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QUALITY OF BIRTHING CARE IN LOW
INCOME SETTINGS: THE CASE OF
ETHIOPIA

NEGALIGN BERHANU BAYOU



THE UNIVERSITY
of EDINBURGH

THESIS SUBMITTED IN THE FULFILMENT OF THE
DEGREE OF DOCTOR OF PHILOSOPHY IN GLOBAL
HEALTH

DECEMBER 2018



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DECLARATION

I declare that I have written this thesis, that I have made a substantial contribution, clearly indicated to each and every chapter, and that this work has not been submitted for any other degree or professional qualification.

As presented in the next section, this thesis has been written based on two studies. The first study analysed routine data collected primarily for administrative purpose by the Ministries of Health and Education, while primary data were collected exclusively for the second study. Although the NIH Fogarty International Center (FIC) funded the primary data collection, it did not play any role in the design of the study, data collection, interpretation and report writing. Moreover, there was no any ongoing or terminated parent research project which any of the two studies was linked to. Therefore, I declare that both studies were conducted solely for this thesis.



Negalign Berhanu Bayou

Edinburgh

December 2018

ABSTRACT

Background: Maternal mortality is a common event for women in the poorer parts of the world. The maternal mortality ratio in Ethiopia is 412 per 100,000 live births. Most high burden countries including Ethiopia have strategies to provide skilled maternity care yet very few are making progress, due at least in part to not ensuring quality facility childbirth care. In Ethiopia, there are no studies on *woreda* (district) level factors associated with skilled birth attendance (SBA) rates, and evidence on quality of Labour and Delivery (L&D) care is generally scarce. Therefore, this project aimed at closing this gap.

Methods: Two quantitative studies were conducted. The first study described variation in *woreda* SBA rates (N=839) and determinants of higher rates using a cross-sectional ecologic study design. The second study examined quality of birthing care in government hospitals (n=20) of Southern Nations and Nationalities Region (SNNPR) by collecting primary data, using a cross-sectional study design.

Key findings: The first study showed that the mean *woreda*-level SBA rate in Ethiopia was low at an ecologic level, but with substantial variations. Women's families, the wider community, availability of health resources, and proportion of four or more antenatal care significantly increased the SBA rate.

The second study revealed gaps in the structural, process and outcome aspects of quality of L&D care in the hospitals. About two thirds of the required inputs were fulfilled, and only two hospitals fulfilled almost all the standards. Laboratory services and safe blood, essential drugs, supplies and equipment were the areas with the largest gaps. In terms of process quality, about two thirds of the standards were met overall for each woman for which she was eligible. The highest scores were achieved with immediate and essential newborn care practices, and care during the second and third stages of labour. History of a danger sign in the current pregnancy had a positive effect on the process quality at the level of each woman. At hospital level, teaching status and structural quality index score had significant

positive effects, whilst annual L&D service volume had a significant negative effect on the process quality index score. Perceived quality of L&D care provided was also suboptimal. Being illiterate, absence of a complication after birth, perceived high quality of interpersonal communication and emotional support, responsiveness, health education and physical environment; all positively influenced women's overall experience. Furthermore, teaching status and primary or general level of hospitals, staff training, and high quality of L&D care process index also positively affected the experience.

Recommendations: It is essential to increase the coverage of four or more ANC visits and strengthen the current community-based approaches to meaningfully increase the SBA rate. There is a need to ensure that all hospitals meet the required structure to enable the provision of quality routine L&D care, with particular emphasis on laboratory services and safe blood for emergency transfusion, and availability of essential drugs, supplies and equipment. It is also important to focus efforts on the factors that showed a significant effect on the process quality of routine L&D care process and the women's experience with the care received.

LAY SUMMARY

Background: Maternal death associated with pregnancy and childbearing is a common event in the poorer parts of the world. For every 1,000 births in Ethiopia, there are about four maternal deaths, which is unacceptably high. Most countries with high maternal death rate including Ethiopia have strategies to provide skilled maternity care yet very few are making progress, due at least in part to not ensuring quality facility childbirth care. In Ethiopia, there are no published studies on *woreda* (district) level factors associated with utilization of skilled delivery care, and evidence on how good the labour and delivery (L&D) service provision is, is generally scarce. Therefore, this project aimed at closing this gap.

Methods: Two quantitative studies were conducted. The first study described variation in *woreda*-level proportion of skilled delivery care and factors associated with higher rates by analysing secondary data from national databases using an ecologic study design. The second study collected primary data from 20 government hospitals of Southern Nations and Nationalities Region (SNNPR) using a cross-sectional study design to examine how good the L&D service provision is.

Key findings: The first study showed that the mean *woreda*-level proportion of skilled delivery care was low at an aggregate level, but with substantial variations. Women's families, the wider community, availability of health resources, and proportion of four or more antenatal care visits had significant positive effects on skilled delivery care use. The second study revealed gaps in the availability of inputs, compliance of health professionals with the recommended standards, and women's experience with the care received. About two thirds of the required inputs were fulfilled, and only two hospitals fulfilled almost all the standards. Laboratory services and safe blood, essential drugs, supplies and equipment were the areas with the largest gaps. Regarding compliance of health professionals, about two thirds of the recommended standards were met overall for each woman for which

she was eligible. Presence of a danger sign in the recent pregnancy, teaching status of hospitals and index score for availability of inputs increased the compliance of health professionals. Whereas annual number of births attended in a hospital was associated with lower compliance. Perceived quality of L&D care provided was also suboptimal. Being illiterate, absence of a complication after birth, favorable experience with interpersonal communication and emotional support, responsiveness, health education and physical environment aspects of care were all associated with higher ratings. Teaching status and primary or general level of hospitals, staff training, and higher compliance of health professionals to the recommended standards were also associated with women's positive overall experience with care received.

Recommendations: It is essential to increase the coverage of four or more ANC visits and strengthen the current community-based approaches to meaningfully increase the SBA rate. There is a need to ensure that all hospitals meet the required inputs to enable the provision of good routine L&D care. It is also important to focus efforts on the factors that showed a significant effect on the compliance of health professionals with the standards and the women's experience with the care received.

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Finally, my heart felt gratitude goes to my family for encouragement and tolerance during my separation for extended periods for the purpose of this project.

LIST OF ABBREVIATIONS

ACNM	American College of Nurse-Midwives
AMTSL	Active Management of Third Stage of Labour
ANC	Antenatal Care
ARV	Anti-retroviral Drug
BEmOC	Basic Emergency Obstetric Care
BEmONC	Basic Emergency Obstetric and Neonatal Care
CEmOC	Comprehensive Emergency Obstetric Care
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
CI	Confidence Interval
CSA	Central Statistical Agency
CSF	Cerebrospinal Fluid
EDHS	Ethiopia Demographic and Health Survey
EHAQ	Ethiopian Hospital Alliance for Quality
EHMI	Ethiopian Hospital Management Initiative
EHRIG	Ethiopian Hospital Reform Implementation Guideline
EMIS	Education Management Information System
EmOC	Emergency Obstetric Care
ENAP	Every Newborn Action Plan
EPHI	Ethiopian Public Health Institute
EPMM	Ending preventable maternal mortality
FA	Factor Analysis
FCI	Family Care International
FIC	Fogarty International Center
FIGO	International Federation of Gynaecology and Obstetrics
FMoH	Federal Ministry of Health
GHLI	Global Health Leadership Institute
Had	Health Development Army
HDT	Health Development Team

HDU	High Dependency Unit
HEP	Health Extension Program
HEWs	Health Extension Workers
HMIS	Health Management Information System
HSDP	Health Sector Development Program
ICC	Intra-class Correlation Coefficient
IESO	Integrated Emergency Surgery Officers
IFRCS	International Federation of Red Cross and Red Crescent Societies
IOM	Institute of Medicine
IRB	Institutional Review Board
JHPIEGO	Johns Hopkins Program for International Education in Gynecology and Obstetrics
L&D	Labor and Delivery
MANA	Midwives Alliance-North America
MDG	Millennium Development Goal
MEDHS	Mini Ethiopia Demographic and Health Survey
MMR	Maternal Mortality Ratio
MNH	Maternal and Neonatal Health
MNHC	Maternal and Neonatal Health Care
MVA	Manual Vacuum Aspiration
NACPM	National Association of Certified Professional Midwives
PCA	Principal Components Analysis
PHCU	Primary Health Care Unit
PMTCT	Prevention of Maternal to Child Transmission of HIV
PNC	Postnatal Care
PPH	Postpartum Haemorrhage
PRB	Population Reference Bureau
QA	Quality Assurance

QI	Quality Improvement
RDT	Rapid Diagnostic Test
RHB	Regional Health Bureau
SBA	Skilled Birth Attendance
SNNP	Southern Nations Nationalities and People's
SNNPR	Southern Nations Nationalities and People's Region
SPA	Service Provision Assessment
SPSS	Statistical Software for the Social Sciences
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHDT	Women Health Development Team
WHO	World Health Organization
WoHO	Woreda Health Office
ZHD	Zonal Health Department

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OVERVIEW OF THE THESIS

Chapter one describes the magnitude of the problem of maternal and neonatal mortality from global, regional and national perspectives. It also provides the current strategies that exist around the world to improve Maternal and Neonatal Health (MNH), an overview of the healthcare system of Ethiopia and the country's efforts to improve MNH including the focus of the second study, the Ethiopian Hospital Alliance for Quality (EHAQ) Labor and Delivery (L&D) Change Package. It finally sets out the purpose and importance of this study and details its aims and objectives.

Chapter two outlines the hypotheses, aims and research questions of the two studies conducted: the first study which examined the variation in *woreda* (district)-level skilled birth attendance (SBA) rates and associated factors, and the second study which examined the quality of L&D services and associated factors in the government hospitals of Southern Nations Nationalities and Peoples Region (SNNPR). Since the quality was measured using Donabedian's structure, process and outcome model, the chapter provides the hypotheses, aims and research questions separately for each of these components for the second study.

Chapter three deals with review of the relevant papers. It describes the review strategy, an overview of utilization of SBA in Ethiopia with the determinants, and the conceptual background that guided this review. It also provides what is currently known about the factors that influence quality of SBA, and critical appraisal of the literature and consequently the value of implementing this project. Finally, the conceptual framework that guided the conduct of the studies is presented.

Chapter four discusses the strategies used to operationalize the project with supportive scientific arguments that favor the choices made at each step of the methodology. First, it provides an overview of the settings at which the two studies were located. Then, it describes overall designs of the studies, followed by the

details about the populations, sampling designs, data collection methods, tools and procedures, and data management and analyses strategies.

Chapter five deals with the results of study one that examined variation in *woreda* (district)-level proportions of SBA and factors associated with higher proportions in Ethiopia. First, it provides distribution of the sample and descriptive statistics by *woreda*. Then, *woreda*-level variation in the proportions of SBA and factors that are associated with higher proportions are provided. Finally, the Chapter discusses the results in detail.

Chapter six describes the structural quality of routine L&D care in government hospitals of SNNPR, which represents the first part of study two that examined the overall quality of L&D care provision using primary data collected from 20 hospitals. First, the Chapter describes availability of the required structural attributes of quality routine L&D care including: general infrastructure; skilled health professionals; and essential drugs, supplies and equipment. Availability of personal protective equipment and consumables; resources to ensure safe, comfortable and woman friendly L&D environment; and laboratory services and blood is also described. Quality Assurance (QA) practices related to routine L&D care and index score for the structural quality are also provided. Finally, the Chapter discusses the results in detail.

Chapter seven deals with the second part of study two: quality of routine L&D care process and associated factors in government hospitals of SNNPR. First, the Chapter describes the characteristics of the participants, followed by the degree to which providers adhered to the recommended care practices. The results are provided by specific areas of care including: initial assessment, care during the second and third stages of labour, and immediate and essential newborn care. Infection prevention practice, use of partograph, active management of third stage of labour (AMTSL), interpersonal communication during L&D and index score for quality of routine L&D care process are also presented. Then, woman and hospital

level factors affecting the quality of L&D care process that were identified using multilevel analysis are provided. Finally, the Chapter discusses the results in detail.

Chapter eight deals with the third part of study two: women' experience with the L&D care they received and associated factors in government hospitals of SNNPR. First, the Chapter describes the characteristics of the participants. Then, women's experiences are described by components of the care, which were identified by factor analysis, including: interpersonal communication and emotional support, responsiveness to preferences, health education, and physical environment. Overall experience scores are also described. Then, woman and hospital level factors affecting women's overall experience with L&D care that were identified using multilevel analysis are provided. Finally, the Chapter discusses the results in detail.

Chapter nine provides an overall discussion of the thesis. First, summary of the findings is presented, followed by discussion of implications for policies and programs. Then, limitations and recommendations for further research are provided. Finally, an overall conclusion is provided in the Chapter.

CHAPTER 1: INTRODUCTION

Introduction

This chapter outlines the rationale for undertaking this research study. It describes the magnitude of the problem of maternal and neonatal mortality from the global and local perspectives. After an analysis of current strategies around the world to improve Maternal and Neonatal Health (MNH) the chapter provides an overview of the healthcare system of Ethiopia and the national efforts to improve MNH.

1.1 Global burden of maternal and neonatal mortality

Women are honored by societies for their role as mothers. However, pregnancy and childbirth involve a terrifying journey in most parts of the world (Ransom et al., 2002). Maternal death is, “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of 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, 1989).

Globally, maternal mortality is estimated at 303 000 deaths in 2015 (WHO, UNICEF, UNFPA, World Bank Group, United Nations Population Division, 2015), almost all (99%) occurring in low-and-middle-income countries (Say et al., 2014). The sub-Saharan Africa accounted for more than two third of the deaths, 201000 (66%), followed by southern Asia, 66000 (22%). High income countries have 46 times lower maternal mortality ratio (MMR) (12 per 100 000 livebirths) compared to the sub-Saharan African countries (546 per 100 000 livebirths). The lifetime risk of maternal death in high income countries is one in 4900 per livebirth compared to one in 36 in the sub-Saharan Africa, beyond a 100 times difference (Alkema et al., 2016).

Evidence shows that 42% of the maternal deaths are due to adverse intrapartum events (Lawn et al., 2009). Haemorrhage (24%), obstructed labour (8%);

eclampsia (12%), sepsis (15%) and unsafe abortion (13%) account for more than 70% of maternal deaths. Other direct causes including ectopic pregnancy, embolism and anesthesia-related causes are responsible for 8% of the deaths. Indirect causes including severe anemia, TB, malaria and HIV/AIDS (particularly in Sub – Saharan Africa), are claimed to be responsible for the remaining 20% (WHO, 2011b).

Though there has been a significant reduction (45%) in maternal deaths between 1990 and 2015 (WHO, UNICEF, UNFPA, World Bank Group, United Nations Population Division, 2015), it doesn't match the expectation given the improved coverage of effective interventions (Graham et al., 2013). Most of the maternal deaths are avoidable through the delivery of basic essential maternal health services (WHO, 2004). However, many such deaths occur due to poor quality of health care (WHO, 2018b; Graham et al., 2016). For example, institutional mortality rates for deliveries occurring in developing countries are above the recommended rate of 1% (Dogba and Fournier, 2009), though poor quality care may not be blamed for all the deaths.

The health of newborns is associated with the health of their mothers (FCI, Inc, 2007; WHO, 2011b; Lawn et al., 2009). Global estimates of newborn mortality and stillbirths are 19 per 1000 live births and 18 per 1000 total births, respectively, with large variations across and within countries (WHO, 2016b). Nearly all the deaths (98%) occur in low-and-middle-income countries, Sub-Saharan Africa and South Asia contributing to three fourth of the burden (Lawn, et al., 2014). About 30–40% of still births and neonatal deaths result from poor maternal health and inadequate care during pregnancy, delivery and immediate postpartum period (FCI, Inc, 2007; Lawn et al., 2009).

1.2 Burden of maternal and neonatal mortality in Ethiopia

In Ethiopia, maternal deaths account for 30% of all deaths to 15-49 years old women (CSA Ethiopia and ORC Macro, 2011). MMR in the country is estimated to

be 412 per 100,000 live births (CSA Ethiopia and ORC Macro, 2016), which is among the highest in the world. The lifetime risk of a maternal death in Ethiopia is one in 48 women in 2015 (CSA Ethiopia and ORC Macro, 2016) which is much higher than the average for sub-Saharan Africa, i.e., one in 36 (Alkema et al., 2016). Institutional maternal mortality rate for women with serious obstetric complications, i.e., case fatality rate, was 2% in 2011 (Admasu et al., 2011). Lack of blood and delay in transfusion when available, and inappropriate treatment account for 35.5% of maternal deaths occurring in the Ethiopian hospitals (Hailu et al., 2009).

Prediction of the maternal mortality burden by region for the year 2011 revealed that MMR is higher than the national average (676/100,000 live births) in five out of the 11 regions (UNFPA, 2012). It is by far highest in Somali (747/100,000 live births) and Afar (717/100,000 live births) regions, followed by SNNPR (694/100,000 live births), Amhara (690/100,000 live births), and Oromiya (688/100,000 live births). The three most populous regions of the country, namely, SNNPR, Oromiya and Amhara, constitute over 75% of the country's population and significantly influence the overall maternal mortality burden. MMR is also higher in urban than the rural areas. Educated and wealthier women have lower probability of maternal death (UNFPA, 2012).

The institutional maternal death rate at public hospitals of SNNPR is 0.4% (SNNPR State Health Bureau, 2014). In 2010, 79 maternal deaths were recorded in health institutions in Gamo Gofa Zone, SNNPR, with the primary causes being haemorrhage (42%), obstructed labour (15%), puerperal sepsis (15%), prolonged labour (8%) and complications from abortions (8%). Health institutions from rural and remote *woredas* of the Zone had very high institutional death rates, that is, 61% and 28%, respectively (Girma et al., 2013). Inequitable access to health facilities due to lack of critical infrastructure and low quality of care within the health facilities are major contributors to the high maternal mortality rate in Ethiopia (HEPCAPS1 Project Team, 2012; Sipsma et al., 2013).

The 2016 EDHS revealed that neonatal and infant mortality rates in the country are 29 and 48 deaths per 1,000 live births, respectively. That is, one in every 35 and one in every 21 children die before celebrating the first month of life and the first birthday, respectively (CSA Ethiopia and ORC Macro, 2016). Perinatal mortality rate, which provides a better estimate of the level of mortality and birthing care quality by combining both stillbirths (terminated pregnancies after seven months of gestation) and early neonatal deaths (deaths within the first seven days of life), is 33 deaths per 1,000 pregnancies in Ethiopia. The figure is 26 for SNNPR (CSA Ethiopia and ORC Macro, 2016).

Majority (62%) of the births in Ethiopia are at a higher risk of dying from preventable causes (CSA Ethiopia and ORC Macro, 2016). This is also supported by the 2014 Mini EDHS which reported that a large proportion of maternal and neonatal deaths in Ethiopia occur during the 48 hours after delivery, and these first two days following delivery are critical for monitoring complications arising from the delivery (CSA Ethiopia, 2014). In SNNPR, institutional neonatal death rate within 24 hours of birth at public hospitals is 0.7% (SNNPR State Health Bureau, 2014). Ten neonatal deaths and 178 stillbirths were reported in Gamo Gofa Zone, SNNPR, in 2010 (Girma et al., 2013).

1.3 Strategies to improve MNH: a global perspective

Achieving a meaningful reduction of the MMR requires a combined effort of both technical and political factors (Dogba and Fournier, 2009). Maternal health has been a central agenda to poverty reduction and overall development efforts and increased international attention to maternal mortality (FCI, Inc, 2007; Rasch, 2007). In 2000, 189 countries signed the United Nations Millennium Declaration committing themselves to eradicate extreme poverty by 2015. Eight Millennium Development Goals (MDGs) were used to track the progress toward the commitments, three of which were directly related to health acknowledging its contribution to achieve the others. Two of the health-related goals belonged to

children (MDG 4) and women (MDG 5), aiming to reduce under-5 mortality by two-thirds, and to improve maternal health by reducing maternal mortality ratio by 75% and by achieving universal access to reproductive health, respectively (WHO, 2005). As the deadline for the MDGs was approaching, it was realized that the low-and-middle income countries could not achieve these MDGs. Thus, several global and national initiatives flourished over the past decade to help the countries accelerate the progress (Sharma et al., 2015). Alongside these the Sustainable Development goals, Goal 3 set a maternal health indicator.

The Partnership for Maternal, Newborn and Child Health was launched in 2005 to facilitate strategic alignment among the initiatives (Kruk et al., 2016), some of which are described below. The UN Secretary General's Global Strategy for Women's and Children's Health (2010-2015) was launched in 2010 to accelerate the progress by mobilizing global leaders for adequate investment in the health of women, adolescents, newborns, infants and children (Ki-Moon, 2010). The Every Woman, Every Child strategy was also launched in the same year at the MDGs Summit aiming to save the lives of 16 million women and children by 2015 (UN, 2010). In June 2012, the governments of Ethiopia, India and the USA convened the Child Survival Call to Action to save the lives of 45 million additional children by 2035. In response to the call, 178 governments pledged for maximum possible effort to avoid preventable deaths of women and children. This initiative was called 'A Promise Renewed' to keep the promise of MDG 4 by 2015 and beyond until preventable maternal and childhood deaths become zero (UNICEF, 2015). Similarly, the Every Newborn Action Plan (ENAP) was launched in 2014 with the aim of avoiding preventable neonatal deaths and still births (WHO, 2014). By introducing the concept of "Every Newborn" into the "Every Woman, Every Child" movement, the ENAP's theory of change extends its goals (Lawn et al., 2014) to cover ending preventable stillbirths and deaths of women, newborns and children; and enhancing child development and human capital. Ensuring equitable coverage of high quality MNHC in the post-2015 era is emphasised in the action plan as a

key strategy to meet the targets (Dickson et al., 2015). For instance, an adequate investment in quality L&D care can save three million babies and women each year (WHO, 2014).

In 2015, the new Global Strategy for Women's, Children's and Adolescents Health (2015-2030) emerged from the ENAP and the ending preventable maternal mortality (EPMM) acknowledging the EPMM as an incomplete agenda for post-2015 era which requires a holistic, rights-based approach to sexual, reproductive and MNH as a strategy (WHO, 2015a). The new Global Strategy envisions to realize: "a world in which every mother can enjoy a wanted and healthy pregnancy and safe childbirth, every child can survive beyond their fifth birthday, and every woman, child and adolescent can thrive to realize their full potential, resulting in enormous social, demographic and economic benefits" (UN, 2015a).

A network for Improving Quality of Care for MNCH, ('the QoC Network') was established by nine WHO supported countries including Bangladesh, Côte d'Ivoire, Ethiopia, Ghana, India, Malawi, Nigeria, Tanzania and Uganda; the H6 partnership (WHO, UNAIDS, UNFPA, UNICEF, UN Women, and the World Bank); and partners from all stakeholder groups (WHO, 2018b). The countries envision to see that every pregnant woman and newborn receives good-quality care along the continuum with quality, equity and dignity as core values. In February 2017, the countries held a meeting in Lilongwe, Malawi, and launched the strategies towards reducing maternal and newborn deaths and stillbirths by half in targeted facilities within five years. The Network supposes that ensuring effective implementation, and continuous improvements in quality of care through concerted efforts can make enormous transformational changes in MNCH (WHO, 2018b).

Skilled birth attendant, the person who assists during delivery, and the L&D environment are the two interlinked elements that make up 'skilled birth attendance' as a fundamental strategy to improving MNH (Graham et al., 2001; Adegoke and van den Broek, 2009). Brown et al. (2008) define the term skilled

birth attendance as “the process by which a woman is provided with adequate care during labour, delivery and the early postpartum period.” However, the definition is not consistently used in the literature with substantial variations both within and between countries. For example, various cadres of healthcare providers are reported as skilled birth attendants in sub-Saharan African countries in terms of their name, length of training and function, making it vague as to which of them qualify the internationally agreed definition. Some countries in the region also have cadres of providers attending deliveries, but not officially reported as skilled professionals, for example, auxiliary midwives and medical attendants in Somaliland and Tanzania (Adegoke et al., 2012).

In Ethiopia, the coverage of skilled birth attendance is defined as the proportion of births attended by skilled health personnel at a health facility. The number of all births attended in health center and hospital settings by skilled health personnel is divided by the total number of expected deliveries, and then multiplied by 100. Births attended at health post level are excluded from the numerator (FMoH of Ethiopia, 2014a). The cadres of providers considered as skilled birth attendants are medical doctors, nurses, midwives, health officers and emergency surgical officers. An emergency surgical officer is a master’s level graduate authorized to perform emergency obstetrical surgery (FMoH of Ethiopia, Human Resource Development and Administration Directorate, 2012), while a health officer is a bachelor’s level graduate in public health who performs both clinical and leadership roles at health centre, district hospital, *woreda*, zonal and regional levels (Global Health Workforce Alliance Task Force on Scaling Up Education and Training for Health Workers, 2008).

This thesis adopted the above definition assuming that all births in a health centre or hospital were attended by skilled personnel. However, a slightly modified definition was used in the recent EDHS report (CSA Ethiopia and ORC Macro, 2016) where births attended by urban health extension workers were included in the numerator illustrating the inconsistent use even within Ethiopia. Urban health

extension workers are cadres of providers who are qualified at diploma level (Level-IV) and deployed as members of the Family Health Team of multidisciplinary professionals in an urban health center serving a catchment population of 40,000 urban dwellers (FMoH of Ethiopia, 2015c). However, mere consideration of the urban health extension workers as skilled birth attendants, does not seem to affect the coverage estimate as far as the level of care is maintained. That is, even though the 2016 EDHS included these cadres in the definition of skilled personnel, the lowest level of care was still health center like the former definition. Of note, the abbreviation 'SBA' is used in this thesis to represent the term 'skilled birth attendance', not 'skilled birth attendant'.

All countries where a SBA rate is higher than 80% have a MMR less than 200 (Van Lerberghe and De Brouwere, 2001). The significant reduction in MMR (45%) observed between 1990 and 2015 is primarily due to increased SBA coverage (WHO, 2018b; Alkema et al., 2016). However, inequities exist both between and within populations (Kruk et al., 2018) mainly due to variation in access to and quality of care (Graham et al., 2016; UN, 2015b). For instance, SBA coverage is 99.9% in high income countries, while it is below 40% in many low-and-middle income countries (Sankar et al., 2016). About 53 million deliveries in low income countries are not attended by a skilled professional (Koblinsky et al., 2016).

Access to facilities that are adequately equipped and staffed with skilled birth attendants is a prerequisite for achieving a meaningful reduction in maternal mortality to ensure that all women get skilled care for before, during, and after childbirth (WHO, 2004; WHO, ICM and FIGO, 2004). Institutional delivery alone can significantly prevent maternal deaths as it provides an opportunity for skilled delivery assistance, management of potential complications of labour, and timely referral to a more advanced health facility when appropriate (UN, 2012).

The WHO (2010b) recommends the following key intervention packages for childbirth care. Essential care from the onset of labour up to 24 hours including

promotive and preventive care, essential care for mother and newborn immediately after childbirth and, early recognition and appropriate management of complications. These interventions can reduce: risks of maternal mortality and severe morbidity by 95%; asphyxia related newborn deaths by 40% and; postpartum haemorrhage by 67%. When universally applied, the newborn care packages can reduce more than half of neonatal mortality, saving up to 2 million newborn lives each year (WHO, 2010b).

Recently, skilled provision of emergency obstetric care both for routine and complicated cases has been promoted (FCI, Inc, 2007). The following package of eight interventions exists to treat most direct obstetric complications that, taken together, are known as emergency obstetric care (EmOC): (1) parenteral antibiotics; (2) parenteral oxytocic drugs; (3) parenteral anticonvulsants for pregnancy-induced hypertension; (4) manual removal of the placenta; (5) removal of retained products of conception; (6) assisted vaginal delivery; (7) surgery (e.g. caesarean delivery); and (8) blood transfusion. Health facilities that provide the first six interventions are called basic emergency obstetric care (BEmOC) facilities and those providing all eight are called comprehensive emergency obstetric care (CEmOC) facilities (Dogba and Fournier, 2009).

Critical to reducing MMR are strategies to reduce delays in receiving skilled birthing care and to increase SBA care coverage (Dogba and Fournier, 2009; Rasch, 2007). Mothers-to-mothers education and women's groups are among the most effective applications of peer-to-peer education where mothers are trained to advise other mothers and pregnant women on healthy living and care (IFRCS, 2013; Nair et al., 2010). In such participatory development approaches, community groups undertake an analytical cycle that includes problem identification and prioritization, planning, implementation and evaluation (Rath et al., 2010).

In Nepal, implementation of community mobilization approach using participatory women's groups has resulted in 78% reduction in maternal deaths. They built

social capital that provides collective resources for individuals to draw on during pregnancy and delivery, and to engage community members in overcoming local barriers to safe delivery practice (Manandhar et al., 2004). Involving community leaders and decision-makers also helps ensure sustainability of any practical solutions identified such as shared transport arrangements made to transport pregnant women to facilities (Rath et al., 2010).

Eventhough most high burden countries have strategies to provide skilled maternity care at all levels of the healthcare system and to strengthen capacity of individuals, families and communities; very few are making progress for the following reasons: lack of information, failure to achieve universal access, or choosing strategies other than quality facility childbirth care. Health facilities' failure to provide the right service when and where needed is the main reason for underutilization of MNH services. Cultural differences between providers and women also affect MNH service utilization. Being a woman, poor, unmarried or adolescent leads to discrimination resulting in abuse and neglect, then given poor quality care. Women who have unfavorable experience with providers are not encouraged to use available services (WHO, 2011b).

The difference between coverage of effective interventions and their delivery in a client friendly manner is termed as the quality gap (Kinney et al., 2010). Improving access does not guarantee a high-quality care although it is a necessity (National Academies of Sciences, Engineering and Medicine, 2018). In contrary, achieving high quality is required for efficient delivery of evidence-based practices to prevent maternal and newborn deaths while also preserving their demand (Kinney et al., 2010). Recent evidence shows that half of all maternal and one million newborn deaths can be prevented annually by providing high-quality care before, during and after childbirth. In low income countries, however, mothers receive less than half of the recommended practices in a typical maternity care visit (Kruk et al., 2018).

Rwanda is an example of a sub-Saharan African country in achieving near universal health coverage (World Bank, 2018) as well as in quality improvement (Kirk et al. (2015). Kirk et al. (2015) expressed the country's success as follows: "In the last two decades, Rwanda achieved some of the largest gains in public health the world has ever seen." The Pay for Performance approach along with the Community-Based Health Insurance (CBHI) scheme resulted in a significant improvement in the quality of MNCH care in the country (Kalisa et al., 2015). These improved access to and utilization of essential services and helped achieve 80% and 70% reduction in maternal and infant mortality rates between 2000 and 2014, respectively (Collins et al., 2016). Kirk et al. (2015) also reported that the All Babies Count (ABC) initiative has significantly improved neonatal care processes, resulting in a 41% reduction in neonatal deaths in the country (Kirk et al., 2015). Doctor et al. (2018) similarly witnessed Rwanda's success in reducing maternal and neonatal mortality rates by increasing SBA coverage, suggesting other countries to learn lessons from the success story.

The significant contribution of poor-quality maternity care to the burden of maternal and neonatal deaths in many developing countries has also been recognized by several studies (van den Broek and Graham, 2009; Villar et al., 2001), despite the increase in SBA coverage (WHO, 2018b). This implies that skilled birthing care in health facility setting is not enough to reduce the burden (Souza et al., 2013), and that effectiveness of SBA in improving MNH outcomes is dependent on the quality of care provided (Chou et al., 2015; Kruk et al., 2018; Tuncalp et al., 2015; Sharma et al., 2015; Lawn et al., 2011). Therefore, quality of care should be at the heart of the strategies to ensure adequate case management and to encourage use of maternity services (Hulton et al., 2000; van den Broek and Graham 2009; Hunyinbo et al., 2008).

1.4 Healthcare system of Ethiopia

Health service delivery system of the country is organized in a three-tier system. The first level, the *woreda* (district) health system, comprises a primary hospital (covering 60,000-100,000 people), health centers (1:15,000-25,000 populations (rural) and 1:40,000 population (urban)) and their satellite health posts (1:3,000-5,000 populations) connected each other by a referral system. A primary hospital, health center and health posts form a Primary Health Care Unit (PHCU) with each health center having five satellite health posts. The second level in the tier is a general hospital with population coverage of 1-1.5 million. The third level is a specialized hospital covering 3.5-5 million people.

There is a total of 23,102 formal sector health facilities in Ethiopia which are managed by various authorities including government, other governmental (military, prison, federal police), private for profit and NGOs (mission or faith based, non-profit). Their distribution by level is as follows: 202 hospitals, 3,292 health centres, 15, 618 health posts, and 3,990 private clinics (higher, medium and lower level clinics) (Ethiopian Public Health Institute (EPHI), FMoH of Ethiopia and ICF International, 2014).

With decentralization as key element of health sector reforms in many countries including Ethiopia, districts are more responsible for setting their own priorities and managing their own budgets thus, expected to be more accountable to their local populations for the quality of health services provided (WHO, 2011b). In Ethiopia, offices at different levels of the health sector from the Federal Ministry of Health (FMoH) to Regional Health Bureaus (RHBs) and *woreda* health offices share decision making processes, duties and responsibilities. *Woreda* is the third-level administrative division in Ethiopia that is managed by a local government. It is equivalent to a district with an average population of 100,000 (WHO and Health Metrics Network, 2009). The FMoH and the RHBs focus more on policy matters

and technical support while *woreda* health offices focus on managing and coordinating the operation of the *woreda* health systems (FMoH of Ethiopia, 2010).

Since 2003, the country has introduced an innovative flagship program called Health Extension Program (HEP), which is a community-centered strategy to deliver preventive, promotive services and selected high impact essential interventions: family health, prevention and control of communicable diseases, hygiene and environmental sanitation, and health education and communication (FMoH of Ethiopia, 2014a). It provides an excellent platform to engage the community regularly, foster community ownership and bridging the gap between the community and health facilities. The program serves as a vehicle for bringing key maternal, neonatal and child health interventions free of service charge, especially to the rural communities (FMoH of Ethiopia, 2014b). The program is run by Health Extension Workers (HEWs) who are: 10th grade complete; recruited from their home villages and committed to serve the village; trained on essential health service packages for one year and; government salaried. Two HEWs are deployed at each health post, meaning, at every single village of the country. HEWs in agrarian communities are all females, while males predominate in the pastoralist communities.

Improving community ownership of its own healthcare is among the strategic objectives of Health Sector Development Program (HSDP) IV (FMoH of Ethiopia, 2014a), a recently completed five year rolling national health sector plan. To this end, a new social mobilization scheme called Health Development Army (HDA) has been introduced (FMoH of Ethiopia, 2014c). “The name *army* denotes a group of committed, enthusiastic persons who are prepared to achieve a certain objective” (FMoH of Ethiopia, 2016). It refers to an organized movement of the community through participatory learning and action meetings to promote health and prevent disease through community participation and empowerment (FMoH of Ethiopia, 2014c). Organizing a functional HDA requires the establishment of Health Development Teams (HDTs) that comprise up to 30 households residing in

the same neighborhood. An HDT is further divided into smaller groups of six members, commonly referred as one-to-five networks (FMoH of Ethiopia, 2014c). Women Health Development Team (WHDT) is one of the HDA groups that create fora to discuss women's health issues at all levels of the healthcare system (Yifru and Asres, 2014c). A one-to-five network is said to be functional if the following minimum criteria are fulfilled: received training from HEWs based on the family health guide, has individual and team plan, meets at least once a week, actively discusses on health issues reports and regularly to the HDT. Families of those one-to-five networks which implemented the entire HEP packages are recognized as 'model families' or 'model households' (FMoH of Ethiopia, 2014a).

1.5 Efforts to improve maternal and newborn health in Ethiopia

A lot of efforts have been made to tackle the problem of the unacceptably high maternal mortality in Ethiopia (Afework, 2014). Massive human resource development strategy has been implemented through accelerated training of skilled health professionals to improve EmOC services. Accelerated training of midwifery and anaesthesia professionals and; Integrated Emergency Surgery Officers (IESO) training at master's level are some to mention (World Vision Ethiopia, 2014).

A comprehensive quality improvement mechanism is in place to look at all aspects of quality of services. Through the Ethiopian Hospital Management Initiative (EHMI), Global Health Leadership Institute (GHLI), along with the FMoH, created management tools and processes in the national Ethiopian Hospital Reform Implementation Guideline (EHRIG) since 2013/14. EHRIG is the backbone of hospital reform in the country, aiming at strengthening hospital management as a foundation for ensuring high quality clinical care and improving patient satisfaction. GHLI also supports the EHAQ, the continent's first national quality improvement collaboration to allow hospitals to share best practices. Tools to foster guideline adherence in L&D services provision are among the supports (FMoH of Ethiopia,

2014c). The second cycle of the EHAQ packages is on improving quality of L&D services, which is the focus of the second study in this thesis. This is presented in detail in the subsequent section.

Towards scaling up the women's group approach to maternal health, Ethiopia has shown extensive effort in strengthening and expanding the PHC through the introduction of the home grown innovative program, the HEP (FMoH of Ethiopia, 2014a). New social mobilization schemes such as HDA groups of one-to-five networks (FMoH of Ethiopia, 2014c) have been introduced. The WHDT is an example of the HDA groups creating discussion fora on women's health issues at all levels of the healthcare system. As of 2014, a total of 442,773 HDA groups with 2,289,741 one-to-five networks were formed (FMoH of Ethiopia, 2016). In addition, 840 ambulances are distributed to all *woredas*, one each. If a laboring woman fails to deliver within 12 hours at health center level, the ambulance takes her to the nearest district hospital (Yifru and Asres, 2014c). Thus, improving institutional deliveries is one of the main tasks of HDAs and encouraging outcomes have been found because of their efforts (FMoH of Ethiopia, 2014b). A study by World Vision Ethiopia (2014) reported that female HDAs have enhanced maternal health seeking behaviour in the country. The HDAs gather once every two weeks in their 'one to five' groups to talk about their health and other problems. Networking of health centers to health posts recognised notable achievements in improving SBA rate. The group meetings have become a place where health providers can identify pregnant women for appropriate counseling. Another assessment among families benefiting from the HEP in Wolayta and Kembata Tembaro Zones of SNNPR concluded that model families performed better than non-model families in utilizing maternal and child health services (Asnake et al., 2013).

1.5.1 Ethiopian Hospital Alliance for Quality (EHAQ) L&D Change Package

EHAQ is a learning collaborative based on a model that involves hospitals exchanging knowledge with each other and empowering the hospital industry to teach itself how to improve. The package is designed to help physicians, midwives,

nurses, hospital managers and quality improvement teams seeking to improve hospital L&D care through adherence to evidence-based set of tools, which are locally developed and internationally derived. The package offers hospitals practical ways to better implement existing standards and guidelines such as EHRIG, and gives a refresher on related procedures with emphasis on the prominent gaps identified from the pilot hospitals. The package deals with best practices starting from arrival of the mother to discharge including: maternal flow and triage; essential maternal and neonatal care; infection prevention; availability of essential drugs and supplies and; regular maternal satisfaction surveys (FMoH of Ethiopia, 2014d).

Overall, though performance in maternal health services is significantly improving in Ethiopia due to the above strategies (Bradley et al., 2011; Bradley et al., 2012; World Vision Ethiopia, 2014; Asnake et al., 2013), the existence of substantial unmet needs is also acknowledged (Bradley et al., 2011; HEPCAPS1 Project Team, 2012; Afework, 2014) and much more needs to be done to improve access, quality and uptake of EmOC in the country (Afework, 2014).

CHAPTER 2: HYPOTHESES, AIMS AND RESEARCH QUESTIONS

Introduction

This chapter outlines the hypotheses, aims and research questions of the two studies conducted: the first study which examined the variation in *woreda*-level SBA rates and factors associated with higher SBA rates, and the second study which examined the quality of L&D services and associated factors in the government hospitals of SNNPR, Ethiopia.

2.1. Study One: Variation in *woreda*-level SBA rates and factors associated with higher rates in Ethiopia

Achieving a meaningful reduction of the MMR requires a combined effort of both technical and political factors (Dogba and Fournier, 2009). All countries with a SBA rate higher than 80% have a MMR less than 200 (Van Lerberghe and De Brouwere, 2001). Access to facilities that are adequately equipped and staffed with skilled birth attendants is a prerequisite to ensure that all women get skilled care for before, during, and after childbirth (WHO, 2004; WHO, ICM and FIGO, 2004).

The study hypothesized that: *woreda*-level SBA rates will differ markedly throughout the country and *woredas* with the following characteristics will have higher SBA rates: 1) higher number of expected births in 1000s, 2) higher literacy levels, 3) higher coverage of four or more ANC visits, 4) higher proportions of health centers staffed with two or more midwives, 5) higher number of skilled attendants per 10,000 population, 6) higher proportions of model households graduated as model in the implementation of HEP packages, and 7) higher proportions of functional one-to-five networks. Definitions of these variables are provided in Chapter 4.

Pertinent to the above hypotheses, the study aimed to describe the variation in *woreda*-level SBA rates and identify *woreda*-level determinants of higher SBA rates using a cross-sectional ecologic study design. The following research questions were addressed to achieve the aims: 1) Do *woreda*-level SBA rates vary markedly throughout the country? 2) What are the factors that are associated with higher SBA rates?

2.2. Study Two: Quality of L&D care in the government hospitals of SNNPR, Ethiopia

Evidence shows that 42% of maternal deaths are attributed to adverse intrapartum events (Lawn et al., 2009). Similarly, about 4 million stillbirths or late fetal deaths occur every year in developing countries due to inadequate care during pregnancy, delivery and immediate postpartum period (Tinker and Koblinsky, 1993; FCI, Inc, 2007; Lawn et al., 2009). In Ethiopia, a large proportion of maternal and neonatal deaths occur during the first 48 hours after delivery (CSA Ethiopia, 2014). Thus, measuring quality of care is extremely important especially, where an improvement intervention is in place (MEASURE Evaluation, 2001), like the EHRIG and EHAQ initiatives of Ethiopia.

This study conceptualized quality of L&D care using the Donabedian's structure-processes-outcomes model, which is the most commonly used framework for assessing healthcare quality (Michael, 2006). The general aim of the study was to assess the quality of L&D care in the government hospitals of SNNPR, Ethiopia, against the EHAQ standards using a facility-based cross-sectional study design. Expectation of a high level of cooperation was the basis for selecting SNNPR among the existing 11 Regional States and City Administrations as recommended by Abramson and Abramson (2008). Therefore, this study is divided in to three parts based on Donabedian's model as: (a) structural quality of routine L&D care (b) quality of routine L&D care process, and (c) women's experience with L&D care

they received (an outcome component). The hypotheses, aims and research questions are provided for each component separately as follows.

2.2.1. Structural quality of routine L&D care

Structural measures of healthcare quality are concerned with the descriptive characteristics of the physical state of facilities or providers that affect effectiveness of services including, buildings, equipment, staff, beds and others required as per the set standards (Brook and Williams, 1975; Michael, 2006; WHO, 2012). The assumption behind measuring structure is that the setting can be a strong determinant of care quality and given the proper system, good care will follow (Cleary and Margaret, N.D; Donabedian, 2005; Engender Health, 2000).

Based on information obtained from the literature review, it was hypothesized that structural quality of routine L&D care services in the government hospitals of SNNPR is up to the EHAQ standards. The aim was to describe the level of structural quality of routine L&D care in the government hospitals of SNNPR. The related research question addressed was: To what degree do government hospitals in SNNPR meet the EHAQ standards for structural quality of routine L&D care?

2.2.2. Quality of routine L&D care process

Process quality is assessed in relation to the predefined and agreed standards (Bowling, 2014; James, 1989) such as clinical history, physical examination, diagnostic tests and preventive management (Engender Health, 2000). Other measures of process quality include interpersonal processes such as providing information, emotional support and involving patients in decisions consistent with their preferences (Cleary and Margaret, N.D).

The study hypothesized the following for this part of the study:

- 1) The actual L&D care services offered to every woman complies with the EHAQ standards for process quality.

- 2) The overall quality of routine L&D care process varies across hospitals.
- 3) The following woman level variables are associated with the overall quality of routine L&D care process: age, number of previous births, number of skilled attendants involved in care process, presence of danger sign in current pregnancy, and condition immediately after the birth.
- 4) The following hospital level variables are associated with the overall quality of routine L&D care process: hospital-type (teaching status), hospital-level (primary, general and referral), number of births attended in previous year (service volume), number of fulltime skilled birth attendants working in the L&D ward, refresher training on the management of L&D during 12 months prior to the study, and index of structural quality of routine L&D care.

Pertinent to the above hypotheses, the study aimed to: 1) measure the level of process quality of routine L&D care, and 2) examine woman and hospital level factors associated with quality of routine L&D care process.

The following research questions were addressed to achieve the aims:

- 1) To what degree do skilled birth attendants in the government hospitals of SNNPR comply with the EHAQ standards for routine L&D care process?
- 2) What woman and hospital level variables are associated with the quality of routine L&D care process?

2.2.3. Women's experience with L&D care they received

The outcome component of quality measures the effect of care on health status (Michael, 2006), and patients' evaluations of their health care (Bowling, 2014). Favorable perception of women on quality of care is an important factor associated with facility birth (Shiferaw et al., 2013; Kruk et al., 2009; Esena and Sappor, 2013; WHO, 2011b). Unfortunately, women in developing countries are dissatisfied with facility birth, and their satisfaction level varies according to their expectations, social class and educational status (Dogba and Fournier, 2009; Kigenyi et al., 2013).

The study hypothesized the following for the assessment of women's experience with L&D care they received:

- 1) Women have positive experience with L&D care they received from the hospitals.
- 2) Women's overall experience with L&D care varies across hospitals.
- 3) The following woman level variables are associated with women's overall experience: age, education, occupation, number of previous births, number of ANC visits, and index scores for the following aspects of perceived quality: interpersonal communication and emotional support, responsiveness to preferences, health education, and physical environment.
- 4) The following hospital level variables are associated with women's overall experience: hospital-type (teaching status), hospital-level (primary, general and referral), number of fulltime skilled birth attendants in L&D ward, refresher training on the management of L&D during 12 months prior to the study, and index score for process quality of routine L&D care.

Pertinent to the above hypotheses, the study aimed to 1) to assess the experience of women who received L&D care from the hospitals, and 2) examine woman and hospital level factors associated with women's overall experience with the care. The related research questions were: 1) What is the experience of women who received L&D care from the hospitals? 2) What woman and hospital level factors are associated with women's overall experience with the care they received?

CHAPTER 3: LITERATURE REVIEW

Introduction

This chapter deals with a review of the relevant empirical literature to contextualize the aims of this research. First the review strategy is described. The second section provides an overview of utilization of SBA in Ethiopia with the determinants. The third section describes the conceptual background that guided this review and thus, that frames the concept of the present project. Specifically, the basic concept and assessment framework of quality of health care are discussed in this regard. The fourth section provides what is currently known about the factors that influence quality of SBA. Appraisal of the literature in terms of its contribution and current limitations and knowledge gaps, and consequently the value of implementing this project; are provided in the sixth section. Finally, the conceptual framework that guided the conduct of the studies is presented.

3.1 Review strategy

3.1.1 Data sources and search strategy

Three electronic databases: PubMed Central, Cochrane and MEDLINE, and Google Scholar were systematically searched. Various literature use different names for SBA. Therefore, the search strategy applied to the databases alternatively combined the following broad range of preselected search terms, such as the Medical Subject Headings (MeSH) terms with 'quality of care' using the Boolean logic (AND/OR): 'maternal healthcare*service', 'maternity care*service', 'obstetric care*service', 'perinatal care*service', 'birthing care', 'intrapartum care', 'skilled delivery care*service', 'skilled birth attendant*', 'professionally attended delivery', 'institutional delivery service', 'health*facility delivery', 'labor and delivery care*service'. Grey literature was also consulted. Search was limited to the literature on human subjects and those reported in English language otherwise, there was no geographical or time restriction. First, articles were retained based on their titles, keywords and summaries. Retained

articles were then analysed in depth and their reference lists carefully screened to identify supplementary literature in a 'snowball' approach, Table of contents of targeted journals such as the International Journals of Gynaecology and Obstetrics and BMC Pregnancy and Child Birth. An e-mail alert was set up particularly for the latter journal.

3.1.2 Data extraction and synthesis

This review has focused on the use and quality of obstetric care in terms of the structural, process and outcome components of quality, and other contextual factors specifically, the community context and individual attributes. The analytic framework is discussed in detail under section 3.1.3 below. A data extraction template was developed to organize and describe the selected studies. The form specified the types of studies, their objectives, design, dominant methods, locations, populations (description of the sample) and key findings. Narrative synthesis and descriptive summary of the studies was completed. The results are reported in detail in the subsequent section.

3.1.3 Overview of the literature

Overall, 85 papers were reviewed on dimensions of quality of SBA, of which 28 spoke about the Ethiopian context in one way or another. Of the literature that contained any element of quality of childbirth care in Ethiopia, 15 have assessed availability of infrastructure, equipment, drugs and supplies; only seven on availability of skilled attendants and; nine on compliance of providers to best practices of service delivery process. Perceived poor quality care has been reviewed from 19 studies as a factor for not using SBA, four of which also presented factors associated with women's satisfaction. Eight of the studies on perceived poor-quality care are from Ethiopia, six of which also presented factors associated with women's satisfaction.

Thirteen of the 34 studies that reported on community context related factors are in Ethiopia. Overall, 22 studies agreed that women who are rural residents are less

likely to utilize SBA compared to their urban counterparts, partly due to distance to facilities, limited access to transportation. District with low uptake of SBA are characterized by less literate population, less densely populated, more geographical barriers to access services. Other community context related factors are: cultural barriers (four studies); women's status for decision making (five studies); and preference for skilled providers (two studies). Five studies reported the prevalence of inadequate transportation networks and unfavorable cultural perceptions as additional community context related factors in Ethiopia.

Among the reviewed literature, 16 reported about socio-economic characteristics of women as individual attributes, of which nine were in Ethiopia. The studies showed that women who are poor or in the lowest wealth quantile and; those who are uneducated or less educated are less likely to use SBA. Among women's sociodemographic and obstetric characteristics, age (six studies) and their birthing experiences (11 studies), are frequently cited in the literature as determinants for use of SBA. In addition, 11 studies reported that women's utilization of ANC services; and their experiences of childbirth care (15 studies), determine the use of SBA. Nine of these studies were from Ethiopia.

The studies containing any of the elements of quality of childbirth care in Ethiopia have employed various approaches. One study used demographic mapping methods to estimate numbers of people, women of childbearing age, live births and pregnancies, and distribution of CEmONC facilities. There were two qualitative studies, two literature reviews, two retrospective record reviews, two linked facility and population-based surveys, 12 cross sectional surveys, one prospective birth preparedness study; three mixed methods studies assessed impact of interventions, one case control and one pilot study in a referral hospital (Annex A).

3.2 Utilization of SBA in Ethiopia

The above section has discussed the importance of measuring health service utilisation in assessing quality of care. Services may be available and ready, but

this does not guarantee the delivery and uptake of quality services. Ronald et al. (1983) stated that utilization rates are objective measures of realized access to the services provided. These services may be measured in a variety of ways, a simple proportion of those who did or did not have contact with a provider within a given period, or an overall volume of services consumed, once contact is made.

Utilization rates of skilled maternity care in Ethiopia are generally the lowest in sub-Saharan Africa (UNFPA, 2012). A recent nationwide survey has shown a SBA rate of 28% in the country and 17% of women receive postnatal care within the first two days after birth (CSA Ethiopia and ORC Macro, 2016). Only 3% of deliveries take place in facilities that routinely provide all the signal functions. And 6% of Ethiopian women with obstetric complications are treated in any health facility, half of whom are treated in fully functional EmONC facilities (Admasu et al., 2011). There is regional variation in the proportion of SBA, the highest being in Addis Ababa (97%), and the lowest in Afar (16%) (CSA Ethiopia and ORC Macro, 2016). The covered needs of caesareans in developing countries are below the United Nations targets (Dogba and Fournier, 2009). A higher caesarean section percentage suggests better availability of EmOC services. It is well recognized that very low and/or very high levels of caesarean section (5-15%) are dangerous. Overall, caesarean delivery is extremely low in Ethiopia with a coverage rate as low as 1.8% according to the 2011 DHS (UNFPA, 2012); though Admasu et al. (2011) has reported much lower figure, 0.6% of expected deliveries in the country are by cesarean section. The rate of caesarian section is below 2% in seven out of the 11 regions, the highest being in Addis Ababa at 20% implying variation in the availability of EmOC services by region (UNFPA, 2012).

In SNNPR, the SBA rate is 28.6% and only 16.9% of women receive postnatal care within two days after birth (CSA Ethiopia and ORC Macro, 2016). According to the SNNPR Health Bureau report for the year 2013/2014; 1,525 deliveries were attended in the region at public hospitals on average, of which, 35.8% were by surgical, instrumental or assisted vaginal delivery and; 26.4% were by caesarean

section (SNNPR State Health Bureau, 2014). A total of 4,231 deliveries in Gamo Gofa Zone, SNNPR, were attended in health institutions (three hospitals and 25 health centers) in 2010 (Girma et al., 2013). Each hospital attended 522 deliveries on average. Only 6.6% of the 64,413 expected deliveries occurred at the institutions. Health institutions from rural and remote woredas of the Zone had very low institutional delivery rates.

Determinants of SBA in the country revolve around contextual, socioeconomic and fertility behavior. Dose-response relationship between ANC visits and SBA is apparent. Higher number of ANC visits is associated with increased SBA, while one visit has no effect. Urban women are more likely to use SBA. Women in most regions of the country, except Dire Dawa, Harari and Benishangul Gumuz, are less likely to use SBA than those in Addis Ababa. Both elementary and secondary education is associated with higher SBA. Secondary or higher education in women carries a 2.4 times higher odds of SBA. Women in households with high wealth score are 1.54 times more likely to use SBA. Women who have just initiated child bearing are more likely than others. Since high maternal mortality is associated with inadequate and poor-quality care, access to quality maternal health services and their use must be improved to reduce maternal mortality in the country (UNFPA, 2012).

3.3 Conceptual background

3.3.1 Basic concepts of quality of care

This section sets the context for this project further by reviewing the basic concepts of healthcare quality and theoretical structure for its assessment. There is an extensive body of literature that defines and measures quality in health care. Yet, there is no universally accepted definition of quality of care as it is difficult measure. It embraces multiple dimensions and multiple levels, from patient to health system and health policies, in the case of healthcare quality (Duysburgh et al., 2013; MEASURE Evaluation, 2001). As a result, hundreds of indicators can literally be

used to measure quality, and the volume of data generated can be overwhelming (MEASURE Evaluation, 2001). Different definitions and frameworks have been provided to assess quality of healthcare (Jaime Initiatives Inc., 2004; WHO, 2012; Campbell et al., 2000; Hulton et al., 2000; Michael, 2006; Berwick and Knapp, 1987; Brook and Williams, 1975; Bowling, 2014; Engender Health, 2000; Cleary and Margaret, N.D; Donabedian, 2005; James, 1989; Gold, 1998; Dogba and Fournier, 2009; Tuncalp et al., 2015; MEASURE Evaluation, 2001).

Quality of health care involves proper performance (according to standards) of interventions that are known to be safe, affordable and that have the ability to improve health outcomes and meet or exceed client expectations (Jaime Initiatives Inc., 2004; Campbell et al., 2000; Hulton et al., 2000; Tuncalp et al., 2015). The Ethiopian healthcare quality strategy defines quality as “comprehensive care that is measurably safe, effective, patient-centered, and uniformly delivered in a timely way that is affordable to the Ethiopian population and appropriately utilizes resources and services efficiently” (FMoH of Ethiopia, 2016).

3.3.2. Assessment of health care quality

The most commonly used framework for assessing quality of healthcare is Donabedian’s structure-processes-outcomes conceptualization of quality (Michael, 2006) with the assumption that better health care produces better health outcomes (Berwick and Knapp, 1987). Structural measures of healthcare quality are concerned with the descriptive characteristics of the physical state of facilities or providers that affect effectiveness of services including, buildings, equipment, staff, beds and others required as per the set standards (Brook and Williams, 1975; Michael, 2006; WHO, 2012). It can be operationalised in relation to distribution of staff, their mix in relation to level of training and skill, availability, location and type of facilities; equipment, numbers and types of services, and consumables (Bowling, 2014; Chawla et al., 1996; WHO, 2012); and rules of procedure related to care delivery (Berwick and Knapp, 1987; Engender Health, 2000; Cleary and Margaret, N.D; WHO, 2012). Physicians per population and nurse per physician

are examples of structural measures in relation to staff availability (Brook and Williams, 1975). The assumption behind measuring structure is that the setting can be a strong determinant of care quality and given the proper system, good care will follow (Cleary and Margaret, N.D; Donabedian, 2005; Engender Health, 2000).

Processes of quality refers to intermediate products of care, such as patterns of diagnostic evaluation, access to care (Berwick and Knapp, 1987), rate of utilization (Berwick and Knapp, 1987; Bowling, 2014) and choice of therapies (Berwick and Knapp, 1987). It measures how the service is organised (Bowling, 2014) and whether good practices are followed (Michael, 2006). It is assessed in relation to deviation from predefined and agreed standards (Bowling, 2014; James, 1989), including: clinical history, physical examination, diagnostic tests, justification of diagnosis and therapy, technical competence, evidence of preventive management, coordination and continuity of care, and acceptability of care to the recipient (Engender Health, 2000). It can refer to anything that is done as part of the encounter between a provider and a patient, including interpersonal processes, such as providing information, emotional support and involving patients in decisions consistent with their preferences (Cleary and Margaret, N.D). Process measures are typically developed based on the known relationship between a process and outcomes (Cleary and Margaret, N.D) because, they assume that given the proper procedures, good health outcomes will result (Engender Health, 2000). However, it is not adequate to assess individual processes of care, but rather groups of processes that lead to a better outcome (Cleary and Margaret, N.D). It is convenient to assess both structure and processes together as is difficult to separate them in a complex organization like a hospital (Chawla et al., 1996).

The outcome component of quality measures the effect of care on health status (Michael, 2006), and patients' evaluations of their health care (Bowling, 2014). Outcomes are the combined effects of structure and processes as the attributes of settings where care is delivered affects them (Michael, 2006). Therefore, since structure and process of services can influence their effectiveness (Bowling, 2014),

assessing outcomes means assessing performances which are conditional on structure and process (Michael, 2006). Thus, it is often necessary to measure structure and process to interpret the outcome of the care (Bowling, 2014). For instance, poor performance means low service utilization rates, which might be due to lack of essential drugs and supplies, shortage of staff, or other factors (Michael, 2006). Even though validity of outcomes as a component of quality is seldom questioned; good health outcomes are not always attributable to good procedures due to multiple factors which in addition to the treatment protocol affect or determine health outcomes, for instance, education and income (Engender Health, 2000). Service use and satisfaction level indicators (Bowling, 2014; Cleary and Margaret, N.D; Berwick and Knapp, 1987; James, 1989) are common outcome measures. Quality cannot be achieved without a sufficient set of measurable specifications that reflect customer expectations (James, 1989). However, high satisfaction does not necessarily imply high quality (Cleary and Margaret, N.D).

3.4 Factors affecting quality of SBA

Quality of care process determines both the uptake and outcomes of a service (Graham et al., 2001; Dogba and Fournier, 2009; Hulton et al., 2000). Even though obstetric services are necessary to reduce maternal mortality, they may not be sufficient. Even if the services are available and functioning well, women may have various barriers to using them actually (Thaddeus and Maine, 1994). Implementation of interventions that have been discussed in Chapter 1 is not a guarantee for improved MNH outcomes as quality of care is key to ensure adequate case management and to encourage use of the services (Hulton et al., 2000; FCI, Inc, 2007; Graham et al., 2001). For instance, some countries with improved utilization of SBA have high MMRs, implying the importance of quality of care (FCI, Inc, 2007). Women do not need expensive programs of building, equipping and staffing new facilities often times, but better use of already available resources; which requires creativity in recognizing and responding to the barriers between women and the health care system (WHO, 1989).

Based on the evidence reviewed as to how healthcare quality assessment endeavors should be conceptualized, the factors that determine quality of SBA are generally structured by adapting the Donabedian's structure-process-outcome framework to explicitly include context related factors, which the original model either lacks or considers implicitly. The adaptation aims to make the community context and individual attributes of quality as explicit as possible.

3.4.1 Structure

In order to benefit from the implementation of effective interventions for childbirth care, the healthcare system should ensure that facilities, skilled professionals, essential medicines and devices are available 24 hours a day and 7 days a week to provide all women with quality services and meet the required standards of care (WHO, 2010b; Graham et al., 2001; UNDP, Bureau for Development Policy, 2011; Tchibindat et al., 2004). The use of SBA guarantees optimal outcomes for women and newborns, as structural barriers are common (Hulton et al., 2000). These factors impact not only on service utilization, but also on effectiveness of interventions and client perceptions (Graham et al., 2001; Dogba and Fournier, 2009).

3.4.1.1 Availability of skilled birth attendants

Performance of any health system, and thus improvement of population health depends on productivity, competence, availability and responsiveness of health professionals (WHO, 2006a). Thus, skilled birth attendants are at the heart of the success of EmOC interventions (Rigoli and Dussault, 2003; Dogba and Fournier, 2009). But staff shortages are a major obstacle to providing good quality EmOC in developing countries (Dogba and Fournier, 2009). Staff qualifications also determine their capacity to diagnose and handle patients adequately. For instance, maternal morbidity is significantly better diagnosed and treated by doctors and midwives than by nurses (Dumont et al., 2002). Unfavorable perceptions due to shortfalls in skilled professionals can partly explain lower utilization rates of EmOC

services (Olsen et al., 2005). Thus, composition and deployment of the EmOC team should ensure an adequate mix of clinical skills (Dogba and Fournier, 2009).

In low resource settings like Ethiopia, the population to provider ratio is very high (Bangdiwala et al., 2010), which impacts on maternal and neonatal health as countries with the highest SBA rates have the lowest MMRs (WHO, 2004). Though the International Federation of Gynecology and Obstetrics and, International Confederation of Midwives recommend one skilled provider for every 5000 individuals, the average physician to population ratio is as low as 1 doctor for every 100,000 people in developing countries. In rural areas where 80% of populations in the developing world live, this ratio is even lower (Rosenfield and Schwartz, 2005). To achieve 80% SBA rate, a minimum of 2.28 professional care providers per 1,000 people is recommended (WHO, 2006a). Low utilization of SBAs is partly due to poor geographic distribution of the skilled attendants with more preference to urban areas (Campell and Graham, 2006). For instance, obstetrician and gynaecologist posts are vacant in 30% of district hospitals in Gujarat (Ramesh et al., 2006). In Bangladesh, both inequitable distribution and high absenteeism rates of skilled attendants is a major challenge to SBA (Tatem et al., 2014). In 2005, nurse to population ratio in rural districts of the country with high SBA rates was 1:23,400 and 1:66,300 in districts with low rates (Anwar et al., 2009).

In Ghana, a median of two skilled attendants were always available per facility on call to provide emergency services. At least one skilled attendant was trained to manage obstetric complications in 92% of facilities. The median number of skilled attendants managing obstetric complications at hospitals was nine (Nesbitt et al., 2013). Although midwife students were attending deliveries in some facilities in Cote d'Ivoire, most normal deliveries were carried out by skilled attendants (Delvaux et al., 2008).

In Ethiopia, physician to population ratio is 1:26,943, which is low as compared to the WHO standard of 1:10,000 for developing countries. The standard of one nurse

to 5,000 populations has been surpassed in the country with 1:2,311 (FMOH of Ethiopia, 2014c). However, the workload per midwives is still very high in Ethiopia with the average ratio of one midwife to 1,159 pregnancies (Tatem et al., 2014). This is also supported by Meseret et al. (2013) which reported the number of midwives per population as an important predictor of institutional delivery rates in Southwest Ethiopia. Eventhough excessive workloads create unfavorable professional environment (Hulton et al., 2000), they are affected by many factors. There are areas where increasing numbers of births have not been matched by increases in the availability of SBAs, leading to deterioration of MNH situations (Tatem et al., 2014).

Even if the required number and mix of skilled attendants are available, this alone does not guarantee availability of quality birthing care (Dogba and Fournier, 2009). Their unavailability for 24 hours a day and 7 days a week in facilities; and skills gap they have are other critical problems in developing countries. Having a number of doctors on staff, facilities may function only for a fraction of the day, contributing to the third delay (Maine et al., 1997; Hossain and Ross, 2006). EmOC professionals in Benin, Ecuador, Jamaica and Rwanda scored only 50% in the required skills partly due to inadequate trainings (Dogba and Fournier, 2009). Despite advances in BEmONC personnel at 10 public health centers in Addis Ababa, Ethiopia; where the ratio of providers for 100 expected deliveries was 10.3 for midwives and 14.2 for a skilled attendant (midwives plus nurses) in 2013; their competence was poor, contributing to quality gaps. Majority had insufficient knowledge in diagnosing postpartum haemorrhage (PPH) and birth asphyxia and poor skills in neonatal resuscitation (Mirkuzie et al., 2014). Therefore, having a large number of skilled attendants does not guarantee higher SBA rates unless they are properly skilled and have an enabling environment. A health professional is not necessarily a skilled attendant and a skilled attendant does not mean skilled attendance which encompasses both the providers and enabling environment

(Graham et al., 2001), including availability of the required infrastructure, equipment, drugs and supplies.

3.4.1.2 Availability of infrastructure, equipment, drugs and supplies

Improvements in EmOC supply often increase its utilization, particularly when the community is mobilized and sensitized to its availability (Ande et al., 1997; Oyesola et al., 1997). In developing countries, compliance to the United Nations (UN) standards of BEmOC services is deficient partly due to inadequacy of equipment (Dogba and Fournier, 2009). A study that explored the reasons for regional variations in the utilization between high and low performing rural districts of Bangladesh revealed that distribution of functional EmOC facilities satisfied the UN's minimum criteria of at least one CEmOC and four BEmOC facilities for every 500,000 people in the high performing district, but not in the low performing one (Anwar et al., 2009).

In rural districts of Bangladesh (Anwar et al., 2009) and in Afghanistan (Kim et al., 2013), most equipment required to organize obstetric services are available in all studied facilities. In Afghanistan, 81%-100% of the 78 studied facilities had newborn care guidelines; 90% -100% had a newborn-sized bag and mucus extractor and; 72.1%-90% had a newborn resuscitation table. All regional and specialized hospitals had a suction apparatus, compared to district and provincial hospitals. The proportion of basic infrastructure components in place at district hospitals was significantly smaller than at provincial or regional and specialized hospitals (Kim et al., 2013). Drug supply is inadequate across all facilities compared to patient-load in rural Bangladesh. Unavailability of blood transfusions is among the major barriers; patients must go to private diagnostic centres for blood-grouping and cross matching (Anwar et al., 2009). Rural facilities in Burkina Faso similarly lacked magnesium sulphate to treat preeclampsia/eclampsia (Duysburgh et al., 2013).

In Ethiopia too few facilities provided EmONC to meet the UN standards of 5 per 500 000 population both nationally and in most regions (Admasu et al., 2011). Substantial unmet needs in maternal health services observed at health centers in rural Ethiopia were related to inadequate diagnostic equipment and quality of skilled attendants (Bradley et al., 2011). A comprehensive literature review of health system factors for maternal and perinatal mortalities in Ethiopia for the period of 1980 to 2012 showed that the number of hospitals per 100,000 people is 0.1 to 0.2, which is among the lowest in Africa, which might have contributed to the highest mortality in the country. The hospitals were not well equipped for treating some common causes of maternal and perinatal mortality (Yifru and Asres, 2014a). On the other hand, advances in infrastructure and medical supplies for BEmONC have been reported at 10 public health centers in Addis Ababa in 2013 (Mirkuzie et al., 2014). All health centers had continuous water supply, reliable access to telephone, logbooks and partograph; 50% accessed 24 hours ambulance services; and all had consistent supply of uterotonic drugs.

Woredas with health centres capable of providing EmOC and performing caesarean sections had higher rates of institutional deliveries as compared to *woredas* with health centres not fulfilling the criteria of BEmOC in Southwest Ethiopia, Gamo Gofa Zone. Health institutions from rural and remote *woredas* of the Zone had very low institutional deliveries, few midwives on staff and very high institutional deaths, that is, 61% and 28% for the rural and remote *woredas*, respectively (Girma et al., 2013). It has also been determined that health facility characteristics were more relevant for skilled delivery care use in North Gondar Zone, Ethiopia (Worku et al., 2013a). Out of 15 facilities studied, thermometer was either missing or nonfunctional in five, sphygmomanometer in seven, foetoscope in two, delivery set in five, blank partograph in seven, bag and mask for neonatal resuscitation in seven, sterilizer in five and refrigerator in eight facilities. Toilet facilities and water supply were also unsatisfactory in seven and eight facilities respectively (Worku et al., 2013b).

3.4.2 Service delivery process

This section intends to describe the situation of how adherence of the skilled attendants to best practices influences the quality of birthing care, assuming that all other healthcare system related factors are fulfilled. Studies from Ghana (Nesbitt et al., 2013) and Ethiopia (Bradley et al., 2011; Girma et al., 2013) have shown substandard or inadequate routine delivery care services, partly due to non-compliance of the providers to best practices. High levels of compliance with most aspects of good practices, and non-compliance due to different inter-linked resource constraints are the major factors that affect quality of childbirth care practices (Pitchforth et al., 2010). High levels of technical performance during SBA can be determined by appropriate counselling and health education practices (Duysburgh et al., 2013; Nesbitt et al., 2013; Worku et al., 2013b). However, delaying bathing of the baby for at least six hours after delivery was one of the least frequent routine delivery functions in Ghana, for example (Nesbitt et al., 2013). It has also been reported that 78% of the birthing mothers in North Gondar Zone, Ethiopia, were informed on the progress of their labor (Worku et al., 2013b).

Studies have also emphasized on proper monitoring of condition of both the mother and newborn as an important service delivery practice to birthing women (Duysburgh et al., 2013; Nesbitt et al., 2013; Worku et al., 2013b). Appropriate use of partographs is given a particular attention in this regard by many authors (Duysburgh et al., 2013; Nesbitt et al., 2013; Delvaux et al., 2008; Worku et al., 2013b). Monitoring labour with a partograph was one of the least frequent routine delivery functions in Ghana (Nesbitt et al., 2013), Cote d'Ivoire (Delvaux et al., 2008) and Ethiopia (Worku et al., 2013b). Only 41% of health facilities in Ghana showed correctly completed partographs and had a clock available complete the partograph (Nesbitt et al., 2013); while only 24% of skilled attendants in Southwest Ethiopia used partograph consistently (Worku et al., 2013b).

Other important aspects of birthing care practices include: appropriate laboratory investigations (Duysburgh et al., 2013); adequate examinations (Duysburgh et al.,

2013; Worku et al., 2013b); and appropriate infection prevention practices (Delvaux et al., 2008). For example, using gloves for delivery care was almost universal in Cote d'Ivoire, though very few health workers washed their hands and soaked instruments in decontamination solution less frequently (Delvaux et al., 2008).

3.4.3 Outcome: perceived quality of care

Using consumer views in planning health services results in more appropriate service provision more client satisfaction and better outcomes (Barry et al., 1997; Macfarlane et al., 1997). A review of literature on barriers to SBA showed that negative interactions with health personnel is one of the factors that influence care seeking behaviour among women in labour (Koblinsky et al., 2006). Patient dissatisfaction can result in lower attendance at health facilities, thereby reducing the rate of SBA, and generally slowing any progress in MNH (Dogba and Fournier, 2009). A systematic review reported that women in developing countries are generally dissatisfied. They rarely find the accompaniment, communication and empathy that they had with traditional midwives; and providers often fail to explain clinical procedures to them and mock women's expressions of pain. Thus, obstetric care received from a hospital is sought only as a last resort in developing countries (Dogba and Fournier, 2009). Other studies have also identified favorable perception of women in the quality of service as an important factor in determining their choice of facility birth (Shiferaw et al., 2013; Kruk et al., 2009; Ekena and Sappor, 2013).

Non-medical aspects of quality (sanitation facilities and companion during delivery) were evaluated in Ghana as proxies for acceptability and comfort of intrapartum and postnatal care (Nesbitt et al., 2013). Median score for the non-medical quality was 2 out of 5 with only 13% of the facilities providing the highest non-medical quality overall. Though most facilities provided a toilet facility, it was rated as 'clean' by less than half of the women. Similarly, client-provider interaction during childbirth was perceived as very poor and low in Tanzania (Duysburgh et al.,

2013), and Uganda (Kigenyi et al., 2013), respectively. In Ethiopia, women's satisfaction with delivery care is suboptimal (61.9%). While 68.8% are very likely to deliver in the same hospital, 69.1% are very likely to recommend the hospital to others (Tayelgn et al., 2011). Bradley et al. (2011) has also revealed substantial unmet expectations of laboring mothers at health centers in rural Ethiopia. Even with greater numbers of better trained staff and more equipment, they had limited capacity to address more complex birthing needs, reducing the likelihood that women would use the facilities for childbirth. Perceived poor quality service is reported to be a reason for not delivering in a health facility by majority of women from the SNNPR than any other region in Ethiopia (CSA Ethiopia, 2014).

In developing countries, women's level of satisfaction varied according to their expectations, social class and educational levels (Dogba and Fournier, 2009; Kigenyi et al., 2013). Higher educational level (college/university); rural residence (Kigenyi et al., 2013); health facility related factors (short waiting time, availability of waiting area and fair service cost); health providers' characteristics (ensuring privacy during examinations) (Tayelgn et al., 2011; d'Ambruoso et al., 2005) and; condition of the woman immediately after delivery (absence of complication) (Tayelgn et al., 2011) are among the predictors of higher overall maternal satisfaction and thus, higher quality scores for birthing care services. Lack of sensitivity to patients' modesty, uncomfortable delivery beds or couches and potential separation from family members during labour, were the specific aspects of delivery that discouraged rural Ethiopian women from seeking institutional delivery services (Sipsma et al., 2013). Regarding condition of the woman immediately after delivery, gratitude by near-miss women to the staff who saved their life, and having a live newborn which is valued the most by some women can offset staff misbehavior (Dogba and Fournier, 2009).

3.4.4 Community context

Community context can influence the access to and uptake of SBA. Communities with high levels of social capital, where material and psychosocial resources are

shared by members who work together to address their problems collectively, are more likely to challenge their problems (Poortinga, 2006). Individual women and their families live in communities, which vary in important social ways including place of residence. Urban households use SBA significantly more than rural communities do. This is partly due to distance to facilities, one of the most intractable barriers to SBA, particularly where transport is either expensive or unavailable (Magadi et al., 2000; Ekena and Sappor, 2013). In this situation, many pregnant women do not attempt to reach a facility for delivery because walking many kilometers is difficult in labour and impossible if labour starts at night (Thaddeus and Maine, 1994). Supporting this argument, a meta-analysis of socio-demographic factors predicting birth in health facility (Yifru and Asres, 2014b) revealed an inverse relationship between the distance of women's residence from the facility and the proportion of facility birth. The closer a health facility is to the home of users, the more likely that it will be patronized during labour.

A study that explored the reasons for regional variations in the quality of obstetric care between high and low performing rural districts of Bangladesh found that the context of care was different in the districts (Anwar et al., 2009). The population in low performing district is less literate, less dense, more conservative and has more geographical and sociocultural barriers in accessing services (long distance between the facility and district town), than the high performing district. Several other studies also agree that women who are rural residents are less likely to utilize SBA compared to their urban counterparts (CSA Ethiopia, 2014; Davidson, 2004; Tatem et al., 2014; Girma et al., 2013; Singh et al., 2012; Houweling et al., 2007; Tura et al., 2014; Yifru and Asres, 2014b). For example, the recent EMDHS has shown that urban births are six times more likely than rural births to be use skilled delivery care (CSA Ethiopia, 2014).

Other community context related factors that determine the use of SBA include: transportation networks together with distances (Tatem et al., 2014; Anwar et al., 2009; Ekena and Sappor, 2013; Thaddeus and Maine, 1994; Magadi et al., 2000;

Mpembeni et al., 2007; King et al., 2015; Yifru and Asres, 2014a; Tura et al., 2014), cultural barriers (Tatem et al., 2014; Anwar et al., 2009; Dogba and Fournier, 2009), women's status for decision making (King et al., 2015), preference for skilled providers (Worku et al., 2013a; King et al., 2015), and confidence in healthcare facilities (King et al., 2015). For instance, multiple professionals examining women one after the other, especially in public hospitals, is difficult to accept in many contexts, where vaginal examination is linked to sexual intercourse and sometimes experienced as rape (Dogba and Fournier, 2009).

In Ethiopia, inadequate transportation networks and unfavorable cultural perceptions are prevalent (Tatem et al., 2014). Unequal use and access to obstetric care was also noted in Gamo Gofa Zone, Southwest Ethiopia, where remote rural districts that lacked EmOC facilities had lower institutional deliveries (Girma et al., 2013). While the presence of female health professionals was identified as a community context related facilitator to SBA use in Afar Region of Ethiopia, women's low status and restricted opportunities for decision making, long distances, cost, domestic workload, and traditional practices which include a preference for birthing at home with a traditional birth attendant; were the community context related barriers to accessing SBA (King et al., 2015). In addition, Worku et al. (2013a) observed that communal factors were more relevant determinants for skilled delivery care in Ethiopia. In Wolayta and Kembata Tembaro Zones, Southern Ethiopia, model families better utilized maternal health services than non-model families (Asnake et al., 2013). Variations in institutional deliveries were observed among *woredas* in Gamo Gofa Zone, SNNPR (Girma et al., 2013). *Woredas* with largest towns had the highest proportion of facility births. Institutional deliveries per institutional catchment area varied from zero to an average of more than 20% in the two *woredas* with towns having hospitals.

3.4.5 Individual attributes

This subsection presents the relationship between selected socioeconomic and demographic characteristics of women and use of SBA. Women's obstetric

characteristics are also described, focusing on their ANC use and birthing care experiences.

3.4.5.1 Socioeconomic characteristics of women

A woman's socio-economic status by and large, determines whether a woman will seek SBA (Esen and Sappor, 2013). Socioeconomic disadvantage can have a detrimental effect on maternal health and that indicators such as level of household wealth and level of education are associated with women's utilization of all maternal health care services (Kunst and Houweling, 2001).

Several studies (Davidson, 2004; Tatem et al., 2014; Singh et al., 2012; UNDP, Bureau for Development Policy, 2011; CSA Ethiopia, 2014; Anwar et al., 2008; Tura et al., 2014; Yifru and Asres, 2014a) have demonstrated that women who are poor or in the lowest wealth quantile are less likely to utilize SBA compared to their wealthy counterparts. For example, over 23% of women in the lowest wealth quintile have access to SBA compared to 78% of women in the highest wealth quintile in Kenya (Davidson, 2004). In Bangladesh, women in the highest wealth quintile were more than twice as likely to use SBA as those in the poorest (Anwar et al., 2008). Similarly, there are huge wealth-based disparities in SBA with the poorest women far less likely to access SBA in Ethiopia (UNFPA, 2012; CSA Ethiopia, 2014; Tatem et al., 2014).

A woman's educational status and her specific knowledge about pregnancy and delivery care are also important in uptake of the services (Simkhada et al., 2008; CSA Ethiopia, 2014). Formal schooling exposes women to information about reproductive health and pregnancy care, education and use of maternal health services are closely related. Education is also associated with other precursors of safe motherhood such as contraception and greater economic independence, thereby, enhancing women's self-efficacy (Grown et al., 2005). Other studies that conquer the argument that uneducated or less educated women are less likely to utilize SBA compared to their educated counterparts include, Davidson (2004),

Singh et al. (2012), Reuben and Mary (2013), Kunst and Houweling (2001), Grown et al. (2005), UNDP, Bureau for Development Policy (2011), Simkhada et al. (2008), Gurmesa et al. (2014), Worku et al. (2013a), UNFPA (2012), and Negalign and Yohannes (2013).

3.4.5.2 Sociodemographic characteristics and obstetric experiences of women

Among women's sociodemographic and obstetric characteristics, age (Say and Raine, 2007; WHO, 2011b; CSA Ethiopia, 2014) and their birthing experiences (Say and Raine, 2007; Tura et al., 2014; Amano et al., 2012; Teferra et al., 2012; Yifru and Asres, 2014a; Worku et al., 2013a; CSA Ethiopia, 2014), are frequently cited in the literature as determinants of SBA use. For instance, it has been shown in Ethiopia that delivery in a health facility is more common among births to mothers below the age 35 (CSA Ethiopia, 2014). A meta-analysis conducted by Yifru and Asres (2014b) on articles reported between 2000 and 2013 from developing countries demonstrated that the chance of adult women giving birth in a health facility was less than teenage women by about 72%. Number of pregnancy (gravida) has inverse relationship with the rate of SBA; primigravid women (pregnant for the first time) are more likely to deliver in health facilities than multiparous women (Tura et al., 2014; Yifru and Asres, 2014b; UNFPA, 2012; CSA Ethiopia, 2014).

Several literature also reported that previous ANC experience is a positive determinant of SBA utilization (FMoH of Ethiopia, 2014a; Ross, 1998; Esena and Sappor, 2013; Abou-Zahr and Wardlaw, 2003; Anwar et al., 2008; Worku et al., 2013a; Yifru and Asres, 2014b; Bayou and Gacho, 2013). ANC visit is an indicator of quality and use of health care during pregnancy increasing the likelihood of receiving effective maternal health interventions. The antenatal period presents opportunities for reaching pregnant women with interventions that may be vital to their health and wellbeing and to their infants (FMoH of Ethiopia, 2014a; Ross, 1998; Esena and Sappor, 2013). It is an important safety net for healthy

motherhood and childbirth (Abou-Zahr and Wardlaw, 2003). Most ANC attendants especially with more than four visits understand the benefits of SBA with time (Esená and Sappor, 2013). Studies from Bangladesh (Anwar et al., 2008) and Ethiopia (Worku et al., 2013a; Yifru and Asres, 2014b) favored the argument that previous experience of ANC services is a strong predictor of SBA. Meta-analysis by Yifru and Asres (2014b) cited that a woman attending ANC has more than seven times increased chance of delivering in a health facility. The MEDHS 2014 also reported that delivery in a health facility is more common among births to mothers who had at least four ANC visits (CSA Ethiopia, 2014). In addition, other literature (Esená and Sappor, 2013; Cleary and Edgman, 1997; Koblinsky et al., 2006; Barry et al., 1997; Macfarlane et al., 1997; Dogba and Fournier, 2009; Nesbitt et al., 2013; Duysburgh et al., 2013; Kigenyi et al., 2013; Tayelgn et al., 2011; d'Ambruoso et al., 2005), have reported previous childbirth care experience of women as a determinant of their use of SBA.

3.5 Gaps in the literature

Despite the existence of extensive literature in Ethiopia on the determinants of SBA, most of the studies have limited generalizability due to their restricted geographic scope. Most studies are limited to zonal, *woreda*, or facility level. Even so, they included a few facilities representing each of these levels. Some studies have largely focused on the performance of selected PHCUs, that is, health centers and health posts, with few studies involving hospitals. No published study could be found that has produced at least regionally generalizable results about quality of L&D care by collecting primary data, except for the EDHS and Service Provision Assessment (SPA). Though the EDHS involve nationally representative samples, they do not objectively capture information about structural and process measures of obstetric care (UNFPA, 2012). On the other hand, information from the SPA is exclusively limited to structural measures. Most surveys of women's experience (both community and facility based) used a one-year recall period for their interviews, which has a high risk of recall bias. Record review was also

dominant method used by the reviewed studies to judge the providers adherence to best practices, which is less valid than other methods like direct observation. Direct observation has been used by only two studies as part of a multi-country study, one of which was limited only to observation of the AMTSL. Although a survey of 10 health centers in Addis Ababa acknowledges that observation of actual performance is the standard method for assessing providers' skills, it used self-reported data as a proxy for observations of the actual performance (Mirkuzie et al., 2014).

Generally, none of the reviewed studies has attempted to comprehensively address quality of a critical component of MNH services, that is, L&D care. Facilities that provide a high standard of obstetric care in one dimension of quality do not necessarily provide a high standard of care in others. For instance, CEmOC facilities may not provide the highest quality routine delivery care, and facilities providing high quality obstetric care do not necessarily provide high quality newborn care (Nesbitt et al., 2013). Most studies have examined only an element of quality of L&D services. Majority assessed quality from structural (resource inventory), perceptions (users and providers views), and individual level determinants. Many of those studies on the process of care relied on providers or users reports rather than objective assessments. This analysis is well supported by a systematic review that explored quality of EmOC in developing countries which confirmed that the structure and outcomes components of quality are largely documented, while processes are documented primarily from the users' perspective. Much less is done with respect to the technical aspects of care even though this is a major element of quality of EmOC. As variations in process quality account for important differences in outcomes, processes must be better documented in order to promote high quality services (Dogba and Fournier, 2009).

Therefore, understanding *woreda*-level factors associated with SBA rates and quality of L&D care in government hospitals is crucially important as the country seeks to encourage more hospital-based births. To date, we could find no

published national studies of the *woreda*-level factors associated with SBA rates, and data on quality of L&D services in government hospitals are lacking.

3.6 Conceptual framework of quality of birthing care

As discussed in section 3.4, quality of care during childbirth in health facilities reflects the available physical infrastructure, supplies, management, and human resources with the knowledge, skills and capacity to deal with pregnancy and childbirth, normal physiological, social and cultural processes, but prone to complications that may require prompt lifesaving interventions (Tuncalp et al., 2015). A systematic review that explored the importance of human resources in the quality of EmOC in developing countries has also established interdependency among all aspects of good quality EmOC: structure, process and results (Dogba and Fournier, 2009). The existence of effective maternal health services alone guarantees neither use nor improved outcome. Where services exist they should provide at least a standard of care that results in the best possible outcome given the resources available and should not inhibit utilisation. A woman's experience of care is also likely to influence her future health seeking behaviour. There are procedures specific to childbirth in an institutional setting that women dislike or fear, and which may therefore inhibit utilisation (Hulton et al., 2000).

In light of the evidence reviewed, this project used the Donabedian's structure-processes-outcomes model to organize the various elements of quality of birthing care with adaptation to incorporate certain contextual factors, both at *woreda* and, hospital and woman levels that were hypothesized to determine the use of SBA and women's overall experience with care, respectively. Quality of L&D care is defined as the degree to which L&D services for women in labor increase the likelihood of timely and appropriate treatment for achieving desired outcomes that are consistent with current professional knowledge as per the EHAQ standards. For quality of care to be meaningful, it is fundamental that provision of care within the hospitals and care as experienced by users be consistent with the basic EHAQ

norms (FMoH of Ethiopia, 2014a). Because, use of services and outcome are the result not only of the quality of the provision of care, but of women's experience of that care. Provision of care may be of high quality against all EHAQ standards, but unacceptable to women (Hulton et al., 2000).

Structural quality also includes supportive community structures, in addition to the volume and distribution of health resources in an area. This structural property is based on data available at a geopolitical level of aggregation (the county in which individuals reside) rather than on attributes of individuals themselves. Similarly, community characteristics are summary measures for the counties in which the respondents live (Andersen et al., 1983). Therefore, in this context, community structures that empirically represented the *woreda*-level aggregate in study one were proportion of health centers staffed with two or more midwives, density of skilled birth attendants per 10,000 population, proportion of model or graduated households currently model in the HEP, and proportion of functional one-to-five networks. In the second study, availability of the required inputs at hospital level to enable delivery of quality routine L&D care including; general infrastructure, human resource, essential supplies, drugs and equipment, and level of engagement of the hospital in the EHAQ packages in terms of QA were addressed under structure.

While process measure in the first study included utilization of four or more ANC visits, providers' adherence to EHAQ standards for routine L&D care was measured in the second study including, initial assessment, physical examination, investigation, treatment and interaction with women. Finally, proportion of SBA and women's overall experience with the L&D care they received from the hospitals were the outcomes measured in the first and second studies, respectively. Furthermore, *woreda* level aggregate measures of community characteristics such as education, region and expected number of deliveries were considered as contextual factors in the first study. Similarly, hospital characteristics and sociodemographic and obstetric characteristics of the mothers were considered as contextual factors in the second study.

3.7 Significance of the research

Measuring quality of care is extremely important in cases where a quality improvement intervention is in place (MEASURE Evaluation, 2001), like the EHRIG and EHAQ initiatives of Ethiopia. Improving compassionate and respectful care behavior is another initiative underway since 2017 (FMoH of Ethiopia, 2017). It highlights to staff their performance and helps determine effectiveness of the intervention and informs future improvement strategies. Above all, it is of tremendous importance to consumers who are the first to benefit from better services and who may be further encouraged to meet their needs as a result of quality services received (MEASURE Evaluation, 2001).

As Ethiopia seeks to be a middle-income country within the next 30 years, improved quality of hospital care is fundamental to such development. Although less than 30% of mothers are giving birth in facilities, this number is likely to triple in the next 30 years. A more thorough understanding of the factors associated with SBA rates and of the quality of hospital L&D services is paramount to creating a health care sector that will support Ethiopia's development agenda. Findings from this research can help Ethiopia identify factors associated with success in increasing SBA rates. It will support community level initiatives of the country such as HDA networking, and a motto of creating 'home delivery free' *kebeles* (villages), by generating systematic evidence. Findings from the second study has identified critical gaps in the quality of hospital birthing care to contribute to the health facility reform initiatives of the FMoH particularly, EHRIG and EHAQ. This will ultimately benefit Ethiopian mothers and their babies who receive quality services, and ultimately their families and broader communities. In addition, this research has contributed to the body of knowledge in the field. Researchers in Ethiopia and beyond who are interested in MNHC QI would benefit from the identified research gaps as well as from the methodology. The research is novel in Ethiopia, emerged out of a true need in the country, and was feasibly accomplished with existing and original data collection and under the mentorship of faculty from Yale and Edinburgh Universities.

CHAPTER 4: METHODOLOGY

Introduction

This chapter discusses the strategies used to operationalize the project with supportive scientific arguments that favor the choices made at each step of the methodology. First, it provides an overview of the settings at which the two studies were located. Then, it describes overall designs of the studies, followed by the details about the populations, sampling designs, data collection methods, tools and procedures, and data management and analyses strategies.

4.1. Study One: Variation in *woreda*-level SBA rates, and factors associated with higher rates in Ethiopia

4.1.1. Setting

Ethiopia is the tenth largest country in Africa, covering 1,104,300 km² and is the major constituent of the landmass of the Horn of Africa with one million km² land area and 104, 300 km² water. It is bordered on the North and Northeast by Eritrea, on the East by Djibouti and Somalia, on the South by Kenya, and on the West and Southwest by Sudan (Figure 4.1).

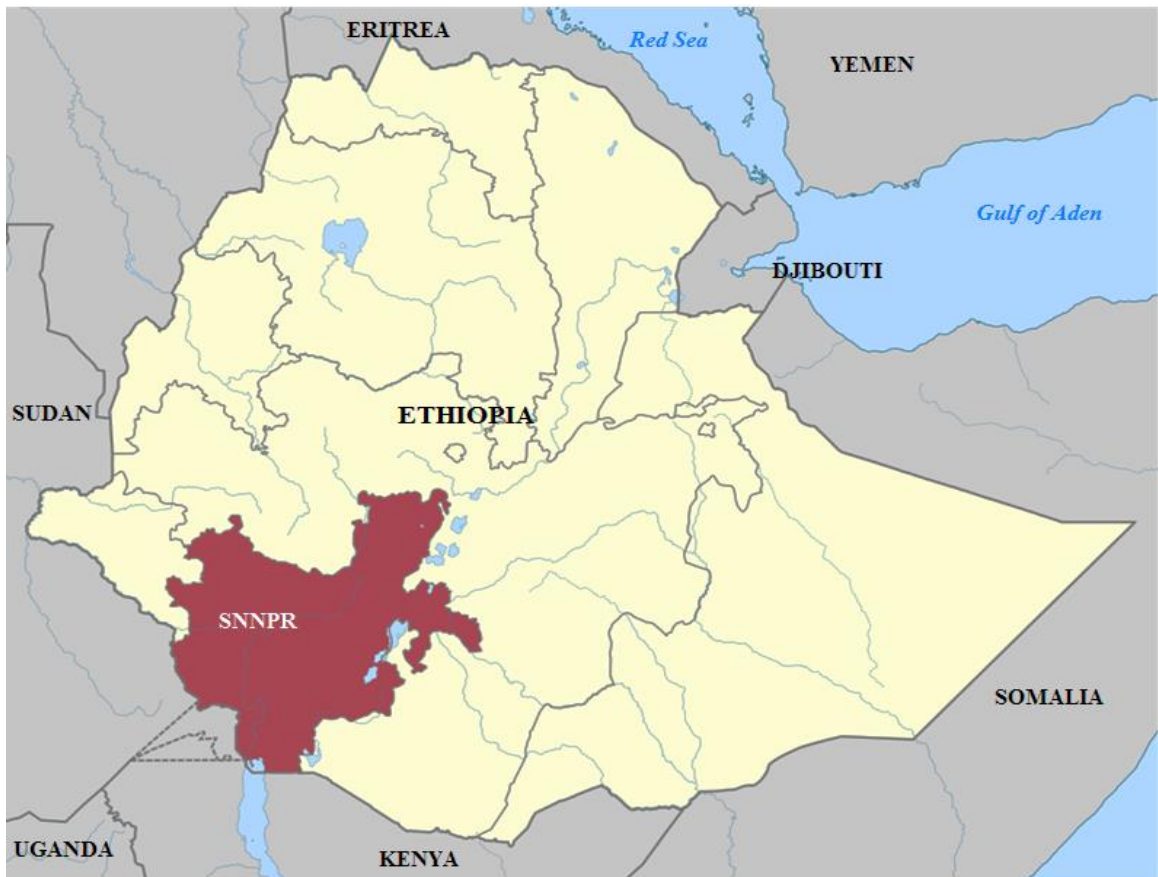


Figure 4.1: Administrative map of Ethiopia (Abegaz, 2013)

More than half of the country lies above 1,500 meters and the predominant climate type is tropical monsoon, with temperate climate on the plateau and hot in the lowlands (FMoH of Ethiopia, 2010). The country is administratively structured into nine autonomous regional states; Tigray, Affar, Amhara, Oromiya, Somali, Benishangul-Gumuz, Southern Nations Nationalities and Peoples (SNNP), Gambela, and Harari; and two chartered City Administrations, that is, Addis Ababa and Dire Dawa Administration Councils (CSA Ethiopia and ORC Macro, 2011) (Figure 4.1). The regional states and city administrations are subdivided into 839 administrative *woredas* (districts) including town administrations, which are in turn divided into about 16,253 *kebeles*, the smallest administrative units (FMoH of Ethiopia, 2010).

Total population of the country, as projected from the 2007 National Population and Housing Census, is 84,320,987 for the year 2012, of which, 42,556,999 are males and 41,763,988 females (CSA Ethiopia, 2012). More than 80% of the country's population lives in the regional states of Amhara, Oromiya, and SNNPR (CSA Ethiopia and ORC Macro, 2011). Age structure of the population is typical of a society with a young population. A large proportion of the population (45%) is under age 15, while only 4% are over age 65. The average household size is 4.8 persons and 22% of the households are female-headed. The total fertility rate is 4.1 children per women. The majority have little or no education, where 49% of females and 37% of males have never attended school. Eighty-four percent of the urban population is in the highest wealth quintile in contrast to the rural population (10%) (CSA Ethiopia, 2014). Crude birth and adult death rates in the country are, 28 (CSA Ethiopia, 2014) and 4.5 (CSA Ethiopia and ORC Macro, 2011) per 1000 population, respectively.

4.1.2. Study design

A cross-sectional, ecologic study was conducted using the national data available from the databases of Health Management Information System (HMIS) and Education Management Information System (EMIS) of Ethiopia for the year 2015. An ecological study examines the relationship between aggregated health data and exposing factors (Anderson, 2006), where service use rates are examined in relation to factors described on the population level as the unit of analysis rather than individual level (Aschengrau and Seage, 2013). All administrative *woredas* in the country were the source of the study population. Data reported by all of the 839 administrative *woredas* were abstracted from the two databases, representing the entire population of Ethiopia. An excel template was designed for data abstraction.

4.1.3 Study variables

The proportion of births attended by skilled health personnel was the dependent variable examined. As discussed in Chapter 1, it was estimated from the total number of expected births (FMoH of Ethiopia, 2014a). The independent variables included the proportion of pregnant women who had four or more ANC visits, proportion of Health Centers (HCs) staffed with at least two midwives, proportion of functional one-to-five networks, proportion of families who have been certified as a model family by HEP, and mean difference in Gross Enrolment Ratio (GER) between boys and girls in primary education. Proportions of women who had four or more ANC visits and functional one-to-five networks were estimated from the expected total pregnant women and functional one-to-five networks, respectively (FMoH of Ethiopia, 2014a).

A one-to-five network is said to be functional if the following minimum criteria are fulfilled: received training based on the family health guide, has individual and team plan, meets regularly (at least once a week), actively discusses on health issues, and reports regularly (FMoH of Ethiopia, 2014a). Proportion of currently model families graduated in implementing HEP is computed by adding the previous and new graduates and then deducting the drop outs (FMoH of Ethiopia, 2014a; 2014c). GER is calculated as the total number of children enrolled in grades 1-8, irrespective of their age, as a percentage of the school age population. In Ethiopia, the official admission age to this level is 7-14 year (FMoE of Ethiopia, 2016). Once the GER was estimated separately for boys and girls, the mean difference in GER of boys and girls was then calculated by subtracting the latter from the former.

4.1.4 Data quality

Although administrative databases were not originally intended for research use, their potential for research is increasingly being recognized (Connell et al., 1987). Description of the datasets and, citing any routine data quality checks conducted and previous researches published on quality of the data are essential to ensure internal validity of the data (van Walraven and Austin, 2012). Since HMIS database was the source of almost all variables (except education), data QA presented here

had focused on it. HMIS in Ethiopia is designed to generate different types of reports at each level of the health system that can be used for monitoring and evaluation of health programs, and submitted to each next level (FMoH of Ethiopia, 2014a). Reporting completeness, timeliness and accuracy have one indicator each within the HMIS through which quality of data generated by the system is monitored every quarter. For instance, the standard of 100% completeness has been achieved by several regions in the country, the minimum acceptable level being 80% (FMoH of Ethiopia, 2014c). A study has also showed that 93% of health facilities complete the monthly form before reporting (Hiwot et al., 2014). The Ministry's report also confirmed 92.3% and 90% completeness and timeliness of HMIS report, respectively (FMoH of Ethiopia, 2014b). Introduction of electronic HMIS in about two thirds of health centers and hospitals also maximizes data quality by providing consistent and authenticate data throughout the hierarchy starting from the level it is entered the first time, and by providing smart features to identify exaggerated numbers (Fekadu and Tariq, 2013). Furthermore, the actual dataset was checked for potential logical inconsistencies and anomalies. For example, when the number of births attended exceeded the number of expected births in a *woreda* for 2015; the data was cross validated with the baseline figure indicated on the Ministry's plan document for the subsequent year, 2016. With all these evidences, we considered the dataset is suitable for analysis.

4.1.5 Data analysis

Data abstracted on an excel template were exported to SPSS for windows version 21.0 for analysis. Missing data were treated using listwise deletion technique where all data for a case that had one or more missing values were removed from the analysis (Peugh and Enders, 2004). The *woreda* was used as a unit of analysis. The reason for choosing *woreda* as a level of aggregation was that Ethiopia adopts a federal government system with devolution of power to lower levels (FMoH of Ethiopia, 2015b). The federal system has a four-tier governance structure, namely; central government, regions, *zones* and *woredas* (Wang et al., 2016). Being the

lowest governance structure, *woredas* are empowered to allocate budget for government functions at a local level. For example, the national health sector transformation plan 2015 – 2020 is translated into action plans through the *woreda*-based health sector annual planning process (FMoH of Ethiopia, 2015b).

Descriptive statistics were computed, and simple linear regression models were run to see unadjusted effects of covariates on SBA rate, followed by multiple linear regression analysis. The variables in an ecological analysis are usually measured in aggregate on a continuous scale, even if they were discrete before aggregation at an individual level (WHO, 1997; Greenacre and Primicerio, 2014). For example, service utilization rate can be treated as a continuous outcome in an ecologic study, and as a discrete outcome in an epidemiologic study, e.g., number of clients who used a service. In another example, a discrete variable sex becomes a continuous variate when measured as the proportion of the population that is male or female (WHO, 1997). Therefore, the multivariate models that are appropriate for ecological analyses are linear regression models (WHO, 1997; Greenacre and Primicerio, 2014). Normality assumptions were checked before analyses. Except region, all variables were positively skewed with long tails to the right, and thus logtransformed. Regression coefficients were then transformed back to their original scales to facilitate interpretation. Because both the dependent and independent variables were log-transformed, the effects of changes in X on Y (both unlogged) were estimated and interpreted in two ways as suggested by Benoit (2011): as multiplicative or proportional changes in both X and Y and, as an expected percentage change in Y when X increases by some percentage. In the former case, multiplying X, for instance, log-proportion of ANC₄₊ ($b=0.6$) by $e \approx 2.72$ multiplies the outcome variable by $e^{0.6} = 1.822$. Therefore, proportion of ANC₄₊ increases the expected proportion of SBA by 1.822. A proportional change like this can be converted to a percentage change by subtracting 1 and multiplying by 100 (Benoit, 2011). Thus, proportion of ANC₄₊ increases the expected proportion of SBA by about 82.2%. In the latter case, which was applied in this study, the

expected change in Y associated with a $p\%$ change in X is calculated as $e^{\beta \cdot \log[(100+p)/100]}$ (Benoit, 2011). In this case, we estimated the effect of a 1% increase in X on Y , by multiplying e^{β} by $e^{\log(1.01)} = 0.00995$. Considering the same example, $e^{0.00995 \cdot 0.6}$ will be 1.005988. Using the same formula described in the former case, a percentage change can be converted by subtracting 1 and multiplying by 100. Thus, a 1% increase in proportion of ANC₄₊ increases the expected proportion of SBA by 0.60%.

Multicollinearity among independent variables was checked using Pearson's correlation coefficient threshold value of 0.40 or above. Stepwise selection method was used as there were no a priori hypotheses to determine the order of entry of the independent variables. P-value of 0.05 was used to enter a variable in to the model, and 0.1 to remove from. Beta coefficients were presented with their significance level. P-value < 0.05 was considered significant.

4.1.6. Ethical consideration

As the study was based on publicly available data, it did not need Institutional Review Board (IRB) approval. The study was designed to have limited inquiry into individual experiences, and it was therefore not inherently designed to measure attributes of individuals. Permission was however sought from the Ministries of Health and Education in order to get access to the data.

4.2. Study Two: Quality of L&D care in government hospitals of SNNPR, Ethiopia

4.2.1 Setting

The study was situated in SNNPR, one of the 11 regional states that make up Ethiopia. SNNPR is located in the Southern and South-western parts of Ethiopia bordered by Kenya in South, the Sudan in South west, Gambella region in North-west, and Oromia region in North-west, North and East (USAID/Ethiopia, N.D). It is the third populous region hosting about 20% of the country's population, which

is about 18.9 million (SNNPR State Health Bureau, 2011a). The region is administratively divided into 14 zones, 4 special woredas, 157 woredas, 22 city administrations, and 3,926 kebeles/villages (SNNPR State Health Bureau, 2011b).

Potential health service coverage of the region, measured as proportion of the population living within 10km radius of a primary health care unit, is 93%, while the actual health service utilization rate is below 50%. Twenty hospitals (Figure 4.2), 448 health centres and 3340 health posts were the publicly owned health facilities operating in the region (SNNPR State Health Bureau, 2011b). About one third (35%) of the hospitals are teaching hospitals, whilst the remainder are non-teaching hospitals. Half of the hospitals are general hospitals by level, about one third (35%) are primary and the remainder (15%) are referral. In 2014, performance of the hospitals in the region on selected key indicators showed emergency room mortality rate of 0.2%, in-patient mortality rate of 3.6%, surgical site infection rate of 1%, and physician attrition rate of 21.4% (SNNPR State Health Bureau, 2014).

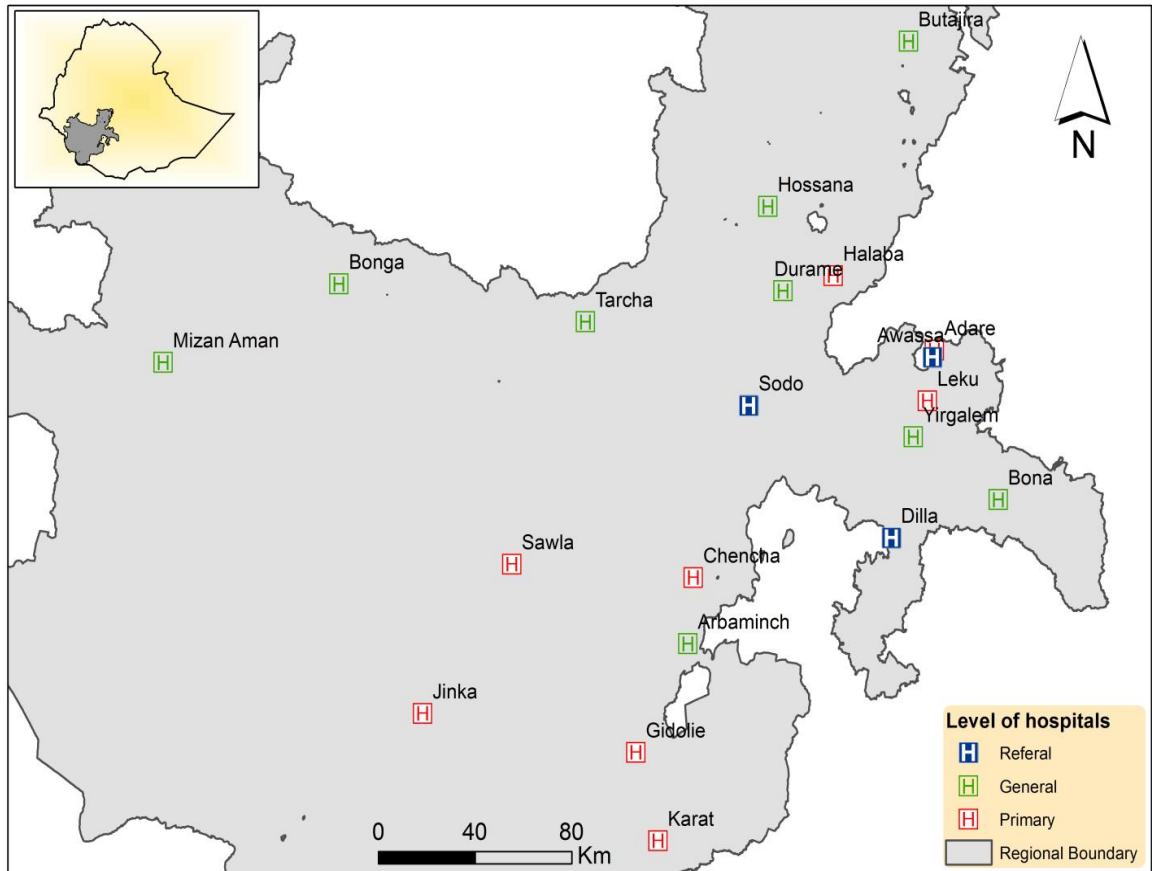


Figure 4.2: Map of the study hospitals, SNNPR, Ethiopia, 2016

4.2.2. Study design

This study employed a facility-based cross-sectional study design involving census of all government hospitals in SNNPR aiming to examine the quality of routine L&D services. SNNPR was chosen because it is believed that a researcher's knowledge about the research setting and the population can be used to hand pick cases for inclusion in a study (Polit et al., 2006). Thus, expectation of a high level of cooperation was the basis for selecting SNNPR among the existing 11 Regional States and City Administrations as recommended by Abramson and Abramson (2008).

4.2.3. Population

All government hospitals in SNNPR and all mothers who received SBA at these hospitals in 2016 were the source populations. All of the government hospitals in SNNPR (n=20) and those mothers who received L&D care at these hospitals during data collection period were the study populations. A total of 30,502 deliveries were attended at all public hospitals of SNNPR in 2013/14 (SNNPR Health Bureau, 2014). A total of 2400 women were expected to be attended at the hospitals over 30 days data collection period with the estimated number of four deliveries per hospital per day.

4.2.4. Participant recruitment

4.2.4.1. Exit interview

The data collectors recruited women who delivered on the general labour ward of SNNPR hospitals during the data collection period of one month from 11th November to 10th December 2016, and who were well enough to respond to the questions consecutively before they left hospital. Hospital stay after delivery varies depending on the parturients' condition. Most women have a normal labour, delivery and postpartum period, and usually they are discharged within a day of delivery. Women with complications stay longer. The minimum in-hospital stay is 6 hours after which the risk of life endangering conditions is less likely (FMoH of Ethiopia, 2014e). Conservatively taking this minimum time, women who delivered before 3:00am were recruited for the exit interview during the following day if stable by the time they were approached by the data collector. The midwife in charge indicated which women on the ward might be approached during the data collectors' regular working hours. Each woman was asked to ascertain her age, as only women above 18 years of age were considered for the interview.

4.2.4.2. Direct observation

The process of L&D is generally divided in to three stages. The first stage of labour is in turn divided in to latent and active phases. The latent phase is the period

between the start of labour and 4cm cervical dilatation, and the active phase is the period between 4 and 9cm dilatation and accompanied by regular contractions. Second stage of labour is from full dilatation of cervix (10cm) and foetal expulsion which is also subdivided into two phases. Early phase, which is passive and non-expulsive phase, is characterized by full dilatation of cervix without involuntary expulsion contractions (no maternal urge to push); and late phase, which is active and expulsive phase, is characterized by visible foetus, or expulsion contractions during full dilatation with urge to push. Third stage of labour is from foetal expulsion and complete delivery of the placenta and membranes. The average duration of active phase of first stage of labour is 6.5 hours. The early phase of second stage of labour normally lasts up to 1.5 hour, while the late phase lasts up to 1 hour (FMoH of Ethiopia, 2014e).

Women generally arrive for admission to the maternity ward when uterine contractions start, often while they are in an early phase of labour. Early admission means waiting for several hours until the active phase of labour starts. In Ethiopia, if a woman lives near a health facility, she is advised to go to the facility at the first signs of labour for skilled attendance. If living far from the health facility, she will have been recommended to travel to a facility two to three weeks before the expected date of delivery and stay either at the maternity waiting home, or with family or friends near the facility. Admission to the L&D ward is recommended when there is evidence of regular uterine contractions, cervical effacement of more than 50% and dilatation of 3-4 cm (FMoH of Ethiopia, 2014e).

For the purposes of this study, only normal deliveries were included in the direct observation. Labour was considered normal when the following conditions were fulfilled (FMoH of Ethiopia, 2014e). The woman didn't have any risk factors (e.g. pre-eclampsia or previous scar); labour started spontaneously and at term; foetal presentation was vertex; delivery was by spontaneous vertex; all stages of labour were lasting a normal duration; the neonate was alive and normal; and the woman had uncomplicated puerperium. Therefore, absence of obstetric complications,

being in active labour (with cervical dilatation of 4-9 cm) and being 18 years of age or older were the criteria to select women for the observation. Each woman was asked to ascertain her age.

L&D care processes of women who were attended by staff at the hospitals from 8:30am to 12:30am in the morning, from 1:30pm to 5:30pm in the afternoon and from 6:30pm to 9:30pm in the night, were observed consecutively until one hour postpartum. However, in hospitals which had high volumes of deliveries, it was not feasible for the data collectors to observe care for every woman for this entire period, due to overlapping deliveries. They therefore observed the maximum number they could, without compromising data quality. If there was a single woman in active labour, both data collectors observed the session (two data collectors were assigned at each hospital). If two women who were in active labour were being attended in a hospital simultaneously, the data collectors observed one each, and if more than two, they randomly selected only two women using a lottery method and observed one each.

4.2.5. Data collection methods

The structure and process indicators of quality that most directly affect quality outcomes identified by a previous study on quality of family planning (MEASURE Evaluation, 2001), are consistent with the EHAQ indicators for L&D service at public hospitals (FMoH of Ethiopia, 2014d; FMoH of Ethiopia, 2015a). It is recommended to use observation, facility audit and exit interview techniques to obtain the most complete picture of quality. Although there are certain overlaps, each technique provides a unique perspective not available from the others (MEASURE Evaluation, 2001). Thus, these techniques were employed from November 11th to December 10th, 2016 to obtain the most complete picture of quality of L&D services. The detailed description of each of the methods is presented below.

4.2.5.1. Facility audit

Readiness of health facilities can only be measured through facility audit (MEASURE Evaluation, 2001). Service-specific readiness of health facilities refers to their capacity to provide a specific service, measured through the presence of tracer items that include trained staff, guidelines, equipment or supplies, diagnostic capacity, medicines and commodities (WHO, 2010a). The hospitals were inventoried for availability of the required personnel, facilities, equipment, drugs and supplies, in relation to routine L&D services through facility audit.

4.2.5.2. Observation

Observation does not only refer to direct observation, but to any method of examining and recording the process, activities and outcomes of a service (Work Group for Community Health and Development, 2015). Direct observation is the purest and most verifiable form of observation, thus it is the only method that can objectively assess adherence to evidence based practices (Work Group for Community Health and Development, 2015; JHPIEGO, 2004). Generally, observation is essential in the assessment of basic quality indicators relating to cleanliness, state of equipment, provider-client relations, and to verify if aspects of care are as per the agreed standard (Hulton et al., 2000). The reliability of direct observation technique for measuring intrapartum care as compared to record review has also been reported due to poor documentation practice especially in low-income settings (Faye et al., 2014). Direct non-participant observation of routine L&D services provision was conducted to assess adherence of the providers to the recommended EHAQ care practices. It is one of the methods used by the FMoH of Ethiopia for competency assessment to certify a skilled attendant at the end of BEmOC training (FMoH of Ethiopia, 2014e).

4.2.5.3. Exit interview

Client exit interview is the only source of data on client's perspectives on the quality of services they received (MEASURE Evaluation, 2001). Interviews with women who gave birth at a facility, which are best taken on the day of discharge, are

effective in capturing data on the course of their labour, decision-making process, choice of facility and actual experience of care (Louise et al, 2000). Elements of satisfaction cover satisfaction with the outcome, the interventions and with the service received including staff friendliness, availability of supplies and waiting times. In many cases, the woman may dislike the health facility protocols such as the situation when family members are not allowed to be present, which may lead to perceptions of poor quality (Thaddeus and Maine, 1994). Women's experience survey was conducted at exit as part of this study.

4.2.6. Data collection tools

Facility audit checklists, direct observation checklist and structured questionnaire were the data collection tools for this study.

4.2.6.1. Facility audit checklist

WHO recommends using a standardized tool to assess the availability and functioning of the tracer items in each service provided (WHO, 2010a). The recently developed national quality improvement and self-assessment tools for maternal, newborn and child care quality improvement for hospitals in Ethiopia designed by The Yale GHLI in collaboration with the FMoH for use by hospitals themselves or by external evaluators (FMoH of Ethiopia, 2015a) was used for the facility audit. The tools were developed after reviewing international clinical guidelines to determine those that were relevant to Ethiopia and to identify required adaptations for the Ethiopian context. The draft tools were shared with various stakeholders for feedback and tested in Zewditu Memorial Hospital. Feedback from the hospital staff was extremely positive, highlighting that the tools are complete, concise and user-friendly. They were also piloted in additional hospitals and modified based on the experiences (Yale GHLI, 2013).

The tool (Annex B) included all items corresponding to the following service domains: general characteristics of the hospitals (total number of maternity beds, human resources (total number of skilled attendants available, by category),

supplies, drugs, equipment and L&D services. The degree of engagement in QA activities of the EHAQ packages as measured by assessing if the hospitals conduct regular audits and use recommendations from the audits for quality improvement. This was measured by assessing the availability of essential guidelines, establishment of a quality improvement committee from different case teams and assigning a focal person as a coordinator; whether the committee conducts a regular documented meeting at least every two weeks; whether the hospital conducts a regular monthly neonatal and maternal death audits and provides recommendations that are discussed, documented and implemented) (FMoH of Ethiopia, 2015a).

4.2.6.2. Direct observation checklist

Direct observation checklist is a clinical skills checklist which is a standardized list of sequential key steps for a normal labor and childbirth care (JHPIEGO, 2004). Few contents of this tool (Annex C) were also adapted from the FMoH of Ethiopia (2014e), JHPIEGO (2004), Yale GHFI (2013) and Measure DHS (2012) service provision assessment survey tools as appropriate to include certain important practices that were missing in the EHAQ standards (FMoH of Ethiopia, 2014d; FMoH of Ethiopia, 2015a). When a large area and numerous facilities are covered in assessing services at facilities, selecting a short, defined list of important functions facilitates comparability of results. It is not to be a complete list of services that should be available at a facility (Maine et al., 1997). The specific practices assessed were making thorough assessment, diagnosis and management of normal labor according to the EHAQ standards (FMoH of Ethiopia, 2014d; FMoH of Ethiopia, 2015a). More specifically, initial assessment of the woman in labour, care during the second and third stages of labour, infection prevention practice, use of partograph to monitor labour, interpersonal communication during L&D, and immediate and essential newborn care practices were captured.

4.2.6.3. Structured questionnaire

Maternity care experience survey was conducted using a set of closed-ended questions developed and tested by Yale GHLI (2013) in collaboration with the FMoH (Annex D). A questionnaire is a structured group of questions to gather information in a consistent way with each respondent. Likert scales are often used in questionnaires where the respondent is asked to assess a positive statement expressing an opinion, and to record their level of agreement with that statement (UNICEF, 2005). The survey questionnaire was constructed from 5-point Likert scale ranging from 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'.

Though the questionnaire has not yet been validated, cognitive test was done, and all the necessary revisions were made as appropriate to correct certain confusing words and phrases. It was also piloted in additional hospitals before it was endorsed and released for use (Yale GHLI, 2013). The questionnaire captured information on the background characteristics of the mothers, their ratings on the items about: the communication from health workers, cleanliness of the delivery room, privacy and comfort, waiting time, and availability of drugs and equipment, and overall satisfaction with the care received.

4.2.7. Data collection procedure

The SNNPR Health Bureau was directly approached by the principal investigator to identify the study hospitals. The data collectors (40 professional midwives) and four supervisors, who produced evidence of experience in similar activities and, commitment of permission to be outside work for the data collection period, were identified and assessed. The principal investigator trained them intensively for one week, both on the theoretical and practical aspects to ensure agreement among them in measuring the variables. The training specifically covered contents including the EHAQ change packages for L&D care and related guidelines; data collector's guides, that is, how to use the tools, effects of observation on

participants; and importance of confidentiality and participants' dignity. Tools were pretested in Shashemene hospital from an adjacent region, Oromia, for clarity, validity and reliability of the questions; and appropriate revisions were made based on the feedback from data collectors and supervisors before commencement of the actual field work.

For the purpose of this project, the 20 hospitals were grouped in to three clusters based on their geographic location using the regional capital, Hawassa City, as a reference point as; Central, Southern and South western Zones. The purpose of the clustering was to facilitate management of the field work particularly for logistical efficiency.

The first day of data collection was devoted to introduction with the hospital compound and maternity unit staff; obtaining permission; and collection of facility audit data at the respective hospitals. First, permission was obtained from the hospitals and respective L&D units to conduct the study. Then, hospital managers connected the data collectors with the delivery case team leaders at each hospital, who in turn allowed them in to the L&D unit and introduced to the staff in the unit.

Exit interviews and observations started from the second day and continued for one month. The data collectors took the position of an identified outside assessor. Each single variable on the facility audit and direct observation checklists received a score of '1' if the commodity was available and in working condition, or if the activity was observed and performed according to accepted standards of care, respectively, and a score of '0' if this was not the case. The data collectors were trained to record an "observation gap" response only in rare occurrences, for instance they might have one-hour lunch and dinner break every day, during which they were away or, they might have trouble seeing what the provider was doing. At the end of a completed (and continuing 'normal') direct observation, and before starting a new observation, the data collectors accessed the clinical record of the

woman to transfer data about her initial assessments (history and physical examination) to complete 'Section-I' of the checklist.

Exit interviews were conducted in the women's preferred language in a room that was arranged near to the main gate of the hospital. These helped ensure both visual and auditory privacy of the women and encouraged their free and spontaneous response.

Given the estimated number of four deliveries per hospital per day, an independent data collector observed each delivery session. The data collectors approached women who had no specific risk factors such as pre-eclampsia or previous caesarean section scar, and whose labour was anticipated to be progressing normally in the late active phase of first stage for observation. When the labour became abnormal at a later stage, the providers privately informed this to the data collector and the observation stopped immediately.

Supervisors were responsible for close supervision of the overall data collection process in their respective clusters. They had regular meetings with the data collectors to give feedback and discuss about the challenges they faced during data collection. After checking for completeness and consistency of the collected data, supervisors packed and stored it in a secured place until they submitted to the principal investigator. The principal investigator finally collected from all the supervisors and stored in the office at Jimma University in separate locked cabinets.

4.2.8. Study variables

4.2.8.1. Dependent variables

Overall mean score (index) of quality of L&D care process and women's global rating of their overall experience with L&D care they received were the two dependent variables addressed in the study. The overall mean score (index) of process quality was computed by averaging the indices for different aspects of

L&D care process. Similarly, the overall experience score was summarized by averaging the women's global rating of their hospital stay on a scale of 0-10 (latter converted to 0-100), and their willingness to recommend the hospital to family members and friends for the same service.

4.2.8.2. Independent variables

The above dependent variables were explained by various woman and hospital level independent variables as fixed effects. The independent variables along with their corresponding dependent variable are shown in Table 4.1 below. New variables can be created from existing ones through arithmetic operations on two or more variables to obtain measures that relate more directly to the research questions. A common form of derived variable in multilevel datasets involves calculating a summary statistic (e.g., the mean) of a level-1 variable for each higher-level unit (Antony, 2010). Variables such as index of quality of L&D care process were derived by adapting the approach used in a similar study that assessed quality of obstetric care in 14 hospitals in Benin, Ecuador, Jamaica, and Rwanda (Burkhalter et al., 2006) by aggregating woman level scores to create a total hospital level score.

Table 4.1: Study variables, quality of routine L&D care in public hospitals in SNNPR, Ethiopia, 2016

		DEPENDENT VARIABLES	
		Index score of L&D care process	Overall experience score (global rating)
INDEPENDENT VARIABLES	Individual level	<ul style="list-style-type: none"> ➤ Age ➤ № of previous births ➤ № of skilled attendants involved in care process ➤ Presence of danger sign in current pregnancy ➤ Condition of baby 	<ul style="list-style-type: none"> ➤ Age ➤ Education ➤ Occupation ➤ № of previous births ➤ № of ANC visits ➤ Condition immediately after the birth ➤ Index of interpersonal communication & emotional support ➤ Index of responsiveness ➤ Index of health education ➤ Index of physical environment
	Hospital level	<ul style="list-style-type: none"> ➤ Hospital-type (teaching status) ➤ Hospital-level ➤ Mean № of births attended in previous year ➤ Mean № of fulltime skilled attendants in L&D ward ➤ Index of structural quality of L&D care ➤ Refresher training on management of L&D 	<ul style="list-style-type: none"> ➤ Hospital-type (teaching status) ➤ Hospital-level ➤ Refresher training on management of L&D ➤ Index of process quality of L&D care

4.2.9. Data management and analysis

4.2.9.1. Data management

Data were coded and entered in to SPSS for Windows version 21.0 by two experienced encoders independently. Then, data were cleaned from errors and inconsistencies by checking for missing data, and for coding and typographical errors during entry. Incomplete interviews were excluded, and survey filters were followed, and inappropriate routings corrected. For instance, if a respondent answered Q324-326, regardless of the instruction for Q324 which says 'go to Q327', the answers to Q325-326 were removed.

When categorical variables appear as covariates in models, they are represented by a series of dummy indicator variables (Antony, 2010). Variables such as hospital-type (i.e., teaching status), hospital-level, educational status, and occupation were dummy coded. For example, hospital-type was coded '1' for teaching and '0' for non-teaching hospitals; and educational status dummy coded as '1' for literate (had formal education of at least primary level) '0' otherwise.

4.2.9.2. Scoring and summarizing data

Unweighted data were used for the analysis of quality of L&D care index scores as recommended by previous researchers (Tripathi et al., 2015; Leisher et al., 2016; WHO, 2010a). This is a direct score summation approach where all indicators or items under a quality component were given equal weight (Tripathi et al, 2015), which is the simplest scoring method with an assumption that a linear relationship exists between all items of a given quality component (Kaplan and Normand, 2006). This is because all government hospitals existing in SNNPR were included in the sample, each hospital was visited for the same length of time, so all service transactions observed, and clients interviewed were assumed to have had the same overall probability of selection. The data were thus self-weighting, and no further action was required during analysis (JHPIEGO, 2004). Moreover, constructs of the composites were based on a well-defined scientific evidence, i.e.,

the EHAQ change package for L&D care (FMoH of Ethiopia, 2014d), where similar measures were grouped together as structure, process and outcome, to help identify areas for quality improvement. Therefore, all elements that constituted each of the three quality components were considered equally indispensable for the provision of L&D care according to the EHAQ standards.

The usual numerical scores do not reflect the all-or-none aspect of medical care. It is recommended to assign scores to performance of specific dimensions of care and aggregate them to get a numerical index usually ranging from 0–100. This gives the picture of the whole as well as its individual parts as care can be good in many of its parts, but inadequate in the aggregate (Donabedian, 2005). Thus, responses for all positively stated questions were converted into a 0–100 continuous scale with higher scores indicating higher process or structural quality, or more favorable experiences with L&D care; and vice versa for negatively stated questions.

An index score for structural attribute of quality was constructed at hospital level using the WHO (2010a) recommendation, using data generated from facility audit. An overall facility readiness score for a specific service is defined as a cumulative availability of components required in a facility to deliver the service. It is unweighted average of number of items present and functioning, expressed as a percentage of the total number of items in that service (WHO, 2010a). Thus, an item of structural quality was assigned a value of 100 if it was performed and 0 otherwise.

An index score for each quality measure for each observed woman was computed as a mean score across all items which were assigned a score between 0–100. The score was reported as a percentage of the maximum possible score. That is, the total number of interventions performed in each woman divided by the total number of interventions she was eligible for. In other words, an individual level composite score indicates the average standards of care the woman received

which she was eligible for. The unit of analysis for direct observation was an observation session which represented a unique woman, but not unique providers since providers might have cared for multiple women during the data collection period. Even if there was a possibility that a woman might have participated both in the exit interview and direct observation, we did not link up these data of the same woman as it was difficult to achieve, and increased complexity of analysis. An index score was also computed at hospital level for process quality of L&D care in a similar fashion by averaging all individual level scores of the same.

Exit interview items were assigned a score based on the number of scales they had. The four-point, three point and two-point scales were converted to scores of 0, 33.3, 66.7, 100; 0, 50, 100; and 0, 100; respectively. The five-point scale including ratings of 1, strongly disagree; 2, disagree; 3, neither agree nor disagree; 4, agree and 5, strongly agree were similarly converted to the scores of 0, 25, 50, 75 and 100, respectively. The overall experience score that was rated on a scale of 0-10 (0 being the worst and 10 being the best hospital) was multiplied by 10 and converted to the scores of 0-100. this scoring method was particularly used for women's experience scores as it is more sensitive to differences and thus preserves the gradations of original rating, rather than dichotomizing responses which does not entirely capture gradations of patients' evaluations (Brown et al., 2008). The method is widely adopted by several other studies including Benson and Potts (2014), The Futures Group International (N.D), Brown et al. (2008), NHS England Analytical Team (2013, 2015, 2016), and Webster et al. (2011). The literature recognize that arithmetic transformation of mean scores to a 0 to 100 scale allows the mean item scores to be compared with the summary score of an index as well as the overall summary score on a common scale.

As presented in detail in the subsequent section, factor analysis was conducted for the exit interview data using the principal component analysis extraction method for data reduction purposes. The analysis yielded four principal components that explained 68.1% of the total variation in women's overall

experience. Component scores (indices) were computed by averaging the item scores used to feed into each of the four components, i.e., summary scores were created for each component by summing responses of items that loaded on that component and dividing by the number of responses (Webster et al., 2011). An overall experience score was then calculated by averaging women's global ratings of their overall evaluation of the care on two items: overall evaluation of the hospital experience on a scale of 0-10 (latter converted to 0-100), and willingness to recommend the hospital to family members and friends for the same service.

Summary statistics such as proportion, mean and standard deviation were computed for descriptive analysis of the degree of adherence of each attribute of quality of L&D care against the expected EHAQ standards. The results were presented using tables, graphs and narrative texts as appropriate.

Once the descriptive analysis was completed for each of the three datasets, they were merged in to two in preparation for further statistical analyses. Data from the facility audit and direct observation were merged to make a hierarchical dataset consisting of 1335 women nested in 20 hospitals to examine the predictors of the quality of L&D care process. Similarly, data from facility audit and exit interview were merged to make a hierarchical dataset consisting of 2165 women nested in 20 hospitals to examine the predictors of women's overall experience with the L&D care they received.

4.2.9.3. Factor analysis

Varimax orthogonal rotation was used assuming that the factors are independent of each other. Appropriateness of the analysis for the dataset was checked by conducting various tests and the results proved that a valid factor analysis could be performed. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy with values between 0.8 and 0.9 are generally satisfactory, and a sphericity test should reveal the overall significance of all correlations within a correlation matrix (Robin, 2012). The KMO value of this dataset was very good (KMO = 0.82), and Bartlett's

Test of Sphericity revealed significant correlation between the items with P-value < 0.001.

The initial factor structure resulted in six factors with eigenvalues greater than one. Close scrutiny revealed that some of the factors were not clean, where some items loaded simultaneously on more than one factor, and some did not belong to a meaningful group of items. For a good factor solution, a variable should load high (0.4 or above) on one factor and low on all other factors (Ajai and Sanjaya, 2009). Thus, variables with high factor loading on more than one component were dropped from subsequent analyses. Hygienic condition of the L&D ward loaded on Component 1 (0.498) and Component 5 (0.443); privacy during delivery loaded on Component 1 (0.443) and Component 4 (0.424); health professionals introducing themselves loaded on Component 2 (0.493) and Component 5 (0.513); and waiting time to get a bed after arrival to labour ward loaded on Component 2 (0.453) and Component 4 (0.488). Similarly, variables with low extraction commonalities were removed (Ajai and Sanjaya, 2009). For instance, only 16.5% of the variability in the time taken to go through all checks and admission process, once arrived at the hospital, was explained by the extracted factors.

Two more items were dropped based on the scale reliability test results. Cronbach's alpha value above 0.70 is used as a reasonable test of scale reliability (Ajai and Sanjaya, 2009). One component consisting of availability of all the needed laboratory services, and medical supplies had low scale reliability with Cronbach's alpha coefficient of 0.301, and the items had low corrected item-total correlation coefficient, $r = 0.177$ each.

The final scale consisted of 14 items in four components: 5 items on interpersonal communication and emotional support, 4 items on responsiveness, 3 items on health education, and 2 items on physical environment. The components were easy to interpret and explained 68.1% of the total variation. Interpersonal communication and emotional support, responsiveness, health education and

physical environment explained 19.3%, 18.6%, 18.2%, and 12.0% of the total variation, respectively (Annex E).

Cronbach's alpha confirmed internal consistency of the final scale which was 0.78 for interpersonal communication and emotional support, 0.83 for responsiveness to clients' preference, 0.87 for provision of health education, and 0.73 for physical environment (Annex F). Convergent validity was also evident from the analysis with statistically significant correlations between each of the component scores and women's overall experience score which was averaged from the two global rating items at P-value <0.01.

4.2.9.4. Multilevel analysis

Quality of care may be influenced by patient and hospital factors. The characteristics of patients and hospitals that are most closely related to the dependent variable can be examined using the common statistical method, Ordinary Least Squares (OLS) regression analysis. However, the nesting of patients within hospitals can lead to correlated observations and the possibility of downwardly biased estimates of the standard errors associated with the regression coefficients (O'Dwyer and Parker, 2014).

Multilevel modeling, also known as hierarchical linear modeling or linear mixed modeling, has become a popular way to analyze data with statistical dependency by easily allowing group characteristics to be included in models of individual outcomes. It also allows calculating the reduction in variance with the addition of independent variables at the individual and group levels in subsequent models (O'Dwyer and Parker, 2014). Ignoring the hierarchical data structuring is likely to introduce omitted variable (Hox, 2002).

Testing theoretical models that explicitly incorporate variation in micro-effects across macro-theoretical contexts offers an important opportunity to advance the knowledge of healthcare quality. Thus, multilevel analysis aims to determine the

direct effect of individual or lower and group or higher level explanatory variables, and to determine if explanatory variables at group level serve as moderators of individual level relationships, which ultimately show up as statistical interaction between explanatory variables from different levels (Hox, 2002).

Data from this research had a multilevel structure with mothers who visited the study hospitals for L&D care services nested within the hospitals. Assuming that service quality is strongly influenced by hospital characteristics, we expected strong between hospital effects on the quality of L&D care provided in the government hospitals of SNNPR. Therefore, mixed effects multilevel linear regression analyses were employed with hospital specified as a random effect to examine how hospital characteristics were associated with individual outcomes. Hospital level variables were taken as higher level (level-2), and individual characteristics of women were taken as lower level (level-1) variables. Each woman in a hospital was assigned the same value for the hospital characteristic. Thus, the possibility of a statistical dependency or correlation among the women who received L&D care from the same hospital was considered while also including hospital characteristics in models for predicting individual level outcomes (O'Dwyer and Parker, 2014).

The first step in multilevel analysis is to investigate both the theoretical and statistical necessity of using the approach. From theoretical perspective, the research questions necessitate multilevel analysis. Statistically, the required minimum sample size at the highest level in the data hierarchy is the primary consideration for multilevel modeling procedures for higher order statistical significance tests. Generally, models with fewer than 20–25 groups may not provide accurate estimates (O'Dwyer and Parker, 2014). In the present study, the sample size at level-2 was 20 hospitals. The presence of correlated errors was also tested before running the analysis as an important statistical necessity. An ordinary regression was estimated for this purpose and the residuals were saved, followed by analysis of variance to investigate whether or not the residuals were

significantly related to group membership. Significant results meant that the ordinary regression assumption of independent errors is violated by the nested structure of the data. Further, the necessity of multilevel analysis was investigated through the unconditional or null model.

Then, the mixed effects multilevel linear regression modeling was employed in two stages using the Advanced Statistics Module of SPSS IBM Statistics to achieve a parsimonious predictive model. A two-level intercept-only model was used to predict each of the outcomes using woman and hospital characteristics to test the null hypothesis that there is no variation in the outcome under investigation between clusters (i.e., hospitals).

The first model, also called the empty or null model, was fitted with no explanatory variables with hospital ($n=20$) as the random effect. This model was used to determine whether the overall difference between hospitals and women in terms of the outcomes under investigation, i.e., overall mean quality of L&D care process, and women's overall experience with the care, was significant. The second model or the full model was fitted by adding all hospital and woman level variables to measure the residual variance explained at lower and higher levels, after adjusting for woman and hospital characteristics. Thus, the full model was a random intercept model for both outcomes examined.

Intra-class Correlation Coefficients (ICCs) were also calculated for both the null and full models to see the amount of variance in each of the outcomes due to differences between-hospital, and thus informed the decision that evaluating random effects at the hospital level was appropriate. Furthermore, significance of the hospital effects was tested using the likelihood ratio test for each outcome by calculating the difference in the $-2 \times \log$ -likelihood values for the two successive models (null versus full). The difference was regarded as a χ^2 value with the degree of freedom being the same as the number of extra parameters added in the next model. The tests of goodness-of-fit were significant for both outcomes with p-value

<0.001 confirming appropriateness of the multilevel model with hospital effects. Because of the centering of all continuous independent variables on the grand means, the random term of the intercept at hospital level is the variance among the hospitals in the adjusted mean. Thus, the reference group for each continuous independent variable was woman or hospital at an average level. Positive values represented scores above the mean and negative values represented scores below the mean. The estimated regression coefficients were presented along with their standard errors and p-values. P-value <0.05 was used to declare statistically significant associations.

4.2.10. Data quality control

Various mechanisms were employed to optimize validity and reliability of the research. First, experienced professionals with midwifery skills were recruited to collect the data. Common standards that were accepted by all members of the research team were used to assure agreement in measurements. Data collector's guidelines were developed for each data collection tool for this purpose. Boundaries of observations and interviews were set to delimit what to include and exclude.

The data collectors and supervisors were trained intensively for one week both on the theoretical and practical aspects to ensure agreement among the team in identifying various conditions. The training specifically covered contents including the EHAQ change packages for L&D care guidelines; data collector's guides that were developed describing how to use the tools, effects of conducting interview and direct observation on participants (both women and providers in the case of observation); and the importance of confidentiality of the information and respecting participants' dignity. Tools that were developed and tested in the same setting were used with minor adaptation to meet the need of the study, which were further pretested in Shashemene hospital from an adjacent region, Oromia; and revisions were made as appropriate before commencement of the actual field work.

Availability of essential equipment, drugs and supplies was based on point prevalence at the time of observation and does not necessarily indicate a constant supply, but this was the best possible assessment given the resources. Assessing twice, i.e., on the first and last days of the data collection period, could have improved this. Similarly, performance of some tasks could not be verified as the items on the observation checklist were coded as 'yes' or 'no'. For example, it is possible that providers might have performed the interpersonal communication behaviors simultaneously with other tasks unrecognized by the observers. Therefore, besides checking coded events, it might have been helpful if the checklist captured observers' subjective notes, for example, comment on women's engagement in care process and content of client-provider interactions.

One of the two data collectors in each hospital who was fluent in the language predominantly spoken in the hospital's catchment conducted the exit interview in a room that was arranged near to the main gate to ensure both visual and auditory privacy of the women. These helped to encourage women's free and spontaneous response, thereby minimizing social desirability bias. In addition, proper interview technique was emphasised in the training, i.e., to read the questions as they were written and not to guide the responses.

When health workers are under direct observation, particularly by their own peers, quality of their performance increases by 20% on average, which is called the Hawthorne effect (Leonard and Masatu, 2006; Bowling, 2014). However, this is a short-lived effect lasting in the first 10 to 15 observations, after which the usual performance level resumes (Leonard and Masatu, 2006). To mitigate against the Hawthorne effect in this study, providers were assured that the sole purpose of the study is to contribute to service quality improvement thereby, contributing to saving lives and not to apportion blame. They were also informed that the hospitals' performance will be communicated in aggregate to the specific hospitals. The instructions and training to data collectors also emphasised the importance of not passing on any comments about care to local staff. Furthermore, the fact that

adequate time (one month) had been spent in the research setting reassures that the pretended behaviors might have not been maintained during this long period minimizing the bias (Bowling, 2014). Data from observation could have been improved if two independent data collectors observed each delivery rather than one. This might have helped to check any inter-observer variability. However, these extra resources were not available, and collectors were trained to appreciate this bias to minimize it.

Supervisors and the principal investigator closely supervised the field work. Supervisors reviewed the completed data collection tools every day for completeness and consistency, and whenever possible, errors were corrected, and missing data were filled in. Consistency was checked by looking at the response agreement between questions using a skip pattern. They also had regular meetings with data collectors to discuss and solve the challenges they faced in the process. Furthermore, double data entry method was employed using two experienced encoders as an important data quality improvement measure.

4.2.11. Ethical considerations

Ethics approval was obtained from the IRBs of Jimma University and The University of Edinburgh (Annex G and Annex H, respectively). A letter of cooperation was issued by the SNNPR Health Bureau to the study hospitals. All participants, that is, women and providers involved in direct observation as well as women involved in exit interview, were asked to provide informed and voluntary consent. They were informed that they did not have to participate in the study and that if they chose not to participate, it would not affect their care or employment at the hospitals in any way. During observations, when there were circumstances where the care given was poor such that it would affect the wellbeing of the mother or the baby, the observers professionally intervened by talking to the relevant professional(s). It would be unprofessional and unethical to keep on observing mismanagements. The professionals were not embarrassed as this was clarified prior to the study, and that the sole purpose of the study was to improve services

thereby save lives and not to apportion blame. All participants were also assured about confidentiality of the information they provided.

CHAPTER 5: VARIATION IN *WOREDA* (DISTRICT)-LEVEL SBA RATES AND FACTORS ASSOCIATED WITH HIGHER RATES IN ETHIOPIA

Introduction

This chapter discusses the results of study one. First, it provides distribution of the sample and descriptive statistics by *woreda*. Then, *woreda*-level variation in the SBA rates and factors associated with higher rates are provided. Finally, it discusses the results in detail.

5.1. Results

5.1.1. *Woreda* sample and descriptive statistics by *woreda*

Data were ascertained for all *woredas* (N=839) across the 11 regions and city administrations of Ethiopia. However, the analytic sample was limited to 677 *woredas* which had no missing values for any of the variables. As shown in Table 5.1, *woredas* varied substantially in terms of socioeconomic characteristics (i.e., population size, number of expected births, mean difference in GER between girls and boys, and proportion of households that have graduated as model families). Population size was computed in 10,000s, and on average, a *woreda* had population size of 7.4 for 2015 fiscal year (SD=1.7).

The highest variation in population size was observed among *woredas* in Amhara, Benishangul Gumuz and Somali regions with SD of 2.0 each, as opposed to *woredas* in Addis Ababa and Harari regions, SD=1.3 each. Similarly, the number of expected births was computed in 1000s, and an average number of expected births was 2.2 (SD=1.7) in a *woreda*. This indicator varied more among *woredas* in Oromia region (SD=2.1), and less among *woredas* in Harari region (SD=1.3). Mean difference in GER of boys and girls in primary education was 14.9% (SD=2.7). The GER across *woredas* in Tigray region highly varied (SD=5.6) whereas, those *woredas* in Dire Dawa had the lowest variation (SD=1.2). The

mean proportion of graduated currently model families was 24.5% (SD=3.0), with greatest variation among *woredas* in Gambella region (SD=5.6).

Table 5.1: *Woreda*-level variation in demographic and socioeconomic characteristics by region and overall, Ethiopia, 2015

Region and overall	Total population in 10,000s		Number of expected births in 1000s		Difference in GER of boys and girls		Proportion of model families	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Addis Ababa (N=10)	31.8	1.3	7.6	1.4	12.7	1.7	44.2	2.1
Afar (N=34)	5.1	1.6	1.6	1.6	19.7	2.2	18.8	3.3
Amhara (N=149)	11.0	2.0	3.9	1.8	8.5	2.9	37.3	4.2
Benishangul G. (N=20)	9.6	2.0	1.4	1.7	31.2	1.9	26.3	2.4
Dire Dawa (N=8)	3.9	1.8	1.3	1.8	10.4	1.2	12.6	4.0
Gambella (N=13)	2.8	1.7	0.8	1.7	33.9	3.7	5.0	5.6
Harari (N=9)	2.4	1.3	0.7	1.3	12.1	4.5	40.4	2.1
Oromia (N=249)	8.9	1.9	3.0	2.1	12.1	3.6	25.5	3.3
SNNPR (N=134)	11.1	1.7	3.8	1.8	19.2	2.5	26.3	2.7
Somali (N=19)	6.3	2.0	2.2	1.9	20.9	2.8	17.8	3.2
Tigray (N=34)	12.8	1.4	4.0	1.4	5.9	5.6	46.3	3.0
Total of Ethiopia (N=677)	7.4	1.7	2.2	1.7	14.9	2.7	24.5	3.0

Mean proportion of women who had four or more ANC visits was 44.7% (SD=1.6). The highest variation was observed in *woredas* from Gambella region (SD=2.3), while the lowest variation was observed among *woredas* in Addis Ababa region (SD=1.1) (Figure 5.1).

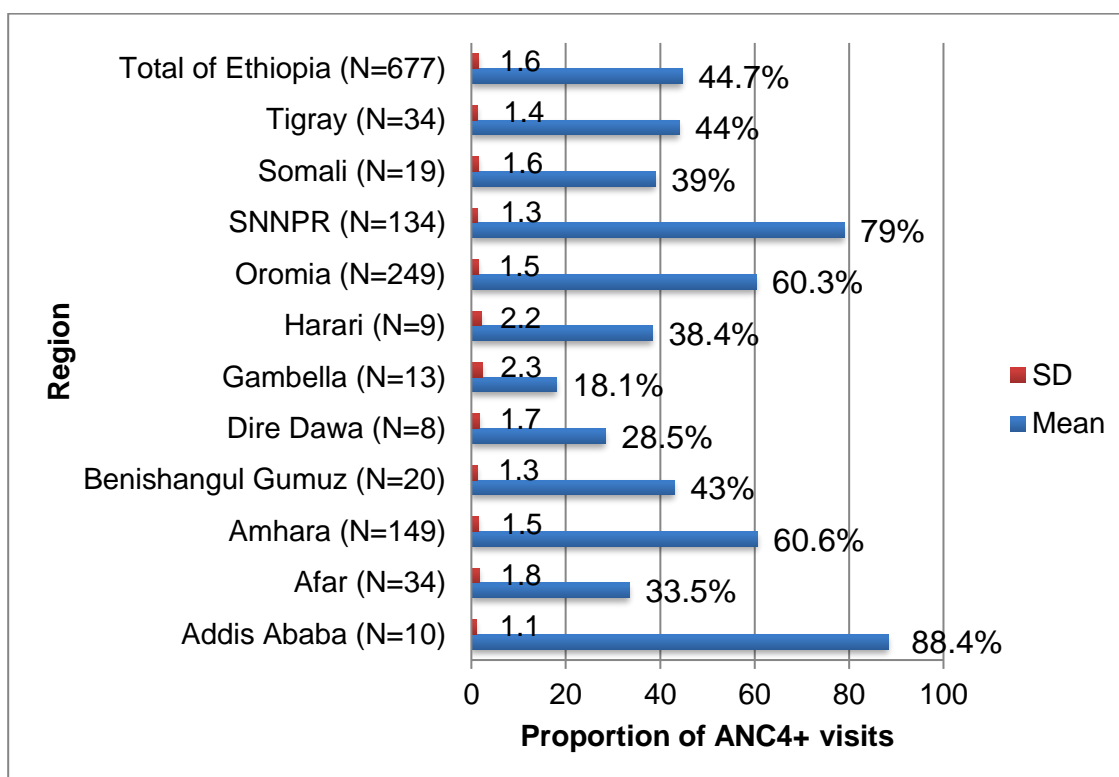


Figure 5.1: *Woreda*-level variation in the proportion of pregnant women who had four or more ANC visits by region and overall, Ethiopia, 2015

As displayed in Table 5.2, *woredas* also varied substantially in availability of health resources that may promote health. The average number of HCs available in a *woreda* that provide BEmONC services for 25,000 population was 1.1(SD=1.6), with the highest variation observed among *woredas* in Somali region (SD=2.3). The mean proportion HCs staffed with two or more midwives was 60.3% (SD=1.8). The variation was much higher among *woredas* in Somali region (SD=4.1) and lowest among *woredas* in Tigray region (SD=1.3). Mean proportion of functional one-to-five networks was 50.3% (SD=3.0). *Woredas* from Gambella and Harari regions varied largely (SD=7.6) on this indicator while those from Benishangul Gumuz and Dire Dawa varied less (SD=1.2 each). Mean number of skilled birth attendants in the *woredas* was 6.7(SD=1.8) for 10,000 population. *Woredas* in Harari region had the highest mean number, 15.3(SD=2.7), while *woredas* in Oromia region had the lowest, 4.8(SD=1.9). Mean number of midwives per 10,000

population was 1.3(SD=2.0). Harari region had the highest mean number, 3.9(±2.3), followed by Addis Ababa, 1.7(±1.6), and Benishangul Gumuz, 1.7(SD=1.7). The mean number varied highly in *woredas* from Gambella and Somali regions as opposed to those from Dire Dawa and Tigray regions.

Table 5.2: *Woreda*-level variation in health resources by region and overall, Ethiopia, 2015

Region and overall	BEmONC service ^a		% of HCs staffed with ≥2 midwives		% of functional 1 to 5 networks		No of all skilled attendants ^b		No of midwives ^c	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Addis Ababa (N=10)	1.4	1.3	73.1	1.9	4.3	1.5	9.1	1.5	1.7	1.6
Afar (N=34)	1.1	2.1	59.5	1.8	65.0	1.6	5.6	1.7	0.8	2.2
Amhara (N=149)	1.1	1.5	50.6	2.0	75.9	1.7	5.9	1.8	1.0	1.9
Benishangul G. (N=20)	1.0	1.4	68.7	1.5	90.8	1.2	7.3	1.3	1.7	1.7
Dire Dawa (N=8)	1.0	1.9	74.5	1.6	98.1	1.2	8.0	1.5	1.2	1.6
Gambella (N=13)	0.8	2.1	45.4	1.5	4.6	7.6	7.9	1.8	1.1	2.6
Harari (N=9)	0.9	1.2	65.8	1.6	35.9	7.6	15.3	2.7	3.9	2.3
Oromia (N=249)	1.0	1.7	34.1	4.1	34.8	5.7	4.8	1.9	1.0	1.9
SNNPR (N=134)	1.4	1.7	74.7	1.5	56.5	3.0	5.3	1.6	1.0	1.7
Somali (N=19)	1.3	2.3	45.6	2.7	23.5	7.2	5.4	2.4	1.1	2.6
Tigray (N=34)	0.9	1.5	89.4	1.3	63.8	3.1	5.8	1.5	1.2	1.6
Total of Ethiopia (N=677)	1.1	1.6	60.3	1.8	50.3	3.0	6.7	1.8	1.3	2.0

^a Mean number of HCs that provide BEmONC services for 25,000 population

^b Mean number of all skilled birth attendants per 10,000 population

^c Mean number of midwives per 10,000 population

5.1.2. *Woreda*-level variation in SBA

The *woreda*-level proportion of expected births with SBA had a mean of 33.1%, SD of 1.8, and range of 4.5% to 81.5%. *Woredas* varied substantially in the proportion, and the *woreda*-level variation differed across regions. Addis Ababa

had the highest (62.9%) mean proportion of expected births attended by skilled professionals, followed by Oromia (54.6%) region, while Somali (12.9%) and Afar (16.2%) regions had the lowest mean proportions. Regions with the highest *woreda*-level variation were Somali (SD=3.0), followed by Afar (SD=2.3), while Benishangul Gumuz region had the lowest *woreda*-level variation (SD=1.4) (Figure 5.2).

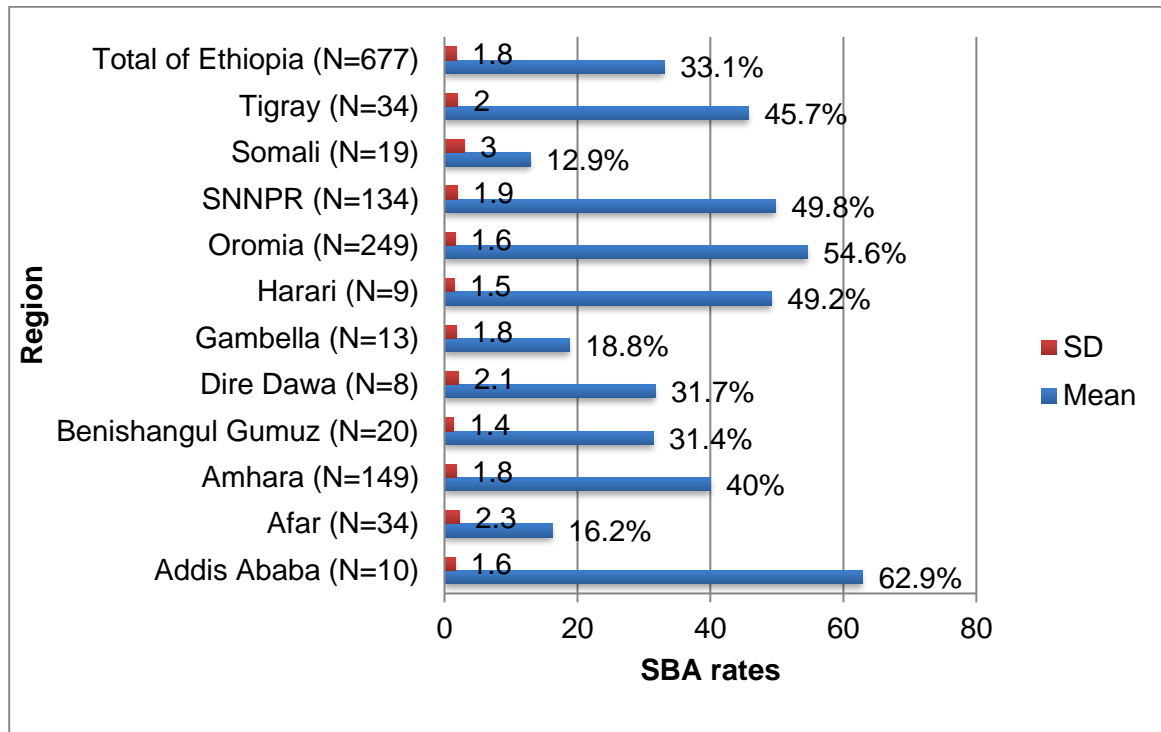


Figure 5.2: *Woreda*-level variation in SBA rates by region and overall, Ethiopia, 2015

5.1.3. Regression Analyses

First, simple linear regression analysis was run to see the unadjusted effect of each of the predictors on the outcome variable, followed by multiple linear regression analysis for their adjusted effects. Both the unadjusted and adjusted associations from the regression models of SBA rates per expected births and, *woreda* socioeconomic and demographic characteristics and, *woreda* health resources are presented on Table 5.3.

5.1.3.1. Bivariate associations with SBA

Among regions, Afar ($b=0.374$, $p=0.000$); Amhara ($b=0.953$, $p=0.041$); Benishangul Gumuz ($b=0.783$, $p=0.026$); Gambella ($b=0.438$, $p=0.00$); SNNPR ($b=1.172$, $p=0.011$); Somali ($b=0.398$, $p=0.000$); and Tigray ($b=1.226$, $p=0.044$) regions showed statistically significant association with the proportion of SBA in the bivariate analysis. Similarly, difference in GER among boys and girls ($b=0.965$, $p=0.024$); number of expected births in 1000s ($b=1.151$, $p=0.000$); proportion of graduated model households in adopting the 16 packages of HEP ($b=1.135$, $p=0.000$); and proportion of pregnant women who had four or more ANC visits ($b=2.012$, $p=0.000$) were among the demographic and socioeconomic characteristics of the *woredas* that were significantly associated with the proportion of SBA. Proportion of functional one-to-five networks ($b=1.109$, $p=0.000$); proportion of HCs staffed with two or more midwives ($b=0.891$, $p=0.004$); and number of skilled birth attendants per 10,000 population ($b=1.093$, $p=0.021$) were the health resources that showed significant unadjusted effect on the proportion of SBA (Table 5.3).

5.1.3.2. Multivariate associations with SBA

Multivariate analysis yielded several independent variables (including indicator variable for region); these together explained 41.3% (adjusted $R^2=0.413$) of the total variability in *woreda*-level SBA as a proportion of expected births (Table 5.3). The following independent variables were significantly associated with the outcome: proportion of women who had four or more ANC visits; proportion of model families; proportion of functional one-to-five networks; and number of skilled attendants per 10,000 population.

The percentage change in the expected proportion of SBA given a 1% change in the proportion of four or more ANC visits was found to be 0.60%. We expect every extra 1% in the proportion of four or more ANC visits to lead to an increase of 0.60% in the proportion of SBA, all else equal. Similarly, a 1% increase in the proportion of functional one-to-five networks will lead to an increase in the

proportion of SBA by 0.08%. A 1% increase in the proportion of graduated model families was associated with 0.07% increase in the expected proportion of SBA. Like that of the proportion of functional one-to-five networks, an increase in the number of skilled birth attendants per 10,000 population by one unit was associated with a 0.08% increase in the expected proportion of SBA.

Regarding regional variation, the average variation in the proportion of SBA among *woredas* in Addis Ababa, Dire Dawa, Gambella, Harari and Tigray regions was found to be the same compared to the variation in Oromia region after adjusting for all other variables in the model. Whereas, *woredas* in SNNPR, Afar, Amhara, Benishangul Gumuz and Somali regions had more variations in the proportion of SBA than those *woredas* in Oromia region. The regression coefficients on these five regions were positive and statistically significant. Specifically, the difference in the proportion of SBA among *woredas* in SNNPR and *woredas* in Oromia region was $b=0.786$, which is 78.6% more on average, compared to the difference among *woredas* in all other regions versus *woredas* in Oromia region. The differences in the proportion among *woredas* in Amhara and Benishangul Gumuz regions and *woredas* in Oromia region were $b=0.736$ and $b=0.694$, which is 73.6% and 69.4% more on average, respectively. Similarly, the differences among *woredas* in Afar ($b=0.441$) and Somali ($b=0.331$) regions were 44.1% and 33.1% more on average, respectively (Table 5.3).

Table 5.3: Unadjusted and adjusted associations from linear regression models of SBA rates per expected births and *woreda* socioeconomic characteristics and health resources (N=677 *woredas*), Ethiopia, 2015

Independent variable	Unadjusted Coefficients		Adjusted Coefficients		% Change in Y Given a 1% Change in X***
	B	P-value	B	P-value	
Demographic and socioeconomic characteristics					
Region*					
Addis Ababa	1.513	0.066	1.021	0.563	-
Afar	0.374	0.000	0.441	0.000	-
Amhara	0.953	0.041	0.736	0.000	-
Benishangul Gumuz	0.783	0.026	0.694	0.003	-
Dire Dawa	0.723	0.170	0.987	0.673	-
Gambella	0.438	0.000	0.948	0.097	-
Harari	1.179	0.483	1.011	0.723	-
SNNPR	1.172	0.011	0.786	0.000	-
Somali	0.398	0.000	0.331	0.000	-
Tigray	1.226	0.044	0.983	0.584	-
Oromia**	-	-	-	-	-
№ of expected births in 1000s	1.151	0.000	1.066	0.069	-
Difference in GER among boys and girls	0.965	0.024	1.003	0.927	-
% of graduated model families	1.145	0.000	1.074	0.000	0.07
% of women who had ANC ₄₊ visits	2.012	0.000	1.822	0.000	0.60
Health resources					
% of functional 1 to 5 networks	1.109	0.000	1.087	0.016	0.08
% of HCs with 2 or more midwives	0.891	0.004	0.983	0.588	-
№ of skilled attendants/10,000 population	1.093	0.021	1.088	0.018	0.08

*Regression coefficient of a region was interpreted as the average difference in variation of SBA rate among *woredas* in that region compared to the difference in the variation of the rate among *woredas* in all other regions versus *woredas* in Oromia region.

**Reference group

***The % change in Y given a 1% change in X was estimated only for variables which showed significant association with the outcome, except for the Region dummies. As described in Chapter 4, this was calculated as $e^{\beta \cdot \log[(100+p)/100]} = e^{\beta \cdot 0.00995}$. Then a 1% change was converted by subtracting 1 and multiplying by 100. Example, for ANC₄₊: $e^{0.00995 \cdot 0.6} = 1.006$. Thus, a 1% change is: $(1.006 - 1) \cdot 100 = 0.60\%$.

5.2. Discussion

The use of SBA significantly improves maternal and neonatal outcomes (Parkhurst et al., 2005; Miller et al., 2016; Luwei et al., 2014). In this study, the average *woreda*-level proportion of SBA was found to be low compared to 49.8% reported for low income countries in a multi-country ecologic study (Zizza et al., 2011). Difference in scope and data sources between the studies may explain the discrepancy. Unlike the present study, which is entirely based on routine HMIS reports that were analysed at district-level, the other study analyzed data from various sources including DHS, routine Ministerial reports and small-scale studies, at national level. On the other hand, differential population projections might have been used in a specific region or *woreda* to calculate the proportion of SBA, rather than those centrally made by the CSA Ethiopia across all regions and *woredas* (FMoH of Ethiopia, 2015c). Projections made at local level are likely to overestimate the total population due to its implications on resource allocation, ultimately underestimating the proportion of SBA. The possibility of multiple births that occurred during the reference year in underestimating the coverage of SBA cannot also be ruled out. Unless the *woreda*-level proportions of SBA improve until this report is written, which represents the performance in 2015, the finding highlights the need for extra efforts to realize the national target of 80% by 2020 which has been set by the Ethiopian health sector transformation plan (HSTP) (FMoH of Ethiopia, 2015b).

Substantial variation in the proportion of SBA was observed across *woredas*. This finding is supported by a study conducted in Gamo Gofa Zone, Ethiopia, where average number of institutional deliveries varied among *woredas* from zero to 20% (Girma et al., 2013). Another ecologic study in India also reported wide district-level variations of institutional births (Randive et al., 2013). The *woreda*-level variation in the proportion also differed across regions. *Woredas* in SNNPR, Afar, Amhara, Benishangul Gumuz and Somali regions had more average variations in

the proportion of SBA than those *woredas* in the biggest region, Oromia. It may be the effect of other confounders, the control of which might not be possible because of the ecologic nature of the data. This needs to be investigated further with longitudinal approaches and controlled studies.

The antenatal period is an important safety net for healthy motherhood and childbirth (Abou-Zahr and Wardlaw, 2003). The significantly positive effect of the proportion of four or more ANC visits on the proportion of SBA observed in this study confirms the existing knowledge that when mothers have at least four contact points with skilled providers during ANC, they are more likely to be retained in SBA (Chukwuma et al., 2017; Anwar et al., 2008; Worku et al., 2013a; Yifru and Asres, 2014b; Esena and Sappor, 2013). The finding also supports the argument that 'four or more ANC visits' indicates the proven dose-response relationship between ANC visits and SBA rate (FMoH of Ethiopia, 2014a; Esena and Sappor, 2013; UNFPA, 2012).

Interventions targeting women, their families and the wider community can have an important contribution to improving maternal and neonatal health (WHO, 2011b). The proportion of model families who adopted the 16 packages of HEP was observed to have a significantly positive effect on the proportion of SBA. This is consistent with a comparative study done in Wolayta and Kembata Tembaro Zones in Southern Ethiopia, which demonstrated that model families better utilize maternal health services than non-model families (Asnake et al., 2013). The finding highlights the importance of enabling families to improve the utilization of SBA in particular and help them produce their own health in general.

Availability of skilled attendants in health facilities per the standard is a requirement for improving access to and utilization of skilled birthing care. Poor geographic distribution of skilled attendants with more preference to urban areas is a strong predictor of low SBA rate (Campell and Graham, 2006). In this study, density of skilled birth attendants per 10,000 population had a significantly positive effect on

the outcome. It was observed that *woredas* had almost achieved the expected skilled attendants to population ratio, all categories aggregated. A *woreda* is expected to have 6.57 skilled birth attendants per 10,000 population (Ethiopian Standards Agency, 2012a; Ethiopian Standards Agency, 2012b), while the actual number was 6.7. This finding is comparable with the national figure of 7/10,000 population (FMoH of Ethiopia, Human Resource Development and Administration Directorate, 2012). However, it is far below the minimum threshold density of 23/10000 population required to achieve 80% coverage of SBA (WHO, 2006a) to meaningfully reduce maternal and neonatal deaths. This also highlights the need to reconcile the national and international standards.

Evidence shows a positive relationship between health services use and social network structure which refers to features of the relationship among members within a network (Cofie et al., 2017; Edmonds et al., 2012; Poortinga, 2006), for example, members' connectedness, demographic homogeneity and frequency of contact (Cofie et al., 2017). Communities with high levels of social capital, where material and psychosocial resources are shared by members who work together to address their problems collectively, are more likely to challenge the problems (Poortinga, 2006). The evidence of significantly positive effect of functional one-to-five networks on the proportion of SBA in this study strengthens this fact. This is also supported by other global experiences (IFRCS, 2013; Nair et al., 2013). One-to-five network is a broad-based community engagement platform for participatory peer to peer learning to bring about transformational change. Using the approach, the FMoH aims to achieve 'home delivery free villages,' one of the criteria for a transformed *woreda* (FMoH of Ethiopia, 2014c). Thus, the finding confirms that community support groups, particularly women's groups are essential for increasing the proportion of SBA, thereby contributing to improving MNH. When properly managed, such groups are critical for ensuring that pregnant women and their families get support from community until delivery (Lassi et al., 2014). They also serve as a vehicle to disseminate promotive, preventive and curative

messages including about the availability and use of quality MNHC (Barros et al., 2012). Since the study is limited to network structural characteristics, a similar study is needed to examine the association between SBA and network functional characteristics: resources exchanged among members including social support (e.g., advice, assistance and emotional support) and social influence, i.e., shared norms and behaviors that influence members' attitudes and behaviors (Cofie et al., 2017).

The analysis did not prove the hypotheses about positive association between *woreda*-level proportion of SBA and female education. Previous studies have shown that educational status of women relative to men is a strong predictor of the use SBA (CSA Ethiopia, 2014; Simkhada et al., 2008). In this study, mean difference in literacy rate of girls and boys was not associated with the outcome in the final adjusted model. This may be due to the fact that GER is a proxy for more proximal factors that really matter, such as proportions of ANC₄₊ and graduated model families. However, this merits further research. It may also be due to the non-specific nature of the indicator GER, which measures enrollment in grades 1-8 as a percentage of the school age population, irrespective of age. It includes enrolment in formal primary schools as well as in alternative basic education centres, which are informal schools. The alternative basic education centres usually enroll students who are not of the official age, i.e., 7-14 year (FMoE of Ethiopia, 2016). Using net enrollment rate instead may provide a different result as it excludes enrolment in alternative basic education centres.

The non-significant association between number of expected deliveries and *woreda*-level proportion of SBA also contradicts with the study from Bangladesh that examined reasons for variations in quality of obstetric care among high and low performing two districts which reported that low performing district is less densely populated than high performing district (Anwar et al., 2009). The fact that the significant unadjusted effect goes away when other things are controlled might mean that the more populous *woredas* are able to perform high on proportions of

ANC₄₊, functional one-to-five networks, graduated model families, and density of skilled attendants. Thus, the fact that the Bangladeshi study didn't adjust for all these variables may explain the difference.

The analysis did not prove positive association between *woreda*-level proportion of SBA and proportion of HCs staffed with two or more midwives. Like that of the number of expected births, the fact that its significant unadjusted effect goes away when other things are controlled might mean that *woredas* which perform high on this indicator are able to perform high on the proportions of ANC₄₊, functional one-to-five networks, graduated model families, and density of skilled attendants (all categories aggregated). Thus, these variables might be more proximal factors which can serve as proxies for proportion of HCs staffed with two or more midwives. Again, this merits further research.

This study has both strengths and limitations in its ecological design. This research design is appropriate to assess the association between SBA rates and sociodemographic characteristics, and availability of health resources at the population level in administrative districts. We were able to retrieve demographic and health care related variables for all 839 *woredas* from publicly available sources, and no selection bias was introduced by the research team as no *woreda* that had data for all variables was excluded from analysis. The limitations are related to the research design and quality of the data. They are discussed in detail under Chapter 9 General Discussion.

CHAPTER 6: STRUCTURAL QUALITY OF L&D CARE IN GOVERNMENT HOSPITALS OF SNNPR, ETHIOPIA

Introduction

This Chapter describes the structural quality of routine L&D care in government hospitals of SNNPR, which represents the first part of study two that examined the overall quality of L&D care provision using primary data collected from 20 hospitals. Availability of the required structural attributes of quality routine L&D care including: general infrastructure; skilled health professionals; and essential drugs, supplies and equipment are described. Availability of personal protective equipment and consumables; resources to ensure safe, comfortable and woman friendly L&D environment; and laboratory services and blood are also described in the Chapter. QA practices related to routine L&D care and index score for the structural quality are also provided. Finally, the Chapter discusses the results in detail.

6.1. Results

6.1.1. Availability of general infrastructure

The general infrastructure was measured in terms of availability of: continuous electricity and water supply with a reliable backup source; telephone service for internal communication and for use by patients or their families; suggestion box and transportation service. Accordingly, 14(70%) of the hospitals had continuous electricity and water supply 24 hours a day and 7 days a week. Similarly, 18(90%) had a reliable backup source in case of power cut (e.g., an automatic generator, or one that can be started within 5 minutes). While 8(40%) of the hospitals had telephone service for internal communication, only 1(5%) had the same service in the compound for use by patients or their families. Though 17(85%) of the hospitals reported that they had suggestion box or log book for handling compliant in the labour ward, only 9(52.9%) of them regularly evaluated and documented the suggestions.

Two (10%) of the hospitals did not have a functional ambulance or other vehicle stationed at the hospital for emergency transportation for clients. Laboring mothers go directly to labour ward before any administrative procedure, and emergency triage exists for sick pregnant mothers who are not in labor in 17(85%) and 13(65%) of the hospitals, respectively. In aggregate, the mean percentage score for availability of general infrastructure was found to be 64.6%. That is, 64.6% of the required items of general infrastructure were available on average.

6.1.2. Availability of skilled health professionals

A total of 440 fulltime skilled birth attendants of all categories (i.e., Gynecology and Obstetrics (Gyn/Ob) specialists, Integrated Emergency Surgical Officers (IESOs), General Practitioners (GPs), Health Officers (HOs), Nurses and Midwives) were working in maternity ward in all hospitals.

The analysis by category, however, revealed that there was no fulltime Gyn/Ob specialist, GP and nurse in 8(40%), 10(50%) and 8(40%) of the hospitals, respectively. On the other hand, there was no hospital without a fulltime midwife, and 19(95%) of the hospitals had four or more fulltime midwives (Table 6.1).

Table 6.1: Distribution of fulltime skilled birth attendants working in maternity ward by category in public hospitals in SNNPR, Ethiopia, 2016

Category of skilled birth attendants	Number available		
	0	1-3	≥ 4
	No (%)	No (%)	No (%)
Gyn/Ob specialist	8(40)	10(50)	2(10)
Integrated Emergency Surgical Officer (IESO)	5(25)	12(60)	3(15)
General Practitioner (GP)	10(50)	6(30)	4(20)
Health Officer (HO)	14(70)	6(30)	0
Nurse	8(40)	3(15)	2(10)
Midwife	0	1(5)	19(95)

Notably, all hospitals reported that one or more of the skilled attendants was always present at the hospital or on-call, 24 hours a day and 7 days a week for routine L&D care including weekends. However, the available skilled attendants in only 9(45%) of the hospitals had received refresher training on obstetric care during 12 months prior to the study. Taking these two indicators in to account, i.e., continuous availability of at least one of the skilled attendants at the hospital or on-call, and receipt of refresher training, the mean percentage score for availability of skilled birth attendants was 72.5%.

6.1.3. Availability of essential drugs, supplies and equipment

On the day of assessment, 2(10%) of the hospitals did not have an emergency drug cabinet in the maternity ward, and only 5(25%) of the hospitals had all essential drugs required for L&D care service provision. All hospitals had injectable oxytocin. However, magnesium sulphate, TTC eye ointment and anti-retroviral (ARV) drugs for HIV positive mothers were each missing in two hospitals. Similarly, nevirapine syrup was missing in one hospital for neonates exposed to HIV. The same was true with availability of essential equipment where 5(25%) of the hospitals had all essential equipment. A filled oxygen tank with flow meter, ultrasound, and a bed with accessories were frequently absent. They were available in L&D ward in 17(85%), 16(80%) and 13(65%) of the hospitals, respectively. In addition, 10% of the hospitals lacked a functional and regularly monitored refrigerator, while 30% lacked a functional autoclave or dry oven in the ward.

The adequate availability of supplies was much lower. All essential supplies were available in only 3(15%) of the hospitals. Importantly, 40% did not have towels for drying and wrapping new-born babies, and two hospitals (10%) did not have HIV test kits (i.e., KHB or Stat pack). On average, 52.5% of the required essential drugs, supplies and equipment were available in the L&D ward of the study hospitals (Figure 6.1).

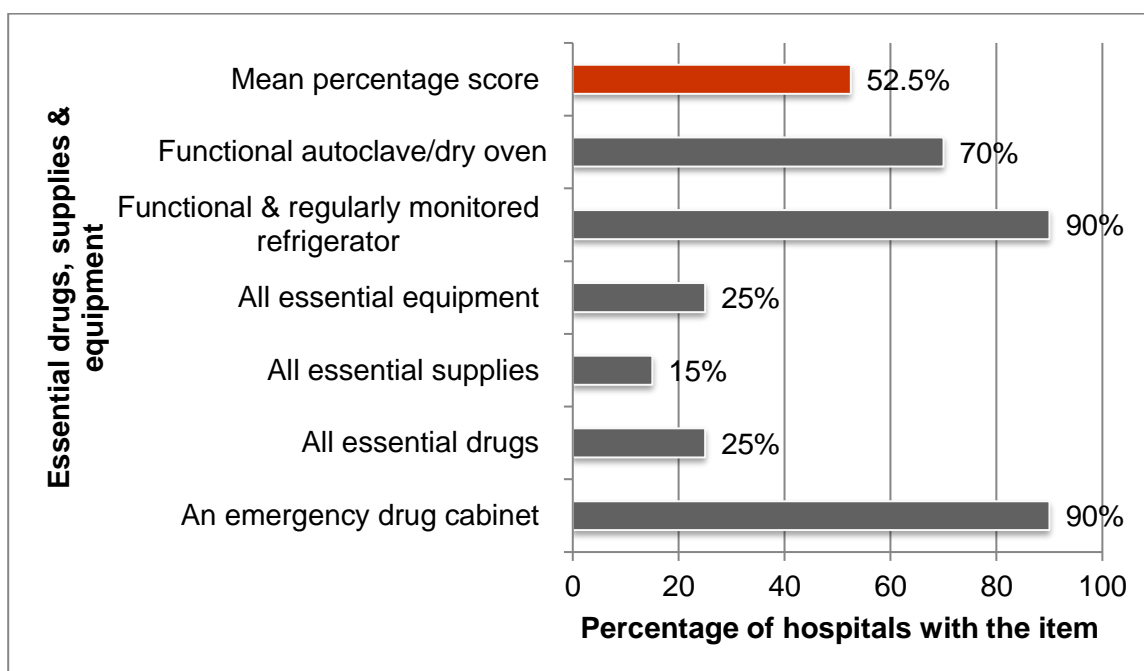


Figure 6.1: Availability of essential drugs, supplies and equipment in the L&D ward at public hospital in SNNPR, Ethiopia, 2016

6.1.4. Availability of personal protective equipment and consumables

Personal protective equipment such as, goggle, boots, apron and gown were available in the L&D ward for infection prevention in 65% of the hospitals. Consumables such as alcohol, chlorine, detergents, gloves and syringes were available in 95% of the hospitals for the same purpose. All hospitals had adequate safety boxes, while 95% had adequate yellow and black color-coded waste collecting bins for waste segregation. The mean score for availability of personal protective equipment and consumables was 88.8%.

6.1.5. Availability of resources to ensure safe, comfortable and woman friendly L&D environment

Almost all (95%) of the hospitals had well ventilated rooms for women in both the first and second stage of labour. The rooms were able to be maintained at an appropriate temperature, (i.e. neither too cold nor too hot so between 20-30C⁰), in 70% of the hospitals. Moreover, only 65% of the hospitals had sufficient space for

women in the first stage labour to walk around, and to have one companion. The hospitals had an average of 3.8(SD=0.9) maternity beds for the first and second stage labour, ranging between 2.5 and 6 beds.

Regarding hand washing and toilet facility standards, 16(80%) of the hospitals had tap water and functional sinks with detergents in maternity ward, each. A functional and clean toilet with door, and hand washing basin with soap was available in only 60% of the hospitals. Overall, 78.9% of the required safety, comfort and privacy standards were met by the hospitals (Table 6.2).

Table 6.2: Availability of resources required to ensure safe, comfortable and woman friendly L&D environment at public hospitals in SNNPR, Ethiopia, 2016

Items	Hospitals with item	
	No	%
Well ventilated rooms for first and second stage labour	19	95
Neither too cold nor too hot rooms (good temperature) for first and second stage labour	14	70
Screens or curtains to ensure privacy	17	85
First stage room has 4 beds	15	75
Second stage room has at least 2 delivery couches	20	100
Sufficient space for women at first stage to walk around and for one companion	13	65
Hand washing and toilet facilities:		
Tap water	16	80
Functional sinks with detergents	16	80
Functional and clean toilet with door, and hand washing basin with soap	12	60
Mean percentage score		78.9

6.1.6. Availability of laboratory services and blood

All the lab tests required for a mother in labour were available 24 hours a day and 7 days a week in only 15% of the hospitals. Specifically, tests for Cerebrospinal Fluid (CSF) microscopy, liver function and renal function were not always available in 40%, 35% and 35% of the hospitals, respectively. Similarly, 25%, 20% and 10% of the hospitals did not always provide serum protein and albumin tests, CD4 count or HIV plasma viral load tests, and HIV tests, respectively, for women in need. On the other hand, 85% of the hospitals were being satisfactorily supplied with blood from a blood bank, which was stored properly in a fridge, with a temperature record. All of these hospitals provided blood without replacement. Only 50% of the required standards for availability of laboratory services and supply of safe blood were met in this study.

6.1.7. QA practices

QA practices related to Maternal and neonatal health care (MNHC) assessed by checking whether the hospitals had guidelines for key L&D care processes, an organizational framework for MNHC Quality Improvement (QI) activities, and regular maternal and neonatal death audit function. All essential guidelines and protocols were available in the L&D ward in only half of the hospitals. Particularly, management protocol on selected obstetrics topics, version 2010 by FMOH, and infection prevention guidelines were missing in 25% and 15% of the hospitals, respectively.

In regard to QI activities, 13(65%) of the hospitals did establish a MNHC QI committee from different case teams, and assigned a focal person to coordinate the committee. However, documented regular meetings (at least every two weeks) were achieved only by 9(69.2%) of these hospitals. Similarly, 75% of the hospitals had been conducting monthly maternal and neonatal death rounds or audits, and were providing recommendations. Of these, 14(93.3%), reported that they were

actually implementing the recommendations. Overall, 72.5% of the standards for QA practices were met.

6.1.8. Index score for structural quality of routine L&D care

An overall mean score of structural attributes was calculated taking all of the domains discussed above in to consideration. In general, the hospitals had fulfilled 68.5% of the standards for the structural aspects of quality of L&D care. Availability of essential equipment and supplies for infection prevention was the category that scored the highest (88.8%). In contrast, the two critical components of the care process which scored lowest were the availability of laboratory services and safe blood supplies (50%), together with the availability of essential drugs, supplies and equipment (52.2%) (Figure 6.2).

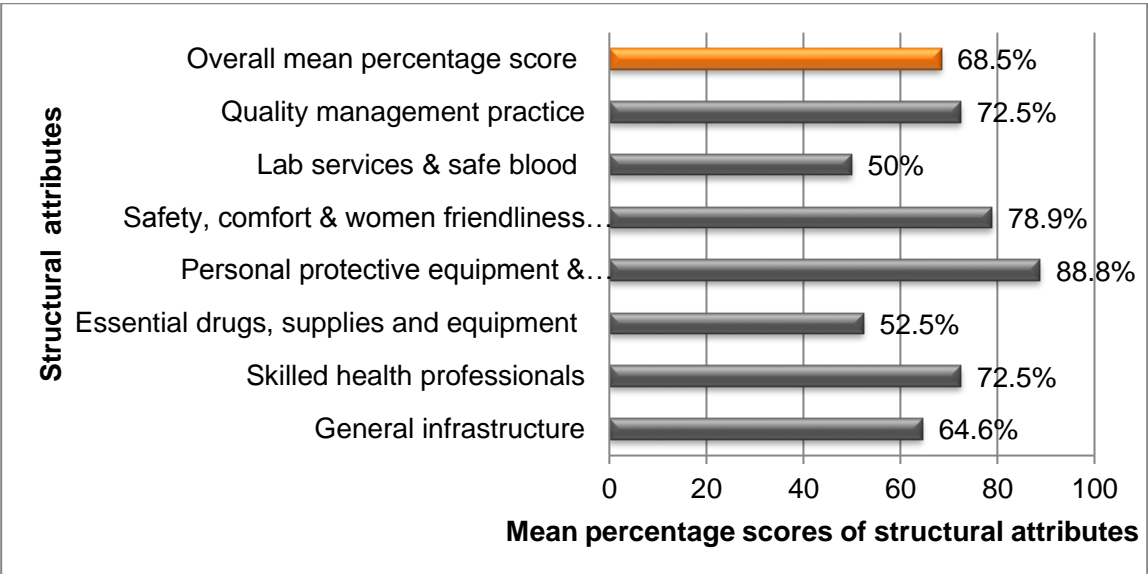


Figure 6.2: Index scores for structural attributes of quality L&D care at public hospitals in SNNPR, Ethiopia, 2016

6.2. Discussion

6.2.1. Availability of general infrastructure

It is encouraging that most hospitals had continuous electricity and water supply, which contrasts with previous studies (EPHI, FMoH of Ethiopia and ICF

International, 2014; Fisseha et al., 2017; Centers for Disease Control and Prevention, 2014; Smith et al., 2017). However, gaps were highlighted in the availability of telecommunication infrastructure, with less than half of the hospitals having had telephone service for internal communication, and only one hospital had the same in the compound for use by patients and their families. A study in Northern Ethiopia has reported that fewer facilities (12.5%) had a working phone or shortwave radio (Fisseha et al., 2017). All hospitals in Zambia and 88% in Uganda had functional communication systems, (Centers for Disease Control and Prevention, 2014), which is different from these findings. Nevertheless, this may not be an accurate reflection, because fixed telephone services are becoming less common in Ethiopia, with increasing coverage of cell phones. This profound and technological change in telecommunications is not fully considered in the structure of the audit and needs to be updated. Functional communication systems facilitate communication among health facilities, contributing to improved referral networks for women with complications (Centers for Disease Control and Prevention, 2014). It also contributes to positive experience of women with the care process through improving responsiveness to their needs such as access to information and social and emotional support (Mosadeghrad, 2014).

Availability of a functional motorized vehicle is important to ensure that women with complications are able to reach facilities that can provide appropriate care. A functional ambulance for emergency referral transportation was available in great majority (90%) of the hospitals. This is much higher than the figures reported in previous studies including, 65% (EPHI, FMOH of Ethiopia and ICF International, 2014), 59.4% (Fisseha et al., 2017), and 61% (Centers for Disease Control and Prevention, 2014). The difference may be partly explained by difference in the definition of the indicator. Whether a functioning ambulance or other vehicle was stationed at the hospitals for emergency transport was measured in this study. In the SPA+ Survey, for example, the indicator included an additional criterion whether the vehicle had fuel available on the day of the survey (EPHI, FMOH of

Ethiopia and ICF International, 2014). Differences in the composition and number of health facilities studied may also explain the discrepancy. While 20 public hospitals were included in this study, the other studies also included health centres in addition to hospitals, and from different managing authorities including government, private and non-government. Regarding the difference in managing authorities, it has been reported that financing and support systems are important features of operational environment that can affect facility performance. For instance, government facilities usually depend on district and provincial administration for salary and material inputs (Lindelow and Wagstaff, 2003). Furthermore, difference in the scope of the studies compared could also be part of the explanation. While the present study focused on the structural quality of routine L&D care, the others (EPHI, FMOH of Ethiopia and ICF International, 2014; Fisseha et al., 2017) included resources for managing obstetric complications as well.

Evidence shows that women have limited opportunities to express opinions about their childbirth experience due to lack of policies, a suggestion box or log book. Even where such policies exist, they are not always implemented (Bohren et al., 2015). Despite that, most hospitals had a suggestion box or log book in the labour ward for handling complaints, and suggestions were regularly evaluated and documented in only about half of them. This may indicate a lack of accountability, and an undermining of women's rights to seek justice for their mistreatment or malpractice (Bohren et al., 2015).

Health facilities should also have a written, up-to-date policy on triage and waiting times for emergency and non-emergency consultations and treatment for maternal and newborn healthcare (WHO, 2016a). However, one third of the hospitals did not have emergency triage system for sick pregnant mothers who are not in labour. This is another gap that needs improvement.

6.2.2. Availability of skilled health professionals

Obstetric services must always be available, as an obstetric emergency can happen at any time (FMoH of Ethiopia, 2014d). On a positive note, one or more skilled attendants were always present in all hospitals including weekends, for routine L&D care. Almost all hospitals had four or more fulltime midwives, though about half of them lacked a fulltime specialist in gynecology and obstetrics or a general practitioner. This is much better than reported in Northern Ethiopia (53.1%; Fisseha et al., 2017). The recent SPA+ Survey (EPHI, FMoH of Ethiopia and ICF International, 2014) and a facility survey in Uganda and Zambia (Centers for Disease Control and Prevention, 2014) provided similar observations.

Ongoing practice and periodic refresher training is important for maintenance of obstetric management skills (de Graft-Johnson et al., 2017). Skilled attendants were trained on management of L&D in 12 months prior to this study in about half of the hospitals, which is similar to Northern Ethiopia (56.3%; Fisseha et al. 2017). Favoring of the argument, Yigzaw et al. (2017) also identified lack of training among midwives as a barrier for provision of quality L&D care. Limited opportunities for refresher training on obstetric care may indicate less emphasis given to the importance of in-service training in improving the quality of L&D care (Getachew et al., 2011).

6.2.3. Availability of essential drugs, supplies and equipment

The required essential drugs, supplies and equipment should be kept in the L&D ward at all times to avoid unacceptable delay in providing the services (FMoH of Ethiopia, 2014d). At variance with this guideline, all essential drugs and equipment were available in only a quarter of the hospitals, and even fewer (15%) hospitals had all the supplies. Importantly, oxytocin, an effective intervention to prevent postpartum hemorrhage was universally available, while magnesium sulphate, an effective intervention to manage pre/eclampsia, was missing in two hospitals.

Previous studies have also highlighted gaps in meeting the standards for essential drugs, supplies and equipment, though the degree of availability varies. For example, Getachew et al. (2011) reported that 52.6% of the hospitals in Ethiopia (N=19) had all the medicines and supplies needed for normal delivery, and 16% had magnesium sulfate. Centers for Disease Control and Prevention (2014) also reported universal availability of oxytocin and magnesium sulfate in Zambian hospitals. Both studies revealed better findings than the present study (except for oxytocin) which may be partly explained by methodological and contextual differences between the studies. Hospitals from different managing authorities (government and missionary) across the country were included in the former study, while contextual difference and inclusion of different levels of facilities are worth mentioning in the latter study.

Women with unknown HIV status should receive a rapid HIV test in maternity wards so that if diagnosed positive, ARV drugs can be given to the mother and baby in time to prevent vertical transmission (FMOH of Ethiopia, 2014d). However, two hospitals lacked HIV test kits (i.e., KHB or Stat pack) and ARV drugs for HIV positive mothers, and a hospital lacked Nevirapine syrup for exposed babies. In Zambia, HIV test kits were universally available and 50% of hospitals had ARVs drugs. In Uganda, 69% of the hospitals had ARV drugs (Centers for Disease Control and Prevention, 2014). To stop new vertical transmission of HIV, the coverage of Prevention of Maternal to Child Transmission (PMTCT) of HIV service should be above 85%. Yet, only 60.6% of HIV-positive Ethiopian women receive ART (FMOH of Ethiopia, 2015b). Thus, it is evident that shortage of HIV test kits and ARVs is a structural barrier faced by the hospitals that limits access to the service.

Notably, four in ten hospitals lacked towels for drying and wrapping newborns which highlights a critical gap in the hospitals' capacity to promote thermoregulation in newborns. This is in agreement with previous work. For instance, de Graft-Johnson et al. (2017) identified largest gap in the supply and

Fisseha et al. (2017) reported that the supply was available in 15.6% of the facilities. Overall, the ability of a hospital to provide quality L&D care services can be seriously affected by lack or non-functioning of an essential drug, supply or equipment (Lindelov and Wagstaff).

6.2.4. Infection prevention and woman friendly L&D environment

It is important that IP equipment and supplies are readily available and accessible to enable health workers to adhere to the recommended hygiene practices, to prevent avoidable infections (WHO, 2015b). It is promising that almost all hospitals had consumables for IP, and adequate safety boxes and color-coded bins for waste segregation. Personal protective equipment was also fulfilled in most hospitals. This is better than a similar study which reported that the required personal protective items were available in two third of the facilities (Fisseha et al., 2017). The discrepancy could be due to the difference in the type and number of facilities included in the studies.

Health facilities should ensure that the L&D environment is woman friendly. It is essential that women have access to a reliable supply of safe water and toilet facility in maternity ward (FMoH of Ethiopia, 2014d). Almost all hospitals had well ventilated rooms, and majority had tap water, sufficient space, a functional and clean toilet, and functional sinks with detergents, each. Availability of safe water supply is comparable with a study that reported 65.6% (Fisseha et al., 2017), but lower than the figure reported in Centers for Disease Control and Prevention (2014) where all hospitals in Uganda and Zambia had a suitable supply. This might be due to the relaxed definition of the indicator used in the latter study, i.e., regular water supply versus a relatively specific definition used in this study, i.e., regular tap water supply.

The availability of toilet facility is favored by the Ethiopia SPA (+) Survey 2014 which reported an average of 74% of facilities having had a functioning latrine facility (EPHI, FMoH of Ethiopia and ICF International, 2014), but much higher than

34.4% reported in Northern Ethiopia (Fisseha et al., 2017). Again, difference in the definition of the variable is the likely explanation for the deviation. While Fisseha et al. (2017) measured the variable as availability of functional toilet and shower; the current data did not specify the 'shower' element.

6.2.5. Availability of laboratory services and blood

Hospitals need to have the capacity to conduct laboratory tests as it significantly enhances the quality of L&D care services. They should have continuous supply of safe blood for emergency transfusions when the need arises, for instance, to treat hemorrhage (EPHI, FMoH of Ethiopia and ICF International, 2014). However, critical gaps were identified in this aspect with all tests needed by a mother in labour always available in few (15%) hospitals. This is consistent with the Ethiopia SPA (+) Survey 2014 which also found very low capacity of health facilities to conduct even the basic tests (EPHI, FMoH of Ethiopia and ICF International, 2014). Another study conducted in Malawi also showed low score for laboratory system (Smith et al., 2017).

The results also revealed that most (85%) hospitals were getting blood from blood bank with safe storage practice, which is better than 75% in Ugandan hospitals (Centers for Disease Control and Prevention, 2014). This encouraging finding may reflect leadership commitment and efforts made to improve availability of safe blood and blood products in hospitals across Ethiopia. For instance, the existing blood banks have been reorganized by transferring the management of blood transfusion services from the Ethiopian Red Cross Society to government, the National Blood Transfusion Service. New blood banks are also constructed (FMoH of Ethiopia, 2015b). Due to lifesaving nature of the service, efforts should however be strengthened further to close the observed gap, even if small (15%).

6.2.6. QA practices

The standard is that hospitals should have protocols and guidelines on various aspects of maternal and neonatal healthcare (MNHC) and display them as

references for the staff (FMoH of Ethiopia, 2014d). However, only half of the hospitals had all essential guidelines and protocols in the L&D ward. The frequently missing guidelines for normal birth were management protocol on selected obstetrics topics (2010 version) and infection prevention protocol. Previous studies have also reported this poor performance (Getachew et al., 2011; Smith et al., 2017). Accessibility to the best evidence determines successful implementation of evidence-based medicine (Armstrong, 2003), for example, the use of printed job aids that provide prompts to remind providers to perform specific tasks during intrapartum care is the most important predictor of quality of EmOC (Adeyi and Morrow, 1997). Thus, the result indicates another opportunity for quality improvement (QI).

Maternal and neonatal death review is important to improving the quality of MNHC services through systematic process of identifying factors associated with the deaths, generating recommendations to develop interventions against future similar deaths, and measuring improvement (FMoH of Ethiopia, 2014d). It is encouraging that great majority of the hospitals were conducting monthly maternal and neonatal death audits and implementing its recommendations. On the other hand, despite that two third of the hospitals had a MNHC QI committee with a coordinator or focal person assigned, the committee was not conducting regular meetings at least every two weeks in one third of the hospitals. It appears that the encouraging finding with maternal and neonatal death audit in some hospitals was not adequately supported by the organizational framework and standard procedures indicated in the EHAQ package (FMoH of Ethiopia, 2014d). That is, some hospitals were conducting death audits in the absence of a MNHC QI committee.

Inadequate performance of health facilities on various QA activities has also been observed in previous studies. For example, EPHI, FMoH of Ethiopia and ICF International (2014) showed that about half of the hospitals in Ethiopia had regular QA activities with observed documentation. Poor practice surrounding maternal

and neonatal morbidity and mortality audit was also observed in Malawi (Smith et al., 2017). Effective QA audit and feedback system in place can determine successful implementation of evidence-based practice (Armstrong, 2003). There is a need to improve the ability to learn lesson from case reviews.

6.2.7. Overall structural quality of routine L&D care

It is assumed that good quality of actual care cannot be ensured in the absence of the enabling environment, including capacity of the facility (Leisher et al., 2016; Ollerhead and Osrin, 2014), and organizational context (Ollerhead and Osrin, 2014). Different interlinked resource constraints are the major factors that affect the quality of L&D care provision (Pitchforth et al., 2010). Capacity gaps were observed in the hospitals to provide quality routine L&D care services with about two thirds of the required resources fulfilled overall. Only two hospitals had fulfilled almost all the standards, while one third of the hospitals had low readiness to deliver the service. Laboratory services and safe blood, and essential drugs, supplies and equipment were the areas with the largest gaps.

These current findings are generally consistent with a recent study conducted in Northern Ethiopia on quality of delivery service where 65.62% of the facilities had good input quality (Fisseha et al., 2017), but much better than another study on quality of midwifery care in Amhara Region, Ethiopia, which reported 16.3% for availability of all essential drugs, and less than 10% for all essential equipment, all supplies, and all IP materials, each (Yigzaw et al., 2017). The present finding is also favored by other studies. For example, essential equipment for obstetric care was not always available in Kenyan hospitals (Opondo et al., 2009) and health facilities in six sub-Saharan African countries including Ethiopia (de Graft-Johnson et al., 2017). It is important to note that the results show just a single timepoint prevalence of the availability of the required inputs for the provision of quality care. This was the best possible assessment given the resources. Thus, they may not necessarily indicate a constant supply.

Gaps in structural quality of L&D care can demotivate providers and constrain their adherence to the actual care practices (EPHI, FMoH of Ethiopia and ICF International, 2014; Dieleman and Harnmeijer, 2006), although quality services can still be provided in minimal service delivery settings (EPHI, FMoH of Ethiopia and ICF International, 2014). Poor facility readiness can also have negative effect on women's perceptions and service use as reported in Nigeria (Uzochukwu, 2004), ultimately weakening the link between health facilities and community (Opondo et al., 2009).

CHAPTER 7: QUALITY OF L&D CARE PROCESS AND ASSOCIATED FACTORS IN GOVERNMENT HOSPITALS OF SNNPR, ETHIOPIA

Introduction

This Chapter deals with the second part of study two: quality of routine L&D care process and associated factors in government hospitals of SNNPR. First, the Chapter describes the characteristics of the participants, followed by the degree to which providers adhered to the recommended care practices. The results are provided by specific areas of care including: initial assessment, care during the second and third stages of labour, and immediate and essential newborn care. Infection prevention practice, use of partograph, AMTSL, interpersonal communication during L&D and index score for quality of routine L&D care process are also presented. Then, woman and hospital level factors affecting the quality of L&D care process that were identified using multilevel analysis are provided. Finally, the Chapter discusses the results in detail.

7.1. Results

7.1.1. Characteristics of the study participants

A total of 1351 labouring mothers consented for the study. However, the progress of labour of 16 women became non-normal at later stage and the observations discontinued. Thus, the analytic sample presented here represents the routine L&D care process of 1335 mothers who had normal labour with completed observation until one hour postpartum.

The majority (36.7%) of the women were aged 21-25 year, followed by 26-30 year (33.3%). About two thirds (66.8%) had total number of pregnancy (gravida) of one or two, and 74.2% had given birth to one or two children. About three fourth (77.1%) of the women had three to four ANC visits for the present pregnancy. Thirty eight (2.8%) women encountered one or more danger signs in the present

pregnancy. Nearly one third (28.9%) of these women had fever, followed by cough or shortness of breath (23.7%). More than half (57.8%) of the women were attended at a non-teaching type of hospital, and 58.1% were attended at a general hospital by level. Almost all (98.8%) of the women were in supine (lithotomy) position during childbirth. The baby was alive and in good condition (with no complication) until the end of observation in 95.6% of the cases (N=1333) (Table 7.1).

Table 7.1: Characteristics of participants of direct observation of L&D care process at public hospitals in SNNPR, Ethiopia, 2016

Characteristics of participants	No	%
Age (N=1326)		
20 and below	244	18.4
21-25	487	36.7
26-30	441	33.3
31-35	119	9.0
36-40	40	3.0
41 and above	4	0.3
Number of pregnancies (N=1129)		
1-2	754	66.8
3-4	269	23.8
5 and above	106	9.4
Number of previous births (N=1089)		
1-2	808	74.2
3-4	201	18.5
5 and above	80	7.3
Number of ANC visits in current pregnancy (N=1205)		
1-2	246	20.4
3-4	929	77.1
5 and above	30	2.5
Encountered any danger sign in current pregnancy	38	2.8
Danger signs encountered in current pregnancy (N=38)		
Fever	11	28.9
Cough or shortness of breath	9	23.7
Severe headaches or blurred vision	8	21.1
Convulsions, or swollen hands or face	6	15.8
Vaginal bleeding	4	10.5
Type of hospital attended at (N=1335)		
Teaching	563	42.2
Non-teaching	772	57.8
Level of hospital attended at (N=1335)		
Primary	304	22.8
General	775	58.1
Referral	256	19.2
Position of the woman during childbirth (N=1335)		
Supine (lithotomy)	1319	98.8
Lateral tilt	16	1.2
Foetal outcome at the end of observation (N=1333)		
Alive with no complication	1275	95.6
Alive with complication	58	4.4

Four hospitals, namely; Hossana, Butajira, Wolaita Sodo and Arba Minch, together contributed the highest number, 555(41.6%), of observations. Similarly, six

hospitals (i.e., Hawassa, Adare, Yirgalem, Durame, Jinka, and Halaba) together contributed the next highest number, 400(30%); and another group of six hospitals (Gidole, Bonga, Mizan Aman, Sawula, Leku, and Dilla) contributed 277(20.7%) of the observed deliveries. The rest, 103(7.7%), were from Bona, Chench, Tercha, and Karat hospitals. The distribution of observed deliveries by each hospital is shown in Figure 7.1. Hossana hospital contributed the highest number of observations (188), followed by Butajira hospital (133), while only 10 deliveries were observed in Karat hospital.

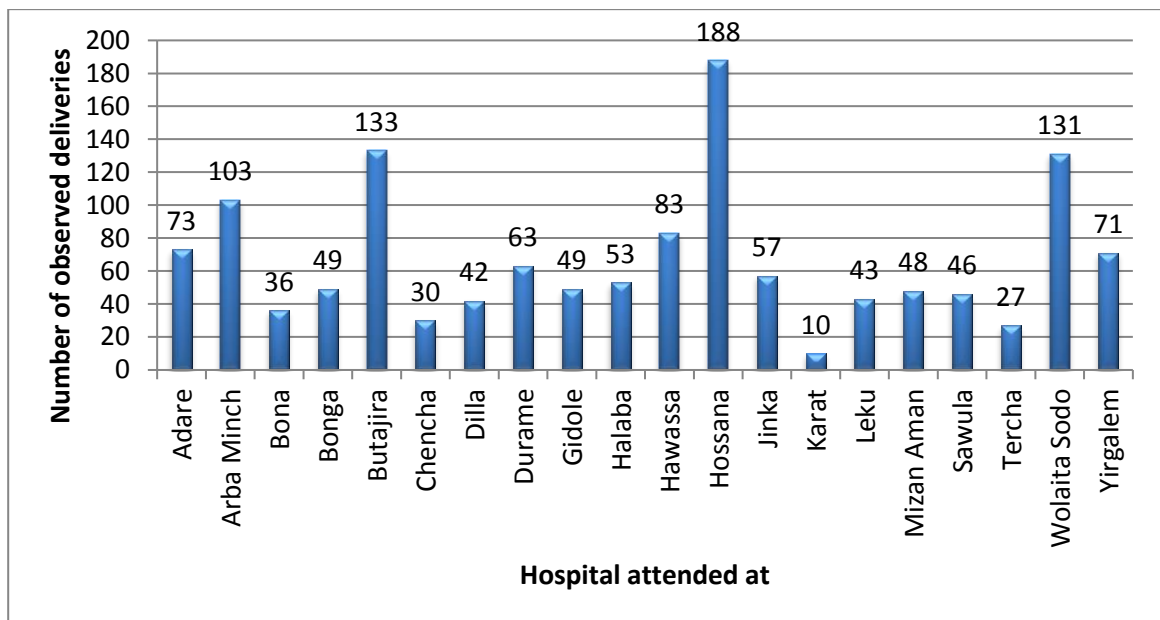


Figure 7.1: Distribution of participants of direct observation of L&D care process by hospital in SNNPR, Ethiopia, 2016

7.1.2. Initial assessment of the woman in labour

Since women were approached for observation after they had already been admitted, there was no chance for direct observation of their initial assessment during the first and early second stages of labour. Instead, the woman’s clinical record was reviewed at the end of the observation session to ascertain whether the key elements of history and physical examination were recorded or not (Table 7.2). The most commonly documented aspects of the initial assessment were vaginal examination findings, (95.3%), which included checking and recording

cervical dilatation, foetal presentation, and membrane status. However, documenting the general examination findings, i.e., blood group and Rh status, haemoglobin level, HIV and syphilis tests, and urine test for protein, was generally low (58.4%). Pulse rate was measured at initial assessment and recorded for most (93.8%) of the women, while temperature was recorded only for about half (52.5%) of the women.

The previous obstetric history of complication during previous pregnancies, i.e., high blood pressure, convulsion, postpartum hemorrhage, caesarean delivery, still birth or prolonged labour, was recorded for only 6% of the women. Similarly, providers recorded whether the woman had encountered any danger sign in the present pregnancy in only 2.8% of the cases. Overall, the mean percentage score for initial assessment of the woman in labour was 59.6%. That is, the providers adhered to 59.6% of the required initial client assessment standards in every observed delivery.

Table 7.2: Initial assessment of the woman in labour at public hospitals in SNNPR, Ethiopia, 2016

Initial assessment tasks	Observed deliveries	
	No	%
Age, gravidity and parity	1073	80.4
History of danger signs of pregnancy ¹	38	2.8
History of complication during previous pregnancies ²	80	6.0
Temperature	701	52.5
Pulse rate	1252	93.8
General examination ³	780	58.4
Abdominal examination ⁴	1078	80.7
Vaginal examination ⁵	1272	95.3
Mean percentage score	59.6%	

¹Danger signs: headaches, fever, discharge, swelling of hands and face, convulsions/loss of consciousness, vaginal bleeding

²Complications: high blood pressure, convulsion, postpartum hemorrhage, cesarean delivery, still birth, prolonged labor

³General examination: blood group and Rh status, hemoglobin level, HIV and syphilis tests, and urine test for protein

⁴Abdominal examination: checked fundal height, position/lie, and FHB

⁵Vaginal examination: checked cervical dilatation, foetal presentation, and membrane status

7.1.3. Care during the second and third stages of labour

The essential childbirth practices during the second and third stages of labour are shown in Figure 7.2. The quality of care during these stages of labour was found to be adequate in the following areas: examination of the placenta and membranes for completeness, palpation of the uterus every 15 minutes after the placenta is delivered to confirm uterine contraction, and examination of the vulval-perineal region for possible lacerations. Providers performed these tasks in 92.1–95.1% of the observed cases.

On the other hand, tasks like checking for vaginal bleeding, and taking blood pressure and pulse rate every 15 minutes after birth were performed only in half (52.8%) and one third (30.5%) of the cases, respectively. The mean percentage score for L&D care practices during the second and third stages of labour was found to be 77.9%. Providers adhered to 77.9% of the EHAQ standards in each observed delivery.

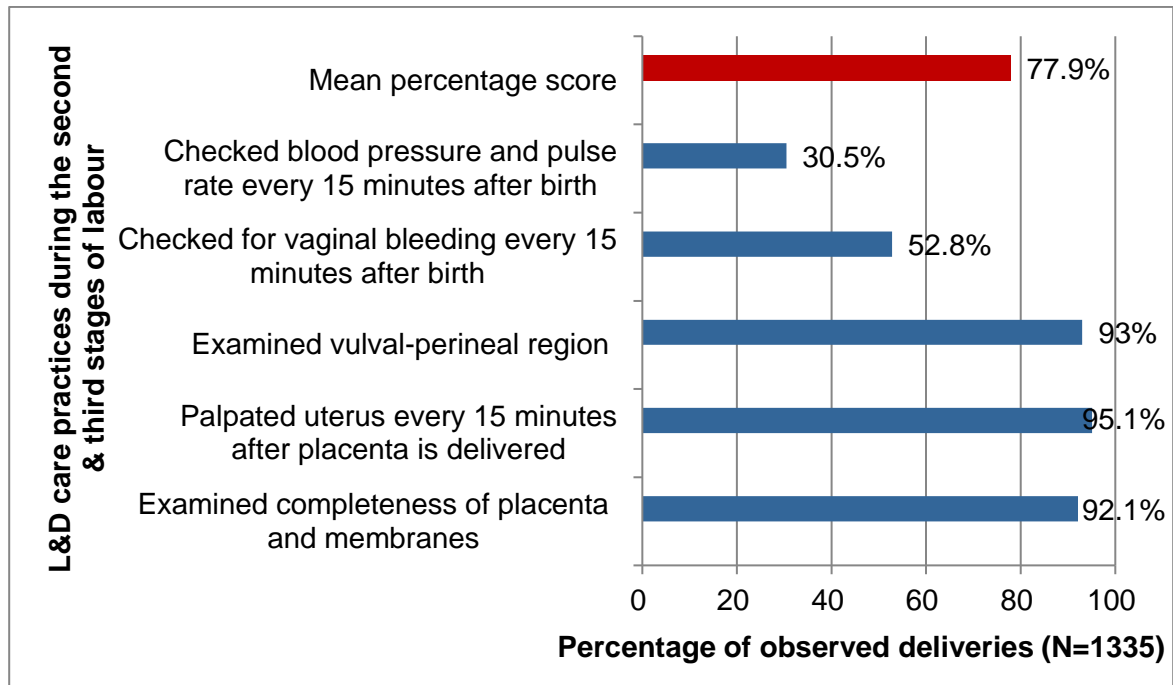


Figure 7.2: Essential practices during the second and third stages of labour at public hospitals in SNNPR, Ethiopia, 2016

7.1.4. Immediate and essential newborn care

Most of the immediate and essential newborn care standards were met in the majority of the observed deliveries, where providers performed the recommended tasks in 87.6% to 98.7% of the deliveries (Table 7.3). The vast majority of newborns were dried with a towel immediately after birth and weighed and classified. However, assisting the woman to initiate breastfeeding was not typically practiced. Providers helped the mother initiate breastfeeding within the first hour postpartum through placing the baby skin to skin on mother's chest or abdomen for at least 30 minutes in only about a third (37.6%) of the cases. Overall, 86.8% of the immediate and essential newborn care standards were met in each observed delivery.

Table 7.3: Immediate and essential newborn care in the first hour postpartum at public hospitals in SNNPR, Ethiopia, 2016

Immediate and essential newborn care practice	Observed deliveries (N=1335)	
	No	%
Delivered to mother's abdomen	1170	87.6
Immediately dried with warm towel	1289	96.6
Wiped eyes as s/he stimulated breathing	1255	94.0
Cut cord, tied 2 fingers from abdomen and another 2 fingers from the first	1195	89.5
Placed skin to skin on mother's chest or abdomen for at least 30 minutes to initiate breastfeeding	498	37.6
Applied tetracycline eye ointment to both eyes	1163	87.6
Gave vitamin K 1mg IM	1214	91.3
Weighed and classified	1312	98.7
Mean percentage score	86.8%	

In addition, during the first hour of delivery, providers checked the umbilical cord for possible haemorrhage at least once in 87.9% of the babies and checked the temperature every 15 minutes in only 21.9% of the newborns. Explanation on the importance of delayed bathing for the first 24hrs after birth was given to only 52.3% of the mothers.

7.1.5. Infection prevention practice

Adherence to the recommended infection prevention practices was assessed against a set of standard measures including hand-washing practices, use of protective barriers, decontamination of reusable items, and disposal of contaminated items.

Wearing gloves, disposal of sharps and decontamination were performed correctly most of the time (96.7%, 91.8% and 96.5%, respectively). However, wearing other protective clothing to protect face, hand and body, i.e., gown, apron, boots and goggles, was rarely practiced (14.4%). Of all these personal protective barriers, boots and goggles were used less commonly, with providers using them in only in 48.2% and 17.2% of cases, respectively. Similarly, hand washing was less commonly (38.8%) practiced before examination during labour. The practice remained inadequate (76.4%) even at the end of the procedure. Disposal of contaminated wastes was also practiced inadequately (77.9%). In aggregate, the mean percentage score for adherence to the infection prevention practices was found to be 71.8% (Table 7.4).

Table 7.4: Infection prevention practices during routine L&D care at public hospitals in SNNPR, Ethiopia, 2016

Infection prevention practice	Observed deliveries (N=1335)	
	No	%
Washed hands before examination during labour	503	38.8
Put on two pairs of sterile gloves for vaginal examination	1291	96.7
Put on clothing to protect face and other parts of the body	192	14.4
Decontaminated all reusable instruments in 0.5% chlorine solution	1226	91.8
Disposed all sharps in a yellow colored puncture proof container immediately after use	1284	96.5
Disposed all contaminated wastes in a red colored leak proof container ¹	1038	77.9
Disposed non contaminated materials in a container designated for general waste	1063	79.7
Washed hands thoroughly with soap and water, and dried them	1015	76.4
Mean percentage score	71.8%	

¹Contaminated wastes included for example gloves and swabs.

7.1.6. Use of partograph to monitor labour

Partograph was used to monitor the progress of labour in 80.4% of the observations. Of these observations (N=1073), cervical dilatation was plotted on the partograph at least every 4 hours in 91.2% of the cases, while temperature was plotted at least every 2 hours only in 36.6% of the cases. On average, 76.4% of the standards for correct use of a partograph were met (Figure 7.3).

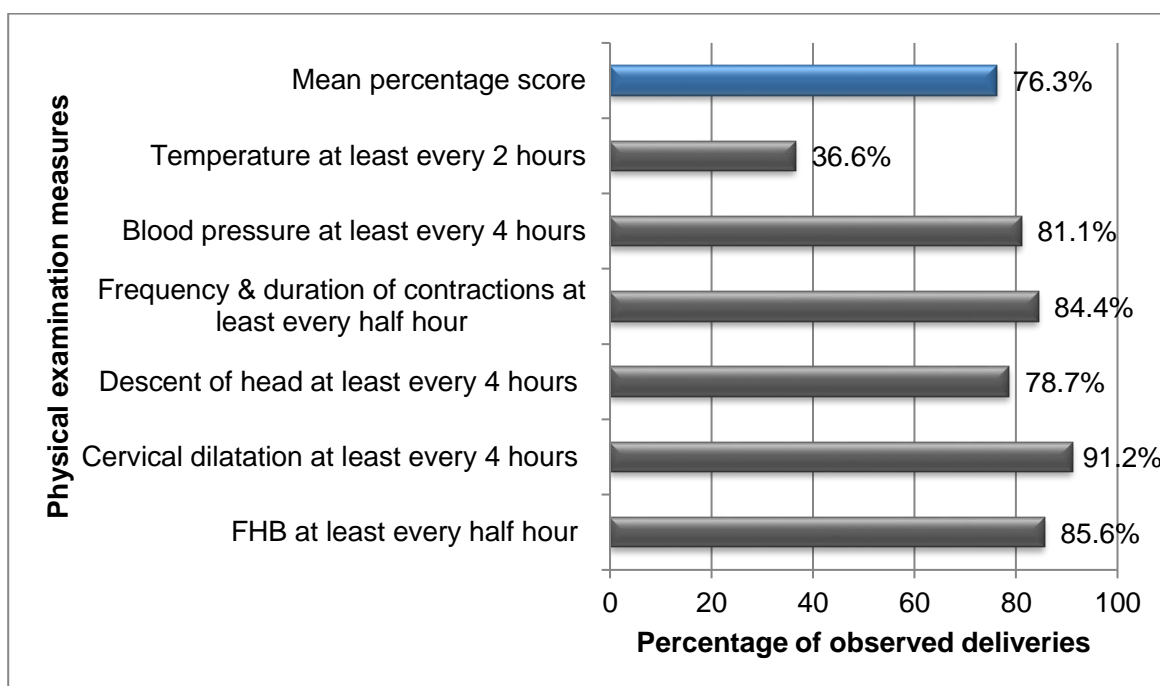


Figure 7.3: Correct use of partograph at public hospitals in SNNPR, Ethiopia, 2016

7.1.7. AMTSL

Compliance of the providers to AMTSL standards is shown in Figure 7.4. Almost all (97.2%) of the women were given a uterotonic, i.e., oxytocin or ergometrine, and almost all of them received it within three minutes of delivery, of which, 90.8% were given within one minute of delivery. Adding in controlled cord traction decreased the mean percentage score for compliance to AMTSL standards to 74.1%. Finally, adding in uterine massage decreased the percentage further to 69.7%. Therefore, all components of AMTSL were correctly performed in 69.7% of the observed deliveries. To maintain the analysis approach, the mean percentage score was also calculated for compliance to AMTSL standards, which was 76.4%.

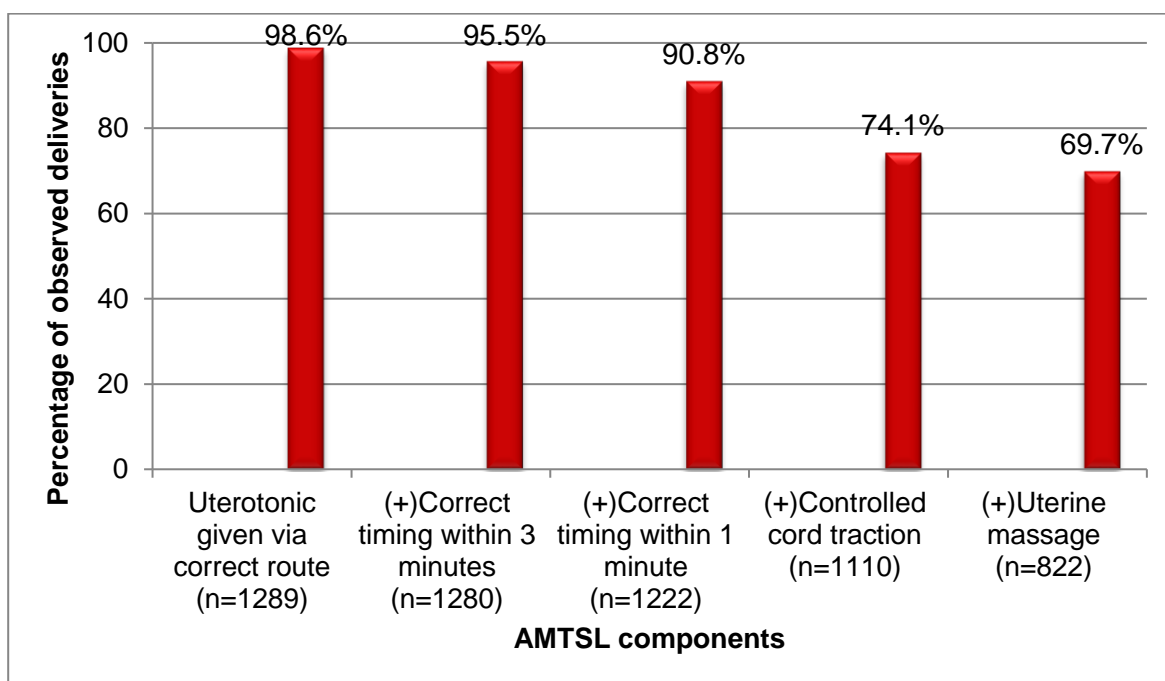


Figure 7.4: Compliance to AMTSL standards at public hospitals in SNNPR, Ethiopia, 2016

7.1.8. Interpersonal communication during L&D

Quality of care during L&D is also measured by the extent to which women are treated with respect, and have appropriate communication with a provider. Two measures of interpersonal communication were observed to assess woman friendliness of the care process. Providers encouraged only about a third (31.4%) of the women to have a support person present throughout L&D. Explanations of procedures and what would happen during labour were offered in about two third (63.1%) of the labours observed. Overall, the mean percentage score for interpersonal communication during L&D was 47.2%.

7.1.9. Index score for quality of routine L&D care process

The overall summary score for quality of routine L&D care process is shown in Figure 7.5 by key domains including initial assessment of the woman, care during second and third stages of labour, immediate and essential newborn care, infection

prevention practice, use of partograph for labour monitoring, AMTSL, and interpersonal communication.

Overall, the quality of routine L&D care services provided to labouring mothers at public hospitals in SNNPR was found to be substandard with an index score of 66.6%. That is, the hospitals could meet only 66.6% of the EHAQ standards of L&D care process (FMoH of Ethiopia, 2014d) in every observed woman for which she was eligible. The hospitals achieved the highest mean percentage score (86.8%) on immediate and essential newborn care practices, followed by care during the second and third stages of labour (77.9%). On the other hand, they scored the lowest in complying with AMTSL standards (42.2%), followed by interpersonal communication (47.2%), and initial assessment of the woman in labour (59.6%).

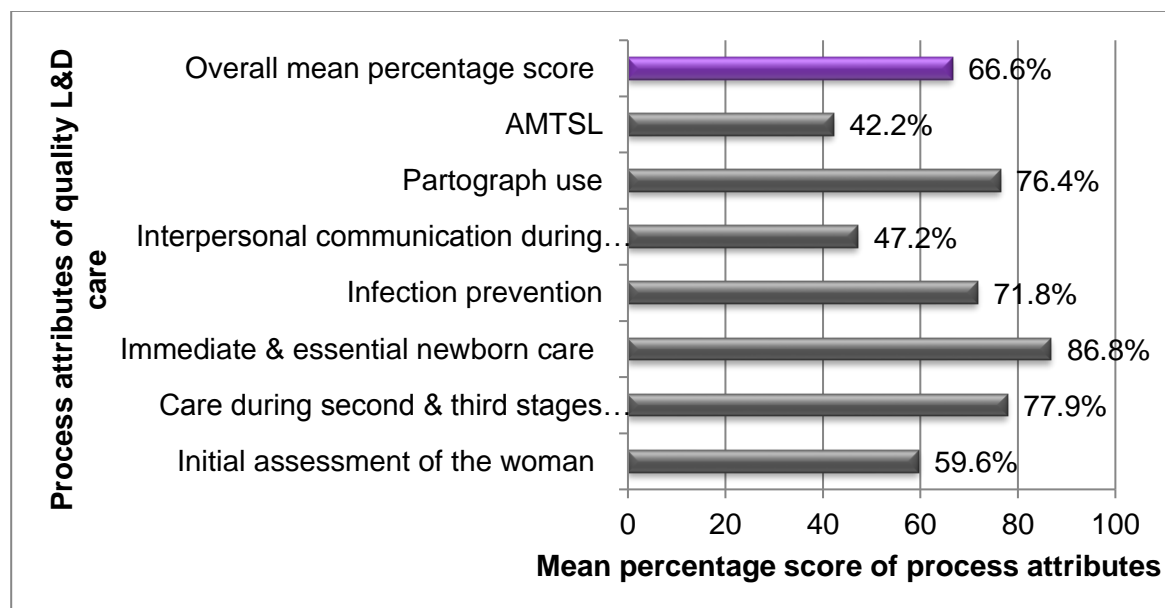


Figure 7.5: Summary of overall quality of routine L&D care process by attribute at public hospitals in SNNPR, Ethiopia, 2016

Quality of L&D care process was higher in Sawula and Yirgalem hospitals with overall mean percentage scores of 87.4% ($\pm 2\%$ points) and 85.2% ($\pm 2.2\%$ points), respectively. Three (15%) of the hospitals scored between 70.5% and 75.8%, while the majority, 12(60%), scored between 60.2% and 69.9%. Three (15%) hospitals

which provided the lowest level of quality of L&D care were Adare, 53.6% ($\pm 6.9\%$ points); Wolaita Sodo, 56.6% ($\pm 9.6\%$ points); and Bonga, 57.4% ($\pm 5.4\%$ points).

7.1.10. Factors affecting quality of L&D care process

Suitability of the mixed-effects multilevel linear regression model was evaluated first by computing the ICC in the empty-model. As shown in Table 7.5, the variance components suggested statistically significant variability at the between hospital (68.04) and within-hospital (47.90) level. The ICC in the null model was computed as: $ICC = 68.04 \div (68.04 + 47.90) = 0.5868$, which suggested that 58.68% of the index score variability occurred between hospitals. The presence of such significant heterogeneity motivated addition of Level 1 and Level 2 explanatory variables to the model in subsequent analysis. The full model, which was fitted by adding all hospital and woman level variables, reduced the ICC to 0.4388. This still suggested that 43.9% of the variation in the index score was attributed to hospital level variables indicating the preference for multilevel analysis with hospital as random effect.

Factors that significantly affect the quality of the L&D care process index were identified both at the hospital and individual levels after adjusting in the final model (Table 7.5). At the lower level, the presence of a danger sign in the current pregnancy was the only variable that had a positive effect on the process quality index. The index score was significantly higher among women who had history of a danger sign compared to their counterparts ($\beta = 5.66$; $P\text{-value} = 0.001$).

Among the hospital level variables, type of hospital, average number of births attended in the hospital in the previous year (2015), and index of structural quality of L&D care were found to have statistically significant fixed effects on the index of process quality of L&D care, holding all other variables constant. The index score for quality of L&D care process significantly increased among women belonging to teaching hospitals ($\beta = 12.10$; $P\text{-value} = 0.005$) as compared to those belonging to non-teaching hospitals. The expected process quality index score for a hospital of

average annual L&D service volume was shown to be significantly low ($\beta = -5.34$; P-value = 0.007). That is, every additional delivery attended in a hospital in a given year is associated with reduction in the index score of quality of L&D care provided to a woman by 5.34 points.

A statistically significant positive relationship was established between index scores of structural and process attributes of quality L&D care. Women who belonged to a hospital with average index score for structural quality of L&D care had significantly higher expected index score for process quality of the same ($\beta = 5.26$; P-value = 0.001). For every one-point increase in the index for structural quality of L&D care, the index score for quality of L&D care actually provided to a woman increases by 5.26 points. However, associations between the expected index score for process quality, and the number of fulltime skilled health professionals working in maternity ward and provision of refresher training on management of L&D in the past 12 months prior to the study were not evident in this analysis.

Regarding the hospital level random effects, a substantial proportion of the between hospital variance was explained by the model (Table 7.5). In the final model, the between hospital variation was significantly reduced from 68.04 in the null model to 23.11. This was a 36.64% reduction in the unexplained between-hospital variance (P-value = 0.004) indicating that the only woman level variable that was allowed to vary randomly, condition of baby at the end of observation, significantly varied across hospitals. That is, dependent on the hospital level index score of quality of L&D care process, the relationship between this variable and quality of L&D care process offered to women was different for different hospitals.

The residual ICC remained significantly large, 33% (P-value < 0.001), indicating that even after controlling for individual factors, a considerable clustering of the index of process quality of L&D care at hospital level was evidenced. The random part of the model generally indicated that not all of the between hospital variance

in the index score of quality of L&D care process was explained by the variables in the model.

Table 7.5: Predictors of the index of quality of L&D care provision at public hospitals in SNNPR, Ethiopia, 2016

Characteristics	Null model			Full model		
	β	SE	P-value	β	SE	P-value
Fixed Part: Level-1						
Age				0.30	0.33	0.371
No of previous births				-0.14	0.33	0.664
No of skilled attendants involved in care process				0.04	0.46	0.930
Danger sign in current pregnancy (Reference: no)				5.66	1.42	0.000
Baby in normal condition (Reference: no)				1.40	1.53	0.361
Fixed Part: Level-2						
Hospital-type:						
Teaching (Reference: non-teaching)				12.10	3.82	0.005
Hospital-level (Reference: referral)						
Primary				10.39	5.55	0.076
General				7.55	4.44	0.104
Mean No of births attended in previous year				-5.34	1.77	0.007
Mean No of fulltime skilled attendants in L&D ward				-0.75	1.87	0.694
Refresher training on management of L&D				-1.58	1.32	0.243
Index of structural quality of L&D care				5.26	1.30	0.001
Random Part (random effects as level-2 variance)						
Fixed effects intercept	67.41	1.87	0.000	50.89	4.89	0.000
Random effects intercept (hospital level variance)	68.04	21.95	0.002	23.11	8.01	0.004
Residual (variance at individual level)	47.90	2.44	0.000	46.88	2.39	0.000
Intraclass Correlation Coefficient (ICC)						
Level-2	$68.04/(68.04+47.90) = 0.587 = 58.7\%$					
Level-1	$23.1/(23.1+46.9) = 0.33 = 33\%$					
Log-likelihood ratio test for preference to multilevel model with hospital random effects						
-2*Log-likelihood at Level-2	5361.96					
-2*Log-likelihood at Level-1	5324.75					
P-value	<0.001					

7.2. Discussion

7.2.1. Initial assessment of the woman in labour

A complete initial assessment of the woman in labour informs the decision whether she needs extra care or referral (Getachew et al., 2011). Performance on these tasks was inadequate with providers adhering to less than two third (59.6%) of the standards in each delivery. Particularly, general examinations including anemia, HIV, syphilis and urine test results were less frequently documented. The practice was much lower for history of complication during previous pregnancies and danger signs in the current pregnancy. These are generally consistent with some previous studies including Getachew et al. (2011), Skilled Attendance For Everyone (SAFE) International Research Partnership (2003), Rawlins et al. (2013), and Yigzaw et al. (2017). The findings indicate the prevalence of missed opportunities for timely identification of women in need of more care. Busy providers might have focused on the most essential assessment tasks based on general assessment of whether the woman looks well or distressed, and on gynecological examination (Getachew et al., 2011). The fact that the tasks were assessed through record review, not direct observation as women were approached in the active second stage of labour, might have underestimated the performance. That is, providers might have actually performed the tasks, but failed to record them.

7.2.2. Care during the second and third stages of labour

Providers must comply with essential childbirth practices in every delivery and every time as it involves both routine and unexpected events including complications. The mother must be frequently checked for abnormal postpartum bleeding within one hour after the birth (WHO, 2015b). Vital sign measures also provide important early warning information about such complications: a rising

pulse rate (WHO, 2015c) and low blood pressure signal the resultant hypovolemic shock.

Providers adhered to about three quarters of routine L&D care practices during the second and third stages of labour in each delivery. Encouragingly, examination of the placenta, membranes and vulval-perineal region, and uterine massage were always fully performed. This is consistent with a study conducted in Malawi in 2013 which similarly reported high-performance levels on these tasks (Gupta et al., 2014). The relatively high levels of compliance with these practices could also be partly explained by the Hawthorne effect (Baltussen et al., 2002; Leonard and Masatu, 2006; Bowling, 2014). The results may therefore indicate the best possible performance of the skilled attendants instead of their average performance (Bowling, 2014). Observer bias, which is inherent in the direct observation method, might also be part of the explanation (Abramson and Abramson, 2008). These are discussed in detail in Section 9.3.2.2.

In contrast, gaps were observed in monitoring maternal condition with vaginal bleeding checked less frequently, and blood pressure and pulse rate checked even rarely. This is in line with other studies (Yigzaw et al., 2017; Burkhalter et al., 2006), but conflicts with Herfina et al. (2017) which could be due to different observation periods: two hours in Herfina et al. (2017), but one hour in this study. Contextual differences may also be part of the explanation. The finding may reflect gaps in providers' knowledge (de Graft-Johnson et al., 2017; EPHI, FMoH of Ethiopia and ICF International, 2014; Getachew et al., 2011; Yigzaw et al., 2017). The specific reasons, however, need to be explored further.

7.2.3. Immediate and essential newborn care

Provision of essential newborn care immediately after birth ensures its successful transition to extrauterine life. Thermal control should be done first as evaporation of the amniotic and vaginal fluid on the baby can promote harmful cooling (WHO, 2015b). Early initiation of breastfeeding also helps in thermal control and prevents

newborn infections (Conde-Agudelo et al., 2014; Getachew et al., 2011). This study showed that most of the recommended newborn care tasks were performed in majority of the deliveries. This is in line with a similar study conducted in Tanzania which reported that most of the essential newborn care tasks were performed in more than 90% of the deliveries (Plotkin et al., 2010).

Relatively high levels of compliance were observed particularly in the following tasks: cord care, drying and wrapping with a towel, wiping eyes while stimulating breathing, and weighing and classifying. High scores for cord care and drying immediately after birth endorse several previous studies (de Graft-Johnson et al., 2017; Getachew et al., 2011; Plotkin et al., 2010; Ngabo et al., 2012; Gupta et al., 2014). For example, 94% of the babies were immediately dried and wrapped with towel in Tanzania (Plotkin et al., 2010), and all newborns received the same service in Rwanda (Ngabo et al., 2012). Similarly, over 95% of newborns were immediately dried and wrapped in a dry towel in Malawi (Gupta et al., 2014). As discussed in the preceding section for care during the second and third stages of labour, the Hawthorne effect (Baltussen et al., 2002; Leonard and Masatu, 2006; Bowling, 2014), and the observer bias (Abramson and Abramson, 2008) could partly explain the relatively high levels of compliance with some of the immediate newborn care tasks.

On the other hand, the study showed that early initiation of breastfeeding by placing the baby skin-to-skin with the mother, checking temperature every 15 minutes, and advising about the importance of delayed baby bath for the first 24hrs were tasks infrequently performed to standard. Several studies have similarly reported low performance on putting newborn skin-to-skin with the mother (Burkhalter et al., 2006; Sobel et al., 2011; Getachew et al., 2011). Inadequate performance on early initiation of breastfeeding is also evident in other studies (de Graft-Johnson et al., 2017; Getachew et al., 2011; Miller et al., 2003). Low score for advising about delaying baby bath is also consistent with a similar study

(Nesbitt et al., 2013). The observed gap in complying with the critical tasks, i.e., early initiation of breast feeding and thermal care, is concerning.

7.2.4. Infection prevention practice

Adherence to infection prevention standards during L&D care prevents the mother, neonate and health workers from acquiring infections (Getachew et al., 2011). Yet, this was inadequately practiced with about one third of the standards unmet in each observation. Wearing gloves, disposal of sharps and decontamination were completely performed to the agreed standard; hand washing was less commonly practiced; and wearing other personal protective barriers (boots and goggle) was rarely practiced.

The overall performance is higher than a study conducted in Ethiopia six years ago (Getachew et al., 2011), and comparable with another study conducted in Malawi (Smith et al., 2017). The use of gloves and other protective clothing, hand washing and waste disposal practices are almost comparable as Getachew et al. (2011) reported. Low hand washing practice is consistent with several studies (de Graft-Johnson et al., 2017; Burkhalter et al., 2006; Getachew et al., 2011; Hoque et al., 2012), and appears to be an important gap as it risks maternal sepsis and cross infections with fatal diseases like HIV and Hepatitis B (Getachew et al., 2011). The finding may be partly explained by the high score on the use of gloves, implying the possibility of interrelationship between the two standards as shown by Burkhalter et al. (2006). This however needs further investigation.

7.2.5. Use of partograph to monitor labour

A partograph, as a simple clinical recording chart, is a tool that can save a life. When correctly used to monitor progress of labour, it can help improve fetal and newborn survival, and significantly reduces unnecessary interventions (WHO, 2015b; Luwei et al., 2014; Getachew et al., 2011; Burkhalter et al., 2006). In this study, partograph was used in eight of ten observations, and correctly used in three quarters of them. The consistent use of partograph for labour monitoring is much

better than for previous studies conducted in different countries including, Sweden (Sandin-Bojo et al., 2006), China (Gao and Barclay, 2010), Uganda (Ogwang et al., 2009), and Ethiopia (Getachew et al., 2011), and almost comparable with a study conducted in Kenya (Kagama et al., 2011). Incorrect partograph use is also similarly cited in several studies (Luwei et al., 2014; Burkhalter et al., 2006; Miller et al., 2003; Ogwang et al., 2009; Getachew et al., 2011). Non-use of partograph can lead to delayed diagnosis of complications, and incomplete or incorrect use can lead to misinterpretation and inappropriate or no action, ultimately leading to complications from prolonged labor including fistula (Getachew et al., 2011). It is important to explore the reasons for non-use and incorrect use of this effective intervention.

7.2.6. AMTSL

AMTSL, an effective intervention to reduce the risk of postpartum hemorrhage (Begley et al., 2010), includes three interlocking tasks: administration of a uterotonic drug (preferably oxytocin 10 units intramuscular) within one minute of delivery, delivery of placenta with controlled cord traction, and immediate massage of fundus of the uterus until contraction (WHO, 2006c). All AMTSL tasks were correctly performed in about two third of the deliveries, and uterotonic was almost universally administered. Compliance to all AMTSL tasks is much higher than the study in Ethiopia which reported 29% (Getachew et al., 2011). Universal use of uterotonic is however in line with this study. Large sample size may partly explain the relatively better compliance to all AMTSL tasks observed in this study. The time gap between the studies (2010 versus 2016) may also be part of the explanation; the current finding possibly reflecting the result of the Government's efforts towards safe motherhood, such as massive human resource and health facility development strategies.

7.2.7. Interpersonal communication during L&D

High levels of technical performance during skilled birthing care can be determined by appropriate counselling and health education practices (Duysburgh et al., 2013; Nesbitt et al., 2013; Worku et al., 2013b). It has been shown that presence of birth companions increases the likelihood of spontaneous vaginal delivery (WHO, 2015c), reduces the need for pain medications, shortens labour and increases satisfaction with care experience (WHO, 2015b).

Interpersonal communication during L&D and respect for women's preferences were found to be inadequate with two of three women given explanation about what was happening, and one of three women encouraged having a companion. These are consistent with previous studies (Getachew et al., 2011; Miller et al., 2003; Worku AG et al., 2013b). Given observation method of data collection, it is possible that providers might have performed these behaviors simultaneously with other tasks unrecognized by data collectors, underestimating the performance (JHPIEGO, 2004). The argument that overcrowding of labour ward could be a barrier for presence of birth companion (Miller et al., 2003) seems to be less likely in this study as the analysis of structural quality (discussed in the preceding Chapter) has revealed adequacy of the related standards including number of beds and space. The findings highlight opportunities for improvement as poor interpersonal communication and lack of responsiveness to preferences can limit maternal health services utilization (Bowser and Hill, 2010). Factors affecting quality of L&D care process

The final multilevel model revealed that factors affecting the quality of L&D care process index existed both at woman and hospital levels. The index score varied across hospitals with a significant increase in women with positive history of danger sign in current pregnancy. Similarly, significant positive effects of teaching status of hospital and structural quality index score, and a significant negative effect of annual L&D service volume on the outcome were observed at hospital level. Age, parity and number of skilled attendants involved in care process, which might be expected to affect the quality of L&D care process, did not have a

significant effect at woman level. A significant effect was also shown neither for level of hospital, number of full-time skilled attendants working in maternity ward, and provision of refresher training on management of L&D at hospital level.

Danger signs act as an alarm for the likelihood of complications. For example, history of antepartum haemorrhage in current pregnancy indicates that there could be placenta praevia during labour (WHO, 2015b). Positive history of danger sign had favorable effect on the quality of L&D care process. It could be that providers might have paid more attention to such women and better complied with the standards. The significance of overlooking skills for managing normal delivery in favor of skills to manage life-threatening complications has been emphasized in the literature (JHPIEGO, 2004). Given only women in normal labour were observed, and any such labour can become non-normal at any time during the course, offering less quality care for women with no history of danger sign suggests the possibility of delayed detection and management of complications when they occurred in such women. Prioritizing cases merely based on history can lead to inappropriate or no action. For comprehensive understanding of the case and thus for an evidence informed action, history should be supplemented by information from other sources including physical examination and clinical records such as the partograph.

The effects of parity and number of skilled attendants involved in care process on the overall process quality were non-significant, which confirms what have been reported previously by Tripathi et al. (2015) and Parkhurst et al. (2005), respectively. However, the latter finding conflicts with Gbangbade et al. (2003) which demonstrated a significant positive effect of the number of providers on a team during labour on compliance to the intrapartum care standards. This could be due to difference in the scope of the studies. The study by Gbangbade et al. (2003) didn't assess care during delivery unlike this study.

Good quality of care cannot be ensured in the absence of the enabling environment including facility capacity (Leisher et al., 2016; Ollerhead and Osrin, 2014), and organizational context (Ollerhead and Osrin, 2014). Evidence shows that high workload; shortage of drugs, equipment and supplies; and lack of training opportunities can demotivate health workers (Dieleman and Harnmeijer, 2006). This argument confirms the observed positive effect of structural quality and negative effect of service volume on the overall quality of L&D care process. The study by Emma et al. (2010) similarly found that non-compliance due to different interlinked resource constraints is the major factor that affects quality of L&D care. The negative correlation between service volume and quality of care is also consistent with previous studies (Leisher et al., 2016; Miller et al., 2003). Low volume hospitals tend to pay more attention to quality of care than their counterparts. The effect of structural quality on the outcome tends to confirm appropriateness of Donabedian's model in guiding this research, and thus validity of the inference (Donabedian, 2003).

The importance of hospital type in explaining variation in the quality of care across hospitals was also shown in this study, with teaching status of a hospital favorably influencing the outcome. This may highlight the important role of senior attending professionals, including professors in promoting adherence to health service standards. It has been shown that high quality providers are critical to produce high quality outcomes (Mosadeghrad, 2014). The non-significant effect of level of hospital on the process quality index is supported by previous studies (Burkhalter et al., 2006; Parkhurst et al., 2005). The effect of staff training was not significant as well, which is surprising. However, it may be explained methodologically. Since the data was captured at hospital level through facility audit, small sample size could particularly explain the finding. Interviews with health workers should provide a more valid measure of the variable.

The association between number of fulltime skilled attendants working in maternity ward and process quality index was not significant. Unlike high income countries

where improving health worker density predicts improved health outcomes both at individual and population levels, other critical predictors exist in low income countries that are equally important as the total number (El-Jardali et al., 2007). An indepth understanding of factors that are as important as whether staff are present or not such as working condition, human resource management practice and motivation (Parkhurst et al., 2005) would be needed.

Not all of the between hospital variance in the quality was explained by the variables in the model, which suggests that missing variables of probable importance could partly explain the findings as shown in Lale and Rosalind (2007). The available data shows that most of the factors affecting the outcome existed at hospitals, which implies that variations in the quality of L&D care process can be mainly explained by the degree of managerial and leadership commitment as shown in Uzbekistan (Tamburlini et al., 2013). To ensure that every mother receives quality L&D care, the identified organizational barriers need to be addressed.

CHAPTER 8: WOMEN'S EXPERIENCE WITH L&D CARE AND ASSOCIATED FACTORS IN GOVERNMENT HOSPITALS OF SNNPR, ETHIOPIA

Introduction

This Chapter deals with the third part of study two: women' experience with the L&D care they received and associated factors in government hospitals of SNNPR. First, the Chapter describes the characteristics of the participants. Then, women's experiences are described by components of the care, which were identified by factor analysis, including: interpersonal communication and emotional support, responsiveness to preferences, health education, and physical environment. Overall experience scores are also described. Then, woman and hospital level factors affecting women's overall experience with L&D care that were identified using multilevel analysis are provided. Finally, the Chapter discusses the results in detail.

8.1. Results

8.1.1. Characteristics of the study participants

Sociodemographic characteristics of the participants are presented in Table 8.1. Mean age of the women was 25.6(\pm 5.1) years. The majority (36.5%) were aged 21-25 years, followed by 26-30 years (32.4%). Nearly all (93.5) women were married, and more than half (53.5%) were Protestant Christians. The highest level of education attained by most women (28.2%) was first cycle primary education (grade 5-8), and 15.8% of the women did not attend any formal education. The majority (16.3%) were from the Sidama ethnic group, followed by Wolaita (11.8%), Gurage (10.4%) and Amhara (10%). Nearly half (49.1%) of the participants were merchants, 14.5% were government employees, and 4.5% were house wives.

Table 8.1: Sociodemographic characteristics of the respondents, women's experience with L&D care at public hospital in SNNPR, Ethiopia, 2016

Characteristics	No	%
Age		
20 or below	444	21.2
21-25	762	36.5
26-30	677	32.4
31-40	207	9.9
Marital status		
Single	87	4.0
Married	2024	93.5
Divorced	32	1.5
Widowed	22	1.0
Religion		
Orthodox Christian	647	29.9
Protestant Christian	1158	53.5
Muslim	273	12.6
Catholic	87	4.0
Highest level of education completed		
No formal education	341	15.8
Primary education (grade 1-4)	348	16.1
Primary education (grade 5-8)	610	28.2
Secondary education (grade 9-12)	502	23.2
College & above	364	16.8
Ethnic group		
Sidama	352	16.3
Wolaita	255	11.8
Gurage	226	10.4
Amhara	216	10.0
Gofa	157	7.3
Gamo	135	6.2
Kembata	130	6.0
Tembaro	116	5.4
Silte	95	4.4
Kafa	92	4.2
Oromo	74	3.4
Derashe	72	3.3
Halba	68	3.1
Gedeo	50	2.3
Dawro	48	2.2
Bench	47	2.2
Others*	32	1.4
Occupation		
Merchant	1064	49.1
Daily laborer	431	19.9
Government employee	313	14.5
Private enterprise employee	141	6.5
Unemployed	118	5.5
Housewife	98	4.5

*Others included Konso and Tigre ethnic groups.

The majority (55.2%) of women were attended at a general hospital, about a quarter (23.9%) at a primary hospital, and the rest (21%) at a referral hospital. Similarly, more than half (54.1%) of the women were attended at a non-teaching type of hospital, while the rest (45.9%) were attended at a teaching hospital. Distribution of participants by specific hospitals revealed that majority (12.8%) were from Hossana, followed by Adare (8.9%), Wolaita Sodo (8.8%) and Hawassa (8.5%) hospitals (Figure 8.1).

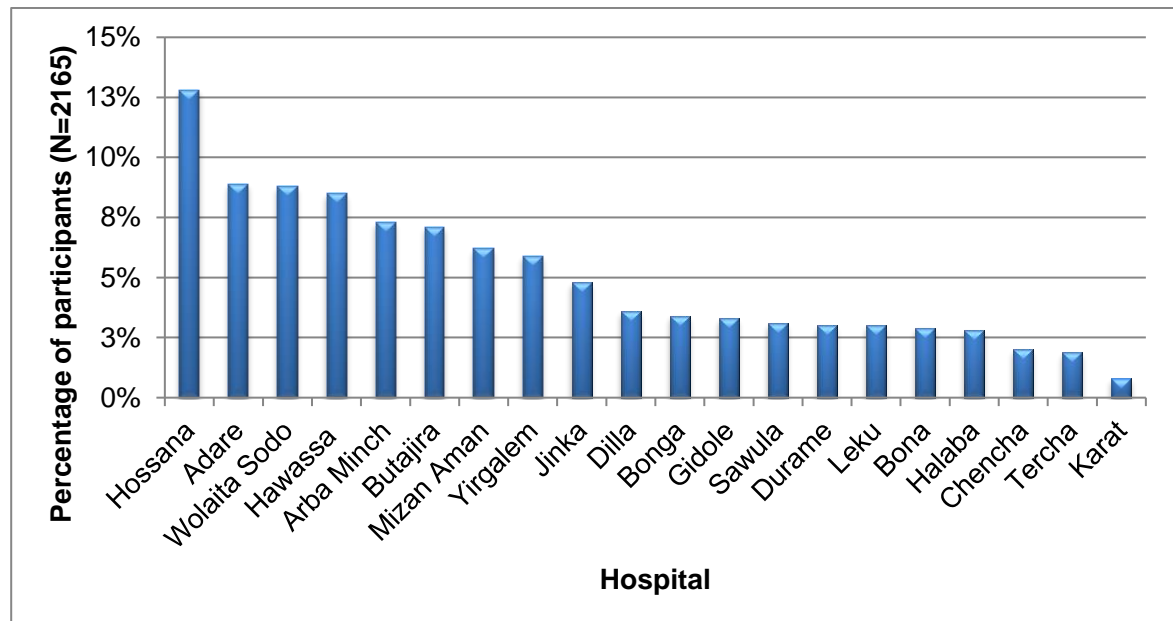


Figure 8.1: Distribution of respondents by hospital, women’s experience with L&D care at public hospital in SNNPR, Ethiopia, 2016

The great majority (92.3%) of the women had ANC checkup in the recent pregnancy, of which, about two thirds (67.4%) had three to four visits, while 4.1% had five or more visits. Similarly, about two thirds (64.7%) of the women had three to four children in total. Immediately after childbirth, 91.3% of the mothers and 90.3% of the newborns did not have any complication. Of 188 mothers who reported having a complication, 35.1% and 31.9% had bleeding and loss of consciousness, respectively. On the other hand, the majority (76.1%) of the newborns that had a complication (n=209), were reported to have had difficulty breathing (Table 8.2).

Table 8.2: Obstetric characteristics of the respondents, women's experience with L&D care at public hospital in SNNPR, Ethiopia, 2016

Characteristics	No	%
Had ANC checkup in current pregnancy		
Yes	1998	92.3
No	167	7.7
Number of ANC visits in current pregnancy		
1-2	449	20.7
3-4	1459	67.4
5 and above	88	4.1
Parity		
1-2	1401	64.7
3-4	552	25.5
5 and above	212	9.8
Mother's condition immediately after birth		
Normal	1977	91.3
With complication	188	8.7
Complications in mother immediately after birth (N=188)		
Bleeding	66	35.1
Loss of consciousness	60	31.9
Severe pain	28	14.9
High fever	24	12.8
Convulsion	10	5.3
Baby's condition immediately after birth		
Normal	1956	90.3
With complication	209	9.7
Complications in baby immediately after birth (N=209)		
Difficulty breathing	159	76.1
High fever	31	14.8
Convulsion	15	7.2
Yellowish discoloration of skin	4	1.9

8.1.2. Women's experience with L&D care

Descriptive statistics of women's experience with the care are organized based on the principal components which were identified by factor analysis as meaningful measures of women's experience with the extent to which the following needs were met: interpersonal communication and emotional support, responsiveness to preference, provision of health education, and physical environment. Descriptions

of the constituent items, the components and overall experience scores are provided.

8.1.2.1. Experience scores by item, component and overall

The first component, interpersonal communication and emotional support, consisted of five items asking about the overall reception of hospital; whether health professionals clearly answered questions and concerns during labor, childbirth and afterwards until discharge; courtesy of treatment (i.e., whether health professionals treated them as persons); reassurance and encouragement when in pain; and seeing a health professional immediately at arrival to hospital. Of all the items, seeing a health professional immediately at arrival to the hospital was rated the highest (83.3) with standard deviation of 19.8 points, while clearly answering questions and concerns during labour, childbirth and afterwards until discharge had the lowest mean rating, 68.7(\pm 12.6 points). All other items, i.e., courtesy of treatment, reassurance when in pain, and overall reception of the hospital, were rated between 71.1 and 77.3. Therefore, the composite score for women's experience with the extent to which their interpersonal communication and emotional support needs were met was found to be 76.7(\pm 14.5 points) (Table 8.3).

Responsiveness to women's preference was composed of four items asking about whether health professionals allowed: to choose their preferred sleeping position during labour, to ambulate during labour if they wished to do so, to have a family member or companion present throughout L&D, and to choose their preferred position during delivery. Generally, all of the items were scored low. Relatively, ambulating during labour (if wished) was rated the highest, 57.8(\pm 17.1 points), while choosing the preferred delivery position was rated the lowest, 35.2(\pm 11.6 points). The scores for choosing the preferred position during labour, and presence of a family member or companion throughout L&D were around 51. In aggregate, the mean score for the responsiveness component was 49(\pm 13.1 points) (Table 8.3). With regard to the education component, three items were related to whether women were given health education after delivery on breast feeding, vaccination

and family planning. Average scores of the items ranged between 63.8 and 76.6, and composite score for the component was 69.5(\pm 30.6 points). The physical environment component included two items about access to bathroom and shower services within the L&D ward, which were rated very low, with mean scores of 44.3(\pm 13.5 points) and 27.6(\pm 9.2 points), respectively. The mean score for the component was 40(\pm 16.6 points) (Table 8.3).

Women's overall impression was measured by averaging scores for two items: how they would rate the hospital for the care and whether they would recommend it to friends and family for the service. Mean scores for the items were 79.8(\pm 15.7 points) and 77.4(\pm 21.1 points), respectively. The summary score for women's overall experience was therefore, 78.6(\pm 16.5 points), that is, women on average reported positively on 78.6% of the L&D care quality items assessed (Table 8.3).

Table 8.3: Women’s experience with L&D care by item, component and overall at public hospitals in SNNPR, Ethiopia, 2016

Component/Item	Mean	SD
Interpersonal communication and emotional support	76.7	14.5
Overall reception of hospital	77.3	18.9
Health professionals clearly answered questions and concerns	68.7	12.6
Courtesy of treatment by health professionals	77.0	19.9
Reassurance by health professionals when in pain	77.1	19.6
Seen by a health professional immediately at arrival to hospital	83.3	19.8
Responsiveness	49.0	13.1
Allowed to choose preferred sleeping position during labour	51.6	17.2
Allowed to ambulate if wished during labour	57.8	17.1
Allowed to choose preferred position during delivery	35.2	11.6
Allowed to have one family member throughout L&D	51.5	20.2
Education	69.5	30.6
Received health education on breast feeding	76.6	32.4
Received health education on vaccination	68.3	36.6
Received health education on family planning	63.8	38.1
Physical environment	40.0	16.6
Accessed bathroom service in L&D ward	44.3	13.5
Accessed shower service in L&D ward	27.6	9.2
Overall experience (global rating)	78.6	16.5
Overall rating of the hospital on a scale of 0-100	79.8	15.7
Willingness to recommend the hospital to friends and family	77.4	21.1

8.1.2.2. Experience scores by hospital

Interpersonal communication and emotional support items were rated the highest by women from Sawula, 96.3(±11.7 points), and Bona, 93.1(±7.1 points), hospitals; while women from Wolaita Sodo hospital rated them the lowest, 58.3(±10.3 points). Generally, the component was rated between 70.0 and 77.5 in most (40%) of the hospitals, followed by 81.2 and 88.1 in seven (35%) of the hospitals (Table 8.4).

The composite score for responsiveness was highest in Bona, 83.9(\pm 11.9 points), and Karat, 83.7(\pm 12.3 points), hospitals, while it was the lowest in Wolaita Sodo hospital, 20.5(\pm 10.9 points). Generally, the mean score for responsiveness was rated below 50 in nine (45%) of the hospitals, ranging from 20.5(\pm 10.9 points) in Wolaita Sodo to 49.4(\pm 16.2 points) in Gidole. Four (20%) of the hospitals scored between 60.1(\pm 11.4 points) in Arba Minch and 64.8(\pm 8.7 points) in Leku; and three (15%) scored between 74.7(\pm 16.7 points) in Hawassa and 79.4(\pm 15.0 points) in Sawula (Table 8.4).

Education was rated highest in most (40%) hospitals ranging between 89.9(\pm 23.3 points) in Bona and 98.6(\pm 6.7 points) in Gidole. In contrary, Tercha and Hossana hospitals scored the lowest, 11.4(\pm 7.5 points) and 12.5(\pm 2.5 points), respectively. The score was between 70.4 and 82.2 in 20% of the hospitals. Similarly, 20% of the hospitals scored from 57.1 to 68.7, and another group of 20 scored below 50, ranging from 11.4 to 45.7. Combining the latter two segments of hospitals yielded that 40% of the hospitals scored below 70 for education component. Notably, the mean score for physical environment was below 50 in about two thirds (65%) of the hospitals, which was between 0 in Chenchu and Durame, and 47.2(\pm 13.1 points) in Karat. The component was rated high in four hospitals, from 72.9(\pm 29.1 points) in Gidole to 98.8(\pm 7.2 points) in Butaiira hospitals (Table 8.4).

With regards to the overall experience score, four hospitals (20%) had higher scores ranging between 90.5(\pm 11.0 points) in Durame, and 93.2(\pm 10.7 points) in Sawula. Another group of 20% of the hospitals scored between 83.4(\pm 13.2 points) in Leku, and 88.9(\pm 10.9 points) in Tercha. Majority (45%) of the hospitals had overall experience scores between 71.3(\pm 15.5 points) in Adare, and 79.6(\pm 11.3 points) in Jinka. On the other hand, Wolaita Sodo, Arba Minch and Dilla hospitals had lower overall experience scores, 63.7(\pm 15.6 points), 68.9(\pm 24.9 points), and 69.3(\pm 9.5 points), respectively (Table 8.4). In general, 11(55%) hospitals had overall experience scores above the average (78.6), and the rest (45%) below the average.

Table 8.4: Hospital level summary scores, women’s experience with L&D care at public hospitals in SNNPR, Ethiopia, 2016

Hospital	Interpersonal Communication & Emotional Support		Responsiveness		Education		Physical Environment		Overall experience (global rating)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Adare	65.6	10.9	42.6	11.1	68.7	21.3	21.7	1.6	71.3	15.5
Arba Minch	73.4	9.7	60.1	11.4	95.1	14.5	0.4	0.9	68.9	24.9
Bona	93.1	7.1	83.9	11.9	89.9	23.3	89.5	13.2	92.7	10.4
Bonga	66.6	10.8	37.7	7.8	57.1	11.8	14.6	9.5	73.9	14.1
Butajira	75.2	5.4	32.2	9.7	67.2	12.4	98.8	7.2	73.4	6.9
Chencha	84.1	10.3	52.9	14.8	82.2	23.4	0	1	79.2	14.4
Dilla	70.0	10.4	34.3	11.4	70.9	18.6	0.6	0.8	69.3	9.5
Durame	75.5	11.4	23.6	7.0	95.3	17.7	0	1	90.5	11.0
Gidole	86.8	15.1	49.4	16.2	98.6	6.7	72.9	29.1	74.7	20.6
Halaba	72.2	16.8	63.0	14.9	81.9	28.3	44.3	21.5	74.1	12.8
Hawassa	81.5	11.2	74.7	16.7	93.3	18.7	45.9	13.4	79.5	11.4
Hossana	87.6	9.4	33.1	12.7	12.5	2.5	3.7	1.2	93.1	8.1
Jinka	81.2	12.0	53.6	18.2	45.7	16.2	17.1	8.9	79.6	11.3
Karat	88.1	7.3	83.7	12.3	68.5	20.7	47.2	13.1	84.9	14.4
Leku	73.9	8.4	64.8	8.7	97.4	14.9	51.0	13.5	83.4	13.2
Mizan A.	73.4	13.7	42.0	22.4	70.4	21.3	57.9	20.4	76.5	12.7
Sawula	96.3	11.7	79.4	15.0	94.5	18.9	52.7	13.3	93.2	10.7
Tercha	85.5	7.5	64.5	14.1	11.4	7.5	27.2	6.1	88.9	10.9
Wolaita S.	58.3	10.3	20.5	10.9	43.8	4.2	43.5	9.5	63.7	15.6
Yirgalem	77.5	8.2	76.0	9.3	98.2	9.7	88.9	16.9	83.7	11.0
Total	76.7	14.5	49.0	13.1	69.5	30.6	40.0	16.6	78.6	16.5

8.1.3. Factors affecting women’s overall experience with L&D care

Like the analysis of process quality index, the suitability of the model was evaluated by computing the ICC in the empty model. The variance components suggested a statistically significant variability at the between hospital (67.44) and

within-hospital (180.93) level, as shown in Table 8.5. The ICC in the null model was computed as: $ICC = 67.44 \div (67.44 + 180.93) = 0.2715$, which suggested that 27.15% of the total women's experience score variability occurred between hospitals. The presence of such significant heterogeneity motivated the addition of Level 1 and Level 2 explanatory variables to the model in subsequent analyses. The full model, which was fitted by adding all hospital and woman level variables, reduced the ICC to 0.0604. This again suggested that 6.04% of the variation in women's overall experience with the care was attributed to hospital level variables, indicating the preference for the multilevel analysis with hospital as a random effect.

After adjustment in the final two-level model, the analysis revealed the factors affecting women's overall experience with L&D care both at the hospital and individual levels (Table 8.5). At the lower level, women's educational status, condition immediately after birth, and index scores of their experience with interpersonal communication and emotional support, responsiveness to preferences, health education, and physical environment aspects of L&D care were shown to have significant influence on the expected mean overall experience score, holding all other variables constant.

Literate women, who were educated at primary level or above, had significantly lower mean overall experience score ($\beta = -2.54$; $P=0.004$) as compared to illiterate women, who did not have formal education. Similarly, women in normal condition immediately after birth experienced the care more positively than those who had a complication ($\beta = 1.89$; $P=0.046$).

Importantly, women's positive rating for interpersonal communication and emotional support aspect of the care they received, responsiveness of providers to their preferences, health education received, and physical environment had strong positive influence on their global rating of their hospital stay.

Women with average index score for interpersonal communication and emotional support ($\beta = 6.78$; $P < 0.001$), responsiveness of providers to their preferences ($\beta = 3.62$; $P < 0.001$), provision of health education ($\beta = 1.68$; $P < 0.001$), and physical environment ($\beta = 1.65$; $P = 0.002$) had higher mean overall experience score. For every one-point increase in the index score for interpersonal communication and emotional support, women's global rating of the care they received increases by 6.78 point. Similarly, every one-point increase in the index scores for responsiveness to preferences, health education, and physical environment increases women's overall experience by 3.62, 1.68, and 1.65 points, respectively.

Among the hospital level variables, type and level of hospital, provision of refresher training on management of L&D, and quality of L&D care process were found to have statistically significant association with women's overall experience with the care, holding all other variables constant. Being served in a teaching hospital was found to increase women's global rating significantly ($\beta = 6.83$; $P\text{-value} = 0.015$) compared to being served in a non-teaching hospital. Similarly, mean experience score significantly increased among women attended at a primary hospital ($\beta = 12.18$; $P\text{-value} = 0.006$) and at a general hospital ($\beta = 13.23$; $P\text{-value} = 0.001$) as compared to those attended at a referral hospital. Furthermore, women who belonged to hospitals of average training status had significantly higher overall experience score ($\beta = 0.09$; $P\text{-value} < 0.001$). In the same way, women who belonged to hospitals of average quality of L&D care process had significantly higher overall experience score ($\beta = 2.26$; $P\text{-value} = 0.028$). That is, every one-point increase in the index scores for quality of L&D care process leads to an increase of women's experience score by 2.26 points.

Regarding the hospital level random effects, a substantial proportion of the between hospital variance was explained by the model (Table 8.5). In the final model, the between hospital variation was significantly reduced from 67.44 in the null model to 9.43. This was an 86.06% reduction in the unexplained between-hospital variance ($P\text{-value} = 0.015$) indicating that the woman level variables,

which had significant association with outcome as discussed above, significantly varied randomly across hospitals. That is, dependent on the hospital level mean global rating, the relationship between these variables and women's overall experience with the L&D care they received was different for different hospitals.

Unlike the analysis of process quality index, the random part of the model in this case indicated that great majority of the between-hospital variance in women's overall experience with L&D care was explained by the variables in the model. The residual intra-class correlation coefficient was small though still significant at $p < 0.05$, 5.85% (P-value = 0.015). This indicated that clustering of the overall experience score at hospital level was small after controlling for individual factors, though still significant at $p < 0.05$.

Table 8.5: Predictors of women's overall experience with L&D care at public hospitals in SNNPR, Ethiopia, 2016

Characteristics	Null model			Full model		
	β	SE	P-value	β	SE	P-value
Fixed Part: Level-1						
Age				0.12	0.08	0.113
Educational status:						
Literate (Reference: illiterate)				-2.54	0.88	0.004
Occupation:						
Employed (Reference: unemployed)				1.04	0.71	0.144
№ of previous births				-0.13	0.25	0.608
№ of ANC visits for current pregnancy				0.57	0.31	0.066
Condition immediately after birth:						
Normal (Reference: with complication)				1.89	0.94	0.046
Index of interpersonal communication & emotional support				6.78	0.38	0.000
Index of responsiveness to preferences				3.62	0.42	0.000
Index of health education				1.68	0.41	0.000
Index of physical environment				1.65	0.53	0.002
Fixed Part: Level-2						
Hospital-type:						
Teaching (Reference: non-teaching)				6.83	2.49	0.015
Hospital-level (Reference: referral)						
Primary				12.18	3.85	0.006
General				13.23	3.07	0.001
Refresher training on management of L&D				0.08	0.01	0.000
Quality of L&D care process index				2.26	0.96	0.028
Random Part (random effects as level-2 variance)						
Fixed effects intercept	80.12	1.87	0.000	65.17	4.34	0.000
Random effects intercept (hospital level variance)	67.44	22.06	0.002	9.43	3.88	0.015
Residual (individual level variance)	180.935.76		0.000	146.68	4.67	0.000
Intraclass Correlation Coefficient (ICC)						
Level-2	$67.44/(67.44+180.93)=0.2715 = 27.15\%$					
Level-1	$9.43/(9.43+146.68) = 0.0604 = 6.04\%$					
Log-likelihood ratio test for preference of multilevel model with hospital effects						
-2*Log-likelihood at Level-2	16108.94					
-2*Log-likelihood at Level-1	15658.23					
P-value	<0.001					

8.2. Discussion

8.2.1. Interpersonal communication and emotional support

Respectful care, and interpersonal and cultural sensitivities are important in the perceptions of quality woman friendly birthing care (Lalonde and Miller, 2015; Tunçalpet al., 2015; JHPIEGO, 2004; WHO, 2010c). All birthing mothers should receive immediate attention on arrival at the facility and information about the care, have effective interactions with staff, and receive support to strengthen their capability during childbirth (FMoH of Ethiopia, 2016). Pooled under interpersonal communication and emotional support component, these tasks scored close to the overall experience score (76.7). As discussed in the preceding Chapter, inadequate interpersonal communication during L&D was also evident from direct observation of the L&D care process. Consistency of the finding despite different assessment methods confirms its validity.

Similar results have been cited in the literature. For example, a systematic review reported dissatisfaction of birthing women with explanations about their care (Bohren et al., 2015). Another study also showed lack of privacy, dignity and attention as characteristic features of the labor ward (Miller et al., 2003). Different factors could explain the observed gaps. Providers may be busy with clinical care overlooking the communication aspect or perceive that communicating women about every procedure is repetitive (Bohren et al., 2015). Inadequate interpersonal communication and supportive care can have negative effect on client loyalty; for sustained uptake of the service in the future from the same facility, and recommending the same to others in need (Bohren et al., 2015).

8.2.2. Responsiveness to preferences

Every woman should be offered the option to experience L&D with the companion of her choice; her needs and preferences should be taken into account during L&D and postpartum period (FMoH of Ethiopia, 2016; WHO, 2016a). Health workers were perceived less responsive to women's preferences in this study. This is

consistent with the finding from direct observation of the L&D care process (presented in the preceding Chapter) where women were less frequently encouraged to have a birth companion. The finding also endorses previous studies conducted in the Dominican Republic (Miller et al., 2003), South Africa (Brown et al., 2007) and Brazil (Nagahamg and Santiago, 2008), which showed that women were often not allowed to have companion during L&D. Evidence shows that presence of companions increases the likelihood of spontaneous vaginal delivery (WHO, 2015c), reduces the need for pain medications, shortens labour and increases satisfaction with care experience (WHO, 2015b). Possible explanations for the finding could be that providers may not be trained to deliver women in positions other than supine, and thus may not let them choose their own positions for L&D. Hospital policy may also ban birth companions considering them as hindrance (Bohren et al., 2015). It is a concern that women were mostly less autonomous and passive participants in their care process which should be improved.

8.2.3. Health education

The standard is to satisfy all women with health education and information about vaccination, exclusive breastfeeding and birth spacing and family planning (FMoH of Ethiopia, 2016). Unfortunately, these were not positively experienced by all women. High levels of technical performance during skilled birthing care can be determined by appropriate counselling and health education practices (Duysburgh et al., 2013; Nesbitt et al., 2013; Worku et al., 2013b). It is therefore imperative to explore the reasons for the observed gap to guide focused remedial actions.

8.2.4. Physical environment

A conducive physical environment for childbirth is partly characterized by L&D area with a functional, clean and accessible bathroom or shower room and toilet for use only by women (FMoH of Ethiopia, 2016; WHO, 2016a). Yet, the study revealed that women poorly accessed bathroom and shower services within L&D. This is in

line with other studies (Bohren et al., 2015; Miller et al., 2003), but conflicts with analysis of the facility audit dataset in the assessment of structural quality of L&D care (presented in Chapter Six) where majority of the hospitals had tap water, a functional and clean toilet, and functional sinks with detergents. This availability-accessibility gap needs an in-depth investigation.

8.2.5. Overall experience

A comprehensive quality of care assessment often involves patient care experience or satisfaction as an important component (Jenkinson et al., 2003; Sjetne et al., 2007). The key feature of a high quality and humane health care is respecting the needs and concerns of patients (Jenkinson et al., 2003; WHO, 2016a). Satisfied patients are more likely to adhere to their treatment, ultimately achieving better clinical outcomes (Walker et al., 2003). Given the standard that all birthing mothers should be satisfied with expressed overall satisfaction with the services they received (FMoH of Ethiopia, 2016), the mean overall experience score of 78.6 indicates suboptimal perceived quality of L&D care. This finding reinforces those of others reported in the literature. For example, women reported positively on 76% of the items assessed in Malawi (Creanga et al., 2017), and 81.7% of women in Northwest Ethiopia were satisfied with the care they received (Bitew et al., 2015). Higher results have also been reported in Bangladesh (92.3%) (Hasan et al., 2007) and Malawi (85%) (Creanga et al., 2017), while studies from South Africa (51.9%) (Lumadi and Buch 2011), Kenya (56%) (Bazant and Koenig, 2009), and Ethiopia (61.9%) (Tayelgn et al., 2011) showed lower results. A much lower (19%) overall satisfaction of women has also been reported in Ethiopia recently (Demas et al., 2017). Methodological differences between the studies are acknowledged in explaining part of the disparities in this comparison. Because almost all of these studies have used other approaches for rating and computing experience scores, and hence may collect different results that are open to different interpretations. For instance, none of the reviewed studies used mean scores or a 0-100 rating scale, and most results were interpreted as percentage of

women satisfied or not satisfied. There were limitations within the exit interview method which could partly explain the relatively high levels of experience ratings, and these are discussed in detail in Section 9.3.2.3.

8.2.6. Factors affecting women's overall experience with L&D care

This study has identified individual and hospital characteristics affecting women's experience with the L&D care they received. Educational status, condition immediately after birth, and ratings on interpersonal communication and emotional support, responsiveness to preferences, health education and physical environment aspects of the care were significantly associated with women's overall experience at individual level. Type and level of hospitals, provision of refresher training, and index score for quality of L&D care process were significantly associated with the outcome at higher level.

Illiterate women tended to rate the care they received more positively than their counterparts confirming the previous studies (Veenstra and Hofoss, 2003; Mosadeghrad, 2014; WHO, 2010c). This could be due to the fact that literate women are likely to have better knowledge of their rights than illiterate women which, in turn, leads to higher expectations of quality services (Mosadeghrad, 2014).

Consistent with the existing literature (Tayelgn et al., 2011; Sjetne et al., 2007), the study also found that women who reported to have had no complication immediately after birth experienced the care more positively than their counterparts. Such women may be happy that they successfully completed their deliveries, whilst being somewhat unaware of the clinical processes that support this outcome (Tayelgn et al., 2011; Morris and Bailey, 2014). In contrast, women who experienced a complication may tend to give more negative evaluations (Sjetne et al., 2007). It is also possible that providers dealing with high risk patients may feel stressed and may not comply with standards and address patient expectations (Mosadeghrad, 2014).

The results also confirmed that perceived high quality of interpersonal communication and emotional support, responsiveness to preferences, health education and physical environment aspects of the care had strong positive influence on women's overall experience. The findings generally match with the current literature. For example, it has been reported that quality of patient care depends directly on the quality of patient education and responsibility (Mosadeghrad, 2014). Women's perception that the facility is clean was a significant determinant of satisfaction with birthing care in Malawi (Creanga et al., 2017). Studies from Ethiopia have also showed that having opportunity to talk to health workers (Demas et al., 2017), short waiting time to see a health professional (Demas et al., 2017; Tayelgn et al., 2011), and privacy during examinations (Tayelgn et al., 2011) predicted women's satisfaction with intrapartum care.

These findings generally underscore the role of effective communication, involving women, and adequate physical facilities in improving women's experience with L&D care. Informed and engaged clients can reduce inappropriate use of services and errors, and help improve service quality through constructive criticism (Mosadeghrad, 2014). Improving women's knowledge about their rights to demand quality services that meet their needs, and thus influencing their expectations of quality services is important (JHPIEGO, 2001; Mosadeghrad, 2014). It is also highlighted that high-quality services cannot be achieved with low quality resources.

Regarding hospital characteristics, being served in a teaching, and a primary or general hospital significantly and positively affected women's overall evaluation of the care compared to being served in a non-teaching and a referral hospital, respectively. The effect of teaching status could be partly explained by the reputation of the academic status, which might have positively influenced women's rating (Messina et al., 2009). On the other hand, women attended in a primary or general hospital may not always need advanced care than those attended in a referral hospital, they may not have high expectations and thus their overall needs

can easily be satisfied (Messina et al., 2009; Tayelgn et al., 2011). A study in the Dominican Republic has similarly found poorly perceived quality of L&D care in referral hospitals compared to district or peripheral hospitals (Miller et al., 2003). However, some individual level variables that may have important role in the relationships between women's experiences and type and level of hospitals, such as mode of admission (i.e., whether referred or not), mode of delivery, and length of hospital stay were missing in the dataset, and thus uncontrolled in the analysis. Further research that addresses the limitation would be needed.

Evidence shows that health workers' knowledge and skills are key barriers to deliver high quality services (Mosadeghrad, 2014; Dieleman and Harnmeijer, 2006), which need that women's positive experience was associated with provision of refresher training on management of L&D in 12 months prior to the study. Lack of training opportunities can demotivate health workers (Dieleman and Harnmeijer, 2006) further influencing the quality of service provision.

Finally, a strong positive association was observed between the quality of L&D care process actually offered in the hospitals and women's experience, endorsing a previous study (Creanga et al., 2017). This tends to confirm appropriateness of Donabedian's model in guiding the study which assumes that L&D care process influences outcome of the care, and thus validity of the inference (Donabedian, 2003). However, given the lower sensitivity of experience rating to variations in the quality of care processes (Donabedian, 2003), high experience scores do not necessarily imply actual receipt of high quality care (Cleary and Margaret, N.D; Leisher et al., 2016; Creanga et al., 2017) as women may not be aware of the standard of care and may have low or no expectations (Creanga et al., 2017). This could not be verified as women's expectations were not captured, which would be addressed in a future similar study.

CHAPTER 9: GENERAL DISCUSSION

Introduction

This chapter presents a summary of the results, implications for policies and programs, limitations along with the strategies attempted to optimize the rigour of the studies, and recommendations for further research. Finally, an overall conclusions section is presented.

9.1. Summary of findings

9.1.1. Variations in *woreda*-level proportion of SBA and factors associated with higher proportions

This study showed that the mean *woreda*-level proportion of SBA in Ethiopia is low at an ecologic level, and there is substantial variation in the proportion among *woredas*, and across regions. The study has reinforced the importance of ANC and other community-based approaches, and functional community structures for increasing the proportion of SBA. The contribution of women's families, the wider community, and availability of health resources to increase the proportion of SBA has been demonstrated at aggregate level. Higher proportions of: pregnant women who had four or more ANC visits, graduated model families, and functional one-to-five networks; and higher number of skilled attendants per 10,000 population are associated with higher *woreda*-level proportions of SBA. The national staffing standards for skilled birth attendants seem to be met, but the minimum threshold recommended by WHO is far below standard.

9.1.2. Structural quality of routine L&D care in government hospitals of SNNPR, Ethiopia

This is the first part of the second study which provides information about the structural quality of routine L&D care. Accordingly, capacity gaps were observed in the hospitals to enable them provide quality routine L&D care services, with about two third of the required resources fulfilled overall. Only two hospitals had

fulfilled almost all the standards, while one third of the hospitals had low readiness to provide quality routine L&D care. Laboratory services and safe blood, and essential drugs, supplies and equipment were the areas with the largest gaps. The following specific findings were evident.

Most hospitals had continuous electricity and water supply, and a functional ambulance service, but telecommunication infrastructure was inadequate. Women had opportunities to express their childbirth experience in most hospitals, but suggestions were regularly evaluated and documented in only half of the hospitals. Moreover, one third of the hospitals didn't have emergency triage system for sick pregnant mothers who are not in labour.

Even though one or more skilled attendants were always present in all hospitals for routine L&D care, they received refresher training on obstetric care during 12 months prior to the study in only about half of the hospitals. Only a quarter of the hospitals had all essential drugs and equipment, and less than a quarter of the hospitals had all the required supplies. Notably, few hospitals lacked HIV test kits and ARV drugs limiting access to PMTCT of HIV services. Some hospitals lacked the capacity for thermoregulation of newborns due to lack of towels for drying and wrapping. Almost all hospitals had IP supplies and equipment to enable hygienic practices, and the majority had woman friendly L&D environment with sufficient space and a reliable supply of safe water and toilet facilities.

All the required laboratory tests were always available in only a few hospitals, whilst most hospitals were getting blood from blood bank with safe storage practice. Regarding adherence to QA practices, only half of the hospitals had all essential guidelines and protocols in the L&D ward, highlighting that the management protocol on selected obstetrics topics (2010 version) and an infection prevention protocol were frequently missing. Furthermore, some hospitals were conducting monthly maternal and neonatal death audits and implementing

recommendations in the absence of a supportive organizational framework, i.e., a MNHC QI committee, with a focal person assigned, that meets regularly.

9.1.3. Quality of routine L&D care process in government hospitals of SNNPR, Ethiopia, and associated factors

As part of the second study, this analysis revealed that the quality of routine L&D care services provided to labouring mothers at public hospitals in SNNPR was found to be substandard. Overall, about two third of the standards were met. The highest scores were achieved with immediate and essential newborn care practices, and care during the second and third stages of labour. In contrast, hospitals scored lower on AMTSL, interpersonal communication, and initial assessment of the woman. Factors affecting the quality existed both at hospital and individual levels. A positive history of a danger sign in the current pregnancy had a significant positive effect at the individual woman level. At a hospital level, significant positive effects of teaching status of hospital and structural quality index score, and a significant negative effect of annual L&D service volume on the process quality index score were observed.

9.1.4. Women's experience with L&D care they received from government hospitals of SNNPR, Ethiopia, and associated factors

According to this third part of the second study, the perceived quality of L&D care provided in the government hospitals of SNNPR was suboptimal. Specifically, client-provider interactions and supportive care was inadequate, women were less empowered in their care process, providers were less responsive to women's needs and preferences, and health education and physical environment components of the care were inadequate. Being illiterate, absence of complication after birth, perceived high quality of interpersonal communication and emotional support, responsiveness to preferences, health education and physical environment components of the care; all positively influenced women's overall

experience. Furthermore, teaching status and whether primary or general level of hospitals, staff training, and a high quality of L&D care process, all positively affected the outcome.

9.2. Implications for policies and programs

Countries with SBA rates of at least 80% have a MMR less than 200 (Van Lerberghe and De Brouwere, 2001). Evidence shows that slow progress in skilled maternity care provision is partly due to choosing strategies other than quality facility childbirth care (WHO, 2011). Among the reasons that motivate countries to invest in health care quality improvement interventions is the understanding that improvements in access to achieve universal health coverage will not lead to the desired outcomes without adequate emphasis to quality (WHO, 2018a). The results of this thesis highlighted that increasing both the coverage and quality of child birth care need attention.

9.2.1. Variations in *woreda*-level proportion of SBA and factors associated with higher proportions

The low average *woreda*-level proportion of SBA highlights the need for extra efforts to realize the national target of 80% by 2020 which has been set by the Ethiopian health sector transformation plan (HSTP) (FMoH of Ethiopia, 2015b). It is essential to increase the coverage of four or more ANC visits to meaningfully increase the proportion of SBA. The national staffing standards need to be revisited and reconciled with the international standards to meet the minimum threshold density of 23 skilled attendants per 10000 population required to achieve 80% coverage of SBA (WHO, 2006a).

The findings also highlighted the importance of enabling families to help them produce their own health in general, and to improve the utilization of skilled birthing care in particular. The current community-based approaches, i.e., model families and one-to-five networks, need to be promoted further to maximize their positive effect on SBA coverage. Meaningful engagement of communities in their health

care can introduce a new level of accountability for quality care, thereby facilitating institutionalization of a culture of quality in the health system (WHO, 2018a).

9.2.2. Quality of routine L&D care process in government hospitals of SNNPR, Ethiopia

The results of facility audit suggest the need to ensure that all public hospitals in SNNPR meet the required structure to enable the provision of quality routine L&D care. This is with an emphasis on laboratory services and safe blood for emergency transfusion, and essential drugs, supplies and equipment. There is a need to ensure that hospitals have a functioning telecommunication system mainly for external use by women and their families, and a functioning emergency triage system for sick pregnant mothers who are not in labour. It is also essential to ensure that the L&D environment is woman friendly. Poor access to safe water supply and toilet facility in maternity ward needs an urgent attention in this regard, because it endangers maternal sepsis and cross infections with fatal conditions coupled with the low hand washing practice observed in direct observation.

There is a need for routine monitoring of the adequacy of essential drugs, supplies and equipment. Particular attention should be given to make HIV test kits and ARV drugs always available in hospitals to enable them to prevent vertical transmission of HIV. Hospitals also need to have adequate towels for drying and wrapping the newborn to improve thermal control. The capacity of hospitals should also be strengthened to conduct basic laboratory tests for women, giving emphasis to liver and renal function tests, serum protein and albumin tests, CD4 count or HIV plasma viral load tests, and HIV tests. Efforts are also needed to further close the observed small gap in safe blood supply due to its lifesaving nature.

Accessibility to the best evidence, along with effective QA audit and feedback systems can determine successful implementation of evidence-based practice (Armstrong, 2003). All essential L&D care guidelines and protocols for normal delivery should be made available in L&D ward at all hospitals. Ensuring the

availability of the two commonly missing protocols is particularly important: management protocol on selected obstetrics topics 2010 version, and IP protocol. It is also important to ensure accountability by establishing a responsive compliance handling system in the L&D ward. Hospitals should encourage women to express opinions about their childbirth experience and take appropriate remedial actions based on the feedback.

To ensure continuous quality improvement in MNHC, hospitals should have a culture of learning lessons from case reviews. They should conduct regular maternal and neonatal death audits in compliance with the standard procedures and supportive organizational framework showed in the EHAQ package (FMoH of Ethiopia, 2014d). A strong leadership is also important to warrant completion of the audit cycle.

Insights from direct observation suggest that L&D care provided both to the women and their babies was inadequate. Particularly, screening and prevention of hypertensive disorders of pregnancy and postpartum hemorrhage were inadequate in mothers. Likewise, early initiation of breastfeeding by placing skin-to-skin with mother, prevention of hypothermia, and advice on delayed baby bath for the first 24hrs were inadequate in newborns. Inadequate compliance with critical tasks including, hand washing, use of partograph, AMTSL, and interpersonal communication during L&D and respect for women's preferences is especially concerning which should be improved.

Thus, efforts should be made to improve compliance of providers with the EHAQ standards. Providing training for the staff on the identified gaps is essential. Involving senior attending professionals in promoting adherence to health service standards is also be important. Ensuring managerial and leadership commitment is vital to ensure adequate resource allocation for quality improvement interventions. Notably, the positive effect of structural quality on the quality of the L&D care process suggests the need to improve the enabling environment.

The results from the exit interview underscore the role of effective communication with women, and adequate physical facilities to improve women's experience with L&D care. Thus, gaps in the interpersonal skills of providers and systemic flaws related to physical facilities should be fixed to improve women's experience with care. Improving women's knowledge about their rights to demand quality services is important. There is also a need to improve women's autonomy and active participation in their care process so that every woman is offered the option to experience L&D with the companion of her choice, and where her needs and preferences are considered throughout. Training providers on respectful maternity care should be considered. There is also a need to close the availability-accessibility gap of physical facilities. Moreover, the positive effect of quality of L&D care process on women's experience suggests the need for adequate investment in improving the process quality.

9.3. Limitations

There are several limitations in this thesis that are acknowledged. Each of them is discussed below and separately for the two studies, along with the strategies used to minimize their influence on the robustness of the study.

9.3.1. Variations in *woreda*-level proportion of SBA and factors associated with higher proportions

This study has limitations in its ecological design and data quality. Lack of individual level information in the design leads to ecological fallacy or ecological bias, where the association observed between aggregate level variables doesn't necessarily represent the association that exists at individual level (Aschengrau and Seage, 2013). The findings may not also be generalized to other settings owing to the potential differences in the data sources used to estimate the SBA rate, in the definition of SBA, and how different countries report skilled attendants.

These are likely to constrain comparisons both within and between countries (Adegoke et al., 2012).

According to the national guideline (FMoH of Ethiopia, 2015c), the proportion of SBA should be calculated based on population projections made centrally by the CSA Ethiopia from the most recent census. However, differential population projections might have been used in a specific region or *woreda*, rather than those made centrally by the CSA Ethiopia across all regions and *woredas* (FMoH, 2015c). This might have biased the average proportion of SBA as projections made at local level are likely to overestimate the total population, due to its implications on resource allocation, ultimately underestimating the proportion of SBA. The fact that births attended by skilled personnel at home are missing due to the restrictive definition, and that multiple births that occurred during the reference year might have also underestimated the proportion. Conversely, the assumptions that all institutional deliveries were attended by skilled personnel in a conducive environment are less likely to be always true, over-estimating the coverage. This could not be verified as data on the standards of the enabling environment were not available from the database. Kruk et al. (2018) argues that the proportion of SBA does not reflect quality of childbirth care, and hence, not considered as a good indicator of the progress in MNH.

About 20% of the *woredas* which had missing values for any of the variables were excluded from the analyses. These *woredas* were not significantly different from the others in terms of population size and distribution by region. No evidence could be found to conclude that the variations in the reporting rates were due to vested interests, and that the services for which data were missing were not being provided.

This study did not prove the hypotheses about positive association between *woreda*-level proportion of SBA and female education, partly due to the non-specific nature of the indicator GER. It measures school enrollment from 1st to 8th

grades as a percentage of the school age population, irrespective of age. GER includes enrolment both in the formal primary schools and informal schools or alternative basic education centres. The alternative basic education centres usually enroll students who are not of the official age, i.e., 7 to 14 year (FMoE of Ethiopia, 2016). Using net enrollment rate instead may provide a different result as it excludes enrolment in alternative basic education centres.

Because a macro-ecological approach was used that deliberately sacrifices details in order to understand the overall picture, the analysis did not consider all possible determinants of SBA rate such as *woredas* disaggregated by urban-rural divide, population disaggregated by age, urban-rural divide, fertility rates, wealth status, and access to transportation networks, for which data were not available from the databases. Thus, the findings should be interpreted with caution as the observed variation in the proportion of SBA across *woredas* may be the effect of other confounders, the control of which might not be possible because of the ecologic nature of the data, and despite the multivariate analysis applied.

9.3.2. Quality of L&D care in government hospitals of SNNPR

The results have limited generalizability to all public hospitals in the country, as the study was conducted only in SNNPR due to resource limitations. The quality of L&D care provided in the public hospitals of the region might differ from other regions. The use of locally adapted EHAQ standards could also compromise the external validity of the study.

Representation of facilities from different managing authorities (government, private and non-government) is important as it implies differences in resource allocation, service requirements and working conditions, which can affect the quality of care they provide in different ways (Say and Raine, 2007). Thus, the results from this study may not even reflect the quality of L&D services provision in SNNPR, as it did not include public health centres and private and NGO owned facilities that provide skilled delivery care. Furthermore, the fact that the results on

the structural and process components of quality represent only the routine L&D care, they cannot be generalized to the quality of other types of deliveries, i.e., assisted and caesarean deliveries.

Composite scores are averages which can result in loss of important information (Abramson and Abramson, 2008). The results of all the three components of quality of L&D care were summarized using composite scores with apparent loss of item specific details. For example, the factor analysis yielded four factors that explained 68.1% of the total variation in women's overall experience. This illustrates that items containing 31.9% of the information were dropped from the analyses, although internal consistency was confirmed by using Cronbach's *alpha* for each factor. While acknowledging the limitation, composite measures have several advantages including: increased reliability than individual items (Abramson and Abramson, 2008), and giving the picture of both the whole and individual parts, i.e., an overall summary of the quality of care both at patient and provider levels (Donabedian, 2005; The Physician Consortium for Performance Improvement, 2010). This facilitates comparison and simplifies communication of performance on technical components of care to non-technical audiences (The Physician Consortium for Performance Improvement, 2010).

An extension of the above limitation relates to the use of unweighted scoring or equal weighting approach for the composite measures. It is acknowledged that assuming a linear relationship between all items and that they are equally important for the provision of quality L&D care might have impacted the results. For example, in the assessment of process quality, initial assessment of the woman in labour may not be directly comparable to the AMTSL tasks in terms of complexity and level of effort they require. The use of unweighted scoring was based on the recommendation of several researchers in the field (Tripathi et al., 2015; Leisher et al., 2016; WHO, 2010a). The use of a weighted scoring was ruled out due to lack of evidence on the relative importance of the constructs of each quality component, though a well-defined scientific evidence exists on the

constructs, i.e., the EHAQ change package for L&D care (FMoH of Ethiopia, 2014d). Risk adjustment was not required as process, structure and outcome measures were not combined into one composite measure (The Physician Consortium for Performance Improvement, 2010).

9.3.2.1. Limitations specific to facility audit

Availability of equipment, and essential drugs and supplies was based on point prevalence at the time of observation and does not necessarily indicate a constant supply, but this was the best possible assessment given the resources. The data captured on the availability of telephone service might not be valid as the facility audit checklist considered only fixed telephone service. However, due to the profound technological change in telecommunications in Ethiopia, the coverage of cell phones is wider than the landline telephone network. In addition, information on refresher training was captured at hospital level through facility audit. The information might be less valid as it depended on the L&D case team leader's verbal report which is subject to recall bias. Interviews with selected health professionals would rather provide a more valid measure of the indicator.

9.3.2.2. Limitations specific to direct observation

Some results from direct observation may indicate the best possible performance of skilled attendants, instead of their average performance due to the inevitable Hawthorne effect (Baltussen et al., 2002; Abramson and Abramson, 2008; Bowling, 2014). This might have contributed to the relatively high-performance scores on some practices of the L&D care process, especially for care during the second and third stages of labour, and for newborn care. However, the fact that adequate time (one month) had been spent in the research setting reassures that the pretended behaviors might have not been maintained during this long period minimizing the bias (Baltussen et al., 2002; Bowling, 2014). Conversely, observing all service transactions and interviewing all women over the one-month period could have another limitation that is also acknowledged. Data collectors might

have unintentionally communicated their expectations to the skilled attendants biasing the behavior in favor of their expectations (Bowling, 2014).

Observer variation is another limitation which is inherent in direct observation method. Data collectors may be influenced by their experience of what to consider as 'normal' and tend to find what they expect to find (Abramson and Abramson, 2008). This could also be part of the explanation for the relatively high scores as mentioned above. Inter-rater reliability was not tested as two independent observers were not used for each observation due to resource limitation. Test-retest reliability was not examined either, owing to the nature of the care under evaluation, i.e., a woman's L&D care could only be observed once. However, other measures were taken to minimize the limitations. A carefully detailed data collection guideline was developed and used by the data collectors for consistent measurements. Professional midwives who were not affiliated with the study hospitals collected the data after receiving an intensive training. They also received periodic supervision from experienced and qualified supervisors who were also trained.

The initial assessment tasks were not observed but reviewed from clinical records, as women were approached in the active second stage of labour for ease of identifying normal labours. This might have underestimated the performance of these tasks as providers might have performed the tasks but failed to record them. To get a full picture of the quality, observations should have covered all services starting from arrival to maternity ward to immediate postpartum period.

Performance of some tasks could not be verified during direct observation as the items on the checklist were coded as 'yes' or 'no'. For example, it is possible that providers might have performed some of the interpersonal communication behaviors simultaneously with other tasks unrecognized by the observers, which might have underestimated the performance. Therefore, besides checking coded events, the observation checklist should have also captured observers' subjective

notes, for example, comment on women's engagement in care process and content of client-provider interactions.

Inevitably, there may be confounders that are unrecognized and could not therefore be measured and adjusted for. Even though multilevel analysis was used in the examination of factors associated with the quality of L&D care process, other variables of probable importance (both at woman and hospital levels) such as economic and educational status and residence are missed. This was evident from the random part of the final model which indicated that not all of the between hospital variance in the process quality index was explained by the variables in the model. Thus, this might have affected interpretation of the results.

9.3.2.3. Limitations specific to exit interview

Interviewing women at exit facilitated their recall of the care experience. However, we recognise that given the clinical environment, mothers might have tended to answer questions favourably due to social desirability bias. For example, near-miss women might have shown gratitude to the staff who saved their life and, what matters most for some women may be a live newborn, which can offset staff misconduct (Dogba and Fournier, 2009). The environment might have also been intimidating and might have blocked women's free and spontaneous response (Dogba and Fournier, 2009). These could partly explain the relatively high levels of satisfaction. Intensive training of the data collectors on proper interview technique and conducting the interviews in a separate room are believed to minimize the biases.

While we set out to capture the views of women who had favorable and unfavorable care experiences to ensuring quality (Graham et al., 2013), we recognise that by excluding women who were too ill to respond we have introduced the possibility of selection bias, as the experiences of these women are likely to be different from others. This could also be part of the explanation for the relatively

high experience ratings, as evidence exists on a positive relationship between adverse birth events and poor-quality care (Graham et al., 2013).

Given the lower sensitivity of experience rating to variations in the quality of care processes (Donabedian, 2003), high experience scores do not necessarily imply actual receipt of high-quality care (Cleary and Margaret, N.D; Leisher et al., 2016; Creanga et al., 2017). Women may not be aware of the standard of care and may have low or no expectations (Creanga et al., 2017). This was uncontrolled in this study as women's expectations were not captured.

Some individual level variables that may have important role in the relationships between women's experiences and type and level of hospitals, such as mode of admission (i.e., whether referred or not), mode of delivery, and length of hospital stay were missing in the dataset, and thus uncontrolled in the analysis. Moreover, the associations reported in this thesis should not be interpreted as causal given the cross-sectional design.

9.4. Recommendations for further research

Related to the study that assessed variations in *woreda*-level SBA rates and associated factors, it is recommended that similar studies are performed that consider all potential determinants of SBA rate, such as *woreda* disaggregated by urban-rural divide, access to transportation networks, and population disaggregated by age, fertility rates, and wealth status. The significant associations identified in this study also need to be elucidated further with longitudinal approaches or controlled studies to establish causation. Examining how correlated ANC and model families are, and also model families and functional one-to-five networks are, merit further study. Moreover, the effect of functional characteristics of one-to-five networks on the use of SBA needs to be researched further.

The study that assessed the quality of L&D care provided in government hospitals of SNNPR similarly suggests potential areas for future research. Supplementing

with qualitative data through health worker interviews, particularly focusing on the facilitators and barriers for the provision of quality L&D care, and suggestions for possible improvement would be important in explaining some of the findings. An in depth understanding of factors that are as important as staff availability such as working condition, motivation, human resource management practice would also be needed. An in-depth investigation is also needed to interrogate the reasons for the following gaps: inadequate health education practice, non-use and incorrect use of the partograph, and the availability-accessibility gap of physical facilities in labour wards. Finally, representation of facilities from different managing authorities (government, private and non-government) in a similar study is important as it can have a direct or indirect effect on the quality of care they provide.

Regarding the multilevel analyses which examined factors that affect the overall quality of L&D care process and women's overall experience with the care they received, inclusion of more individual level variables into the design of similar future studies is suggested. Examples of such variables include residence, income, history of previous complications, mode of admission, mode of delivery, length of hospital stay, expectations of the care, and the sex of the health workers.

9.5. Conclusion

A more thorough understanding of *woreda*-level factors associated with SBA rates is crucially important to Ethiopia, as reducing maternal mortality is central to achieving its national goal of becoming a middle-income country within the next 30 years. More comprehensive and better understanding of routine L&D care practices is also required. This thesis has addressed these two major knowledge needs.

The first study has generated systematic evidence to support community level initiatives of the country such as HDA networking, and a motto of creating 'home delivery free' kebeles/villages.

The second study has identified gaps in the quality of hospital birthing care that contribute to the health facility reform initiatives of the FMoH particularly, EHRIG and EHAQ. Specifically, systematic evidence was generated about the degree to which the hospitals comply with the recommended EHAQ standards for structural, process and outcome aspects of quality of L&D care. Individual and hospital characteristics responsible for the observed level of process quality and women's overall experience with care are also determined, after adjusting for potential clustering effect by reducing the impact of factors that might not be within the control of hospitals.

Together both studies seek to support the continuous improvement of maternal and neonatal health in Ethiopia recognizing the national ambition to achieve the goal of reducing the unacceptably high MMR to 199 deaths per 100,000 live births and the neonatal mortality rate to 10 per 1,000 live births by 2020 (FMoH of Ethiopia, 2015b).

REFERENCES

Abegaz, B., 2013. *Aid, accountability, and institution-building in Ethiopia: A comparative analysis of donor practice (Working paper)*. USA: United Nations University - World Institute for Economic Development Research.

Abou-Zahr, C.L., and Wardlaw, T.M., 2003. *Antenatal care in developing countries: promises, achievements and missed opportunities: an analysis of trends, levels and differentials, 1990-2001*. Geneva: World Health Organization.

Abramson, J. and Abramson, Z.H., 2011. *Research methods in community medicine: surveys, epidemiological research, programme evaluation, clinical trials*. John Wiley & Sons.

Adegoke, A., et al., 2012. Skilled Birth Attendants: who is who? A descriptive study of definitions and roles from nine Sub Saharan African countries. *PloS one*, 7(7), p.e40220.

Adegoke, A.A. and Van Den Broek, N., 2009. Skilled birth attendance-lessons learnt. *BJOG: An International Journal of Obstetrics & Gynaecology*, 116, pp.33-40.

Adeyi, O. and Morrow, R., 1997. Essential obstetric care: assessment and determinants of quality. *Social Science & Medicine*, 45(11), pp.1631-1639.

Admasu, K., et al., 2011. Indicators for availability, utilization, and quality of emergency obstetric care in Ethiopia, 2008. *International Journal of Gynecology & Obstetrics*, 115(1), pp.101-105.

Afewerk, M.F., 2014. MDGs in the final year and maternal and child health in Ethiopia: What next?. *Ethiop. J. Health Dev.*, 28(2).

Alkema, L., et al., 2016. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*, 387(10017), pp.462-474.

Amano, A., et al., 2012. Institutional delivery service utilization in Munisa Woreda, South East Ethiopia: a community based cross-sectional study. *BMC pregnancy and childbirth*, 12(1), p.105.

Ande, B., et al., 1997. Improving obstetric care at the district hospital, Ekpoma, Nigeria. *International Journal of Gynecology & Obstetrics*, 59(S2).

Anderson, I., 2006. *Epidemiology for halisovetare – en introduktion*. Sweden: Lund University.

Andersen, R.M., et al., 1983. Exploring dimensions of access to medical care. *Health services research*, 18(1), p.49.

Anwar, I., et al., 2008. Inequity in maternal health-care services: evidence from home-based skilled-birth-attendant programmes in Bangladesh. *Bulletin of the World Health Organization*, 86, pp.252-259.

Anwar, I., et al., 2009. Quality of obstetric care in public-sector facilities and constraints to implementing emergency obstetric care services: evidence from high-and low-performing districts of Bangladesh. *Journal of health, population, and nutrition*, 27(2), p.139.

Armstrong, P.W., 2003. Do guidelines influence practice? *Heart*, 89(3), pp.349-352.

Aschengrau, A. and Seage, G.R., 2013. *Essentials of epidemiology in public health*. Jones & Bartlett Publishers.

- Asnake, M., et al., 2013. The Status of Desired Maternal and Child Health Practices and Service Utilizations of Model Families of the Health Extension Program in SNNPR, Ethiopia. *J Community Medicine & Health Education*, 3(258).
- Baltussen, R.M.P.M., et al., 2002. Perceived quality of care of primary health care services in Burkina Faso. *Health policy and planning*, 17(1), pp.42-48.
- Bangdiwala, S.I., et al., 2010. Workforce resources for health in developing countries. *Public Health Reviews*, 32(1), p.296.
- Barros, A.J., et al., 2012. Equity in maternal, newborn, and child health interventions in Countdown to 2015: a retrospective review of survey data from 54 countries. *The Lancet*, 379(9822), pp.1225-1233.
- Barry, M.J., et al., 1997. A randomized trial of a multimedia shared decision-making program for men facing a treatment decision for benign prostatic hyperplasia. *Disease Management and Clinical Outcomes*, 1(1), pp.5-14.
- Bartlett, L., et al., 2015. Facility-based active management of the third stage of labour: assessment of quality in six countries in sub-Saharan Africa. *Bulletin of the World Health Organization*, 93, pp.759-767.
- Bayou, N.B. and Gacho, Y.H.M., 2013. Utilization of clean and safe delivery service package of health services extension program and associated factors in rural kebeles of Kafa Zone, Southwest Ethiopia. *Ethiopian journal of health sciences*, 23(2), pp.79-89.
- Bazant, E.S. and Koenig, M.A., 2009. Women's satisfaction with delivery care in Nairobi's informal settlements. *International Journal for Quality in Health Care*, 21(2), pp.79-86.
- Begley, C.M., et al., 2010. Active versus expectant management for women in the third stage of labour. *Cochrane Database of Systematic Reviews*, (7).

Benoit, K., 2011. *Linear regression models with logarithmic transformations*. London: London School of Economics.

Berwick DM. and Knapp MG., 1987. Theory and Practice for Measuring Health Care Quality. *Health Care Financ Rev*; Spec No:49-55. p. 49.

Bhutta, Z.A., et al., 2014. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *The Lancet*, 384(9940), pp.347-370.

Bitew, K., et al., 2015. Maternal satisfaction on delivery service and its associated factors among mothers who gave birth in public health facilities of Debre Markos Town, Northwest Ethiopia. *BioMed research international*, 2015.

Bohren, M.A., et al., 2015. The mistreatment of women during childbirth in health facilities globally: a mixed-methods systematic review. *PLoS medicine*, 12(6), p.e1001847.

Bowling, A., 2014. *Research methods in health: investigating health and health services*. UK: McGraw-Hill Education.

Bowser, D. and Hill, K., 2010. *Exploring evidence for disrespect and abuse in facility-based childbirth*. Boston: USAID-TRAction Project, Harvard School of Public Health.

Bradley, E.H., et al., 2009. Research in action: using positive deviance to improve quality of health care. *Implementation science*, 4(1), p.25.

Bradley, E.H., et al., 2011. Access and quality of rural healthcare: Ethiopian Millennium Rural Initiative. *International Journal for Quality in Health Care*, 23(3), pp.222-230.

Bradley, E.H., et al., 2012. A systems approach to improving rural care in Ethiopia. *PLoS One*, 7(4), p.e35042.

- Brook, R.H. and Williams, K.N., 1975. Quality of health care for the disadvantaged. *Journal of Community Health*, 1(2), pp.132-156.
- Brown, A.D., et al., 2007. Comparing patient reports about hospital care across a Canadian-US border. *International Journal for Quality in Health Care*, 20(2), pp.95-104.
- Brown, C.A., et al., 2008. Antenatal care and perinatal outcomes in Kwale district, Kenya. *BMC Pregnancy and Childbirth*, 8(1), p.2.
- Brown, H., et al., 2007. Promoting childbirth companions in South Africa: a randomised pilot study. *BMC medicine*, 5(1), p.7.
- Burkhalter, B., et al., 2006. *Quality of obstetric care observed in 14 hospitals in Benin Ecuador Jamaica and Rwanda*. Bethesda: Quality Assurance Project.
- Callaghan-Koru, J.A., et al., 2016. A qualitative exploration of health workers' and clients' perceptions of barriers to completing four antenatal care visits in Morogoro Region, Tanzania. *Health policy and planning*, 31(8), pp.1039-1049.
- Campbell, O.M., et al., 2006. Strategies for reducing maternal mortality: getting on with what works. *The lancet*, 368(9543), pp.1284-1299.
- Campbell, S.M., et al., 2000. Defining quality of care. *Social science & medicine*, 51(11), pp.1611-1625.
- Centers for Disease Control and Prevention, 2014. *Saving Mothers, Giving Life (SMGL): Emergency Obstetric and Newborn Care Access and Availability, Phase 1 Monitoring and Evaluation Report*. Atlanta: Centers for Disease Control and Prevention, US Dept of Health and Human Services.
- Chawla, M., et al., 1996. *Improving hospital performance through policies to increase hospital autonomy: methodological guidelines*. Boston, MA: Data for Decision Making Project, Harvard School of Public Health.

Chou, D., et al., 2015. Ending preventable maternal and newborn mortality and stillbirths. *BMJ*, 351, p.h4255.

Chukwuma, A., et al., 2017. Quality of antenatal care predicts retention in skilled birth attendance: a multilevel analysis of 28 African countries. *BMC pregnancy and childbirth*, 17(1), p.152.

Cleary, P.D. and Edgman-Levitan, S., 1997. Health care quality: incorporating consumer perspectives. *Jama*, 278(19), pp.1608-1612.

Cleary, P.D. and Margaret, E.O., N.D. *Evaluating the Quality of Health Care*. USA: Behavioral and Social Sciences Research Project.

Collins, D., et al., 2016. *The impact of community-based health insurance on access to care and equity in Rwanda*. Technical brief. Kigali: Management Sciences for Health.

Conde-Agudelo A, Diaz-Rossello JL. (2014). Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev*; (4):CD002771.

Connell, F.A., et al., 1987. The use of large data bases in health care studies. *Annual review of public health*, 8(1), pp.51-74.

Creanga, A.A., et al., 2017. Is quality of care a key predictor of perinatal health care utilization and patient satisfaction in Malawi? *BMC pregnancy and childbirth*, 17(1), p.150.

CSA Ethiopia and ORC Macro, 2005. *Ethiopia Demographic and Health Survey, 2005*. Addis Ababa: Central Statistical Authority.

CSA Ethiopia and ORC Macro, 2011. *Ethiopia Demographic and Health Survey, 2011*. Addis Ababa, Central Statistical Authority.

CSA Ethiopia and ORC Macro, 2016. *Ethiopia Demographic and Health Survey, 2016*. Addis Ababa: Central Statistical Authority.

CSA Ethiopia, 2012. *National statistics abstract*. Addis Ababa: Central Statistical Authority.

CSA Ethiopia, 2014. *Ethiopia Mini Demographic and Health Survey (EMDHS)*. Addis Ababa: Central Statistical Authority.

d'Ambruoso, L., et al., 2005. Please understand when I cry out in pain: women's accounts of maternity services during labour and delivery in Ghana. *BMC public health*, 5(1), p.140.

Davidson R.G., 2004. *"Beyond the Averages": Countdown 2015 Sexual and Reproductive Health & Rights for All*. Washington DC: IPPF, PCI, FCI.

de Graft-Johnson, J., et al., 2017. Cross-sectional observational assessment of quality of newborn care immediately after birth in health facilities across six sub-Saharan African countries. *BMJ open*, 7(3), p.e014680.

Delvaux, T., et al., 2008. Quality of antenatal and delivery care before and after the implementation of a prevention of mother-to-child HIV transmission programme in Côte d'Ivoire. *Tropical medicine & international health*, 13(8), pp.970-979.

Demas, T., et al., 2017. Women's satisfaction with intrapartum care in St Paul's Hospital Millennium Medical College Addis Ababa Ethiopia: a cross sectional study. *BMC pregnancy and childbirth*, 17(1), p.253.

Dickson, K.E., et al., 2015. Scaling up quality care for mothers and newborns around the time of birth: an overview of methods and analyses of intervention-specific bottlenecks and solutions. *BMC pregnancy and childbirth*, 15(2), p.S1.

Dieleman, M. and Harnmeijer, J.W., 2006. *Improving health worker performance: in search of promising practices*. Geneva: World Health Organization.

Doctor, H.V., et al., 2018. Health facility delivery in sub-Saharan Africa: successes, challenges, and implications for the 2030 development agenda. *BMC Public Health*; 18:765.

Dogba, M. and Fournier, P., 2009. Human resources and the quality of emergency obstetric care in developing countries: a systematic review of the literature. *Human resources for health*, 7(1), p.7.

Donabedian, A., 2003. *An introduction to quality assurance in health care*. USA: Oxford University Press.

Donabedian, A., 2005. Evaluating the quality of medical care. *The Milbank Quarterly*, 83(4), pp.691-729.

Dumont, A., et al., 2002. Maternal morbidity and qualification of health-care workers: comparison between two different populations in Senegal. *Journal de gynécologie, obstétrique et biologie de la reproduction*, 31(1), pp.70-79.

Duysburgh, E., et al., 2013. Quality of antenatal and childbirth care in selected rural health facilities in Burkina Faso, Ghana and Tanzania: similar finding. *Tropical medicine & international health*, 18(5), pp.534-547.

El-Jardali, F., et al., 2007. Human resources for health planning and management in the Eastern Mediterranean region: facts, gaps and forward thinking for research and policy. *Human Resources for Health*, 5(1), p.9.

Engender Health, 2000. *Cost Analysis Tool: Simplifying Cost Analysis for Managers and Staff of healthcare services*. New York: Engender Health.

Esen, R.K. and Sappor, M.M., 2013. Factors associated with the utilization of skilled delivery services in the Ga East Municipality of Ghana Part 2: barriers to skilled delivery. *Int J Sci Tech Res*, 2(8), pp.195-207.

Ethiopian Public Health Institute (EPHI), FMOH of Ethiopia and ICF International, 2014. Ethiopia Service Provision Assessment Plus (SPA+) Survey 2014: Key Findings. Addis Ababa: EPHI, FMOH of Ethiopia and ICF International.

Ethiopian Standards Agency, 2012a. *Health Center Requirements*. 1st edn. Addis Ababa: Ethiopian Standards Agency.

Ethiopian Standards Agency, 2012b. *Primary Hospital Requirements*. 1st edn. Addis Ababa: Ethiopian Standards Agency.

Fawole, A.O., et al., 2008. Clients' perceptions of the quality of antenatal care. *Journal of the National Medical Association*, 100(9), pp.1052-1058.

Faye, A., et al., 2014. Development of an instrument to evaluate intrapartum care quality in Senegal: evaluation quality care. *International journal for quality in health care*, 26(2), pp.184-189.

FCI Inc., 2007. *Review of the Safe Motherhood Initiative 1987–2005*. New York: Family Care International Inc.

Fekadu W.F. and Tariq A.T., 2013. *Technical Report on Electronic Health Management Information System (eHMIS) in Ethiopia*. Addis Ababa: USAID-MEASURE Evaluation HMIS Scale-up-Project.

Fisseha, G., et al., 2017. Quality of the delivery services in health facilities in Northern Ethiopia. *BMC health services research*, 17(1), p.187.

FMOE of Ethiopia, 2016. *Education Statistics Annual Abstract, 2007E.C (2014/15)*. Addis Ababa: Education Management Information System (EMIS) and ICT Directorate.

FMoH of Ethiopia, 2004. *Maternal and Child Health Extension Package*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2007. *Health Extension Program in Ethiopia*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2010. *Health Sector Development Program IV 2010/11 – 2014/15*. Addis Ababa: FMoH of Ethiopia

FMoH of Ethiopia, 2011. *Annual Performance Report of 2003 EFY (2010/11): Health Sector Development Program IV-VERSION 1*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2014a. *HMIS Information Use and Data Quality Training Manual*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2014b. *HSDP-IV Woreda Based Health Sector Core Annual Plan 2014/2015: Crossing the finishing line and envisioning beyond: Toward equitable and better-quality health services in Ethiopia*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2014c. *Annual Performance Report of 2006 EFY (2013/14): Health Sector Development Program IV-VERSION 1*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2014d. *Ethiopian Hospital Alliance for Quality (EHAQ): Labor & Delivery Change Package for Ethiopian Hospitals*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2014e. *BEmONC Facilitator's Handbook: Module 4, Child Birth Care (Labor, Delivery and Immediate Post-Partum); Guide for TOT, Part-I*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2015a. *Maternal, Newborn and Child Care Quality Improvement and Self-Assessment Tools for Hospitals*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2015b. *Health Sector Transformation Plan (HSTP) 2015/16 - 2019/20 (2008-2012 EFY)*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2015c. *Second Generation Health Extension Program*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, 2016. *Ethiopian National Health Care Quality Strategy: Transforming the Quality of Health Care in Ethiopia, 2016 – 2020*. Addis Ababa: FMoH of Ethiopia.

FMoH of Ethiopia, Human Resource Development and Administration Directorate, 2012. *Human Resource in Ethiopia*. Addis Ababa: FMoH of Ethiopia.

Gao, Y. and Barclay, L., 2010. Availability and quality of emergency obstetric care in Shanxi Province, China. *International Journal of Gynecology & Obstetrics*, 110(2), pp.181-185.

Gbangbade, S., et al., 2003. *Safe motherhood studies: results from Benin*. Bethesda: Quality Assurance Project.

Getachew, A., et al., 2011. *Quality of care for prevention and management of common maternal and newborn complications: a study of Ethiopia's hospitals*. Baltimore: JHPIEGO.

Gill, Z., et al., 2005. A tool for assessing 'readiness' in emergency obstetric care: The room-by-room 'walk-through'. *International Journal of Gynecology & Obstetrics*, 89(2), pp.191-199.

Girma, M., et al., 2013. Lifesaving emergency obstetric services are inadequate in south-west Ethiopia: a formidable challenge to reducing maternal mortality in Ethiopia. *BMC health services research*, 13(1), p.459.

Global Health Workforce Alliance Task Force for Scaling Up Education and Training for Health Workers, 2008. *Scaling Up, Saving Lives*. Geneva: World Health Organization.

Gold, M., 1998. Beyond coverage and supply: measuring access to healthcare in today's market. *Health Services Research*, 33(3 Pt 2), p.625.

Graham, W.J., et al., 2001. *Can skilled attendance at delivery reduce maternal mortality in developing countries?* Scotland: Aberdeen Maternity Hospital.

Graham, W., et al., 2016. Diversity and divergence: the dynamic burden of poor maternal health. *The Lancet*, 388(10056), pp.2164-2175.

Graham, W.J., et al., 2013. Translating coverage gains into health gains for all women and children: the quality care opportunity. *PLoS Medicine*, 10(1), p.e1001368.

Greenacre, M. and Primicerio, R., 2014. *Multivariate analysis of ecological data*. UK: Fundacion BBVA.

Grown, C., et al., 2005. Taking action to improve women's health through gender equality and women's empowerment. *The Lancet*, 365(9458), pp.541-543.

Gupta, S., et al., 2014. *Evaluation of the Helping Babies Breathe (HBB) Initiative Scale-Up in Malaw: Results from a Dose-Response Analysis*. Malawi: USAID.

Hailu, S., et al., 2009. Health facility-based maternal death audit in Tigray, Ethiopia. *Ethiopian Journal of Health Development*, 23(2).

Hasan, A., 2007. *Patients Satisfaction with Maternal and Child Health Services Among Mothers Attending the Maternal and Child Health Training Institute in Dhaka (Doctoral dissertation)*. Bangladesh: Mahidol University.

HEPCAPS1 Project Team, 2012. *Ethiopia's Health Extension Platform: A background paper prepared for the HEPCAPS1 project Paper #1*. Boston, Massachusetts and New Haven, Connecticut: Harvard School of Public Health and Yale Global Health Leadership Institute.

Hoque, D.M., et al., 2012. An assessment of the quality of care for children in eighteen randomly selected district and sub-district hospitals in Bangladesh. *BMC pediatrics*, 12(1), p.197.

Hossain, J. and Ross, S.R., 2006. The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh. *International Journal of Gynecology & Obstetrics*, 92(3), pp.320-328.

Houweling, T.A., et al., 2007. Huge poor-rich inequalities in maternity care: an international comparative study of maternity and child care in developing countries. *Bulletin of the World Health Organization*, 85, pp.745-754.

Hulton LA, et al., 2000. *A framework for the evaluation of quality of care in maternity services*. Highfield: University of Southampton.

Hunyinbo, K.I., et. al., 2008. Evaluation of criteria-based clinical audit in improving quality of obstetric care in a developing country hospital. *African journal of reproductive health*, 12(3).

IFRCs, 2013. *Maternal, newborn and child health framework*. Geneva: IFRCs.

IOM, 1991. *Improving information services for health services researchers: a report to the National Library of Medicine*. Washington: National Academy Press.

Jaime Initiatives Inc., 2004. *Introduction to the QIP Handbooks: Quality Improvement Handbook for Primary Health Care; Facilitator's Guide, Quality Improvement and the Performance Improvement Review*. USA: Jaime Initiatives Inc.

James, B.C., 1989. *Quality management for health care delivery*. Chicago: Hospital Research and Educational Trust.

Jenkinson, C., et al., 2003. Properties of the Picker Patient Experience questionnaire in a randomized controlled trial of long versus short form survey instruments. *Journal of Public Health*, 25(3), pp.197-201.

JHPIEGO, 2001. *Best practices: performance and quality improvement*. Baltimore: JHPIEGO.

JHPIEGO, 2004. *Monitoring birth preparedness and complication readiness: tools and indicators for maternal and newborn health*. Baltimore: JHPIEGO.

Kagama, F., et al., 2011. *Quality of care for prevention and management of common maternal and newborn complications: findings from a National Health Facility Survey in Kenya—are services provided according to international standards*. Baltimore: JHPIEGO.

Kalisa, I.R., et al., 2015. *The development of community-based health insurance in Rwanda—experiences and lessons*. Medford, MA: University of Rwanda College of Medicine and Health Sciences School of Public Health, Kigali, Rwanda and Management Sciences for Health.

Kaplan, S.H.N. and Normand, S.L., 2006. *Conceptual and analytical issues in creating composite measures of ambulatory care performance*. Washington, DC: Robert Wood Johnson Foundation.

Kigenyi, O., et al., 2013. Quality of intrapartum care at Mulago national referral hospital, Uganda: clients' perspective. *BMC pregnancy and childbirth*, 13(1), p.162.

Kim, Y.M., et al., 2013. Assessing the capacity for newborn resuscitation and factors associated with providers' knowledge and skills: a cross-sectional study in Afghanistan. *BMC pediatrics*, 13(1), p.140.

Ki-Moon, B., 2010. *Global strategy for women's and children's health*. New York: United Nations.

King, R., et al., 2015. Barriers and facilitators to accessing skilled birth attendants in Afar region, Ethiopia. *Midwifery*, 31(5), pp.540-546.

Kinney, M.V., et al., 2010. Sub-Saharan Africa's Mothers, Newborns, and Children: Where and Why Do They Die? *PLoS Med* 7(6): e1000294.

Kirk, C.M., et al., 2015. *MESH-QI Mentoring and Enhanced Supervision for Health Care and Quality Improvement in Rwanda*. Kigali: Partners In Health.

Koblinsky, M., et al., 2006. Erratum: Going to scale with professional skilled care (Lancet (2006) 368 (1377-1386)). *The Lancet*, 368(9554), p.2210.

Koblinsky, M., et al., 2016. Quality maternity care for every woman, everywhere: a call to action. *The Lancet*, 388(10057), pp.2307-2320.

Kruk, M.E., et al., 2009. Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania. *Health policy and planning*, 24(4), pp.279-288.

Kruk, M.E., et al., 2016. Next generation maternal health: external shocks and health-system innovations. *The Lancet*, 388(10057), pp.2296-2306.

Kruk, M.E., et al., 2018. High-quality health systems in the Sustainable Development Goals era: time for a revolution. *The Lancet Global Health*, 6(11), pp.e1196-e1252.

- Kunst, A.E. and Houweling, T., 2001. *A global picture of poor-rich differences in the utilisation of delivery care*. Antwerp, Belgium: ITG Press.
- Lalonde, A.B. and Miller, S., 2015. Mother–Baby Friendly Birthing Facilities Initiative. *International Journal of Gynecology & Obstetrics*, 128(2), pp.93-94.
- Lassi, Z.S., et al., 2014. Evidence from community level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reproductive health*, 11(2), p.S2.
- Lawn, J.E., et al., 2009. Two million intrapartum-related stillbirths and neonatal deaths: where, why, and what can be done? *International Journal of Gynecology & Obstetrics*, 107(Supplement), pp.S5-S19.
- Lawn, J.E., et al., 2011. Stillbirths: Where? When? Why? How to make the data count? *The Lancet*, 377(9775), pp.1448-1463.
- Lawn, J.E., et al., 2014. Every Newborn: progress, priorities, and potential beyond survival. *The Lancet*, 384(9938), pp.189-205.
- Leisher, S.H., et al., 2016. *Quality measurement in family planning: Past present future. Papers from the Bellagio Meeting on Family Planning Quality*. Oakland, CA: Metrics for Management.
- Leonard, K. and Masatu, M.C., 2006. Outpatient process quality evaluation and the Hawthorne Effect. *Social science & medicine*, 63(9), pp.2330-2340.
- Lindelov, M. and Wagstaff, A., 2003. *Health facility surveys: an introduction*. USA: The World Bank.
- Lumadi, T.G. and Buch, E., 2011. Patients' satisfaction with midwifery services in a regional hospital and its referring clinics in the Limpopo Province of South Africa. *Africa Journal of Nursing and Midwifery*, 13(2), pp.14-28.

Luwei P, et al., 2014. *Opportunities for Africa's Newborns: Practical data, policy and programmatic support for newborn care in Africa*. Geneva: World Health Organization.

Macfarlane, J.T., et al., 1997. Reducing consultations for acute lower respiratory tract illness with an information leaflet: a randomized controlled study of patients in primary care. *Br J Gen Pract*, 47(424), pp.719-722.

Magadi, M., et al., 2000. The determinants of delivery care in Kenya. *Social Biology*, 47(3-4), pp.164-188.

Maine, D., et al., 1997. *The design and evaluation of maternal mortality programs*. New York: Columbia University.

Manandhar, D.S., et al., 2004. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial. *The Lancet*, 364(9438), pp.970-979.

Measure DHS, 2012. *Service Provision Assessment survey: core questionnaire*. USA: ORC Macro, Measure DHS.

MEASURE Evaluation, 2001. *Quick Investigation of Quality (QIQ): A User's Guide for Monitoring Quality of Care in Family Planning*. Chapel Hill: University of North Carolina.

Mengesha, Z.B., et al., 2013. Determinants of skilled attendance for delivery in Northwest Ethiopia: a community based nested case control study. *BMC Public Health*, 13(1), p.130.

Messina, D.J., et al., 2009. The relationship between patient satisfaction and inpatient admissions across teaching and nonteaching hospitals. *Journal of healthcare management*, 54(3), p.177.

- Michael, J.M.Q., 2006. *Quality of Care*. USA: Bloomberg School of Public Health, Johns Hopkins University.
- Miller, S., et al., 2003. Quality of care in institutionalized deliveries: the paradox of the Dominican Republic. *International Journal of Gynecology & Obstetrics*, 82(1), pp.89-103.
- Mirkuzie, A.H., et al., 2014. Current evidence on basic emergency obstetric and newborn care services in Addis Ababa, Ethiopia; a cross sectional study. *BMC pregnancy and childbirth*, 14(1), p.354.
- Morris, C. and Bailey, K., 2014. *Measuring health care quality: an overview of quality measures*. USA: Families USA Issue Brief.
- Mosadeghrad, A.M., 2014. Factors influencing healthcare service quality. *International journal of health policy and management*, 3(2), p.77.
- Mpembeni, R.N., et al., 2007. Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets. *BMC pregnancy and childbirth*, 7(1), p.29.
- Nagahama, E.E.I. and Santiago, S.M., 2008. Childbirth practices and challenges for humanization of care in two public hospitals in Southern Brazil. *Cadernos de saúde pública*, 24(8), pp.1859-1868.
- Nair, N., et al., 2010. Improving newborn survival in low-income countries: community-based approaches and lessons from South Asia. *PLoS medicine*, 7(4), p.e1000246.
- National Academies of Sciences, Engineering, and Medicine, 2018. *Crossing the global quality chasm: Improving health care worldwide*. Washington, DC: The National Academies Press.

Ngabo, F., et al., 2012. *Quality of Care for Prevention and Management of Common Maternal and Newborn Complications: Findings from a National Health Facility Survey in Rwanda*. Baltimore, Maryland: JHPIEGO.

Nesbitt, R.C., et al., 2013. Quality along the continuum: a health facility assessment of intrapartum and postnatal care in Ghana. *PloS one*, 8(11), p.e81089.

Ogwang, S., et al., 2009. Assessment of partogram use during labour in rujumbura health Sub district, Rukungiri district, Uganda. *African Health Sciences*, 9(2).

Ollerhead, E. and Osrin, D., 2014. Barriers to and incentives for achieving partograph use in obstetric practice in low-and middle-income countries: a systematic review. *BMC pregnancy and childbirth*, 14(1), p.281.

Olsen, Ø.E., et al., 2005. Human resources for emergency obstetric care in northern Tanzania: distribution of quantity or quality? *Human Resources for Health*, 3(1), p.5.

Opiah, M.M., et al., 2012. Knowledge and utilization of the partograph among midwives in the Niger Delta Region of Nigeria. *African journal of reproductive health*, pp.125-132.

Opondo, C., et al., 2009. Are hospitals prepared to support newborn survival? An evaluation of eight first-referral level hospitals in Kenya. *Tropical Medicine & International Health*, 14(10), pp.1165-1172.

Osamor, P.E. and Grady, C., 2016. Women's autonomy in health care decision-making in developing countries: a synthesis of the literature. *International journal of women's health*, 8, p.191.

Oyesola, R., et al., 1997. Improving emergency obstetric care at a state referral hospital, Kebbi State, Nigeria. *International Journal of Gynecology & Obstetrics*, 59(S2).

Parkhurst, J.O., et al., 2005. Health systems factors influencing maternal health services: a four-country comparison. *Health policy*, 73(2), pp.127-138.

Peugh, J.L. and Enders, C.K., 2004. Missing data in educational research: A review of reporting practices and suggestions for improvement. *Review of educational research*, 74(4), pp.525-556.

Pitchforth, E., et al., 2010. Assessing and understanding quality of care in a labour ward: a pilot study combining clinical and social science perspectives in Gondar, Ethiopia. *Social science & medicine*, 71(10), pp.1739-1748.

Plotkin, M., et al., 2010. *Quality of Care for Prevention and Management of Common Maternal and Newborn Complications: A study of 12 regions in Tanzania. Report 2: Findings on Labour, Delivery and Newborn Care*. Tanzania: USAID.

Polit, D.F., et al., 2006. *Essentials of nursing research. Methods, appraisal and utilization*. Lippincott Williams & Wilkins.

Poortinga, W., 2006. Social relations or social capital? Individual and community health effects of bonding social capital. *Social science & medicine*, 63(1), pp.255-270.

Ramesh, B., et al., 2006. *Maternal health financing—issues and options: a study of Chiranjeevi Yojana in Gujarat* (No. WP2006-08-03). Ahmedabad: Research and Publication Department, Indian Institute of Management.

Randive, B., et al., 2013. India's Conditional Cash Transfer Programme (the JSY) to promote institutional birth: Is there an association between institutional birth proportion and maternal mortality? *PloS one*, 8(6), p.e67452.

- Ransom, E.I., et al., 2002. *Making motherhood safer: overcoming obstacles on the pathway to care*. Geneva, World Health Organization.
- Rasch, V., 2007. Maternal death and the millennium development goals. *Dan Med Bull*, 54(2), pp.167-169.
- Rath, S., et al., 2010. Explaining the impact of a women's group led community mobilisation intervention on maternal and newborn health outcomes: the Ekjut trial process evaluation. *BMC International health and human rights*, 10(1), p.25.
- Rawlins, B.J., et al., 2013. Reproductive health services in Malawi: an evaluation of a quality improvement intervention. *Midwifery*, 29(1), pp.53-59.
- Rigoli, F. and Dussault, G., 2003. The interface between health sector reform and human resources in health. *Human resources for health*, 1(1), p.9.
- Rosen, H.E., et al., 2015. Direct observation of respectful maternity care in five countries: a cross-sectional study of health facilities in East and Southern Africa. *BMC pregnancy and childbirth*, 15(1), p.306.
- Rosenfield, A. and Schwartz, K., 2005. Improving the health of women in developing countries: the time is now. *The Journal of Midwifery & Women's Health*, 50(4), pp.272-274.
- Ross, S.R., 1998. *Promoting quality maternal and newborn care: a reference manual for program managers*. Atlanta, GA: CARE.
- Sandin-Bojö, A.K., et al., 2006. Intrapartal care documented in a Swedish maternity unit and considered in relation to WHO recommendations for care in normal birth. *Midwifery*, 22(3), pp.207-217.
- Sankar, M.J., et al., 2016. When do newborns die? A systematic review of timing of overall and cause-specific neonatal deaths in developing countries. *Journal of Perinatology*, 36(S1), p.S1.

- Sawyer, A., et al., 2013. Measures of satisfaction with care during labour and birth: a comparative review. *BMC pregnancy and childbirth*, 13(1), p.108.
- Say, L. and Raine, R., 2007. A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context. *Bulletin of the World Health Organization*, 85, pp.812-819.
- Say, L., et al., 2014. Global causes of maternal death: a WHO systematic analysis. *The Lancet Global Health*, 2(6), pp.e323-e333.
- Shiferaw, S., et al., 2013. Why do women prefer home births in Ethiopia? *BMC pregnancy and childbirth*, 13(1), p.5.
- Simkhada, B., et al., 2008. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *Journal of advanced nursing*, 61(3), pp.244-260.
- Singh, P.K., et al., 2012. Determinants of maternity care services utilization among married adolescents in rural India. *PloS one*, 7(2), p.e31666.
- Sipsma, H., et al., 2013. Preferences for home delivery in Ethiopia: provider perspectives. *Global public health*, 8(9), pp.1014-1026.
- Sjetne, I.S., et al., 2007. The effect of hospital size and teaching status on patient experiences with hospital care: a multilevel analysis. *Medical care*, pp.252-258.
- Smith, H., et al., 2017. Implementing the WHO integrated tool to assess quality of care for mothers, newborns and children: results and lessons learnt from five districts in Malawi. *BMC pregnancy and childbirth*, 17(1), p.271.
- SNNPR State Health Bureau, 2014. *Annual report on Key Performance Indicators of the Ethiopian Hospital Reform Implementation Guideline (EHRIG) for 2006EFY (2013/14)*. Hawassa: SNNPR State Health Bureau.

SNNPR State Health Bureau, 2011a. *SNNP Region Overview*. Hawassa: SNNPR State Health Bureau.

SNNPR State Health Bureau, 2011b. *SNNP Region Overview*. Hawassa: SNNPR State Health Bureau.

Sobel, H.L., et al., 2011. Immediate newborn care practices delay thermoregulation and breastfeeding initiation. *Acta Paediatrica*, 100(8), pp.1127-1133.

State of Victoria, Department of Human Services, 2008. *A guide to using data for health care quality improvement*. Melbourne: Rural and Regional Health and Aged Care Services Division.

Sharma, G., et al., 2015. Quality care during labour and birth: a multi-country analysis of health system bottlenecks and potential solutions. *BMC pregnancy and childbirth*, 15(2), p.S2.

Souza, J.P., et al., 2013. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. *The Lancet*, 381(9879), pp.1747-1755.

Tamburlini, G., et al., 2013. Improving the quality of maternal and neonatal care: the role of standard based participatory assessments. *PLoS One*, 8(10), p.e78282.

Tatem, A.J., et al., 2014. Mapping for maternal and newborn health: the distributions of women of childbearing age, pregnancies and births. *International journal of health geographics*, 13(1), p.2.

Tayelgn, A., Zegeye, D.T. and Kebede, Y., 2011. Mothers' satisfaction with referral hospital delivery service in Amhara Region, Ethiopia. *BMC pregnancy and childbirth*, 11(1), p.78.

Tchibindat, F., et al., 2004. Bringing together viewpoints of mothers and health workers to enhance monitoring and promotion of growth and development of children: a case study from the Republic of Congo. *Journal of Health, Population and Nutrition*, pp.59-67.

Teferra, A.S., et al., 2012. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, North West of Ethiopia: A community-based cross-sectional study. *BMC pregnancy and childbirth*, 12(1), p.74.

Thaddeus, S. and Maine, D., 1994. Too far to walk: maternal mortality in context. *Social science & medicine*, 38(8), pp.1091-1110.

The Physician Consortium for Performance Improvement, 2010. *Measures Development, Methodology, and Oversight Advisory Committee: Recommendations to PCPI Work Groups on Composite Measures*. USA: American Medical Association.

The Royal College of Midwives, 2014. *High Quality Midwifery Care*. UK: The Royal College of Midwives.

Tinker, A. and Koblinsky, M.A., 1993. *Making motherhood safe*. Washington, DC: The World Bank.

Tripathi, V., et al., 2015. Development and validation of an index to measure the quality of facility-based labor and delivery care processes in sub-Saharan Africa. *PLoS One*, 10(6), p.e0129491.

Tunçalp, Ö., et al., 2015. Quality of care for pregnant women and newborns—the WHO vision. *BJOG: an international journal of obstetrics & gynaecology*, 122(8), pp.1045-1049.

Tura, G., et al., 2014. The effect of birth preparedness and complication readiness on skilled care use: a prospective follow-up study in Southwest Ethiopia. *Reproductive health*, 11(1), p.60.

UNDP, Bureau for Development Policy, 2011. *A Social Determinants Approach to Maternal Health: Roles for Development Actors*. New York: UNDP.

UNFPA, 2012. *Trends in Maternal Health in Ethiopia: Challenges in achieving the MDG for maternal mortality: In-depth Analysis of the EDHS 2000-2011*. Addis Ababa: UNFPA.

UNICEF, 2005. *Useful tools for engaging young people in participatory evaluation*. New York: UNICEF.

UNICEF, 2015. *Ending Preventable Child and Maternal Deaths: A Promise Renewed - Progress Report 2015*. New York: UNICEF.

United Nations, 2012. *The MDGs report 2012*. New York: United Nations.

United Nations, 2010. *Global strategy for women's and children's health*. New York: United Nations.

United Nations, 2015a. *Global strategy for women's, children's and adolescents' health (2016–2030)*. New York: United Nations.

United Nations, 2015b. *Sustainable Development Goals (SDGs)*. New York: United Nations.

USAID Health Care Improvement Project, 2009. *Health Workforce Activity: Engaging Health Workers to Improve Performance, Productivity and Retention*. USA: USAID.

USAID-Ethiopia. (N.D). *Physical Background and Regional Statistical Abstract of Ethiopia*. Addis Ababa: USAID

- Uzochukwu, B.S.C., et al., 2004. Community satisfaction with the quality of maternal and child health services in southeast Nigeria. *East African medical journal*, 81(6), pp.293-299.
- Van den Broek, N.R. and Graham, W.J., 2009. Quality of care for maternal and newborn health: the neglected agenda. *BJOG: An International Journal of Obstetrics & Gynaecology*, 116, pp.18-21.
- Van Lerberghe, W. and De Brouwere, V., 2001. *Reducing maternal mortality in a context of poverty*. Antwerp, Belgium: ITG Press.
- van Walraven, C. and Austin, P., 2012. Administrative database research has unique characteristics that can risk biased results. *Journal of clinical epidemiology*, 65(2), pp.126-131.
- Veenstra, M. and Hofoss, D., 2003. Patient experiences with information in a hospital setting: a multilevel approach. *Medical care*, pp.490-499.
- Villar, J., et al., 2001. The gap between evidence and practice in maternal healthcare. *International Journal of Gynecology & Obstetrics*, 75(S1).
- Walker, M.S., et al., 2003. Patient care in multidisciplinary cancer clinics: does attention to psychosocial needs predict patient satisfaction? *Psycho-Oncology: Journal of the Psychological, Social and Behavioral Dimensions of Cancer*, 12(3), pp.291-300.
- Wang, H., et al., 2016. *Ethiopia health extension program: an institutionalized community approach for universal health coverage*. USA: The World Bank.
- WHO and Health Metrics Network (HMN), 2009. *Strengthening monitoring and evaluation practices in the context of scaling-up the IHP+ compact and Country Health Systems Surveillance platform (CHeSS) of Ethiopia*. Ethiopia: CHeSS/ IHP+ compact project.

WHO, 1989. *Preventing maternal deaths*. Geneva: World Health Organization.

WHO, 1991. *Midwifery education: action for safe motherhood, report of a collaborative pre-congress workshop*. Geneva: World Health Organization.

WHO, 1997. *Linkage Methods for Environment and Health Analysis: Technical Guidelines*. Geneva: WHO, Office of the Global Environmental Health.

WHO, 2004. *Reproductive health strategy to accelerate progress towards the attainment of international development goals and targets*. Geneva: World Health Organization.

WHO, 2005. *Health and the MDGs*. Geneva: World Health Organization.

WHO, 2006a. *The World Health Report 2006: working together for health*. Geneva: World Health Organisation.

WHO, 2006b. *Recommendations on the Prevention of Postpartum Hemorrhage: A Summary of the Results from a WHO Technical Consultation*. Geneva: World Health Organisation.

WHO, 2007. *World Health Statistics: Core Health Indicators*. Geneva: World Health Organization.

WHO, 2010a. *Monitoring the Building Blocks of Health Systems: A handbook of indicators and their measurement strategies*. Geneva: World Health Organization.

WHO, 2010b. *Packages of Interventions for Family Planning, Safe Abortion care, Maternal, Newborn and Child*. Geneva: World Health Organization.

WHO, 2010c. *Working with Individuals, Families and Communities*. Geneva: World Health Organization, Department of Making Pregnancy Safer.

WHO, 2011a. *Monitoring MNCH: understanding key progress indicators*. Geneva: World Health Organization.

WHO, 2011b. *District Planning Tool for MNH Strategy Implementation: A practical tool for strengthening Health Management System*. Geneva: World Health Organization.

WHO, 2012. *Measuring service availability and readiness: A health facility assessment methodology for monitoring health system strengthening: Service availability indicators*. Geneva: World Health Organization.

WHO, 2014. *Every newborn: An action plan to end preventable deaths*. Geneva: World Health Organization.

WHO, 2015a. *Strategies toward Ending Preventable Maternal Mortality*. Geneva: World Health Organization.

WHO, 2015b. *Safe Childbirth Checklist Implementation Guide: Improving the quality of facility-based delivery for mothers and newborns*. Geneva: World Health Organization.

WHO, 2015c. *Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice*. Geneva: World Health Organization.

WHO, 2016a. *Standards for Improving Quality of MNHC in Health Facilities*. Geneva: World Health Organization.

WHO, 2016b. *World Health Statistics 2016: Monitoring health for the sustainable development goals*. Geneva: World Health Organization.

WHO, 2018a. *Handbook for national quality policy and strategy: a practical approach for developing policy and strategy to improve quality of care*. Geneva: World Health Organization.

WHO, 2018b. *Quality, equity, dignity: the network to improve quality of care for maternal, newborn and child health – strategic objectives*. Geneva: World Health Organization.

WHO, ICM and FIGO, 2004. *Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO*. Geneva: World Health Organization.

WHO, UNICEF, UNFPA, The World Bank, United Nations Population Division and Maternal Mortality Estimation Interagency Group, 2013. *Maternal Mortality in 1990-2013*. USA: WHO, UNFPA, The World Bank, and United Nations Population Division Maternal Mortality Estimation Inter-Agency Group.

WHO, UNICEF, UNFPA, World Bank Group, United Nations Population Division, 2015. *Trends in maternal mortality: 1990-2015*. Geneva: World Health Organization.

Wild, K., et al., 2010. Birth choices in Timor-Leste: a framework for understanding the use of maternal health services in low resource settings. *Social science & medicine*, 71(11), pp.2038-2045.

Work Group for Community Health and Development, 2015. *Community Tool Box for Evaluation of Community Programs*. Kansas: The University of Kansas.

Worku A.G., et al., 2013a. Factors affecting utilization of skilled maternal care in Northwest Ethiopia: a multilevel analysis. *BMC International Health and Human Rights*; 13(20).

Worku A.G., et al., 2013b. Availability and components of maternity services according to providers and users' perspectives in North Gondar, northwest Ethiopia. *Reproductive Health*; 10(43).

World Bank, 2018. *Current health expenditure per capita (current US\$)*. Washington, DC: World Bank.

World Vision Ethiopia, 2014. *Causes of Low Skilled-Birth Attendance Coverage in Selected Woredas of Amhara, Oromia and SNNP Regions: Formative Assessment*. Addis Ababa: World Vision Ethiopia.

Yale GHFI, 2013. *Ethiopian Hospital Management Initiative (EHMI) 2013 Annual Report: L&D Clinical Audit Revised Tool*. Addis Ababa: Ethiopia.

Yifru B. and Asres B., 2014a. Reasons for Persistently High Maternal and Perinatal Mortalities in Ethiopia: Part I-Health System Factors. *Ethiop J Health Sci, Special Issue*; 24, pp. 137–148.

Yifru B. and Asres B., 2014b. A Meta-Analysis of Socio-Demographic Factors Predicting Birth in Health Facility. *Ethiop J Health Sci; Special Issue*; 24, pp. 81–92.

Yifru B. and Asres B., 2014c. Actions in the Pipeline and the Way Forward To Reduce Maternal and Perinatal Mortality in Ethiopia. *Ethiop J Health Sci, Special Issue*; 24, pp. 149–168.

Yifru B. and Asres B., 2014d. Perinatal Mortality Trends in Ethiopia. *Ethiop J Health Sci, Special Issue*; 24, pp. 29–40.

Yigzaw T., et al., 2017. Quality of Midwife-provided Intrapartum Care in Amhara Regional State, Ethiopia; *BMC Pregnancy and Childbirth*, 17:261. DOI 10.1186/s12884-017-1441-2.

Zizza A., et al., 2011. Caesarean Section in the World: a new ecological approach; *J PREV MED HYG*; 52, pp. 161-173.

ANNEXES

ANNEX A: Summary of studies conducted on quality of childbirth care in Ethiopia (studies containing any of the elements of quality of care)

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
Andrew et al. (2014)	To produce high resolution datasets depicting estimates of numbers of people, women of childbearing age, live births and pregnancies, and distribution of CEmONC facilities	Demographic mapping methods, Satellite maps of settlements and land cover were constructed to redistribute areal census counts to produce detailed maps of the distributions of women of childbearing age.	Four countries large high burden of maternal and neonatal mortality: Afghanistan, Bangladesh, Ethiopia and Tanzania	Variable ANC, SBA and PNC coverage in all countries, between urban/rural and socio-economic quintiles. Barriers are beyond the geographical location of services. There are localities where increasing numbers of births don't match with increases in availability of MNH workforce, leading to a poor MNH situation even with improving national picture. In Ethiopia, there is potential risk to women and babies living within 50 km of a CEmONC facility (who travel >2 hours by motorised transport).
Meseret et al. (2013)	To assess availability, quality and utilization of EmOC services in Gamo Gofa Zone, Southwest Ethiopia.	Retrospective record review	Mothers treated and served from July 2009 to June 2010, in 3 hospitals and 63 HCs in Gamo Gofa Zone	3 BEmOC & 2 CEmOC facilities qualified for 1,740,885 people. SBA rate of 6.6% of expected births. Districts with a high proportion of midwives & hospitals & HCs capable of doing emergency C/C had high SBA rates. 521 C/Cs (0.8% of 64,413 expected deliveries & 12.3% of 4,231 facility

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				births). 79(1.9%) maternal deaths out of 4,231 deliveries, mostly due to PPH (42%), obstructed labour (15%) & puerperal sepsis (15%). Remote districts had lower institutional births (<2% of expected births compared to overall average of 6.6%). Remote institutions had very high maternal deaths (>4% of deliveries vs. 1.9% average).
Worku et al. (2013a)	To examine the effect of cluster variation & individual, communal (kebele) & facility related variables for skilled maternal care utilization.	Linked facility and population-based survey Facility survey, provider survey Interview with facility managers/heads, providers and clients and observations	1668 women who had births in North Gondar Zone, Ethiopia, in the year preceding the survey	Observed significant heterogeneity among clusters for each indicator of skilled maternal care. Communal factors and health facility characteristics were more relevant. Presence of all six signal functions in the nearby BEmOC facility (HC) increased SBA rate about two times compared to those HCs with at least one function is missing.
Worku et al. (2013b)	To examine availability and components of maternity services according to providers and users perspectives	Linked facility and population-based survey Facility survey, provider survey Interview with facility managers/heads, providers and	Managers/heads of 12 HCs and 3 hospitals) in North Gondar Zone, Services providers in these facilities, Clients who used	ANC & delivery cares were available in most facilities, but majority of them were not fully functioning to their level for EmOC. Signal functions were missing in 5-7HCs. 1 hospital met the criteria for

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
Yifru and Asres (2014a)		clients and observations	services from Jan to Mar 2012	CEmOC (performed CS). 24% of providers used partograph consistently. 13.8% of women received SBA. During delivery, 80% had their B/P measured, 78% were informed on labor progress, 89% had auscultation of FHB, & 80% took drugs to prevent bleeding. Essential drugs were available in all facilities. The following equipment were either missing or nonfunctional: thermometers in 5 facilities, sphygmomanometers in 7, fetoscopes in 2, delivery set in 5, episiotomy set in 5, vacuum extractor in 10, MVA set in 8, bag and mask for neonatal resuscitation in 7, sterilizer in 5 & refrigerator in 8. Similarly, private consultation rooms in 5, delivery room in 5, toilet facilities in 7, water supply in 8 & drainage system in labor ward in 13 facilities were either missing or nonfunctional.
	To assess health system factors for	Literature review	Literature for the period of 1980 to 2012	All types of physicians per 10,000 people is 0.1 to 0.3 and hospitals

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
	maternal and perinatal mortalities in Ethiopia			per 100,000 people is 0.1 to 0.2, which is among the lowest in Africa, which might have contributed to the high maternal and perinatal mortality. Negative correlation was evidenced between maternal mortality ratio, stillbirth and neonatal mortality rates with number of physicians and hospitals. Beyond the number, the available hospitals were not well equipped to treat some common causes of maternal and perinatal mortality
Emma et al. (2010)	To best understand issues affecting quality of clinical care in labour ward of Gondar Referral Hospital, Ethiopia	Pilot study combining clinical and social science perspectives and methods	Labour ward staff at Gondar Referral Hospital	High levels of knowledge and compliance with most aspects of good clinical practice Non-compliance was affected by different inter-linked resource constraints.
Keseteberhan et al. (2011)	To assess the availability and quality of EMONC in Ethiopia,	Facility visit administered standard questionnaire, Review of recent cesarean deliveries, partographs & maternal deaths	All licensed hospitals & HCs in the country	Too few facilities provided EmONC to meet the UN standards of 5:500 000 population. Only 7% delivered in institutions of any type; 3% in facilities that routinely provide all the signal functions. Only 6% of women with obstetric complications are treated in any health facility, half of whom

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				are treated in fully functional EmONC facilities. Nationwide, 0.6% of expected deliveries were by cesarean. Mortality rate for women with serious obstetric complications (case fatality rate) was 2%.
Asnake et al. (2013)	To assess the status of desired MCH practices and service utilization among families benefiting from the HEP in SNNPR, Ethiopia	Cross-sectional comparative study, Comparison of selected variables MCH service utilization was made between a	690 model families and 686 non-model families in Wolayta and Kembata Tembaro Zones,	Model families performed better than non-model families in utilizing MHC services. Government's decision of making all households models through the implementation of the health development army is a timely decision.
Rosemary et al. (2015)	To explore barriers and facilitators to access SBA in Afar Region, Ethiopia.	Questionnaires, Indepth interviews Focus group discussions	14 HEWs, 33 childbearing women 8 other health workers	Facilitators were provision of friendly services, presence of female SBAs & introduction of ambulance service. Barriers were women's low status & restricted opportunities for decision making, lack of confidence in health-care facilities, long distances, cost, domestic workload & traditional practices which include a preference for birthing at home with traditional birth attendant.
Gurmesa et al. (2014)	To determine the effect of birth	Prospective study	Randomly selected 3472 mothers in	Utilization rate of skilled care was low (17.5%). Factors

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
	preparedness and complication readiness on skilled care use in Southwest Ethiopia		Southwest Ethiopia.	affecting utilization exist both at community & individual levels. Having a plan to use skilled care during pregnancy significantly increased the actual use. Place of residence and access to BEmOC (HC) were the higher (cluster) level determinants. While having access to BEmOC (HC) within 2 hours distance on foot was more likely to use skilled care, having access to CEmOC (hospital) within 2 hours distance on foot didn't have significant effect. Maternal education, wealth quintiles, number of pregnancy (gravida), knowledge of key danger signs during labor & ANC use were the lower (individual) level determinants.
Tayelgn et al. (2011)	To measure mothers' satisfaction with referral hospital delivery service	Hospital-based cross-sectional survey, Satisfaction survey instrument	417 delivering mothers who used three referral hospitals in Ethiopia from September to November 2009 were enrolled	Satisfaction rate was suboptimal (61.9%). Satisfaction was associated with wanted status of the pregnancy, immediate maternal condition after delivery, waiting time worker, availability of waiting area, privacy during examinations, and service cost. Health facility related factors and health

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				providers' characteristics were important predictors of overall satisfaction. Overall, 69.1% of women were very likely to recommend the hospital to others and 68.8% are likely to deliver in the hospital again. Mothers without complication were more likely to be satisfied than their counterparts.
Bradley et al. (2011)	To determine impact of a systems-based approach to improving rural care, the Ethiopian Millennium Rural Initiative, on key services indicators	18-month longitudinal mixed methods study of the 10 PHCUs serving 400000 people, using monthly indicator tracking and focus groups.	10 PHCUs and 140 focus group participants	Significant increases in ANC coverage, SBA rates, HIV testing in ANC. Outpatient visit rates also improved. Communities recognized substantial improvements but also voiced continued unmet needs.
Bradley et al. (2012)	To examine variation in impact of a health systems strengthening intervention and understand factors that might explain the variation in impact across PHCUs.	Mixed methods positive deviance study Longitudinal data from the Ethiopia Millennium Rural Initiative (EMRI), In-depth interviews & constant comparative analysis of qualitative data	20 PHCUs in rural Ethiopia, 51 in-depth interview participants	Although overall performance is improving due to the HEP, outcomes are still varied across the country; recent research has identified what distinguishes higher and lower performing Ethiopian health centers in terms of ANC coverage, SBA, and HIV testing for women in ANC. PHCUs with higher performance demonstrated greater managerial problem

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				solving capacity, stronger between PHCU & woreda health office, & greater engagement of religious & government leaders in community mobilization for health.
Shiferaw et al. (2013)	To understand why Ethiopian women might continue to prefer home delivery even when facility based delivery is available at minimal cost.	Mixed study design: cross sectional household survey combined with in-depth interviews and focus group discussions	15–49 year old women	71% of mothers received ANC & 16% SBA rate. Reasons for not seeking institutional delivery were the belief that it is not necessary and not customary, high cost and distance or lack of transportation. Traditional birth attendants were seen as culturally acceptable and competent health workers. Women reported poor quality of care and previous negative experiences with health facilities. Women's low awareness on the advantages of skilled attendance at delivery, little role in making decisions and economic constraints contribute to the low utilization.
Sipsma et al. (2013)	To determine factors influencing facility delivery from providers' perspectives	Qualitative study using in-depth interviews and the constant comparative	Providers' in rural Ethiopia	Influences on women's decisions to deliver at home are multiple, including inadequate resources in facilities; unappealing aspects of

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
		method of data analysis.		delivery in facility settings; and known barriers to accessing services such as distance, transportation and cost. Their perspectives importance of a patient-centred approach to delivery services is underscored, which is fundamental but often lacking.
Mirkuzie et al. (2014)	To examine progress in the implementation of BEmONC in Addis Ababa & compare with the 2008 survey.	Before-After-Cross sectional studies of an intervention project (BEmONC knowledge & skills) Baseline survey from Jan to Mar 2013. Retrospective routine record review Facility observation Using standard tools	29 public HCs & 25 providers in 2008 10 public HCs & 24 providers in 2013 participated	Persistently poor providers' competence contributing to quality gaps on BEmONC despite advances in infrastructure, medical supplies & personnel. Post intervention, all HCs had continuous water supply, reliable access to telephone, logbooks & partograph. 50% of HCs post intervention and, 34% pre-intervention accessed 24 hours ambulance services. In 2013, ratio of providers for 100 expected deliveries was 10.3 for midwives and 14.2 for a SBA (midwives plus nurses). All HCs had a formal fee waiver system in 2013. HCs reporting a consistent supply of uterotonic drugs were 85% in 2008 & 100% in 2013.

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
HEPCAPS1 Project Team (2012)				Majority of providers had insufficient knowledge in diagnosing PPH & birth asphyxia & poor skills in neonatal resuscitation. No significant improvements were observed in providers' knowledge & competence post intervention on PPH management & essential newborn care.
	To better comprehend the situation of agrarian, pastoral and urban HEP.	Extensive literature review Key informant and group interviews	Comprehensive literature review of EDHS (2000, 2005, 2011) & UNICEF's HEP Evaluation (2010) 50 key informant & group interviews	Overall, very positive and impressive increase in access to health promotion, prevention and curative services through the HEP. Rapid expansion of critical health infrastructure and human resources resulted in dramatic improvements in performance indicators. However, there are still many hurdles to attain health outcomes of a middle income country in the next 20 years. HEP alone will not be able to accomplish achievement of goals like MDG 5. Ethiopia needs to improve indicators like institutional deliveries and ANC.

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
Mulumebet et al. (2011)	To assess predictors of safe delivery service utilization in Arsi Zone, Southeast Ethiopia.	Cross sectional community based study using quantitative and qualitative methods	1089 women who gave birth 1 year prior to the study from 9 rural and 4 urban kebeles in 3 woredas	SBA was low. Maternal education, her birth experience and her use of ANC are important predictors.
Mengesha et al. (2013)	To identify determinants of SBA in Northwest Ethiopia	Community based nested case control study of data from infant mortality prospective follow up study & structured questionnaire		Women's education, place of residence, frequency of ANC visit and use of family planning were determinants of SBA.
UNFPA (2012)	To analyse in-depth on progresses and challenges in achieving MDG5 of reducing maternal mortality in Ethiopia to provide up-to-date information and identify areas for improvement.	Descriptive, trend & regression analyses using EDHS 2000, 2005 & 2011 data, Developed a Maternal Death Risk Factors Index (MDRFI) based on several intermediate determinants to highlight regional disparities in maternal mortality burden (which solved the lack of disaggregated data on maternal mortality by region)	21,971 women who had a live birth in 5 year preceding the 3 EDHS.	Maternal mortality burden by region, urban-rural residence & socio-economics: The predicted maternal mortality ratios (MMRs) for 2011 is higher than the national average (676/100,000 live births) in 5 regions. The burden is highest in Somali (747/100,000 live births) & Afar (717/100,000 live births) regions, followed by SNNPR (694/100,000 live births), Amhara (690/100,000 live births), and Oromiya (688/100,000 live births). Compared to Addis Ababa, it is about 3 times higher in Somali & Afar regions. The 3 most populous reigns of the country:

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				<p>SNNP, Oromiya & Amhara, constitute over 75% of the country's population & significantly influence the overall MMR. Urban-rural & socio-economic differentials are apparent in maternal mortality. MMR for urban areas was higher than the rural. Educated & wealthier women had a relatively lower burden. Those with secondary or higher education had lowest risk and, higher wealth is also associated with lower risk. SBA: At the current pace, the proportion of Ethiopian women who will use SBA is predicted to be 20.9% by 2015; rural (6%) & urban (54.5%). Regional variation in SBA rate was apparent in 2011, the highest being in Addis Ababa (83.4%), followed by Dire Dawa (949.9%), Harari (39.2%) & Gambella (31.4%). SNNPR had 9.4% SBA rate in the same year. CS: A higher CS rate suggests the better availability of EmOC services. It is well recognized that very low &/or very high levels of CS (5-15%)</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				<p>are dangerous.</p> <p>Overall, CS delivery is extremely low with a coverage rate as low as 1.8%. It was below 2% in 7 of 11 regions, ranging from 8-10% in Gambella, Harai & Dire Dawa. Addis Ababa had highest CS rate (20%). Determinants of SBA: revolve around contextual, socioeconomic & fertility behavior. There is dose-response relationship between ANC visits & SBA. Higher number of ANC visits is associated with increased SBA, while one visit has no effect. Urban women were significantly more likely to use SBA. Women in most regions, except Dire Dawa, Harari & Benishangul Gumuz, were less likely to use SBA than those in Addis Ababa. Both elementary & secondary education was associated with higher SBA. Secondary or higher education carried a 2.4 times higher odds of SBA. Women in households with high wealth score were 1.54 times more likely to use SBA & those who just initiated child</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
CSA Ethiopia (2014)	To measure the progress of the health sector goals by providing updated information on key health indicators since 2011 EDHS, the third DHS in the country.	Nationwide survey using structured questionnaire	8,070 women of age 15-49 year	<p>bearing were more likely to use.</p> <p>ANC: 40% received ANC from a skilled provider for their most recent birth. 32% made ≥ 4 ANC visits. Urban women were more than twice as likely as rural women to use ANC. SBA: continues to be low (15%), 14% in public & 1% in private facilities. First births are much more likely than births of order ≥ 6 to be delivered in a health facility (36% vs 7%). Facility birth is more common among births to mothers below age 35, births to mothers who had ≥ 4 ANC visits & births to highly educated mothers & mothers in the highest wealth quintile. Urban births are six times more likely than rural births to be delivered in a health facility (63% vs 10%). PNC: coverage is extremely low. Only 12% of women received PNC in the first 2 days of delivery. A large proportion of maternal & neonatal deaths in Ethiopia occur during 48 hours after delivery.</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
Negalign and Yohannes (2013)	To assess utilization of clean & safe delivery service (by HEWs) & associated factors in rural kebeles of Kafa Zone, Ethiopia.	Community based cross sectional survey using multistage sampling technique & structured questionnaire	229 mothers who gave birth 12 months prior to the survey representing 3 of the 10 woredas in the zone	Utilization of clean & safe delivery service is low (19%), determined by women's educational status, knowledge of danger signs & ANC visit. Women with formal schooling & those who knew at least 2 danger signs of pregnancy & labor were more likely to use the service. 33.3% of mothers who had at least 1 ANC visit were not advised about danger signs & those advised were more likely to use.
Getachew et al. (2011)	To determine frequency & quality of interventions that address direct causes of maternal & neonatal deaths & to guide the need for & content of QI activities for MNHC at hospital level in Ethiopia	Cross-sectional nationwide survey as part of a multi-country study using: facility inventory checklist, structured clinical observation checklists for ANC, L&D & obstetric & newborn complications; structured provider interview guide & knowledge tests on L&D practices & national policy & drug review tool	19 public hospitals with the heaviest volume of deliveries (at least 5 per day on average) Interviews with 79 health workers & observations of 126 ANC & 192 deliveries	Overall: quality was below internationally accepted standards for ANC, L&D & newborn care. Providers' knowledge of: management of PPH, PE/E & asphyxia; & signs of obstructed labor was low. PPH: 29% of women received full components of AMTSL, with nearly 100% oxytocin use. Preeclampsia/eclampsia (PE/E): BP was commonly checked during ANC & L&D, but providers rarely asked about symptoms & signs of PE/E or counseled to return if developed signs & symptoms.

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				<p>Magnesium sulfate was rarely available in L&D wards (only in 3/19 hospitals).</p> <p>Obstructed labor: partograph use was very low (despite availability). If at all, they were not always filled out correctly & completely. CS was underused: 7/19 hospitals performed no CS in the previous 3 months. Postpartum sepsis in mother & newborn: Except hand washing & use of protective clothing, IP practice was generally good. Newborn care: Skin-to-skin care practice is especially low.</p>
Bartlett et al. (2015)	To assess the quality of facility-based AMTSL in six countries in sub-Saharan Africa.	Cross-sectional study of direct observation of L&D care was conducted between 2009 and 2012 as part of a multi-country study., focusing on normal delivery care practice and use of uterotonic medicines, controlled cord traction and uterine massage Facility infrastructure and supplies needed for active	Direct observation of 2317 women during third stage of labour in 390 health facilities in Ethiopia, Kenya, Madagascar, Mozambique, Rwanda & Tanzania, of which, 117 observations from 19 hospitals represented Ethiopia	<p>Overall: high quality & coverage of AMTSL in the study countries.</p> <p>SBA: Providers with nurse or midwifery training performed most of the observed deliveries, 71% in Ethiopia. Frequency of provider training in AMTSL was low. Relevant guidelines were frequently unavailable in delivery rooms. In the previous 3 years, 42% of providers received pre-service or in-service training in delivery care & 36% trained in</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
		management were audited and relevant guidelines reviewed using customized forms.		<p>AMTSL.79 Ethiopian providers (n=192) received training (51% on delivery care & 38% on AMTSL).</p> <p>Availability of uterotonic: 91% of facilities had at least 1 uterotonic in delivery room & 87% had oxytocin. In Tanzania, only 75% of facilities had oxytocin available onsite. Syringes & needles to administer oxytocin were available in almost all facilities. 44% of facilities displayed clinical guidelines for a normal delivery, either on a wall or in another easily visible location, of which, 22% were Ethiopian facilities.</p> <p>Individual management components: Uterotonic administration was nearly universal & oxytocin was the most frequently used one. Only 52% of women given a uterotonic at any time received it within a minute of birth & 76% within 3 minutes. 50 women developed PPH & all given oxytocin except a woman. In Ethiopia, 97% (n=117) of deliveries were given any uterotonic (98%</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
Rosen et al. (2015)	To describe the quality of respectful maternity care in diverse facility settings in East and Southern Africa	Facility inventory survey and L&D care observation using structured & standardized checklists	Analysis of select data from a series of cross-sectional surveys conducted in 2009–2012 by the Maternal & Child Health Integrated Program (MCHIP) to assess quality of care in Ethiopia, Kenya, Madagascar, Rwanda & Tanzania. A total of 2164 L&D care observations were conducted, of which, 192 were from 19 Ethiopian hospitals	<p>oxytocin & 2% ergometrine), of which, 79% were given in <1 minute, 13% in 1–3 minutes & 8% in >3 minutes after birth.</p> <p>Overall: though women were treated with dignity & in a supportive manner overall, efforts to increase use of facility-based maternity care in low income countries are unlikely to achieve the desired gains if there is no improvement in quality of care especially elements of respectful care. Failure to adopt a patient-centered approach & a lack of health system resources are contributing structural factors, including inadequate interpersonal communication by providers, abandonment & delays in care including a lack of routine monitoring & inadequate privacy protection. Most births were attended by nurses & midwives (87%) who were female (87%). Medical & nursing students & unskilled assistants attended 5%. In Ethiopia, doctors</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				<p>assisted 20% of births.</p> <p>Information, informed consent & respect for her preferences: At initial consultation (usually admission in labor), providers explained procedures prior to actions in 62% of cases & shared their findings with clients in 67%. Ethiopian clients received this type of information least often (37.7% & 40.6%, respectively).</p> <p>Providers encouraged clients to ask any questions during this initial interaction only in a third of observations. 16 % of Ethiopian women were asked if they had any questions compared to 42 % of Rwandan women. In first stage of labor in 56% of observations, provider explained to client what to expect during labor. 22-43% was encouraged to have a friend or relative with them for support (33.6% in Ethiopia). More than half were encouraged to ambulate or assume alternative labor positions, except in Ethiopia. An Ethiopian observer's open-ended comment is reported as: "no one</p>

AUTHOR(S) (YEAR)	STUDY AIMS	METHODOLOGY	STUDY POPULATION	KEY RESULTS
				<p>provided components of mother friendly care; nothing had been informed regarding progress & findings to the client.”</p> <p>Privacy & confidentiality: Half or more were draped in Rwanda & Madagascar, but less commonly in other countries. In Tanzania, Kenya, Madagascar & Rwanda, more than half delivered in rooms with auditory & visual privacy (54%, 65%, 72% & 77%, respectively). Most women in Zanzibar & Ethiopia were in shared delivery rooms with no curtains to separate & no way to talk without being overheard. Treatment with dignity & respect: 83% were offered respectful greeting by provider & 86% were supported in a friendly way by their provider during first stage of labor. All countries except Ethiopia scored 80% or higher in friendly support.</p>

ANNEXE B: Facility Audit Checklist

Instructions: Complete this inventory checklist by filling with an appropriate number, or by ticking in an appropriate box. Verify the existence of functional equipment and supplies and the condition of the hospital through observation and by asking the head of L&D case team if need be. Place an “X” in the YES column if the item/service is available and functions correctly. Place an “X” in the NO column if the item/service is not available or does not function correctly. That is, the equipment and supplies must be functional at the time of assessment in order to be ticked as YES.

Cover Page		
Date of assessment: _____		
Name of hospital: _____		
Type of hospital:		
1) Teaching		
2) Non-teaching		
Name of data collector: _____		Signature of data collector: _____
Name of supervisor: _____		Signature of supervisor: _____
Section 1: Availability of Human Resource		
Q101: What is the number of FULLTIME skilled birth attendants currently working in maternity ward?	Number	
1) Gynecology/Obstetrics specialist		
2) Integrated Emergency Surgical Officer (MSc)		
3) General Practitioner		
4) Health Officer		
5) Nurse		
6) Midwife (direct entry trained as a midwife)		
7) Nurse midwife (initially qualified as a nurse, then trained as a midwife)		
Q102: Is one or more of the above listed skilled birth attendants ALWAYS present at the hospital, or on-call 24 hours/day; including weekends for routine L & D care (of normal labours)?	Yes	No
Q103: In the last 12 months have the current staff been trained on:	Yes	No
1) Basic Emergency Obstetric Care?		
2) Comprehensive Emergency Obstetric Care?		
3) Integrated Management of Newborn and Childhood Illnesses?		
Section 2: Availability of Basic Infrastructure		
Does the hospital have the following General Infrastructure?	Yes	No
Q201: Continuous electricity supply 24 hours a day and 7 days a week		
Q202: A reliable backup source in case of power cut (e.g., an automatic generator or that can be started within 5 minutes)		
Q203: Continuous water supply 24 hours a day and 7 days a week with reliable backup source		
Q204: Telephone service for internal communication		
Q205: Telephone service in the compound for use by patients or their families		
Does the hospital have the following Infrastructure specific for L&D Care?		
Q206: Suggestion box or log for handling complaints in the labor ward		→ Go to Q208
Q207: Suggestions are evaluated and documented at least weekly		

Q208: Functional ambulance or other vehicle is stationed at the hospital or operates from the hospital for emergency transportation for clients		
Q209: Well ventilated rooms for:		
1) First stage labor		
2) Second stage labor		
Q210: Neither too cold or too hot rooms (with good temperature) for:		
1) First stage labour		
2) Second stage labour		
Q211: Screens or curtains in the rooms to ensure privacy		
Q212: Sufficient space for women at first stage of labor & for one companion to walk around		
Q215: Tap water in the labor ward		
Q216: Functional sinks with detergents in the labor ward		
Q217: Functional & clean toilet with the following elements in the labor ward:		
1) Door		
2) Hand washing basin		
3) Soap		
Q218: Functional autoclave/dry oven in the labor ward		
Q219: All laboring mothers go directly to labor ward before any administrative procedure		
Q220: There is emergency triage for sick pregnant mothers who are not in labor		
Q221: What is the total number of maternity beds for first stage labor		
Q222: What is the total number of delivery couches for second stage labor		
Section 3: Availability of Essential Drugs, Supplies & Equipment in L&D Ward		
Does the hospital have the following drugs & supplies in emergency drug cabinet of L&D ward?	Yes	No
Q301: Uterotonic drugs		
1) Oxytocin injection		
2) Misoprostol PO		
3) Ergometrine		
Q302: Antihypertensive drugs		
1) Nifedipine		
2) Hydralazine		
Q303: Other drugs		
1) Magnesium sulphate		
2) Diazepam		
3) Lidocaine		
4) Atropine		
5) Calcium gluconate		
6) Vitamin K		
7) Tetracycline eye ointment		
8) Ampicillin IV		
9) TDF/3TC/EFV (ARV drugs)		
10) Nevirapine syrup		
11) Aminophylline		
12) Adrenaline		
13) Hydrocortisone		
Q304: Supplies		
1. HIV test kits (KHB, Stat pack)		
2. 40% glucose		
3. IV fluids (crystalloids)		

4. IV Cannula		
5. Syringe & needle		
6. Sterile gloves		
7. IV stand		
8. Mask for oxygen administration		
9. Towels for drying and wrapping new-born babies		
10. Long sleeve glove for removal of retained placenta		
Q305: Does the hospital have the following equipment in L&D ward?		
1. Sphygmomanometer (BP apparatus)		
2. Stethoscope		
3. Suction machine portable		
4. Pinnard stethoscope (Fetoscope)/doppler		
5. Ultra Sound		
6. Thermometer		
7. Filled oxygen tank with flow meter		
8. Nasal prongs for oxygen administration		
9. Catheter for oxygen administration		
10. 5 delivery sets, at least two sterile		
11. Sterile suture kit		
12. Forceps		
13. Vacuum extractor		
14. Urinary Catheter		
15. Stand lamp		
16. Speculum for vaginal examination		
17. Craniotomy set		
18. Sterilizer (Steam or dry)		
19. A new born sized Ambu bag (with volume of 250 ml/less)		
20. Bed with accessories		
21. Cord cutting/clumping set		
22. Radiant Warmer		
23. Weighing scale for baby		
24. Tape to measure baby length and head circumference		
25. Functioning clock		
26. Two Episiotomy sets		
27. Suction bulb for new-born resuscitation		
28. An emergency drug cabinet that has labeled essential drugs		
29. A functional refrigerator		
Q306: Are the following personal protective equipment & consumables available in the L&D ward for infection prevention?		
1. Goggle		
2. Boots		
3. Apron		
4. Gloves		
5. Gown		
6. Alcohol		
7. Chlorine		
8. Adequate yellow & black color-coded waste collecting bins		
9. Adequate safety boxes		
Section 4: Availability of Guidelines & Regular Audits for Improving Quality of L&D Care		
Are the following guidelines & protocols are available &/or clearly posted?	Yes	No
Q501: Management protocol on selected obstetrics topics, FMOH 2010 version?		

Q502: Magnesium Sulphate administration protocol?		
Q503: Infection prevention guideline?		
Q504: Hand washing poster?		
Q505: Newborn corner guideline?		
Q506: Newborn resuscitation flow chart/Helping Babies Breathe Poster?		
Q507: Active management of third stage of labor poster?		
Q508: A MNHC QI subcommittee is established from different case teams		→ Go to Q511
Q509: A focal person is assigned to coordinate the QI team		
Q510: The subcommittee has a regular meeting at least every two weeks that is documented		
Q511: Hospital conducts a regular monthly mortality and morbidity rounds/audits & provides recommendations		→ Go to SECTION 6
Q512: Recommendations from the rounds/audits are discussed & documented		
Q513: Recommendations from the rounds/audits are implemented		
Section 5: Availability of Laboratory Services and Safe Blood		
Q601: Does the hospital always offer the following lab tests and services for laboring mothers? <i>(Please, tick 'YES' only if the test or service is always available)</i>	Yes	No
1) Blood glucose		
2) Haemoglobin		
3) Haematocrit (PCV)		
4) Blood grouping		
5) Rhesus antibodies		
6) Urine dipstick		
7) Urine microscopy		
8) Full blood count		
9) Liver function tests		
10) Renal function tests		
11) HIV test		
12) CD4 count or HIV plasma viral loads		
13) Bilirubin		
14) Serum protein and albumin		
15) Rapid test for syphilis		
16) Microscopy or Rapid Diagnostic Test (RDT) for malaria parasites		
17) Cerebrospinal Fluid (CSF) microscopy		
18) Blood from blood bank for transfusion and stored properly in a fridge with temperature record		→ END
19) Blood transfusion is provided without replacement		

ANNEX C: Checklist for Direct Observation of Normal Labor

Cover Page: General Information			
Date of observation: _____			
Hospital name: _____			
Hospital code: _____			
Type of hospital:			
1. Teaching			
2. Non-teaching			
Observation code: _____			
Cervical dilatation at consent: _____ centimeter			
Time of initial clinical assessment in labour ward: _____			
Q1: Category of all health professionals on shift whose actions are to be monitored in this observation:	Q2: Total number of health professionals in each category:	Q3: Sex of health professionals in each category:	
		1) Male	2) Female
1) Gynecology/Obstetrics specialist			
2) Integrated Emergency Surgical Officer (IESO)			
3) General Practitioner			
4) Health Officer			
5) Midwife (direct entry trained as a midwife)			
6) Nurse			
7) Nurse midwife (initially qualified as a nurse, then trained as a midwife)			
8) Other (Specify) _____			
Name of data collector: _____	Signature of data collector: _____		
Name of supervisor: _____	Signature of supervisor: _____		

Section 1: Extracted (Non-Observed) Data on Initial Assessment of the Woman in Labour		
<i>Instruction:</i> At the end of the observation session, review clinical records of the woman and transfer data about her initial assessments (history and physical examination) to complete this section. As you are approaching the woman after she has already been admitted, you don't have the chance to observe her initial assessments directly.		
Time woman is assessed: _____ Time this data is extracted: _____.		
HISTORY	1) Yes 2) No	
Q101: Are the following personal identifiers of the woman recorded?		
01) Admission date		
02) Admission time		→Go to 04
03) Record the admission time: _____		
04) Name		
05) Age		→Go to 07
06) Record her age: _____		
07) Address		
Q102: Are the following elements of history of the present pregnancy recorded?		
01) Number of previous pregnancies		→Go to 03
02) Record the number of previous pregnancies: _____		
03) Number of previous births		→Go to 05
04) Record the number of previous births: _____		
05) ANC use		→Go to 07
06) Record the number of ANC visits: _____		

07) If the woman has any problems		→Go to Q103
08) List the problems she encountered: _____		
Q103: Is any one (at least) of the following aspects of obstetric history of the woman recorded? A cesarean section, ruptured uterus, or any surgery to the uterus during a previous childbirth?		

HISTORY

Q104: Are the following elements of **medical history** of the woman recorded? (**Note:** For elements listed from 01 to 05, please, check “Yes” only if the test status is recorded on the chart (i.e., the woman had been tested before). Or, tick ‘ordered’ if you find evidence that the test is ordered now (so presumably she had not been tested before), but the result is awaited. Otherwise, check ‘No’.)

01) Hemoglobin level	1)Yes	2)Ordered	3)No
02) Blood group and Rh status	1)Yes	2)Ordered	3)No
03) HIV status	1)Yes	2)Ordered	3)No
04) Syphilis test	1)Yes	2)Ordered	3)No
05) Urine test for protein	1)Yes	2)Ordered	3)No
06) Complete series of five tetanus toxoid (TT) immunizations	1)Yes	2)No	
07) History of any chronic illness, such as TB, hepatitis, heart disease, diabetes or other serious chronic disease	1)Yes	2)No	
08) History of hospital admission or surgery (other than to the uterus)	1)Yes	2)No	
PHYSICAL EXAMINATION	1)Yes	2)No	
Q105: Are the following vital sign measurements recorded at initial assessment?			
01) Respiration rate			→Go to 03
02) Record the number of times it was measured: _____			
03) Blood pressure			→Go to 05
04) Record the number of times it was measured: _____			
05) Temperature			→Go to 07
06) Record the number of times it was measured: _____			
07) Pulse rate			→Go to Q106
08) Record the number of times it was measured: _____			
Q106: Are the following measures recorded from abdominal examination at initial assessment?			
01) Fundal height			
02) Foetal position			
03) Foetal descent			
04) Foetal Heart Beat (FHB)			→Go to Q107
05) Record the number of times it was measured: _____			
PHYSICAL EXAMINATION	1)Yes	2)No	
Q107: Are the following measures recorded from vaginal examination at initial assessment?			
01) Status of membrane			
02) Cervical dilation			→Go to 04
03) Record the number of times it was measured: _____			
04) Foetal presentation			
Q108: Was progress of the labour monitored using partograph?			→End
Q109: Examine partograph to determine whether the following were recorded while the woman was in Active Labor :			
01) FHB plotted at least every half hour			
02) Cervical dilatation plotted at least every four hours			
03) Descent of head plotted at least every four hours			
04) Frequency and duration of contractions plotted at least every half hour			
05) Maternal pulse plotted at least every half hour			

06) Blood pressure recorded at least every four hours		
07) Temperature recorded at least every two hours		
Q110: Was time of birth recorded in the clinical chart?		
Q111: Was sex of the baby recorded in the clinical chart?		

Section 2: Observation of Care During Childbirth

Instructions: Tick as appropriate to indicate if the provider has performed the L&D care processes listed in the following sections (for normal labors). Some of the care processes may be performed simultaneously or by more than one provider. Please note that the box “Not Applicable” (NA) indicates that the item is not appropriate for this particular woman or newborn and does not indicate any failure of the provider. Similarly, tick “Observation Gap” (OG) to show where it is not possible to say the item has never happened, because of some gap in observation of care. If the item should have been performed by the provider but was not, then the “No” box should be ticked. Do not coach or talk to the provider while s/he is performing the procedure, unless there is potential harm to the client or the provider.

	1) Yes	2) No	3) OG	99) NA
Q201: Allowed family member/support person to remain with woman constantly during L& D?				
Q202: Explained what is going to be done to woman or support person?				
Q203: In preparation for the birth, washed hands thoroughly?				
Q204: In preparation for the birth, put on the following personal protective barriers?				
01) Two pairs of sterile surgical gloves				
02) Gown				
03) Apron				
04) Boots				
05) Eyewear/Google				
Q205: Placed the baby on the mother's abdomen?				
Q206: Clamped/tied cord 2 fingers from abdomen and another 2 fingers from the first?				
Q207: Thoroughly dried the baby?				
Q208: Wiped eyes of the baby?				
Q209: Kept the baby warm?				
Q210: Gave mother uterotonic?			→Go to Q214	→Go to Q214
Q211: Which uterotonic? 1) Oxytocin 2) Ergometrine 3) Syntometrine 4) Misoprostol				
Q212: Timing of administration of the uterotonic: 1) At delivery of anterior shoulder 2) Within 1 min of delivery of baby 3) Within 3 min of delivery of baby 4) More than 3 min after delivery of baby				
Q213: Route uterotonic given: 1) IM 2) IV 3) Oral 4) Other, specify				
Q214: Applied controlled cord traction to delivery placenta				

Q215: Examined completeness of placenta and membranes?				
Q216: Massaged uterus after placenta is delivered to confirm uterine contraction?				
Q217: Examined vulval-perineal region for possible lacerations?				
Q218: Decontaminated instruments with 0.5% chlorine solution?				
Q219: Wiped surfaces with disinfectant?				
Q220: Visible wastes observed on surfaces?				
Q221: Splashed blood observed on surfaces?				
Q222: Disposed placenta in a bucket?				
Q223: Disposed sharps in a yellow sharps container?				
Q224: Disposed contaminated materials, e.g., gloves & swabs in a red container for contaminated materials?				
Q225: Disposed non-contaminated materials in a container designated for general waste?				
Q226: Washed hands thoroughly after the delivery?				

Section 3: Observation Of Immediate Post-Partum And Newborn Care				
Immediate newborn care: In the first hour after complete delivery of placenta:	1)Yes	2)No	8)OG	99)NA
Q301: Checked baby's temperature every 15 minutes for 1 hour?				
Q302: Checked umbilical cord for haemorrhage at least once?				
Q303: Weighed the baby?				
Q304: Applied tetracycline eye ointment to both eyes?				
Q305: Gave Vitamin K 1mg IM?				
Q306: Gave BCG vaccine?				
Q307: Gave OPV 0 vaccine?				
Q308: Explained to mother the importance of delayed bathing for the first 24hrs after birth?				
Q309: Started breastfeeding within 1 hour?				
Q310: Placed baby skin to skin on mother's chest or abdomen for at least 30 minutes within one hour after delivery?				
Care of the mother: In the first hour after complete delivery of placenta, checked:				
Q311: Vaginal bleeding every 15 minutes?				
Q312: Blood pressure every 15 minutes?				
Q313: Pulse rate every 15 minutes?				
Q314: Temperature at least once?				

Section 4: General Observations

Q401: What was position of the woman during childbirth?

- 1) Supine (lithotomy)
- 2) Lateral tilt
- 3) Upright (vertical) with support

Q402: Did the observation end at any point prior to delivery?

- 1) Yes
- 2) No →Go to Q406

Q403: What time did the observation end? _____

Q404: What was the reason ending the observation?

- 1) Woman withdraws
- 2) Provider(s) withdraw
- 3) Labor becomes non-normal
- 4) Data collection time of the day ends (9:30pm)
- 5) Other, specify: _____

Q405: What was the maternal outcome at the end of your observation?

- 1) Alive in good condition
- 2) Alive with complication(s)
- 3) Dead

Q406: What was the foetal outcome at the end of your observation?

- 1) Alive in good condition
- 2) Alive with complication(s)
- 3) Stillbirth

Q407: Was there any unavoidable recording gap during this observation (e.g., to have lunch, dinner, or to go for a comfort break, etc.)?

- 1) Yes
- 2) No →Go to Q409

Q408: Record the time duration(s) of the unavoidable recording gap(s):

- 1) Unavoidable recording gap 1: ____ minutes
- 2) Unavoidable recording gap 2: ____ minutes
- 3) Unavoidable recording gap 3: ____ minutes
- 4) Unavoidable recording gap 4: ____ minutes
- 5) Total: _____ minutes

Q409: Time the observation ended (for completed observations): _____

ANNEX D: Women's Experience Survey Questionnaire

General Information		
Hospital name:	_____	
Hospital code:	_____	
Participant ID:	_____	
Date of interview:	_____	
Instruction to data collector		
Please read the following information to the interviewee before you start asking questions. You will be asked about your experience of the care you received for the current birth that has just happened at this hospital. The questions are grouped in three main parts asking about: 1) your age, marital status, etc, 2) your previous childbearing experiences and, 3) your satisfaction with the L&D care you received in the current birth.		
Part-I: Sociodemographic Characteristics of the Respondents		
Q101: How old are you?	_____	
Q102: What is your marital status?		
1) Single		
2) Married		
3) Divorced		
4) Windowed		
5) Other, specify		
Q103: To which ethnic group do you belong?		
1) Sidama	6) Gamo	11) Silte
2) Gurage	7) Kafa	12) Oromo
3) Wolaita	8) Bench	13) Amhara
4) Dawro	9) Kembata	14) Tigre
5) Gedeo	10) Tembaro	15) Other, specify
Q104: To which religion do you belong?		
1) Orthodox Christian		
2) Protestant Christian		
3) Muslim		
4) Catholic		
5) Other, specify		
Q105: What is the highest level of education you completed?		
1) No formal education		
2) Primary education (grade 1-4)		
3) Primary education (grade 5-8)		
4) Secondary education (grade 9-12)		
5) College & above		
Q106: What is your current occupation?		
1) Unemployed		
2) Government employee		
3) Private enterprise employee		
4) Daily laborer		
5) Merchant		
6) Housewife		
7) Other, specify		
Part-II: Obstetric Characteristics of the Respondents		
Q201: How many deliveries have you ever had including this birth that has just happened?	__	
Q202: Did you make any ANC visits during this pregnancy?		
1) Yes		
2) No → Go to Q204		

Q203: How many times did you visit a health facility for ANC? _____
Q204: What was your condition immediately after childbirth? 1) Normal → Go to Q206 2) With health problems
Q205: What was/were the problem(s)? 1) Bleeding 2) High fever 3) Convulsion 4) Severe pain 5) Loss of consciousness 6) Other (specify) _____ 7) Don't know
Q206: What was the baby's condition immediately after birth? 1) Normal → Go to Q301 2) With health problems
Q207: What was/were the problem(s)? 1) High fever 2) Difficulty breathing 3) Convulsion 4) Yellow discoloration of skin 5) Other (specify) _____ 6) Don't know
Part-III: Experience with Care
Instruction: Please, circle a number that represents the woman's response among the choices given. For Likert scaled questions where the respondent has to indicate her level of agreement or satisfaction, instruct her to show you the range of answers symbolically as: two thumbs down for strongly disagree/very dissatisfied, one thumb down for disagree/dissatisfied, both hands flat for neutral, one thumb up for agree/satisfied, and two thumbs up for strongly agree/very satisfied.
Respectful communication from staff
Q301: Health professionals have clearly answered your questions and concerns during labor, childbirth and afterwards until discharge. 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Q302: Health professionals have explained the benefits and side effects of all the medical treatments you received including drugs and procedures. 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Q303: Health professionals treated you with courtesy. 1) Not at all 2) Occasionally 3) Much of the time 4) Mostly 5) All the time
Q304: Health professionals introduce themselves during your hospital stay. 1) Not at all 2) Occasionally 3) Much of the time

<ul style="list-style-type: none"> 4) Mostly 5) All the time
Infrastructure and service
<p>Q305: The hospital's reception was generally good.</p> <ul style="list-style-type: none"> 1) Not at all 2) Occasionally 3) Much of the time 4) Mostly 5) All the time
<p>Q306: Immediately at arrival to the hospital, you were seen by health professionals.</p> <ul style="list-style-type: none"> 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
<p>Q307: After arrival at the hospital, it took too long time to go through all checks and admission process, before you could get to the L & D ward.</p> <ul style="list-style-type: none"> 1) Not at all 2) Yes, a little bit 3) Yes, longer than you thought it should 4) Yes, far too long
<p>Q308: After you arrived to the labour ward, you didn't wait very long to get a bed.</p> <ul style="list-style-type: none"> 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
<p>Q309: You had access to bathroom service in the L&D ward.</p> <ul style="list-style-type: none"> 1) No 2) Yes, occasionally 3) Yes, most of the time 4) Yes, wherever you needed
<p>Q310: You had access to shower service in the L&D ward.</p> <ul style="list-style-type: none"> 1) No 2) Yes, occasionally 3) Yes, most of the time 4) Yes, wherever you needed
<p>Q311: Hygienic condition in the L&D was acceptable to you.</p> <ul style="list-style-type: none"> 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
<p>Q312: During L&D, health professional allowed you to have one family member with you.</p> <ul style="list-style-type: none"> 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
<p>Q313: Health professional(s) encouraged or reassured you when you were in pain during L&D.</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral

4. Agree 5. Strongly agree
Q314: Did you receive health education on breast feeding after delivery? 1) Yes 2) No
Q315: Did you receive health education on vaccination after delivery? 1) Yes 2) No
Q316: Did you receive health education on family planning after delivery? 1) Yes 2) No
Q317: Did you receive laboratory services including ultrasound that you needed during this hospital stay? 1) Yes 2) No
Q318: Did you receive the drugs that you needed during this hospital stay? 1) Yes 2) No
Q319: Did you receive the medical supplies that you needed (e.g., gloves)? 1) Yes 2) No
Patient privacy and comfort
Q320: During labour, the health professionals allowed you to choose your preferred sleeping position 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Q321: During labour, the health professionals allowed you to walk around if you wished 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Q322: The health professionals allowed you to choose your preferred delivery position 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Q323: During delivery your privacy was secured. 1) Strongly disagree 2) Disagree 3) Neutral 4) Agree 5) Strongly agree
Patient expenses
Q324: Did you pay for any service during this hospital stay? 1) Yes 2) No → Go to Q327
Q325: The charge was fair. 1) Strongly disagree

- 2) Disagree
- 3) Neutral
- 4) Agree
- 5) Strongly agree

Q326: Explain the reason for the charge.

Overall satisfaction

Q327: Overall, how satisfied are you with the care you received for this delivery?

- 1) Very dissatisfied
- 2) Dissatisfied
- 3) Neither satisfied nor dissatisfied
- 4) More or less satisfied
- 5) Very satisfied

Q328: Would you recommend this hospital to your friends and family for childbirth?

- 1) Definitely no
- 2) Probably no
- 3) Probably yes
- 4) Definitely yes

Q329: On a scale of 0-10 (0 being the worst & 10 being the best hospital), how would you rate this hospital for the care you received in this delivery?

0 1 2 3 4 5 6 7 8 9 10
 Worst hospital Best hospital

Thank you very much!

ANNEX E: Rotated component matrix: principal component analysis of women's experience with L&D care at public hospitals in SNNPR, Ethiopia, 2016

Item	Component			
	1	2	3	4
Overall reception by the hospital	.786			
Health professionals clearly answered questions and concerns	.630			
Courtesy of treatment by health professionals	.797			
Reassurance by health professionals when in pain	.698			
Seen by a health professional immediately at arrival to hospital	.633			
Allowed to choose preferred sleeping position during labour		.795		
Allowed to ambulate if wished during labour		.820		
Allowed to choose preferred position during delivery		.794		
Allowed to have one family member throughout L&D		.636		
Received health education on breast feeding			.841	
Received health education on vaccination			.889	
Received health education on family planning			.831	
Accessed bathroom service in L&D ward				.885
Accessed shower service in L&D ward				.817

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

ANNEX F: Reliability of the principal components of women's experience with L&D care at public hospitals in SNNPR, Ethiopia, 2016

Item Statistics (N=2165)				
Component	Items	Cronbach's Alpha	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Interpersonal communication and emotional support	Overall reception by the hospital	0.78	0.60	0.72
	Health professionals clearly answered questions and concerns		0.47	0.77
	Courtesy of treatment by health professionals		0.61	0.72
	Reassurance by health professionals when in pain		0.59	0.72
	Seen by a health professional immediately at arrival to hospital		0.50	0.75
Responsiveness	Allowed to choose preferred sleeping position during labour	0.83	0.71	0.75
	Allowed to ambulate if wished during labour		0.67	0.77
	Allowed to choose preferred position during delivery		0.64	0.79
	Allowed to have one family member throughout L&D		0.59	0.81
Education	Received health education on breast feeding	0.87	0.69	0.86
	Received health education on vaccination		0.82	0.74
	Received health education on family planning		0.73	0.83
Physical environment	Accessed bathroom service in L&D ward	0.73	0.57	0.00
	Accessed shower service in L&D ward		0.57	0.00

ANNEX H: IRB Approval Letter from The University of Edinburgh



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08 September 2016

Dr Negalign Bayou

Dear Negalign

Re: Quality of Birthing Care in Low Income Countries: the Case of Ethiopia

The further information supplied and the (revised) documentation for above study has been reviewed by the CPHS ethics committee and we are pleased to grant ethical approval.

Please be aware that this ethical approval is in respect of the protocol and methods as described in the documents submitted to the committee (with amended documents superseding predecessors). If there is in the future a *change* to the study design/protocol/methods, you should check whether this means your level 2 application form needs to be revised, and submit to the committee (via me), any documents that have been revised (study materials/protocol/level 2 form), using tracked changes. You should make clear in your covering email whether:

- (i) you are requesting ethical review of a study amendment; or
- (ii) you are not sure whether such is needed and, in the first instance, would like the committee's opinion on whether a formal approval is needed of the amended design/methods.

Well done on your persevering to meet all the requests made to optimise ethical conduct of these 2 studies, which all the more sensitive and complex because they are being undertaken in busy maternity wards. Very best wishes for the successful execution of this research.

Yours sincerely

Diane White
Ethics Review Group Administrator



CPHS: <http://www.cphs.mvm.ed.ac.uk>
Ethical Review Group : <http://www.cphs.mvm.ed.ac.uk/intra/research/ethicalReview.php> (Staff & PGR Students only)

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