RELATIONSHIP BETWEEN PLACE OF REFERRAL AND BIRTH OUTCOMES AMONG WOMEN WITH OBSTETRIC EMERGENCIES AT TENWEK HOSPITAL IN BOMET COUNTY, KENYA

BY

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A Thesis Submitted to the School of Medicine in Partial Fulfillment for the award of the Degree of Master of Medicine in Family Medicine at Moi University.

DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented for award of a degree in any other University. No part of this thesis may be produced without a prior written permission of the author and/or Moi University.

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Declaration by the Supervisors

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DEDICATION

I dedicate this thesis to my wife Ebby Jepchoge, our sons, Camillus and Peter, my mother Trudea and my late father Joseph Juma.

ABSTRACT

Background: Effective and timely maternal referral is important in obstetric emergencies since most pregnancy complications are unpredictable and progress rapidly to become life threatening. One of the aims of the Kenya Essential Package of Health is provision of adequate and timely referral system, basic and comprehensive emergency obstetric care to pregnant women and their newborns. Timely recognition of obstetric complications and management is crucial in reducing adverse obstetric outcomes. The study was carried out to determine outcomes among self-referred and facility referred women requiring emergency obstetric care.

Objective: To determine maternal and perinatal outcomes among women with obstetric emergencies referred to Tenwek Hospital in Bomet County.

Study design and Methodology: Cross-sectional study of 200 mothers who presented with obstetric emergencies in labour or within 24 hours postpartum. Approval was sought from MTRH/Moi University Institutional Research and Ethics Committee and Tenwek Hospital Research Committee. Datawere collected using interviewer administered questionnaire and review of medical records and summarized using descriptive statistics. Chi-square test was used to compare the maternal and perinatal outcomes in facility and self-referred patients, and in those appropriately and inappropriately referred women. A p value of < 0. 05 was considered statistically significant.

Results: We recruited 200 women who presented with obstetric emergencies in labour or within 24 hours postpartum during the study period. The mean age of participants was 27.7 years (SD ± 11.2) with 50% having had at least 4 antenatal clinic visits. Most of the participants (59%) were self-referrals with 41% having been referred from health facilities. Lack of medical supplies and appropriate health personnel were the main reasons for health facility referral (95.1%). Majority of the women were escorted by relatives (83.5%) and used public means for transport (85%). Only 8% of the participants used ambulance for referral. Sixty eight percent of the women had normal outcomes and normal perinatal outcomes were 109(54.5 %). Thirty two percent of referred mothers had adverse outcomes that included severe postpartum hemorrhage, and complications arising from eclampsia. Adverse perinatal outcomes included neonatal morbidity (30.7%), stillbirths (13.2%) and neonatal mortality (1.6%). Those who were appropriately referred had higher proportion of abnormal maternal outcomes (48.8%) compared to those inappropriately referred ($\chi2$=7.137, p=0.008). Place of referral was not associated with adverse maternal outcomes ($\chi2$ = 1.405, p=0.236). Perinatal outcomes were not significantly associated with place of referral ($\chi2$ = 2.256, p = 0.132) or appropriateness of the referral ($\chi2$=0.436, p=0.509).

Conclusion: Lack of medical supplies and skilled birth attendants remain key reasons for referral. Most of the women and neonates had normal outcomes. Women who were appropriately referred due to obstetric emergencies had significant adverse maternal outcomes compared to those who were inappropriately referred.

Recommendation: Ensure provision of essential medical equipment and supplies and provision of health personnel to lower tiers of care as per the norms and standards.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANC: Antenatal Clinic

BEmOC: Basic Emergency Obstetric Care

CDC: Centre for Disease Control and Prevention

CEmOC: Comprehensive Emergency Obstetric Care

EmOC: Emergency Obstetric Care

FGM: Female Genital Mutilation

HIV/AIDS: Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

IREC: Institutional Research and Ethics Committee

KDHS: Kenya Demographic and Health Survey

KEMRI: Kenya Medical Research Institute

KEPH: Kenya Essential Package of Health

KNBS: Kenya National Bureau of Statistics

KNRHS: Kenya National Reproductive Health Strategy

MDGs: Millennium Development Goals

MMR: Maternal Mortality Ratio

NHSSP II: National Health Sector Strategic Plan II.

SARAM Report: Kenya Service Availability and Readiness Assessment Mapping report

SBAs: Skilled Birth Attendants

TBAs: Traditional Birth Attendants

USAID: United States Agency for International Development

WHO: World Health Organization

OPERATIONAL DEFINITION OF KEY TERMS

1. **Adverse maternal outcomes:** Refers to women who suffered severe life threatening complication requiring admission to HDU/ICU or having more than two units of blood transfusion. It also includes maternal deaths.
2. **Adverse perinatal outcomes:** Includes stillbirths, neonatal morbidity requiring admission to newborn care unit, and early neonatal mortality. We excluded abortion.
3. **Appropriate referrals:** Women who were appropriately referred included those whose referral process met all the referral components: they used ambulance for referral, telephone contact was made, were accompanied by a nurse/midwife, had a referral note and they received treatment before being referred; and those who were self-referred and came from a radius of 5 km or less.
4. **Birth outcome:** These are results of conception and ensuing pregnancy, including live birth, stillbirth, and miscarriage/abortion, maternal and neonatal complications.
5. **Emergency Obstetric Referral:** Referral of pregnant or postnatal mothers with life threatening conditions including but not limited to, obstructed labour, hemorrhage, preeclampsia/eclampsia and puerperal sepsis. Referral is mainly from lower level to higher level health facility.
6. **Facility referral:** These are emergency obstetric referrals coming directly from health facilities including dispensaries, health centers, nursing homes, sub- district and district hospitals.
7. **Inappropriate referrals:** According to the Kenya Health Sector Referral Implementation Guidelines 2014, inappropriate referrals are those referrals that

incorrectly designate destination or necessity or that lack quality of communication, completed referral forms or accompanying documentation. We included 'self-referrals' from places of radius of more than 5 km.

8. **Kenya Vision 2030:** Is the country's new development blue print covering the period 2008 to 2030. It aims at making Kenya a newly industrializing, "middle income country providing high quality life for all its citizens by the year 2030". The vision is based on three "pillars" namely the economic pillar, the social pillar and the spiritual pillar.
9. **Maternal Morbidity**: Medical complications in a woman caused by pregnancy, labour or delivery. Includes obstetric fistula, anemia, infertility, damaged pelvic structures, and depression.
10. **Maternal Mortality**: Is the death of a woman while pregnant or within 42 days after termination of gestation, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not form accidental or incidental causes.
11. **Neonatal Morbidity**: Medical complications affecting the live born infant. Includes birth asphyxia, neonatal jaundice, and sepsis.
12. **Neonatal Mortality**: Is the death of a young, live born infant; classified as: early neonatal death, death of a live born infant occurring fewer than 7 completed days from the time of birth; late neonatal death, death of live born infant occurring after 7 completed days but before 28 completed days.
13. **Obstetric Outcomes:** These are results of conception and ensuing pregnancy, including live birth, stillbirths, and miscarriage/abortion, maternal and neonatal complications.

14. **Perinatal Mortality**: Mortality around the time of birth, conventionally limited to the period from 28 weeks' gestation to 1 week postnatal.
15. **Referral System**: The process through which a primary care provider authorizes a patient to see a specialist or move to higher level of care to receive additional care. It follows the six levels of health service delivery, that is, the community, dispensary, health centers, primary hospitals, secondary hospitals and tertiary hospitals.
16. **Referral**: Is the transfer of a patient from one physician/hospital to another for ongoing management of a specific health problem.
17. **Self-referral**: Women who presented to the hospital without following formal referral channels. Women who presented directly from home with emergency obstetric complication.
18. **Skilled Birth Attendant**: The term '**skilled attendant'** as defined by W.H.O refers exclusively to people with midwifery skills (for example, doctors, midwives, nurses) who have been trained to proficiency in the skills necessary to manage normal deliveries and diagnose, manage or refer complications. Ideally, the skilled attendants live in, and are part of, the community they serve. They must be able to manage normal labour and delivery, recognize the onset of complications, perform essential interventions, start treatment, and supervise the referral of mother and baby for interventions that are beyond their competence or not possible in the particular setting.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Maternal and perinatal morbidity and mortality are significant causes of adverse pregnancy outcomes. Pregnant mothers are at a higher risk of dying during childbirth and thereafter the risk decreases over subsequent days to weeks. Most of the deaths occur around the time of birth, during delivery and immediate postpartum period, with the first 24 hours being the most critical (Chiabi A, Vanessa T, Evelyn M, Seraphin N, Hypolyte S, Virginie T, Pierre-Fernand T, 2014; Lema, 2009; WHO, 2012). In 2015, the World Health Organization (WHO) estimated a global maternal mortality ratio (MMR) of 216 per 100,000 live births, which translated to almost a 44% reduction over a period of 25 years from 1990 since the setting of the Millennium Development Goals (MDGs). Ninety nine percent of these deaths occurred in developing countries, with Sub Saharan Africa (SSA) region alone accounting to for 66% of these deaths (WHO, 2015). These deaths do however mask the magnitude of the challenges that women face during the process of pregnancy and childbirth. For any one maternal death, 100 women develop severe maternal morbidity from life- threatening obstetric complications referred to as near misses (WHO, 2009). According to the WHO (2013), over 15 million women are estimated to develop long term consequences every year due to complications of pregnancy and childbirth.

Pregnancy-related illnesses and complications have significant impact on the outcomes of the foetus and the new-born. In the 2005, over 3.7 million new-borns died in the first 28

days of life with 50% of them dying in the first 24 hours of life(Lawn J. E, Cousens S, and The Lancet Neonatal, & Team, 2005). Furthermore, there were 32 stillbirths per 1000 deliveries, 24 – 37% of them occurring during the intra-partum period, as reported in the subsequent Lancet publication (C. Stanton, J. E. Lawn, H. Rahman & Hill, 2006). Obstetric complications account for upto 58% of stillbirths and early neonatal deaths (Filippi V, Ronsmans C, Campbell OM, Graham WJ, Mills A, Borghi J & M, 2006; Yego et al., 2013).

The major complications accounting for maternal deaths include severe haemorrhage, infections, severe preeclampsia and eclampsia, obstructed labour and abortion related complications (CDC/KEMRI 2007). Haemorrhage and pregnancy induced hypertension are major contributors to maternal deaths in developing countries(McClure E. M., Goldenberg R. L., 2007). The indirect causes which constitute 20% include anaemia, Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndromes (HIV/AIDS), malaria, ectopic pregnancy, embolism and anaesthesia related complications. Most of these complications occur at time of labour and delivery and therefore provision of emergency of emergency obstetric care (EmOC) is important (H. A. O. Afari, 2015). About 75% of maternal deaths can be prevented by timely provision of EmOC services (Paxton. A, Maine D, Freddman L, Fry D, 2005). Access to EmOC services including basic emergency obstetric care (BEmOC) services (parenteral oxytocins, antibiotics, and anticonvulsants; manual extraction of the placenta; removal of retained products of conception); and comprehensive emergency obstetric care (CEmOC) services (basic services plus caesarean sections and blood transfusion) is a key element of the WHO

Making Pregnancy Safer programme (Fournier, Dumont, Tourigny, Dunkley, & Dram, 2009; Weil. O, 1999).

In Kenya, maternal and child health services are integrated in the general health service delivery, and attract key attention since the launch of Safe Motherhood Initiatives in the year 1988 and other global maternal and neonatal health care initiatives aimed at improving maternal and neonatal health. Kenya is among the eighteen countries in SSA, noted to have a very high MMR, estimated at 510 per 100,000 live births(WHO, 2015).

Several strategies have been developed by the Kenyan government to improve maternal and neonatal health. For instance, in 2013, the Government of Kenya developed a policy of free maternal health services, abolishing delivery fees in all public health facilities. .. Women now access delivery services and antenatal care in all public facilities at no cost. In 2014, the First Lady, Mrs Margret Kenyatta launched the Beyond Zero Campaign, an initiative that provides a fully equipped ambulance to each of the 47 county governments in order to conduct outreaches to the remote/ inaccessible communities. It aims at providing ambulatory maternal and neonatal community outreaches and allows skilled birth attendants (SBAs) to conduct deliveries in rural communities in conjunction with County Governments.

The referral system serves as a network that aims at providing continuum of care for both acute and chronic illnesses. This network comprises the four tiers of care namely; the community services, primary health facilities, county referral facilities and national referral facilities as demonstrated in figure 1 below (Gitonga, 2013).

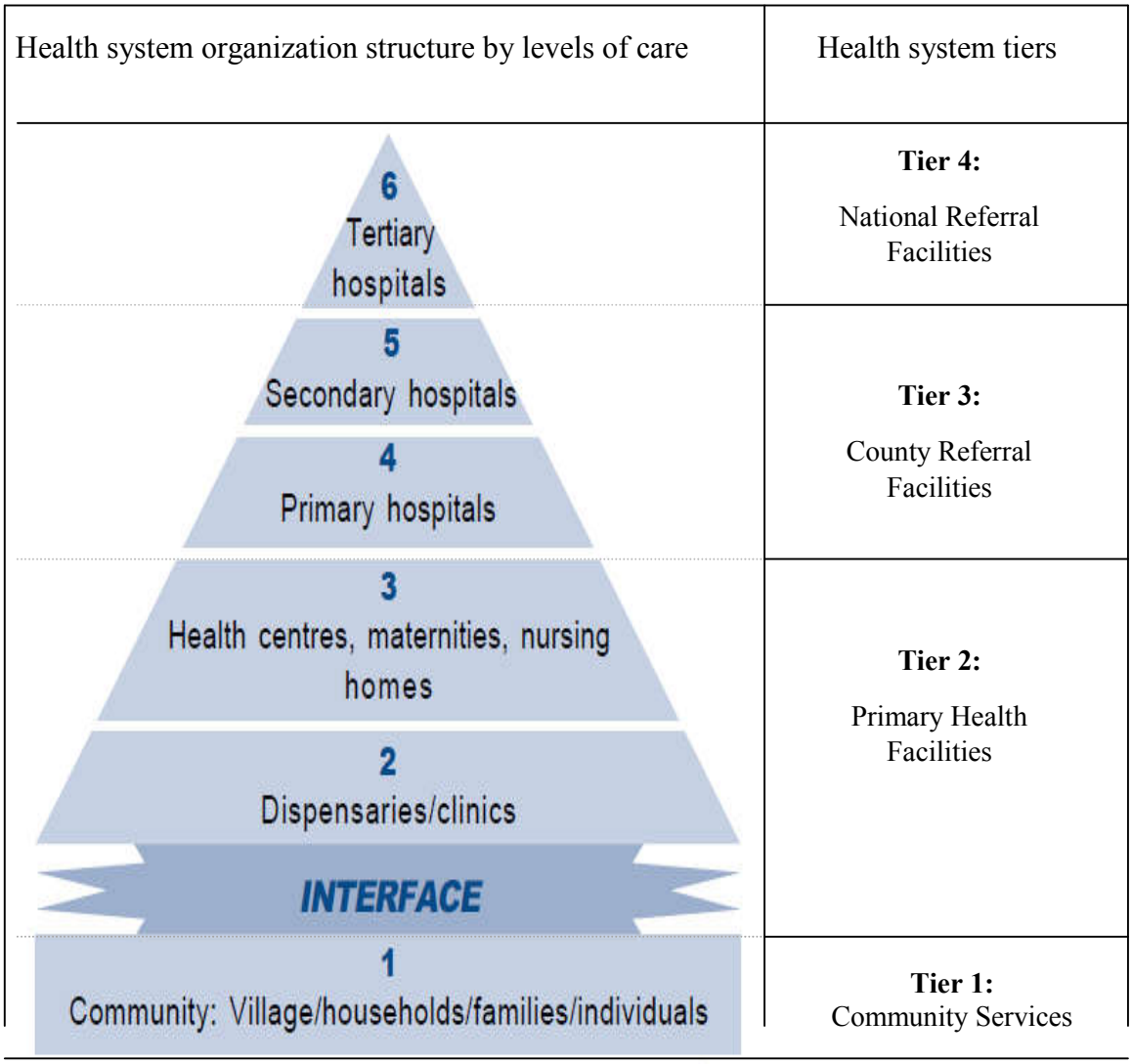

Figure 1: Kenya health care system with four tiers of care compared to the previous six levels of care

Source: GOK/MOH: The State of the Health Referral System in Kenya: Results from a Baseline Study on the Functionality of the Health Referral System in Eight Counties. October 2013

Tier 2 of care should be able to provide BEmOC services, whereas tiers 3 and 4should provide CEmOC to women seeking emergency obstetric care. Due to lack of skilled personnel, adequate equipment and essential medical supplies as well as limited national resources, an effective referral system is required to provide the linkage needed across the different tiers of care as demonstrated in figure 2 below (GOK/MOH, 2014; GOK/MoPHS/MoMS, 2012b; Ministry of Health, 2014)

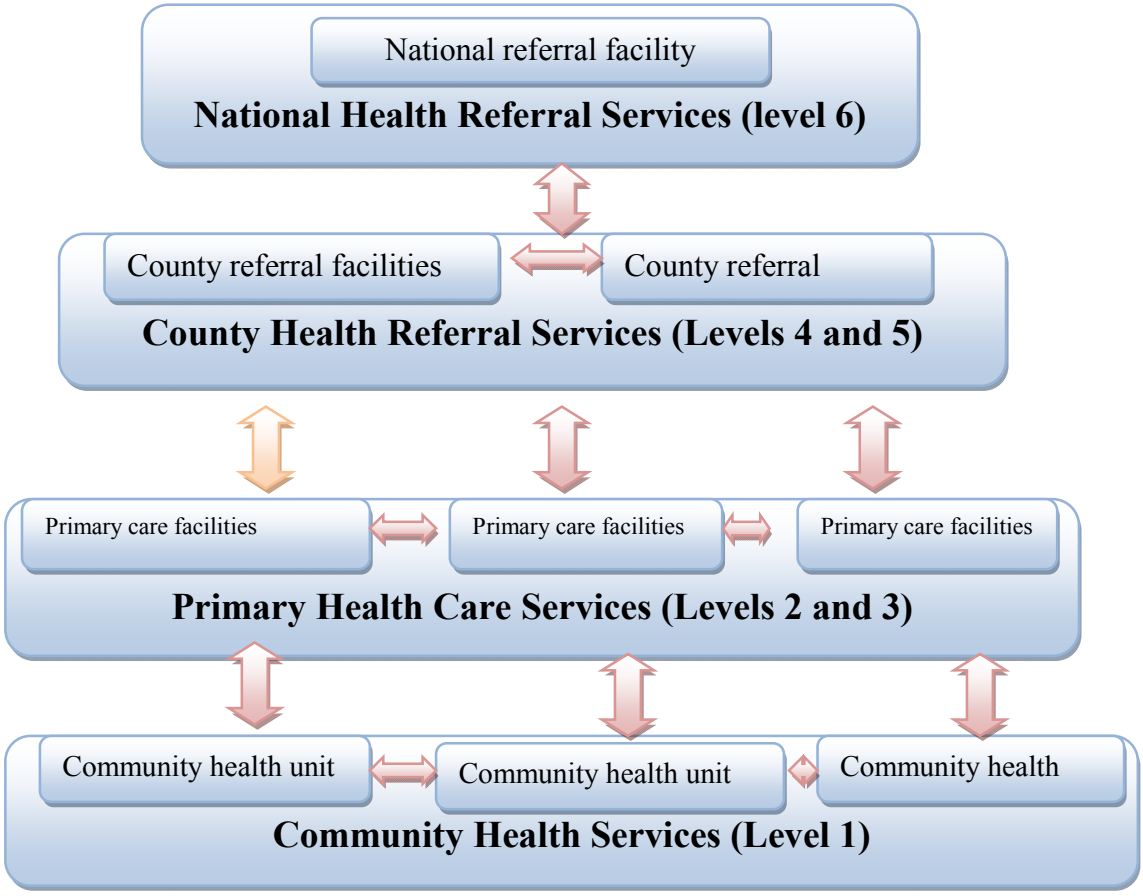

Figure 2: Referral linkage between different levels and tiers of care.

Source: Kenya Health Sector Referral Implementation Guidelines 2014, 1st Edition

In the Kenya Health Sector Strategic and Investment Plan 2012- 2018 (KHSSP 2012-2018), referral system strengthening is one of the seven priority areas under the investment area one of service delivery systems. Some of the critical investment priorities for the referral system outlined are updated referral tools and guidelines at all levels, orientation of the management teams on their referral roles and functions, and tools for referral allowances for expertise movement and fuel for travel (GOK/MoPHS/MoMS, 2012a). According to the Kenya Health Policy 2012 -2030, strengthening the referral system in Kenya will both improve efficiency in the health system and patient outcomes (GOK/MoPHS/MoMS, 2012b).

The current Kenya health referral system is weak, just as it has been observed in other developing countries. This affects the overall performance of the health system and contributes to negative health outcomes (Gitonga, 2013).

Referral of patients from basic to more sophisticated levels of care forms an integral part of the health system(Murray & Pearson, 2006). A better referral between basic and comprehensive obstetric care facilities is important in improving the survival chances of the mother and the baby.

In this research, we describe the birth outcomes of all the referred obstetric emergencies in order to assess the role played by maternal referral system in Kenya. Though no adequate local data is available on the situation in Kenya, policies have identified an effective referral system as a way of increasing access to emergency obstetric care. The Kenya National Reproductive Health Strategy (KNRH 2009-2015) for instance, has

highlighted developing the capacity of referral centers to receive and promptly manage the referrals(GOK/MoPHS/MoMS, 2009).

1.2 Problem Statement

Tenwek Hospital is one of the referral hospitals in Bomet County. Out of a total of 519 women who were referred in 2011, the hospital attended to 68.9% (357) women according to the Bomet County Health Record Office (CHRO). Most of these maternal referrals do not follow proper referral standards and guidelines including, trained health professional accompanying the patient, lack of communication between the referring and referral facilities, patient not being stabilized before being referred, lack of proper referral transportation arrangements and lack of documentation including referral notes. There were many cases of adverse maternal and perinatal outcomes in women who presented at the study site for the first time in labour. These were women who had not attended antenatal clinic visits at Tenwek Hospital. Women who had not attended antenatal clinic at all, or attended at other facilities also presented with obstetric emergencies, bypassing the lower health facilities closer to their homes.

There is limited local data that has assessed the maternal and perinatal outcomes of women with obstetric emergencies who are formally referred and those who are 'self-referred.'

1.3Justification for the Study

The study will assess maternal and perinatal outcomes according to the place of referral in women who were admitted with obstetric emergencies. It will help establish if place of referral plays any role in modifying outcomes in our study population.

The study will also describe the maternal referral process among patient who utilize the formal referral process and therefore will contribute in understanding the integrity of the maternal referral system.

1.3 Research Question

What is the relationship between place of referral and maternal and perinatal outcomes among women admitted with obstetric emergencies at Tenwek Hospital in Bomet County, Kenya?

1.4 Broad Objective

To determine maternal and perinatal outcomes among women with obstetric emergencies referred to Tenwek Hospital in Bomet County, Kenya.

1.5 Specific Objective

1. To determine the socio-demographic and obstetric characteristics among women presenting with obstetric emergencies at Tenwek Hospital.
2. To describe the utilization of the Kenyan Ministry of Health referral components by the women who were referred from the health facilities
3. To describe maternal and perinatal outcomes among women presenting with obstetric emergencies at Tenwek Hospital.
4. To determine the relationship between maternal and perinatal outcomes between women who were ‘self-referred’ and those who were facility referred.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Emergency Obstetric Care

An obstetric emergency/complication is an acute condition that leads to a direct cause of maternal death, such as ante partum or postpartum haemorrhage, obstructed labour, postpartum sepsis, abortion related complications, pre-eclampsia or eclampsia, ectopic pregnancy and ruptured uterus; or indirect causes such as anaemia, malaria, HIV/AIDS and tuberculosis(UNICEF/WHO/UNFPA, 2003). These are also the major causes of severe obstetric complications (Sikder et al., 2011).Obstetric complications are unpredictable and progress rapidly to become severe and life-threatening(H. A. O. Afari, 2015; Hussein, Kanguru, Astin, & Munjanja, 2012). For instance, in a meta-analysis that assessed maternal and perinatal mortality by place of delivery in SSA, it was observed that women with obstetric complications had a higher risk of morbidity and mortality (Chinkhumba, De Allegri, Muula, & Robberstad, 2014).

To address the obstetric complications, it requires the health system to be prepared and respond to these complications when they do arise (WHO, 2003). This is achieved by provision of basic and comprehensive obstetric care services that are offered at different tiers of health care. However to ensure continuity of maternal and neonatal care, tiers of care are inter-linked by the referral system. Maternal referral system, SBA and enabling environment are key elements in ensuring continuity of care of women with obstetric emergencies. In a descriptive cross sectional study that evaluated the components of maternal healthcare delivery that contributed to maternal mortality in Lilongwe District, Malawi. Medical records of 14 maternal deaths that occurred between January and June

2011 were reviewed. Healthcare workers who provided care to the deceased women were also interviewed. They concluded that "skilled birth attendant, enabling environment and referral system are key in maternal healthcare delivery system"(Thorsen, Meguid, Sundby, & Malata, 2014). Therefore, access to appropriate care and prompt referrals to EmOC services could significantly reduce maternal and perinatal morbidity and mortality (C. Ronsmans and W. J. Graham, 2006; Jammeh, Sundby, & Vangen, 2011; Paxton. A, Maine D, Freddman L, Fry D, 2005).

2.2 Maternal Referral System

Effective and timely maternal referral is important in obstetric emergencies since most pregnancy complications are unpredictable. Functional referral system helps prevent maternal and perinatal deaths by ensuring that pregnant women reach appropriate health services when complications arise. A successful maternity referral system has been identified to include: a referral strategy informed by the assessment of population needs and health system capabilities; an adequately resourced referral centre; active collaboration between referral levels and across sectors; formalized communication and transport arrangements; agreed setting-specific protocols for referrer and receiver; supervision and accountability for the providers' performance; affordable service costs; the capacity to monitor effectiveness; and policy support (Murray & Pearson, 2006).

The design and functioning of a referral system in any individual country will be influenced by:

- Health systems determinants: capabilities of lower levels; availability of specialized personnel; training capacity; organizational arrangements; cultural issues, political issues, and traditions,
- General determinants, such as: population size and density; terrain and distances between urban centers; pattern and burden of disease; demand for and ability to pay for referral care (WHO, n.d.).

The Kenya Essential Package of Health six levels of care rationalize the delivery of health services within the health system. The referral strategy provides linkages needed across these different levels of care. The strategy serves as a guide for building effective referral system that responds to the needs of rural and poor populations thereby, contributing to the realization of Vision 2030, and the MDGs (GOK/MoPHS/MoMS, 2012a).

Providers of care should be able to recognize the complications, gauge their severity, provide prompt treatment based on their capacity as defined by the norms and standards for each level of care and refer any clients to a facility where they know adequate treatment is available. Such a referral network aims at improving clients′ access to services, reducing delays to receive required care and avoiding unnecessary delays at point of care.

The Kenya Government through the Ministry of Health has identified the following elements to contribute to effective referral system. They include availability, accessibility and affordability of the services; coordination among the facilities and between providers; relationship including supportive supervision between higher tiers and lower tiers of care; effective communication and transport arrangements; feedback mechanism

in order to track referrals from point of initiation to the point of delivery; and lastly monitoring and quality control of the referral system(WHO/GOK, 2009).

The key components of the upward referral system as highlighted in the Kenya Clinical Management Guidelines Volume III (2009) are implemented as follows; critical evaluation and decision to refer is made, documentation is prepared and must accompany the patient, appropriate communication with respect to referral is made with the receiving health facility and relative, preparation for appropriate transportation is made, an appropriate qualified escort is appointed and a systematic check to ensure that the resuscitation equipment to accompany the patient is available and functioning well. Obstetric emergencies will in addition require a delivery pack.

The utilization of these components in the maternal referral system was used to describe the influence of maternal referral system on maternal and perinatal outcome in women with obstetric emergencies.

2.3Indications for Emergency Obstetric Referral

Indications for maternal referral were varied. According to a Netherland study that was looking at Dutch midwifery practices, it was observed that risk selection, which commonly occurs during antenatal care visits, has been associated with fewer emergency/urgent referrals (Amelink-Verburg et al., 2008). It has also been acknowledged that timely and appropriate obstetric risk selection is still delicate since adverse effects may occur if too few or too many women are referred, or referrals are made too early or too late (Van Weel, Van Der Velden, & Lagro-Janssen, 2009).

In Japanese Red Cross Katsushika Maternity Hospital, forty two percent (42%) of 459 pregnancies that were considered low risk still referred by the midwives to obstetric

centers (Suzuki, 2009). Of these referrals, 39% were due to non-reassuring fetal status, 38% due to failure to progress, 14 % due to >24 hours of premature rupture of membranes at term of more than 24 hours and 9.4% were due to meconium- stained amniotic fluid (Suzuki, 2009). These referral indications were mainly focusing probably to neonatal health conditions.

In study that was evaluating obstetric emergency referral cases at Dr. Cipto Mangunkusumo Hospital, Indonesia noted that postpartum haemorrhage was the commonest indication of referral during third stage (Purnama, Madjid, & Iljanto, 2008).Hypertensive disease were common medical condition leading to referral to higher health facility(Htwe et al., 2011; Nkyekyer, 2000). Nulli-parous and women younger than 20years were more likely to be referred as shown in a study done in Zimbabwe(Majoko, Nyström, Munjanja, & Lindmark, 2005). In addition they noted that women with antenatal referral were more likely to deliver in a hospital (70%) those who had not been referred during antenatal period (18%). Two studies showed that often women were in good general condition at the time of referral indicating that their referral could possibly have been avoided (Nkyekyer, 2000; Ziraba, Mills, Madise, Saliku, & Fotso, 2009a).

Njoroge E. W (2012), in a cross sectional study done, at Kenyatta National Hospital, in order to determine outcome of pregnancy and childbirth of emergency obstetric referrals, recruited 228 participants between May to July 2011. They noted that women who were referred 18.9% had normal labour, followed by ante partum haemorrhage at 13.2%.

2.4 Reasons for Emergency Obstetric Referral

Health system delivery has been highlighted as the main reason leading to women being referred from one tier of care to the other. This ranges from lack of adequate personnel, medical equipment and supplies(GOK/MOH, 2014).

2.5 Obstetric Outcomes in Emergency Obstetric Referral.

Maternal referral system is a key strategy in reduction of adverse obstetric outcomes as a result of obstetric emergencies if recognized in a timely manner and managed appropriately. However the outcomes of obstetric emergency referrals are conflicting (H. A. O. Afari, 2015). Most of the studies have indicated that obstetric emergency referral leads to improvement in quality of care, higher compliance, reduction in mortality and morbidity (Fournier et al., 2009; Jammeh et al., 2011; Strand, de Campos, Paulsson, de Oliveira, & Bergström, 2009). For instance, Fournier et al., (2009) in a study conducted in rural Mali to evaluate the effect of a national referral system in reducing maternal mortality rates through improving access to quality emergency obstetric care. They recorded all obstetric emergencies, major obstetric interventions and maternal deaths during a 4 year observation period (1 January 2003 to 30 November 2006); the year prior to the intervention; the year of the intervention and 1 and 2 years after the intervention. In their findings, they noted that maternal mortality rates decreased among women referred for emergency obstetric care than those who presented without referral.

In other studies the effect of referral system could not be ascertain. Hussein et al., (2012) conducted a study in South Asian Settings to assess the effects of referral interventions that enable pregnant women to reach health facilities during an emergency, after the decision to seek care is made. Bibliographic databases were searched with no date or

language restrictions. Randomized controlled trails and quasi experimental study designs with comparison groups were included. They concluded that "community mobilization interventions may reduce neonatal mortality but the contribution of referral components cannot be ascertained"

At the same time, some studies have shown adverse outcomes in women who are referred. In a case control study that was identifying risk factors associated with maternal mortality in Moi Teaching and Referral Hospital (MTRH), in Kenya. Manual review of medical records of 150 maternal deaths and 300 controls was undertaken between January 2004 and March 2011. They observed that women who had maternal mortality were twice likely to have been referred to MTRH as compared to the controls (Yego, D'Este, Byles, Williams, & Nyongesa, 2014).

2.6 Maternal Referral Challenges

Transport and communication are the main challenge affecting referrals. Most women use public or private (including walking) means of transport to reach the referred centre. This was estimated at 72.7% and 56% in Ghana and Kenya respectively (Nkyekyer, 2000; Ziraba et al., 2009). Afari et al., (2014), conducted a qualitative study that was aimed at describing health care worker-identified system based bottlenecks and the value of local engagement in designing strategies to improve referral processes related to emergency obstetric care in Assin North, Ghana. Semi-structured interviews of 18 healthcare worker participants (8 midwives, 4 community health officers, 3 medical assistants, 2 emergency room nurses and 1 doctor) were performed. They gaps identified in the referral processes included recognizing danger signs, alerting the receiving units, accompanying critically ill patients, documenting referral cases and giving and obtaining

feedback on referral causes. They the main root causes of these gaps as identified by the healthcare workers were transportation, communication, clinical skills and management, and standards of care and monitoring (H. Afari, Hirschhorn, Michaelis, Barker, & Sodzi-Tettey, 2014). It is therefore important to address these gaps inorder to have an effective maternal referral system.

2.7 Conceptual Framework

The following factors were conceptualized to directly or indirectly affect maternal and perinatal outcomes in women with obstetric emergency that presented at Tenwek Hospital. They formed the basis of data collection in assessing birth outcomes among the referred mothers with obstetric emergencies. They included:

1. Regulations: As captured in KHSSP 2012 - 2018, KHP 2012- 2030
2. Socio-economic status of the women: Ensures accesses to EOCs, affordability and decision making.
3. Human resources: Availability of adequate and skilled health personnel
4. Protocols: At the time of study, there was no referral guidelines/policy. However referral procedures were highlighted in various MOH clinical guidelines(GOK/WHO, 2009).
5. Health systems: Access to medical infrastructure, equipment and supplies. Inter facility communication and emergency transportation.
6. Health facility: Facility coverage of signal functions either BEmOC and/or CEmOC.

7. A woman's perceived preference in the choice of health facility.

These factors are illustrated in figure 3 of the modified conceptual framework as adopted from Graham and Bell (Graham, W., & Bell, 2000).

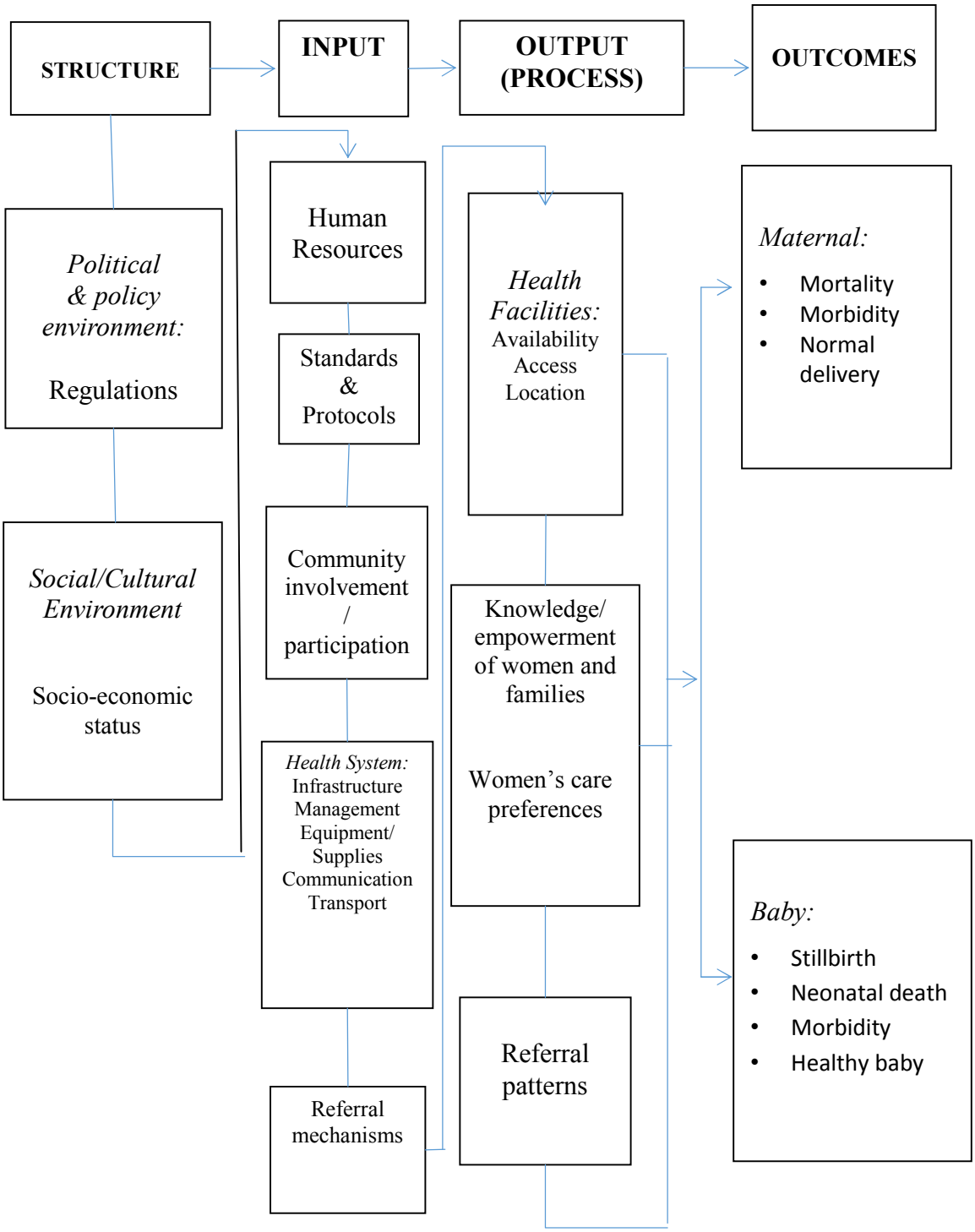

Figure 3: Modified Conceptual Framework

Source: Graham, W., & Bell, J. (2000). Monitoring and evaluating skilled attendance at delivery: trials and tribulations. Bulletin of the World Health Organization.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

Bomet County is one of the 47 counties in Kenya, located in the South Rift region, with Bomet town as the headquarters. It has an estimated population of 724,186 (Kenya National Census Report, 2009) with an area of 1,882 km². It is in the highland area and the rainfall favors agriculture which is the main socioeconomic activity. Agricultural activities include tea and maize farming, horticulture and cattle rearing.

The County has 86 health facilities (Kenya National Census Report, 2009) with 11 Health Centers, 2 Sub County Hospitals, County Referral Hospital (Longisa) and two Faith Based Hospitals (Tenwek and Kaplong). Tenwek Hospital is the main referral hospital in the region. It also serves neighboring counties of Narok, Kericho and Kisii. It is a 300bed Christian mission hospital offering surgical and orthopeadic, medical, maternity and pediatric services. It offers all the comprehensive emergency obstetric care (CEmOC) components in addition to intensive neonatal and newborn care. The maternity unit contains 72 beds, 3 delivery couches and an operating room and diagnostic equipment including ultrasound and cardiotocography (CTG). The newborn unit attends to an average of 40 newborns per day. The unit conducts over 3000 spontaneous vaginal deliveries and over 700 caesarean sections (primarily emergent) per year. In the year 2011, the hospital attended to 357 obstetric emergencies that presented as referrals. The unit has a team composed of an obstetrician, and/or pediatricians, medical officer,

surgical and family medicine residents on rotational basis, medical officer interns, clinical officer interns and midwifes/nurses.

Women of reproductive age in Bomet County are estimated at 27% of the total population and 45% of the female population (Kenya National Census Report, 2009). As per the Kenya Service Availability and Readiness Assessment Mapping (SARAM) report of 2013, the county's health facility is estimated to have 1.1 per 10,000 populations, health staff estimated at 8 per 10,000 population and ambulance services estimated at 0.4 per 100,000 populations(GOK, 2014).

3.2 Study Population

These included women admitted with obstetric emergencies/complications from home or other health facilities during labour or within the first 24 hours post-partum.

3.3 Study Design

This was a cross sectional study of women who presented with obstetric emergencies at Tenwek Hospital maternity Unit between June to December 2013.

3.4 Sample Size Determination

Sample size was estimated using Fischer's formula:

$$n = \frac{Z_{\alpha/2}{}^2 \times p(1-p)}{d^2}$$

Where;

n = anticipated sample size

$Z_{\alpha/2} = 1.96$, standard normal variate

$p =$ Estimated proportion of patient with adverse maternal outcomes. In a study done in Mbarara Regional Referral Hospital, they observed 15.4% adverse maternal outcomes among women who were referred with obstetric emergencies(Emeche, 2010).We adopted this proportion as our *p* in this study.

$d =$ Margin of error at 5% (standard value of 0.05)

$$n = \frac{1.96^2 \times 0.154 \times 0.846}{0.05^2}$$

$$n = \frac{0.50049}{0.0025}$$

$n =$ **200** participants

3.5 Sampling Technique

Consecutive sampling technique was used in selecting patients in to the study. Women who presented with obstetric complications intra-partum or immediate postpartum during the study period and fulfilled the inclusion criteria were consecutively sampled until a sample size of 200 subjects was achieved.

3.5.1 Inclusion Criteria

Women presenting in labour or immediate postpartum (within 24hrs) with obstetric complications/emergencies were recruited in the study. These obstetric complications included antepartum and postpartum haemorrhage, severe preeclampsia and eclampsia, obstructed labour, postpartum sepsis, abortion related complications, ectopic pregnancy and premature rupture of membranes.

3.5.2 Exclusion Criteria

Non-emergency obstetric referrals, elective obstetric admissions, admissions occurring after 24 hours post-partum. Referrals outside Bomet County were excluded from the study to ensure delays associated with distance travelled do not have effect on outcomes during analysis.

3.6 Data Collection Techniques

Upon arrival, eligible patients were identified in the Maternity Labour Ward by the principal investigator and two research assistants.

Assessment was done through history taking and physical examination. Laboratory tests including antenatal profiles and ultrasound investigations were requested on patient to patient basis. All patients requiring resuscitation were managed appropriately.

Eligible patients were enrolled and informed consent was obtained. For those women who were not able to consent, due to the critical condition on admission, surrogate consent was obtained from the relative. Patients meeting the inclusion criteria were recruited consecutively. It was practical to interview women with obstetric emergencies and/or their surrogates, since obtaining this information from purely medical record reviews would have been difficult due to poor record keeping including incomplete documentation. This also allowed inclusion of women who may have delivered in other facilities and presented with postpartum complications. These women would have otherwise been missed since they are not routinely recorded in the maternity register.

The socio-demographic profiles (age, parity, level of education, marital status, distance travelled), referral characteristics (place of referral, mode of transport, pre-transfer care,

accompanying personnel, communication to the receiving facility/study site, form of documentation the patient had, reasons for referrals), diagnosis at admission and indications for referral were recorded in a pretested coded questionnaire. The patients then underwent management and clinical care as per the clinical condition and according to hospital guidelines.

Patients were then followed up and outcomes of interest were obtained after 24 hours. The information on the mode of delivery, and the maternal and perinatal outcomes were extracted from the patient case notes after 24 hours. Mother-baby booklet was used to extract referral information (some facility used the book for referral documentation), and to collaborate the gestation age. The following diagramsummarizes the data collection procedure.

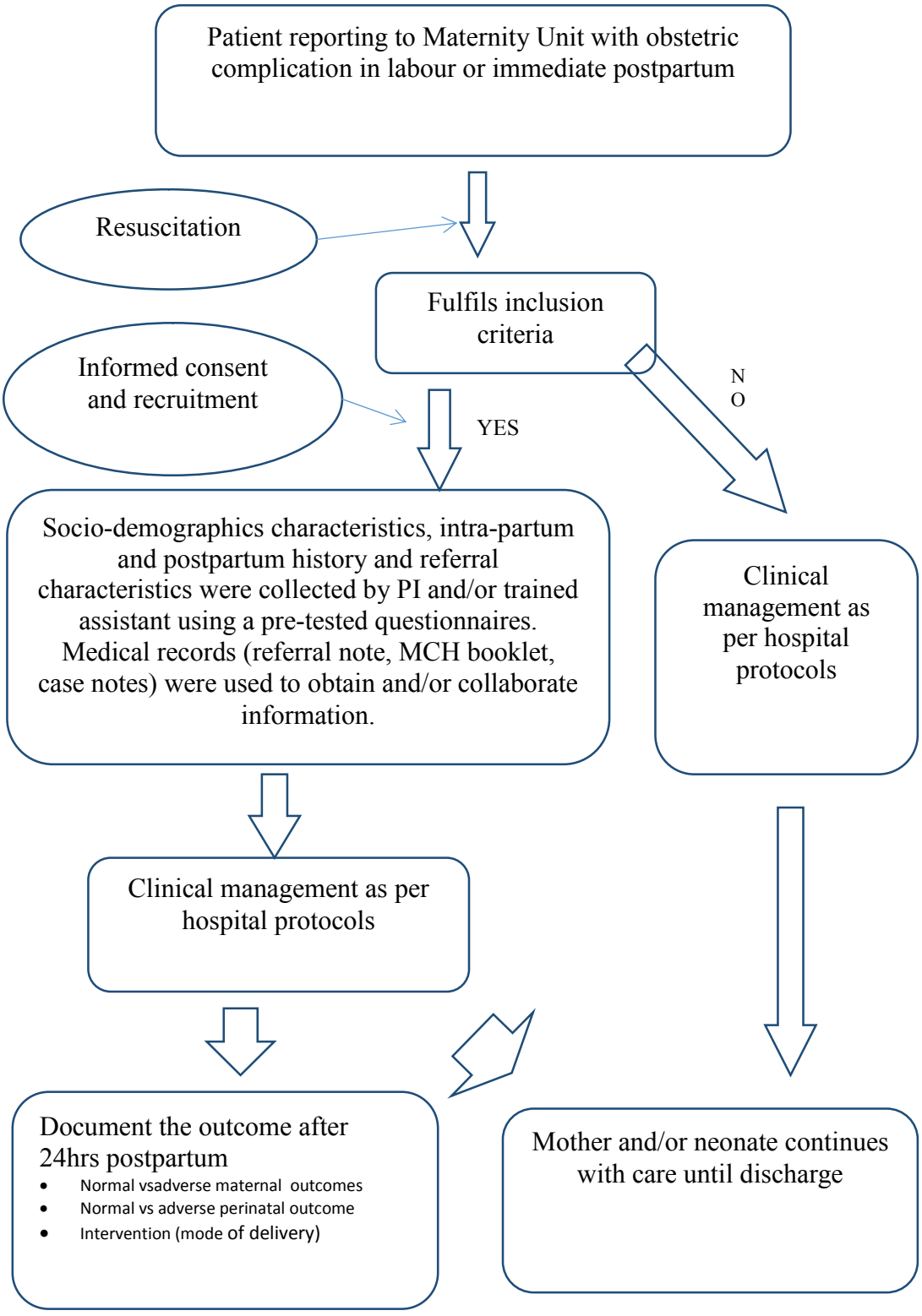

Figure 4: Schematic diagram on data collection process

3.7 Data Processing and Analysis

Questionnaires were checked for completeness in the data sets and cleaned. It was entered into Microsoft Excel spreadsheet and stored in a secured file under the custody of the principal investigator. A new variable for inappropriate and appropriate referral was created. Microsoft Excel spreadsheet were then imported to Statistical Package for Social Scientist version 20 (SPSS v. 20) for analysis.

Data were summarized using descriptive statistics. For both categorical and continuous variables, parametric and non-parametric statistics were used as appropriate. Data were presented in form of frequency tables, bar graphs and pie-charts. Chi-squaretest was used to compare the maternal and perinatal outcomes in facility and self-referred patients, and in those appropriately and inappropriately referred. Those with a $p< 0.05$ were considered statistically significant.

3.8 Ethical Considerations

The study was carried out after approval from the Institutional Research and Ethics Committee (IREC) of Moi University and Moi Teaching and Referral Hospital, and Tenwek Hospital Research and Ethics Committee. Recruited mothers signed an informed written consent and coding of questionnaire was used to ensure confidentiality of participants. Patients were interviewed in a screened room/hospital bed in order to ensure privacy.

3.9 Study Limitation

The findings of this study may not be generalized due to the non-probabilistic sampling technique used.

Being a cross- sectional study, we were not able to fully address the integrity of the maternal referral system due to the fact that causal relationship could not be established between the referral system and the maternal and/or perinatal outcomes.

CHAPTER FOUR

4.0 RESULTS

4.1 Overview

This chapter highlights the key findings on the study on the relationship between place of referral and birth outcomes among women who were admitted with obstetric emergencies at Tenwek Hospital Maternity Unit, between 1st June and 31st December 2013. During the study period there were 1724 total births. Two hundred women with obstetric emergency referrals met the inclusion criteria and were enrolled in the study.

4.2. Socio-demographic and Obstetric Characteristics

4.2.1 Socio-demographic Characteristics

The mean age among study subjects in this population was 27.7(SD = 11.2) [table 1]. The majority were married 175(87.5%) and over 50% had secondary or higher level of education. Majority (64.5%) were housewives and about 20.5% (41) were in a formal employment. Most of the women were referred from places less than 20km away (66.0%) with a median of 15km (1QR 8, 30), and 53.0% spent on average ksh 200 (IQR 80, 1000) on travel to the referral facility.

Table 1: Frequency distribution of socio-demographic characteristics of respondents

Characteristics	Study Participant Distribution (n=200)	
Number	**Percentage**	
Age group (years)		
16 – 20	42	21.0
21 – 25	52	26.0
26 – 30	53	26.5
31 – 35	26	13.0
≥ 36	27	13.7
Mean age (±)	**27.7 ± 11.2**	
Highest education attained		
Primary or less	90	45
Secondary	67	33.5
Tertiary	43	21.5
Distance to referral site (km)		
0 – 5	35	17.5
6 – 20	98	49.0
21 – 35	21	10.5
36 – 50	27	13.5
≥ 51	19	9.5
Median	**15 (IQR 8, 30)**	
Cost of transport to referral site (ksh)		
0 – 200	106	53.0
201 – 400	20	10.0
401 – 600	13	6.5
601 – 800	6	3.0
801 – 1000	7	3.5
> 1001	48	24.0
Median	**200 (IQR 80, 1000)**	
Time taken to reach referral site after a referral decision was made (n= 177)*		
1	47	26.6
2	41	23.2
3	28	15.8
4	22	12.4
5	39	22.0

* 23 of the participants could not recall the time that the referral decision was made.

4.2.2 Obstetric Characteristics

Table 2shows that median gravidity was 3 (IQR 1, 4) with a median parity of 1 (IQR 0, 3). Fifty percent (50%) of women had at least four or more antenatal clinic visits in the index pregnancy with 57.2% having a gestation of thirty seven completed weeks.

Table 2: Frequency distribution of obstetric profiles for the participants

Characteristics	**Study Participant Distribution (n= 200)**
Number	**Percentage**
Parity	
Nulli-parous	**71** **35.5**
Primi-parous	**35** **17.5**
Multi-parous	**77** **38.5**
Grand multi-parous	**17** **8.5**
Median	**1 (IQR 0, 3)**
Gravidity	
1 -2	98 49.0
3-5	79 39.0
≥ 6	23 11.5
Median	**3 (IQR 1, 4)**
Number of ANC visits	
None	25 12.5
One	14 7.0
Two	25 12.5
Three	36 18.0
Four or more	100 50.0
Mean (± SD)	**3.5 ± 2.2**
Gestation age in weeks	
< 27	28 14.0
28 – 32	15 7.5
33 – 36	42 21.0
37 – 41.5	85 42.5
≥ 42 30	15.0

4.3 Referral Characteristics

4.3.1 Diagnosis made at admission

The most common diagnosis made at admission was obstructed and/or prolonged labour (23.0%) followed by severe pre-eclampsia/eclampsia (16.0 %). Malpresentation (12.0%), post-partrtum haemorrhage (8.0%) and ante-partum haemorrhage (7.0 %) were also among the top five common diagnoses made on admission (table 3).

Table 3: Diagnosis made on admission by women with obstetric emergencies

Diagnosis on admission Study Participants (n = 200)		
Number	**Percentage**	
Obstructed labour/prolonged labour	47	23.0
Severe pre-eclampsia /Eclampsia	33	16.0
Malpresentation	24	12.0
Postpartum haemorrhage	16	8.0
Ante-partum haemorrhage	14	7.0
Non reassuring fetal status	10	5.0
Intra-uterine fetal demise	10	5.0
Pre-term labour in active phase*	10	5.0
Abortion related complication	8	4.0
Prolonged rupture of membranes (> 18 hrs)*	8	4.0
Previous scar in active labour**	8	4.0
Ruptured ectopic pregnancy	5	3.0
Puerperal sepsis	3	2.0
Severe anemia	2	1.0
Cardiac disease in labour***	2	1.0

*Preterm labour and prolonged rupture of membranes are associated with significant perinantal mortality and morbidity.

** Previous scar active labour is associated with high risk of ruptured uterus and perinatal mortality.

*** Cardiac disease in pregnancy and labour is associated with high risk of maternal mortality

4.3.2 Utilization of the Referral Components

Forty one percent (82) of the women who were admitted with obstetric emergencies were referrals from health facilities. Most of the referrals (69.5%) were from tier 2 of care, with 30.5 % being referrals from tier 3 of care. As shown in table 4, majority of women who were referred from the health facility were accompanied by relatives (78%). They either used public means of transport (31.7%) or hired a taxi (40.2%). Fifty two point five percent (52.5%) had formal referral note, and 31.7 % of these women received treatment before they were referred. Pre-transfer treatment given included intravenous antihypertensive (30%), intravenous antibiotics (22%), intravenous fluids (13%), labour augmentation with oxytocin (9%) and blood transfusion (4%). Lack of medical equipment and supplies, and inadequate personnel at the referring facility were mentioned as reasons for referral for the majority of participants (95.1%).

Table 4: Frequency distribution of Kenya referral components among health facility referrals

Parameters	Study Participants who were Health facility referrals (n= 82)	
	Number	**Percentage**
Mode of transport		
Ambulance	16	19.5
Boda boda	7	8.5
Matatu	26	32.0
Taxi	33	40.0
Telephone communication		
Yes	12	13.6
No	70	85.4
Person primarily accompanying the patient		
Midwife/nurse	15	18.3
Relative	64	78.0
Unaccompanied	3	3.7
Medical records		
Referral note	43	52.5
Mother Child health Booklet	32	39.0
None	7	8.5
Pre-referral treatment given		
Yes	26	31.7
No	55	67.1
I do not know	1	1.2
Reasons for referral		
Lack of adequate resources*	78	95.1
Preference	4	4.9

* Resources mentioned included lack of theatre, lack of nursery, lack of drugs including Magnesium sulphate ($MgSO_4$), lack of blood for transfusion, lack of appropriate personnel (obstetrician and/or pediatrician).

4.4 Obstetric Outcomes

4.4.1 Maternal outcomes

During the study period, maternal adverse outcomes were at 31.5 % (63) and normal outcomes were at 68.5% (137).There was no maternal mortality reported during this period.

The common cause of severe maternal morbidity (adverse maternal outcome) was post-partum haemorrhage at 43% followed by medical co-morbidity (25.4%) and severe preeclampsia/eclampsia(11.1%) [Figure 5].

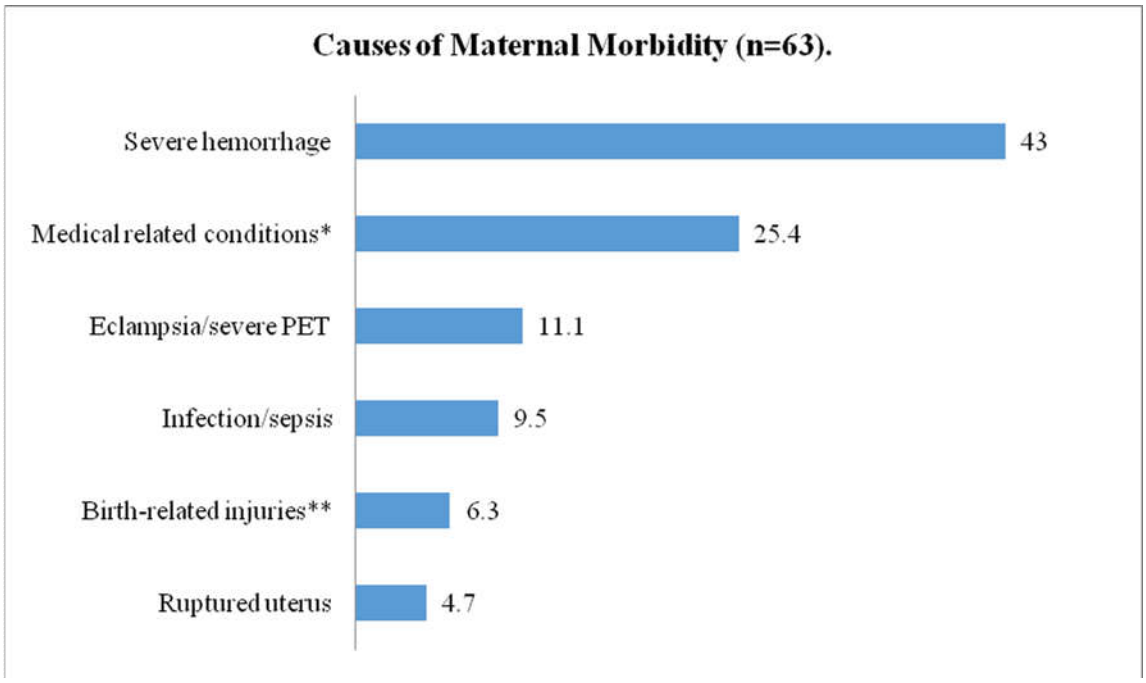

Figure 5: Percentage distribution of adverse maternal outcomes†

†: These were conditions that resulted in severe life-threatening state of the women requiring affected women to be admitted in ICU/HDU for care. Assessment of the outcomes was done 24 hours after the primary intervention.

*Medical related complications: Congestive heart failure (1), deep venous thrombosis (1), diabetes (2), HIV (2), Severe anemia (16), pulmonary embolism (1)

**Birth injuries: Perineal tear (2), cervical tear (1), and bladder injury (1)

4.4.2 Perinatal outcomes

Normal perinatal outcomes constituted 54.5% (103) with the causes of adverse perinatal outcomes being severe neonatal morbidity (30.7%), stillbirth (13.2%) and early neonatal mortality (1.6%)[Figure 6]

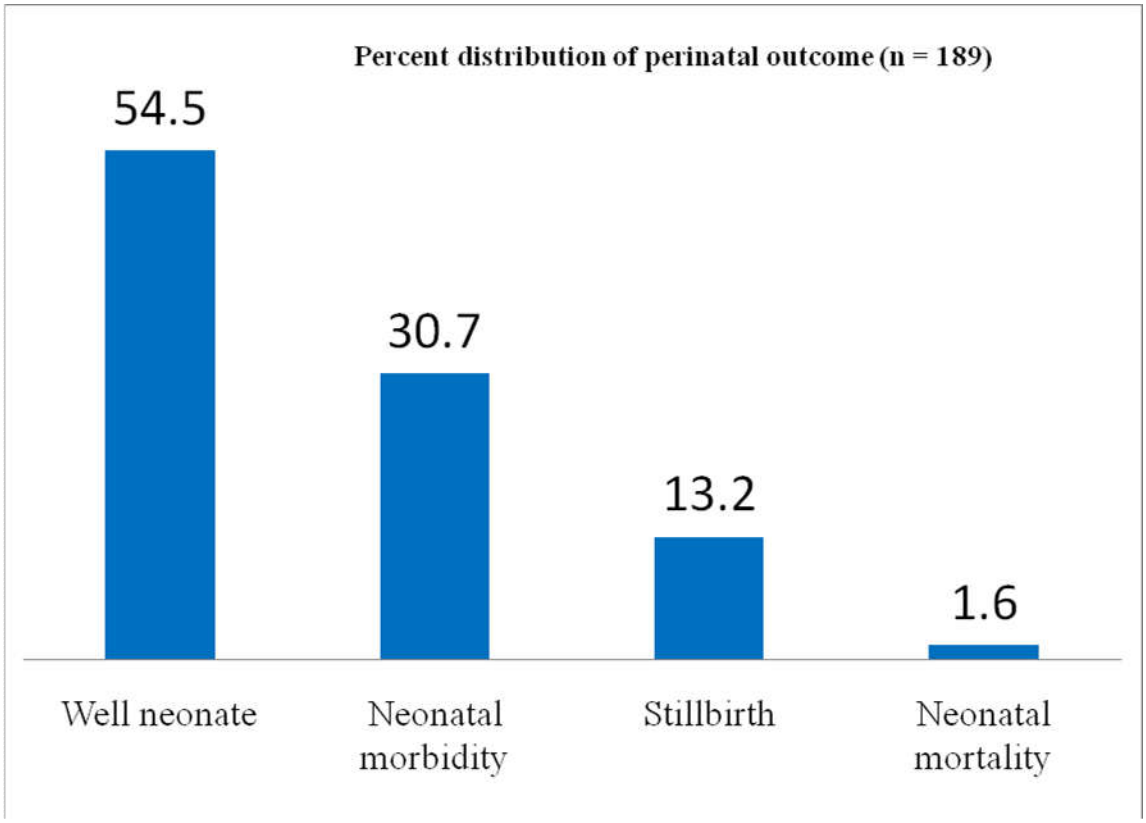

Figure 6: Percentage distribution of perinatal outcomes

4.4.3 Obstetric Interventions

Table 5 below shows the main intervention/ mode of delivery for the women who were referred with obstetric emergencies. Emergency caesarean section (51.5%), followed by spontaneous vertex delivery (38.5% were the most common mode of delivery for the participants. Seven women (3.5 %) had laparatomy due to ruptured uterus (5) and ruptured ectopic pregnancy (2).

Table 5: Frequency distribution of definitive intervention performed

Variable	Number	Percentage
Mode of delivery/Intervention		
Emergency Caesarean section	103	51.5
Spontaneous vertex delivery	77	38.5
Manual evacuation and/or curettage	10	5.0
Laparatomy (hysterectomy)	7	3.5
Breech delivery	3	1.5

4.5 Effect of Place of Referral, Appropriateness of Referral and type of Intervention on Maternal and Perinatal Outcomes

4.5.1 Maternal outcomes

As shown in table 6 below, women who were appropriately referred had a significantly higher proportion of adverse maternal outcomes (48.8%) compared to (27%) of those not appropriately referred ($\chi2=7.137$, $p=0.008$).In addition those who underwent other management intervention (hysterectomy, assisted breech delivery and manual expulsion of the placenta) had significantly higher proportion of adverse maternal outcomes (73.7%) compared to vaginal (26.6 %) and Caesarean delivery 28 (27.5 %) ($\chi2=17.330$, $p < 0.001$). Seventy three percent (73.2 %) of women who were health facility referrals had normal maternal outcomes compared to 65.3 % who those who were self-referred, though this was not statistically significant ($\chi2= 1.405$, $p = 0.236$).

Table 6: Effect of place of referral, appropriateness of referral and mode of intervention on maternal outcomes

Variable	Maternal Outcome		Chi square	P – Value
	Normal	**Adverse**		
Place of referral				
Health facility	60 (73.2)	22 (26.8)	1.405	0.236
Self-referral	77 (65.3)	41 (34.7)		
Appropriate referral				
Yes	21 (51.2)	20 (48.8)	7.137	0.008
No	116 (73.0)	43 (27.0)		
Intervention				
Vaginal delivery	58 (73.4)	21 (26.6)	17.330	< 0.001
Emergency C/Section	74 (72.5)	28 (27.7)		
Others*	5 (26.3)	14 (73.7)		

*Included hysterectomy, breech delivery and manual removal of retainedplacenta

4.5.2 Perinatal outcomes

According to table 7 below, women who delivered through caesarean section had higher proportion of normal perinatal outcomes (61.8%) compared to vaginal (46.8 %) and others (breach delivery)The differences in the outcomes was statistically significant ($\chi2$=14.691, p=0.001). Higher proportion of those not appropriately referred (49.7 %) had adverse perinatal outcomes compared to (43.9 %) those appropriately referred. However the difference in these proportions was not statistically significant ($\chi2$=0.436, p=0.509). Similarly, 54.9 % of those who were health facility referral had adverse perinatal outcomes compared to 44.1 % who were self-referral, though it was not statistically significantly ($\chi2$ = 2.256, p= 0.132)

Table 7: Effect of place of referral, appropriateness of referral and mode of intervention on perinatal outcomes

Variable	Perinatal outcome		Chi square	P-value
	Normal	Adverse		
Place of referral				
Health facility	37 (45.1)	45 (54.9)	2.256	0.132
Self-referral	66 (55.9)	52 (44.1)		
Appropriate referral				
Yes	23 (56.1)	18 (43.9)	0.436	0.509
No	80 (50.3)	79 (49.7)		
Intervention				
Vaginal delivery	37 (46.8)	42 (53.2)	14.691	0.001
Emergency C/Section	63 (61.8)	39 (38.2)		
Others*	3 (15.8)	16 (84.2)		

*Included hysterectomy, breech delivery and manual removal of retained placenta

CHAPTER FIVE

5.0 DISCUSSION

This study was set out to describe birth outcomes among women who were referred or 'self-referred' to the study site requiring emergency obstetric care.

5.1 Referral Process

Lack of resources both human resource in terms of skills and infrastructure remains key reason for obstetric referrals. The majority of respondents were referred due to lack of or perceived lack of equipment and medical supplies, and appropriate personnel. Similar findings have been reported in other studies by (Gitonga, 2013; Njoroge, 2012; Nyamtema, Urassa, & van Roosmalen, 2011; Andrea B Pembe, Paulo, D'mello, & van Roosmalen, 2014). The Kenya Vision 2030 Second Medium Term Plan 2013 – 2017 review has indicated that there is skewed distribution of health personnel and facilities and inadequate infrastructures that are necessary for service delivery (Government of the Republic of Kenya, 2013). This is replicated in Bomet County, where, as per the SARAM report 2013, the county's health facility is estimated at 1.1 per 10,000 population, health staff estimated at 8 per 10,000 population and ambulance services estimated at 0.4 per 100,000 populations(GOK, 2014). There is need to increase allocation of funding that goes directly to increasing service delivery in primary care facilities that act as first point of contact in health care provision (Byl, Punia, & Owino, 2013). Lack of resources has been shown to contribute to higher rate of self-referral (H. A. O. Afari, 2015). To bridge this gap the government of Kenya has come up with Free Maternity services in all public health facilities, and also there is roll out of mobile maternity services in every

county under the 'Beyond Zero Campaign' launched in Jan 2014, an initiative by the First Lady Mrs. Margaret Kenyatta. The aim of the campaign is to improve maternal and child health outcomes in the country.

The majority of the referred women from health facilities used public means of transport, failed to make a telephone call before referral was made and were accompanied by relatives. Nkyekyer et al (2000), in a descriptive study at Korle Bu Teaching Hospital in Ghana, looking at 396 peripartum referrals found that 72.7 % of women travelled by public or private means of transport and 54.2% were not accompanied by health professional. Similar findings were also observed by Ziraba et al (2009) who observed that 56% of referred mothers arrived at the referral facility on foot or by public transport(Ziraba, Mills, Madise, Saliku, & Fotso, 2009).

Lack of transport to health facilities contributes to most Kenyan women to deliver at home (NCAPD Policy Brief, 2010). A baseline study by the Kenya Ministry of Health (2013) that looked at the state of the referral system in Kenya in eight counties by interviewing healthcare workers and community health care workers found that transport was available in 66% of emergency referrals which is in contrast to our findings(Gitonga, 2013).The difference may be related to the fact that Bomet County was not one of the counties involved in their study. Our study also interviewed the women who were receiving care, whereas the baseline study participants were providers of care and possibly may not have disclosed full information depending on the perceived incentives during the study period. The study also looked at all emergency referrals and not specifically obstetric referrals. Other differences noted in their study was that most of the patients were reported to be have been accompanied by the health care provider (53.6%),

had standard referral forms (59.0%), and that receiving health facility were contacted (50.9%) before a referral was made.

5.2 Obstetric Outcomes

Majority of the mothers in the study (68.5 %) had normal maternal outcomes in the immediate post-partum period, whereas 54.5 % were normal perinatal outcomes. These findings were slightly different from those observed in a cross-sectional study in KNH that assessed outcomes of obstetric emergency referrals of 228 women and noted 80.3% and 57.4% normal maternal and neonatal outcomes respectively. The difference in the two studies is the causes of maternal adverse outcomes (Njoroge, 2012). In the study they noted that the main causes of adverse maternal outcome were anaemia at 6.6 % and post-partum haemorrhage at 4.8%. This differs from our study in which we noted that majority (39.8%) of maternal adverse outcomes were due to haemorrhage (postpartum), requiring at least two units of blood transfusion. followed by medical conditions at 25.4% that included heart failure, deep venous thrombosis and pulmonary embolism, diabetes in pregnancy, HIV-related complications (pulmonary jerovecii pneumonia [1] and pulmonary tuberculosis [1]), and severe anaemia. Other causes of maternal morbidity included eclampsia (11.1%), puerperal sepsis (9.5%), obstetric hysterectomy (7.9%) and birth related injuries (perineal tear and bladder injuries) at 6.3%.

The most common causes of adverse perinatal outcomes included neonatal morbidity (30.7 %), stillbirth (13.7%) and early neonatal mortality (1.6 %). Similar findings in severe neonatal morbidity (30.7 5) and stillbirth (12 %) were observed in a study in Central Uganda that assessed the incidence, presentation andperinatal outcomes of severe obstetric morbidity in two referral hospitals (Nakimuli et al., 2015).

5.3 Relationship between place of referral, appropriateness of the referral and birth outcomes.

Most women admitted with obstetric emergencies during study period were self-referrals. Simba et al (2008), in a study conducted in Muhimbili National Hospital, Tanzania, in order to inform the process of strengthening the referral process, observed that 72.5% of the patients seen presented as self-referral (Simba, Mbembati, Museru, & Lema, 2008). Similar findings were noted by Sørbye et al, 2011 in a zonal referral hospital KCMC North Eastern Tanzania (Sørbye, Vangen, Oneko, Sundby, & Bergsjø, 2011) . Bomet County has 49% of births being conducted by skilled birth attendants (Bomet County, MOH 2015). This means that half of births, like in most rural areas occur at home, either unassisted or with assistance of family members or traditional birth attendants (TBAs). In our study, none of respondents indicated having been referred by TBAs, a trend that has been observed in other studies (Pfeiffer & Mwaipopo, 2013). It is possible that in most rural parts of the country, facilities at Tier 2 do not operate at night due to inadequate staffing, lack of proper infrastructure including lighting, and therefore women who require emergency services may as well bypass those facilities and seek care at County referral centers. Poor quality of services at lower health services, patient's preferences, poor referral system and poor infrastructures are some of the reasons that have been sighted to increase level of self-referrals in the higher referral hospitals (Kruk et al., 2009).

Forty one women (34.7 %) who were self-referred had adverse outcomes compared to 22 women (26.8%) who were health facility referrals. This was however not statistically significant. Similar findings were observed in Mbarara Regional Referral Hospital in

Uganda, in a study that compared outcomes of patients who were facility referred and those who were self-referred. They noted no differences in maternal morbidity and mortality in the two groups: 1.6 % in the self-referred group and 5.7 % in the facility referral group(Emeche, 2010). These two observations may be related to the fact that very few referrals are taking place and therefore yielding less data for comparison purposes. However as noted by Purnama et al., (2010) while evaluating obstetric emergency referral cases at Dr. Cipto Hospital, in Indonesia, proper management of any emergency obstetric patient is not associated with any significant difference in outcomes when different groups are compared. Similar findings were observed by Pembe et al., 2010 in Rufiji District, Tanzania where he was assessing the effectiveness of maternal referral system. They noted that lack of referral compliance did not significantly increase the risk of perinatal death (Andrea Barnabas Pembe, 2010).

Among women who were appropriately for referred, 48.8 % developed adverse maternal outcomes compared 27% that were not appropriately referred. The findings were statistically significant. Use of referral process therefore is important. Majority of these women were those who used ambulance services, received pre-referral assessment and treatment before being referred, had a referral note, were escorted by a nurse/midwife and there was a communication between the referring and the receiving facility. These women developed severe life-threatening obstetric conditions (near –miss) and referral process played a key role in ensuring continuity of care and possibly in averting maternal mortality.

Adverse maternal outcomes have been observed in patients who are referred to referral facilities. Referral has been associated with high risk patients seeking to deliver in

referral facilities (Chinkhumba et al., 2014), and referral bias (Nkwo et al., 2014) where lower tiers of care refer patients in critical conditions or too late to benefit from the care at the referral facility. Other contributing factors include delays at home or at first point of care, and delay in receiving appropriate care at the referral facility and poorly equipped referral facilities to handle emergency patients (Martin & Pimhidzai, 2013).

An effective maternal referral system has to encompass a functional health service delivery that among others include skilled birth attendant, proper infrastructural capacity as per the standard and norms, and increased community participation. This has been shown, for instance to reduce maternal mortality. According to a cross-cultural study in Mali, Uganda, India and Uruguay, incorporation of training in emergency obstetric teams, transportation between community and district health centers and community cost sharing programs as part of referral system was shown to decrease maternal mortality (Lim, 2009).

Maternal referral system increases access and coverage of emergency obstetric care (Andrea B Pembe et al., 2014), thereby contributing to reduction in maternal mortality (Fournier et al., 2009).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

1. Reasons for emergency obstetric referrals, namely inadequate medical equipment and supplies and appropriate health personnel, were similar to those highlighted in the Kenya Referral and Implantation Guideline.
2. Utilization of the referral components was poor, with few women having access to ambulance transportation and being accompanied by health care workers during referral from health facilities.
3. The majority of the mothers requiring emergency obstetric care were self-referrals.
4. We observed no association between place of referral and both maternal and perinatal outcomes.
5. Mothers who were appropriately referred had significant adverse outcomes compared to those who were inappropriately referred.

6.2 Recommendation

From this study we recommend:

1. Provision of essential medical supplies and equipment to lower tiers of care for the provision of emergency obstetric care.
2. Adherence to referral guidelines and protocol.
3. Further study to assess the effectiveness of the referral process on the obstetric outcomes.

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APPENDICES

APPENDIX I: CONSENT FORM

Hello. My name is _____ and I am a student at Moi University School of Medicine. I am conducting a survey in Tenwek Hospital on the effectiveness of referral system in obstetric outcome and I would very much appreciate your participation in this survey.

This information will help the government to plan health services. The survey will take between 30 to 60 minutes to complete. Whatever information you provide will be kept confidential and will not be shared with anyone other than members of our survey team. Participation in this survey is **voluntary,** and if I come to any question you don't want to answer, then just let me know and I will go on to the next question; or you can stop the interview at any time.

However, I hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?

May I begin the interview now?

Signature of interviewer: _____Date: _____

Signature of researcher: _____ Date: _____

APPENDIX II: FOMU YA IDHINI

Habari yako, Jina langu ni _____ Mimi ni mwanafunzi katika Chuo Kikuu cha Moi Kitivo cha Matibabu. Ninafanya utafiti katika hospitali ya Tenwek kuhusu ufanisi wa mfumo wa rufaa katika matokeo ya uzazi na ningefurahia kushiriki kwako katika utafiti huu.

Matokeo ya utafiti huu yatasaidia serikali kupanga huduma za afya. Utafiti huu utachukua kati ya dakika 30 na 60 kuukamilisha. Habari yote utakayoitoa itawekwa siri na haitapewa mtu mwingine yeyote ila wanaohusika na utafiti huu.

Kujihusisha na utafiti huu ni wa **HIARI,** na ukikumbana na swali lolote ambalo hautaki kulijibu, nielezee na nitaendelea na swali linaofuata au unaweza simamisha mahojiano haya wakati wowote.

Hata hivyo, natumai kuwa utashiriki katika utafiti huu kwa sababu maoni yako ni la muhimu.

Kwa wakati huu, una maswali yeyote ungetaka kuniuliza kuhusu utafiti huu?

Naweza anza mahojiano sasa hivi?

Sahihi ya Mhojaji_____ Tarehe_____

Sahihi ya Mtafiti_____Tarehe_____

APPENDIX III: QUESTIONNAIRE

Patient code.....

Date of referral..... Time of referral..... Time of arrival.....

SOCIO-DEMOGRAPHIC

- How old are you? _____
- How far from this Hospital do you live?(in kilometers) _____
- How much did you spend on transport to this facility? ksh_____
- What is your ethnic group/tribe?

5 Kalenjin Kisii

6 Maasai Other(Specify)_____

- What is your religion?

 Protestant Muslim

 Catholic No religion

 Other (Specify) _____

□ Please circle the highest school completed.

□ No education □ Secondary □ University

□ Primary □ Middle level college

□ What is the source of your income/ livelihood?

i. Housewife □ Employed

ii. Agriculture/farmer □Unemployed

□ What is your current marital status?

□ Married □ Divorced/separated/widowed

□ Single

ANTENATAL PROFILE

□ How many times have you been pregnant, including this one? _____

□ How many children do you currently have? _____

□ When once your last menstrual period (LMP)? Date _____

□ How old is your previous child? _____

□ How many antenatal care visits have you had? _____

REFERRAL SYSTEM

□ From where have you been referred?

□ Hospital □ Private clinic □ TBA

□ Health centre/dispensary □ Self-referral

□ What mode of transport did you use?

1. Ambulance □ Boda boda □ Walking

2. Public transport(Matatu) □ Taxi

□ Was this hospital contacted before the referral was made? .

□ Yes □ No

□ I do not know.

□ Who came with you today?

□ Midwife/nurse □ Relative □ Alone

□ Patient attendant □ TBA

□ Did you bring any medical records with you?

- Referral note □ Mother baby book
- Partogram □ None

□ What is the reason for referring the patient?

□ Lack of equipment □ Lack of staff

□ Lack of expertise □ Lack of drugs

□ Other (Specify) _____

□ Did you receive any treatment before being referred?

□ Yes □ No □ I don't know

□ If yes, please tick any of the following that was performed before you were referred.

□ I. V antibiotics □ Blood transfusion

□ I.V anticonvulsants □ I.V Fluids

□ I.V antihypertensives □ Syntocinon/Cytotec

□ Herbal medicine □ Others (Specify)

□ What was the diagnosis at the referring facility?

- _____
- _____

□ What is the diagnosis at the referral facility?

i. _____

ii. _____

□ Where was this baby born?

□ Hospital/Health facility □ Home

□ Born before arrival (on the way to hospital)

□ Modes of delivery at the referral hospital?

□ Normal delivery □ Assisted vaginal delivery

□ Cesearean section □ Manual evacuation

□ Breech delivery

□ What was the maternal outcome?

□ Normal delivery □Admitted to HDU/ICU

□Morbidity (Specify)_____ □Mortality(Specify)_____

□ What was the neonatal outcome?

□ Well neonate □ Stillbirth

□ Birth weight□ Neonatal death

□ APGAR score: 1min 5min10min

□Admitted to NICU (Diagnosis) _____

Thank you for your participation.

APPENDIX IV: DODOSO (MASWALI)

Namba ya Mgonjwa.....

Tarehe ya rufaa.....Wakati wa rufaa.....Wakati wa kufiika hospitalini.....

Maswali ya kijamii na kidemografia

1. Una umri gani?

2. Unaishi umbali gani kutoka katika Hospitali hii? _____(Km)

3. Ulitumia nauli ya pesa ngapi kufika kwenye hospitali hii? Ksh_____

4. Kabila lako ni;

 Kalenjin Kisii

Maasai Nyengine (Elezea)_____

5. Dini yako ni;

 Mprotestanti Muislamu Mkatoliki

 Sina dini Nyingine(Elezea) _____

6. Tafadhali tia alama ya mviringo shule ya juu zaidi uliyo hudhuria na kuhitimu.

 Sikuenda shule Shule ya upili Chuo kikuu

 Shule ya msingi Chuo cha wastani

7. Je unapata wapi mapato yako ya kuendeleza maisha.

 Mama wa nyumbani Nimeajiriwa

 Kilimo/mkulima Sijaajiriwa

8. Je eleza hadhi yako ya ndoa.

 Nimeolewa Nimetaliki/Nimetengana/Mjane

 Sijaolewa

HISTORIA YA UJAUZITO

9. Umewahi kuwa mjamzito mara ngapi ukijumlisha pamoja na mara hii? _____

10. Umejaliwa kuwa na watoto wangapi?_____

11. Je, siku yako ya mwisho ya kupata hedhi ilikuwa lini? Tarehe _____

12. Je, mtoto wako wa uliyejaliwa hivi karibuni ni wa miaka ngapi?_____

13. Umepata huduma katika kliniki ya uzazi mara ngapi?_____

MFUMO WA RUFAA

14. Umepewa rufaa kutoka wapi?_____

□ Hospitali □ Kliniki ya kibinafsi □ Mkunga wa kitamaduni

□ Kituo cha afya/Zahanati □ Rufaa ya kibinafsi

15. Je, umetumia aina gani ya usafiri?_____

□ Ambulensi □Boda boda □ Kutembea

□ Usafiri wa umma □ Teksi

16. Je, uliwasiliana na hospitali hii kabla ya kufanya rufaa?

□ Ndio □ La □ Sijui

17. Umekuja na nani leo?

□ Mkunga/Muuguzi □Jamaa □ Pekee yangu

□ Mhudumu wa wagonjwa □ Mkunga wa kitamaduni

18. Je, umeleta kumbukumbu ya matibabu?

□ Maelezo ya rufaa □Kitabu cha mama na mtoto

□ Patogramu □ Hakuna

19. Je, mgonjwa amepewa rufaa kwa sababu gani?

□ Uhaba wa vifaa □ Uhaba wa wahudumu

□ Uhaba wa wataalamu □ Uhaba wa madawa

□ Sababu Nyingine (Elezea) _____

20. Je, Ulipata matibabu yeyote kabla ya kupata rufaa?

□ Ndiyo □ La □ Sifahamu

21. Kama "Ndiyo", tafadhali chaguan mojawapo ya yafuatayo uliyofanyiwa kabla ya kupata rufaa.

□ I.V antibiotiki □ Kuongezewa damu

□ I.V Dawa ya kuzuia kifafa □ I.V maji maji(Fluidi)

□ Vipunguza shinikizo la damu □Syntocinon/Cyntotec

□ Dawa ya mitishamba □ Nyingine (Elezea) _____

22. Ni uaguzi upi uliofanyika katika kituo ulichopata rufaa?

a. _____

b. _____

23. Ni uaguzi upi uliofanyika katika kituo ulicho-elekezwa?

i. _____

ii. _____

24. Mtoto huyu alizaliwa wapi?

 Hospitali/Kituo cha afya Nyumbani

 Alizaliwa kabla ya kufika kwa hospitali(Njiani)

25. Jinsi ya kujifungua katika hospitali ya rufaa?

 Kujifungua Kawaida

Kujifungua kupitia usaidizi wa uke

 Kujifungua kupitia upasuaji

Kuoshwa mfuko wa uzazi (MVA)

Kujifungua mtoto akianzia miguu au matako

26. Je, eleza matokeo ya ujauzito?

 Kujifungua Kawaida

Kulazwa katika kitengo cha wagonjwa mahututi (HDU/ICU)

 Kuugua(Eleza)_____ Kifo (Eleza)_____

27. Je, eleza matokeo ya mtoto aliyezaliwa?

 Mtoto mzuri

Mtoto alizaliwa akiwa ameaga

 Uzito wa mtoto aliyezaliwa_____

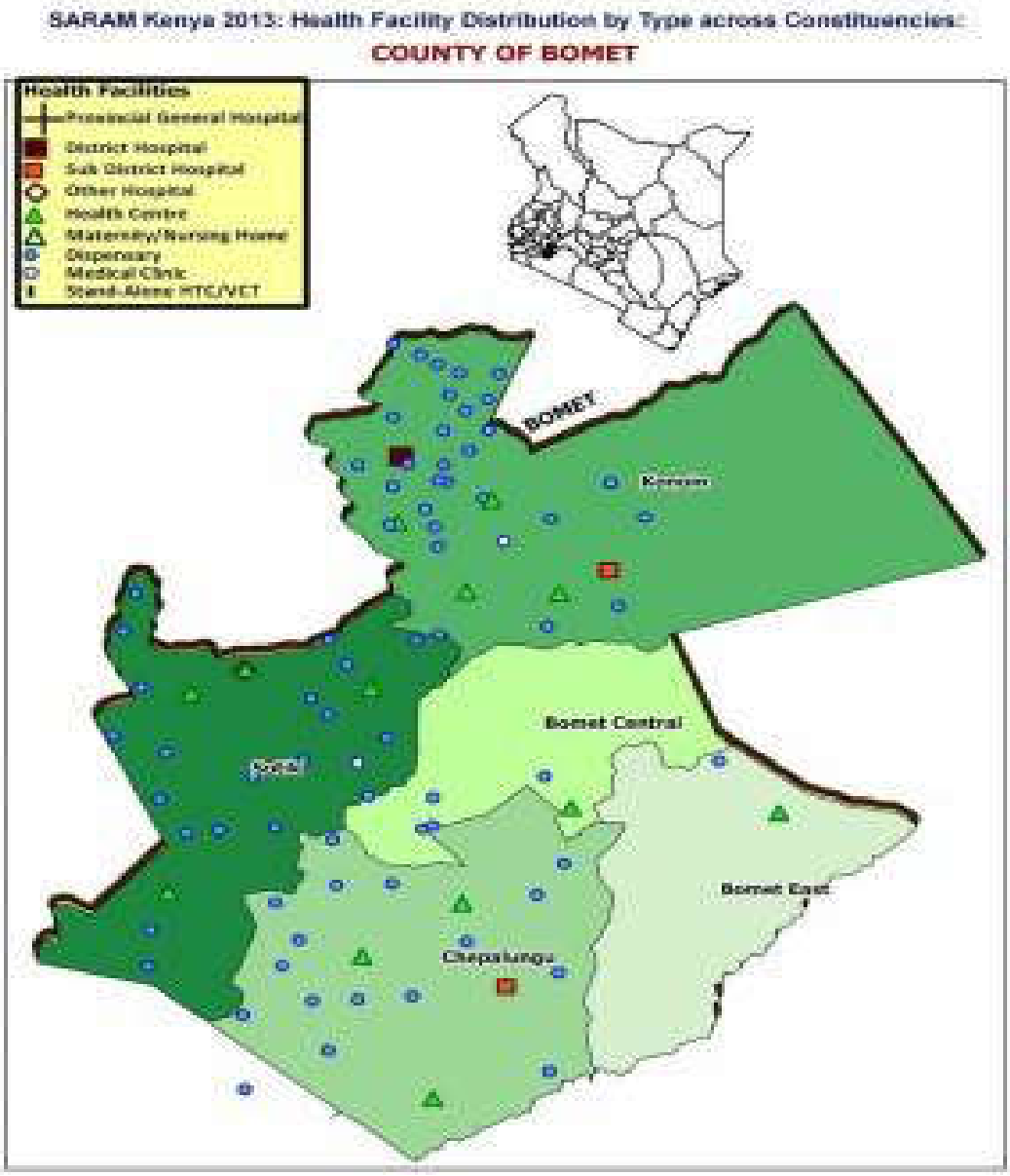
Mtoto aliaga

Alama ya APGAR: ___1min____5min____10min

 Alilazwa NICU (Uaguzi) _____

Asante kwa kushiriki kwako

APPENDIX V: MAP OF BOMET COUNTY



Source: SARAM Report 2013

APPENDIX VI: PILOT STUDY

DR. VITALIS O. JUMA
TENWEK HOSPITAL
P.O BOX 39,
BOMET.
0720 945 747
jumavitalis@yahoo.com

18/04/2013

Approved to carry out
DSVMinal

A.I.C LITEIN HOSPITAL
P. O. Box 200 - 20210
LITEIN - KENYA

TO THE MEDICAL SUPERINTENDANT
LITEIN HOSPITAL.

Dear Sir,

REF: PILOT STUDY.

I, Dr. Vitalis O Juma, Part 2 Family Medicine Registrar at Moi University currently attached a Tenwek Hospital would like to request for permission to carry out pilot study at your institutio This will play a crucial role in the MMED thesis. The title of the research study is " *Impact of Referral System on Birth Outcomes of Emergency Obstetric Care at Tenwek Hospital in Bome County, Kenya.* "This research topic has been approved by Institutional Research and Ethics Committee (IREC) of Moi University.

Your approval will help test the questionnaire and thereby be able to assess if I will be able to answer my research objectives.

Your assistance is highly appreciated.

Yours faithfully,

Dr. Vitalis O Juma

Family Medicine Registrar.

Tenwek Hospital.

cc 1. Hospital Administrator

2. Nursing officer in-charge.

APPENDIX VII: IREC APPROVAL LETTER

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471//2/3

MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

Reference: IREC/2012/217
Approval Number: 000956

14th March, 2013

Dr. Vitalis Ochieng'i Juma,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Ochieng'i,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee have reviewed your research proposal titled:-

"Impact of Referral System on Birth Outcomes of Emergency Obstetric Care at Tenwek Hospital in Bomet County, Kenya."

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000956** on 14th March, 2013. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 13th March, 2014. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

26/03/2013
DR. W. ARUASA
VICE-CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
APPROVED
14 MAR 2013
P.O. Box

cc:
Director	-	MTRH
Principal	-	CHS
Dean	-	SOM
Dean	-	SPH
Dean	-	SOD
Dean	-	SON