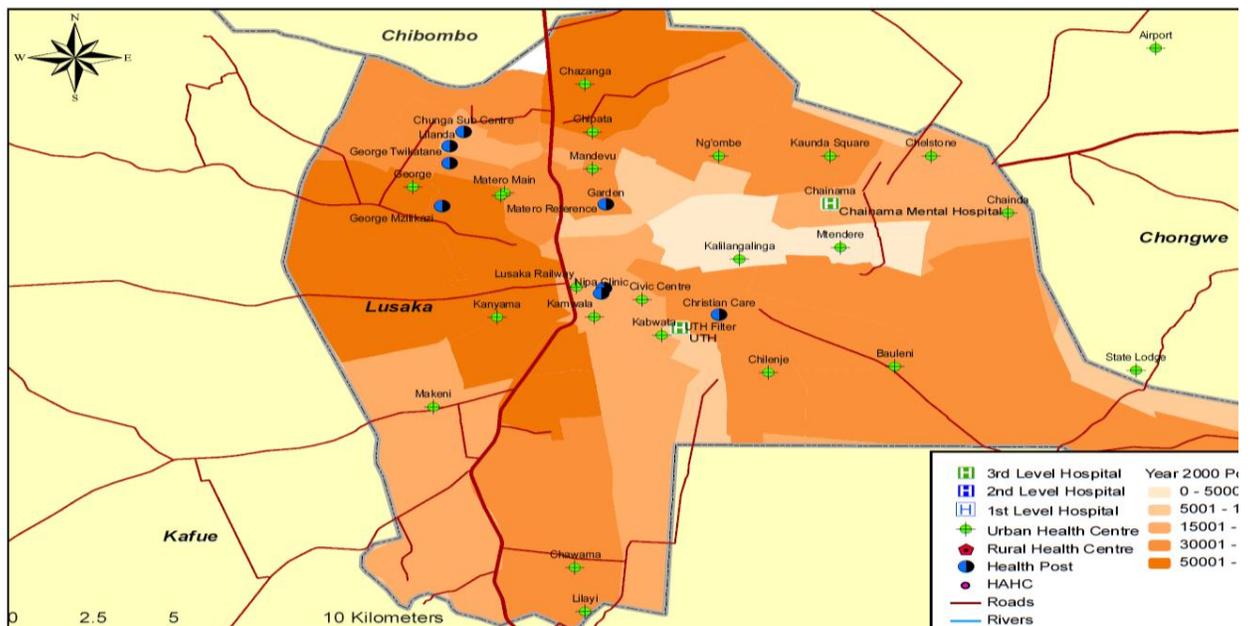


Figure 2: Map of Lusaka District (JICA, 2014)

For administrative convenience, the district is divided into four sub-districts with a first level hospital in each district. At the time, public and private health facilities served a catchment population of approximately 2,281,702 with an estimated 118,649 deliveries. The 2010 census reported a crude birth rate of 5.3 %. These were census based statistics and were obtained from the LCDMO which is responsible for providing primary health care services at public health facilities. Private health facilities are accountable to the HPCZ. Lusaka was chosen for a number of reasons including, its convenient location, the principal investigator's familiarity of the town, proximity of health facilities and resources to conduct the research.

### **3.3 Study Population**

The survey included all public and private health facilities which provide maternal and child health services 24 hours a day, seven days a week in Lusaka district. Women who had experienced obstetric complications during pregnancy and delivery and were available at the health facility at the time of the survey were interviewed to evaluate use and quality of EmONC received and to ensure that individuals were able to provide rich accounts of their experiences of complications. For the purposes of this research, a complicated case was defined as a woman who was diagnosed as having any one of the following conditions; hemorrhage (antepartum and postpartum), prolonged/obstructed labor, postpartum sepsis, complications of induced abortion, pre-eclampsia/eclampsia, ectopic pregnancy, and ruptured uterus. However, during the survey, women who had experienced other complications such as previous cesarean sections, elderly prime ups and small for dates were included. The inclusion and exclusion criteria for participant selection are described in detail in the following section.

#### **3.3.1 Inclusion criteria**

3.3.1.1 Health facilities providing maternity services by a midwife, clinical officer or doctor.

3.3.1.2 Health facilities providing maternal health services 24 hours a day, seven days a week.

3.3.1.3 Health facilities providing investigative laboratories, surgery, blood bank, essential drugs and other supplies.

3.3.1.4 Women seeking care and treatment for an obstetric complication at the health facility at the time of conducting the survey.

### **3.3.2 Exclusion criteria**

3.3.1.4 Dental, ophthalmic health facilities, male circumcision and physiotherapy sites laboratories, Antiretroviral Therapy (ART) centres, sub-centres and nursing homes were not part of this research.

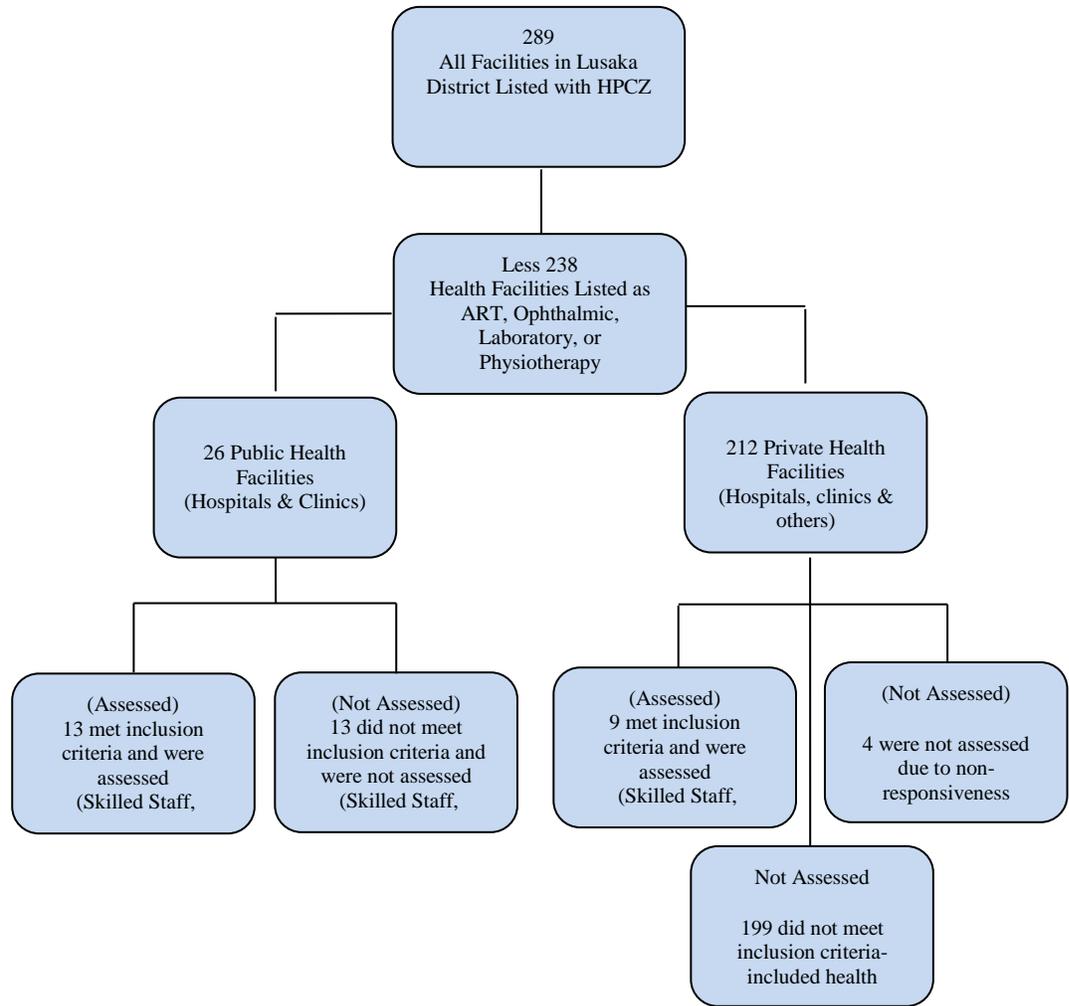
3.3.2.2 Women who had been treated for an obstetric complication and had been discharged from the health facility at the time of conducting the survey.

## **3.4 Sample Sizes**

### **3.4.1 Health Facilities**

A census of all health facilities registered with Health Professionals Council of Zambia (HPCZ) was conducted. The initial list contained 289 public and private health facilities with an indication of the type of service provided by each health facility. Of the 289 public and private health facilities, 51 were specifically listed as centres that provided Anti Retroviral Therapy (ART), dental, laboratory, ophthalmic, physiotherapy or other services. These were excluded from the assessment. To determine if the remaining of 238 facilities were eligible for inclusion into the study, health facility in-charges were asked a series of questions relating to the maternal health services provided at the health facility, including, operational hours, availability of skilled staff and provision of obstetric and neonatal care services .

If the response to any of the above questions was not in the affirmative, the rest of the survey questionnaire was not administered and the health facility was excluded from the study. A total of 39 health facilities were shortlisted for assessment. Of these, 26 were public health facilities and 13 were private health facilities. After administering the questionnaire, 22 health facilities were assessed of which 13 (59 %) public health facilities and 9 (41 %) private health facilities were included in the final analysis. Four of the private health facilities were non-responsive. Figure 3 is a cascade of the health facilities from all health facilities listed with HPCZ to the health facilities that were included in the sample size.



**Figure 3: Cascade of Health Facilities Included in Sample Size**

### 3.4.2 Women with Obstetric Complications

The research team intended to purposively sample and interview 235 women (6 women per health facility) with obstetric complications and seeking care at the health facility at the time the survey was conducted. To calculate a working sample of women to be interviewed, the survey used the reported 15 % as the proportion of pregnant women who were expected to experience a complication. This proportion is recommended by the UN. The sample size for women with obstetric complication to be interviewed was calculated as follows:

$$\text{Survey Sample} = \frac{Z^2 \times (p) \times (1-p)}{C^2}$$

Where

Z = Z value at 1.96 for 95 % confidence interval

p = Prevalence of expected obstetric complications (expressed as decimal)

c = Confidence interval

$$\text{Survey Sample} = \frac{1.96^2 \times 0.15 \times (1-0.15)}{0.05^2}$$

$$\text{Survey Sample} = 196 + 20 \% \text{ (as estimate of non-response rate)}$$

$$\text{Survey Sample: } 20 \div 100 \times 196 + 196 = 235$$

### **3.5 Ethical and Other Considerations**

The researcher obtained approval from the Department of Public Health in the School of Medicine at UNZA after which ethical approval was sought from the ERES Converge IRB. Permission to access public health facilities was sought from MoH, PMO-Lusaka, LCDMO and in-charges at respective health facilities. To access private health facilities, permission was sought from HPCZ and administrators at respective health facilities. Health facility-in-charges were informed about the research in writing and were given a schedule of visits. Respondents were provided with detailed content and the purpose of the survey so as to help them make an informed judgment about whether to participate or not.

The researcher discussed confidentiality issues with the participants and assured anonymity. Details of expectations, risks and benefits of participating were provided to research participants. Written informed consent was obtained from health facility in-charges, hospital administrators and women who had received emergency obstetric care at the time of the survey. Assent was not obtained for females under 18 years of age seeking care at the health facility as there were none during the survey. Participants were not required to disclose personal information but, as a precaution to uphold their confidentiality, unique identifiers were assigned to each questionnaire. There were no physical risks associated with this research. However, some women who were

interviewed confirmed having experienced some amount of psychological trauma associated with effects of the complication that they were treated for.

## **3.6 Data Collection and Management**

### **3.6.1 Data Collection Methods and Instruments**

The research team comprised of the principal investigator, one research assistant and two data collectors. All health facilities were visited by a research team consisting of either the principal investigator, research assistant and data collectors or research assistant and data collectors. The principal investigator was responsible for contacting health facilities, scheduling appointments for interviews at all health facilities, making follow-ups on scheduled appointments and confirming dates of interviews and visits to health facilities. Appointments were confirmed via phone two days before each visit. At the health facility, hospital administrators, health centre in-charges, labour ward in-charges or other senior clinical personnel were interviewed.

The first four health facilities were visited by the entire research team to enable team members have a common understanding of the research procedure. On arrival at the facility, the principal investigator introduced the team and explained the purpose of the visit. Copies of the letters of approval from MoH and ERES Converge IRB were given to the interviewee before the start of the interview. When an interviewee was assigned, the principal investigator provided a consent form whose contents were read aloud and questions answered before it was signed by the interviewee.

Two sets of questionnaires were used to collect nominal, ordinal and categorical variables. The first tool (Appendix H) was a health facility assessment questionnaire which collected primary data. It was used to quantify EmONC services, infrastructure, human resources, drugs and equipment. It was an interviewer-administered questionnaire adapted from the WHO international guidelines for Service Availability and Readiness Assessment (SARA) and contained modules with five sections to assess different components of the services at a health facility (WHO, 2013).

The second tool (Appendix I) was developed for women aged 15-49, who had experienced complications during pregnancy or delivery and were seeking care at the facility on the day the health facility was visited for the survey by the research team.

The third tool (Appendix J) was a health facility case summary sheet which was used to collect data on equipment, drugs, deliveries and complications from appropriate registers. Data collectors used registers that contained pregnancy outcomes from June 2013 to May 2014. The data was collected to help assess EmONC services provided during the period under review.

### 3.6.2 Study Variables

The study identified the following as variables that were used to measure availability, accessibility and quality of EmONC. Table 2 below contains the dependent and independent variables.

**Table 2: Study Variables**

Variable Type	Variable Name
Dependent	Signal Function
Independent	Parenteral antibiotics
	Parenteral anticonvulsants
	Parenteral uterotonics
	Manual removal of placenta
	Removal of retained product
	Assisted vaginal delivery
	Cesarean section
	Blood transfusion

### 3.6.3 The UN Process Indicators

The UN provides a means to calculate results and make comparisons between the standard and actual availability of EmONC. This study used the UN process indicators to measure availability, usability and quality of EmONC. Table 3 tabulates the UN process indicators and recommended level for each indicator.

**Table 3: The UN Process Indicators and Recommended Levels ( WHO, 2009)**

<b>Process Indicator</b>	<b>Recommended Level</b>
Availability of EmONC Facilities	4 Basic EmONC & 1 Comprehensive EmONC per 500,000 population
Geographical distribution	All sub-national levels have 5 EmONC facilities per 500,000 population (as above)
Proportion of all births in EmONC facilities	Minimum acceptable level to be set locally
Met need for EmONC	100% of women with complications treated in EmONC facility
Cesarean section as a proportion of all births	Proportion of births by c/section in population (between 5% and 15%)
Direct obstetric case fatality rate	Not more than 1%

### **3.6.4 Quality Assurance and Quality Control**

The principal investigator conducted a two-day intensive training for one research assistant and two data collectors. During the training, the research team was introduced to the adapted SARA data collection tool and the data variables. During the training, the trainees were provided with definitions of terms, tools for data collection and documentation to support carrying out the survey. They were also walked through the procedures for collecting data and identifying clients with obstetric complications for interviews.

The principal investigator extensively reviewed, pre-tested and revised the survey questionnaires before the survey. Pretesting of the questionnaires was done at a public health facility after permission was sought from the PHO-Lusaka and LCDMO. Questionnaires were checked for accuracy, validity and completeness and revisions to the tools were done after the pretests.

### **3.6.5 Data Management, Analysis and Dissemination**

Data entry errors were eliminated by use of the Teleform desktop software, version 10.8, 2013. Teleform is a highly intelligent data capture system designed to reduce manual data entry associated with automated processing of forms and other documents. The software offers flexibility in capturing handwritten data from paper and seamlessly incorporates the data output into secure, automated applications. It consists of four main application, namely; Teleform designer, scan station, reader and verifier. This software eased the processing of questionnaires from data capture, scanning and verification of data and the creation of a database.

Teleform Designer was used to design and edit the questionnaires after which all form attributes, export and data validation options were defined and set. The form was then printed and attached to the rest of the documents for ethical approval. Once data was collected, Scan Stations were used to read and input data from scanners. The scanned copies were saved in PDF format. The Teleform reader was then used to identify and evaluate image files by comparing them to the templates created in Designer. The data validation and verification were done by the Teleform Verifier which is at the frontend of the application. Quality checks to determine accuracy and completeness were done by comparing data on scanned (PDF) documents with those on original questionnaires. Errors were corrected online after which forms were committed to MS Excel database. All questionnaires administered to health facility staff and women from the same health facility have been filed in a folder and stored in a locked cabinet waiting to be archived. Access to the files was only granted to research team members.

Stata version 11 was used to perform multivariate descriptive data analysis with a 95 % confidence interval. Pearson's Chi<sup>2</sup> test with a  $p < 0.05$  was considered significant. A codebook was developed and contained codes for variables for non- responses that were expected from the questionnaire. To ensure compatibility, data was copied from the Excel spreadsheet into a Stata file using a data editor. This Stata file contained variables as columns and observations as rows. A working directory was defined and a log file created. This was done to keep a record of any work done and extract output from the dataset. The log file helped perform tasks repeatedly without having to write commands from scratch. Stata commands were written and saved using the Do-file editor. Stata commands (run and summarise) were used to provide a general description of the data and the format for each variable was provided as well as the content of the

dataset. Other commands were used to explore and describe the data and conduct cross-tabulations and frequencies.

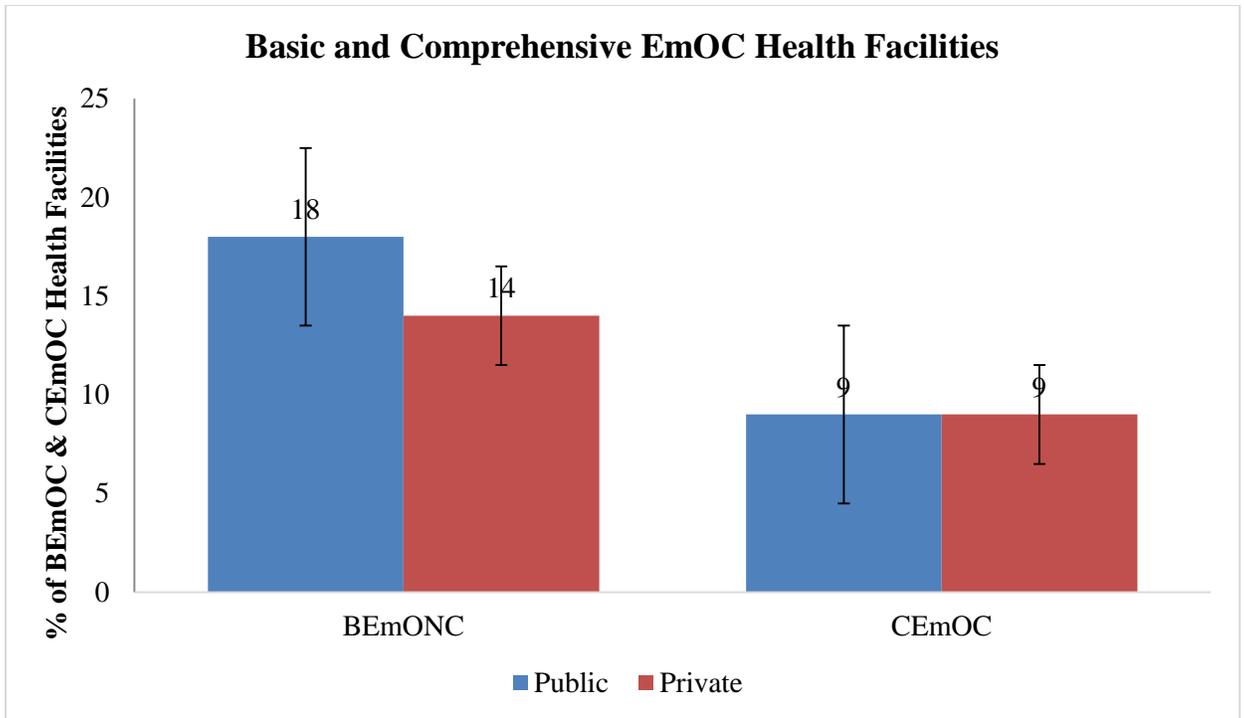
The data collected was solely for the purpose of this study. The preliminary results of this research were disseminated at the graduate forum at UNZA main campus on 8<sup>th</sup> April 2015. Any deficiencies in the use of signal functions for EmONC discovered during the research have been reported to the Ministry of Health for appropriate action. This dissertation, all supporting forms and documents that were used for data elicitation were submitted to the Department of Public Health for archiving as well as MoH and public health facilities that took part in the study. All data collection instruments were discarded appropriately after the second dissemination meeting with a panel of examiners on 14<sup>th</sup> October 2015.

## CHAPTER 4: RESULTS

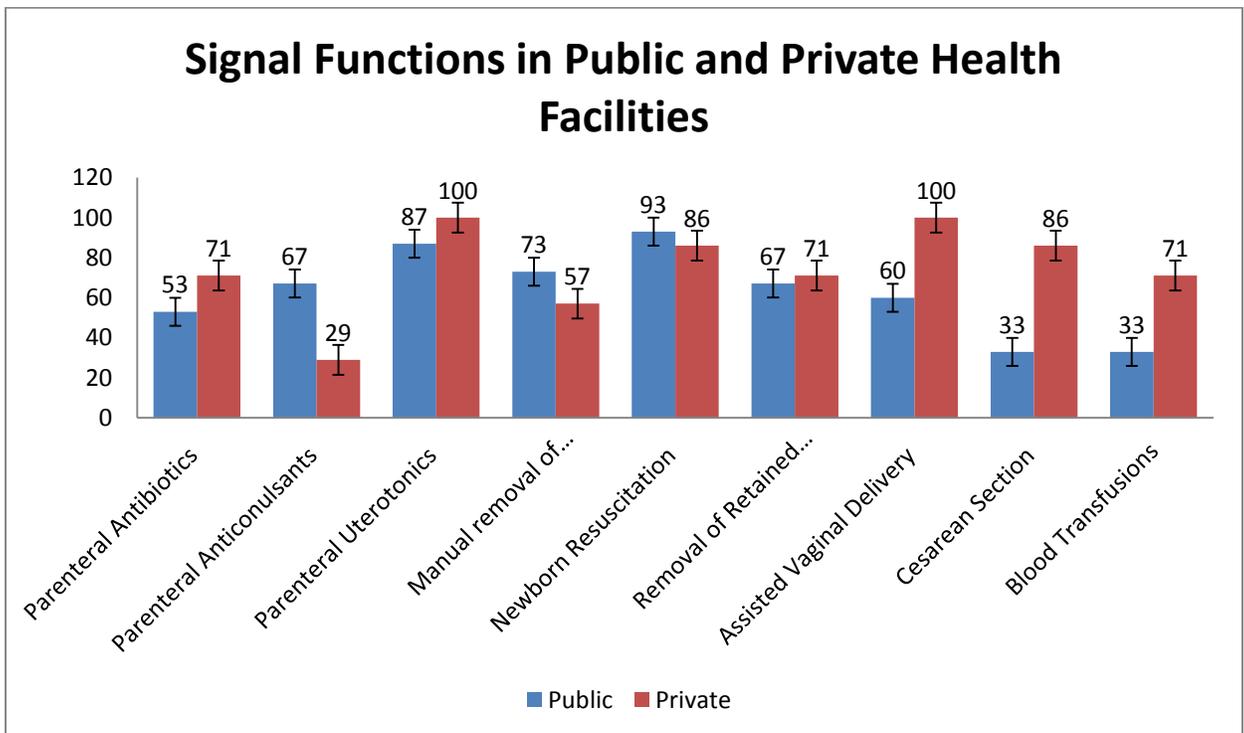
The public health facilities were classified as national tertiary hospital, provincial hospital or health centre while all private health facilities were classified as hospitals. Data from 22 health facilities that were assessed and reported providing maternal and newborn care by a skilled health care provider, 24 hours a day, 7 days a week, 13 (59 %) were public health facilities and 9 (41 %) private health facilities. Table 4 shows the distribution of all signal functions for EmONC at public and private health facilities.

**Table 4: Signal Functions Performed 3 Months Prior to Survey**

	<b>Overall</b> <b>(n=22)</b>	<b>Public</b> <b>(n=13)</b>	<b>Private</b> <b>(n=9)</b>	<b>P-value</b> <b>(Chi<sup>2</sup>)</b>
<b>BEmONC Signal Functions</b>				
Parenteral Antibiotics	13 (59%)	7 (54%)	6 (66%)	0.42
Parenteral Anticonvulsants	12 (55%)	9 (69%)	3 (33%)	0.10
Parenteral Uterotonics	20 (91%)	11 (85%)	9 (100%)	0.31
Manual Removal of Placenta	20 (91%)	12 (92%)	8 (89%)	0.45
Newborn Resuscitation	20 (91%)	12 (92%)	8 (89%)	0.56
Removal of Retained Products	15 (68%)	9 (69%)	6 (67%)	0.82
Assisted Vaginal Delivery	17 (77%)	8 (62%)	9 (100%)	<b>0.05</b>
<b>CEmONC Signal Functions</b>				
Cesarean Section	11 (50%)	3 (23%)	8 (89%)	<b>0.02</b>
Blood Transfusions	9 (40%)	3 (23%)	6 (67%)	0.09



**Figure 4: Health Facilities with Basic and Comprehensive EmONC Health Facilities in Lusaka District**



**Figure 5: Signal Functions in Public and Private Health facilities in Lusaka District**

Health facility assessments determined whether delivery facilities had performed any of the signal functions 3 months prior to conducting the survey. Health facilities were classified as either Basic EmONC if they had performed any seven of the nine signal functions and Comprehensive EmONC if they had performed all nine signal functions 3 months prior to the survey. Following the UN guidelines strictly, only 4(18 %) of the public and 3(14 %) of the private had performed all seven signal functions three months prior to the study and therefore, qualified to be classified as Basic EmONC health facilities. On the other hand, a total of 2 (9 %) of the public and 2 (9 %) of the private had performed Comprehensive EmONC services three months prior to the survey.

Of importance in the provision of Comprehensive EmONC is the capacity for health facilities to provide cesarean sections and blood transfusions as complimentary services. Only 33 % of public and 86 % of private had provided cesarean sections while 33 % of public and 71 % of private health facilities had the capacity to provide blood transfusions. However, blood products were not readily available at any of the health facilities except for the only tertiary hospital in Lusaka district that also serves as a referral hospital for the entire nation.

#### **4.1 Availability of Basic or Comprehensive EmONC Services**

To calculate the available number of Basic and Comprehensive EmONC health facilities in Lusaka, we divided the population for Lusaka by the recommended population as stipulated by the UN. The result was multiplied by four to obtain the required Basic EmONC and by one to obtain the required Comprehensive EmONC as Lusaka District’s population divided by 500,000.

**Table 5: Coverage of EmONC Services in Public and Private Health Facilities in Lusaka District**

		<b>Basic EmONC</b>	<b>Comprehensive EmONC</b>
Population Size	2,281,702		
Public		4	2
Private		3	2
UN Recommendations		18	5
Current Shortfall		12	0

Table 5 shows the distribution of basic and comprehensive EmONC health facilities against recommended minimum levels. The results reveal that basic emergency obstetric needs in Lusaka district were not met. The district requires 12 more health facilities to be able to meet the demand for Basic EmONC.

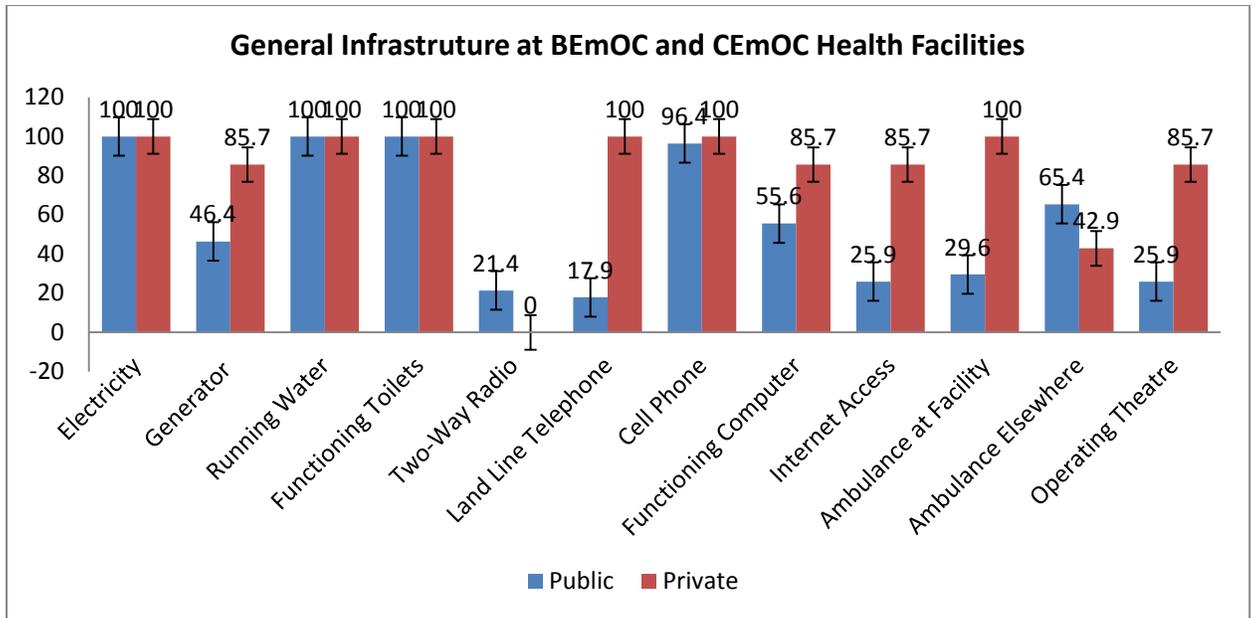
## **4.2 Assessment of Geographical Distribution of Health Facilities Using Functions for EmONC**

To determine if the health facilities were well distributed, the study needed to map health facilities in Lusaka district using GIS software. This study was unable to collect geographic positions coordinates at health facilities because GIS software was not available at the time of analysing data from the health facilities. However, a map of Lusaka district with public health distribution was obtained from the JICA. Based on the calculations (table 5), results show that the district had sufficient Comprehensive EmONC health facilities but an uneven distribution of Basic EmONC health facilities. Even though a map was not developed from geographic coordinates obtained from each facility, a map obtained from a different source indicates that there were public health facilities dotted around the district catering for different populations,

## **4.3 Availability of Infrastructural and Human Resources for the Provision of Signal Functions**

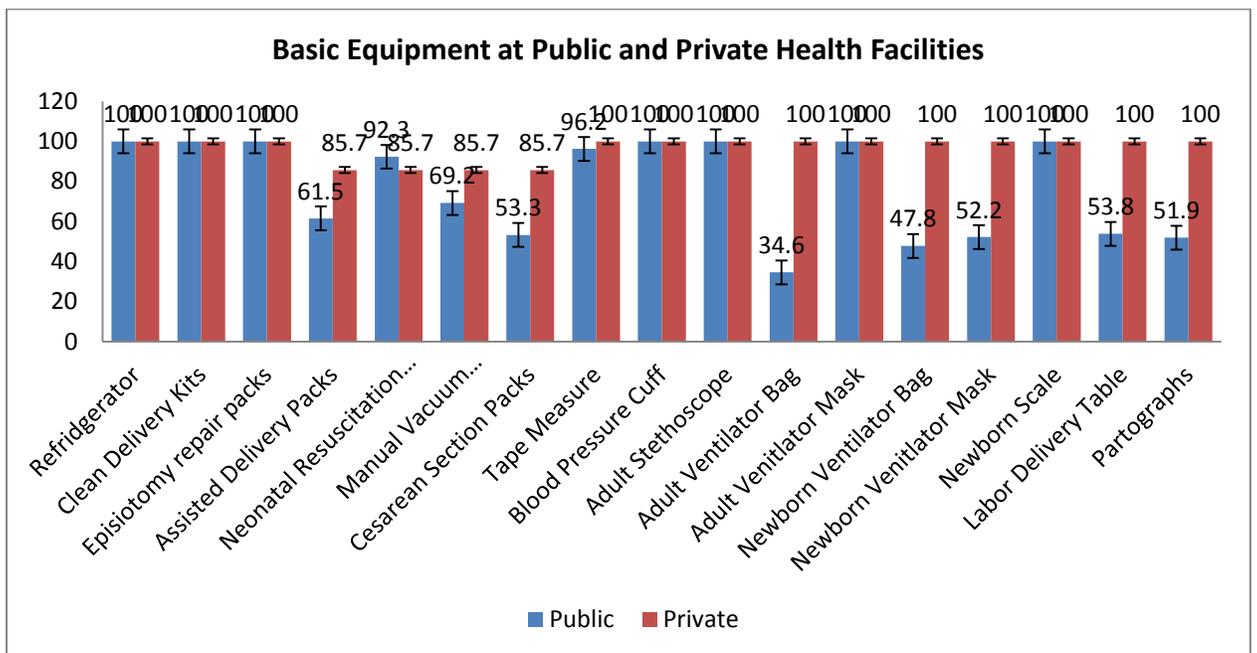
### **4.3.1 Availability of Infrastructure for the Provision of Signal Functions for EmONC Services**

Figure 6 shows availability and functionality of infrastructure at public and private health facilities at the time of the survey. All public and private health facilities reported availability of electricity through the national power line grid. However, only 46 % of public and 86 % of private had back-up power such as a generator for the maternity wing or the entire health facility. Communication infrastructure in form of two-way radio, land line facility or cell phone were available at public (21, 18 and 96 %, respectively) and private (0, 100 and 100 %, respectively) health facilities. Only 26 % of public health facilities reported Internet access while 86 % of private health facilities had access at the time of the survey.



**Figure 6: General Infrastructure at Basic and Comprehensive EmONC Health Facilities**

All health facilities had access to electricity with their source being the national power line grid. Less than 50 % of the public health facilities reported access to backup power via a generator or solar power. At least 86 % of the private health facilities had backup power provided by a generator.



**Figure 7: Basic Equipment at Public and Private Health Facilities in Lusaka District**

Water was available and provided by the district’s water and sanitation company. Backup water supply by means of boreholes was available at all private hospitals and not at any of the public health facilities. All private health facilities had ambulances available within the premises of the hospital while 43 % reported having ambulances for emergency referral off site. Even though only 26 % of the public health facilities had operating theatres, 53 % reported availability of cesarean section packs. The private health facilities reported a match (86 %) between availability of operating theatres and cesarean section packs. In essence, both public and private health facilities with operating theatres had capacity to provide cesarean sections to women in need as long as qualified staff were available to perform surgery. At least half of the public reported using partographs to monitor labor within three months prior to the survey whilst all private health facilities had used them to monitor progression of labor.

#### 4.3.2 Availability of Other Basic Equipment

The provision of EmONC services requires that equipment and standard infection prevention precaution is available so that care is not compromised. Health facilities were assessed for readiness to provide general services that are also useful for providing emergency care. Maternity wards in both public and private health facilities reported an occupancy rate of more than 50 % with an average duration of stay of 6 and 24 hours in public and private health facilities, respectively. Partographs for monitoring progression of labor were available and in use at all private health facilities, this was not the case at public health facilities.

<b>Table 6: Availability of Protocols and Other Basic Equipment</b>			
Item Available and Functional	Total (n=22) (%)	Public (n=13) (%)	Private (n=9) (%)
<b>Protocols</b>			
Obstetric Newborn Complications	64.7	59.2	85.8
Obstetric Hemorrhage	54.5	46.1	85.8
Preeclampsia/Eclampsia	70.6	66.6	85.8
Safe Abortion	25	28	14.3
Post Abortion Care	40.7	40	42.9
<b>Infection Prevention</b>			
Infection Prevention Guidelines	90.9	96.2	71.4

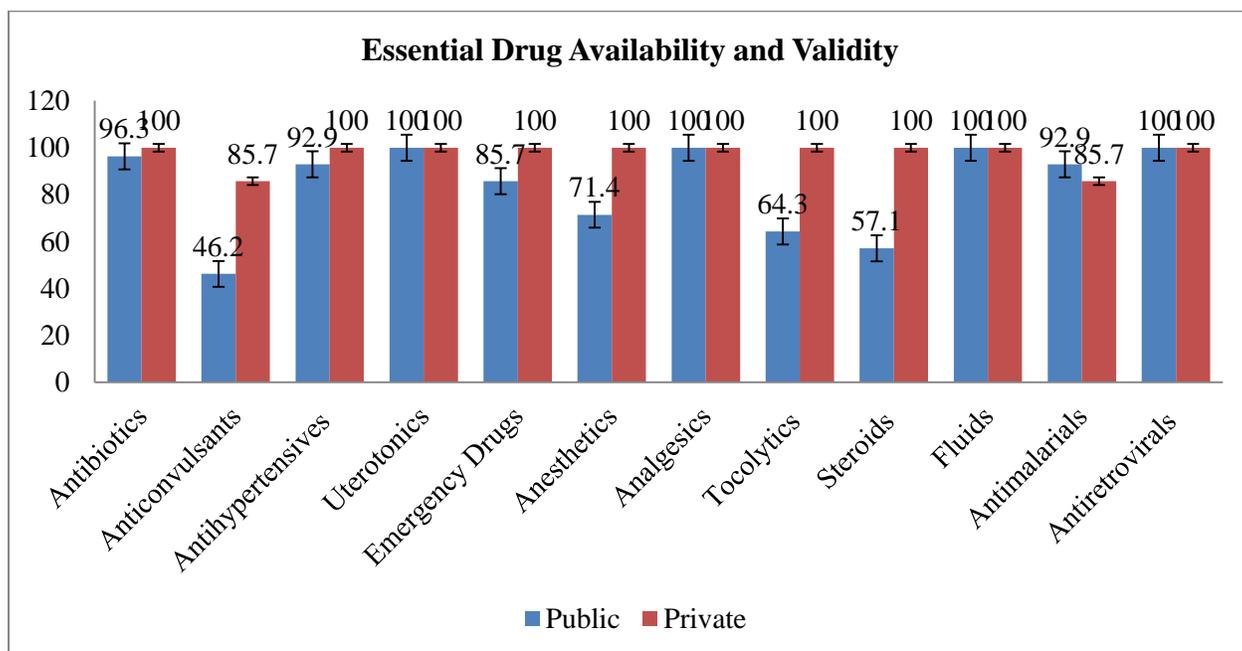
Electric Autoclave	100	100	100
Autoclave Supplies	85.7	78.6	100
Dry Heat Steriliser	36.8	46.2	16.7
Boiler Steamer	21.1	8.3	42.9
Clean Running Water	100	100	100
Hand Washing Soap	100	100	100
Disposable Latex Gloves	97.1	96.4	100
<b>Infection Control</b>			
Waste Receptacle Bins	85.3	81.5	100
Sharps Containers	97.1	96.3	100
Disposable Needles and Syringes	100	100	100
Bleach/Bleaching Powder	97.1	96.4	100
<b>Other Equipment</b>			
Tape Measure	97	96.2	100
Fetoscope	100	100	100
Doppler	73.5	70.4	85.7
Blood Pressure Cuff	100	100	100
Adult Stethoscope	100	100	100
Adult Ventilator Bag	48.5	34.6	100
Adult Ventilator Mask	42.4	26.9	100
Newborn Ventilator Bag	60	47.8	100
Newborn Ventilator Mask	63.3	52.2	100
Adult Scale	90.9	88.5	100
Newborn Scale	100	100	100
Labor Delivery Table	63.6	53.8	100

Equipment and supplies required to perform EmONC services were generally available at all health facilities. Even though more than 50% of the health facilities had protocols for managing pre-eclampsia and eclampsia, a majority of them did not have protocol guidelines for managing other complications such as hemorrhage and abortion. This was because clients in need of post-abortion care were referred to the tertiary hospital. Safe abortion protocols were available at 25

and 28 % of public and private health facilities even though safe abortion services were reportedly not provided at any of the health facilities.

### 4.3.3 Availability and Validity of Essential Drugs

Generally, essential drugs to treat obstetric complications were available at public and private health facilities. Validity of drug supplies was established by observations of expiry dates. Health facilities reported availability and validity of at least one type of drugs under each category (Figure 8).



**Figure 8: Essential Drug Availability and Validity at Public and Private Health Facilities**

Even though anticonvulsants such as magnesium sulphate are important for the management of patients experiencing fits as a result of pre-eclampsia or eclampsia, less than 50 % of public health facilities had them in stock.

### 4.3.4 Availability of Human Resources for the Provision of EmONC Services

The survey quantified full-time and part-time staff availability and training in EmONC. Table 6 shows data on staff available at public and private health facilities and training in EmONC. Private health facilities reported more full and part time doctors and specialists such as obstetricians and gynecologists than public health facilities.

They also had more staff in these categories trained in EmONC. However, the survey results show that public health facilities had more clinical officers, nurses and midwives. Public health facilities reported higher numbers of full-time clinical officers, nurses and midwives as compared to private hospitals. The survey determined that there was at least one midwife on staff but was not able to determine if the minimum staff requirement was met.

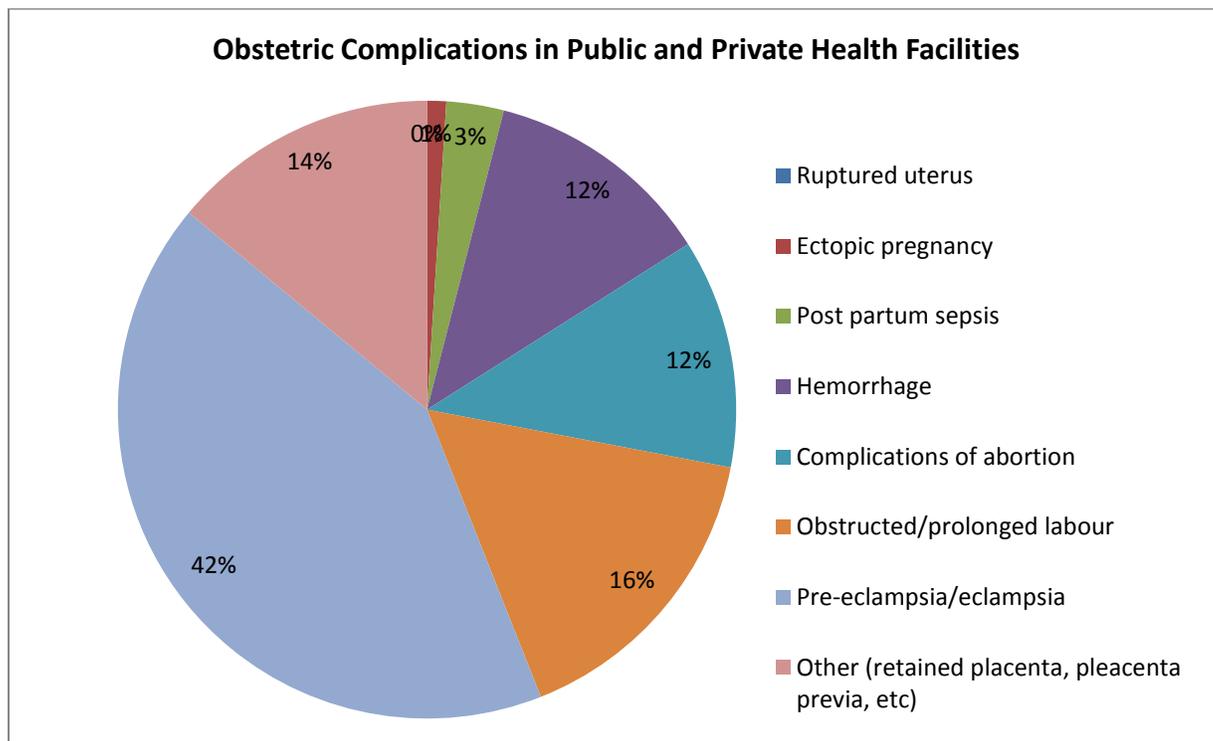
**Table 7: Human Resources at Public and Private Health Facilities in Lusaka District**

	Public		Private	
	Cadre of Staff	Trained in EmONC	Cadre of Staff	Trained in EmONC
Doctors	14	2	66	11
Specialist medical officers	1	0	25	5
Clinicians	64	1	4	0
Nursing professionals	245	12	82	9
Midwifery professionals	166	23	51	19
Pharmacists	21	0	13	0
Laboratory technicians	27	0	40	8
Radiologists	6	0	16	0
Community health workers	122	0	3	0
Other (CDES, etc)	32	0	0	0

#### **4.4 Quality and Use of Signal Functions for the Provision of EmONC Services**

The study reviewed data from June 2013 to May 2014 and collected data on deliveries, obstetric complications and maternal deaths as a result of direct obstetric complications. These data helped determine the need for emergency obstetric care. Figure 7 shows the distribution of obstetric

complications in public and private health facilities in Lusaka District one year prior to implementation of the study.



**Figure 7: Distribution of Direct Obstetric Complications in Basic and Comprehensive EmONC Health Facilities**

Pre-eclampsia/ eclampsia were the most common complication experienced by women in health facilities and accounted for 42 % of the cases during the year under review. This was followed by obstructed labour (16 %), other direct obstetric complications such as retained placenta and placenta previa (14 %) and complications of abortion (12 %). Ectopic pregnancies were the least experienced obstetric complication accounting for less than 1 % of the total complications between June 2013 and May 2014.

#### 4.4.1 Proportion of All Births in EmONC Facilities

This indicator calculates how many women are giving birth in EmONC health facilities as a proportion of the number of expected births in the population. The proportion was calculated using the formula by first multiplying Lusaka District’s population by birth rate and then, dividing the deliveries in EmONC health facilities by estimated births in the district.

#### 4.4.2 Met Need for EmONC

This indicator describes the proportion of women with complications who received emergency treatment out of the total number of pregnant women that are expected to have complications. The study revealed that direct obstetric complications were the most commonly documented in the registers at health facilities. The UN estimates that 15 % of pregnant women will experience obstetric complications. The study used the formula provided by the UN to calculate this indicator. This was calculated by multiplying Lusaka District’s population by the birth rate then; multiplying the result by 15 % to get the expected number of complications.

The result was then divided by the actual number of women with complications at EmONC health facilities. These data do not contain numbers of women who were referred from one health facilities to another. At least 12 % (Table 8) of women who had experienced obstetric complications were treated within health facilities. Ideally, all women must be treated. This indicates that there was an unmet need for EmONC between June 2013 and May 2014.

#### 4.4.3 Cesarean Sections as a Percentage of All Births in the Population

This calculation allows for a comparison of women giving birth by C-section (elective and emergency) in a population to a range of rates considered appropriate on a population level recommended at between 5 % and 15 % of all births.

**Table 8: UN Process Indicators to Measure Quality of EmONC Services**

<b>Process Indicator</b>	<b>Total Number</b>	<b>Public</b>	<b>Private</b>	<b>Proportion at Health Facilities (%)</b>	<b>UN Estimates (%)</b>
Population size	2,281,702				
Expected deliveries	118,649				
Basic EmONC	6			27%	18%
Comprehensive EmONC	5	59980 (97%)	1632 (3%)	23%	5%
% of women treated				12%	100%
Cesarean sections	4,577			4%	5-15%
Maternal deaths	33	32	1	2%	<1%

This was calculated by dividing the number of c-sections in the district by the annual number of births. Table 8 shows that only 4 % of the deliveries were conducted by C-section. This is below the recommended standard of between 5 and 15 %.

#### 4.4.4 Case Fatality Rate

The case fatality rate gives a rough indication of the quality of care women are receiving in EmONC health facilities. The numerator for the case fatality rate is the number of direct obstetric deaths in EmONC health facilities and the denominator is the number of complicated cases seen in EmONC facilities.

**Table 9: Maternal Deaths as a Result of Direct Complications Between 2013 and 2014**

<b>Direct Complications</b>	<b>Number of Cases</b>	<b>Maternal Deaths (%)</b>
Postpartum sepsis	1	3
Ruptured uterus	4	12
Pre-eclampsia/eclampsia	8	24
Hemorrhage	17	52
Other (retained placenta )	2	6
<b>Indirect Complications</b>	1	3
<b>Total</b>	<b>33</b>	<b>100</b>

The findings represented in this table should be interpreted with caution as only data on direct complications was obtained from the delivery register and many differences in proportion may be due to chance alone.

## **CHAPTER 5: DISCUSSION**

### **5.1 Assessment of Signal Functions for EmONC in Public and Private Health Facilities in Urban Settings in Comparison to Similar Studies**

The UN Process Indicators are concerned with evaluating availability, usability and quality of EmONC and ensuring that there are adequate health facilities with either basic or comprehensive EmONC services for a specified population. The availability of staff, infrastructure, drugs and equipment are important predictors of the level of preparedness for a health facility to provide emergency obstetric care. This study found that private health facilities were better prepared in terms of staff, equipment and infrastructure for providing EmONC as compared to public health facilities (Al, 2013).

The findings also show that generally, Lusaka district had adequate Comprehensive EmONC health facilities which were numerically sufficient in relation to the population as recommended by the UN and these findings correspond well with studies conducted elsewhere. There was a high unmet need for Basic EmONC services with a shortfall of 4.6 times health facilities to cater for every 500,000 population as is recommended by the UN. At the time of the study, only four health facilities had performed at least seven signal functions three months prior to the study. These results correspond well with similar studies conducted in 24 low and high-income countries. A similarity illustrating theoretical versus realistic coverage of Basic EmONC services was provided in Uganda where only 4 % of the 129 health facilities that were assessed functioned as recommended by the UN (Ali, 2009; Echoka, 2013; Kongnyuy et al, 2009; Gao et al, 2010 & Oystein et al, 2005). This shortfall suggests that there is need to upgrade health facilities to enable them provide at least seven of the nine signal functions and meet the needs of the Lusaka population.

An important aspect that was considered during the study was the strict classification of health facilities as either Basic EmONC or CEmONC according to established UN standards which did not necessarily indicate that health facilities did not have the capacity to provide emergency obstetrics care. This study found that some health facilities, particularly private ones, did not see enough complicated deliveries to effectively perform all the signal functions within the 3 month period either because women with complications delivered at health facilities in other districts or

because women with complications were referred to higher level health facilities and not properly documented at the health facility where they first presented and developed an obstetric complication (Echoka, 2013). As a result of the infrequency of performance of signal functions for EmONC, health facilities vacillated in status between Basic and Comprehensive EmONC (Mbonye et al, 2006). This made the classification of health facilities as basic or comprehensive EmONC on such bases unreasonable, thereby indicating a need to reclassify the definitions of Basic and Comprehensive EmONC health facilities (Bailey et al, 2006).

If some signal functions were not performed, it may reflect maternal health policies that govern how health systems were designed to manage obstetric complications. This study found that maternal health policies often determine the category of clinicians who should perform which signal functions. Such policies restricted the number of health care providers that provided EmONC, compromised the quality of care and consequently restricted access to emergency care. Other signal functions including assisted vaginal delivery and manual removal of placenta are highly dependent on the availability of trained staff and the use of forceps and vacuum extractor. These signal functions were unlikely to be performed in public health facilities due to non-availability of trained staff and equipment. Procedures were only performed in Comprehensive EmONC health facilities. This was similar to most countries throughout the world (Fauveau, 2006).

At public health facilities and clinics in particular, policy recommended that health care providers refer patients with listed risk factors likely to cause obstetric complications despite the availability of midwives, equipment or drugs. For instance, first time expectant mothers, those under the age of 16, those with more than five previous pregnancies were more likely to be referred to the tertiary hospital for further management.

Further, complications were less likely to be handled in private health facilities as much lower numbers of deliveries were recorded for several reasons including; the price attached to service delivery, which in effect reduced utilisation of signal functions. Private hospitals also reported relative infrequency of occurrence of some complications which resulted into the minimal performance of some signal functions such as removal of placenta and removal of retained products. Even then, low level of activity in these health facilities was not synonymous with compromised quality (Oystein et al, 2005). A common practice in private health facilities was

the referral of women with complications to the only tertiary hospital. Most of the referred patients were either not documented in the registers and when they were, the registers had inadequate information about the complication or the outcome of the patient after referral.

Parenteral uterotonics and antibiotics were more likely to be used than anticonvulsants reflecting problems systemic to health systems and policy issues, inadvertently contributing to non-administration of parenteral anticonvulsants for emergency care. The common use of uterotonics and antibiotics may also reflect their use in general obstetric practice and not just obstetric emergencies. This study also found that even though parenteral uterotonics were commonly used, the majority of health facilities recorded high numbers of maternal deaths caused by Post Partum Hemorrhage. This could have been as a result of lack of competence and knowledge as well as gaps during pre-service and EmONC training (Mirkuzie et al, 2014).

Drugs for treating convulsing women with pre-eclampsia and eclampsia such as magnesium sulfate were not widely distributed to public health facilities and were only in stock at Comprehensive EmONC health facilities. Lower level health facilities did not receive magnesium sulphate because staff were not adequately trained in their use or because policy restricted certain health care providers to use them. Well-meaning national policies or norms established by lead training institutions often determine what category of professional can be trained to provide which functions (Bailey et al, 2006). This was also reflected in the high numbers of women referred to the tertiary hospital for further management of hypertensive disorders. Considering that pre-eclampsia and eclampsia were the highest cause of direct complications across all health facilities, these data should provide renewed attention to redefining policy and scaling up the use of anticonvulsants.

Human resources, transport and communication inadequacies and the lack of other amenities, as well as associated costs are common obstacles to accessing quality obstetric emergency care. The results of this study showed that there were inadequacies in backup power and water, particularly in the public health facilities, presenting a serious challenge for health care providers providing care in Lusaka district which is not prone to power and water outages. Health care providers reported using other means of lighting such as torches while providing care. Water is critical for maintaining hygiene and preventing infection during a delivery and the lack of it can pose serious infection threats. When public health facilities experienced water outages and there was

no water stored anywhere within the facility, maternity wards would temporarily shut down and patients were referred to either the nearest health facility or the tertiary hospital for delivery services.

During the survey, the majority of the health facilities especially in the public sector needed to call for transport from other health facilities during emergency referrals. Where ambulances were available within the vicinity of a health facility, staff reported inadequate fuel and ambulance drivers, poorly maintained vehicles and lack of communication systems during the referral. A study in South Africa reported that 13.6 % of maternal deaths were attributed to a lack of transport for emergency referral. Therefore, the lack of transport can be a barrier to accessing emergency care. Even where transport was available, lack of communication systems had quite often led to delays in arranging referrals. The use of two-way radios was not essential for emergency communication unlike is the case in rural settings where they are the most important and common tool for emergency communication due to limited cell phone signal.

Even though two-way radios were available and functional at the majority of health facilities, there were rarely used. The majority of health care providers chose to use privately owned cell phones for communication during emergencies which entailed staff using their personal funds to purchase phone credit and make emergency calls. Nonetheless, landline telephones were an alternative means of communication especially at private health facilities. The availability of functional transport and communication infrastructure for preventing and managing emergency obstetric complications depicts commitment of the MoH, MCDMCH and other stakeholders in improving maternal health (Mirkuzie et al, 2014).

Since operating theatres, anesthesia and blood products were most available in private health facilities, patients seeking care at such health facilities were more likely to opt for elective cesarean sections regardless of their need for an obstetric intervention. This was similar to a study carried out in Ireland, where the variation in the overall elective cesarean section rates between women seeking care in private health facilities were higher than among women seeking care at public health facilities (Lutomski et al, 2014). Blood products were only available at the tertiary hospital which is also the national referral hospital. Most health facilities reported that it took at least an hour to obtain blood products when needed. The non-availability of blood

products at the time of completing a cesarean section or whenever there was need highly affects outcomes of mothers with PPH.

The results of the survey show that drugs and equipment for providing EmONC were generally available and valid or functional. However, even though eclampsia and pre-eclampsia accounted for 42 % of obstetric complications recorded at public and private health facilities within a one year period, anticonvulsants such as magnesium sulphate, for treating patients with eclampsia and preventing them from fitting were available not readily available at most of the public health facilities. As a result, health care workers at public health facilities were required to refer all eclamptic pregnant women to the tertiary hospital for further management. Public health facilities obtained stock of drugs through a central report and requisition system which required staff to report on use and order quantities based on what had been used in the previous month. Drugs were then supplied by the medical stores. Stockouts of drugs at public health facilities were as a result of underreporting, non-reporting on the part of health facilities or non-availability of drugs or non-receipt of reports from facilities at the central medical stores. Private health facilities obtained their drug stocks through private purchases.

While it was encouraging that all health facilities had a t least one midwife, nurses and clinical officers, there were gaps between the numbers of specialists and anesthetists and the recommended establishments, especially in public health facilities. There was uneven distribution of staff with EmONC training. These results are underscored by findings in a recent systematic review which documents that the most common supply-side barrier to maternal care is staff shortages. These shortages are further complicated by absence of key personnel at night and weekends (Faqir, 2015).

Staff shortages are a major obstacle to providing good quality EmONC. The shortages in public health facilities were mainly as a result of the emigration of trained health workers to other countries and private health facilities within the country. Whilst doctors, anesthetists and surgeons were readily available to provide care during obstetric emergencies at private health facilities, the case was not the same at public health centres. Maternal complications were handled by midwives before patients were referred to larger hospitals for further management. Because of the unavailability of adequately qualified staff at public health centres, some procedures could not be performed neither could medications be administered to patients with

obstetric complications, hence the need for referrals. This affected the frequency of use of signal functions for EmONC. The government has attempted to rectify the inadequacies of anesthetists by providing training incentives for clinical officer generals to undertake anesthetist training but, these efforts have not yielded much fruit because clinical officers are not promoted after the training. They prefer to follow personal career paths. For this reason, the shortage of anesthetists remains a serious challenge around the country (Anwar et al, 2009).

Doctors and clinicians that were available at public health facilities provided services to outpatient and inpatient clients where admission wards were available. These patients did not include maternity patients. Midwives were responsible for providing care to patients in maternity wings and initiated referrals for patients needing further management such as cesarean section. Staff who were not trained in EmONC used basic skills obtained during midwifery training to provide care. Public health facilities did not have staff in any categories working on a part-time basis. Instead, they worked on full-time basis and exchanged between shifts, making it possible for health facilities to operate 24 hours a day, seven days a week. Private health facilities had both full-time and part-time staff, with many part-time coming from the public sector. The survey results do not include numbers of staff in four of the health facilities, two of which are large hospitals. Staff who were interviewed were unable to provide details on the availability of staff and their EmONC training at the time of the survey.

## **5.2 Limitations of the Study**

Although this research was carefully prepared, its results are affected by limitations and shortcomings thus, findings should be considered preliminary. This study was descriptive and may not adequately provide rigorous statistical interpretations of the findings. Future studies need to be conducted in other public and private health facilities in urban districts with similar socio-economic characteristics as Lusaka in order to determine availability, usability and quality of signal functions for EmONC.

The study focused on collecting data on direct obstetric complications from delivery registers in labour wards and not indirect obstetric complications from all possible sources. Complications of abortion at the tertiary hospital were documented in the gynecology ward. The data extracted on complications of abortions may not be generalised to other hospitals. Even though EmONC services constitute maternal and neonatal care services, this research focused on maternal and not

neonatal complications. Data on neonatal emergency services was restricted to newborn resuscitation as one of functions that constitute EmONC signal functions. Data from private health facilities may not be a generalisation of EmONC services provided as some private health facilities did not respond to the request to conduct the survey at their health facility for undisclosed reasons.

Due to time constraints, the researchers identified and interviewed only eight women (out of a calculated sample size of 235) from six health facilities who had sought treatment for obstetric complications in public health facilities. None were interviewed from private health facilities. The time allocated for conducting the assessment at each health facility was limited and there were no women seeking care for obstetric complications at the time of conducting the survey.

This research lacked access to comprehensive data on availability of human resources. Due to time constraints, a high proportion of health facilities were reported the availability of staff even though data was not available about their skills in EmONC. This could be the reason why some facilities were not able to report performance of some signal functions. The Spearman's rank analysis does a significant correlation between human resources availability and use of signal functions.

Lastly, the study was not able to determine the distribution of Basic EmONC or Comprehensive EmONC health facilities due to non-availability of GIS software to analyse geographical data. This was similar in other African countries (Bailey et al, 2006).

## **CHAPTER 6: CONCLUSION**

The performance of signal functions is dependent on patients presenting to health facilities and complications being detected, availability of human resources with necessary skills as well as equipment and drugs to be able to provide quality care. The UN guidelines provide useful indicators for evaluating utilisation, accessibility and quality of EmONC services. However, there is still debate about whether they are an appropriate means to measure signal functions for EmONC. Even though the current status of BEmONC health facilities is below the recommended standard, the MoH and MCDMCH have made great strides in ensuring that emergency obstetric services are improved so as to improve maternal and newborn health outcomes. The results can be seen from the improved transport and communication infrastructure.

### **6.1 Recommendations**

The results from this assessment demonstrate that there is need to further investigate reasons for not performing some signal functions and identify possible areas of improvement in the provision of EmONC. Failure to perform signal functions may be as a result of maternal health policy constraints, inadequate training, supplies and equipment. For instance, the policy issues preventing the administration of parenteral anticonvulsants and performance of removal of retained products of conception and assisted vaginal delivery require further investigation. The lack of manual vacuum aspiration kits at many health facilities requires improvement in the supply chain from health facilities to medical suppliers. Further, based on the findings of the study documented above, the following recommendations were made:

- 6.1.1. Consideration should be made to improve skills of health care providers in management of obstetric complications, both during pre-service training as well as during in-service.
- 6.1.2 Health facilities should be improved and upgraded to allow them to perform at least basic signal functions for treatment of obstetric complications and meet the stipulated standard of EmONC.
- 6.1.3 Relevant authorities must conduct staff audits so as to determine EmONC training needs and plan for follow up trainings for staff that need to be trained.

- 6.1.4 Districts should be involved in conducting scheduled quality improvement visits to health facilities so as to identify gaps in maternal and newborn health care provision and devise strategies for improvement together with staff at health facilities providing EMONC.
- 6.1.5 Operating theatres and hubs for blood storage must be constructed at decentralised points in order to decongest the only tertiary hospital and make blood products readily available during operations.
- 6.1.6 Policy amendments to enable health facilities with capacity in human resources and skills perform signal functions for EmONC.

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## APPENDICES

### Appendix A: Budget

SIGNAL FUNCTIONS FOR EMERGENCY OBSTETRIC CARE AS AN INTERVENTION FOR REDUCING MATERNAL MORTALITY : ASURVEY OF PUBLIC AND PRIVATE HEALTH FACILITIES IN LUSAKA DISTRICT, ZAMBIA						
No.	Item	Description	Qty	No. of Months	Unit Cost (ZMK)	Total (ZMK)
1	Equipment	Laptop	2	-	4,500.00	9,000.00
		External drives	2	-	750.00	1,500.00
		Software	1	-	5,000.00	5,000.00
2	Stationery	Bond paper	10	-	250.00	2,500.00
		Toner	1	-	750.00	750.00
		Pens	15	-	1.50	22.50
		Pencils	10	-	0.50	5.00
		Clip boards	2	-	7.00	14.00
		Stapler	1	-	25.00	25.00
		Staples	1	-	15.00	15.00
		Paper clips	1	-	15.00	15.00
		Filing clips	1	-	30.00	30.00
		4	Human Resources	Consultant data analyst	1	1
Research Assistants	2			2	750.00	3,000.00
Data Collectors	2			2	500.00	2,000.00
5	Administrative costs	Photocopying	5000	-	0.30	1,500.00
		Binding	4	-	45.00	180.00
6	Dissemination	Publishing	1	-	0.00	0.00
		Poster printing	1	-	900.00	900.00
7	Meetings	Research Assistant training	2	-	500.00	1,000.00
		Meetings (other)	4	-	250.00	1,000.00
8	Other	REC fees	1	-	500.00	500.00
		Incidentals (5%)				1,572.83
		<b>Total</b>				<b>14,152.83</b>

## Appendix B: Gantt Chart

SIGNAL FUNCTIONS FOR EMERGENCY OBSTETRIC CARE AS INTERVENTIONS FOR REDUCING MATERNAL MORTALITY: A SURVEY OF PUBLIC AND PRIVATE HEALTH FACILITIES IN LUSAKA DISTRICT, ZAMBIA																					
Activity Details	September 2013-May 2015																				
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<b>1. Preparing the proposal</b>																					
Receive guidance & select and refine topic																					
Refine topic & refine guiding question																					
Search and obtain literature																					
Begin proposal writing																					
Submit 1st draft of proposal with literature review																					
Develop research methods																					
Develop and translate consent forms																					
Develop survey questionnaire																					
Complete literature review																					
Submit 2nd draft of proposal with methodology																					
Finalize proposal																					
Present proposal to Graduate Forum																					
Submit proposal to ERES																					
Feedback from ERES and resubmission																					
Submission to MoH & feedback																					
Submission & Feedback to PMO, LCMO, HPCZ																					
<b>2. Starting the Research Project</b>																					
Develop research plan																					
Recruit & train research assistants																					
Pre-test & revise questionnaire																					
<b>3. Data Management</b>																					
Data collection																					
Data entry & data quality assurance training																					
Data entry/transcription & cleaning																					
Data Analysis																					
<b>4. Data Analysis and Report Finalisation</b>																					
Report writing																					
Submit 1st draft of dissertation																					
Dissemination of results																					
Submit final of dissertation																					

## Appendix C: Ethical Approval



33 Joseph Mwilwa Road  
Rhodes Park, Lusaka  
Tel: +260 955 155 633  
+260 955 155 634  
Cell: +260 966 765 503  
Email: eresconverge@yahoo.co.uk

I.R.B. No. 00005948  
E.W.A. No. 00011697

24<sup>th</sup> July, 2014

**Ref. No. 2014-May-032**

The Principal Investigator  
Ms. Tannia Tembo  
The University of Zambia  
School of Medicine  
Dept. of Public Health  
P.O. Box 50110,  
LUSAKA.

Dear Ms. Tembo,

**RE: SIGNAL FUNCTIONS FOR EMERGENCY OBSTETRIC CARE AS AN INTERVENTION FOR REDUCING MATERNAL MORTALITY: A SURVEY OF PRIVATE AND PUBLIC HEALTH FACILITIES IN LUSAKA DISTRICT, ZAMBIA.**

Reference is made to your corrections submitted on 22<sup>nd</sup> July, 2014. The IRB resolved to approve this study and your participation as principal investigator for a period of one year.

Review Type	Ordinary	Approval No. <b>2014-May-032</b>
Approval and Expiry Date	Approval Date: 24 <sup>th</sup> July, 2014	Expiry Date: 23 <sup>rd</sup> July, 2015
Protocol Version and Date	Version-Nil	23 <sup>rd</sup> July, 2015
Information Sheet, Consent Forms and Dates	<ul style="list-style-type: none"> <li>English, Bemba.</li> </ul>	23 <sup>rd</sup> July, 2015
Consent form ID and Date	Version-Nil	23 <sup>rd</sup> July, 2015
Recruitment Materials	Nil	23 <sup>rd</sup> July, 2015
Other Study Documents	Survey Questionnaire.	23 <sup>rd</sup> July, 2015
Number of participants approved for study	235	23 <sup>rd</sup> July, 2015

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

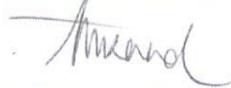
#### **Conditions of Approval**

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to the IRB within 5 days.
- All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to the IRB within 5 working days.
- All recruitment materials must be approved by the IRB prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. Documents must be received by the IRB at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Any documents received less than 30 days before expiry will be labelled "late submissions" and will incur a penalty.
- Every 6 (six) months a progress report form supplied by ERES IRB must be filled in and submitted to us.
- ERES Converge IRB does not "stamp" approval letters, consent forms or study documents unless requested for in writing. This is because the approval letter clearly indicates the documents approved by the IRB as well as other elements and conditions of approval.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of ERES Converge IRB, we would like to wish you all the success as you carry out your study.

Yours faithfully,  
**ERES CONVERGE IRB**



Dr. E. Munalula-Nkandu  
BSc (Hons), MSc, MA Bioethics, PgD R/Ethics, PhD  
**CHAIRPERSON**

## Appendix D: Letter of Approval from the Ministry of Health

All Correspondence should be addressed to the  
Permanent Secretary  
Telephone: +260 211 253040/5  
Fax: +260 211 253344



REPUBLIC OF ZAMBIA  
MINISTRY OF HEALTH

In reply please quote:

MH/101/17/6

No.....

NDEKE HOUSE  
P. O. BOX 30205  
LUSAKA

14<sup>th</sup> October, 2014

Ms Tannia Tembo  
University of Zambia  
School of Medicine, Public Health  
LUSAKA.

Dear Dr Tembo,

### Re: Request for Authority to Conduct Research

The Ministry of Health is in receipt of your request for authority to conduct a study titled: **“Signal Functions for Emergency Obstetric Care as Interventions for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia.”** I wish to inform you that following submission of your request to my Ministry, our review of the same and in view of the ethical clearance, my Ministry has granted you authority to carry out the above mentioned exercise on condition that:

1. The relevant Provincial and District Directors of Health where the study is being conducted are fully appraised;
2. Progress updates are provided to MoH quarterly from the date of commencement of the study;
3. The final study report is cleared by the MoH before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by the MoH, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, and all key respondents.

Yours sincerely,

Dr. D. Chikamata  
Permanent Secretary

**MINISTRY OF HEALTH**

Cc: District Medical Officer

# Appendix E: Letter of Approval from Provincial Health Office - Lusaka

All communications should be addressed  
to the Community Development Officer

Telephone: +260-211-235554  
Telefax: +260-211-236429



REPUBLIC OF ZAMBIA

In reply please quote

No.: .....

## MINISTRY OF COMMUNITY DEVELOPMENT MOTHER AND CHILD HEALTH

DISTRICT COMMUNITY HEALTH OFFICE  
P.O. BOX 50827  
LUSAKA

16<sup>th</sup> January 2014

Dr. Tannia Tembo  
The University of Zambia  
School of Medicine  
Department of Paediatrics and Child Health  
**LUSAKA**

Dear Dr. Tembo

### **RE: AUTHORITY TO CONDUCT RESEARCH STUDY IN LUSAKA DISTRICT**

We are in receipt of your letter over the above subject.

Please be informed that Lusaka District Community Health Office has no objection for you to conduct a research study on **"Signal functions for emergency obstetric care as interventions for reducing maternal mortality: A survey of public and private health facilities in Lusaka District, Zambia"** for academic purposes only.

However, please ensure that client names or health care records identifiers are not included in the data collected by the students.

Please ensure that a copy of the findings is also provided to Lusaka District Community Health Office at the end of the research study.

By copy of this letter, the Health Facility In-Charges for Kalingalinga, Chelstone, Ngombe, Bauleni, Mtendere, Kanyama, Chawama, Chilenje, Chipata, George and Matero Ref are hereby notified and requested to facilitate accordingly.

Yours Sincerely

Dr. Lendy Kasanda  
**PRINCIPAL CLINICAL CARE OFFICER**  
**For/DISTRICT MEDICAL OFFICER**

C.c. The In-Charge: Kalingalinga, Chelstone, Ngombe, Bauleni, Mtendere, Kanyama, Chawama, Chilenje, Chipata, George and Matero Ref Health Centres

C.c. Head of Department: School of Medicine – Dr. M. Makasa

## Appendix F: Letter of Approval from Health Professionals Council of Zambia



### HEALTH PROFESSIONS COUNCIL OF ZAMBIA

Health Professions Council of Zambia  
Dental Training School Premises, Wamulwa Road, Thornpark  
P. O. Box 32554  
10101 Lusaka  
Zambia

Tel.: (260-211) 236241  
Fax: (260-211) 239317  
E-Mail: [hpcz@iconnect.zm](mailto:hpcz@iconnect.zm)  
Website: [www.hpcz.org.zm](http://www.hpcz.org.zm)

---

Your Reference:  
In reply please quote

8<sup>th</sup> December, 2014

Tannia Tembo  
University of Zambia School of Medicine  
Lusaka

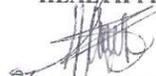
**REF: Authorisation to conduct Research in Private Health Facilities in Lusaka District**

With reference to your letter dated 3<sup>rd</sup> December 2014 in which you requested for permission to conduct research on the effectiveness of signal functions of emergency obstetric care in Private Health Facilities in Lusaka District, I write to inform you that your request is granted. This is subject to your obtaining permission with the individual hospital administration.

The Health Professions Council of Zambia acknowledges the role research provide in provision of quality maternal and child health care and therefore wishes you all the best in your research.

Yours faithfully,

**HEALTH PROFESSIONS COUNCIL OF ZAMBIA**

  
Dr. M. M. Zulu  
Registrar

# Appendix G (i): Participant Information Sheet and Consent Form - English Version

## INFORMED CONSENT FORM-SIGNATURE FORM

**Title of Study:** Signal Functions for Emergency Obstetrics Care as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia

**Protocol:** Version 1.0, dated 30<sup>th</sup> April 2014

**Principal Investigator:** Tannia Tembo, School of Medicine - Department of Public Health

---

### Agreement of Participant:

I have read the information given to me about the purpose, procedures, possible benefits and risks of this research. I have asked all the questions I may have at this moment. I voluntarily agree to participate in this research.

---

Name of Research Participant

---

Date

---

Signature of Research Participant

---

Name of Person Obtaining Informed Consent

---

Date

---

Signature of Person Obtaining Informed Consent

---

\*Name of Witness

---

Date

---

\*Signature of Witness

\*Note: Witness name, signature and date are required on this consent form only when the consenting volunteer is not able to read or write.



Please print your left thumbprint in this box if you (or your witness) are unable to provide a signature above.

**Confidentiality**

We will do everything to protect your confidentiality. All information collected from you is strictly confidential. All research staff will be trained in methods to protect confidentiality. You do not need to give us your names. Study materials will use a unique identification number. They will be kept in locked file cabinets accessible only by the research team. In the event of publication, your names will not be used. Information about you may be reviewed by the principal investigator, other research team members and the Excellence in Research Ethics and Science (ERES Converge IRB).

**Risks and Benefits**

There are no physical risks to participants. You may be uncomfortable, have doubts or feel bad about discussing your experience. You may disclose personal about your condition and the care you have received. Information we collect from you may be accessed by a person who is not a member of the research team. We will do everything within our means to main confidentiality.

You may not receive direct benefits from participating in this research. Your participation will help inform future maternal mortality reduction interventions in Zambia. We will gather information about availability, accessibility, usability and quality of emergency obstetric care services which will be used to advocate for scale up and improvement of emergency obstetric care services.

**Voluntary Participation**

Your participation is voluntary. You may refuse to participate for any reason. You will not be punished for refusing to participate. If you agree to participate, please sign and date this consent form in duplicate. You will be offered a copy of the signed form.

**Costs**

There is no cost incurred by you for participating in this research. You will not receive anything for participating in the study.

**Funding**

Funding for this research is provided by the student. There are no financial benefits for conducting this research.

**Right to Withdrawal/ Seek Clarification**

You may choose to withdraw your consent to be in the study at any time for any reason. You will not be punished for withdrawing from. Deciding to withdraw will not affect the care you receive at the facility.

You have the right to ask and to be given answers to any of the questions you may have. Please contact the head of research documented on the first page of this document for further questions. You can also call the indicated person on 0967-785-515.

If you have any questions and need further clarification about this research and your rights as a research participant, please contact:

The Secretary  
Excellence in Research Ethics and Science (ERES Converge IRB)  
33 Joseph Mwila Road  
Rhodes Park  
Lusaka, Zambia  
Tel: 0955-155-633/4  
Or  
Tannia F. Tembo  
University of Zambia - School of Medicine  
Department of Public Health  
P.O Box 32379  
Lusaka  
Cell: 0967-785-515

**INFORMED CONSENT FORM-SIGNATURE FORM**

**Title of Study:** Signal Functions for Emergency Obstetrics Care as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia

**Protocol:** Version 1.0, dated 30<sup>th</sup> April 2014

**Principal Investigator:** Tannia Tembo, School of Medicine - Department of Public Health

---

**Agreement of Participant:**

I have read the information given to me about the purpose, procedures, possible benefits and risks of this research. I have asked all the questions I may have at this moment. I voluntarily agree to participate in this research.

---

Name of Research Participant

---

Date

---

Signature of Research Participant

---

Name of Person Obtaining Informed Consent

---

Date

---

Signature of Person Obtaining Informed Consent

---

\*Name of Witness

---

Date

---

\*Signature of Witness

\*Note: Witness name, signature and date are required on this consent form only when the consenting volunteer is not able to read or write.



Please print your left thumbprint in this box if you (or your witness) are unable to provide a signature above.

## **Appendix G (ii): Participant Information Sheet and Consent Form – Bemba Version**

**The University of Zambia  
School of Medicine  
Department of Public Health  
Consent to Participate in Research Study  
Biomedical Form  
Bemba**

---

**IRB No.:** 00005948  
**FWA No.:** 00011697

**Consent Form Version Date:** Version 1.0, dated 30<sup>th</sup> April 2014

**Umutwe wa Masambililo:** Signal Functions for Emergency Obstetrics Care as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia

**Protocol:** Version 1.0, dated 30<sup>th</sup> April 2014

**Kafwailisha Mukalamba:** Tannia Tembo, School of Medicine - Department of Public Health  
**Email Address:** [tannia\\_t@yahoo.com](mailto:tannia_t@yahoo.com)

**Ukulefuma Indalama:** Bakasambilila

**Namba iya Lamya iya Masambililo :** 0967-785-515

---

### **Ilyashi Pali Aya Amasambililo Yakufwailisha**

Uku ukufwailisha kulecitwa naba Tannia F. Tembo ba kasambilila pa University of Zambia mwi sukuluiya miti – ku department ya Public Health. Aya amasambililo yali ne subilo iyakusambilila ukubomba kwama signal functions muku chingilila amafya ayakumya kwifuma nangu mukupapa. Tulefwaya ukwishiba nga ama signal functions yalasangwa elyo nga yalabomba nge efyo yalingile mu fipatala. Tulesubila ati ilyashi twalakolonganya yalaafwilisha ububomfi bwa ma signal functions ku maafya aya mafumo elyo nokupapa. Tulemilomba ukuti mubulemo ulubali pantu namulingana na abo tulefwaya mu masambililo.

### **Ifyalacitika**

Mwalasalwa ukubulamo ulubali pacipatala epo mulepokela ukutangatwa pali ubwafya mwapitamo pe fumo nangu pa kupapa. Ukulingana kwenu ukwa kwingila mumasambililo kwala monwa na babmofi abamumasambililo. Bala mibelengela ilyashi ilya cisuminisho elyo nokumispusha nga cakuti namukwata amepusho. Nga cakuti mwasumina ukubulamo ulubali twalamipusha uku siana ici pepala cacisuminisho. Nga cakuti teti musaine, twalalomba ukuti mu fwatike icikumo icikalamba.

Twala mipushako pali ubwafya mukwete elyo nokutangatwa eko mwapokelela pano pa cipatala. Uku ukulanshanya kwalasenda ama minutes ama kumi yatathu.

**Inkama**

Tukeesha fyonse mumaka yesu ukuchingilila inkama shenu. Yonse ilyashi twalasenda kuli imwe ikaba ninkama. Tamufwile ukutupela amashina yenu. Ifyaku bomfya fyonse ifya mumasambililo fikabomfya ama nambala ayaibela. Tuka fisunga mu ma bokoshi aya komwa elyo ababomfi aba mukufwailisha ebakalaya bomfya. Tatwakabomfye amashina yenu nga cakuti ilyashi yasabankanya. Ilyashi lyenu likapitwamo nabakafwailisha mukalamba, ba kafwailisha bambi elyo naba Excellence in Research Ethics and Science (ERES Converge IRB).

**Amafya elyo Nokunonka**

Takuli amafya aya nga kumya kumubili kuli abo abalebulamo ulubali mu masambililo. Kuti limbi mwaumfwa insoni, mwa twishika elyo nangu mwaumfwa ububi pakulanda pali efyo mwapitamo. Kuti limbi mwatweba ilyashi pali ubwafya mwapitamo elyo no kutangatwa eko mupokela. Ilyashi twa lanshanya tayaka bonfeshwa na bantu abashali ababomfi ba aya amasambililo. Tukesha fyonse ifya mumaka yesu ukusunga inkama.

Kuti limbi teti mupoke ukunonkelamo ukwalosha kuli imwe ukufuma mukubulamo ulubali muli aya amasambililo aya kufwailisha. Ulubali lwenu lukafwilisha ne lyashi pakuwamya inshila ishakuchiligilila infwa sha banamoya pamulandu wa mafya ayesa nokukwata ifumo nangu paku papa. Twala kolonganya ilyashi pali ukubapo, ukukwata, ukukbomfya elyo no busuma wa tangatwa munshita sha mafya aya pama fumo na pakupapa. Tuka bomfya iyi ilyashi uku wamya inshila shaku tangatwa banamyo abamafumo.

**Ukuipeela pakumbulamo ulubali**

Ukubulamo ulubali kwaku ipeela. Kuti mwakana ukubulamo ulubali pamulandu u uli onse. Nga cakuti mwa sumina uku bulamo ulubali, mwala saina elyo nokulemba inshiku pa fipepla fibili ifya cisuminisho. Twalamipela ici pepela cimo ica sainishiwa.

**Umutengo**

Takwakabe umutengo kuli imwe pakubulamo ulubali mumasambibililo. Tamwakapokelele iciliconse pakubulamo ulubali mumasambibililo.

**Ukulefumo Indamala**

Uku ukufwailisha kulepeelwa indalama nabakasambilila. Takuli ukunonkelamo ukwandalama pali uku ukufwailisha.

**Insambu pakufuma nangu ukufwaya Ilyashi ilya kulundapo**

Kuti mwasala ukufuma mumasambililo aya kufwailisha panshita iliyonse nangu pamulandu u uli onse. You may choose to withdraw your consent to be in the study at any time for any reason. Takuli icilango nga cakuti mulefwaya ukufunyamo ulubali. Ukusala ukufumamo takwa ka kumye ukutangatwa eko mulepoka pano pa cipatala.

Namukwata insambu isha kwipusha amepusho elyo nokukwata amasuko pa mepusho ayo mukwete. Nga cakuti namukwata amepusho, kuti limbi mwalanda naba lemblwe pamulu lya ici icipepala. Kuti limbi mwabatumina pa lamyala pali numbala 0967-785-515.

Nga cakuti namukwata amepusho ayali yonse elyo mulefwaya ukuti balondololepo nakabili pali aya amasambililo elyo nensambu shenu paku bulamo ulubali, kuti mwalanda na ba:

The Secretary

Excellence in Research Ethics and Science (ERES Converge IRB)

33 Joseph Mwila Road

Rhodes Park

Lusaka, Zambia

Tel: 0955-155-633/4

Or

Tannia F. Tembo

University of Zambia - School of Medicine

Department of Public Health

P.O Box 32379

Lusaka

Cell: 0967-785-515

## ICISUMINISHO-ICI PEPALA ICHAKUSAINA

**Umutwe wa Masambililo:** Signal Functions for Emergency Obstetrics Care as an Intervention for Reducing Maternal Mortality: A Survey of Public and Private Health Facilities in Lusaka District, Zambia

**Protocol:** Version 1.0, dated 30<sup>th</sup> April 2014

**Kafwailisha Mukalamba:** Tannia Tembo, School of Medicine - Department of Public Health

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### **Ukusuminisha ukwa ulebulamo ulubali:**

Nimbelenga ilyashi ilya peelwa pamulu. Ninjipusha amepusho eyo ningakwata pali ino inshita. Mukuipeela nasumina ukubulamo ulubali mu aya amasambililo ayakufwailisha.

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Ishina ilyalembwa ilya ulebulamo ulubali mu kufwailisha

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Inshiku

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Ukusaina nangu ukufwatika ukwa ulebulamo ulubali

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Ishina ilyalembwa ilya mubomfi uwe bumba ilya kufwailisha ulepoka icisuminisho Inshiku

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Ukusaina ukwa mubomfi uwe bumba ilya kufwailisha ulepoka icisuminisho

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\*Ishina iyalembwa ilya kwa kamboni

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Inshiku

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Ukusaina ukwa kwa kamboni

\*Ica kumwekeshapo: Ishina ilya kwa kamboni, nokusaina, nenshiku filefwaika pa cipepla icakusuminisha nga cakuti abalebulamo ulubali teti babelenge nangu ukulemba.



Fwatikeni ici kumo ici kalamba ica kulefuti umu mukabokoshi nga cakutilla imwe (nangula kamboni wenu) teti musaine pamulu.

# Appendix H: Health Facility Assessment Tool



UFI

## Introduction and Consent

### Instructions:

Please complete this module at the facility as soon as you arrive and before interviewing the health facility in charge. Obtain consent from the health facility in charge or other delegated staff at the health facility before you start the interview.

Hello! My name is Tannia Tembo and I am a student at the university of Zambia in the School of Medicine, Department of Public Health. I am conducting a research on signal function for Emergency Obstetric Care as interventions for maternity mortality reduction. The purpose of the research is to assess the effectiveness of signal function for managing complications related to pregnancy and delivery. We want to know if signal functions are available and accessible. We hope that the information we collect can be used to improve the use of signal functions for obstetric complications in health facilities. We expect all health facilities in Lusaka District that provide maternal and child health care by a skilled health care provider, 24 hours a day, seven days a week to participate. We will interview you, observe the equipment and drugs and review the registers at your health facility. We hope to spend 45 minutes conducting the health facility assessment and two hours collecting data from the registers in the facility.

Taking part in this survey is voluntary and all information obtained from you is strictly confidential. All documents related to this research will only be accessed by the research team and kept under lock and key. In the event of publication, your names will not be identified by the information you give us. You may refuse to participate for any reason or withdraw from the assessment at any time during the interview. Choosing not to participate will not affect your relationship with your employers or the researchers. If you choose to participate, please sign and date this consent form. You have the right to ask questions and be given answers about this assessment. Please contact Tannia Tembo on 0967785515.

**Consent to participate:** I understand the information I have read (or heard) about the purpose and the benefits of this assessment. I have asked all the questions I have at this moment. All my questions have been answered, satisfactorily. I willingly agree to participate in this assessment.

Name of interviewer:

Signature of interviewer:

Team/interviewer Number:

Date of consent (dd/mm/yy)  .  .

Name of interviewee:

Signature of interviewee:

Position at health facility:

Phone number of interviewee:

Date of consent (dd/mm/yy)  .  .

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### Data Collection Modules

- Module 1. Facility Identification and Facility Function Assessment
- Module 2. EmONC signal Function Assessment
- Module 3. Facility infrastructure and Human Resource
- Module 4. Essential Drugs, Equipment and Supplies

### Module 1: FACILITY IDENTIFICATION AND GENERAL INFORMATION

#### Section A: Facility Identification Information

**Instructions:** Obtain the health facility code from the in-charge. Enter the last two digits of the provincial and district codes and the last three digits of the health facility code in the UFI section before you obtain geographic coordinates. Please take one measurement at the entrance of the health facility and another at the back.

Health facility name:

Unique Facility Identifier

Health Facility Code

#### Geographic Coordinates 1

Latitude (decimal format)

 N or S

Longitude (decimal format)

 E or W

Elevation

 meters

Accuracy Reading

 meters

#### Geographic Coordinates 1

Latitude (decimal format)

 N or S

Longitude (decimal format)

 E or W

Elevation

 meters

Accuracy Reading

 meters

### MODULE 2: EmOC SIGNAL FUNCTION ASSESSMENT

#### Section A: Facility Function Assessment

**Instructions:** Please direct these questions to the health facility in charge.

1.	Type of facility (Select one)	<input type="radio"/> National/ Tertiary Hospital <input type="radio"/> Provincial/ District Hospital <input type="radio"/> Government Health Centre <input type="radio"/> Private Hospital <input type="radio"/> Private Health Centre/ Clinic <input type="radio"/> Other (Specify) <input type="text"/>
2.	Type of operating agency	<input type="radio"/> Government <input type="radio"/> Private (for profit) <input type="radio"/> NGO (not for profit) <input type="radio"/> Mission (faith based) <input type="radio"/> Other (Specify) <input type="text"/>

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3.	Urban/ peri-urban	<input type="radio"/> Urban <input type="radio"/> Peri-urban	<input type="text"/> <input type="text"/>
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**Section B: General Services Assessment**

**Instructions:** This module should be completed at the health facility. Write the signal functions that have been performed at this facility in the last three months. Also fill in section for the availability of guidelines or protocols.

Do you provide the following services?		Response	
No	Item	Yes	No
4.	Obstetric and Newborn Care (If "no" skip to item 8)	<input type="radio"/>	<input type="radio"/>
5.	Family planning	<input type="radio"/>	<input type="radio"/>
6.	Antenatal Care	<input type="radio"/>	<input type="radio"/>
7.	Prevention of Mother to Child Transmission of HIV	<input type="radio"/>	<input type="radio"/>
8.	Is the facility staffed 24hours a day, 7days a week?	<input type="radio"/>	<input type="radio"/>
9.	Does the health facility provide delivery and newborn care 24hours a day, 7days a week? (If "no" to 4,8 and 9, end interview)	<input type="radio"/>	<input type="radio"/>

**Section C: Signal Function Assessment**

No	Item	Response	
Please tell me if this facility has performed any of the following EmOC signal functions in the last 3months		Yes	No
10.	Parenteral antibiotics	<input type="radio"/>	<input type="radio"/>
11.	Parenteral anticonvulsants	<input type="radio"/>	<input type="radio"/>
12.	Parenteral uterotonics	<input type="radio"/>	<input type="radio"/>
13.	Manual removal of placenta	<input type="radio"/>	<input type="radio"/>
14.	Newborn resuscitation with bag and mask	<input type="radio"/>	<input type="radio"/>
15.	Removal of retained products	<input type="radio"/>	<input type="radio"/>

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No	Item	Response
16.	If removal of retained products was performed in the last 3 months, which method was used?	<input type="radio"/> Vacuum aspiration <input type="radio"/> Dilation and curettage (D & C) <input type="radio"/> Dilation and evacuation (D & E) <input type="radio"/> Misoprostol
17.	Assisted vaginal delivery	<input type="radio"/> Yes <input type="radio"/> No
18.	If assisted vaginal delivery was performed in the last 3 months, which method was used?	<input type="radio"/> Vacuum extractor <input type="radio"/> Forceps
19.	Caesarean Section	<input type="radio"/> Yes <input type="radio"/> No
20.	What type of anesthesia is currently used when performing a Caesarean section delivery?	<input type="radio"/> General <input type="radio"/> Spinal/ epidural <input type="radio"/> Katemine <input type="radio"/> Other (Specify) <input type="text"/>
21.	Blood transfusion	<input type="radio"/> Yes <input type="radio"/> No
22.	How many units of blood does this facility have in stock today?	<input type="text"/>
23.	If the facility needed to transfuse blood products, how many minutes would it take to obtain blood products?	<input type="text"/>

**Section D: Guidelines and Protocols**

No	Item	Response			
		Within reach	Yes, on wall	Yes, but stored	No
	Are there guidelines or protocols available in the maternity ward for:				
24.	Management of obstetric and newborn complications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	Management of obstetric hemorrhage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26.	Management of pre-eclampsia/ eclampsia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27.	Safe abortion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.	Post abortion care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29.	Is there a formal audit or case review of maternal deaths at the facility?	<input type="radio"/> Yes <input type="radio"/> No			

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**MODULE 3: FACILITY INFRASTRUCTURE AND HUMAN RESOURCES**  
**Section A: General Infrastructure**

**Instructions:** Please direct these questions to the health facility in charge.  
 There are eight (8) sections.

No	Item	Response
30.	How many beds are available for maternity patients in this facility? (Write number)	<input type="text"/>
31.	How many beds are available for delivery patients in this facility (Write number)	<input type="text"/>
32.	How often do obstetric patients sleep on the floor?	<input type="radio"/> Never <input type="radio"/> Sometimes (at least once per month) <input type="radio"/> Often (at least once per week) <input type="radio"/> Most of the time (daily) <input type="radio"/> Don't know
33.	How often do obstetric women deliver on the floor?	<input type="radio"/> Never <input type="radio"/> Sometimes (at least once per month) <input type="radio"/> Often (at least once per week) <input type="radio"/> Most of the time (daily) <input type="radio"/> Don't know
34.	How long do women stay at the facility after an uncomplicated delivery?	<input type="radio"/> Less than 6 hours <input type="radio"/> 6-24 hours <input type="radio"/> More than 24 hours <input type="radio"/> Don't know
35.	Does this facility have electricity?	<input type="radio"/> Yes <input type="radio"/> No
36.	What is the primary source of electricity?	<input type="radio"/> Power line (grid) <input type="radio"/> Generator <input type="radio"/> Solar <input type="radio"/> Other (Specify) <input type="text"/>
37.	Is a functional generator or solar system available for obstetric patients?	<input type="radio"/> Yes <input type="radio"/> No
38.	Does this facility have water functions such as hand washing for patients and staff use?	<input type="radio"/> Yes <input type="radio"/> No
39.	What is the primary source of	<input type="radio"/> Piped water <input type="radio"/> Hand pumped/ borehole <input type="radio"/> Well <input type="radio"/> Other (Specify) <input type="text"/>
40.	Is there a functioning toilet designated for clients use?	<input type="radio"/> Yes <input type="radio"/> No

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No	Item	Response		
		Not Available at the facility	Available at the facility and functional	Available at the facility but not functional
	Does this facility have one of the following?			
41.	Two-way radio	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42.	Land line telephone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43.	Cell phone (owned by facility or individual staff)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44.	Functioning computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45.	Internet access to email or internet within the facility today	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section B: Transport and Referral**

No	Item	Response
46.	Does this facility have a functional ambulance or other vehicles for emergency transportation for antenatal deliveries and postnatal care that is stationed at this facility? (If "No", skip to 49)	<input type="radio"/> Yes <input type="radio"/> No
47.	Does this facility have a functional ambulance or other vehicle for emergency transportation for clients that is stationed at another facility?	<input type="radio"/> Yes <input type="radio"/> No
48.	Is there fuel for the ambulance or other emergency vehicle available today?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
49.	Is there formal written protocol for referring patients?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
50.	When referring a patient, do staff inform the referral clinic or hospital about the patient and emergency?	<input type="radio"/> Immediately by phone/ radio <input type="radio"/> Immediately by text message <input type="radio"/> Upon referral by paper <input type="radio"/> No
51.	Does this facility receive information about the outcome of the patient from the referral facility?	<input type="radio"/> Yes, always (> 80% of the time) <input type="radio"/> Yes, sometimes (50-80% of the time) <input type="radio"/> Yes, rarely (> 50% of the time) <input type="radio"/> Not applicable (Does not refer)

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UFI **Section C: Infection Prevention and Health Care Waste Management**

No	Infection Prevention	Response				
52.	Does the facility have any guidelines on standard precautions on infection prevention?	<input type="radio"/> Yes <input type="text"/> <input type="radio"/> No <input type="text"/>				
Please tell me if the following items used for processing of equipment for reuse are available and functional at the facility today		Available		Functioning		Don't know
		Yes	No	Yes	No	
53.	Electric autoclave (pressure and wet heat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54.	Non electric autoclave	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
55.	Electric dry heat steriliser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
56.	Electric boiler or steamer (no pressure)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
57.	Non-electric pot with cover for boiling/ steam	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
58.	Heat source for non-electric equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

No	Infection Control	Available		Functioning		Don't know
	Please tell me if the following resources and supplies used for infection control are available in the facility today	Yes	No	Yes	No	
59.	Clean running water (piped, bucket with tap, pour pitcher)	<input type="radio"/>				
60.	Hand-washing soap/ liquid soap	<input type="radio"/>				
61.	Disposable latex gloves	<input type="radio"/>				
62.	Waste receptacle (pedal bin) with lid and plastic liner	<input type="radio"/>				
63.	Sharps container ("safety box")	<input type="radio"/>				
64.	Environmental disinfectant (e.g chlorine, alcohol)	<input type="radio"/>				
65.	Disposable syringes with disposable needles	<input type="radio"/>				
66.	Auto-disable syringes	<input type="radio"/>				

No	Health Care Waste Management	Response		
67.	How does this facility dispose of sharps waste (e.g filled sharps boxes?)	<input type="radio"/> Burn incinerator <input type="radio"/> Open burning <input type="radio"/> Dump without burning <input type="radio"/> Remove off site		
68.	How does facility dispose of medical waste other than sharps boxers?	<input type="radio"/> Burn incinerator <input type="radio"/> Open burning <input type="radio"/> Dump without burning <input type="radio"/> Remove off site		
69.	Is the incinerator functional today?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Don't know
70.	Is fuel for the incinerator available today?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> Don't know

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UFI **Section D: Human Resources**

**Prompt:** I have a few question about staffing for this facility. Please tell me how many staff with each of the following qualifications are currently assigned to, employed by, or seconded to this facility. Please count each staff member only once on the basis of the highest technical or professional qualification. For doctor,I would also like to know how many of the total number are part-time in this facility. Please tell me how many of the available staff are trained in EmOC.

No	Item	Assigned/ Employed/ seconded (full-time)	Trained in EmOC	Part-time	Trained in EmoC
71.	Doctor (medical officer/ general practitioner)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
72.	Specialist medical officer	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
73.	Clinician/ paramedical professional	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
74.	Nursing professionals	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
75.	Midwifery professional	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
76.	Pharmacists	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
77.	Laboratory technicians (medical and pathology)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
78.	Radiologists	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
79.	Community health workers	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
80.	Other (Specify)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
81.	How often do staff trained in EmOC practice providing care for obstetric emergencies?	<input type="radio"/> Never <input type="radio"/> Sometimes(at least once per month) <input type="radio"/> Often (at least once per week) <input type="radio"/> Most of the time (daily) <input type="radio"/> Don't know			

No	Item	Response		
	What do you use to measure referral of women with obstetric complications for further management at a higher level healthy facility?	Yes	No	Don't know
82.	Type of complication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
83.	Severity of complication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
84.	Available of equipment and drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
85.	Availability of qualified staff to handle complication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
86.	Other (Specify) <input type="text"/>			

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UFI **Essential Drugs Stock Out**

No	Item	Response					
		Currently out of stock	within last month	Within 3 months	Within 6 months	Within 12 months	Not applicable
Have you had a stock out of any of the following in the last 12 months?							
100.	Antibiotics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
101.	Anticonvulsants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
102.	Oxytocics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
103.	Drugs for emergencies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
104.	Antimalarials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section B: Essential Supplies**

No	General Supplies	Response	
Does this facility have the following?			
105.	Soap	<input type="radio"/> Yes	<input type="radio"/> No
106.	Gloves	<input type="radio"/> Yes	<input type="radio"/> No
107.	Non-sterile protective clothing	<input type="radio"/> Yes	<input type="radio"/> No
108.	Bleach or bleaching powder	<input type="radio"/> Yes	<input type="radio"/> No
109.	Puncture proof sharps container	<input type="radio"/> Yes	<input type="radio"/> No
110.	Autoclave supplies	<input type="radio"/> Yes	<input type="radio"/> No

**Tests**

No	Item	Response		
Does this facility conduct the following tests on site?		Not available	Available and functional	Available but non-functional
111.	Urinalysis tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
112.	Point-of-care hemoglobin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
113.	HIV rapid testing kit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
114.	Syphilis tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
115.	Malaria diagnosis (RDT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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UFI **Section C: Equipment****Refrigerator**

No	Item	Response
116.	Does this facility have at least one functioning refrigerator?	<input type="radio"/> Yes <input type="radio"/> No
<b>Maternity Ward Pre-packaged Sets</b>		
117.	Are there clean delivery kits in this facility?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
118.	Are there functional episiotomy/ cervical, vaginal laceration repair packs available in this facility?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
119.	Are there functional assisted delivery packs available in this facility (Obstetric vacuum or forceps)	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
120.	Are there functional uterine evacuation packs available	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
121.	Are there functioning neonatal resuscitation packs available in this facility?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
122.	Are there manual vacuum aspiration (MVA) packs available in this facility?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
123.	Are there functional dressing instrument packs available in this facility	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't know
124.	Does this facility have an operating theatre?	<input type="radio"/> Yes <input type="radio"/> No
125.	Are there functional Caesarean section packs available in this facility?	<input type="radio"/> Yes <input type="radio"/> No

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No	Does this facility have the following anesthetic equipments and supplies?	Not available at the facility	Available at facility and functional	Available at the facility but non-functional
126.	Anesthetic face masks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
127.	Oropharyngeal airways	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
128.	Larygoscope with spare bulbs and batteries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
129.	Endotracheal tubes with cuffs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
130.	Incubating forceps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
131.	Spinal needles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
132.	Suction aspirator, foot operated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
133.	Suction aspirator, electric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
134.	Oxygen cylinders with manometer and flow meter tubes and connectors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
135.	Anesthetic vaporizer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Other Equipment**

Item		Response		
No	Does this facility conduct the following test on site?	Not available at the facility	Available at facility and functional	Available at the facility but non-functional
136.	Tape measure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
137.	Fetscope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
138.	Doppler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
139.	Blood pressure cuff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
140.	Adult Stethoscope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
141.	Adult ventilator bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
142.	Adult ventilator mask	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
143.	Newborn ventilator bag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
144.	Newborn ventilator mask	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
145.	Adult scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
146.	Newborn scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
147.	Labor and delivery table	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
148.	Partographs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Section D: Interviewer's Observations on completion of Questionnaire**

149. Result Codes

- Completed
- Respondent not available
- Refused
- Partially completed
- Other (specify)

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# Appendix I: Questionnaire for Women



94654

Questionnaire ID

## RESEARCH PURPOSE:

This research will be conducted by Tannia F. Tembo, a post-graduate student at the University of Zambia in the Department of Public Health. You have been selected to participate in this research study about signal function for emergency obstetric care because you have experienced an obstetric complication. The information we collect will help us evaluate signal functions as interventions for maternal mortality reduction. We will assess the availability, accessibility, usability and quality signal functions, and their use in private and public facilities.

We would like you to answer a few questions that will take no more than 30 minutes. Please note that your responses are strictly confidential. You are not required to indicate your name on this questionnaire. We will use a unique identifier to identify you.

## Section A: Facility Information

**Instruction:** Please put a tick (✓) or cross (X) in the box to correspond to respondent's answer.

Health facility name:

Name of interviewer:

## Section B: Demographic Information

1. Who is the respondent?

Woman with complication     Women's mother/ father     Other (Specify)   
 Husband/ Partner     Woman's child

2. How old are you?

15 - 19yrs     35 - 39yrs  
 20 - 24yrs     40 - 44yrs  
 25 - 29yrs     45 - 49yrs  
 30 - 34yrs     Other (Specify)

3. What is your highest level of education?

None     Primary     Secondary     College

4. What is your marital status?

Single     Divorced/Separated  
 Married/Cohabiting     Widowed

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64854

Questionnaire ID

15. Did you require a caesarean section?

Yes  No

16. If yes to Q 15, how much did it cost?

k

17. What medication did you get for the complication? (You can select more than one)

- |  |  |
|--|--|
| <input type="checkbox"/> Antibiotics (Amoxicillin, Ampicillin, Gentamicin, Metronidazole)    | <input type="checkbox"/> Analgesics (Asprin, Paracetamol, Pethidine)                 |
| <input type="checkbox"/> Antihypertensive (Hydralazine, Methyldopa, Nifedipine)              | <input type="checkbox"/> Tocolytics (Salbutamol)                                     |
| <input type="checkbox"/> Anticonvulsants (Magnesium Sulphate (injection 50%))                | <input type="checkbox"/> Steroids (Dexamethasone and Prednisolone (injection))       |
| <input type="checkbox"/> Oxytocics and prostaglandins  | <input type="checkbox"/> Fluids (Dextrose, Glucose, Normal Saline, Ringer's Lactate) |
| <input type="checkbox"/> Drugs for emergencies (Adrenaline, Atropine, Lasix, Hydrocortisone) | <input type="checkbox"/> Antimalarials (Coartem, Quinine)                            |
| <input type="checkbox"/> Anesthetics (Lignocaine/ Lidocaine)                                 | <input type="checkbox"/> Antiretrovirals (ARVssd-NVP, AZT/ 3TC, Cotrimoxazole)       |

**Section D: Information on Referral**

18. Were you referred from another facility?

Yes  No

19. What is the name of the facility you were referred from? (Name of facility)

20. What is the type of facility you were referred from?

- |  |   |
|--|---|
| <input type="checkbox"/> Government hospital | <input type="checkbox"/> Health post                          |
| <input type="checkbox"/> Private hospital    | <input type="checkbox"/> Self-referral (directly from home)   |
| <input type="checkbox"/> Health centre       | <input type="checkbox"/> Other (Specify) <input type="text"/> |

21. Who did the referral?

- |   |   |
|---|---|
| <input type="checkbox"/> Self-referral (directly from home) | <input type="checkbox"/> Nurse/ midwife                       |
| <input type="checkbox"/> Doctor                             | <input type="checkbox"/> Other (Specify) <input type="text"/> |

22. What mode of transport did you use to reach the health facility (You can select more than one mode)

- |   |   |
|---|---|
| <input type="checkbox"/> Private vehicle    | <input type="checkbox"/> Walked                               |
| <input type="checkbox"/> Government vehicle | <input type="checkbox"/> Other (Specify) <input type="text"/> |
| <input type="checkbox"/> Ambulance          |   |

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64854

Questionnaire ID

23. What was the cost of transport from your home to the facility?

- Below K20.00     
  K20.00 - K100.00     
  Above K100.00

**Section E: Information on Delivery**

24. Where did you deliver?

- |   |   |
|---|---|
| <input type="checkbox"/> Not applicable (No delivery) | <input type="checkbox"/> Enroute                              |
| <input type="checkbox"/> Government hospital          | <input type="checkbox"/> Home                                 |
| <input type="checkbox"/> Private hospital             | <input type="checkbox"/> Other (Specify) <input type="text"/> |
| <input type="checkbox"/> Health centre                |   |

25. How did you deliver?

- |  |   |
|--|---|
| <input type="checkbox"/> Not applicable (No delivery)          | <input type="checkbox"/> Forceps                              |
| <input type="checkbox"/> Spontaneous Vaginal delivery (Normal) | <input type="checkbox"/> Vacuum extraction                    |
| <input type="checkbox"/> C-Section                             | <input type="checkbox"/> Other (Specify) <input type="text"/> |

26. Maternal outcome

- |  |  |
|--|--|
| <input type="checkbox"/> Referred                  | <input type="checkbox"/> Absconded       |
| <input type="checkbox"/> Discharged                | <input type="checkbox"/> Died (hospital) |
| <input type="checkbox"/> Discharged against advice | <input type="checkbox"/> Unknown         |

27. Fetal outcome

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> Not applicable | <input type="checkbox"/> Died    |
| <input type="checkbox"/> Alive          | <input type="checkbox"/> Unknown |

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# Appendix J: Health Case Summary Form

## HEALTH FACILITY CASE SUMMARY FORM

Name of Health Facility: \_\_\_\_\_

Health Facility Code: \_\_\_\_\_

Name of Data Collector: \_\_\_\_\_

Instructions: Please review admission, labour and delivery registers to collect information for this form. Count tallies and insert totals per month here.

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Year's Total
<b>Process Indicator</b>													
Number of Obstetric Admissions													
Number of Deliveries													
Number of Caesarean Sections													
Macerated Stillbirths													
Fresh Stillbirths													
<b>Maternal Deaths - Direct Causes</b>													
APH/PPH													
Obstructed/ Prolonged Labour													
Ruptured Uterus													
Postpartum Sepsis													
Pre-eclampsia/Eclampsia													
Induced/Septic Abortion													
Ectopic Pregnancy													
Other (Specify)													
<b>Maternal Deaths - Indirect Causes</b>													
Malaria													
HIV/AIDS													
Anaemia													
TB													
Hepatitis													
Other (Specify)													
<b>Obstetric Complication (Treated)-Direct Causes</b>													
Antepartum Heamorrhage													
Post Partum Heamorrhage													
Obstructed/ Prolonged Labour													
Ruptured Uterus													
Post Partum Sepsis													
Pre-eclampsia/Eclampsia													
Complications of abortion													
Ectopic Pregnancy													
Other (Specify-Retained Placenta)													
<b>Obstetric Complication (Treated)-Indirect Causes</b>													
Malaria													
HIV/AIDS													
Anaemia													
TB													
Hepatitis													
Other (Specify)													
<b>Obstetric Complication (Untreated-Referrals)-Direct Causes</b>													
Antepartum Heamorrhage													
Post Partum Heamorrhage													
Obstructed/ Prolonged Labour													
Ruptured Uterus													
Post Partum Sepsis													
Pre-eclampsia/Eclampsia													
Complications of abortion													
Ectopic Pregnancy													
Other (Specify)													
<b>Obstetric Complication (Untreated-Referrals)-Indirect Causes</b>													
Malaria													
HIV/AIDS													
Anaemia													
TB													
Hepatitis													
Other (Specify)													

