FACTORS INFLUENCING USE OF INSTITUTIONAL DELIVERY CARE SERVICES IN ERITREA: PROVIDING SUGGESTION TOWARDS IMPROVEMENT OF SKILLED BIRTH ATTENDANCE (SBA) IN HEALTH FACILITY.

By

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Eritrea

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Factors influencing use of institutional delivery Care Services in Eritrea: Providing suggestion towards improvement of skilled birth attendance (SBA) in health facility.

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 'Factors influencing use of institutional delivery care services in Eritrea: Providing suggestion toward improvement of skilled birth attendance (SBA) in health facility' is my own work.

Signature: 

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Table of Contents

List of figures/tables

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Abbreviations

DHS	Demographic and Health Survey
EmOC	Emergency Obstetric Care
EPHS	Eritrean Population Health Survey
GDP	Gross Domestic Product
GFR	General Fertility Rate
IMF	International Monetary and Financial
MDG	Millennium Development Goal
MMR	Maternal mortality ratio
MMRate	Maternal mortality rate
MOE	Ministry of Education
MOH	Ministry of health
PP	Purchasing Power-parity
SBA	Skilled Birth Attendant
TAG	Technical Advisory Group
TBA	Traditional Birth Attendant
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
USA	United States of America
WHO	World Health Organization

Definition

Maternal Mortality: "The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes"(WHO 2014).

Maternal mortality ratio (MMR): "the number of maternal deaths during a given time period per 100 000 live births during the same time period" (WHO 2009).

Maternal mortality rate (MMRate): "the number of maternal deaths in a population divided by the number of women aged 15–49 years or woman years lived at ages 15–49 years" (WHO 2014).

Skilled Care: "is a quality of care to the women during pregnancy, childbirth and postpartum period and her infant provided by a skilled personnel supported by an enabling environment (necessary equipment, supplies and medicines and infrastructure) and functional referral system" (WHO 2012).

Skilled Birth Attendant (SBA): "is an accredited health professional such as 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 postpartum period, and in the identification management and referral or complications in women and newborn" (WHO, 2008).

Traditional Birth Attendant (TBA): "traditional, independent of the health system, not formally trained and community based providers of care during pregnancy, childbirth and the postpartum period. TBAs either trained or not, is excluded from the category of skilled health workers" (WHO, 2004).

Abstract

Background: In Eritrea about 25% and 45% of the maternal deaths occurred during delivery and 24 hours of post delivery period respectively. Skilled birth attendance (SBA) in health facilities is low (34%) and 66% of women get birth at home assisted by unskilled traditional birth attendants and/or families.

Objective: To analyze & explore the factors for underutilization of institutional delivery care. And provide recommendation towards improving use of SBA in health facilities.

Methodology: Literature review on factors influencing utilization of institutional delivery care services at birth. The three delay model is used to address the objectives of my thesis.

Findings: The three delays factors; socio-economic/cultural factors, the actual & perceived accessibility and quality of care are the main factors hindering women from utilization of institutional delivery care services at birth. SBA in health facility was found very low among poor, uneducated and rural women.

Conclusion: The three delay factors, delay in decision to seek care, delay to reach health facility and delay to receive adequate &quality emergency obstetric care are the factors for underutilization of institutional delivery care by skilled birth attendants (Bas).

Recommendation:

- Improve the health seeking behavior through educating, informing and mobilizing women, family and community.
-Delegation of obstetric life saving care to lower levels by providing short training to Doctors and and Nurses/Midwives to practice safely.
-Improve quality of care through training health worker and equipping the health facilities with necessary equipments, drugs and supplies.
-Establish reliable transport, communication and referral system through community and public-privet partnership.

Key words: SBA, institutional delivery, home delivery, maternal mortality, three delay model.

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Introduction

I am clinical laboratory scientist (CLS) graduated from University of Asmara in 2002. I have worked in National blood transfusion services of Eritrea for seven years. The maternity hospitals were one of major clients in the blood transfusion services. I have also observed large number of women delivering without skilled birth attendants (SBAs) at home especially in rural areas.

Pregnancy and childbirth is the biggest health risk of disability and death for women especially in developing countries (UNICEF 2009). Globally each year an estimated of 289,000 women die from complications related to pregnancy and childbirth. Another 5.7 million women suffer with severe disabilities. More than 99% of maternal death is in developing countries and 62% in sub-Saharan Africa (WHO 2014).

In Eritrea maternal mortality ratio (MMR) was 380 deaths per 100, 000 live births (EPHS 2010), and the current MMR is estimated to be 240 deaths per 100,000 live births (WHO 2014).More than 50% of maternal death can be prevented by skilled delivery and post delivery care in health facility (WHO 2014). Maternal health is one of the priority interventions in the health strategic plan of Eritrea 2010 - 2016 (MOH 2010). The priority is to improve access, availability and quality of emergency obstetric care in order to reduce maternal and newborn morbidity and mortality (MOH 2010). In Eritrea underutilization of SBA in health facility is a problem. Only 34% of births are attended by SBAs in health facilities (EPHS 2010). Large proportions of maternal deaths are also happened during birth (25%) and 45% within 24 hours of post delivery periods.

This thesis aims to explore the factors contributing to underutilization of institutional delivery care services in Eritrea. The results will provide evidence based recommendations to improve utilization of SBA in health facilities.

CHAPTER 1: BACK GROUND INFORMATION

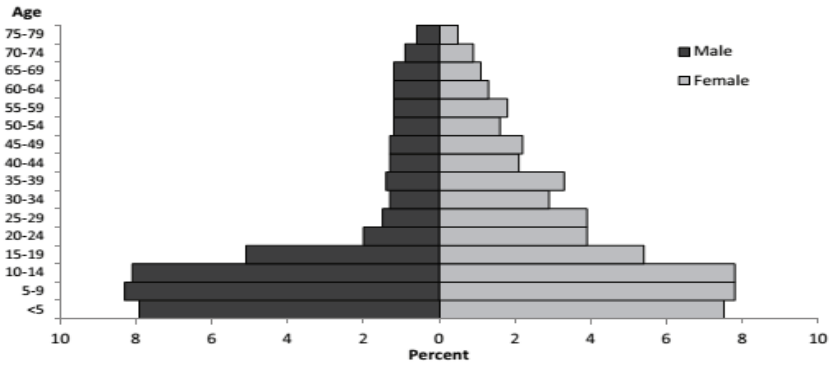
1.1 Geography and Climate

Eritrea is located in horn of Africa along the red sea coast and shares border with Djibouti, Sudan, and Ethiopia. It has total area of 122,000 square kilometer. It is administratively divided into six zones (zobas), 58 sub-zones, 704 administrative areas, and 2,580 villages (EDHS, 2002). Eritrea has three main topographical regions: the arid mountains, temperate weather of highlands and desert at red sea coast. The mountainous nature of the land scale and the poor road infrastructure makes transport difficult especially during the rainy season. Animal transport is common in rural and remote areas of the country.

1.2 Population Demography

Eritrean population size is estimated to be 3.2 million (EPHS 2010).The population growth rate is 2.4% and crude birth rate of 32.1 per 1000 population (UNFP 2013). The country has large younger age distribution about 47% of the total population are under 14 years; 42% between 15-49 years and 11% above 50 year. The average fertility rate is 4.8 per women of the reproductive age. It is higher in rural areas 5.7 per woman compared to 3.2 per woman in the urban areas (WHO 2014). Life expectancy at birth is 61 years for male and 66 years for female. Almost 80% of the population lives in rural areas; depending on agricultural, live stock and pastoral activities. The high land population is dominant in economic and political environment while the low lands are mostly nomadic with no definite settlements (EPHS 2010).

Figure 1.1 Eritrean population pyramid 2010(Source: EPHS 2010)



1.3 Socio-cultural and religion beliefs

Eritrean population consists of diverse cultural traditions inherited from parts of the world including Middle East Arabs , Ethiopia and other parts of Africa. It has nine ethnic groups with two major religions almost 50% Muslim and 50% Christian. Christianity culture plays an important role in shaping the people mode of life in high lands and Islamic culture is dominant in the low lands. Polygamy marriages are common in the low lands of Eritrea where Muslim religion dominant and taken as part of religious norms for Muslims.

1.4 Socio-economies

Eritrea is one of the low-income countries in the world. In 2012 the GDP per capita was 450 US$ and the current GDP per capita adjusted in purchasing power in dollar is 542.17 US$. More than 53% of the population lives under National poverty line (World Bank 2014). According to the African economic outlook report Eritrean economic growth was estimated 6.3% in 2012 because of the mining products of Copper, Gold, and Zink (UNDP 2012). The country economic growth and development was heavily disrupted due to the border conflict with Ethiopia resulting excessive destruction of financial and human resources. Though the conflict resolved it is still in "no peace and no war" situation because the border has not been demarcated. The large percentage of the labor force tied up in National military force continues to interfere with agricultural production and economic development of the country. According to the International Monetary and Financial (IMF), in 2013 the total GDP of Eritrea was 3.44 billion US$ with GDP growth rate of 1.33%. However the persistent economic burden and poverty are still widely spread in the country.

1.5 Education

The Eritrean education system is administered by the ministry of education aimed to make basic education available to all. Despite of the challenges in number, capacity and quality of training institutions, the education policy intend to promote equal opportunity in terms of access, equity, relevance and continuity of education to all citizens. Eritrea has made notable progress in improving literacy level of the population after independence by introducing adult education programs.

In 2008 the national literacy rate was 67% with wide disparity of literacy between the six regions, sex and residence. The literacy level was 56.3% for female and 73.6% for male. The literacy ratio in urban was 82.6% and 53.6% of rural residents. According to the education management information system 2008-2012, the primary school gross enrolment ratio of female was 42.1% and 51% for male. The secondary school participation net enrolment ratio for female was 25.4% and 31.7% of male (MOE, Eritrea 2012). Education is a base to development and women's empowerment as well. However the very low women enrolment in secondary and higher education is a big challenge, especially in rural areas of the country.

1.6 Political Environment

Eritrea has got independence in 1991 after 30 years war with Ethiopia. In 1993 the independence was approved by almost 99.9% results of referendum. Women's involvement and role in the Eritrean liberation front was also brought a tremendous influence on the equality and empowerment of women status in Eritrea (Stefanos 1997). In 1997 the Government of Eritrean approved the new constitution with the broad participation of all sections of the population residing in the country, as well as Eritreans living abroad. However, this has never been put into practice, and Eritrea's first elections were postponed indefinitely following the outbreak of the border conflict with Ethiopia in 1997 (Weldehaimanot 2007). Despite of the border conflict, political instability and economic burden of the country Ministry of health and health professionals have good commitment towards improvement of their population health.

1.7 Health care system

The description of the health care system in this section includes: the health policy, health strategy and health care structures, reproductive and maternal health care system, and Health care financing.

1.7.1 Policy, strategy, and health care Structure

Eritrean health policy was developed in 2006 with a vision to improve the health status of people by creating enabling environment to provide sustainable quality health care that is acceptable, affordable and accessible to all citizens (MOH 2010). The Ministry of Health is making efforts to improve the capacity of health facilities, as well as the academic institutions

in Eritrea. As a result of concerted efforts to expand health services by building health facilities and equipping them with the necessary equipment and skilled health personnel, access to health care services was improved gradually since independence (EPHS 2010).

The Eritrean health care system is based on primary health care model and is fully provided by public health care facilities except few faith mission health centers. The Health care structure has three levels: primary, secondary, and tertiary level health care facilities (MOH 2010).

Primary care (level-I): Community based health service (CBHS) is the catchment area with an estimated average population of 500-2000 people. CBHS provides basic health care package at the community level. Health stations are the first contact health facility provides preventative care mainly immunization, antenatal care, control of communicable diseases and basic curative services. The health station serves for about 5000 to 10000 population. Health centers are larger than health stations provide curative and preventative care, including mother and child clinics. In addition health center are responsible to supervision of health stations and provision of training to community health workers and traditional birth attendants. Community hospital is in a sub-region level provides general medical and obstetric care, basic laboratory support services, minor surgical procedures and deliveries and supervision of health centers. Community hospital serves for about 50,000 to 100,000 population (MOH 2010).

Secondary care (level-II): Zonal referral hospital is the the secondary care located in regional capitals. Regional referral hospital provides General surgery, deliveries, laboratory, ophthalmic, radiology, dental, obstetric and gynecological services. In addition regional referral hospital provides support to lower level heath facilities in the regions and also used as referral center and clinical training sites for primary level. The regional referral hospitals serve for about 400 thousand to 1.7 million populations (MOH 2010).

Tertiary care (level-III): National referral hospitals are specialized facilities located in Asmara providing medical and surgical care services to the whole country. The national referral hospitals include Orotta referral hospital, Orotta pediatric hospital, Orotta gynecological/obstetrics hospital, Berhanaini ophthalmic hospital and St. Mary's psychiatric hospital (MOH 2010). It also used as training center for regional referral hospitals.

1.7.2 Reproductive and Maternal health care system

Ministry of health of Eritrea adopted the basic essential elements of comprehensive and integrated reproductive health care package. This package include prenatal, delivery and post delivery care, management of obstetric emergencies and neonatal complications (Safe motherhood); family planning services; prevention and management of infertility and sexual dysfunction; sexually transmitted diseases including HIV/AIDS; promotion of healthy sexual maturation and gender equality; protect harmful traditional practices, such as female genital mutilation, premature marriage, and domestic & sexual violence; and management of non infectious reproductive health problems such as genital fistula and cervical cancer (MOH 2010).

1.7.3 Health Care Financing

The national health financing policy in Eritrea depends on funds from government revenue, donors and fee for services. Though the country face challenge on shortage of fund the fee for services is highly subsidized by the government in public health facilities. The total health expenditure as percentage of GDP was 5% in 2012. It is three times lower than the Abuja declaration 15%. The general government expenditure on health as percentage of total government expenditure was low 3.6% (2011) compared with average of African region 8.2 - 9.6%. The privet expenditure on health 55.1% and the external resources for health as percentage of total health expenditure was 69.1% (Kirigia, JM, Zere, E and Akazili, J 2012). Despite of the government subsides still the out of pocket payment is above the capacity of the majority of the population. There is no health insurance but there is exemption for the poor by providing poverty certificate. The inadequate fund for health and absence of health insurance affects the maternal health care services.

1.7.4 Human resource for health

Eritrea has critical shortage of skilled health professional's especially doctors and Midwife's. The ratio of physician per population is 6 per 100,000 and the ratio of nurse and midwives per population is 75 per 100,000 (MOH, Eritrea 2005 & WHO AFRO 2010). The ratio health professionals per population are far from the WHO recommendation 1 physician per 10,000 and 1 nurse per 5000 population (WHO 2008). According to MOH, Human resources planning

and management report (2012) the total human resource for health at national level was 8184 employees. Out of this the 5022 (61.4%) were professionals and the remained 3162 (38.6%) were administrative staffs.

Ministry of health is making effort to address human resource for health by improving the Number and capacity of health institutions. As a result 4 new Associate Nurse schools in regional referral hospitals; and College of Medicine and Dentistry was opened to strengthen the existing colleges of Nursing, pharmacy and clinical laboratory since 2001 to 2010. In addition short course training programs are also provided in specialization of surgery, pediatrics and Gynecology and Obstetrics and internal Medicine to improve competency and motivation of health professionals (Sharan M et al 2010).

Figure 1.2 Total health workers and densities in 2008, Eritrea.

Categories	Number	Density/1000 population	Density/ 1000 population/Afro
Physicians	213	0,06	0,22
Nurses and midwives	2 747	0,75	1,17
Dentists and technicians	28	0,01	0,04
Pharmacists and technicians	151	0,04	0,06
Environ, and public health	115	0,04	0,05
Laboratory technicians	251	0,07	0,06
Other health workers	256	0,07	0,17
Community health workers	nd	nd	0,45
Management and support	nd	nd	0,41
Total	3 761	1,03	2,63

Source: Human resource for health fact sheet Eritrea © 2010 Africa Health Workforce Observatory.

CHAPTER 2: PROBLEM STATEMENT, JUSTIFICATION, OBJECTIVE AND METHODOLOGY

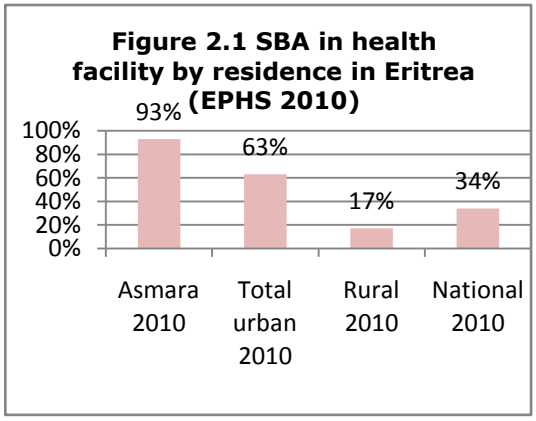
2.1. Problem of statement

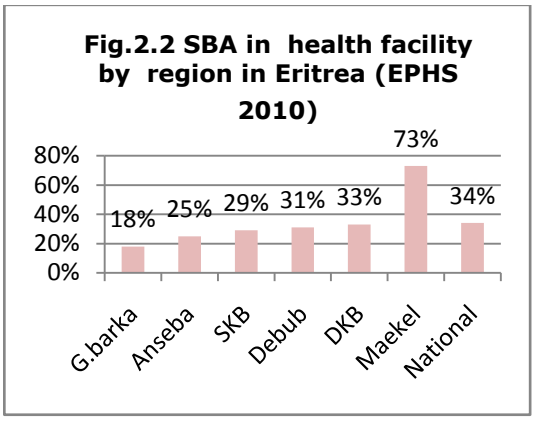
Globally every year 60 million women give birth outside health care facilities (mainly at home) and out of this 52 million deliver with unskilled traditional birth attendants (UNICEF 2009). Many African countries make improvement on maternal health care services to reduce maternal morbidity and mortality to achieve millennium development goal (MDG5) target (WHO, UNICEF & UNFPA 2013).

Eritrea made huge success in reducing the maternal mortality ratio (MMR) from 998 to 380 deaths per 100,000 live births since 1995 to 2010 respectively. The maternal deaths account 26% of all women deaths of age 15-49 years (EPHS 2010). The current MMR is estimated to be high 240 deaths per 100,000 live births (WHO 2014). In Eritrea 25% of maternal death occurs during delivery and 45% within 24 hours of post delivery period (Michael, GA et al 2004). These unacceptable maternal deaths can be addressed by improving use of skilled birth attendance (SBA) in health facility. Skilled birth attendance in health facility implies not only availability of skilled health professional midwife/nurses /physicians but also existence of enabling environment to provide quality of basic emergency obstetric care (UNFPA 2O10).

In Eritrea the number of women delivering in health facility with skilled birth attendants (SBAs) was improved from 28% to 34% in 2002 to 2010 respectively (EPHS 2010). In 2013 an estimated of 43% women use SBA in health facility and the remaining 57 % of women deliver at home with unskilled traditional birth attendants (TBAs) or family /friends (WHO 2014). The SBA in health facility of Eritrea is much lower than the average SBA in health facility of developing countries 59% (UNICEF 2008). More than 90% home-delivered women do not receive post delivery care (UNFPA 2013). More over utilization SBA in health facility is markedly low among the rural, uneducated and poor women where the fertility rate is high 5.7 child per woman (EPHS 2010). Use of SBA in health facility has also huge variation between regions, residence (urban/rural), economic status and education levels (see figure 2.2 & 2.3 page 8).

According to EPHS (2010) only 17% of rural women use SBA in health facility compared to 63% totals urban and 93% Asmara. Use of SBA in health facility in "Gashbarka" is very low (18%) compared to 73% of "Maekel" region. In addition 81% and 90% of women delivered in health institution are secondary school and above education level, and women of highest wealth quintals respectively. The gap in use of SBA in health facility shows inequitable access to skilled delivery care services. This is contributing to unacceptable high maternal deaths among the poor, uneducated and rural women (WHO 2012).





ANC is an opportunity to arrange for institutional delivery. The ANC coverage by skilled health provider was 89% (EPHS 2010). The gap between use of ANC and SBA in health facility indicates presence of barrier factors deterring mother's from use of the SBA in health facility. Use of SBA in health facility is a complex concept, which is influenced by complex and interlinking factors in perspective of the service seekers and service providers. The differentials in use of delivery and post delivery care services is due to Socio-economic and Cultural factors; Women's decision making power; Psychosocial and personality factors; and the Accessibility and Quality of health care services (WHO, UNICEF & UNFPA 1997).

2.2. Justification

Access to SBA in health facility with basic emergency obstetric care is a key to save the life of mother's and her child because more than half of maternal deaths and the majority of prenatal deaths occurred during delivery or within the first 48 hours after delivery (UNICEF 2009& WHO 2012). About 15% of all births are complicated to potentially fatal condition. Although many of the complications are unpredictable, but almost all are treatable and preventable

by skilled delivery care services (WHO, UNICEF, UNFPA & World Bank 2012). However home delivery with unskilled traditional birth attendants might worsen the complication of births and is the leading factor for maternal death. About 56% of maternal and newborn deaths could be prevented if all births were assisted by SBAs in a health facility or providing basic emergency obstetric care (State of the World's Mothers 2013).

The health of mother is crucial factor on the life of the family, especially children who are dependent on their mothers to provide food, care, and emotional support. Maternal death or disability increases the probability of child death, poor growth and development (Filippi et al, 2006). Eight million new born deaths per year and 20% of under five diseases burden is attributed to lack of adequate and quality maternal care during delivery. Children, who lost their mothers die more frequently, are more at risk of becoming malnourished and less likely to attend school (WHO 2005). The death of mothers predisposes not only to family impoverishment but also contributes to the overall poverty of a country.

Despite of the strong effort of Ministry of health to improve maternal health the underutilization of SBA in health facilities is remained as a challenge to reduce maternal morbidity and mortality. The aim of the thesis is to assess and analyze the factors hindering women from use of SBA in health facilities. The study will provide recommendation for effective intervention to improve utilization of SBA in health facility in Eritrea.

2.3. Research question

What are the socio cultural factors influencing mothers from use of SBA in health facility in Eritrea?

What are the factors influencing mothers from access to delivery care services in health facility in Eritrea?

What are the health systems related factors influencing mothers from receiving adequate and quality of delivery care services in health facilities in Eritrea?

What are the better possible practices to improve use of SBA in health facility in Eritrea from the evidence and experience of other countries?

2.4 Objective

2.4.1 General objective

The general objective is to identify and analyze factors influencing women from use of institutional delivery care services in Eritrea and provide recommendation toward improving skilled birth attendance in health facilities.

2.4.2 Specific objectives

- To explore the socio-economic/cultural factors contributing to low use of SBA in health facilities in Eritrea.
- To identify and describe the access factors influencing mothers from use of SBA in health facilities in Eritrea.
- To identify and analyze factors related quality of delivery care services contributing to low utilization of SBA in health facility in Eritrea.
- Draw on evidence to address the above factors, and provide recommendation towards improving delivery care services and increasing utilization of SBA in health facilities in Eritrea**.**

2.5 Methodology

This study is literature review based on peer reviewed articles, grey literature and reports on the factors influencing use of institutional delivery care services in Eritrea, Ethiopia, and Sudan. In addition literatures from sub-Saharan Africa and global reports are used as a reference to compare the findings. The review will analyze the factors and the related evidences for underutilization of institutional delivery care services in Eritrea, based on the three delay model. Because of the limited literature/articles from Eritrea, I have used articles from Ethiopia, eastern Sudan and joint literature review from developing countries to answer the thesis problems.

2.5.1 Search strategy

Search engine for literature review done through internet using Google scholar and Pub- Med , web sites for WHO, UNFPA, UNICEF, UNDP, Medical Journals, Ministry of Health reports, EDHS, EPHS, Peer Review Articles and Reports and KIT library. This review includes literatures related to

institutional delivery care and factors influencing use of SBA in health facility in Eritrea, Ethiopia and eastern Sudan from 2000-2013 published only in English. It is also included the relevant unpublished documents and reports. The three delay model adapted to this thesis was from 1994.

Key words: Combination of the following words is used in searching literature: maternal mortality, emergency obstetric care, Institutional delivery, skilled birth attendant, home delivery, health seeking behavior, three delay model, Eritrea, Ethiopia ,Sudan, socio-cultural, socioeconomic, accessibility, availability, perceived cost, quality of care, traditional birth attendance, decision making power, health seeking behavior ,

2.5.2 Limitations of the study

This thesis reviews the available literature. There was no much literature in Eritrea, specifically related to institutional delivery care. Due to the limitation of literature, I have used literature from neighbor countries Ethiopia , Eastern Sudan and other countries to analyze the thesis objectives. Though there is some difference in the access and quality of maternal care services and health care system in this countries but is is also possible to infer the evidences to address the problems. The socio-economic and socio-cultural belief of Eritrea, Ethiopia and eastern Sudan is similar. Most of the findings of the available literatures reviews are descriptive type. In general the the unavailability of literature in Eritrea limited the thesis objectives. Hence primary data could explore more the actual and perceived factors for low utilization of institutional delivery care services in Eritrea and this is the limitation of the literature review study.

2.6 Conceptual Frame Work

I have looked at Anderson model of health seeking behavior; Tanahashi/Knipppenberg model and the three Delay model. Anderson models provide factors influencing access and utilization of health care. The model may help to explore the interaction between the external environment; predisposing factors; enabling factors and the need factors that influence the access and utilization of health care services in relation to the health outcome (Andersen, R 1995). Anderson model may not help explain the delay factors related to quality of services. Tanahashi/Knippenberg model focuses on the health services coverage and the factors that influence the low utilization of EmOC services. The model

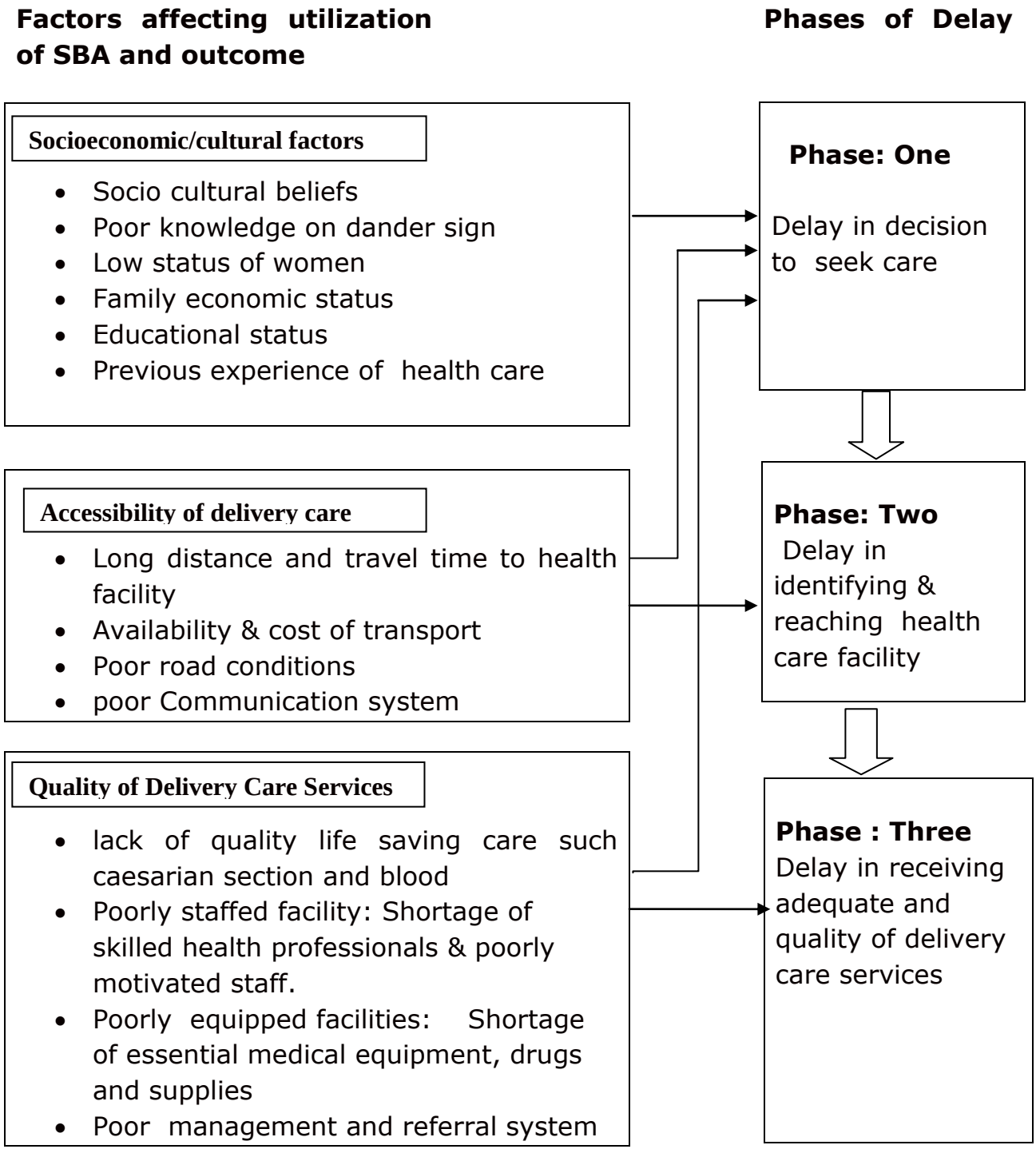
analyses the interaction between the delivery care services provided and the mothers benefit from the services but not include socio-cultural factors. The coverage of maternal health care depends on the availability of resources; distribution of health facilities; and women's attitudes towards health care (Tanahashi, T 1978 & Knippenberg et al 1990).

Three delay models were developed by Thaddeus and Maine (1994) to conceptualize the factors influencing use of obstetric care and the health outcomes. The three delay model is able to identify the factors contributing to maternal mortality. The model focuses on factors between the onset of obstetric complications and receiving adequate and quality of care for better health out come. The three delay model examined how the factors caused delay in decision making to seek care; identifying and reaching health care; and receiving adequate and quality of care. For my thesis I used the three delay model to explore the factors influencing women from use of skilled delivery care in health facility. The model will help me to examine delivery care services in Eritrea because more than 50% of births occurred outside of health facility.

Three Delay Model

According Thaddeus and Maine (1994) the first phase delay in decision to seek care includes three main factors: socio- economic/cultural factors; perceived accessibility of care; and perceived quality of care. The socio-economic /cultural factors include :- illness factors (recognition of complications, perceived severity & etiology); women status (access to money, restricted mobility, decision-making power ,value of women's health); education status; and economic status. The second phase delay focus on actual accessibility factors include: uneven distribution and location of health facility, long distance and travel time, lack and costs of transportation. The third phase delay focus on receiving adequate and appropriate treatments and quality of care at health facility (shortage of skilled of health personnel, incompetent skill, inadequate drugs and equipments, lack of appropriate referral system, unavailability of basic and comprehensive emergency obstetric care (Thaddeus, S & Maine, D 1994). Use of skilled birth attendance in health facility is influenced by complex and interlinked factors. It is beyond providing health facilities.

Figure 2.3 Three delay factors influencing use of skilled birth attendance in health facility.



(Source: Adapted from Thaddeus and Maine, 1994)

CHAPTER 3: RESULTS OR FINDINGS

This chapter will provide specific evidence from the literature to address the objective of the thesis based on the adapted conceptual framework of the three delay model. The findings are from Eritrea, Ethiopia, Sudan and other developing countries. Though there is limited study done in Eritrea. However , there are quite a number of studies done in Ethiopia, Sudan and other developing countries related to institutional deliveries which have similar characteristics to Eritrean context.

3.1. First Delay (Delay to seek health care)

There are multiple factors influencing women's decision to seek health care. The delay in decision to seek care includes three main factors: socio-economic/cultural factors; perceived accessibility of care; and perceived quality of care (Thaddeus & Maine 1994).
In Eritrea Delay to seek health care is one of the major factors contributing to 40% maternal death. The decision to seek care might be influenced by either failure to recognize the risk and consequence of the birth complications, socioeconomic and cultural factors and the perceived accessibility and perceived quality of delivery care services in the health facility (Ghebrehiwet, M & Morrow, M.R 2010). The finding was shown similarity with studies done in the neighbor countries Sudan and Ethiopia, and other developing countries.

A cross-sectional study conducted by Aweke, W & Seleshi, K (2013) in Ethiopia revealed that delay to seek emergency obstetric care in health facilities contributes to 37.8% of home delivery without SBAs. This has significant association with knowledge on antenatal care, educational status, occupation, monthly income, consultation, decision making power, preference of place of delivery; problems in previous and current pregnancy

Similarly a community based survey done in Eastern Sudan also showed that 73.4 % maternal death at birth was associated to delay in seeking medical care. The delay to seek care influenced either husband decision where to deliver, not available of health care facility nearby, cost of delivery care service and transport to reach the health facility (Mohamed et al 2011).

3.1.1 Socio-economic and cultural factors

Socio-economic and cultural factors play a major role in women's decision to seek health care and use of SBA in health facility. These factors include: knowledge on dander sign /risk of birth complication, women status, household economic status, educational status and previous experience of health care services.

3.1.1.1 Socio-cultural factors

Social and cultural beliefs have great association with women's life especially in rural areas where cultural and religious beliefs are highly practiced. Religious and cultural beliefs are thought to influence women's decision to seek health care and use of institutional delivery care by SBAs.

According to EPHS (2010) result about 12.2% of women have concerns over a male health provider, which is a barrier for use and accessing SBA in a health facility. Another study done by Mengsteab, E (2006) in Eritrea "zoba Anseba" showed that 24% of home delivery was associated with women's cultural beliefs that first child should be delivered at parents home.

Another study done in three zones of the Eritrea(Gash barka, Northern red sea and southern red sea) showed that SBA in health facility was higher among Christian women (58.0%) compared to 30.4% Muslim mothers. In addition to this 20.3%, 12.5% and 7% of women in "Gash-Barka", Northern red sea and Southern red sea respectively mentioned that male health provider as a barrier for use of SBA in health facility (Michael, G.A 2006). A similarly study conducted by Mulumebet, A (2011) in Ethiopia revealed that women with Christian religion utilize SBA in health facility more likely than Muslim women. Therefore social and cultural beliefs are one of the factors for low utilization of SBA in health facility.

3.1.1.2 Knowledge on danger sign and benefit of SBA

Knowledge of the mothers on the danger sign and complication of birth and advantages of institutional delivery care services significantly associated with women's decision to seek care and use of SBA in health facility. According to EPHS (2010) result 10.8% of women reported a lack of knowledge on where to go to seek care and 11.3% lack of permission to seek care may be from husband and family members.

Findings from a case-control study done in Eritrea indicated that a mother having good knowledge on danger signs and complication of births is more likely to use SBA in health facility than a mother with poor or lack of knowledge (Ghebrehiwet, M et al 2003). Another study done in low land of Eritrea by Michael, G.A et al (2006) showed that mothers had high knowledge on the danger sign and benefits of SBA in health facility. However mothers from "Gash-Barka" where the lowest (17%) use of SBA in heath facility had lower knowledge (78.9%) compared to 86.7% of southern red seas zone with higher use of SBA among the low lands. Moreover Muslim women had lower (81%) knowledge on danger sign and benefits of SBA in health facility than Christian women 91.8%. The knowledge also increases from 78.2% among uneducated mother up to 93.1% of secondary school level mothers.

A similarly house hold based survey done in "Zoba Anseba" showed that more than 76% of mothers have knowledge on dander signs and benefits of SBA in health facility. However the main reason for more than 50% of women to deliver at home was easy delivery, sudden delivery and absence of birth complications (Mengsteab, E 2006). This finding has consistency with studies done in Ethiopia that showed mothers having good knowledge and attitude toward danger sign of pregnancy and child birth were three times more likely to use skilled delivery care services in health facility than the counterpart mothers with poor knowledge and attitude (Mulumebet, A et al 2011 & Teferra et al 2012).

3.1.1.3 Women's status

Women's status is one of major factors influencing delay in decision to seek care and use of SBA in health facility. This includes mother's age at birth, marital status, family size and women's decision making power.

Mother's age at birth has significant association with use of SBA in health facilities. In rural areas of Eritrea early marriage is common before reaching secondary school and without knowledge on risks of pregnancy and child birth. Women who get birth at young age suffer from prolonged labour which can result to serious birth complications and/or deaths of mother and/or fetus. However the young women have better knowledge, level of education, discussion with husbands and exposure to modern information and communication technology which sensitize them to deliver in health facility

than the older women. In addition to this older women have experienced of delivery may think delivery as easy and normal event.

The EPHS (2010) results showed that mothers with age group less than 20 years tend to deliver in health facilities with SBAs more likely (43.5%) than mothers with age of 20-34 years (34.2%) and 35-49 years (30.4%). Similarly a study done in Ethiopia by Tsegay, S et al (2013) revealed that younger mothers (18-29 years age) are more likely to use institutional delivery (54%) than mothers of age 30-39 years age group mothers (39%). Another study done in Ethiopia showed that women who married at age less than 15 years were 5.4 and 5 times less likely to deliver in health facilities than women married at age 15–19 and 20–24 years respectively (Tesfay, S et al 2014).

Women's marital status and family size are also noted as factors influencing the decision to seek care and use of SBA in health facility. The gender inequality and the restricted value and role of women in domestic work (as family care givers, cooks and cleaners) become a barrier to access and use of health care facility (WHO 2009). A study conducted by Mufunda, J et al (2006) in Eritrea showed that 66% unmarried women use SBA in health facility compared to 34.3% married women because the decision making power to seek health care is shared with their husbands.

Parity or family size has also association with decision to seek care and use of SBA in health facility. Women's with first order births are more likely to deliver in health facilities (48%) than women with more than six birth orders 23% (EPHS 2010). Similarly a study done by Sharan, M et al (2011) showed that mother's with smallest family size (1-3 children) are more likely to use SBA in health facility than mothers with a large family Size(more than 4 children). This finding is consistent with many studies done in Ethiopia by Teferra et al (2012); Tsegay et al & Worku et al (2013) revealed that women with higher family size are less likely to use SBA in health facility than the counterpart women with low family size.

Women's decision making power is a factor for women's decision to seek care and use of SBA in health facility. This is influenced by residence, education level and economic status of the households. Results of EPHS (2010) showed that men attitude to women's decision making power is lower in rural area (41%) compared to 72% of total urban areas and 80% of the

Asmara. It was also lowest in "Gash- Barka" (35%) and highest (76%) in "Maekel" regions. Men's attitude on women's participation in decision making was low among uneducated (27%) and lowest wealth quintile households (28%) compared with 70% of secondary or higher education level and 76% highest wealth quintile households respectively.

3.1.1.4 Households economic status

In Eritrea only one fourth of women are employed. The women decision making power is much higher among employed women (EDHS 2002). Many literatures revealed that house hold income and economic status has strong association with utilization of skilled delivery care in health facilities.

According to EPHS (2010) results women from lowest wealth quintile households were very less likely (8.6%) to use SBA in health facilities than women from the middle wealth quintiles (22%) and 89.8% higher wealth quintile households. More than 32.6% of women reported lack of money as barrier for decision to seek care and use of the skilled delivery care in health facility. Financial hardship and constraints was higher among married and divorced women (42%), women with large family size (47%), rural women (50%), uneducated women (55%), and 57.3% women from the lowest wealth quintile households. However, it is also a barrier for 26% of unmarried women, 30% women with first birth, 24% of urban women, and 18.3% secondary or above education levels and 17.5% of women from highest wealth quintile in Eritrea (EPHS 2010).

3.1.1.5 Education status

Mother education is an important factor in deciding safe delivery care in health facility. Education is a key factor deterring the awareness and knowledge of women on the danger signs/complications of birth and benefit of SBA in health facility (World Bank 2006). In addition education is also a tool to build up women empowerment to break the economic dependency and cultural barriers to overcome the decision making power to seek health care. Many literatures explained significant association between education and use of SBA in health facility. As level of education increase the knowledge and awareness of women on use of SBA in health facility also increase.

According to EPHS (2010) results 55% not-educated women reported lack of money a barrier to use SBA compared to 18.3% secondary or above education levels. A cross sectional study done in Eritrea showed that uneducated women are less likely to use SBA in health facility (24.3%) than women of secondary school and above 83.9 % (Mufunda, J et al 2006). These findings are consistent with many studies done in Ethiopia, Sudan and many other developing countries that women's education has strong association with the use of delivery care in health facility. For instance, many study in Ethiopia shows that mother's education is strongly associated with the use of delivery care services in health facilities. Mothers with education level of secondary school and above tend to use SBA in health facilities about 11 times higher than the counterpart not educated mothers (Nugusse et al 2004 and Teffera et al 2012)

3.1.1.6 Residence

Many literatures indicate that residence has strong association with utilization of institutional delivery care services. The effect of residence is not only due to lack of access and availability of EmOC facility but also influenced by the low education level, low socio-economic status, culture, employment, gender, low decision making autonomy and lack and high cost of transport in rural areas**.**

In Eritrea more than 60% of women age 15-49 are living in rural areas. Mothers living in Asmara and other urban areas of the country were more than 5 and 4 times more likely to delivery in health facility than rural dwellers, respectively (EPHS 2010). Findings from study done in Ethiopia by Teferaa et al (2012) and Eastern Sudan Kessela region by Abbaker et al (2013) showed consistency that urban women tend to use SBA in health facility more likely than rural areas. Another study done by Tesfay, S (2013) in Ethiopia revealed that urban women have high perceived benefit towards use of institutional delivery service (98.3%) and perceived maternal health risks associated with home delivery (95.8%).

3.1.2 Perceived accessibility of health care

Women's perception on accessibility of health care services is important to make decision to seek heath care. The perceptions of the long distance and travel time, high the cost of transport and health care services as well as the opening hours of the nearest health facility desensitize mother's decision to

seek delivery care. Though there is no study done in Eritrea use of SBA in health facility is also associated with mother's previous experience during ANC visits.

The EPHS (2010) result revealed that women who do not visit ANC are less likely to use SBA in health facility than women who visited 1-3 times (18.6%) and more than 4 times ANC visit (50.2%). Similarly a study done in Ethiopia by Teferra et al (2012) and Eastern Sudan by Abbaker A et al (2013) revealed that mothers who attend prenatal care were more than 4 and 6 times more likely to to deliver in health facility by SBAs than mothers who did not attend prenatal care.

3.1.3 Perceived quality of care

Women's perception on the quality of care is a major factor influencing women's decision to seek and use SBA in health facility. In Eritrea 89% of mothers prefers to deliver in hospitals than in health centers or health station. Because of the low perceived quality of care in health centers and health station (Mufunda, J et al 2006). Findings from EPHS (2010) revealed that 12.1% and 19.4% of women tend to deliver at home due to the low perceived quality of care and long waiting time on the maternal health care services.

Similarly study done by Hailemichael, F et al (2013) in Ethiopia showed delay to seek delivery care was associated with previous experience of poor quality of care and staff attitude during pregnancy, delivery and post delivery care services. Women who had good perceived quality of care are more likely to use skilled delivery care in health facility than women with poor perceived quality of care. Many literatures in sub-Saharan countries Sudan, Kenya, Tanzania, Zambia, Gambia and others also noted perceived quality of care as a factor for the use of institutional delivery care.

3.2. Second delay (delay to identify/reach health facility)

The second delay is associated to the actual availability and accessibility of health care services including the refferal system.The physical availability and accessibility of delivery care facilities are the major factors for the delay in identifying and reaching delivery care services on time. These factors include distance and travel time to health facility ; availability and cost of

transport; poor road condition and poor communication system(Thaddeus and Main 1994).

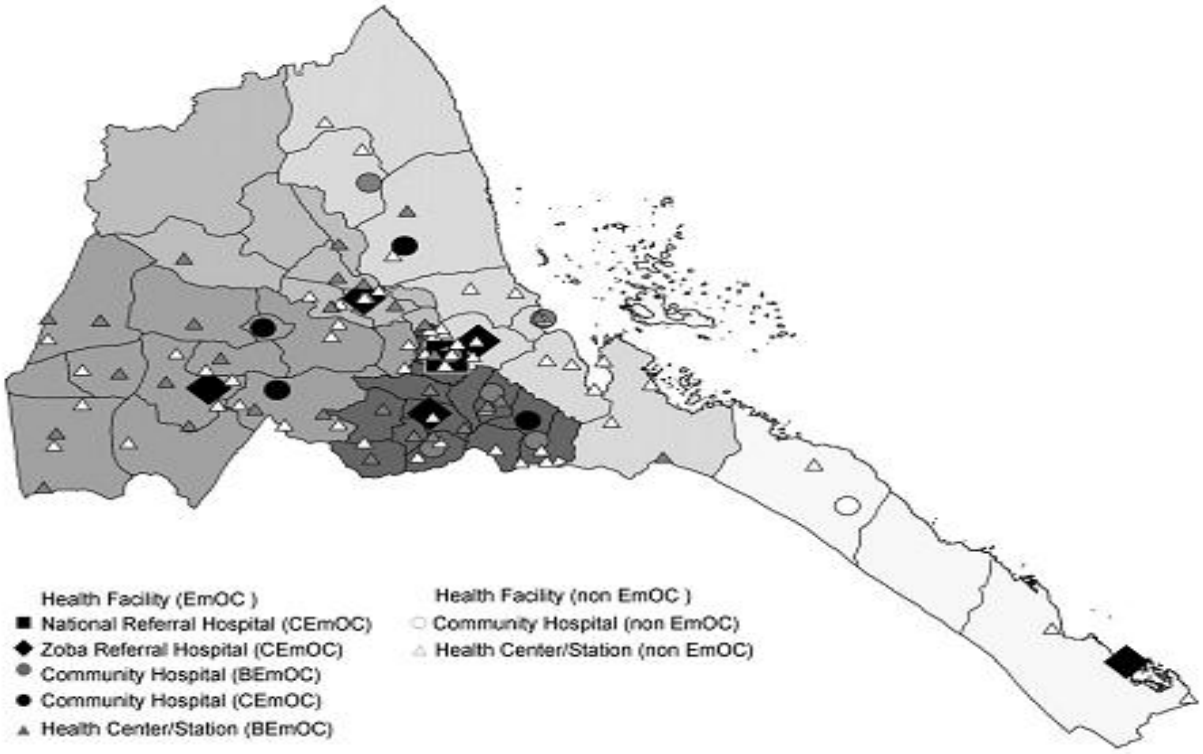
3.2.1 Distance and travel time to health facility

According WHO (2013) Eritrea has 26 hospitals, 63 health centers, 340 health stations, and negligible number of faith mission facilities. The Ministry of health Eritrea (2010) reported that 70% of the population lives within 10 km radius and more than 50% within 5 km radius from health facilities. However the country is still facing serious challenge to promote equitable, accessible and affordable quality of maternal health care services.

The physical inaccessibility remains one of the major barriers for under utilization of institutional delivery care in Eritrea. A qualitative study done by Ghebrehiwet, M et al (2003) showed that poor access to health care accounts to 38% (n=111) home delivery mainly due to long distance, high cost and lack of transport or both. The geographical distribution and location of EmOC facilities strongly influence use of SBA in health facility. The result of EPHS(2010) revealed that women decision to seek care for delivery in health facilities is due to lack of money for transportation (39%), lack of transportation (36%), and distance of health facility (33%).

Despite of the total number of health facilities the inequitable distribution remains a barrier for use of institutional delivery in rural women either because facilities do not exist in some areas, or existing facilities are not accessible. Findings from the national health facility survey 2008-2009 showed that long distance and travel time as basic factor for women to travel 81 km from community hospital and 42 km from health center to get the nearest referral hospital and if there is serious complication needs to travel an average distance of 191 km to reach the zonal or national referral hospital with a bad road may take up to 2- 9.6 hours (Sharan, M et al 2011). A case-control study done by Ghebrehiwet, M & Marrow, R (2003) revealed that 82% of the cases and 65% of controls reach health facilities within 1-3 hours while the remaining 18% of cases and 35% of the controls took more than 3 hours.

Figure 3.1 Distribution of health facilities and population density in Eritrea (the darker shaded area more densely populated)



Source: Sharan et al (2011). Int J GynecolObstet

3.2.2 Availability and cost of transport

Lack of transport and communication is the main cause of delays in the referral system of delivery care services in remote areas (WHO 2009). In Eritrea availability and cost of transport is also one of the major factor for low use of SBA in health facility. Only 61% of males and 15% females age 15-64 are employed and more than 50% of the population lives below the national poverty line (EPHS 2010).

A study done by Michael, G.A et al (2006) showed that 40% of the home delivery was due to unavailability and/or inaccessibility of emergency obstetric care nearby. In Eritrea 17% of hospitals and 41% of health centers and health stations have no ambulance. More than 84% of the households do not own any means of transportation (EPHS 2010) and the cost for private transport is high (17-36 US $) above the capacity of the general population (Sharan, M et al 2011). In addition there are also areas where no

availability of transport and women has to use human or animals as transport to reach the obstetric care. Findings from case control study by Ghebrehiwet, M & Marrow, R (2003) revealed that 46% of cases and 24% of controls used stretchers and animals to reach obstetric care services. Similarly results of EPHS (2010) showed that 29.3% of pregnant women travel on foot/stretcher /animals, 52.5% use public transport and only 18.6% use ambulances to reach health facilities. It is also worse in rural areas and lowest wealth quintile households where 43.5% rural women and 56.3% of women from low wealth quintile use foot/stretcher/ animals to reach health care facilities.

3.2.3 Poor road condition

Poor road condition has direct association with access to transport and high cost of transport. A study done in Eritrea showed that poor road condition has direct association with underutilization of SBA in health facility (Ghebrehiwet, M & Marrow, R 2003). Similarly a study in Ethiopia showed that poor road conditions such as muddy, rivers and mountainous areas are accompanied by lack of transport and has strong association with delay to seek and reach health facility which influence mothers to deliver at home (Duffy, S and Mills, S et al 2007).The poor road condition is underlying factor for disincentive even though women need to deliver in health facility.

3.2.4 Lack of Communication system

Lack of effective communication system is one of the factors for the second delay. In Eritrea only 25% households has access to telephone (EPHS 2010).The absence of telephone communication between women and health providers, and also with in health centers and hospitals contribute on delay to identify and reach delivery care services. In a study done by Birmeta et al (2013) in Ethiopia showed that women who had access to radio or television were three times more likely to deliver in health facility than those with no exposure to any mass media. Mothers also delay due to lack of information where to go to seek care.

3.3 Third delay (Delay to receive adequate and quality of care)

The delay in receiving adequate and quality of delivery care in health facility is a major factor for low utilization of SBA in health facility in Eritrea. The third delay factors include: quality of care, shortage of skilled human resources, shortage of material resources (equipments, essential drugs and

medical supplies); and inadequate management and referral system (Thaddeus & Main 1994).

3.3.1 Quality of care

Quality of care is very important factor for use of SBA in health facility. The quality of EMOC services depend on the interaction between health providers and clients. The availability of life saving care such blood transfusion , caesarean sections and other delivery related care also influence women's decision to use institutional delivery care facilities. In Eritrea the leading causes of maternal death are pre-eclampsia (22%), abortion (19.5%), postpartum sepsis (17.1%), and post partum hemorrhage (14.6%). These maternal complications can be addressed through adequate and quality of EmOC services.

According to EPHS (2010) results 12.1% of women age 15-49 years reported quality of care a barrier to use of SBA in health facility. Quality of care was a barrier for 17.9% uneducated; poor (21%) and 15 % rural compared to 6.5% of secondary and above; 5.6% of rich and 6.4 of urban women respectively. A qualitative study done in Eritrea showed that 52% hospitalized maternal death (cases) was associated with poor quality of care. In addition to this 25% survived mothers (controls) mentioned poor quality of care as avoidable factor in the delivery care facility (Ghebrehiwet, M 2003). Another study done by Sharan, M et al (2011) in Eritrea revealed that only 11 hospitals (including the referral hospitals) are classified as EmOC facilities. These hospitals can provide: parental antibiotics, use uterotonic drugs (e.g. oxytocin), use anticonvulsants, removal of placenta and retained products, assisted vaginal delivery, cesarean section and blood transfusion.
Caesarean section and blood transfusions are one of the lives saving intervention to prevent birth complications. WHO recommended normal limits of caesarean section rate at birth is from 5% up to 15%. Results from EPHS (2010) Eritrea showed that only 3% of women get birth by caesarean section and the rate is very low in four regions "Anseba", "Gashbarka", Northern and Southern red sea (less than 1%) compared to 2.3% "Debub" and 8% "Maekel".

Postpartum hemorrhage is one of the top 5 causes of maternal mortality (14.6%) in Eritrea (Sharan, M et al 2011). The incidence of postpartum hemorrhage is 40% after vaginal delivery and 30% after cesarean section

and the most important treatment of postpartum hemorrhage is blood transfusion (Jansen, A.J et al 2005).Eritrea has centralized National Blood transfusion service (NBTC) policy to provide quality blood and blood products to the entire country. According MOH (2010) report 80% of the country blood supply is from the national blood transfusion center located in Asmara. However, the accessibility is limited to only 11 hospitals mainly the National and Regional referral hospitals and hospitals where they have 24 hours electric supply and reliable transport system (Sharan, M et al 2011).

3.3.2 Shortage of skilled human resources

Despite of the strong effort of the government of Eritrea, shortage of human resource for health is remained a challenge to provide quality maternal health care. Shortage and misdistribution human resource is one of the major factor influencing the quality EmOC services and use SBA in health facilities. It hampers the provision of quality delivery care services due to shortage of skilled and competent health professionals and poorly motivated health workers.

According to the WHO (2004) definition United Nations references; midwives, nurses, physicians, anesthetists and obstetricians are the qualified staffs to provide EmOC services to mothers during birth. However Skilled birth attendance in health facility implies not only availability skilled health professional midwife/nurses /physicians but also existence of enabling environment to provide adequate and quality of basic and emergency obstetric care (UNFPA 2O10).

The national health facility survey Eritrea (2008) on maternal health system showed major shortage of skilled health professionals at all levels of the maternal health care services. In this study 91.7% of referral hospitals; 79.2% of community hospitals; and 63.9% of health centers had shortage of maternity staff. In addition more than 79% of the maternity staff satisfied on their job profession. However salary dissatisfaction is universal from 100% referral hospitals staffs; 93.7% hospital staff and 82.6% health centers staffs (Sharan, M 2011).

According to MOH , Human resources planning and management report (2012) a total of 9151 health professionals were trained and graduated at degree, diploma and certificate level from the health training institutes in the country and over sea scholarship(since 1991-2012). However the number health professionals employed in MOH at national level are 5022 (61.4%).

The general migration rate of health professional in Eritrea was more than 25%. The country is facing brain drains through migration and detention of-health professionals due to political instability, low salary, and lack of incentive, motivation and future career developments (Ratha, D et al 2011). The EmOC staff qualification is a determinant factor on the quality of delivery care services. The first step for assessing the quality of maternal health care is access to skilled health personnel (Doctors and midwifes/Nurses) to women during labour, delivery and postpartum period (UNFPA 2011).

Table 3.2 Number of health providers for maternity care and percent of shortage reported.

Health professional	Referral hospital			Community hospital			Health center/station		
	No. available	No. needed	Percentage shortage	No. available	No. needed	Percentage shortage	No. available	No. needed	Percentage shortage
Obstetrician/gynecologist	10	14	58.3	7	22	75.9	0	252	100.0
Medical doctor	7	16	69.6	12	20	62.5	4	260	98.5
Anesthesiologist	1	7	87.5	0	6	100.0	0	72	100.0
Nurse-anesthetist	12	16	57.1	7	27	79.4	0	220	100.0
Nurse	3	30	90.9	22	68	75.6	72	860	92.3
Nurse-midwife	45	42	48.3	41	66	61.7	44	572	92.9
Health assistant/auxiliary nurse	25	35	58.3	37	70	65.4	257	1432	84.8

(Source: Sharanet al 2011, Int.J. Gynecol- Obstet, doi:10,1016/j. ijgo2011.07.025)

3.3.3 Shortage of material resources

Quality of delivery care services influenced by poorly equipped facilities: unavailability of blood bank; essential drugs (oxytocics, anticonvulsants, antibiotics and painkillers) and medical supplies (syringes, needles, scissors, blade and suture materials, and gloves). In Eritrea only 7 out of 116 health facilities have onsite functional blood bank and 15 out of the 116 health facility had operating theaters. The majority of referral hospitals of community hospitals had the equipment needed for maternity services, including gynecological examination table, fetoscope, autoclave, speculum and forceps. However, 29.2% of referral hospitals, 40.4% of community hospitals and 29.8% of health centers/stations had reported shortage of equipment, essential drugs and medical supplies (Sharan, M et al 2011).

Because of the shortage of drugs and supplies women obliged to buy drug outside the public health facilities. Mothers from poor rural households have difficulty to afford the high cost of drugs in privet pharmacies and transport cost to reach health facility. Shortage of equipments, drugs and supplies is a major factor that influences mothers from receiving adequate and quality of care leading to underutilization of SBA in health facilities.

3.3.4 Poor management and referral system

Health care management and referral system is one of the factors affecting quality of care and use of institutional delivery care services. In Eritrea patients are referred from the lower primary level health centers to community hospitals and the secondary level regional referral hospitals and then to tertiary level national referral hospitals. However most of the health facilities have no protocol or guidelines on referral system and more than half of the health facilities lack ambulance for referral and other health care services (Ghebrehiwet, M et al 2003). A study done by Sharan, M et al (2011) in Eritrea noted that majority of mothers by pass health centers that offer poor quality of care in favor of the hospitals that provide relatively good quality of EmOC with skilled physicians and mid wife's and good stock of drugs even though they need additional expenses. Olsen, N et al (2000) and Jallow, A (2007) noted that it not only availability of qualified staff, capacity and management of quality of EmOC services but also the referral system influence utilization of maternal health care services.

3.4 Best practice to improve utilization of SBA in health facility

There are many lessons learned from many developing countries including Eritrea to improve availability, access, and quality of delivery care in order to increase utilization of SBA in health facility and reduce maternal death at birth. The government of Eritrea opened four associated nurse training institute in regional referral hospitals to expand the College of Medicine and College of Nursing/Midwifery located in the capital city. However the colleges are producing limited number of doctors, nurses and mid wives to the entire health facilities in the country (MOH 2010).

The Government of Gujarat, in India, innovative public–private partnership scheme in 2006 between public and private facilities to provide delivery care to poor women in rural areas. The scheme was able to enrolled large numbers of obstetricians at a relatively small delivery cost. The access of

institutional delivery, treatment of birth complications and caesareans increased in poor women in remote areas (Singh, A 2009).

In addition India established "JSY scheme" providing incentives to pregnant women to encourage ANC visit and "ASHA scheme" training of volunteer community health worker and providing incentives to recruit women on use and benefits of institutional delivery in rural Uttar Pradesh. These schemes increased the rate ANC visit and use SBA in health facility (Population Council 2010).

Ministry of Health, Ethiopia established Health Extension Program to train community health worker to recruit women and community on danger sign and complication of childbirth; and benefits of institutional delivery to progress of meeting the MDGs (Benteyerga 2011).

Ministry of health Mali established village committee to organize transportation plan and training of TBAs to identify danger sign and refer to delivery care facilities. The government in collaboration with NGOs introduced telephone or radio communication and transportation to create connection between lower and higher level health care facilities (Grieco &Turner 2005).

Indonesian community's midwives were posted in rural areas to avoid long distance and travel time of women for skilled delivery care. The number of women delivered by skilled health provider increased from 18% to 55% in rural and from 22% to 66% in urban areas. In addition the health insurance program of Indonesia was covered almost all of the poorest women, to alleviated the cost of delivery in health facility (Fikree, F et al 2007).

In 2003 Ministry of Health, Ghana introduced an exemption policy to improve the uptake, quality, financial and physical accessibility of delivery care services in public, private and faith-based health facilities. The exemption policy covers normal deliveries, assisted deliveries including Caesarean section and management of medical and surgical complications arising at deliveries. The exemption policy results an increases of facility-based deliveries among the poorest and least educated women (Ministry of health, Ghana 2004).

CHAPTER FOUR: DISCUSSION

This chapter will provide discussions on the findings from literatures review on factors influencing use of SBA in health facility based on the three delay model.

Eritrea is one of the countries on track to achieve the MDG5 showed 77% reduction in MMR between 1990 and 2013. The average annual reduction in MMR between 1990 and 2013 was -6.2%. However the average estimated MMR in Eritrea is 14 times higher (240 deaths per 100,000 live births) than the developed countries (16 deaths per 100,000 live births). The average adult life time risk of maternal mortality of Eritrean women is extremely high (1:52) compared with the average life time risks of woman from developing countries (1:160) and 1:3700 in developed countries (WHO 2014).

In Eritrea more than 25% and 45% of maternal death in Eritrea happened during delivery and 24 hours after delivery respectively. Because majority of child births are carried out at home under relatively unhygienic conditions by unskilled TBAs and/or family or relatives which can lead to high incidence of maternal and newborn death. However this maternal incidence or death can be reduced if childbirth takes place in health facilities under supervision of skilled birth attendants who has the knowledge, equipment and supplies. The immediate causes of birth related complications and deaths are due to inadequate care of mother during delivery and post delivery period.

4.1 First delay

The findings from the three countries Eritrea, Ethiopia and eastern Sudan have shown similarities in the factors associated with the first delay (delay in decision to seek care). In Eritrea socio-cultural, socio-economic, perceived accessibility and perceived quality of care are the main factors influencing women's in decision to seek health care and use of SBA in health facility.

Child birth is one of the happy events which give high social value to women in all religious and cultural beliefs in Eritrea. The social and cultural beliefs deter women's perception on risks/complications of birth and the benefit of institutional delivery care by SBAs. The social and cultural factors, knowledge, women's status and decision making power are interconnected and are difficult to tease out independently. Finding from Eritrea has been shown that religious affiliation influences the women's decision to seek care

and use of SBA in health facility. The religious beliefs limit women's access to education, decision making power, freedom movement and social interaction especially in Muslim women. Similarly use of SBA in health facility may affected by socio-cultural beliefs like first child should be delivered at family home and women should not expose bared to man even during delivery and Birth complications are related to God. This religious and cultural beliefs influence women to delay to seek care which may expose to death especially for women far from EmOC services.

Women's status such as age at birth, marital status and parity are the factors interlinked with the social-cultural factors shown in the findings. It is noted that women from low socioeconomic status joined with suppressive socio-cultural norms are less powerful in decision to seek health care and place of delivery. The Knowledge on danger sign at birth and benefits of institutional delivery care was found to be high in Eritrea. However the perception of women on use of SBA in health facility is limited with the onset of birth complication leading to delay in decision to seek care. Young women at age 20-34 years have a better education and exposure to mass media information and social interaction than the teen age women (less than 18 years) and the mother greater than 35 years.

Education is an opportunity to empower women. Empowered women have less economic dependency, better access to mass media and information, better confidence and capacity to make decision to seek and use modern health care services. In Eritrea majority of women's decision making to seek delivery care is made by family , in- laws or elderly mothers in the community. Most of the time husband (man) is involved for finical assistance. The findings shown that women living in rural areas and with low household socioeconomic status face difficulty to get money to reach health care facility on time, because of the economic dependency on their husband to get money. This influences mothers to deliver at home which may expose them to higher risk of death. In Eritrea although there is no specific study done but men involvement in reproductive health of their wife and themselves is very limited or low. Kabakyenga et al (2012) noted that male involvement in reproductive health in Uganda had shown positive association in utilization institutional delivery care services at birth.

The perceived accessibility and quality of health care services has been noted as a factor influencing mother's decision to seek health care and use

of SBA in health facility especially in rural areas located near communities health facilities. The perceived accessibility and quality of care deterred by the previous experience to access and quality of maternal health care .This is related to the availability of skilled personnel, drugs and supplies, and the attitude of service providers. Some women still tend to appreciate traditional birth attendants even though they know TAB has limited skills but the attitude and commitment of the TBA to support and respect the religious and cultural norms is more acceptable than the health workers. In rural areas where there is a strong cultural and religious' belief the male mid wife's/ nurses are not accepted by the women and society. More over the rude and unfriendly approach of health workers is also considerable factor for mothers to prefer home delivery by the TBA.

4.2. Second delay

The findings showed similarities in the actual physical accessibility of healthcare services. The long distance and travel time, poor road condition, lack and cost of transportation and lack of communication system are the main factors influencing mother's accessibility and utilization of SBA in health facilities in each country. The government of Eritrea through the MOH, tried to address the issue of equitable accessibility and quality of maternal health care services to achieve the millennium development goal (MDG-5). However the arid and mountainous geographical land scale added (cobined) with the poor road infrastructures and transportation system still remained to be a major challenge for rural women to reach delivery care services especially the remote periphery of the country. This is also resulting huge variation in use of SBA in health facility and the maternal mortality ratios between rural and urban women.

The findings from Eritrea and Ethiopia showed similarities especially in the primary health care levels where more than half of their population live above five km distance from health facilities have difficulty to reach health care services. Affordability of health care and transport was also found to be an obstacle for women to reach medical care in many countries. This is similar to Eritrea where women have difficulty to pay the direct or indirect costs including the opportunity costs of the families. The delivery care services are known as free services in Eritrea. However most of the findings showed informal costs in health facilities where women pay for services and buy drugs outside the health facility, with very high cost in

private pharmacy. Women from households with low socio-economic status face difficulty to afford the cost and preferred to deliver at home with TBA and/or family or in lows.

Findings also showed similarity on the availability of obstetric care where nearby health facilities do not provide obstetric care and referral system is poor/ not proper. In Eritrea there are limited numbers of health facility (11 hospitals) that provides basic and comprehensive EmOC services. These hospitals have inequitable distribution in the entire country and are inaccessible especially to the rural periphery areas. Therefore women have to be referred to the national or regional referral hospitals where they need to travel long distance and travel time for two to nine hours to reach. Hence women decide to deliver at home and/ or bypass the nearest health centers / health stations and to the community hospitals where they can get transport in case of emergency complications.

In addition to this findings shown that the availability and costs of transport are also found to be an obstacle for women to reach to referral hospitals where one in five hospitals and four in ten health centers and health station do not have ambulance in Eritrea. These factors contribute in delay from reaching the higher level referral health facility during emergency cases and mothers may die in their way to referral hospitals. Women having such experience tend to prefer to deliver at home by compromising the benefits and accepting the risks and complications that may happen at during child birth.

4.3. Third delay

The findings showed the similarity and differences in factors related to the third delay (delay to receive adequate and quality of delivery care in health facilities). Poor quality of care, Shortage of skilled health professionals; equipments, drugs and supplies; and poor management and referral system are the main factors influencing mothers from use of SBA in health facilities.

The findings are much similar to Eritrean context where BEmOC and CEmOC services are inadequate, and the health facilities providing EmOC are facing shortage of human and material resources. In some parts of Eritrea especially urban areas and central zone "ZobaMaaekel" the MOH have already addressed the BEmOC and CEmOC services. However, findings showed that poor working conditions and lack of motivation, incentives,

heavy workloads and low salary are the factors contributing poor quality of care and low utilization of skilled birth attendance in health facility.

According to MOH , Human resources planning and management report(2012) a total of 9151 health professionals were trained and graduated at degree, diploma and certificate level from the different training institutes in the country and over sea scholarship(since 1991-2012). However out of the total of 8184 MOH employees at national level 5022 (61.4%) were professionals and 38.6% were administrative staffs. This shows that there is high attrition level of health professionals in the country leading to shortage of health staff in health care services.

Shortages of skilled birth attendants (Doctors and midwifes) were similar in all findings and Eritrea is also facing the same problem of shortage of skilled health personnel's as in many African and developing countries. Availability and accessibility of Doctors and mid wife's in health facility deters the mother's choice for place of delivery. In rural areas health professionals are young with limited skill and experience. The lack of experienced Doctors and midwife's/ nurses in health centers and health station decreases the acceptability and perceived quality of the health centers and many women by pass health centers and deliver in hospitals where they can get better experienced and skilled health professionals.

The limited number qualified skilled personnel become over loaded as a result the quality of the services will affect. In the opposite task shift is practiced to cover the shortage of skilled staff which can affect the quality of delivery care services in most developing countries like Eritrea. Shortage of equipments, drugs and supplies is found to be in some of the hospitals and distant health facilities in remote areas.

According to UNICEF, WHO and UNFPA (1997) 15 per cent of births have fatal complication and are treated in EmOC facilities. Women experiencing obstetric complication such as hemorrhage may die within two hours interval from the onset of the complication in absence of any EmOC services. Similarly, complication such as ruptured uterus, eclampsia, obstructed labour, and infection may result death of mothers within one to six days in absence of medical care. Therefore delay to seek care; delay to reach health care facilities and delay to receive adequate and quality of care are major factors that contributes to the high maternal mortality in during birth complication.

Availability and accessibility to life saving emergency obstetrical care such as caesarean section and blood transfusion services is mandatory to save live of mother. However the limited access to EmOC at birth especially caesarean section and blood transfusion services in lower level hospital increases the number of hospitalized maternal death. This may influence the actual and perceived quality of delivery care services and use of SBA in health facility.

Findings from each countries showed that quality of obstetric care EmOC is influenced by the poor the management health care services; attitudes of health providers and referral system of the maternal health care systems. Findings also noted that abusive attitudes of health workers discourage women from use of SBA in health facility. However this may have difference between individual attitude health worker and health facilities with different abusive experiences during care. This shows the presence poor management system of health care services which influences the quality of obstetric care and low use of skilled birth attendance in health facilities.

4.4 Best practice to improve utilization of SBA in health facility

In general, public health facilities in Eritrea lack the capacity to reach and provide basic emergency obstetric care services to many rural and remote areas. The public-privet partnerships scheme of India is one lesson for Eritrea to promote and allow private health facility to provide emergency obstetric care to poor women in rural areas at a relatively small cost. The government can make cost recovery to Poor women to take up the benefit of skilled delivery care in the privet.

Establishment of the new medical school and nurses /midwives training institute in Eritrea was one strategy to address the shortage of human health work forces. However lack of intervention to improve retention and reduce attrition of of the trained health professionals was one of the problems to overcome the shortage of skilled health professionals in Eritrea. Indonesian community's midwives were posted in rural areas to avoid long distance travel of women for skilled delivery.

In many countries Ethiopia India and Ghana establishment health extensions programs and training of volunteer community health workers and TBAs in rural area was helpful to improve the knowledge and health seeking behaviors of women and the community. Indonesian post of midwives in rural was one one of the strategies to increase the use of SBA in the rural

areas of the country. However the monitoring and sustainability of the programs was the difficulties in most developing countries.

The village committee in Mali was good lesson and practice to address the transportation problem in Eritrea by organizing privet transport owners in the community for the women to reach delivery care facilities timely. The exemption policy in Ghana and poverty certificate in Eritrea is good practice to address the catastrophic health expenditure of women at birth. However in Eritrea mothers from the low income households face difficulty to afford the high cost of transport.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Maternal health care service is one of the government priorities to be expanded and promoted especially in to rural periphery areas. Skilled birth attendance in health facility is a key and proven intervention in reduction of maternal mortality. It provides safe birth conditions to save life of mothers and her child.

In Eritrea general utilization of SBA in health facility is low (34%) with big variance between rural and urban; poor and rich; educated and uneducated and among the regions. The use of SBA in health facilities is very low 17% in rural areas; 28% among poor households, 27% uneducated women and 18% "Gash- Barka" region. More than 25% and 45% of mother's death occurred during delivery and within 24 hours of post delivery period. The underutilization of SBA in health facilities is influenced by multiple factors associated with the delay in seeking care, delay in reaching health care facilities and delay in receiving adequate and quality of care in health facilities.

The health seeking behavior of women is significantly associated with the socio-economic and cultural factors. The social-cultural factors include gender, women's status and decision power. The lack of access to medical care leads to needless deaths of mothers with preventable complication of births. The underutilization institutional delivery care services and the poor health outcomes among rural, poor and uneducated mothers is the result of financial and social barriers. Gender inequality is also the underlying cultural factor for low utilization institutional delivery and poor health outcomes. Other factors like knowledge of danger sign and advantages of birth in health facilities, economy, education and geographical residence are also major factors for low utilization SBA in health facilities.

The inequitable geographical distribution of health facility in terms of the distance, type and quality of care provided by the facility deters the accessibility and use of delivery care services. Access to the health facility is the major factor that hinders women from reaching health care facility on time. The factors include long distance and travel time; poor road infrastructure and high cost of transport and other opportunity costs.

Socioeconomic constraints contribute to delay in reaching health care facility because women from low socio-economic households are facing the challenge in payments of direct and indirect costs to reach the health facility. In addition, the poor referral system and lack of ambulances at the lower level of health facility results delay of mothers to reach the higher level referral hospitals.

Human and material resources are key factors to assure access and quality maternal health care services. This includes skilled health professionals, equipment, drugs, and supplies. In Eritrea there is shortage of skilled staff, drugs, equipment and supplies which leads to poor quality of care in the lower health care facilities that prevents women from receiving appropriate and adequate quality care on time. The limited access to lifesaving emergency obstetrical care such as caesarean section and blood transfusion services especially in lower level hospitals and health centers the main causes of inadequate quality of care and deaths of mothers at births. Beside to the skills and competence of health professionals; the attitude and communication of health workers with the mothers is also determinant factor in use of SBA in health facility.

There is no single intervention which can address the range of maternal death. Institutional delivery is generally recommended as the best option for improving maternal health. The emergency obstetric care facilities must have trained staff, infrastructure and standardized quality of delivery care protocols to manage delivery and other birth complications.

5.2 Recommendation

The recommendations are based on evidence of the findings for the purpose of improving the availability, access and utilization of SBA in health facility in order to reduce the morbidity and mortality of mothers and new born child in Eritrea. The recommendations are specified in four areas: at the policy level; program level; health care services level and community level.

Policy level

The government of Eritrea, MOH, politicians and other stakeholders must review the current health policy for better improvement of the availability, accessibility & quality of delivery care services in the country. This includes

- The government of Eritrea must revise the health financing policy considering the priority of health to increase the current government budget expenditure on health from 3.6% to 15% according to the Abuja deceleration.
- The governments of Eritrea through MOH need to revise the health care service policy to promote the involvement of privet health facility and NGO on provision of maternal health services.
- The government of Eritrea through MOH must introduce clear health worker career development policy in order to attain or increase health work force retention and decrease attrition of health professionals. This may include providing extra hardship incentive, working and living condition, and further study (scholarship) opportunity for the health professionals worked in remote rural areas.

Program/management level

- The MOH should increase the number of health professionals (doctors, nurses and midwives) by increasing the number of students enrolled in the existing colleges to address the proportion of health professional-population ratio in health facilities.
- The MOH has to provide short courses and on job training/workshops programs to update the knowledge, skills and attitude of existing health professionals.
- The MOH have to introduce quality assurance program and conduct regular evaluation and monitoring to assess the performance of skilled health work force and quality of emergency obstetric services. This quality assurance programs will help to measure the effectiveness and impact of interventions and also to protect the right of women to health.
- The MOH must conduct further study in order to explore the actual factors hindering women from use of institutional delivery care services. In addition factors influencing health professionals to provide adequate and quality of care in order to make evidence based interventions to address the gaps in the maternal health care services.

Health care services level

- The MOH must improve the availability of essential resources (equipments, drugs and supplies) in the existing health care facilities. This could be by creating good communication and stock management of resources and advanced procurement of the essential resources.

- Task shift and delegation of emergency obstetric life saving practices to lower level health care facilities where Doctors, midwives and nurses allow practicing life saving emergency obstetric care services by providing short course training.

Community levels

- The MOH has to train community health workers and /or TBAs and work jointly to maintain the flow of information or communication between the community and health care facilities. The health providers to use community health worker and TBAs to sensitize women family and community on birth preparedness as well as their awareness on birth complications and the importance of SBA in health facility.

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Appendix 1: Map of Eritrea

Appendix 2: Place of delivery

Percent distribution of live births in the five years preceding the survey by place of delivery and percentage delivered in a health facility, according to background characteristics, Eritrea 2010

	Health facility						
Background characteristic	Public sector	Private sector	Home	Other	Missing	Total	Percentage delivered in a health facility
Mother's age at birth							
<20	34.5	0.9	64.4	0.0	0.2	100.0	35.4
20-34	32.9	1.3	65.3	0.2	0.4	100.0	34.2
35-49	29.1	1.3	69.2	0.2	0.2	100.0	30.4
Birth order							
1	46.1	2.1	51.2	0.1	0.5	100.0	48.2
2-3	34.2	1.1	64.3	0.1	0.3	100.0	35.3
4-5	28.2	0.6	70.7	0.2	0.2	100.0	28.8
6+	21.1	1.4	77.0	0.1	0.4	100.0	22.5
Residence							
Total urban	71.4	1.8	26.6	0.1	0.2	100.0	73.2
Asmara	88.7	3.8	7.3	0.0	0.1	100.0	92.5
Other Town	61.9	0.6	37.2	0.1	0.2	100.0	62.5
Rural	15.5	1.0	82.9	0.2	0.4	100.0	16.5
Zoba							
Debubawi Keih Bahri	33.0	0.4	66.6	0.0	0.0	100.0	33.4
Maekel	69.8	2.9	27.2	0.0	0.2	100.0	72.6
Semenawi Keih Bahri	29.1	0.2	70.3	0.0	0.3	100.0	29.3
Anseba	23.7	1.5	74.7	0.1	0.1	100.0	25.1
Gash-Barka	17.1	0.5	81.6	0.1	0.7	100.0	17.6
Debub	30.1	1.3	68.0	0.4	0.3	100.0	31.4
Mother's education							
No education	15.2	0.4	83.9	0.2	0.3	100.0	15.6
Primary	27.8	1.6	70.2	0.1	0.4	100.0	29.4
Middle	53.8	1.5	44.3	0.0	0.3	100.0	55.3
Secondary or above	77.1	3.4	19.1	0.1	0.3	100.0	80.5
Antenatal care visits							
None	5.7	0.0	93.4	0.3	0.6	100.0	5.7
1-3	17.6	1.0	81.2	0.3	0.0	100.0	18.6
4+	48.3	1.9	49.6	0.1	0.1	100.0	50.2
Don't know/missing	35.3	0.0	64.7	0.0	0.0	100.0	35.3
Wealth quintile							
Lowest	7.7	0.9	90.9	0.2	0.3	100.0	8.6
Second	11.6	0.6	87.1	0.1	0.6	100.0	12.2
Middle	21.7	1.1	76.4	0.3	0.5	100.0	22.8
Fourth	48.0	0.7	51.3	0.1	0.0	100.0	48.6
Highest	86.3	3.4	10.0	0.0	0.3	100.0	89.8
Total	32.4	1.2	65.9	0.1	0.3	100.0	33.7

(source : EPHS 2010).

Appendix 3: Assistance during delivery

Percent distribution of live births in the five years preceding the survey by person providing assistance during delivery, percentage of birth assisted by a skilled provider and percentage delivered by caesarean-section, according to background characteristics, Eritrea 2010

Background characteristic	Person providing assistance during delivery								Percentage delivered by a skilled provider	Percentage delivered by C-section
	Doctor	Nurse/ midwife	Auxiliary nurse/ midwife	Traditional birth attendant	Relative/ other	No one	Don't know/ missing	Total		
Mother's age at birth										
<20	7.6	24.6	3.5	40.5	23.8	0.0	0.0	100.0	35.8	3.2
20-34	7.2	25.3	2.1	46.0	18.7	0.2	0.4	100.0	34.7	2.9
35-49	6.3	22.3	2.3	48.5	20.0	0.4	0.2	100.0	30.9	2.1
Birth order										
1	11.9	33.5	3.1	36.1	15.0	0.0	0.5	100.0	48.5	6.3
2-3	7.5	25.7	2.7	44.0	19.8	0.1	0.3	100.0	35.8	2.8
4-5	5.0	22.3	1.9	50.4	19.8	0.3	0.2	100.0	29.3	1.4
6+	4.2	17.4	1.4	52.7	23.2	0.6	0.4	100.0	23.0	1.0
Place of delivery										
Health facility	20.9	72.0	6.5	0.3	0.3	0.0	0.0	100.0	99.4	8.3
Elsewhere	0.1	0.7	0.2	69.2	29.5	0.3	0.0	100.0	1.0	0.0
Missing	0.0	6.3	0.0	4.6	0.0	0.0	89.2	100.0	6.3	0.0
Residence										
Total urban	16.1	55.1	2.6	19.8	6.0	0.1	0.2	100.0	73.9	5.8
Asmara	23.4	67.6	2.1	4.9	1.8	0.0	0.1	100.0	93.1	9.7
Other Town	12.1	48.3	2.9	28.0	8.3	0.2	0.3	100.0	63.3	3.6
Rural	3.2	11.5	2.2	57.0	25.4	0.3	0.4	100.0	16.9	1.5
Zoba										
Debubawi Keih Bahri	4.6	22.5	7.2	63.3	2.3	0.1	0.0	100.0	34.3	0.8
Maekel	18.3	53.3	2.1	22.4	3.9	0.0	0.1	100.0	73.6	8.4
Semenawi Keih Bahri	7.7	20.6	2.0	62.8	6.6	0.0	0.3	100.0	30.3	1.4
Anseba	3.9	18.7	2.6	64.1	10.2	0.3	0.2	100.0	25.2	2.0
Gash-Barka	4.0	10.2	3.6	67.6	13.4	0.4	0.7	100.0	17.8	0.9
Debub	4.6	26.1	1.0	20.1	47.7	0.3	0.3	100.0	31.7	2.3
Mother's education										
No education	3.2	10.8	2.2	61.5	21.7	0.4	0.3	100.0	16.1	1.0
Primary	5.7	22.4	1.8	45.0	24.5	0.1	0.4	100.0	29.9	1.8
Middle	11.5	41.7	2.6	28.0	16.0	0.0	0.2	100.0	55.8	5.3
Secondary or above	18.4	58.7	3.3	12.4	6.7	0.0	0.4	100.0	80.5	8.2
Wealth quintile										
Lowest	1.2	5.9	1.5	67.1	23.2	0.7	0.3	100.0	8.6	0.7
Second	1.9	9.0	2.1	61.2	25.2	0.2	0.5	100.0	12.9	0.6
Middle	4.6	15.5	3.0	49.8	26.5	0.1	0.5	100.0	23.1	1.0
Fourth	10.7	35.8	3.0	35.0	15.4	0.1	0.0	100.0	49.5	3.2
Highest	20.2	68.0	1.9	6.3	3.2	0.0	0.3	100.0	90.1	10.2
Total	7.1	24.7	2.3	45.8	19.5	0.2	0.3	100.0	34.1	2.8

(source : EPHS 2010)

Appendix 4: Problem in accessing health care

Percentage of women age 15-49 who reported that they have serious problems in accessing health care for themselves when they are sick, by type of problem, according to background characteristics, Eritrea 2010

Background characteristic	Problems in accessing health care									
	Knowing where to go	Getting permission to go for treatment	Getting money for treatment	Distance to health facility	Having to take transport	Not wanting to go alone	Concern no female provider available	Queuing in line for treatment	Quality of the health service	At least one problem accessing health care
Age										
15-19	13.0	14.5	32.6	30.5	32.9	26.8	12.9	17.5	10.6	56.0
20-34	9.2	10.5	38.2	32.3	34.8	22.2	12.0	19.9	12.9	58.2
35-49	10.0	10.3	45.0	34.3	37.8	22.8	12.0	20.1	11.8	60.9
Number of living children										
0	11.4	12.3	30.5	26.1	29.2	23.6	12.1	17.9	11.2	53.0
1-2	9.1	10.6	40.9	33.1	36.0	22.0	10.9	18.6	12.0	59.1
3-4	9.3	10.0	43.9	34.1	36.1	21.3	11.8	20.2	11.9	60.3
5+	10.9	11.9	47.2	41.3	44.2	26.9	14.3	22.0	13.7	65.5
Marital status										
Never married	10.5	11.6	28.4	22.4	25.6	21.6	10.2	16.5	10.3	50.7
Married or living together	10.8	12.1	42.9	37.9	40.6	24.9	13.6	21.2	13.2	61.9
Divorced/separated/ widowed	7.1	6.6	45.8	29.1	31.5	20.0	9.5	17.2	10.0	60.2
Employed last 12 months										
Not employed	11.7	13.3	40.6	35.6	38.1	25.7	14.3	20.3	13.3	60.4
Employed for cash	5.0	5.0	31.8	16.7	20.7	12.8	5.1	15.7	7.9	47.9
Employed not for cash	7.7	4.9	41.4	37.2	40.7	23.8	6.2	18.7	8.0	64.6
Missing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residence										
Total urban	4.3	4.2	24.2	8.1	10.6	10.5	4.1	13.7	6.4	40.4
Asmara	3.0	3.0	21.3	5.8	8.3	9.1	2.4	15.3	5.3	39.6
Other Town	5.3	5.3	26.6	10.0	12.4	11.7	5.6	12.4	7.3	41.2
Rural	14.4	16.1	49.3	49.1	52.1	32.1	17.6	23.2	15.9	70.8
Zoba										
Debubawi Keih Bahri	15.5	21.7	38.1	45.5	44.8	43.3	27.4	23.7	20.6	63.5
Maekel	2.7	2.4	23.7	9.2	12.0	9.5	2.3	12.6	4.5	41.7
Semenawi Keih Bahri	11.5	14.1	37.3	42.6	41.4	30.2	17.7	22.3	12.9	63.4
Anseba	23.8	32.2	59.8	48.5	57.4	46.1	31.0	38.1	25.0	76.0
Gash-Barka	11.8	11.6	42.2	40.4	42.0	22.9	12.6	15.2	14.7	62.3
Debub	8.2	6.7	41.0	34.4	36.8	20.8	8.0	17.9	9.1	59.7
Education										
No education	15.7	18.5	55.0	51.5	53.5	35.2	21.2	25.9	17.9	73.6
Primary	10.9	10.7	43.3	35.0	38.6	23.5	12.5	20.0	12.2	63.5
Middle	6.2	7.0	27.0	19.5	22.9	15.3	5.0	13.1	6.7	46.9
Secondary or above	3.8	3.4	18.3	8.8	11.7	10.0	2.5	13.0	6.5	37.9
Missing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wealth quintile										
Lowest	19.5	21.7	57.3	64.3	65.9	41.8	25.4	28.9	21.0	80.1
Second	17.5	18.5	53.9	53.7	56.7	36.7	20.2	26.1	18.4	73.9
Middle	11.2	12.8	44.9	36.8	40.6	25.9	13.9	20.9	13.2	65.4
Fourth	4.2	4.7	32.2	17.3	21.0	12.4	4.3	11.9	5.9	49.3
Highest	3.5	3.7	17.5	5.4	7.3	8.9	3.0	13.4	5.8	35.3
Total	10.3	11.3	39.2	32.6	35.4	23.4	12.2	19.4	12.1	58.6

(source : EPHS 2010)

Appendix 5: Trends in estimates of maternal mortality ratio (MMR, maternal deaths per 100,000 live births)

COUNTRY	MMR		Range of uncertainty 2013		Number of maternal deaths	Life time risk of materna l death	Change in MMR betwee n 1990-3013	Average annual % chenge in MMR 1990-2013
	1990	2013	Lower estima te	Higher estimat e				
Eritrea	1700	240	210	670	880	1:52	-77	-6.2
Developin g regions	430	230	180	320	286,000	1:160	-46	-2.6
Develope d regions	26	16	12	23	2300	1:3700	-37	-2
Sub saharan Africa	990	510	380	730	179,000	1:38	-49	-2.9
World	380	210	160	290	289,000	1:190	-45	-2.6

Source: Trends in maternal mortality: 1990 to 2013 (WHO 2014)