

**Making skilled attendance at child birth in Tigray region,
Ethiopia possible**

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Vrije University Amsterdam

Making skilled attendance at child birth in Tigray region, Ethiopia possible

A thesis submitted in partial fulfillment of the requirement for the degree of Master of Public Health

by

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Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis "Making skilled attendance at child birth in Tigray region, Ethiopia possible" is my own work.

Signature.....

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Dedication: This dissertation is dedicated to my husband Mohammed Abrar, my children Mubark, Anwar and Sabrina and to my brother Nasr, father Yenus Nuru and my beloved mother Kedija Abdullah for encouragement and prayers. They all have always been wishing me well in my life.

Abstract

Ethiopia is one of the developing countries with the highest maternal mortality ratio (MMR) at 673 per 100,000 live births. Tigray, the study area and located in the north, is one of the nine regions of Ethiopia. It has a shortage of skilled birth attendants and has a low utilization of obstetric care. In Tigray, rural women have poor access to basic emergency obstetric care and comprehensive emergency obstetric care. The study aims to understand the root cause of low utilization of skilled attendance at birth by examining the socio-economic, socio-cultural, political and facility-based barriers that prevent women from using skilled birth attendant.

The study employed literature review using the three delay model of, regional data, study reports, reviews and national and international organizations. The study analysis shows that low income, high illiteracy rates of women and/or community and cultural beliefs are some of the factors that hinder decision-making. Inaccessible: long distance to BEmOC and CEmOC, shortage of means of transport for referral and poor road conditions are delays in getting to health facility. There are incompetent skilled attendant, insufficient EmOC poor data management, limited monitoring and evaluation of obstetric care and thus poor quality of care at facility level all these causes delay to use of skilled attendance at child birth including EmOC.

In response to this problem, Tigray Regional Health Bureau has low political commitment: low financing per capita health expenditure of 3USD. Tigray health bureau tries to address transport gaps and shortages of skilled attendant but still mothers die due to insufficient EmOC and few numbers of skilled birth attendant, poor quality of care and limited resources.

Based on this study, it is recommended to MOH, Tigray regional health bureau and Tigray state of government policy-makers to promote health extension workers through skills building to become skilled birth attendant. I will propose an assessment of EmOC in Tigray and further research on skilled attendance at child birth in order to reduce maternal mortality.

Key words: Antenatal care, delivery, postnatal care, maternal health, Access, socio-economic, socio-cultural, Available, Quality, health policy, RH strategy, skilled attendant, maternal mortality, BEmOC, CEmOC, WHO, UNFPA, Tigray, Ethiopia, Africa.

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LIST OF ABBREVIATIONS

BEmOC	Basic Emergency Obstetric Care
CEmOC	Comprehensive Emergency Obstetric Care
CHWs	Community Health Workers
DHO	District Health Office
EDHS	Ethiopia Demographic Health Survey
EmOC	Emergency Obstetric Care
FGM	Female Genital Mutilation
HMIS	Health Management Information System
HSDP III	Health Sector Development Plan three
IEC	Information Education Communication
MDGs	Millennium Development Goals
MMR	Maternal Mortality Ratio
PMTCT	Prevention Mother to Child Transmission
RH	Reproductive Health
STIs	Sexual Transmitted Infections
TBA	Traditional Birth Attendant
UN	United Nation
UNFPA	United Nations Population Fund Agency
WHO	World Health Organization

Definitions (Operational terms)

Skilled attendance/skilled care: are defined as the process by which a pregnant woman is provided care with adequate care at birth including emergency obstetric care (EmOC) (WHO, 2005).

Skilled Birth attendant: an accredited health professional – such as a midwife, doctor or nurse who has been educated, and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns (WHO, 2008).

Health extension workers (HEWs): are female health workers who have passed 10th grade and completed training for one year in order to provide essential health interventions provided at kebele and household levels with focus on sustained preventive health actions and increased health awareness. Two HEWs are assigned per health post (at kebele level) (EFMOH, 2005).

Enabling environment: is defined as a working environment with policy framework, community participation, intersectoral collaboration and political commitment for skilled attendance at birth. Of women with ability to decide to seek care, access and quality of obstetric care including EmOC to support skilled attendant and make sure women with complications to receive adequate care of EmOC. It includes women educational level, income, women status in the family including in the community, access and adequate drugs, supplies, equipment and transport means for referral, communication, supervision and monitoring, guidelines and protocols (Canavane, 2008).

Maternal mortality Ratio (MMR): is defined as death of a woman while she is pregnant, delivery, six weeks after delivery and abortion regardless of the site of pregnancy, from any cause related to or aggravated by pregnancy and its complications (WHO, 2005).

Basic emergency obstetric care (BEmOC) includes: intravenous/intramuscular (injectable) antibiotic, oxytocin, anticonvulsant, manual removal of retained products, assisted vaginal delivery, removal of retained products (UNFPA, 2008).

Comprehensive emergency obstetric care (CEmOC) includes: all six basic emergency obstetric cares plus Caesarean Section and blood transfusion (UNFPA 2008).

Preface

The author of this thesis is a Public Health Officer in Ministry Of Health at the District Health Office (DHO) in Adigrat, Tigray region northern Ethiopia where she is responsible for health management in the district. She previously worked on Expanded Program on Immunization (EPI) as a coordinator for five years, Maternal and Child Health (MCH) head of department for five years, health center in charge for one year and four years as a DHO head bringing her years of experience to 15 years. During this time, I observed more problems regarding maternal health. This subject has interested me because of the following reasons. First, maternal mortality is one of the major public health problems in Tigray region, and poor women should not die because of having a baby. Secondly, it is one of the Millennium Development Goals (MDGs) to improve maternal health and yet it will not be achieved especially in Sub-Saharan Africa and especially in Tigray, due to low skilled attendance at birth including EmOC. Thirdly, the study will be useful for the region of Tigray as well as to the country in developing policy on scaling up of HEWs as a lower cadre that will become skilled birth attendant and improve on obstetric care interventions.

The issue of maternal mortality and low skilled attendance at birth including EmOC remains a challenge in Tigray. In addition to the shortage of skilled birth attendant, services are unaffordable and poor access to emergency obstetric care especially to rural women is a big challenge, where most of the population lives in Tigray region, Ethiopia.

This provides an opportunity to analyze the factors associated with skilled attendance at child birth, using the three delay model. The study describes obstetric care coverage and its trends both for skilled attendance at birth and EmOC in Tigray, and also describes the determinants of delays of skilled attendance at birth including EmOC. It reviews maternal health strategies and services adapted to address maternal mortality in Tigray. It also includes enabling environment of conceptual framework. Finally, it recommends improvement and makes skilled attendance at birth in order to reduce maternal deaths.

The thesis is structured into **six chapters** as follows: **Chapter one** provides background of the country and study area, Tigray region, Ethiopia. **Chapter two** addresses problem statement. **Chapter three** includes conceptual framework of three delay model. Findings & discussions is in **chapter four**, and best practices in **chapter five**. Conclusions and recommendations made in **chapter six**.

This thesis will be presented to policy makers; MOH and Tigray Regional Health Bureau in order to make better policy. I will propose to conduct an assessment of EmOC in Tigray and further research once I return home to make skilled attendance at child birth in Tigray region possible.

CHAPTER 1 Country and study area profile

1.1 Geography and climate

Ethiopia is one of the Sub-Saharan countries located in the Horn of Africa. It's bordered on the north by Eritrea, on east by Djibouti and Somalia, on south by Kenya and west, southwest by Sudan. The country has a surface area of 1.1million sq.km and average population density of 67 people per sq.km. The topography ranges from 4,550 meters above sea level up to 110 meters below sea level and temperature of 47⁰c to 10⁰c. The mountainous nature of the country and poor road infrastructure makes many places difficult to reach (FDREPCC, 2008).

Tigray region the focus of this thesis is one of the nine regions of Ethiopia located in the northern part of the country. It's bordered by Eritrea to the north, Sudan to the west, Afar region to the east and Amhara region to the south (FDREPCC, 2008).

1.2 Demography

Ethiopia has a population of 73.9 million, the second populous country in Africa, having male to female ratio of 50.5 to 49.5 percent with an annual growth rate of 2.6%. Most of the population 84% lives in rural areas whereas 16% lives in urban areas. It has almost half of the population (51.9%) between 15-64 years in reproductive age (FDREPCC, 2008). Life expectancy at birth is low at 48 years, for males 47 years and for females 49 years (FMOHE, 2005).

Ethiopia had high total fertility Rate of 5.4 children per woman from 1999 to 2004. The level of fertility is lower in urban areas with a total fertility of 2.4 than rural areas total fertility of 6 (EDHS, 2005). Crude birth rate was 35.7 per 1000 population (FDREMOH, 2006/07).

Tigray region has a population of 4,314,456 having male 49.2% and female 50.8%. Most of the population lives in rural areas (80.5%). The annual growth rate is 2.5% (FDREPCC, 2008). The total fertility rate is 5 in line with the national but higher than capital city of the country, Addis Ababa, which is 1-2 children per woman (TRHB, 2006) and crude birth rate was 37.3 per 1000 population higher than the national 35.7 per 1000 population (FDREMOH, 2006/07).

1.3 Ethnic composition

Ethiopia has over 87 different ethnic groups. Tigray has 7 ethnic group but 96.55 were Tigrinya. The cultural beliefs among various ethnic groups influence decision-making to seek skilled attendance at birth. The country

has different religions with 43.5% being Orthodox Christians, 33.9% Muslims, 18.6% Protestants and 2.6% other traditional religions. These different religions have an influence in decision- making in use skilled attendance at birth such as husband permissions as in Muslim and traditional religions (FDREPCC, 2008).

1.4 Economy

Ethiopia is one of the low income countries in the world; almost 47% of the population lives below the poverty line. The economy is based on subsistence farming which accounts for almost 50% of Gross National Product and suffers from frequent drought, flooding and poor cultivation practices with per capita income of US\$100. The economy of Tigray region is similar to the country dependent on subsistent farming (FMOHE, 2005).

1.5 Education

The country has low literacy level. It is only 38% of adult literacy level, for males 50% and for females 26.6%. This may influence health-seeking behavior to decide to use skilled attendance at birth (FMOHE, 2005). Literacy level of Tigray for women 33.7% and men 67.5%. This shows that men have great chance to education than women which is inequity (EDHS, 2005).

1.6 Administration

Ethiopia has a Federal Democratic Republic political structure composed of nine decentralized regions. The country has 63 zones, 501 districts, 17,730 rural and 1,621 urban kebeles (smallest administration unit) devolved in power to regional government and further to district. Regional government is full autonomy to use resources (revenue collection) and budgeting of the public health sector such as for running cost of health services, procurement of drugs, equipments and salary for personnel. They formulate their regional plans and compile districts' plan and performances (FMOHE, 2005).

Administratively, Tigray region has 5 zones, 35 districts and 694 kebeles. Mekelle is the capital city of the region. It is decentralized in power. Budget allocated by regional and local government to Tigray regional health bureau and district health office respectively (TRHB, 2005).

The decentralization of the health care system worsens shortages of health workers in Tigray region because of pooling technical staff to administrative offices (TRHB, 2007).

1.7 Organization of the Health System and Service Delivery

Structure: The health care system in the country operates at four levels; the referral, zonal/district hospital, health centers and health post. There are 131 hospitals, 600 health centers, 9,914 health posts and 1,578 private clinics. Each referral hospital, zonal hospital, district hospital, health center and health post service 5000,000, 1,000,000, 250,000, 25,000 and 5000 populations respectively. The first referral level for health post was health center and gate keeping for district and zonal hospital (FMOHE, 2005).

Tigray has one referral hospital not functional for referral purpose but their plans revive to referral hospital. It has 5 zonal hospitals, 7 district hospitals, 42 health centers, 600 health posts and 25 private for profit and 16 private non profit clinics see (annex 1b). In Tigray the private clinics do not provide delivery (TRHB, 2007). From my experience one private hospital providing delivery including EmOC in Mekelle, capital city of the region often serving the wealthier urban women and this data is missing in Tigray health bureau, meaning poor HMIS.

Human Resources: The health care system has severe shortage of skilled human recourses especially midwives despite the efforts made by limited training institutions. The health workers population ratio is far from WHO recommendation; 1 physician for 10,000; and 1 nurse for 5,000 people (WHO, 2008). See Table 1:

Figure 1: Health workers to population ratio in Ethiopia

Health workers	Number	Ratio	Standard population
Doctors	1,806	1: 409,192	1:10,000
HOs	1,151	1: 642,051	
Nurses	18,146	1: 40,725	1:5,000
HEWs	17,653	1: 41,863	1:2,500

Source: (FMOHE, 2005) HSDP III 2005/6-2009/10.

Tigray has only 13 nurse-midwives and 157 junior-midwives for 4.3 million population and have only one midwifery training schools with low coverage of obstetric care (TRHB, 2005) (details in chapter four).

Performance: The health care crisis manifest itself by poor health indicators especially the maternal mortality ratio due to inaccessible and poor quality of BEmOC and CEmOC services especially to rural women (FMOHE, 2005). See table 2

Figure 2: Health indicators of Ethiopia

Indicator	Value
Infant Mortality Rate	77/1000 live birth
Under five mortality rate	123/1000 live birth
Maternal Mortality Ratio	673/100,000 live birth
Potential health service coverage	72%
Adult HIV Prevalence(15-49years)	2.1 Urban=7.7 Rural=0.9

Source: (FMOHE, 2007; DHS 2005) *For HIV prevalence FHAPCO, 2007

Health Financing: The total health expenditure on health of the country is low (USD 5.6) per capita compared to other Sub-Saharan Africa countries. Although the policy exempts poor women from paying still there is a shortage of drugs, gloves and supplies and as a result, they are obliged to buy drugs, gloves outside the health facility which makes the cost unaffordable. The exemption policy does not cover all obstetric care, which bear negative health consequences on rural poor who cannot afford paying to high travel cost (FMOHE, 2005).

Inadequate funding affects effective delivery of health care including maternal health services. Shortages of drugs, consumable equipments worsen the performance of obstetric care. Further capacity of managers at regional and district level to plan for logistics is lacking hence didn't stock out (FMOHE, 2005).

National health policy: The national health policy since 1993 focuses on decentralization of the health system and provision of equitable and acceptable standard of health service system with special attention to preventive services (Health Policy, 1993).

The policy seeks for intersectoral collaboration and strategic capacity building. However, there is no clear policy of Human Resource Development (HRD) and it gives little attention to protecting the health of health personnel (Girma, S. et al, 2007).

The policy is family centered and gives special attention to vulnerable segment of the population e.g. pastoralists, the urban poor and national minorities (Health Policy, 1993).

In 2004, the policy on abortion was introduced to reduce unsafe abortion and access to safely legalized abortion in cases of rape, incest, mental disorders of women, underage pregnancy and termination of pregnancy due to fetal deformities that could not be managed (The Criminal Code of the Federal Democratic Republic of Ethiopia 2004).

Other related policies, such as gender policy and HIV/AIDS etc supports the promotion of obstetric care are in place (FMOHE, 2005).

National Reproductive Health Strategy (2006-2015): The National Reproductive Health (RH) Strategy provides a legal framework for the protection of RH rights of women and girls. It aimed at reducing maternal morbidity and mortality by addressing harmful sociocultural practices like early marriage, FGM and provision of quality of RH services and improving the socioeconomic status of women. However, women the rate of FGM is 60-80% in the country (FMOHE, 2006).

The strategy is mainstreamed into Health Sector Development Plan three (HSDP III) and poverty reduction strategy aiming at the achievement of MDG. Among other activities it focuses on universal access to basic health care services by supporting health extension programmes in the country. Two midwives and one health officer posted in each health center to provide EmOC, and two female health extension workers are posted to each health post (FMOHE, 2005). Alongside the implementation of the RH strategy is policy reforms e.g. task shifting to authorize nurses and midwives to provide abortion care, which has contributed to reduction of post-abortal complications (MOHE, 2006; Otsea, k. and Tesfaye, S. 2007).

The HSDP III proposes to strengthen 600 health centers nationwide to provide BEmOC, and 98 of the 131 hospitals and 25% of health centers to provide CEmoC within 5 years. However, according to recent reports only 28% (166) and 75% (79) of CEmOC targets respectively were achieved. Shortages of skilled human resource, medical supplies and weak referral system hindered the achievement of the RH targets (FMOHE, 2007; FMOHE, 2005).

The success of the national RH strategy is dwarfed by weak intersectoral collaboration. For instance the implementation of policy against early marriage is not pursued vigorously by the Ministries of women and social affairs. This translates to obstetric complications among married adolescents (MOHE, 2006).

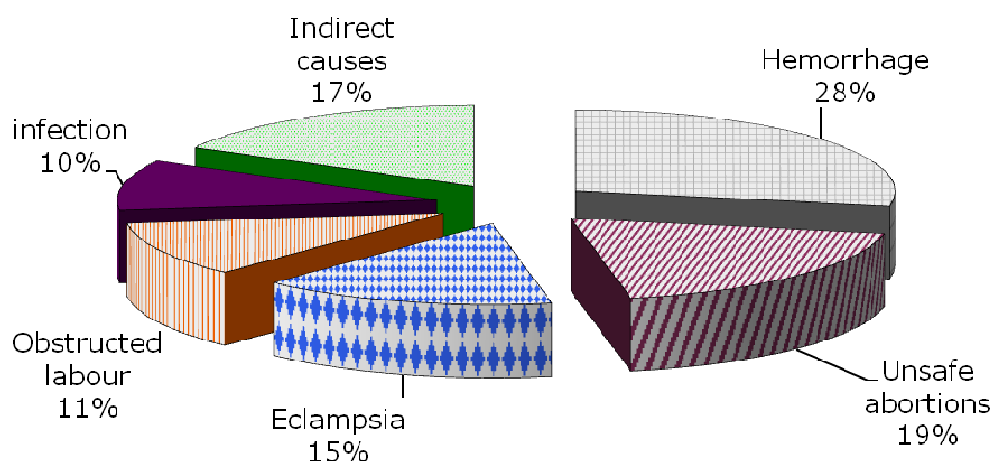
CHAPTER 2 Problem Statement, Objectives and Methodology

2.1. Problem Statement:

Reducing Maternal Mortality Ratio (MMR) by three fourth (3/4) is one of the Millennium Development Goal (MDGs) that has to be achieved by the year 2015. According to the WHO (2005) report, every day 1500 women die worldwide from pregnancy related complications that could be preventable. In 2005, there were 536,000 maternal deaths among which more than fifty percent (50%) occurred in Sub-Saharan Africa. There is great disparity in MMR among developing and developed countries. The WHO 2005 report shows that, in developing countries the MMR is 450 per 100,000 live births whereas in developed countries it is 9 per 100,000 live births (WHO, 2005).

Ethiopia is one of the developing countries with the highest MMR of 673 per 100,000 live births (EDHS, 2005). In Tigray MMR 505-756 per 100,000 live births based on community survey, Tigray 2001 (TRHB, 2005). Maternal mortality is one of the major public health problems in Tigray, Ethiopia. In Ethiopia maternal deaths are caused by direct 75% and indirect causes 25%. Direct causes of maternal deaths are largely neither predictable nor preventable and these accounts hemorrhage 28%, unsafe abortion 19%, eclampsia 15%, obstructed labor 11% and infection 10%. Indirect causes are HIV/AIDS, Malaria, Rheumatic heart diseases Hepatitis, and anemia (UNFPA, 2007).

Figure 3: Ethiopia causes of maternal mortality



These direct and indirect causes are complicated and compounded by "delay" factors: decision making, access to obstetric care including EmOC and quality of care provided by skilled birth attendant during pregnancy,

delivery and six months after delivery at health facility (Khama, O. et al 2006).

Women who get access to maternal health services in the country are very few. Data from Ethiopia Demographic and Health Survey (EDHS) show that 28% of women get antenatal care, at least make four visits during pregnancy, 5.7% get assistance from skilled health professionals during delivery, and only 6% received postnatal care after delivery (EDHS, 2005).

In developed country 99% of the births assisted by skilled birth attendant compare to 62% in developing countries. Five countries have low percentage of skilled attendance at birth which is less than 20% (WHO, 2008). Ethiopia is one of the least five countries with low skilled care during child birth which is 5.7% but skilled attendance at child birth including EmOC is one of effective strategy to reduce maternal death (EDHS, 2005). Countries such as Sri Lanka, Egypt and Tunisia have increased skilled attendance at child birth significantly at community or at health facilities level reducing maternal mortality (WHO, 2008).

According WHO estimate 57 countries thereby have critical shortage of skilled birth attendant especially doctors, nurses and midwives including Ethiopia. Shortages of skilled birth attendant are severe in Ethiopia 3-4 times lower than even from east African countries. Ethiopia has marked shortage of life saving health professionals only 174 Obstetricians and they are more concentrated in urban settings (Girma, S. et al, 2007).

Shortage of doctors in Tigray, region Ethiopia, which is the study area, is very severe and especially to the rural districts, to compensate this shortage team training of health personnel such as health officers are trained for EmOC to do cesarean section instead of doctors and nurses trained as anesthetist (TRHB, 2007).

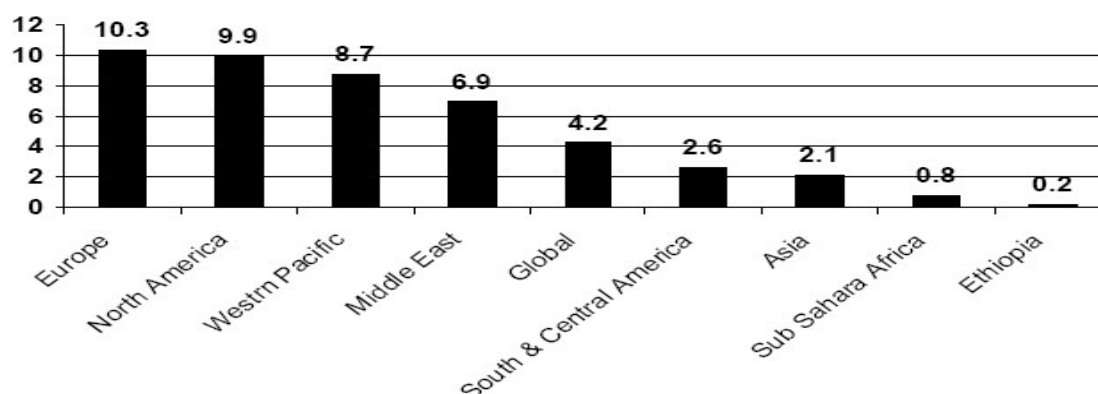
This shortage is due to rapid expansion of health care facilities and uneven distribution of health workers between regions such as urban regions of Addis Ababa and Dire Dawa is better than Tigray region. Besides this shortage poor management of health service delivery, poor training and poor research (Girma, S. et al, 2007).

In addition to shortage of skilled birth attendant and low skilled care at child birth including EmOC there are various factors contributing to high MMR. For instance incompetent health professionals, poor access to EmOC health facility, inability to afford for the service supplies such as gloves, IV fluids etc and inadequate drugs and equipments related to obstetric care (FMOHE, 2005).

Offer basic package and meet the MDGs the estimated health workers to population ratio should be 2.5 per 1000 population but in Ethiopia is

about 0.2 per 1000 population even lower than Sub-Saharan Africa and these applies to skilled birth attendant (Abuja, 2004).

Figure 4: Density of health workers per 1000 population



Source: (Adapted from Girma, S. et al, 2007; Abuja 2004) Addressing Africa's Health workforce crisis.

Ethiopia has few training health institutions only 48 and limited training capacity. The formal training universities are inadequate. It graduates 200-300 health officers per year less which is less than the required 5000 needed up to the year 2009. However having these problems it has a plan to post 1 health officer in each health center to do EmOC (Girma, S. et al, 2007; FDREMOH, 2006/07).

Ethiopia has a new innovative accelerated expansion of health officers training in 20 hospitals but in practice there is only one midwife in the health center and 1 health officer in some health center meaning insufficient EmOC and suffers from shortage of Tutors, an imbalance between trainer and trainees which leads to poor quality of training (Girma, S. et al, 2007).

Training of health extension workers provided in both Technical and Vocational training institutes in all regions. Tigray has two training institution for health extension. They are trained for one year after 10th grade completion and planned to post 1:2,500 population ratio and this aims universal access to primary health care to rural women (FMOHE, 2005).

The training of health extension workers includes basic delivery care, but one can question whether this confirms to the WHO criteria for skilled birth attendant. There is no curriculum to health extension workers to become skilled birth attendant. In Tigray the figures of delivery attended by them added to skilled attendance but according to WHO definition they are not skilled. Training of health extension workers is almost 71% achieved from what is planned, however the training institutions lack practical skills especially to skilled attendance at birth and early

identification of complications (Girma, S. et al, 2007; FDREMOH, 2006/07).

From my experience in annual evaluation of the region the skills of health extension workers towards delivery care were not attending delivery as expected and Tigray regional health bureau decided to improve their performance to train for one month in delivery services. However WHO recommends training in midwifery skills at least 18-24 months so within one month of training, they do not develop skills. Furthermore the women in labor do not accept them because they are young.

Furthermore in Tigray health care financing is low in 2007 with per capita health expenditure of 3USD. The regional government allocates 12% to health sector. In total the regional health bureau budget were 56.4% from government and 43.6% were from donor such as WHO, UNICEF, Global Fund etc. This means that almost half of the health budget is from donors. From my experience most of the budget allocated goes to the salary of health workers. This is clearly seen in obstetric care with shortages of gloves, drugs and equipments (TRHB, 2007).

During my participation in annual evaluation of maternal and child health program both at district and regional level, the issue of maternal mortality has been lingering for years. Therefore there is need to understand the root cause of low utilization of skilled birth attendant. For example, looking at the socio economic, socio cultural, political and facility based barriers that prevent women from using skilled attendance at child birth. And make an analysis of these factors in order to find appropriate ways to intervene in order to increase skilled attendance at child birth so that MMR is reduced in Tigray region, Ethiopia.

2.2. Study Rationale

This thesis is primarily intended to Policy makers, such as MOH, Regional government state of Tigray, Tigray regional health bureau focus on shortage of skilled birth attendant and issues of affordability, access of basic and CEmOC, means of transport, communication for referral in order to make better polices to benefit women.

2.3. General Objectives

Describe and analyze skilled attendance at birth by looking at socio economic, socio cultural, political influences and facility based factors associated with low use of skilled attendance at child birth in Tigray region, Ethiopia and make recommendations to improve it.

2.4. Specific objectives

- i. Analyze effective coverage and its trends of women to skilled attendance at child birth including EmOC in Tigray region, Ethiopia.
- ii. Identify main bottlenecks of women to attend skilled attendance at child birth including EmOC looking at socio cultural/economic and health service factors in Tigray, region Ethiopia.
- iii. Review of maternal health strategies and services in Tigray, region Ethiopia.
- iv. To identify best practices in terms of improved skilled attendance at child birth including EmOC elsewhere especially Sub-Saharan Africa.
- v. To identify ways through which skilled attendance at child birth can be improved and provide appropriate recommendations that can be addressed in Tigray, region Ethiopia.

2.5 Study questions

- i. What are the socio economic, socio cultural, political and institutional factors that women face when seeking skilled birth attendance at delivery in Tigray region, Ethiopia?
- ii. What are the factors affecting accessibility to delivery including BEmOC and Comprehensive emergency obstetric care in Tigray region, Ethiopia?
- iii. What mechanisms are available for referral for basic and comprehensive EmOC in Tigray region, Ethiopia?
- iv. How is demand created at community level for skilled attendance at child birth in Tigray region, Ethiopia?
- v. What is currently being done to increase skilled birth attendance at child birth including BEmOC and CEmOC and how effective has this been in Tigray region, Ethiopia?
- vi. What can be done to improve skilled attendance at child birth in Tigray region, Ethiopia?

2.6 Study methodology

Relevant literature will be reviewed using secondary data a review of conceptual framework the three delays model that have been used to look at low skilled attendance including EmOC and maternal mortality. Health Policy and RH strategies in Ethiopia related to safe motherhood, obstetric care services and how they are delivered. Determinants of three delays: socio economic, socio cultural influences and facility based factors that affect use of skilled attendance at child birth and availability of EmOC in Tigray region.

2.7. Limitation of the study

Data from Tigray, Ethiopia is scarce, limited and unreliable. Reporting and recording of health services is poor; for example the number of health facilities with number of BEmOC and CEmOC in table 7 and number of

health centers and hospitals specifically in Tigray the numbers are the other way round (FMOHE, 2007. p, 73).

Moreover there is no maternal audit in Tigray except one study on five selected zonal hospitals with difficulties on data collection. Region specific reports are missing. No primary data will be collected due to resource and time limitation. So this paper relies on literature available, and reports are not always complete.

2.8. Searching strategy

Main searching tool for literature review used in this thesis include Google scholar, Pub med, science direct, KIT library, VU library were used for searching journals, reports and reviews. Websites were accessed for additional information from Ethiopia governmental organizations, UN agencies such as WHO, UNFPA, World Bank. Some materials inaccessible on web sites were collected which I know from my personal observation and experiences.

Key words: Antenatal care, delivery, postnatal care, maternal health, Access, socio- economic, socio-cultural, Available, Quality of care, health policy, RH strategy, skilled birth attendant, maternal mortality, BEmOC, CEmOC, WHO, UNFPA, Tigray, Ethiopia, Africa.

The following chapter presents the conceptual framework that was used for the analysis of factors affecting skilled attendance at child birth in Tigray region, Ethiopia.

CHAPTER 3 Conceptual frame work three delay model

There are various health seeking behavior and health utilization frameworks that can be useful in analysing factors affecting skilled attendance at child birth including provision of EmOC. There is the Thaddeus and Main three delays model that is commonly used to understand factors contributing to maternal mortality and morbidity (Thaddeus and Main, 1994).

3.1 The Three Delay Model:

1. The first delay **"in decision making"** is related to individual (woman), family (relative, spouse) and community socioeconomic status. These also affect educational, income levels, women status in the family and the community that in turn makes them rely on getting permission from husband or father or mother-in-law to seek health care. Socio cultural beliefs, opportunity cost, perceived distance and perceived cost from health facility and previous experiences with quality of care also act as factors causing the first delay.
2. The second delay is to **"identify and reach medical facility."** This is related to factors affecting access cost of transport, time spent on travel, having no one to accompany a pregnant woman, no communication, poor road conditions and unreliable means of transport, inequitable distribution and distance to health facilities providing EmOC.
3. The third delay is related to **"accessing quality care in health facility"**. It includes availability of skilled birth attendant with competent skills, availability of supplies, adequate equipment, drugs and actual quality of care provided, means of referral, appropriate treatment, guidelines/protocols, supervision and monitoring of delivery care including EmOC.

The Thaddeus and Maine delay model is helpful to identify contributing factors affecting obstetric health seeking behavior and using skilled birth attendant from the onset of complications including EmOC (Thaddeus and Main, 1994).

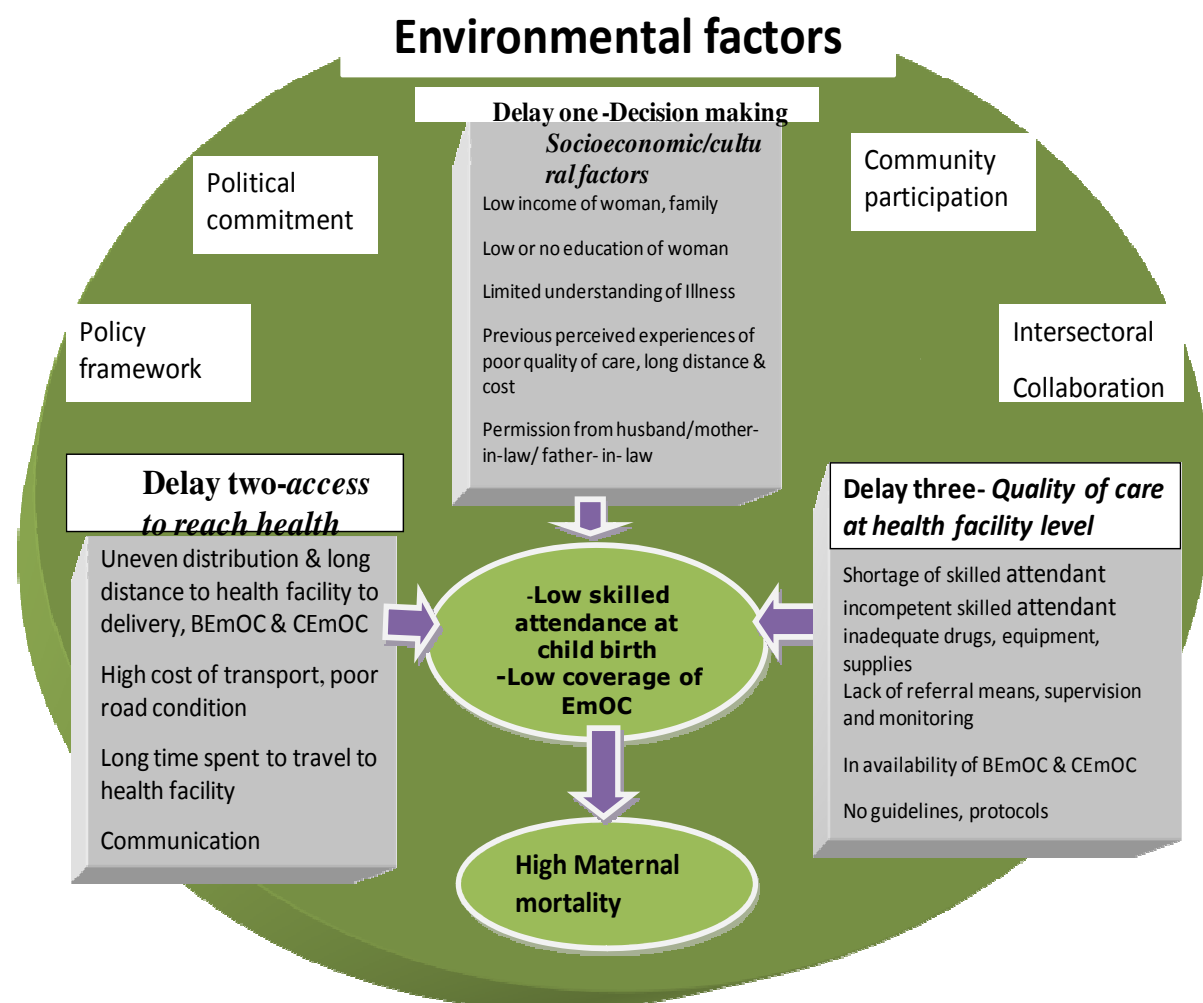
However, the model has limitation in that it does not deal with the preventive part of obstetric care that means antenatal care, family planning and postnatal care. This means exclusion of delays regarding seeking care around antenatal care, family planning prevention of malaria in pregnancy etc. Again the model assumes that delays are only linked to complications, yet a pregnant laboring postpartum woman who also has not experienced a complication may also simply delay to seek care at the

appropriate time and with an appropriate health provider which in this case is skilled birth attendant. Moreover the indirect causes of maternal death such as anemia in pregnancy, chronic infections, HIV/AIDS, malaria and so on are neither regarded as obstetric emergencies nor complications, yet they still require timely and appropriate management (Khama, O. et al 2006).

Recognizing the limitations of the 3 delay model, this paper will ensure that the application of model includes looking at delays that take places even when there are no complications, as well as considering delays to seek care for the indirect cause of maternal death.

Since this paper is looking at making skilled attendance at child birth possible then a framework has to deal with both delay factors as well as factors concerning creating an enabling environment, dealing with policy framework, community participation, intersectoral collaboration and political commitment for skilled birth attendant. That is organizational change, ensuring quality assurance, addressing challenges, such as inadequate human resources, materials supplies, logistics etc.

Figure 5: Three Delay contributing factors to seek skilled attendance at child birth including EmOC



Source: Adapted from Thaddeus and Main 1994

1.1.1. First Delay

- i. **Household factors:** Household factors in this context are factors that influence decision making of an individual on whether to seek obstetric health care. These include the socioeconomic, sociocultural factors, perceived quality of care, perceived cost, perceived long distance to health facility and women's status in the household that reduces her ability to make decisions about her own health. All these factors at household level may affect use of skilled attendance at child birth (Thaddeus and Main 1994).

A study in Gondar, Ethiopia showed that higher educational level of woman has strong influence. This is because education enables them to develop capacity to make decisions about their own health. And place of residence in an urban area where women have better access to information about use of skilled attendance at birth and complications that arise during labor than among, low educated and rural women. Those who do not have access to information, majority which are rural women gave birth at home practicing harmful practices such as abdominal massage during labour and drinking traditional medication for pain relief during labour this practice is due to poor knowledge of management of complications (Nigussie, M. et al 2004; Mills, S. et al, 2007).

A study in Niger shows that the main reason for delays to go to health facility was due to past experience of poor outcome of pregnancy such as still birth, poor management of treatment. Women may choose a place for delivery. Because they feel that staff non responsive, rude, refuse to assist them, lack of empathy, lack of confidentiality and privacy. Further they experience long waiting time (Meyer, L. et al, 2007; Duffy, S. 2007; D'Ambruso, L. et al, 2005).

Low household income is one of the barriers preventing the utilization of skilled attendance at child birth. A study in Ghana and Benin shows that households with low family income cannot afford obstetric care including EmOC at health facility level (Borghini, J. et al 2003). To overcome financial barriers of decision making to seek skilled attendance at child birth, universal access through social insurance for pregnant women especially during delivery has been introduced in Ghana and South Africa through (Borghini, J. et al 2006).

Women in Niger were noted to experience some delays to seek care because culturally if they are to deliver outside the home it is considered as unlucky. Women in this case delay to decide where to give birth and end up delivering without a skilled birth attendant as this would mean going to deliver outside the home. With the Islamic

religion the man is the main decision maker on whether a woman has to give birth at a health facility or home. If the labor is prolonged this means another delay as they have to find him wherever he is to seek for permission and communities with Muslim religion do not allow male attendants (Paul, B.K, 2002; Meyer, L. et al 2007).

- ii. **Community factors:** Community acceptance of skilled attendance at birth is critical to success of delivery with a skilled provider. Study in Bangladesh reveals that, in rural settings men, older women and mother-in-law often play a role in deciding where woman should seek and use skilled attendance at birth. In addition to this the majority of rural Bangladesh population believes giving birth is an act of God and is 'natural event' and for this reason, they don't expect delivery complications (Paul, B.K, 2002; Chowdhury et al, 2006; Nigussie, M. et al 2004).

Some negative perceptions of the health facility, like families not being allowed to enter the obstetric care, gave rise to underutilization of the attendance. And families and/or community with older woman negative perception about episiotomy, in first place why they do episiotomy? Other studies have documented that the supine position for delivery with legs spreading, causes extreme shame among some cultural this acts as a barrier to decision making to skilled attendance at birth the same in Ethiopia (Chowdhury et al, 2006; Nigussie, M. et al 2004).

Uganda, community perspective towards obstetric care were perception of poor quality of care due to poor skills among the lower cadre health professional, shortage of drugs, poor staff response and long distance of the health facilities leads to community delay in decision making (Kiguli, J. 2008).

1.1.2. Second Delay

Delay two is a delay of a woman to reach obstetric care. This is caused by long distance, uneven distribution of obstetric care services, poor road conditions, lack of transport means, high cost of transport and even time spent to travel including time of accompanying individuals, and lack of communication (Thaddeus and Main 1994).

- i. **Long Distance:** Distance is the relationship between the actual geographical location of laboring woman and obstetric care (WHO, 1993). Studies in Zambia, Ghana and Malawi show long distances experienced by woman to reach health facility for deliver. Differences in distance exist among urban and rural areas. A rural woman has to travel longer distance than urban woman to health

facility in most cases (Stekelenburg, J. et al 2004; Thaddeus and Main 1994; Mills, S. et al, 2007).

- ii. **Lack of transport and high cost of transport:** Transport is a means such as ambulance, motorcycle and stretcher etc of taking a laboring woman to reach the obstetric care. In Rwanda, Zimbabwe, to improve referral from community to a skilled attendant for safe obstetric care practice, community participation in emergency transport was practiced. To support poor people who could not afford, a community scheme was established. Families involved in the scheme paid half of the cost and the health committee paid the rest (Pearson, L. and Shoo, R, 2005; Mills, S. et al, 2007; Costello, A. et al 2006; Mekbib, T. et al, 2003; Graham, W. 2001).

A study in Uganda shows that there is disparity among the poor and the rich regarding access to health care when there is need to travel very long distances to health facility. Unlike the poor, the rich could afford the cost of the transport (Kiguli, J. 2008; Graham, W. 2001; Duffy, S. 2007).

- iii. **Poor road conditions:** A study in Ethiopia showed that in rural Gimbie due to poor road conditions such as muddy and mountainous accompanied by lack of transport women deliver at home and delay to seek and reach to health facility (Duffy, S. 2007; Mills, S. et al, 2007).
- iv. **Lack of effective communication system:** Inadequate effective communication facilities impede the link between a woman in labor and skilled birth attendant, likewise between the latter and higher health facilities with EmOC. Kenya found the use of cell phone effective in reducing second delay (Geller, S. et al, 2007). In Malawi some of the radio communication were not functioning that hinder a woman to reach facility (Kamwendo, LA. & Bullough, C., 2005).

1.1.3. Third Delay

A delay three is lack of appropriate quality of care at health facility level. These include uneven distribution, inadequate number of skilled birth attendant, incompetent, insufficient numbers of BEmOC and CEmOC, shortages of drugs, supplies and equipments with weak referral, no guidelines/protocols, inadequate supervision and monitoring hinder women to use skilled attendance at birth including EmOC at facility level (Thaddeus and Main 1994).

- i. **Poor quality of care:** The organization of EmOC and the interaction between pregnant women in labour and skilled attendance at birth determines the quality of EmOC. Availability of well motivated skill personnel, medical and surgical supplies and

blood are critical determinants of quality of EmOC. Poorly quality of care manifest itself through hospital delays are common in Ethiopia because most hospitals lack blood banks and EmOC materials and in addition blood donation is not easily accepted by the community, leading catastrophic outcome for the mother and the baby (Duffy, S. 2007). In Malawi shortage of EmOC equipments such as non functional autoclave leads to poor quality of care delay at hospital (Kamwendo, LA. & Bullough, C., 2005)

- ii. **Few skilled birth attendants:** Skilled attendant shortage refers to the shortages in number of the attendants required to attend delivery. WHO proposed that one skilled birth attendant to attend 200 births per year. Studies in Africa show that delivery with skilled birth attendant is low due to migration from rural to urban areas, from the public facility to private health facilities and out immigration from Africa to developed countries the effects has been noted in Malawi, Ghana, Zambia, and other countries. There is also poor health care financing particularly to obstetric care and shortage of skilled birth attendant leads to increased workload and poor quality of care (African union, 2009).
- iii. **Incompetent skilled attendant:** Competency is the way that skilled birth attendant is organized and the manner in which skilled birth attendant and clients interact, interpersonal communication of provider with necessary skills and attitudes (Harvey, S. et al 2007). In countries like Malaysia, Sri Lanka and Egypt the availability of skilled birth attendant and working with the adequate health system, that provides continuous care from community to a referral facility that provides EmOC increases uses of skilled attendance at birth and hence decreases maternal mortality(MacDonagh, S. 2005; Canavane, 2008; Harvey, S. et al 2007).
- iv. **Poor staff attitude:** In addition to problems of financial cost of drugs, supplies, equipments, transport, and distance to facility, and poor staff attitude leads to poor quality to conduct delivery and including EmOC delay woman to seek care at facility level (MacDonagh, S. 2005;Gessesew, A. and Melese, M. 2002).
- v. **Uneven distribution of skilled birth attendant:** A study in Tanzania shows that uneven distribution of skilled birth attendant and poor management of EmOC leads to poor quality and low use of EmOC services (Olsen et al, 2005; Gessesew, A. and Melese, M. 2002).

1.1.4. What is enabling environment to skilled attendance at birth

Enabling environment is defined as a working environment with policy framework, community participation (decentralization, accountability)

intersectoral collaboration and political commitment for skilled attendant. It includes women's education, socioeconomic development, and women status in the family and the community, cultural and religious influences. (Canavane, 2008; MacDonagh, S., 2005; D'Ambruoso, L. et al, 2005).

- i. **Policy frame work:** A study in Uganda to improve availability and utilization of EmOC indicates that the government gave priority to safe motherhood initiative by revising the national maternal policy increases funding to EmOC (Pearson, L. and Shoo, R. 2005).

Many countries such as Kenya, Rwanda, Sudan, Uganda changing policy of doctors a task shift to midwives and nurses to provide EmOC such as Cesarean section to increase availability of skilled birth attendant have been used as strategy to reduce maternal death including Ethiopia (Pearson, L. and Shoo, R. 2005; MacDonagh, S., 2005; FMOHE, 2005).

- ii. **Intersectoral collaboration:** Intersectoral collaboration is factors outside the health sector such as Education, Woman Affairs, Communication, and Transport etc that affect to seek skilled attendance at birth. A study in Malawi showed that high MMR was due to related factors with other sectors such as Education low enrollment of woman in education and hunger a problem in food security, HIV/AIDS and others that need collaboration in order to increase decision making and access to skilled attendance at birth and improves MMR (McCoy, D. et al, 2004; MacDonagh, S. 2005).

- iii. **Community participation:** Community participation is important to use skilled birth attendant such as by women group, community dialogue, capacity building on complications of EmOC and mutual support networks that helps a woman to use health facility during delivery including EmOC (Costello, A. et al 2006).

Furthermore, in Ethiopia in Amhara region, Ambo hospital showed that community participation on what is being done in BEmOC and CEmOC starting from planning up to evaluation example of community activity in Ambo the community expands one block in the hospital for the shortage of rooms for BEmOC and CEmOC to solve maternal emergency complications related to pregnancy and delivery and better working environment for skilled birth attendant too (Mekbib, T. et al, 2003).

- iv. **Political commitment:** Political commitment is a responsibility of the government to play a role to targets set in MDG 5 to reduce maternal death such as skilled attendance at birth to seek

care of a woman. Besides this they have the responsibility of their citizen's right in this case the right of woman not to die because of child birth by having access, quality of care (Costello, A. et al 2006).

From the above mentioned discussion it indicates that household and/or community low socioeconomic status, culture beliefs, perceived poor quality of care, perceived long distance to health facility and high cost access to skilled attendance at birth are barriers in decision making to seek skilled attendance at child birth including EmOC.

Long distance to skilled attendance at child birth including EmOC, lack of transport, lack of communication, poor road conditions and high cost of transportation delay to reach health care facility.

Barriers to delay three are few skilled birth attendants, incompetent skill without supportive supervision, shortage of drugs, supplies, equipments, EmOC. In addition to this poor quality of care, insufficient BEmOC and CEmOC, absence of guidelines protocols delay women at facility.

Enabling environment that makes for determinants of three delays make possible skilled birth attendance at child birth including EmOC and hence reduce maternal mortality.

CHAPTER 4 Study findings and Discussions

This chapter presents three main parts. Section 4.1 describes obstetric care coverage and its trends of skilled attendance at birth and C/S rate in Tigray. Section 4.2 describes the determinants of delays in skilled attendance at birth including EmOC in Tigray. Finally section 4.3 describes maternal health strategies and services developed in Tigray region to address high maternal mortality. This also includes the description of enabling environment of the conceptual frame work.

4.1 Obstetric care coverage and its trends to skilled attendance at birth and C/S rate in Tigray

Obstetric care is skilled care during pregnancy, at child birth and six weeks post delivery including EmOC (EDHS, 2005).

In Tigray obstetric care is provided at all levels including in the health post (smallest health unit). These services include antenatal care, normal delivery, postnatal care, family planning and IEC (FMOHE, 2005). But services like Prevention of Mother to Child Transmission (PMTCT), HIV counseling and testing, safe abortion care, BEmOC and CEmOC are provided in health centers and hospitals only (TRHB, 2007).

Obstetric care coverage: In Tigray 51.6% of pregnant women had at least one antenatal care visit during the entire duration of their pregnancy, which fell short of WHO recommendation of at least four visits during the pregnancy period.

Coverage for skilled attendance at delivery is 9.7% in 2006, which is lower than the national average of 16.2%. In Tigray deliveries include the deliveries assisted by HEWs, although they are not recognized by WHO standard as skilled birth attendants. In addition, most often the HEWs are not accepted by women in labour because of young age.

Equally, TBAs assist most deliveries in Tigray province, which is not accepted skilled but Tigray health bureau in line with WHO (TRHB, 2007).

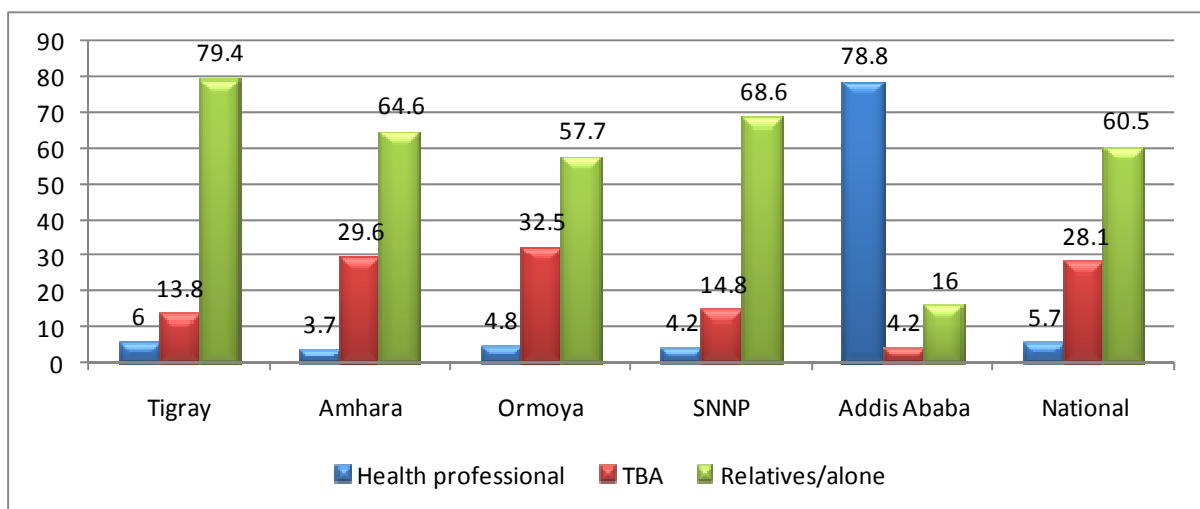
Figure 6: Obstetric care coverage by health facility and TBA in 2006 in Tigray region

Obstetric care coverage	Health facility (Skilled care)	TBA	Total
Antenatal care	51.6%	31.2%	82.8%
Delivery	9.7%	22.6%	32.3%

Source: (TRHB, 2007, p. 73) Tigray Health Bureau Profile

In the province only 9.7% of pregnant women deliver in health facilities, where skilled attendant is expected. However, from my personal experience some of the deliveries are assisted by unskilled attendants even within the hospital setting (TRHB, 2007). The proportion of pregnant mothers actually assisted by health professionals during delivery is only 6% (EDHS 2005) and over two-third were assisted by relatives of had delivered alone in contrast to Addis Ababa. This means that there is unequal distribution of skilled birth attendant and EmOC services between urban and rural and among regions of the country. (Fig 7)

Figure 7: Skilled attendance at birth in Tigray region compare with other regions of Ethiopia



Source: (EDHS, 2005. p, 118) Ethiopia Demography Health survey

4.2 Emergency obstetric care in Tigray

<p>BEmOC includes:</p> <ul style="list-style-type: none"> •Intravenous and/or intramuscular Injectable Antibiotic •oxytocin •anticonvulsant • Manual removal of retained products • Assisted vaginal delivery • Removal of retained products (UNFPA, 2008) 	<p>CEmOC includes:</p> <p>All six basic emergency obstetric cares plus:</p> <ul style="list-style-type: none"> •C/S •Blood transfusion <p>(UNFPA 2008)</p>
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Tigray has 19 BEmOC and 7 CEmOC services provided in health centers and hospitals respectively (UNFPA, 2008). This number is grossly inadequate for the population of Tigray province, since WHO recommended 1 CEmOC and 4 BEmOC facilities per 500,000 populations.

The quality of services provided in the few facilities is low compared to standard CEmOC and BEmOC facilities. From personal experience most of these facilities lack blood bank and basic theatre equipments.

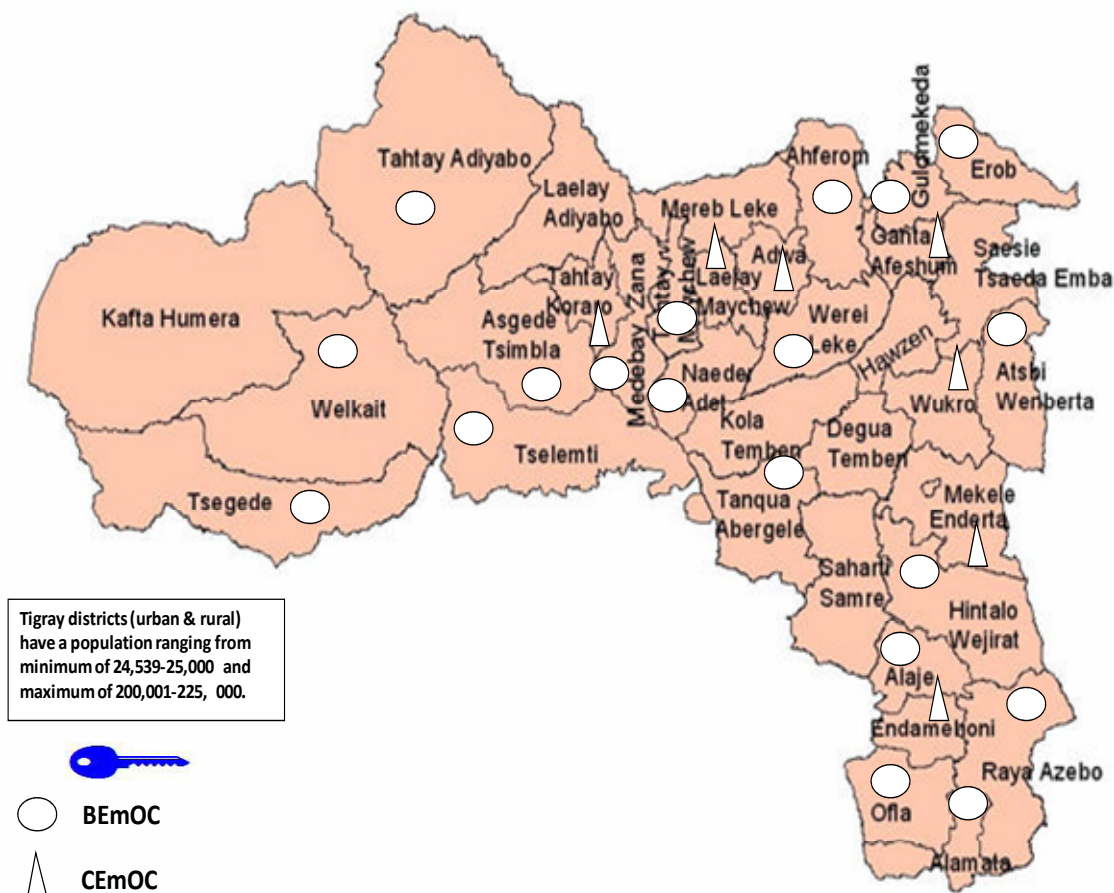
EmOC assessment conducted in some African countries revealed that most of the facilities do not fulfill the criteria of standard EmOC and BEmoc facilities. Basic requirements like anticonvulsant such as Magnesium sulphate, Oxytocin, blood bank, antibiotics etc were not available (Levine, A. et al, 2008). Ethiopia and Tigray region are not exceptional.

Figure 8: Availability of EmOC in Tigray

Total number of population	Availability of EmOC		Recommended number of EmOC	
	BEmOC	CEmOC	BEmOC	CEmOC
4,314,456	19	7	34	9

Source: (TRHB, 2007, p. 73) Tigray Health Bureau Profile

Figure 9: Distribution of BEmOC and CEmOC in Tigray Province



Source: (TRHB, 2007, p. 73) Tigray Health Bureau Profile

As you can see figure 8 some of the districts do not have EmOC services. This means that mal-distribution of BEmOC and CEmOC among remote districts such as Kafta Humera and Laelay Adiyabo districts.

4.3 Trend analysis of assisted deliveries and cesarean section rate in Tigray

Figure 10 statistically percentage of skilled assisted deliveries calculated as proportion of assisted deliveries out of expected number of deliveries. Cesarean section rate calculated proportions of cesarean deliveries out of expected number of deliveries (Pearson, L. and Shoo, R. 2005).

Figure 10: Skilled deliveries and cesarean section rate in Tigray region

Years	Expected delivery	Assisted deliveries including TBA	Assisted deliveries 'skilled'	Cesarean section	Cesarean section rate	% skilled assisted deliveries
2004	183,851	59,379	?	630	0.34%	?
2005	168,844	58,634	16, 012	599	0.35%	9.5%
2006	173,909	54,826	15,415	733	0.42%	8.8%

Source: (TRHB, 2004/5/07, p.24, 59, 73) Tigray Health Bureau profile, Mekelle.

Majority of pregnant women in need of cesarean section are not accessing it in the province. This is evident by low cesarean section rate calculated as a proportion of women who had cesarean section to expected number of delivery. The rate is 0.34%, 0.35% and 0.42% for the year 2004, 2005 and 2006 respectively, these figures far below the expected cesarean section rate (5% to 15%) (Pearson, L. and Shoo, R. 2005). Since, most of the facilities are located in urban areas majority of rural women cannot access them, implying urban-rural inequity of CEmOC.

Similarly, percentage of skilled assisted deliveries has also reduced over the years. Low cesarean section rate and low skilled assisted delivery can be attributed to demand and supply barriers, which are prevalent in Tigray province. However, the data provided has to be interpreted with caution because the expected deliveries (denominator) are not consistent and also they may include deliveries by TBAs.

4.4 Determinants for Delays in skilled attendance at child birth including EmOC in Tigray

4.4.1 Delay one

The factors that affect the first delay in seeking for skilled assistance at child birth are low and/or no education, low income, cultural beliefs, perceived poor quality of care, perceived long distance, and perceived cost, woman status at family and/or community level and opportunity cost (Thaddeus and Main 1994).

- i. **Low and/or no education:** Literacy level influences the decision to seek skilled attendance at birth including EmOC. In Tigray women with higher education have adequate knowledge on the likelihood of complications during delivery and make adequate preparation to seek for institutionalize delivery (Hiluf, M and Fantahun, M. 2008).

Furthermore regional health strategic plan 2004-2006 shows that barriers for use of skilled attendance at birth were illiteracy and inadequate health information (TRHB, 2003; EDHS, 2005).

- ii. **Low income:** Low income negatively influences care seeking and partly explains high level of home deliveries in Ethiopia including Tigray. Women with high income tend to seek obstetric care more than low earning women (Thaddeus and Main 1994; EDHS, 2005).
- iii. **Cultural beliefs:** Cultural beliefs affect the health seeking behavior of a pregnant woman to access skilled assistance; it is generally believed that labour is a normal event that does not require special attention. In Tigray most women (93.9%) feel comfortable to deliver at home because of the support of relation. It is an Islamic tradition for a woman to seek for consent from her husband before seeking for care Household chores also inhibits women to seek for skilled attendance at birth the same as in Bangladesh (Kassyou, H., 2008; Chowdhury et al, 2006).
- iv. **Perceived poor quality of care:** Delivery services in Tigray are perceived to be of poor quality partly because the clients lack confidence on the health care providers available at lower level of the health care system. Communities also perceived that most women in labour are referred to hospitals and in most cases late (TRHB, 2003).
- v. **Perceived long distance:** Perceived distance is a barrier for accessing skilled attendance at birth and EmOC. This influences the decision of women and families to seek for care.

4.4.2. Delay two

Factors that causes the delay in reaching health facility for skilled attendance at child birth or EmOC includes (WHO, 1993):

- i. **Long distance:** In Tigray health post, health centers, hospitals with EmOC services are within a minimum radius of 5kms, 10km and 20kms respectively. It takes 2 or more hours for pregnant to access care. This discourages them to seek for skilled birth attendant even if there is complication (TRHB, 2007, Gessessew, A. and Melese, M. 2002; Levine, A.C., et al 2008).
- ii. **Poor road condition:** Poor road network especially those connecting the Kebeles (where 80.5% of the populace reside) and the mountainous nature of the country side contributes to the difficulties in reaching BEmOC and CEmOC are found even when referred. In addition, the travel cost is unbearable for majority of families (Levine, A.C., et al 2008).
- iii. **Lack of transportation:** Ambulances are available in Zonal hospital, some district hospitals and some health centers but there is no ambulance in the health post. Even where the ambulances exist they are not equipped with emergency drugs. In Adigrat district, where I work women in labour are only accompanied by a first aider that lacks the skill to assist delivery. But it is inter-facility referral pregnant women are often accompanied by a skilled health worker equipped with emergency supplies in case the woman the delivers in the ambulance.

In Tigray, Adigrat hospital maternal mortality is often as a result of prolonged obstructed labour complicated by ruptured uterus. Most of these women are rural dwellers that could not access EmOC because of distance, lack of transport and good communication services (Gessessew, A. and Melese, M. 2002; Hailu, S. 2006).
- iv. **Lack of communication:** In Tigray province most of health facilities except health posts have either mobiles and/or land telephones, but they are for administrative purposes and hardly used for the purpose of referral. However, some families have GSM for trade purpose, which may be of help in some instances. Eighty percent of rural populace of the province listens to radio (Demits Wayne), hence it can be used for health promotion my observation.
- v. **Uneven distribution of health facility:** Health care facilities are sited without considering the overall equity of distribution within the province. This makes some of the rural area at a disadvantage position, where woman in labour has to walk or be

carried with a makeshift stretcher for more than 10 Km. This delay often results into catastrophic consequences(Levine, A.C. et al, 2007; Duffy, S. 2007).

4.2.3 Delay three

Factors that influences delay three, which is delay in providing quality care at health facility in the context of Tigray province are:

- i. **Inadequate number of skilled birth attendant:** Inadequate competent skilled attendance, shortages of drugs, equipment and supplies, inadequate supportive supervision and weak referral system demotivate women to seek for skilled birth attendance at child birth and EmOC (Levine, A.C. et al, 2007).

Figure 11: Type of health personnel to population ratio in Tigray region in 2005

Type of health personnel	Actual number	Health personnel to population ratio	Expected
doctor	47	1:91,797	1:10,000
Health officers	63	1:68,484	
Nurses	702	1:6,146	1:5,000
midwife	13	1:331,881	
Junior midwife	157	1:27,481	
Health extension workers	1,229	1:3,510	1:2,500
Community health agents (CHA)	2,684	1:1,607	
Traditional Birth attendants (TBA)	4,294	1:1005	
Community Based Reproductive Health Agents (CBRHA)	1,935	1:230	

Source: (TRHB, 2005) Tigray Health Bureau profile

*For Health extension workers (TRHB, 2006)

Shortage of competent skilled health workers in Tigray is evident by high health worker to population ration as depicted by figure 11 above. Although, all cadres of health care workers are affected by the shortage it is more pronounce for midwives and doctors (1 doctor per 91,797 populations)

Adequacy and competency are not commensurate to good care; other factors like accommodative staff attitude and privacy play a significant motivating role (TRHB, 2003).

- ii. **Poor quality of care:** A part from the skill of the health care worker and availability of equipments and medical supplies, defying standard protocols and guidelines significantly contribute to poor maternal outcome. In Tigray basic procedures and documentation for monitoring the progress of labour like the use of partograph is not being practiced. Data management is equally bad making quality improvement through maternal audit impossible (Hailu, S. 2006).

4.5 Review of maternal health services adapted to address maternal mortality in Tigray region.

Safe motherhood strategies components are antenatal care, family planning, delivery, postnatal care and obstetric care (WHO, 2001). Enabling environment is fundamental for the success of these strategies (Canavane, 2008).

- i. **Provision of antenatal care:** Tigray has antenatal coverage of 35.3% lower than regions Addis Ababa (88.3%) and Dire Dawa (53%). Antenatal utilization is closely related to educational level and place of resident; women with education and those living in urban areas utilize skilled birth attendant than their low-literate and rural counterparts (EDHS, 2005). Tigray is a rural province with low-literacy rate, hence the lower utilization of antenatal.

Inadequacy of laboratory supplies and payment of user fees characterized antenatal care services of Tigray. This leads to poor management of pregnant women and inability to detect and treat infections and pregnancy associated morbidities like gestational diabetes and syphilis. Lack of detection of these pregnancy related morbidities might lead abortion, still birth and mortalities (EDHS, 2005).

- ii. **Provision of family planning:** Family planning is provided in Tigray in all facilities and communities by community health workers. CHWs provide pills and condom but refer users of long term contraceptives to health facilities. Despite these services, Tigray has only 16.5% FP uptake much less the regions of Addis Ababa, Dire Dawa and Harrari (57%, 34% and 34% respectively) (EDHS, 2005).

Inadequate skills of health workers to insert Norplant and Intrauterine Contraceptive Device, cultural beliefs of the woman like fear of being sterile when using family planning and complaints

minor side effects of pills are some of the challenges facing the family planning programme in the province (EDHS, 2005).

- iii. **Provision of Tetanus Toxoid (TT):** The rate of utilization of two more doses of TT in Tigray is 29% (national average 28%). It is provided in antenatal care and through community outreaches like schools. The coverage is lower than the regions of Addis Ababa (58%) and Dire Dawa (50%). This low coverage of TT may be due to lack of integration with other services, fear of vaccine reactions and sterility (my observation, TRHB, 2007).
- iv. **Nutritional status of reproductive age (15-49):** About 38% of people in Tigray within the age group of 15-49 years are undernourished with a BMI of less than 18.8 kg/m² and about 2.8% of women have a height less than 145cm. Undernourished women are prone to anemia if pregnant and women less than 152cm are likely to have contracted pelvis, which may cause obstructed labour and consequently maternal injuries and death (TRHB, 2007).
- v. **Prevention of anemia in pregnancy:** In Tigray the prevalence of mild (Haemoglobin level <10-10.9 g/dl) and severe (Haemoglobin level are 22.4% and 0.6% respectively. Anemia in pregnancy is commoner in pregnant women with poor socioeconomic status. To prevent anemia Iron sulfate is provided during antenatal care freely from UNICEF support, but there is frequent stock outs due to poor planning and logistics management. Metallic taste and epigastric pain are side effects that deter pregnant women from taking iron sulfate supplement (EDHS, 2005).
- vi. **Reducing teenage pregnancy:** Teenage pregnancy accounts for 14.7% of pregnancies in Tigray province. These pregnant teenage girls are prone to obstructed labour, fistula, and psychological depression and are also likely to miss education leading to economic dependency on their husbands. Although, the RH policy denounces such marriages the intersectoral collaboration between women affairs, social affairs to address teen age pregnancy is weak. (EDHS, 2005).
- vii. **Preventing and managing malaria in pregnancy:** In Tigray province malaria is amongst the top ten morbidities and mortalities (EDHS, 2005). The policy has led to improvement in malaria control especially amongst pregnant women as one of the crucial target groups. Consequently, 69% of households were covered by treated bed nets and 100% houses had residual insecticide spray protecting 78% of the population (TRHB, 2007).
- viii. **Control of HIV and AIDS:** HIV prevalence among adults (15-49 years) in Tigray is 2.1% and 4.2% among pregnant women.

There are 41 PMTCT sites located within 12 hospitals and 29 health centers, which are not adequately utilized; only 13% antenatal care attendants were tested for HIV in 2006 among which 17% tested positive. Poor counseling skills, low literacy level, fear of being divorce and lack of permission from husband are the likely barriers of utilization of PMTCT (TRHB, 2007).

- ix. **Managing of abortion:** Safe abortion care is a care given to a woman for early abortion and manage unwanted pregnancy with safe services and professional care (WHO, 2003). It is one of the leading gynecological admissions in the province (TRHB, 2005). The policy allowing safe abortion and nurses and midwives to undertake this procedure at health centers may improve women survival, however people are not aware about the existence of such policy (Otsea, k. and Tesfaye, S. 2007).

Baseline survey conducted in 2007 showed that there was limited availability of safe abortion care; only 14 and 3 health facilities offer basic safe abortion care and comprehensive safe abortion care respectively. Even the centers offering basic safe abortion care the health workers lack the skill to conduct induce abortion (Otsea, k. and Tesfaye, S. 2007).

4.6 Enabling environment

Enabling environment are policy frame work, community participation, political commitment and intersectoral collaboration to enhance skilled attendance at birth and EmOC (Canavane, 2008; MacDonagh, S. 2005).

- i. **How the health policy and RH strategy does works in practice?** Enshrined within the policy frame work is the right of women to have skilled care during pregnancy and delivery. Similarly, skilled birth attendant have legislative responsibility of life saving procedures. In Tigray the policy gives priority to maternal health but it faces the challenge of shortage of skilled birth attendant. In the region there are only 13 midwives and 157 junior midwives with limited access to EmOC especially for rural women (TRHB, 2005).

The implementation of the RH policy in the province is also confronted by inadequate budgetary allocation and misuse of donor funds coming through SWAP because of the liquidation approach. Salary of health workers and overhead cost competes with the essential requirement of EmOC on the meager fund available. This translates to inadequate medicine and supplies and poor quality of obstetric care (TRHB, 2007).

Tigray has a plan to improve health financing by introducing health insurance system. Equally, the policy of free obstetric care to those women who cannot afford is being roll out (TRHB, 2007).

- ii. **Community participation:** Community participation from design through implementation to monitoring of RH programme promotes community ownership and sustainability; Men, women and non-governmental organizations should be fully involved. A good practice is the participation of a local NGO Tigray Development Agency (TDA) in fistula prevention and repair campaigns, where the organization works with local groups to mobilize community and supports women with fistula to access treatment (Hamlin Fistula International, 2009).
- iii. **Political commitment:** Political commitment in this case is considered as the political will to support obstetric care in case of financing, policy, gender, equity etc. Tigray has low political with per capita health expenditure of 3 USD in 2007 (TRHB, 2007) dwarf the obstetric care with shortages of logistics. Besides low financing the region do not negotiate for midwives posting from MOH. Further it has also poor advocacy with donors to increase availability of skilled birth attendant to train, deploy and retain. However the regional health bureau trying to improve: office vehicles were changed to function as ambulances provided to remote districts such as to remote district Erob in Tigray. Besides this ambulances belong to Red Cross was negotiated to be ambulances of health centers and hospitals my observation.
- iv. **Intersectoral collaboration:** Maternal health challenges can only be addressed adequately through multi-sectotal collaboration, since most of the issues are outside the purview of public health. Ministry of education, social development and women affairs have crucial roles to play. Long term disabilities like obstetric fistulae demand the attention of sectors with relevant competencies (TRHB, 2007).
- v. **Poor Health Management Information System (HMIS):** Although, in some districts there are computer and internet facilities, data management and is poor as a result of inadequate skills and commitment (TRHB, 2007).

From the foregoing discussion it is apparent that strategies are being put in place to address lack of transport and access to care for long term complications like fistula center in the region and community involvement in provision of family planning services and use of misoprostol to treat postpartum hemorrhage.

Low political commitment, low financing of the health sector, inadequate midwives and incompetent health workers, poor accessibility to

emergency obstetric care especially rural women are some of the challenges. Poor socioeconomic status and harmful cultural practices are some of the barriers on the demand aspect. These factors lead to low skilled attendance at child birth and high mortality in the province.

CHAPTER 5 Best practices in terms of skilled attendance at birth including EmOC from elsewhere especially Sub-Saharan Africa.

There are demand and supply factors that hinder woman from using skilled attendance at child birth including EmOC. Some of the demand factors are educational level of women, income, cultural beliefs, and norms in decision making. Supply side factors are distance, roads, communication, referral system, availability of skilled birth attendant with competency.

Addressing financial barriers to improve skilled birth attendant

There are lessons learned on how to improve skilled attendant and EmOC in areas with high MMR in Sub-Saharan Africa including Ethiopia. In Ghana they removed financial barriers by revising policy of health care financing in 2003 to address out of pocket payment for obstetric care. Exemptions for delivery were established. Transport cost and other logistics such as drug were not included in the package. The exemptions doubled skilled attendance during delivery from 10% to 20% (Fikree, F et al, 2007). However, in 2008, the government did not provide funding for the exemptions as a result, the policy was not effective, and facilities started charging obstetric care. However, there is the introduction of health insurance which covers cost of care including obstetric care. The challenge has been most poor women are not yet registered with an insurance scheme and often start registration when they are pregnant and during the second trimester. By the time the insurance cover is activated, they would have already delivered and therefore not benefitted from the health insurance (Fikree, F et al, 2007).

In Indonesia community midwives have been posted in rural areas. Therefore in each village a woman does not need to travel long distances for delivery by a skilled provider. This has resulted in increased deliveries conducted by a skilled provider from 22% to 66% in urban and from 18 to 55% in rural in 1990-2003. However the benefits increased more among the rich than the poor woman. The government tries to compensate this to cover the financial barrier to all poor women by health insurance. But in practice only 22% of the poor woman got a health insurance card (Fikree, F., et al 2007).

Increased number of skilled birth attendants

Increasing the number of skilled birth attendant in Ethiopia, Amhara region and giving competency training significantly increased utilization of skilled care (Mekbib, T. et al, 2003). Utilization of BEmOC and CEmOC is closely linked to increased number of trained competent skilled birth attendant. A study in Ambo after investing such as increased number of trained skilled birth attendant, availability of drugs and supplies with regular supervision, monitoring and evaluation of performance of two

health centers (Shenen and Ijaji health centers) between 1999-2001 the number of institutional deliveries increase from 38 to 206 health center (Shenen health center) and from 76 to 326 (Ijaji health center) respectively, this shows that a six fold increase in utilization of skilled delivery including EmOC (Mekbib, T. et al, 2003).

Malawi faces severe shortages of skilled birth attendants with high MMR in 1999-2002 due to HIV, outmigration, low salary, work load and lack of supportive supervision etc. Malawi MOH creates advisory committee for health. They consist of members from church health association professional committee for health: DFID, Global fund (MacDonagh, S. 2005). The church health association support in training and the Global fund assist in fund. It has new innovative strategy to retain skilled birth attendant: by employing retired health workers, providing scholarships and periodic increase salary, incentives includes housing, communication, transport etc. They also increase skilled birth attendant by expanding pre-service and in-service training: by increased midwifery training schools with skills. In their plan includes adequate procurement of essential drugs, supplies which provides a good working environment and encourages retention of the health work force (WHO, 2008; MacDonagh, S. 2005).

Addressing quality of care among skilled birth attendant

In Burkina Faso by improving quality of care provided at facility level, skilled attendance at birth increased compared to facilities with poor performance (Fikree, F. et al 2007). To increase skilled attendance at birth, they looked at demand and supply side factors. To improve quality of the supply side they strengthened the health management team especially at the health center, provided adequate essential drugs, in-service training for skilled birth attendant to improve EmOC and to improve barriers to referral. They used radio calls for consultation to doctors for case management. To address some demand factors they increased awareness of the importance of skilled attendance at birth not only to women but also influential persons on decision making like husband, religious leaders etc increased skilled attendance at birth to about 10%. The challenges faced during this implementation were that auxiliary midwives assigned in the health center as in WHO did not fit the criteria of skilled attendance at birth (Graham, W. et al, 2008; Hatt, L., et al, 2007).

In Amhara region, Ethiopia, shows that not only training of skilled attendant improves quality of BEmOC and CEmOC but also needs skills for regular supervision to ensure availability of essential drugs anticonvulsants such as Magnesium Sulphate, antibiotics, blood supplies, oxytocin and guidelines for quality assurance woman during delivery use to follow the progress of labour they use partograph, universal infection prevention, vital registration of births and deaths for maternal audit and HMIS (Mekbib, T. et al, 2003).

Maternal audit is an important tool to the identification of poor quality of obstetric care services and efficient EmOC services. If criteria based audit is effectively used it improves quality of care and accountability of the health system, thus reduces maternal and neonatal deaths. In Malawi a retrospective study of 60 obstetric emergencies referred from health centers (Kongnyuy, E. et al, 2008) were compared with the established standards set for optimal referral of EmOC. This identified weakness and gaps of referral system measures were put forward and implemented for three months. The audit results show that a significant improvements in standards and case management by a doctor at arrival at hospital improved communication between hospitals and health centers improved. Another study in Thyolo district in Malawi used an audit of uterine ruptures as an indicator for quality of EmOC in hospitals with high incidence of uterine rupture and shortage of skilled attendance at birth. The audit was effective in making conscious the consequences for clinical mistakes observed. The audit result was good with constructive ideas, open discussions and learning experiences rather than blaming one another. Self criticism from different cadres of staff was encouraged and respected (Kongnyuy, E. et al, 2008).

Improving the policy environment

Skilled attendance at birth is an effective strategy to reduce MMR which set as target in MDG 5. However, skilled attendance at birth cannot stand alone by itself as MMR is caused by different determinants. The focus to improve skilled attendance at birth is a collective action of strategies. In Sri Lanka MMR significantly reduced from 1,056 per 100,000 in 1947 to 27 per 100,000 in 1992 and in Malaysia from 543 per 100,000 in 1950 to 18 per 100,000 in 1991. Lessons from Sri Lanka were safe motherhood strategies by looking at government both at local and national level, health system and communities (Pathmanthan, I. et al 2003).

In Sri Lanka the government has high political commitment to health of citizen's by giving priority to vulnerable groups' of woman, children and old age. They also increase basic midwifery training for 18-24 months and focus on technical competency and allocation of adequate resources. In addition to political commitment they have good sectoral collaboration. This includes free provision of education without gender discrimination and the net enrollment 97% for males and 98% for females to increase women awareness on decision making and ensuring trained skilled birth attendant. Besides this to avoid barriers of transport cost the government assigns ambulances and where there is no ambulance in the facility to refer to EmOc facility, the health worker organizes for taxi or other vehicle and the MOH reimburse the cost of transport (Pathmanthan, I. et al 2003).

The health system in Sri Lanka made frontline midwives available at every household level with cheap cost and training. These midwives were locally

recruited with in order to retain and respect socially acceptable cultural norms of the society. This front line midwives supervised by nurse and Public Health Midwives. This is also linked to EmOC and skilled attendance at nearby clinics, hospitals and referral EmOC facilities with Obstetricians. During home visits midwives, they give continuous education on safe motherhood packages such as family planning, antenatal care, skilled delivery etc. and this increases women awareness on decision making and using skilled attendance at child birth including EmOC (Pathmanthan, I. et al 2003).

CHAPTER 6 Conclusions and Recommendations

6.1 Conclusion

Maternal mortality and addressing where there are shortages of skilled birth attendant is a global problem especially the later (WHO, 2005). Maternal health is one of the MDGs indicator 5 and yet it is unlikely to be achieved if the ways maternal services are being provided do not improve in Tigray, region Ethiopia.

Low income, illiteracy and cultural barriers influence the use skilled attendance at child birth at household/community level. If there are ineffective strategies at household and community levels to get women to use the services of a skilled attendance at birth, even if a facility has enough skilled attendance at birth, they will not be providing services to the women who in the first place, are delivering at home due to various barriers. The situation in Tigray shows that facilities have insufficient skilled birth attendants when compared to WHO recommended standard of at least one skilled attendant for 200 births every year. In Tigray region, skilled attendants are assigned in the health centers and hospitals in the district and towns ignoring the majority of the rural population. Health posts in rural areas are staffed with unskilled providers such as health extension workers who also conduct deliveries without the required competency needed and they fail to detect early cases for referral.

There is no means of transport for referral among the health posts in rural kebeles (small administration units) and the road condition is poor. In addition to socioeconomic and cultural factors affecting access to BEmOC and CEmOC, the quality of obstetric care is poor and fails to save the lives of women.

Many women die due to child birth-related complications, which can be prevented by ensuring access to competent skilled birth attendant, well resourced working environment that is supported by a policy framework that also addresses community participation, intersectoral collaboration, adequate funding for maternal health care and political commitment to support increased skilled attendance at child birth including EmOC.

6.2 Recommendations

Based on the study findings, how can mothers' lives be saved in Tigray region, in Ethiopia?

To ensure skilled birth attendance at birth possible: provide training to give skills that save lives.

Ministry Of Health (MOH)

Ministry of health should conduct research on community perception on skilled attendance at child birth including understanding of cultural beliefs that hinder decision-making to seek skilled attendance at birth including EmOC. MOH should focus on developing legislation and policies to scale up health extension workers and formulate guidelines and protocols on BEmOC and CEmOC. It should also develop manuals and implement guidelines on obstetric care and at the same time strengthen inter-sectoral collaboration other sectors. Furthermore, it should commit and develop strategies that encourage equitable distribution of skilled birth attendant in urban and rural settings.

Currently, the curriculum of health extension workers does not include recommended skills for skilled birth attendant yet they are expected to conduct deliveries. To upgrade them to skilled birth attendant, a curriculum should be designed to scale up health extension workers, in-service training for one year and eight months to have midwifery skills at community and at health posts to be skilled as per WHO standards. They should be supervised by midwives at health center and given refresher training to update their knowledge and skills.

Regional government state of Tigray

Regional government in the state of Tigray should increase capital and recurrent budgets to adequately finance obstetric care to make sure drugs, equipment and supplies are adequate for the exemption policy for obstetric care to be effective. Also, the region should consider incentives to health professionals especially skilled birth attendants such as night duty allowances, housing, scholarships and salary increment. The region should carry out an assessment of EmOC services in order to understand the status of the services. Based on the findings, the region should define specific short and long-term strategies to address the challenges identified.

Tigray Regional Health Bureau

Develop policy together with MOH for long-term training and scaling up of health extension workers which are available at health post and can be trained for one year and eight months in order to attain a certificate after training for one year and eight months in BEmOC.

Increase midwifery training schools providing skills and train for human resource and management plan. Continue usual midwives' training in place updating for those already practicing. Continue training of the existing health officers instead of doctors to offer CEmOC, and institute systems to monitor quality of obstetric care such as maternal death audits, criteria-based audits focusing on improving referral system. Use the findings from the audits to improve continuously, the quality of care in

the facilities. Equip the hospitals, health centers and health posts with all the necessary supplies and equipment.

Ensure quality assurance for the provision of obstetric care using standard protocols such as use of partograph for the management of labour, improved training including in medical schools, record keeping and documentation. Monitoring and supervision should be carried out together with refresher trainings so that it addresses the problem of inappropriate management of cases or delays caused at health facility.

Improve health financing

The introduction of the planned health insurance should ensure coverage of obstetric care costs. In addition to the obstetric care services the government should have to tackle other barriers of skilled attendance at birth such as means of transport as experiences of other countries where means of transport was absent from insurance cover, the cost should be reimbursed by the Tigray regional health bureau. Strictly most poor women should be registered earlier with an insurance scheme before they become pregnant and fast-track registering of already pregnant women so that they benefit from the insurance during delivery.

District Health Offices (DHO)

Improve supervision, monitoring and evaluation of obstetric services
District health office should perform monitoring and evaluation analyses of the existing situation to know the reasons behind low utilization of skilled attendance at birth including EmOC. Ensure enabling environment by health staff and community participation for solutions to referral means.

Hold quarterly meetings at the regional, districts level and increase communication between health centers and hospital-based clinical staff to help improve on referral, emergency transport and involve influential community leaders.

Improve referral for further management of obstetric care

Community health workers should serve as a linkage between community and skilled birth attendant when a woman is pregnant, delivery and 42 days post-delivery and they should support in community mobilization of preventive programs.

Health workers

Provide culturally-sensitive services

Health workers should respect women's culture, belief, and should be friendly, keen or willing to assist women in labour. They have to give

proper health information to the women to encourage utilization of skilled attendant at birth including EmOC.

Community

The community should be fully involved in creating awareness of services during pregnancy, complications, and should actively participate in establishing initiatives that will ensure access to a skilled birth attendance such as having community health committees that organize local transport schemes and encouraging women to use skilled attendance at child birth.

The community should plan for birth preparedness during pregnancy, delivery and within 42 days after delivery seek postnatal care with a skilled attendant. The community should work with civil society and other local organizations in advocating for improved quality of obstetric care and safe motherhood in general.

NGOs

NGOs should play a leading role to increase resource allocation such as funding drugs, equipment and other needs for EmOC services, to health post, HC and hospital.

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Annex 1

1a. Operational indicators used

Indicators	Numerator	
	Denominator	
Antenatal coverage	Number of first antenatal visits	X100
	Estimated number of deliveries	
Deliveries attended by skilled health personnel	Number of deliveries attended by skilled health personnel	X100
	Estimated number of deliveries	
Family planning acceptance rate	Number of new and continuous acceptors of family planning services	X100
	Number of non-pregnant women in fertile age(15-49 years)	
Potential health coverage	Number of primary health facilities by respective standard number of population to be served	X100
	The sum of these numbers by the total population	
Per capita public expenditure for health	Total public expenditures for health	
	Total population	

Source: (TRHB, 2007, p.55) Tigray Health Bureau Profile, Mekelle

1b. Types of health facilities required and actual to standard coverage in Tigray

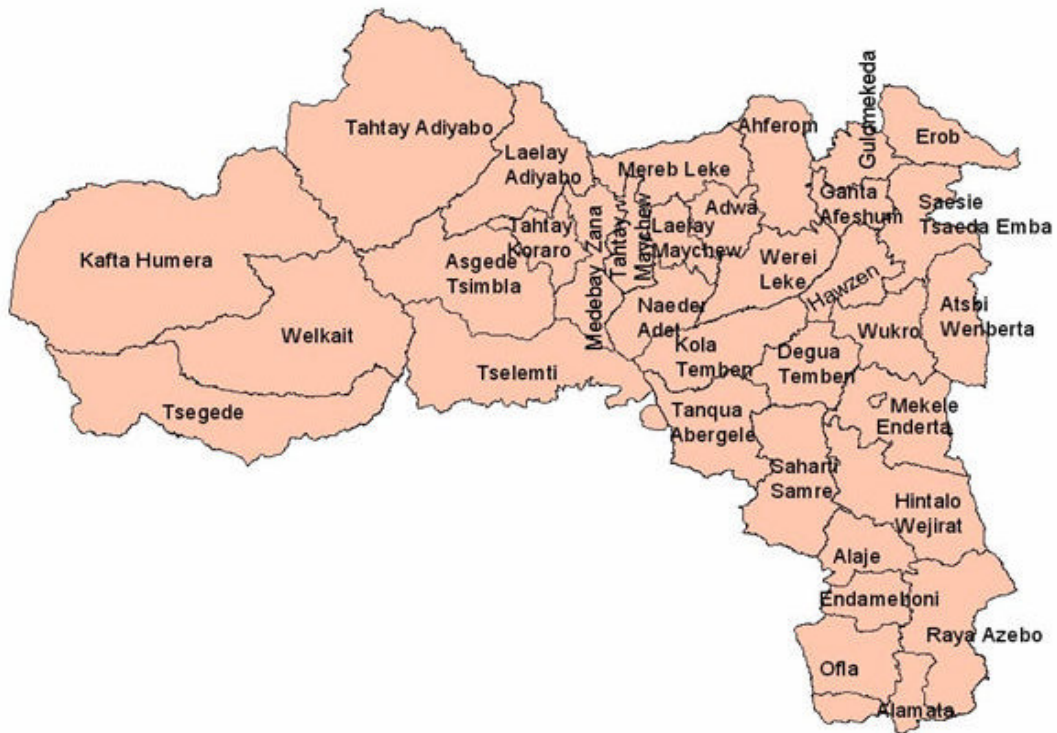
Type of health facilities	Required	Government (Public)	Private		Total	shortage	Standard coverage
			For profit	Non profit			
Referral Hospital	1	1	0	0	1	0 but non functional	4-5 000,000
Zonal Hospital	5	5	0	0	5	0	1:1000,000
District Hospital	17	7	0	0	7	-10	1:250,000
HC	172	42	0	0	42	-130	1:25,000
Health Post	862	600	0	0	600	-262	1:5,000
Clinic		0	25	16	41		

Source: (TRHB, 2006/07)

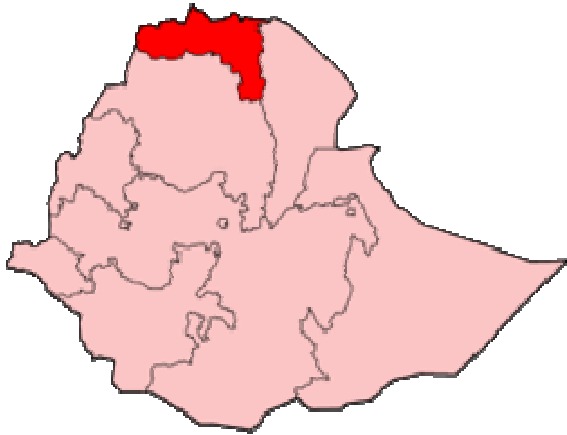
*for private clinic FMOHE, 2006/07

Annex 2

a. Map of Tigray



b. Map of Tigray, Ethiopia



Source: (TRHB, 2007) Tigray Health Bureau Profile

