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Adverse feto-maternal outcomes and coping after fetal loss among women who gave birth in selected public hospitals in Eastern Ethiopia

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By

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STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this dissertation is my work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis, and completion of this dissertation. All scholarly matter, that is included in the dissertation, has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every serious effort has been made to avoid any plagiarism in the preparation of this dissertation.

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BIOGRAPHICAL SKETCH

My name is Masresha Leta Serbesa. I was born and raised in Ethiopia, where I have built my academic and professional career in the field of nursing and midwifery education. I completed my primary and secondary education at Arbegnoch Elementary School and Harar Senior Secondary School, respectively. I then pursued a Diploma in Midwifery at Harar Health Science College, graduating with honors in 2002.

I hold a Bachelor of Science degree in Computer Science and IT from Haramaya University (2007), a Bachelor of Science in Nursing from the same university (2013), and a Master of Science in Midwifery Education from Mekelle University, where I graduated in 2016. Since October 2021, I have been a PhD candidate in Nursing at Haramaya University, focusing my dissertation on adverse fetomaternal outcomes and maternal coping mechanisms related to these outcomes.

I have over 15 years of professional experience, mostly at Harar Health Science College, where I serve as a lecturer, department head, and director of Research and Community Service. My responsibilities include teaching nursing and midwifery students, mentoring, coordinating practical attachments, conducting research, and providing training to health professionals and community members. Since 2024, I have also been a member of the Research Advisory Committee of the Ethiopian Midwifery Association.

Throughout my career, I have contributed extensively to research with over 13 published articles in reputable journals. My work primarily focuses on maternal and neonatal health, family planning, reproductive health, and community health practices in Ethiopia. I have also been involved in various trainings related to sexual and reproductive health, gender-based violence, leadership, infection prevention, and research skills.

My professional journey reflects my dedication to advancing nursing and midwifery education and improving maternal and child health outcomes in Ethiopia through teaching, research, and community service.

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ABBREVIATIONS

APH	Antepartum Hemorrhage
BSc	Bachelor of Science
CDC	Center for Disease Control and Prevention
CPD	Cephalopelvic Disproportion
CS	Cesarean Section
EDHS	Ethiopian Demographic and Health Survey
HFSUH	Hiwot Fana Specialized University Hospital
MAS	Meconium Aspiration Syndrome
MSAF	Meconium Stain in Amniotic Fluid
NICU	Neonatal Intensive Care Unit
PIH	Pregnancy Induced Hypertension
PLTC	Potentially Life Threatening Conditions
PPH	Post-partum Haemorrhage
PROM	Premature Rupture of Membrane
SDG	Sustainable Development Goals
SVD	Spontaneous Vaginal Delivery
UNICEF	United Nations International Children's Emergency Fund
UTI	Urinary Tract Infection
WHO-	World Health Organization

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Original Papers

This dissertation is based on the following original papers:

I. Leta, M., Tura, A.K., Shiferaw, K., Mezmur, H. and Assefa, N.[2025GC]. Adverse fetal outcomes among women who gave birth at public hospitals in Eastern Ethiopia: A multicenter study **(Under review)**

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ABSTRACT

Background: Adverse maternal and fetal outcomes remain a significant public health concern, particularly in low- and middle-income countries where inadequate healthcare infrastructure contributes to elevated rates of morbidity and mortality. According to the World Health Organization, approximately 260,000 maternal deaths occurred globally in 2023, with the majority in low-resource settings, alongside an estimated 2 million stillbirths annually. Pregnancy-related complications are the major factors resulting in devastating outcomes, inflicting profound emotional and psychological distress on women and their families. While previous studies in Ethiopia and similar settings have documented adverse feto-maternal outcomes, many have not thoroughly assessed non-obstetric predictors or the long-term psychosocial effects on women. This study seeks to address these by understanding the extent and predictors of adverse feto-maternal outcomes and exploring women's coping after fetal loss.

Methods: A hospital-based cross-sectional mixed-methods study was conducted from October 28, 2023, to March 31, 2024, in six public hospitals in eastern Ethiopia. A Simple random sampling technique was used to select samples among those who gave birth in these health facilities. Six trained midwives collected quantitative data via face-to-face interviews supplemented by a review of medical charts from admission to discharge. Predictors of adverse feto-maternal outcomes were identified using Poisson regression analysis at $p < 0.05$.

The qualitative part of the study followed a phenomenological approach with in-depth interviews using a semi-structured tool to study women's coping strategies following a fetal loss. An interview was conducted at the first and six months after the loss of the fetus to assess their coping mechanism using the "Living with Grief after Pregnancy Loss" model. Coping was described as involving connectedness that facilitate healing. In contrast, disconnectedness, that hinders effective coping and prolongs distress. Data was analyzed using Open Code software through both deductive and inductive approaches based on the five-steps of framework analysis. The trustworthiness of the data was ensured throughout the data collection period.

Results: A total of 2,608 women with a mean age of 26 (± 5.1 years) participated in the study. The magnitude of adverse maternal and fetal outcomes was 15.68% (95% CI: 14.70%–16.66%) and 26.6% (95% CI: 25.6–27.6), respectively. Low household wealth, having maternal danger signs at admission, alcohol use during pregnancy, prolonged labor, and maternal age above 35 years were associated with adverse maternal outcomes. Folic acid intake during pregnancy, partner support, and spontaneous vaginal delivery were found to be protective of adverse maternal outcomes. Similarly, history of pregnancy complications, maternal anxiety, referral from lower-level health facilities,

presence of maternal danger signs at admission, and chewing khat during pregnancy were associated with adverse fetal outcomes; while folic acid supplementation was protective. Coping fetal loss (connectedness) was reflected in strong faith in religious, presence of social support, personal resilience for problems, and in cultural acceptance of conditions, whereas blaming God, avoiding support networks, emotional withdrawal, and cultural conflicts were features of disconnectedness.

Conclusion: About one in six women and one in four fetus experienced adverse maternal and fetal outcomes, respectively. Existing social networks, religious values, and personal behaviors of withstanding problems influenced maternal coping after fetal loss positively.

It is imperative to equip health system with necessary resources to early detect and manage pregnancy related complications, and to have efficient referral pathways. Comprehensive psychosocial support, addressing religious, family, and cultural dimensions is necessary for the women to have a better coping.

Keywords: Adverse maternal outcome, adverse fetal outcome, feto-maternal outcomes in eastern Ethiopia, coping after fetal loss.

1. INTRODUCTION

1.1 Background

Adverse pregnancy outcomes are a broad term comprising the maternal and the fetus/newborn complications, which occurs during labor and delivery, and the postpartum period. It can be categorized as adverse maternal and fetal outcomes (Tadese et al., 2022a). Adverse maternal outcome can be explained as any pregnancy-related condition that resulted in maternal morbidity, potentially life-threatening conditions, maternal near misses (women who nearly died), or maternal deaths during or following childbirth (Guida et al., 2018). On the other hand, a composite existence of one or more of the following can be considered as adverse fetal outcomes: preterm birth, stillbirth, low birth weight, low APGAR score, IUFD, or early neonatal deaths(immediately after birth) (Control et al., 2013, Althabe et al., 2015).

The trend of maternal and fetal adverse outcomes in Ethiopia and similar settings has shown some improvement over recent decades due to increased healthcare interventions (Leta M, 2022b); however, the burden remains high. For example, maternal mortality in Ethiopia was reported at 412 deaths per 100,000 live births in 2016, with a slow but steady decline over time (EPHI., 2022) and reaching 267 per 100,000 live births in 2020 (WHO, 2023d). Despite this progress, adverse pregnancy outcomes continue to be one of the major issues in Ethiopia, particularly in rural areas and among disadvantaged populations. This persistence is limited by antenatal care, poor socioeconomic conditions, and inadequate emergency obstetric services (EDHS, 2019).

The issue of maternal and fetal adverse outcomes gained prominence in global health discussions following the Safe Motherhood Initiative in the late 1980s and the Millennium Development Goals (MDGs) era, which prioritized reducing maternal and child mortality (Souza, 2024b). Since then, Ethiopia has implemented various strategies, including expanding maternal health services, training skilled birth attendants, and improving referral systems. Despite these efforts, challenges remain to fully address the multifaceted causes of adverse outcomes (UNICEF, 2024).

The continuum of ill health following pregnancy and childbirth may have an impact on subsequent pregnancies (Althabe et al., 2015). Women who developed adverse outcomes in current pregnancies are at increased risk of developing similar complications in future pregnancies. Recent studies have revealed that long after the index pregnancy, pregnancy-specific problems continue to have an impact on maternal health (Kerber et al., 2007, Muglia LJ, 2022). In addition; to its effect on index pregnancy, adverse feto-maternal outcomes have

significant implications on maternal and family coping towards the problem. Women with adverse pregnancy outcomes may have increased psychological stress in the current or subsequent pregnancies (Neiger, 2017b). The most problematic type of stress, however, is psychological for many women and their families. Poor sleep, concerns about their postpartum bodies and sexuality, disappointment with the level of support they received from their partner, feelings of isolation or loneliness, and guilt over having negative thoughts about the baby or parenthood can all plague parents (Van D., 2012, Walker L. M., 2022).

The Ethiopian government recognizes these challenges and has prioritized maternal and child health in its Health Sector Transformation Plan (HSTP). The HSTP focuses on improving access to quality maternal and newborn health services, strengthening health systems, enhancing community engagement, and reducing preventable deaths. Key areas include expanding antenatal care, improving facility-based deliveries, and integrating maternal mental health services to address the psychological impact of adverse pregnancy outcomes (Rono J, 2022).

1.2. Statement of the problem

Adverse maternal outcomes remain a significant public health issue, especially in low- and middle-income countries (LMICs), where healthcare resources are limited (WHO and UNFPA, 2019). Severe complications often necessitate intensive care unit (ICU) admissions, frequently caused by anemia, hypertensive disorders, and postpartum hemorrhage (Pollock W, 2010). These conditions contribute to maternal mortality and extended hospital stays, with lengths ranging from 1.3–6.6 days for vaginal deliveries and 2.5–9.3 days for cesarean sections (Oona M. R. C., 2016). Surgical site infections (SSIs) further complicate recovery, particularly in cesarean deliveries, with regional variations in infection rates: Africa (11.91%), Ethiopia (12.32%), and North America (3.87%) (Farid M., 2023, Temesgen G. W., 2024). Postpartum anemia affects 50–80% of women in developing countries, often requiring blood transfusions due to hemorrhage and iron deficiency (Butwick, 2021).

The severity of maternal and fetal adverse outcomes is especially pronounced in sub-Saharan Africa, which accounts for 94% of global maternal deaths, with a maternal mortality ratio of 542 per 100,000 live births far exceeding the global average of 216 (Musarandega et al., 2021, Lawrence et al., 2022). Maternal mortality remains unacceptably high worldwide, with approximately 260,000 women dying during and following pregnancy and childbirth in 2023 alone, highlighting the urgent need for intensified efforts to reduce preventable deaths (WHO, 2023c). Ethiopia's maternal mortality ratio stands at 412 per 100,000 live births, reflecting

persistent challenges in maternal health (Saltzman, 2021). Similarly, adverse fetal outcomes such as low birth weight, preterm birth, and stillbirth remain disproportionately high, with national prevalence estimates ranging from 18.2% to 32.5% (Adhena T, 2017, Tsegaye B., 2018). These outcomes contribute not only to neonatal morbidity and mortality but also to increased maternal anxiety and psychological distress (Voit FAC, 2022, Malhotra A, 2019). The consequences of adverse maternal and fetal outcomes extend beyond immediate morbidity and mortality. Approximately 75% of maternal deaths are preventable, primarily caused by hemorrhage, infection, and hypertensive disorders (WHO, 2023b). Perinatal deaths, nearly half of which are linked to low birth weight, prematurity, and infections, often result from delays in reaching referral facilities (Emmanuel, 2022). Moreover, adverse pregnancy outcomes have long-term effects on maternal health, increasing the risk of complications in subsequent pregnancies and chronic conditions later in life (Neiger, 2017a).

Psychological, social, and economic impacts on women and families are profound. Mothers experiencing adverse outcomes often suffer from depression, anxiety, poor sleep, feelings of isolation, and guilt, which can extend to family members (George et al., 2013, Cole, 2012, Kirigia et al., 2014, Herbert et al., 2022). These psychological burdens contribute to increased risks of marital stress, social isolation, divorce, and suicide (Clossick, 2016, Agaro et al., 2016) (Ghimire et al., 2019, Heazell et al., 2016). In low-resource settings, limited access to mental health services and lack of grief management training among healthcare workers further compound these challenges (Stroebe M, 2007, Eddy C. P. , 2024). Several factors have been associated with adverse maternal and fetal outcomes in Ethiopia, including rural residence, lack of antenatal care, advanced maternal age, pregnancy-induced hypertension, and short inter-pregnancy intervals (Tsegaye, 2018, Tegegne et al., 2019) (Kebede et al., 2018). However, many studies rely on self-reported data, have small sample sizes, or use retrospective designs, limiting the understanding of these outcomes (Adane et al., 2014, Akilew et al, 2014). Furthermore, important predictors such as partner support and maternal mental health remain under-researched. Most existing research focuses on cross-sectional data collected during hospitalization, and often using brief coping scales that fail to capture the long-term emotional and psychosocial impacts of adverse fetal outcomes (Carver, 1997, Yeshambel et al., 2022). Notably, no qualitative study in Ethiopia has comprehensively explored maternal coping following fetal loss using a validated theoretical framework. The Grief Response following Pregnancy Loss model offers a promising approach to understand variations in coping across different demographic and social contexts (Fernández-Basanta et al., 2020). Understanding

these coping strategies is crucial for designing tailored interventions that support affected women and reduces the burden following adverse fetal outcomes.

This study aims to assess the magnitude and predictors of adverse maternal and fetal outcomes in Ethiopia and to explore women's experiences and coping following adverse fetal outcomes using a validated grief framework. By addressing existing research gaps, this study seeks to inform targeted interventions and improve maternal and newborn health outcomes in Ethiopia and similar settings.

1.3. Significance of the study

The findings from this study will provide policymakers, decision-makers, and program implementers with essential insights to guide the development and update of strategies aligned with Ethiopia's Health Sector Transformation Plan (HSTP-II) and maternal health continuum of care initiatives. This research addresses adverse feto-maternal health issues and enhances maternal coping mechanisms, contributing to strengthened emergency obstetric care, reduction of delays in care, and overall improvement in maternal and neonatal outcomes. The findings can assist the Ministry of Health in enhancing mother and child health initiatives at regional levels, emphasizing antenatal, intrapartum, and postnatal care, with significant benefits for public health outcomes and cost-efficient interventions. Furthermore, the study explores coping strategies women employ following fetal loss, informing national guidelines based on WHO recommendations. By illuminating women's experiences and coping mechanisms beyond mere statistics, this research fills an important gap necessary for achieving the 2030 Sustainable Development Goals. It will equip healthcare providers with a more empathetic understanding to support women emotionally and psychologically after fetal loss, improving mental health outcomes through personalized care and community engagement. This holistic approach will enhance both immediate clinical outcomes and long-term well-being for affected women and families.

Objectives

1.3.1. General objective

This study aimed to assess adverse feto-maternal outcomes and maternal coping after fetal loss among women who gave birth in selected public hospitals in Eastern Ethiopia from October 28, 2023, to March 31, 2024

1.3.2. Specific Objectives

1. To assess adverse maternal outcomes among women who gave birth at public Hospitals

2. To assess adverse fetal outcomes among women who gave birth at public Hospitals
3. To explore coping strategies following fetal loss among women who gave birth in selected public Hospitals

1.5. Research questions

This study tries to answer the following critical questions emanated in the statement of the problem:

- ✓ What is the magnitude of adverse maternal outcomes among women visiting public health facilities for delivery service in Eastern Ethiopia?
- ✓ What is the magnitude of adverse fetal outcomes among women who are coming for delivery service and will give birth at public health facilities in Eastern Ethiopia?
- ✓ What are the patterns of coping among women with fetal loss?

2. LITERATURE REVIEW

A systematic literature review was conducted across multiple international databases, including PubMed, Science Direct, Hinari, JSTOR, Google Scholar, EBSCO, Web of Science, and Scopus, covering publications from 1982 to 2025, using keywords related to adverse pregnancy outcomes such as fetal outcomes, maternal outcomes, coping, and others. The search process involved refining search terms, selecting relevant resources, and gathering comprehensive studies.

2.1. Magnitude of adverse maternal outcomes

Although many women can handle the physiological changes of pregnancy, about 30% of women have adverse pregnancy outcomes. Adverse maternal outcomes refer to pregnancy-related complications that negatively affect the health of the mother during pregnancy, childbirth, or the postpartum period, and remain a significant global public health concern, particularly in low- and middle-income countries (LMICs) (Soma-Pillay P, 2016).

Approximately 15–30% of pregnant women experience such complications, which contribute substantially to maternal and newborn morbidity, mortality, and long-term physical and psychological consequences (Balkus et al., 2021). In Sub-Saharan Africa, a systematic review and meta-analysis by Tamirat et al. (2021) identified obstetric hemorrhage (29%) and hypertensive disorders of pregnancy (21.2%) as leading causes of maternal death.

Similarly, in Ethiopia, hypertensive disorders affect about 6.82% of pregnant women, with eclampsia accounting for 4.7% of complications, both significantly increasing the risk of intensive care admission and adverse outcomes (Tamirat et al., 2021). (Tesfa et al., 2020, Beyene et al., 2023).

In Ethiopia, maternal mortality rates remain high but have shown significant decline over the past two decades; the maternal mortality ratio (MMR) dropped from 871 per 100,000 live births in 2000 to around 267 per 100,000 in 2020, reflecting progress through expanded skilled delivery services and improved maternal health care systems (Berhan Y, 2014).

However, direct obstetric complications still account for approximately 85% of maternal deaths in the country, with obstetric hemorrhage and hypertensive disorders being leading causes (Delie, 2024). A decline in maternal mortality in Ethiopia is attributed to multi-sectoral interventions including increased skilled birth attendance (from 8% in 2000 to 49% in 2016), enhanced emergency obstetric care, use of modern contraceptives, and community demand generation efforts (Melesse DY, 2024). Yet, maternal mortality at nearly 195 per 100,000 live births in 2023 remains above the Sustainable Development Goals target of

below 70, indicating the need for continued focus on preventing and managing pregnancy complications(EPHI, 2022).

Comparable research from Nepal reported that 13.4% of eclamptic women required ICU admission, and mortality was 1.9% among this group (Pradhan et al., 2019). These complications, including hypertensive disorders of pregnancy and postpartum hemorrhage, contribute to poor maternal outcomes and underscore the importance of timely intervention and effective maternal health services.

2.2. Magnitude of Adverse fetal Outcomes

Adverse fetal outcomes remain a pressing global health challenge, particularly impacting low- and middle-income countries (LMICs) where healthcare resources are limited(Zhang C, 2025). A comprehensive analysis covering 2010 to 2023 documented significant rates of adverse birth outcomes across multiple hospitals, revealing that preterm birth (PTB) and low birth weight (LBW) continue to be prevalent. The pooled rates of PTB and LBW were found to be approximately 7.74% and 5.89%, respectively, with temporal increases observed in both indicators over the analyzed period(Degno S, 2021). The pooled fetal death rate in 21 Sub-Saharan Africa (SSA) countries was 34.7 per 1000 births (Akombi and Renzaho, 2019). In Ethiopia, the pooled prevalence of adverse fetal outcomes is estimated at 26.88%, with low birth weight (10.06%) and prematurity (8.76%) being the most common complications(Alemu et al., 2022, Sendeku et al., 2020). Such complications often necessitate neonatal intensive care, with extended hospital stays adding to the burden on families and healthcare systems(Sisay et al., 2022, Tiruneh et al., 2021).

Globally, complications like preterm birth, low birth weight, and congenital anomalies account for millions of neonatal deaths annually, highlighting ongoing inequities and the urgent need for targeted interventions in affected regions(Liu T, 2024). Stillbirth rates are notably high. Globally, 84% of stillbirths occur in low- and middle-income countries(Hug et al., 2020, Korenromp et al., 2019). Ethiopia reports stillbirth rate of 7.09% , far exceeding rates in many developed countries(Berhie et al., 2016). Early neonatal mortality rates are also high in Ethiopia, with studies reporting approximately 29.5 deaths per 1000 live births, which parallels findings from other resource-constrained settings where under-resourced neonatal care and delayed obstetric interventions compound fetal risk (Jena et al., 2020).

2.3. Factors associated with adverse feto-maternal Outcomes

2.3.1. Socio-demographic factor

Adverse pregnancy outcomes have been strongly linked to maternal socio-demographic characteristics, including place of residence, age, educational attainment, and income. Evidence from a cross-sectional study conducted in Ethiopia in 2021 found that rural residence and lower educational levels significantly increased the risk of negative pregnancy outcomes (Muluneh et al., 2022). Supporting this, a Canadian study reported that mothers residing in rural areas had a 1.57-fold higher risk of experiencing postpartum hemorrhage compared to urban dwellers. The same study also indicated that adverse fetal outcomes, including preterm birth and low birth weight, were more prevalent among rural mothers (Amjad et al., 2019). Maternal age is another critical factor influencing feto-maternal health. In Oman, research showed that older first-time mothers experienced higher rates of complications such as postpartum hemorrhage and preterm birth than women aged 21 to 34 years (Al Ghailani et al., 2019). Conversely, adolescent mothers—particularly those in China, the USA, and Ethiopia faced elevated risks of preterm delivery, low birth weight, and poor neonatal Apgar scores compared to adult women (Gibbs et al., 2012, Lin et al., 2021, Tadesse et al., 2021). Maternal education also plays a pivotal role; a 2017 study from India revealed that half of the low birth weight cases occurred among women who had no formal education, highlighting the protective role of educational attainment in pregnancy outcomes (Khurana, 2017).

2.3.2. Obstetric Factors

Antenatal care (ANC) follow-up is one of the most critical interventions in preventing adverse pregnancy outcomes. According to a WHO global survey, women who received ANC more than four times were 60% less likely to experience negative outcomes (Harrison et al., 2020). Supporting this, a study in Malaysia revealed that women without ANC follow-up had over five times the risk of postpartum hemorrhage (Keya TA, 2021). Similarly, research in Ethiopia and other countries demonstrated that lack of ANC visits is significantly associated with preterm birth, low birth weight, and other poor fetal outcomes (Stacey et al., 2012, Gumedde et al., 2017, Heaman et al., 2019). Importantly, ANC is also essential for detecting obstetric emergencies early, which can further prevent maternal and neonatal complications. For instance, in Ethiopia, over half of the mothers with eclampsia experienced poor outcomes, while conditions such as antepartum hemorrhage (APH) and hypertensive disorders were strongly associated with stillbirth (Getaneh et al., 2021); (Alemayehu et al., 2022, Adane et al., 2014).

When such emergencies progress to the intrapartum stage, labor complications often follow. One such complication is meconium-stained amniotic fluid (MSAF), a sign of fetal distress. Studies in Nigeria showed that higher grades of MSAF often led to cesarean delivery and increased risk of low Apgar scores, while lower grades were associated with assisted vaginal delivery (Tairy et al., 2019, Gallo et al., 2023). In cases where contractions weaken or the cervix fails to dilate effectively, the second stage of labor becomes prolonged, which in turn raises the likelihood of neonatal morbidity and the need for ICU admission due to birth asphyxia (Ehsanipoor and Satin, 2021); (Sandström et al., 2017).

Beyond labor complications, the spacing between pregnancies—known as inter-pregnancy interval (IPI) also plays a vital role in pregnancy outcomes. Short IPIs (less than six months) have been associated with increased risks of preterm birth, anemia, and third-trimester bleeding, particularly in developing countries (Conde-Agudelo et al., 2005); (Jena et al., 2022). On the other hand, excessively long IPIs (over 60 or 120 months) have been linked to preterm birth and large-for-gestational-age infants in countries like China and Canada (Hanley, Hutcheon et al., 2017; Zhang, Shen et al., 2018). These findings suggest that both extremes in pregnancy spacing can compromise maternal and fetal health.

Previous adverse pregnancy experiences, such as recurrent spontaneous abortion (RSA), further compound these risks. Women with such histories are more likely to face complications like postpartum hemorrhage, stillbirth, and poor neonatal outcomes in subsequent pregnancies (Sheiner et al., 2005, Field and Murphy, 2015, Fawzy et al., 2016).;(Yang et al., 2017). These past experiences often contribute to heightened maternal stress, which introduces yet another pathway to adverse outcomes. Psychological distress during pregnancy, especially fear related to previous losses or labor, has been shown to activate stress-sensitive immune and hormonal pathways that negatively influence fetal development (Traylor et al., 2020). Studies in Thailand, Germany, and China confirmed that women with high levels of stress or anxiety during pregnancy were significantly more likely to experience preterm birth and deliver low birth weight babies (Martini et al., 2010); (Tanpradit and Kaewkiattikun, 2020); (Ding et al., 2014)

2.3.3. Behavioral factors

Behavioral factors such as smoking, alcohol consumption, and khat use during pregnancy have been significantly linked to adverse fetal and maternal outcomes. According to the CDC, smoking during pregnancy can damage fetal tissues, particularly those in the lungs and brain, while also increasing the risk of conditions such as cleft lip, cleft palate, and miscarriage due

to reduced oxygen supply from carbon monoxide exposure (Delpisheh et al., 2006, Inoue et al., 2017, Shea AK, 2008). Similarly, alcohol consumption during pregnancy has been shown to double or even triple the risk of delivering low birth weight (LBW) babies when compared to non-drinking mothers (Sbrana et al., 2016, Zar et al., 2019, Tadese et al., 2022b). In Ethiopia, another prevalent behavioral concern is khat chewing. A 2023 meta-analysis revealed that pregnant women who consumed khat were 29% more likely to develop anemia, highlighting its significant negative impact on maternal health (Yitayih et al., 2023).. These findings underscore the need for targeted behavioral interventions and public health education during pregnancy.

2.3.4. Admission Characteristics (referral and non-referral cases)

Referral system inefficiencies—particularly delays in decision-making and transportation—have been associated with adverse feto-maternal outcomes (Pembe et al., 2010). For example, a 2019 study from India reported that anemia (51.1%), postpartum hemorrhage (18.2%), and vaginal wall tears (15.8%) were the leading causes among referred maternal admissions, with 5.3% requiring ICU care and 0.9% resulting in maternal death (Jakhar et al., 2019). Similarly, a 2021 Zimbabwean study found that 15.5% of referred mothers required blood transfusions, 5.3% were admitted to ICU, and the case fatality rate reached 4.4% (Busumani and Mundagowa, 2021). On the fetal side, referrals have also been linked to poor outcomes. An Indian study in 2022 reported NICU admissions in 9% of referred newborns (Hareesh 2022), while a Zimbabwean study revealed stillbirths in 10.7% and early neonatal deaths in 3.4%, resulting in a perinatal mortality rate of 151 per 1,000 live births (Bauserman et al., 2020).

2.3.5. Partner Support and Intimate partner Violence during Pregnancy

Beyond clinical factors, the level of partner support also influences outcomes. A study in Gonder, Ethiopia found that lack of husband support during pregnancy to be a predictor of poor pregnancy outcomes (Muluneh et al., 2022), Similarly a U.S. study reported that partner support, particularly among teens, reduced the risk of low birth weight and miscarriage, though paradoxically increasing the chance of preterm birth by 37% (Shah et al., 2014). Meanwhile, intimate partner violence (IPV) during pregnancy substantially elevates risk. Physical violence has been linked to postpartum hemorrhage (Ibrahim et al., 2015), and women exposed to IPV in Tigray, Ethiopia were four times more likely to experience adverse birth outcomes (Berhanie et al., 2019). Psychological and sexual violence, as shown in Egypt and Nepal, also increased the risk of preterm birth by 2.4 and 1.14 times, respectively (Ibrahim et al., 2015); (Koirala, 2022)). IPV's consequences on fetal outcomes are equally

alarming: studies from Vietnam and Egypt report a six-fold increase in low birth weight (Hoang et al., 2016), and up to ten times higher risk of stillbirth and early neonatal death among exposed mothers (Ibrahim et al., 2015).

2.4. Maternal coping mechanism following an adverse fetal Outcomes

Experiencing fetal loss is a profoundly distressing event that can trigger significant emotional, psychological, and social challenges for women. Such losses not only cause grief but may also result in long-term mental health effects if not appropriately addressed (Cuenca, 2023). The vast majority of authors concur that a coping reaction is likely and reasonable after a woman experiences adverse pregnancy outcomes, such as stillbirth or fetal death (Patterson, 2000b, Brown, 1993, Patterson et al., 2002). A qualitative study done in Great Britain in 2015 showed that mothers who have had adverse outcomes, such as perinatal loss, can employ different coping strategies to safeguard her and others from emotional distress during a subsequent pregnancy, as well as to reassure themselves and hold onto hope that the pregnancy will result in a live birth. According to some data, mothers are aware that some of these coping mechanisms can influence their relationship with their unborn child (Shurack, 2015). Another qualitative study done in Great Britain in 2013 among women who faced pregnancy termination for fetal abnormality uses coping strategies such as receiving support from the health professionals, acknowledging the baby (seeing the baby as a way to accept, such as naming the baby, taking photos, and showing the photos to others, and thus cope with the loss) and some women may choose to withdraw from their social network, particularly when friends went on to have successful pregnancies (Lafarge et al., 2013).

According to a qualitative study conducted in the USA in 2003 among African American Women, women who experienced stillbirth/fetal deaths reported using strategies like talking about it, avoiding dealing with it, relying on religious/spiritual beliefs and values, and self-reflection, or receiving counselling from support groups or individual therapists (Van et al., 2003). Similarly, a qualitative study conducted in San Francisco, California (2012) explored how women cope with adverse perinatal outcomes, revealing a range of coping strategies that women employ to manage their grief and loss (Van and Dying, 2012).

Some women used self-talk or sought information to understand and make sense of their loss, helping them cognitively process the event. Others adopted a perspective that certain occurrences are beyond human control and happen for a reason, which provided a form of acceptance and emotional relief. Additionally, many women relied on conversations with family and friends, using social support to share their feelings and recover from distress.

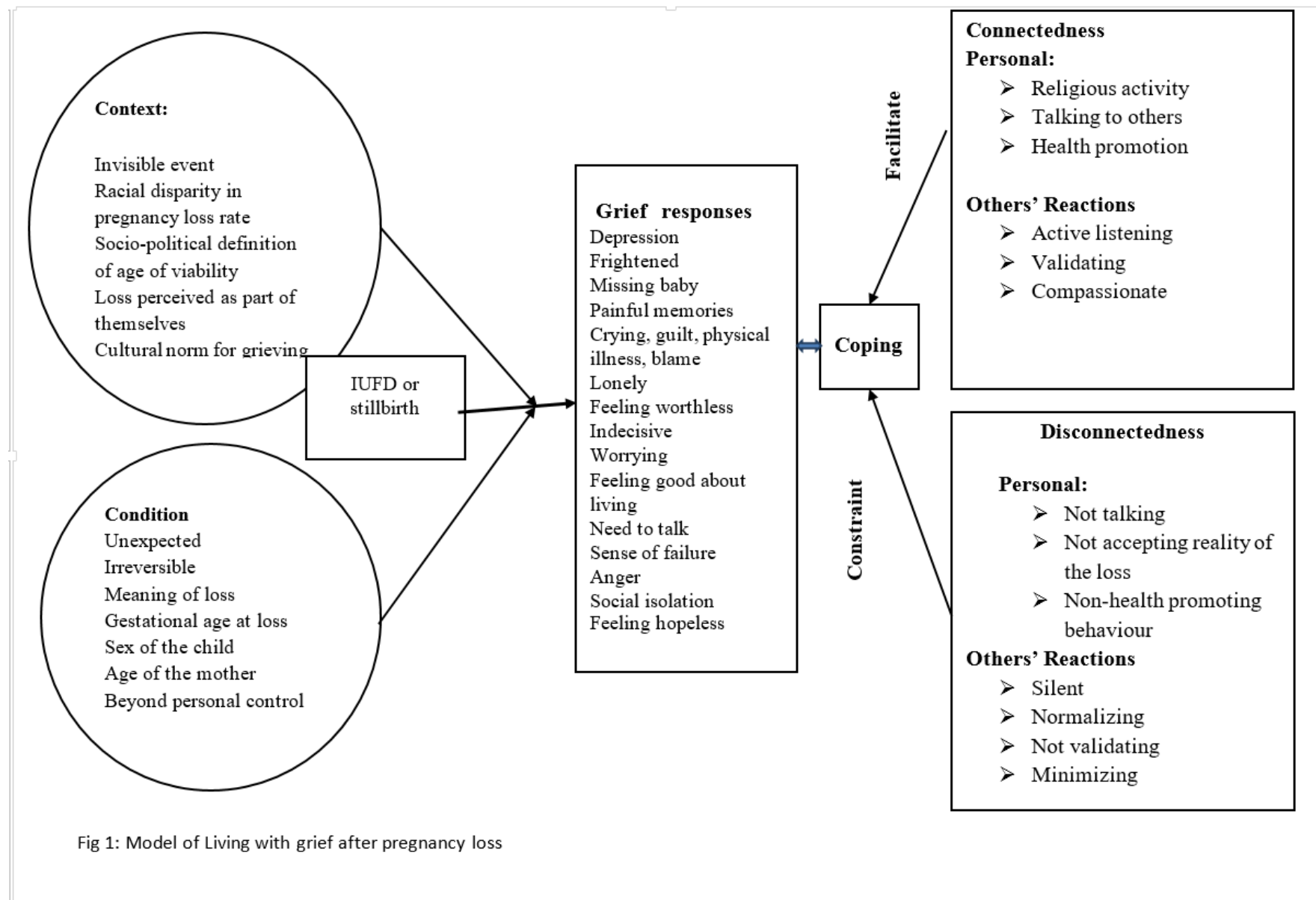
These varied coping mechanisms align with broader themes identified in the literature, such as emotion-focused coping (e.g., acceptance, spiritual reframing) and problem-focused coping (e.g., seeking information, social engagement), underscoring the complex and individualized nature of coping after fetal loss (Jacquelyn, 2021).

In Ethiopia, each person's coping technique after fetal loss is unique. Women utilize various coping mechanisms to deal with repeated stillbirths and fetal deaths and to lessen the social repercussions. They employed conventional treatments like drinking holy water or herbal medication, or they wore necklaces made of parchment with religious text on them (Sisay et al., 2014).

To date, most research on maternal coping mechanisms following adverse pregnancy outcomes has been conducted in developed countries, with limited qualitative evidence available from Ethiopia. Notably, a mixed-method study by conducted in three public hospitals in Addis Ababa explored how women cope with perinatal death within the Ethiopian context. This study revealed that social support, particularly from friends, significantly enhanced positive coping and identified multiple coping themes through thematic analysis, including emotional responses and practical strategies. However, many existing studies, including this one, lack clear use of established coping models and do not specify the timing of coping assessments, limiting comparability and theoretical grounding. Given that the current study adopts a qualitative approach, it builds upon and extends this knowledge by applying a structured coping framework to better understand how Ethiopian women navigate fetal loss within their sociocultural context.

Theoretical Framework for coping mechanism: “Model of living with grief after Pregnancy Loss”

Model of living with grief after pregnancy loss widely applied in the field of Nursing, and used here to organize, theorize, interpret, and suggest the means of coping mechanism women's used as a home-based coping experiences. Model of living with grief after pregnancy loss was developed by studies with African-American by Patterson's from two grounded theories (Van, 2001) and conceptualize a women's coping following an adverse fetal outcomes (IUFD/Stillbirth) involving holistic care given to her by others or by her own (Figure 1).



Several models have been developed to capture the complexity of grief following pregnancy loss, each offering different perspectives on how women experience and process their loss. Stage theories, such as Kübler-Ross's five stages of grief (denial, anger, bargaining, depression, acceptance), provide a sequential framework but have been critiqued for oversimplifying the non-linear nature of perinatal grief (Beth, 2020). The Dual Process Model emphasizes the oscillation between confronting loss and engaging in restoration-oriented activities, reflecting the dynamic coping process (Schut, 1999). Continuing Bonds Theory recognizes the ongoing emotional connection to the lost baby as a natural and potentially adaptive part of grief (Klass, 1996). Additionally, models of complicated grief focus on distinguishing normal grief from prolonged, impairing distress that may require clinical intervention (Prigerson, 1995). Beyond these, culturally adapted and women-centred frameworks highlight the critical role of social, cultural, and gender dimensions in shaping grief and coping, emphasizing autonomy, empowerment, and the tailoring of support to individual experiences (Fontein-Kuipers Y, 2018). These models collectively underscore the multifaceted and individualized nature of grief after pregnancy loss and provide theoretical foundations for developing effective emotional support and intervention strategies.

We selected the Model of grief after pregnancy loss because it is part of the suite of existing models for women-centered care, and thus it provides a means bridge examining women's Coping experience and considering how to improve nursing and other supportive care within health facilities. Understanding women's coping mechanisms through self/personal perspectives, support from others, cultural role and religious beliefs can provide insights that contribute to the development of appropriate interventions, support systems, and counselling services to better address the unique needs of Ethiopian women and promote their emotional well-being.

In this model, good Nurses first must address identifying what social context the women who faced fetal loss may experience following her lost baby and what personal issues she may develop during her stay over a one and six month period following her fetal loss(Patterson, 2000a).

Patterson, describe strategies for coping with following numerous aspects of grief experience. These include coping with one's own feelings and responses following the loss of a pregnancy, coping with other people's reactions to the loss, coping with memories of the child, and coping with pregnancies that follow(Patterson, 2000a). However, coping was significantly negatively affected by the personal

factors, such as not wanting to talk to any individual, denying the event, as well as others' reaction factors like not receiving attention from other individuals and minimizing her stress conditions. This model has been supported as valid through a study done in Spanish European women in Spain (Sara Ferná'ndez-Basanta 2019).

Patterson also described Nurses' facilitation for the grief experience following pregnancy loss. Nurses were compassionate, and their interventions were effective in facilitating the grief experience around the time of their loss. The Nurse provided emotional support, comfort, and empathy to help individuals cope with their grief. They created a safe space for individuals to express their emotions, share their feelings, and process their loss(Patterson, 2000a).

2.4. Conceptual framework

The conceptual framework for factors affecting the adverse feto-maternal outcomes and women's coping mechanisms is developed after reviewing different literature to visualize the relationship of the variables with the outcomes and the relationships among each other.

2.1. Conceptual framework

The conceptual framework for adverse feto-maternal outcomes and women's coping mechanism was developed after reviewing different literature to visualize the relationship between the predictors with the outcomes at the selected public hospitals in eastern Ethiopia.

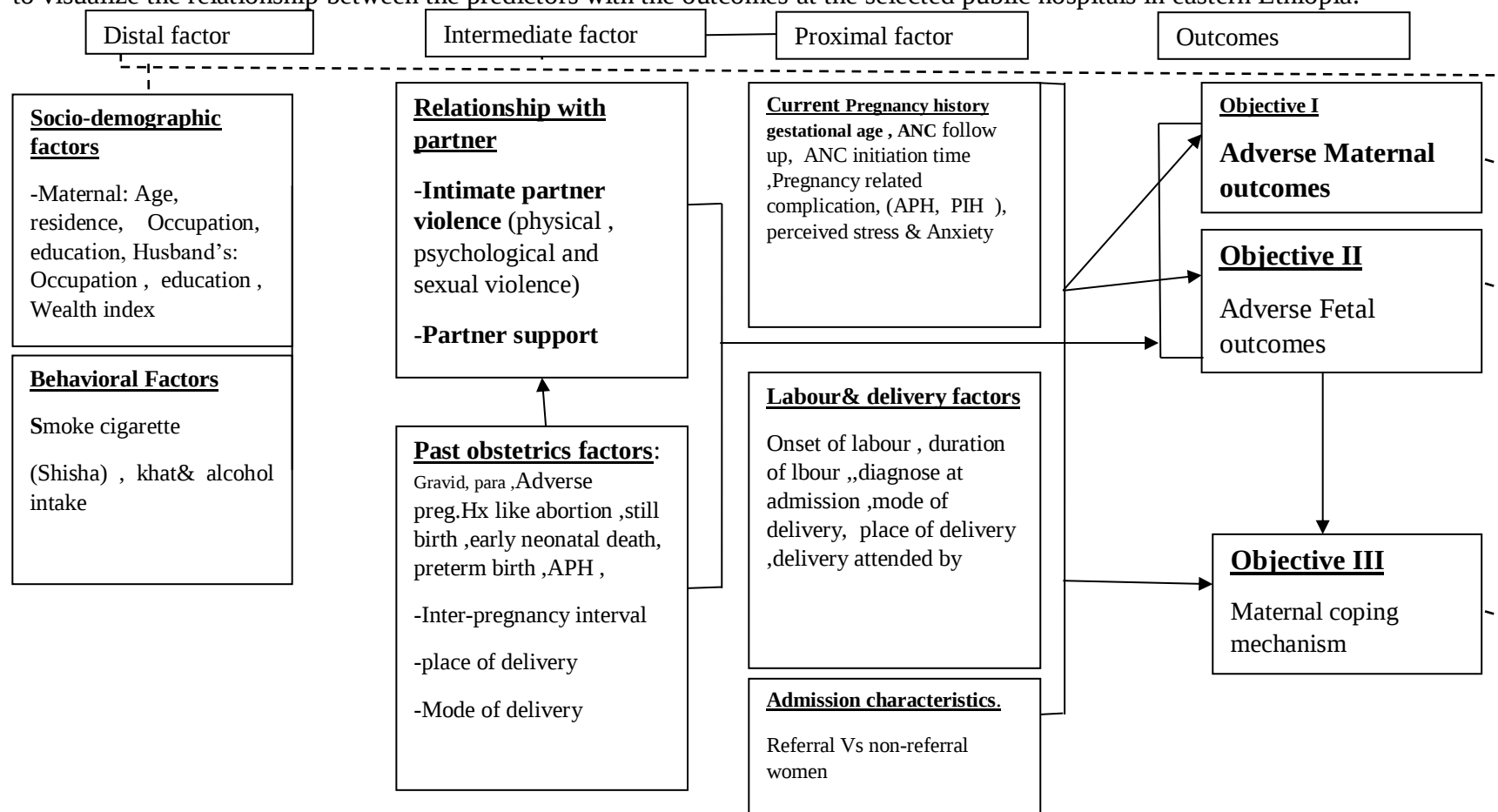


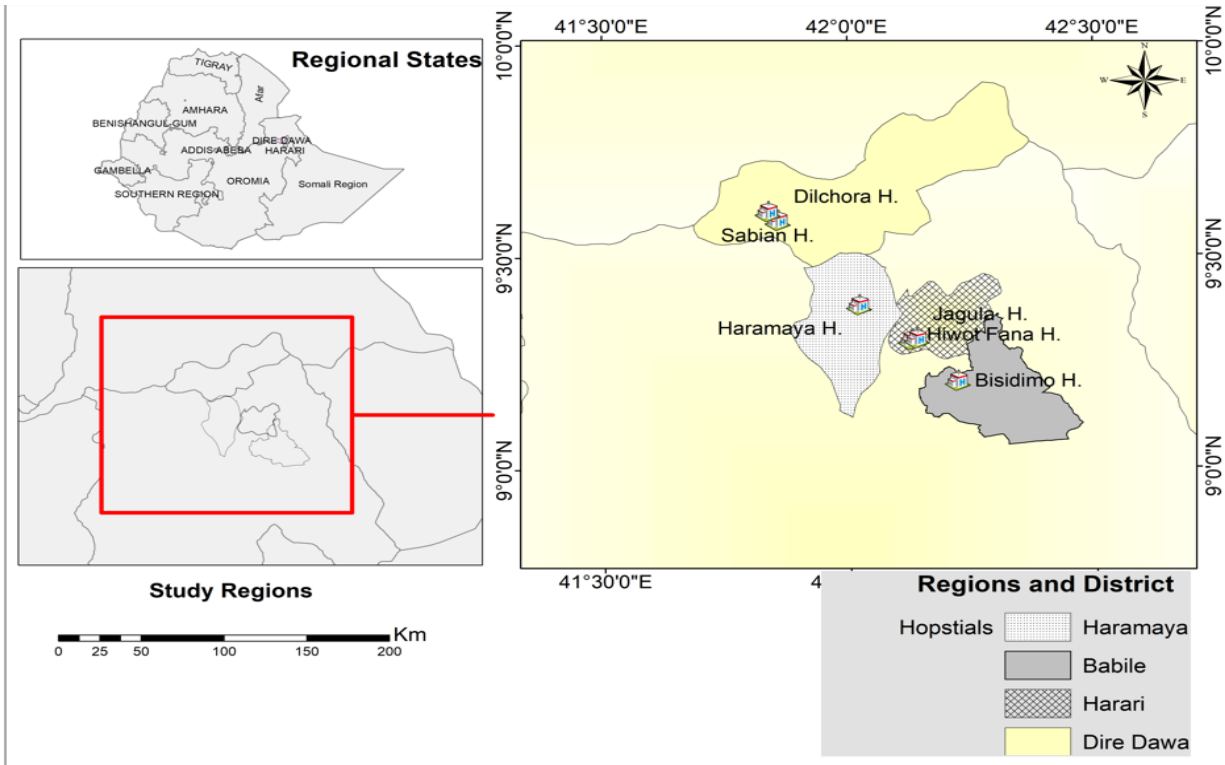
Fig-2: Adverse feto-maternal outcomes and women's coping at public hospitals in eastern Ethiopia.

Source: developed through literature review (Ganchimeg et al., 2014, Al Ghailani et al., 2019, Zar et al., 2019, Tessema et al., 2022, Degno et al., 2021, Lin et al., 2021, Yusuf et al., 2023, Teshale et al., 2021, Brown, 1993, Van et al., 2003).

3. METHOD AND MATERIALS

3.1. Study Area and Period

The study was conducted in six public hospitals that serve both urban and rural populations in the Harari Region, East Hararghe Zone of Oromia, and the Dire Dawa City Administration. The hospitals included in the study are one specialized hospital (Hiwot Fana), one referral hospital (Dil Chora), and four general hospitals (Jugal, Haramaya, Sabian, and Bisidimo), which provide maternal and neonatal health services. Hiwot Fana Comprehensive Specialized University Hospital, one of the oldest and largest referral teaching hospitals in eastern Ethiopia. It has 405 admission beds, multiple wards including ICUs, and manages approximately 5,800 deliveries annually, serving a catchment of over 6 million people (HFSUH-HR, 2023, HFSUH-HMIS, 2022). Jugal Hospital, established in 1965, supports clinical training and provides maternity services with 90 beds and around 3,000 deliveries per year, while its NICU admits about 30 neonates monthly (JH-HR, 2023, JH-HMIS, 2023). Dil Chora Referral Hospital, founded in 1960, has 298 beds with a large maternity ward and neonatal ICU, recording 4,630 deliveries and 128 stillbirths in 2022/23 (DCH-HR, 2023, DCH-HMIS, 2023). Bisidimo Hospital, originally a leprosy center since 1966, now offers general health services, including an ICU and NICU with 139 beds, managing nearly 880 deliveries semi-annually (BDH-HMIS, 2023, BDH-HR, 2023). Sabian General Hospital, upgraded to general status in 2019, has 128 beds and conducted 2,520 deliveries with over 200 adverse pregnancy outcomes reported recently (SGH-HR, 2023, SGH-HMIS, 2023). Haramaya General Hospital, established in 2013, features 167 beds and a well-equipped labor ward serving a wide patient population (HGH-HMIS, 2023, HGH-HR, 2023). Together, these hospitals provide comprehensive, representative care for maternal and neonatal health across the regions. The data collection took place from October 28, 2023, to March 30, 2024.



Fig_3: Map of the study area

3.2. Study design

A hospital-based cross-sectional mixed-methods study was conducted.

3.3. Source and Study population

The source population for this study were all women who attended the hospitals for labor and delivery and their newborns during the study period. Among these, women who delivered a baby and volunteer to participate in the study were our study populations.

3.4. Sample size

A total of 2608 women were recruited at admission & 2696 of their neonates were enrolled in the study. The sample size for each objective was determined using online Epi-Open software with the assumption of 95% CI with a power of 80%.

3.5. Sampling

Simple random sampling was used to select the participants .

Table 1: Summery of Study objectives, design, population, and sample size

Objectives	Study design	Study population	Sample size
1.To determine adverse maternal outcomes among mothers who will come for delivery service	Cross-sectional study design	All women who came to the selected hospitals for labour and delivery services were considered for the study in the specified time period	-Based on magnitude , from a study done in Ghandi memorial hospital Addis Abeba (Mohammedseid et al., 2017) with a p-value of 35.5% for the adverse maternal outcome following obstetrics emergency , by adding 5% lost follow-up rate , the calculated sample size become 369 -With an assumption of 95% confidence interval (CI)(P1=exposed with the outcome and P2=unexposed with the outcome), P1=11.9%, p2=8.3%, P=80% Factor: Place of labour trial at home(Getachew et al., 2021) , 5% lost to follow-up rate final sample size is 2326 Calculated using open-epi software online
2.To assess adverse fetal outcomes among mothers who will give birth in the selected public health facilities	Cross-sectional study design	All women who gave birth in the selected hospitals during the study period were the study population	Based on magnitude, from a study done in Felge Hiwot hospital Behar dar city, Ethiopia (Alemayehu et al., 2022) with a p-value of 33.2 % for the adverse fetal outcome, by adding 5% lost follow-up rate the calculated sample size becomes 357 -With an assumption of 95% confidence interval (CI) (P1=exposed with the outcome and P2=unexposed with the outcome) P1=4%,p2=2%, RR=4.82,P=80% Factor: post-term pregnancy as a factor (Tadese et al., 2022b) .The calculated sample size becomes 2608 by adding 5% lost to follow up rate Calculated using open-epi software online(https://openepi.com)
3.To explore coping mechanisms among women who experienced fetal loss in public hospitals	Phenomenological approach qualitative study design	women who face adverse fetal outcomes such as IUFD or stillbirth	With a minimum sample size of 20 but based on the level of information saturation and variety of ideas among the groups

3.6. Inclusion and Exclusion Criteria

Women who have visited the hospitals for delivery with their babies were included. However, women who gave birth at home or other facilities and visited the hospitals for health care services of various kind were excluded (Papers I & II).

3.7. Enrollment and Follow-up

Recruitment of study participants took place at the delivery ward of selected hospitals. Trained research assistants explained and invited women to participate in the study. Once women accepted the invitation, they were asked for consent.

Data collectors gathered baseline information on socio-demographic and behavioral characteristics, and other maternal information from a mother or her medical records. A review of the maternal chart was performed to obtain information about labor and its outcomes. All women delivered in the study hospitals were included. The newborns were followed from delivery to hospital discharge (Paper II).

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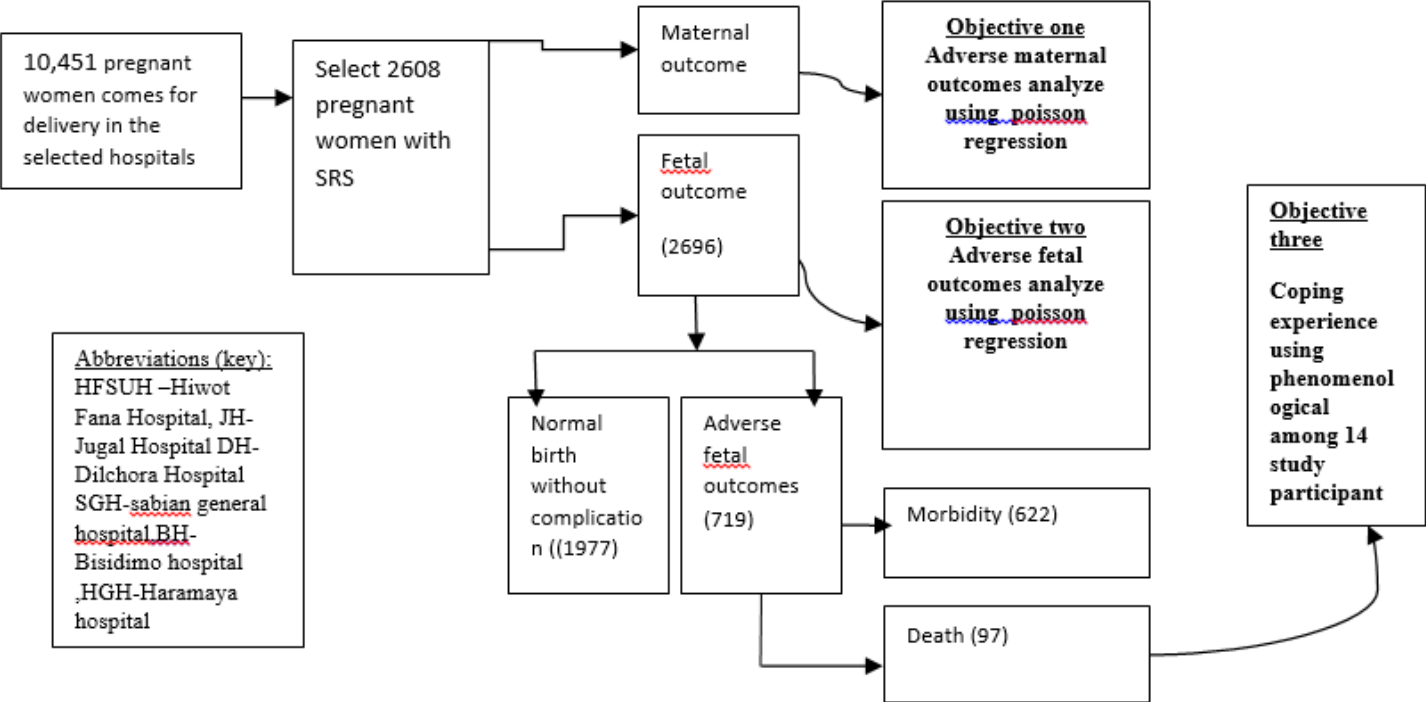


Fig. 4: Recruitment of study participants and the interrelationships between the objectives

3.8. Data Collection and Procedure

3.8.1. Data Collection and procedure for a quantitative study

The data collection technique used in this study was face-to-face interviews and a review of records and charts. Six female BSC midwives and two MSc midwives were selected and trained to collect data. The study utilized structured, validated questionnaires adapted from previous literature (Tekelab T, 2019, Abdo RA, 2016, Adane AA, 2014). To ensure validity, the questionnaires were translated into Amharic, Afan-Oromo, and Af-Somali using a forward-backward translation process, followed by pretesting and expert review to confirm cultural relevance and clarity across all languages. Data were collected on socio-demographic, behavioral, obstetric, and fetal factors, including perceived stress and anxiety, using standard scales (PSS-14 (Chan, 2020) and Kessler-10(Kessler RC, 2003b)). Stress/anxiety was categorized using a 5-point Likert scale and simplified into binary outcomes. Partner support (Turner RJ, 1990) and intimate partner violence (Deshpande NA, 2013) were also assessed using validated tools, with all procedures adhering to national infection prevention guidelines (paper I & paper II).

3.8.2. Data Collection and Procedure for a Qualitative Study.

The researcher did the in-depth interviews using a semi-structured guide based on the Loss Model (Patterson, 2000a), informed by prior studies and the theory of Living with Grief after Pregnancy Loss. The guide, developed in English and translated into Amharic and Afan Oromo, explored socio-demographics, emotional experiences, and coping mechanisms. In-depth interviews were scheduled in advance, held privately at participants' homes, lasted 45–90 minutes, and were audio-recorded with note-taking. The tool was pretested among women with fetal loss at Haramaya General Hospital before data collection. Based on the pretest, minor adjustments were made to improve the clarity of questions, ensure cultural sensitivity, and enhance the logical flow of the tool. Data collection occurred at two time points: at one month and six months following the fetal loss. At one month, the focus was on immediate emotional responses, initial coping strategies, social support, and perceptions of the loss. The six-month interviews assessed changes over time in grief intensity, adaptation and coping processes, reopening of social and cultural roles, and needs for support, allowing for a longitudinal understanding of the bereavement experience (Paper III).

3.9. Quality Control and Data Management

3.9.1. Quality Control and Data Management for quantitative studies

The questionnaire was pretested on 10% of the sample size at Deder Hospital to ensure tool appropriateness and participant selection accuracy, with necessary modifications made. Data collectors

were supervised and provided with regular feedback to maintain data quality. Data completeness and accuracy were monitored daily, and real-time error checks were conducted using Kobo Toolbox. Data were cleaned and analyzed using Stata software version 14 with descriptive statistics and appropriate statistical tests ($p < 0.05$) to assess relationships between categorical variables (Papers I & II).

3.9.2. Quality Control and Data Management for a Qualitative Study

The trustworthiness of the data was ensured using the four key criteria: credibility, dependability, conformability, and transferability. Credibility was achieved through peer debriefing, prolonged engagement, and reviewing participants' feedback post-interview. Dependability and conformability were addressed by using a uniform interview guide, validating transcripts with recordings, and documenting procedures thoroughly. Transferability was supported through detailed field notes, non-verbal cues, and a rich description of findings, ensuring the study's reliability and relevance (Paper III).

3.10. Variables and measurement

Adverse maternal outcome: postpartum hemorrhage (PPH), hysterectomy, uterine rupture, puerperal sepsis, anaemia, bladder trauma, perineal tear, cervical tear, surgical site complications following caesarean or instrumental vaginal delivery, and maternal deaths.

Adverse fetal outcomes: preterm birth, asphyxia, respiratory distress, birth trauma, hypothermia, meconium aspiration syndrome, stillbirth, low birth weight, low fifth-minute APGAR score, NICU admission, IUFD or early neonatal deaths (immediately after birth during data collection time) sa

Wealth index: a composite measure of a household's cumulative living standard used to assess socioeconomic status

Maternal behavior: smoking, chewing, and alcohol intake.

Past obstetric history: parity, gravidity, bad obstetric history, stillbirth, early neonatal death, abortion, NICU admission, ICU admission, blood transfusion, mode of delivery. place of delivery, if any.

Current obstetric history, gestational age, pregnancy-related complications, Inter-pregnancy interval, ANC follow-up, number of ANC follow-ups, station, cervical dilatation, qualification of the health professional who attends the delivery and onset of labour

Labour and delivery characteristics: presentation, position, fetal heart rate pattern.

Perceived stress and Anxiety, Partner support during pregnancy, Intimate partner violence & Admission cases: referral status

Operational Definitions

Adverse Maternal outcomes: PPH, hysterectomy, uterine rupture, puerperal sepsis, anaemia, bladder trauma, perineal tear, cervical tear, surgical site complications following caesarean or instrumental vaginal delivery, and maternal deaths. If the mother had one or more of the above conditions (recorded on the chart), she was considered to have adverse maternal outcomes (McMahon MJ, 1996, Mavrides E, 2016).

Adverse fetal outcomes: at least one preterm birth, asphyxia, respiratory distress, birth trauma, hypothermia, meconium aspiration syndrome, stillbirth, low birth weight, low fifth-minute APGAR score, NICU admission, IUFD or early neonatal deaths(immediately after birth during data collection time)(WHO, 2003, Williams, 1982).

Perceived Stress: the degree to which situations in the maternal life are appraised as unpredictable, uncontrollable, and overwhelming (Cohen, 1983).

Anxiety: an emotional state characterized by feelings of apprehension, tension, or uneasiness arising from the anticipation of a potential threat or danger, whether real or perceived an emotional state characterized by feelings of apprehension, tension, or uneasiness arising from the anticipation of a potential threat or danger, whether real or perceived (APA, 2024).

Danger sign at admission: includes Haemorrhage, pregnancy-induced hypertension, infection, swelling of the face, hand, or feet, fetal distress, reduced or absent fetal movement, loss of consciousness, and obstructed and prolonged labor, or if she developed at least one of nine danger signs stated in the World Health Organization (WHO) (WHO, 2015).

3.11. Data processing and analysis

Stata 14 was used for data analysis for the quantitative studies, and Open Code software employing a combination of deductive and inductive coding approaches based on the five steps of framework analysis was employed for our qualitative study.

3.12. Ethical considerations

Ethical clearance was obtained from Haramaya University's Institutional Health Research Ethical Review Committee (Ref.no. IHRERC/190/2023). The study followed the appropriate ethical conduct of a study. Key issues during the study included maintaining confidentiality of participant information, obtaining informed consent, and ensuring the safety and well-being of all participants. These were handled through strict adherence to ethical guidelines, such as anonymizing data, providing clear explanations of the study purpose, allowing voluntary participation, and implementing safety protocols throughout the research process.

4. RESULTS

4.1. Socio-demographic and Obstetric-related characteristics of women

A total of 2,608 women were enrolled in the study, achieving a 100% response rate. The majority of participants were 20-34 years old (71.36%), with a mean age of 26 years (± 5.1), urban residents (60.43%), and identified as Oromo by ethnicity (77.26%). Regarding socioeconomic and demographic characteristics, the majority were housewives (73.61%), Muslim by religion (79.29%), and married (98.08%). Nearly half had at least a primary education (43.79%), and a significant proportion belonged to the lowest wealth index classification (30.37%). Of all the participants in the study, the majority (49.62%) had been pregnant more than once, with 45.55% having a birth spacing of 24-59 months. Approximately 24.41% of these women had a history of complications during past pregnancies, either with their baby or themselves. 71.62% of the participants had received antenatal care, with 56.15% starting in the first trimester. Regarding danger signs upon admission, 20.17% of the women experienced them, with 24.73% being diagnosed with pregnancy abnormalities like APH, PIH, and amniotic fluid abnormalities.

4.2. Social and behavioral-related characteristics of women

Regarding on history of substance use, (18.37 %) and (5.18%) of them had used Khat and Alcohol during their current pregnancy, respectively. The majority of the participants (58.63%) had no partner support during pregnancy, of them (2.03%) experienced intimate partner violence. Around 43.60 % and 49.50 % of the study participants experienced perceived stress and anxiety during pregnancy, respectively (Fig 5)(Paper I).

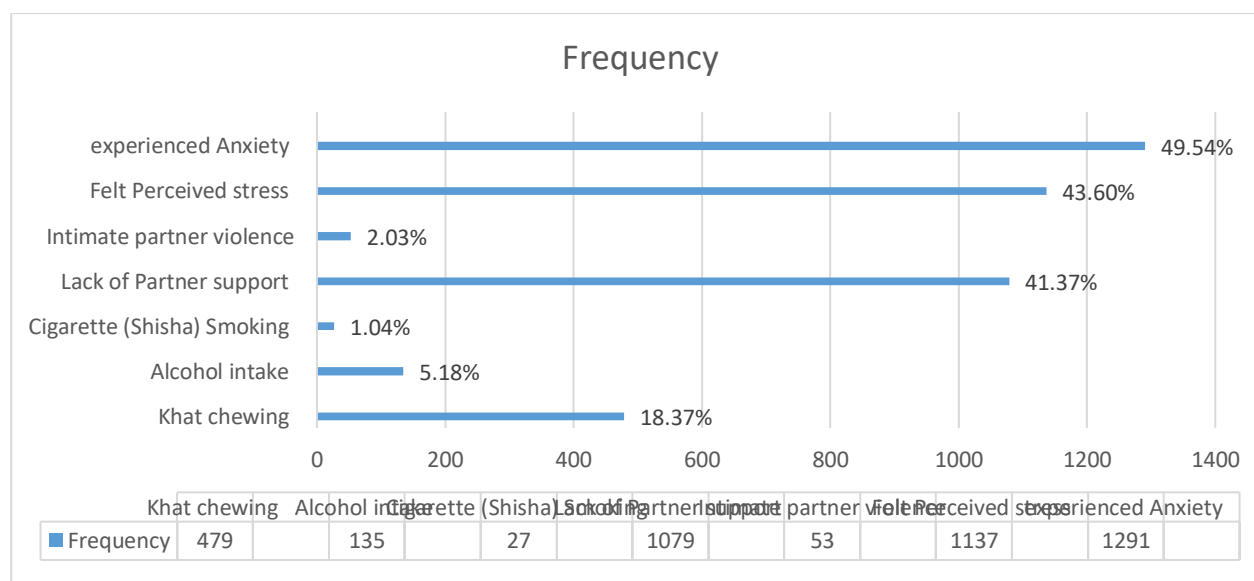


Fig 5 Social and behavioral related characteristics of study participants during pregnancy, Eastern Ethiopia 2024

4.3. Obstetrics and Newborn Characteristics

Regarding birth of the fetus, most deliveries were spontaneous vaginal deliveries (66.92%), and cesarean sections comprising one-third (33.08%). Nearly half of the women were multigravida (49.62%), while primigravida and grand multigravida accounted for 31.21% and 19.23%, respectively. Pregnancy intervals were mostly between 24 and 59 months (45.62%), with fewer women having shorter <24 months (11%) or longer >60 months (12.21%) intervals. Complications during the previous pregnancies were relatively lower (6.61%). Over a quarter (27.21%) of the women were referrals from other health facilities, with nearly half of these referrals arriving within 30 minutes. Labor onset was predominantly spontaneous (87.61%), and most labors lasted less than 12 hours (81.23%) (Paper II).

4.3. Adverse maternal outcomes

Of the total 2608 women included in the study, 15.68% (95% CI: 14.70% -16.66%) had adverse maternal outcomes. The study revealed that the primary adverse outcome after childbirth was post-partum anemia (whose Hemoglobin level was less than 11gm/dl)(89.97%) followed by postpartum hemorrhage (3.61%) and pregnancy-induced hypertension (severe pre-eclampsia/eclampsia) (2.92%). Of those women who faced an adverse maternal outcome, 23.71% and 10.51% of them experienced a long hospital stay following CS and due to PPH and post-partum Eclampsia following vaginal birth, respectively (Fig. 6).

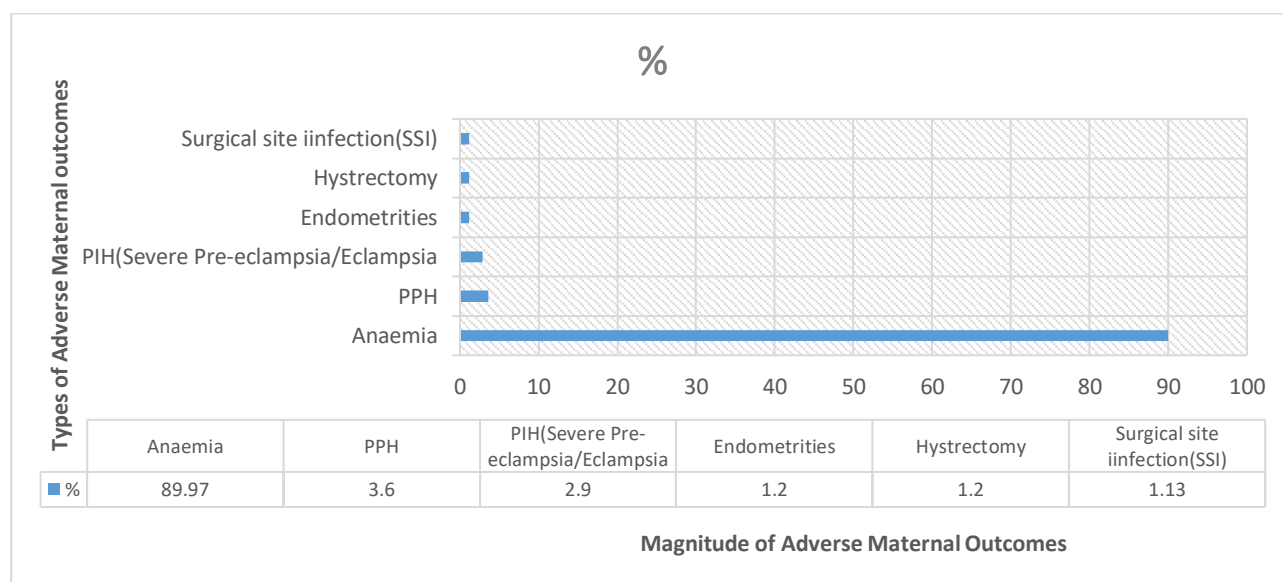


Fig 6: Types of adverse maternal outcome following birth in the study Hospitals, Eastern Ethiopia 2024

Factors associated with adverse maternal outcomes

Study participants characteristics, such as poor wealth index category, maternal age greater than 35 years, drinking alcohol during pregnancy, spontaneous vaginal delivery, prolonged labour, having

partner support during pregnancy, danger sign at admission, and folic acid intake during pregnancy, were significantly associated with adverse maternal outcomes.

Maternal age greater than 35 years increased the risk of adverse maternal outcomes by two-fold (ARR=2.13; 95% CI: 1.52, 2.98) compared to those aged 15-24 years. Additionally, women with danger signs at admission had a more than two-fold increased risk of adverse maternal outcomes (ARR= 2.75; 95% CI: 2.26, 3.35) compared to those with no danger sign at admission. Similarly, women from the poor wealth index had a fourfold increase in the risk of adverse maternal outcomes (ARR=3.81; 95% CI: 2.96, 4.89).

Furthermore, pregnant women who take alcohol during pregnancy and mothers who spent a labour duration of greater than or equal to 24 hours demonstrated a significantly increased risk of adverse maternal outcomes (ARR = 1.86; 95% CI: 1.32, 2.62) and (ARR = 1.69; 95% CI: 1.00, 2.85), respectively. However, folic acid intake during pregnancy was associated with a 53% reduction in the risk of adverse maternal outcomes compared to those who did not take folic acid, as indicated by (ARR= 0.47; 95% CI: 0.38, 0.57). This means, women who took folic acid were significantly less likely to experience adverse maternal outcomes, and mothers having partner support during pregnancy were linked to a 30% lower risk of adverse maternal outcomes (ARR = 0.70; 95% CI: 0.59, 0.83). Women who received support from their partners had a significantly reduced risk compared to those without such support. Furthermore, mothers experiencing a spontaneous vaginal delivery were associated with a 42% reduction in the risk of adverse maternal outcomes (ARR = 0.58; 95% CI: 0.49, 0.68). Women who had a spontaneous vaginal delivery were much less likely to face adverse outcomes than those who did not (Fig. 7) (Paper I).

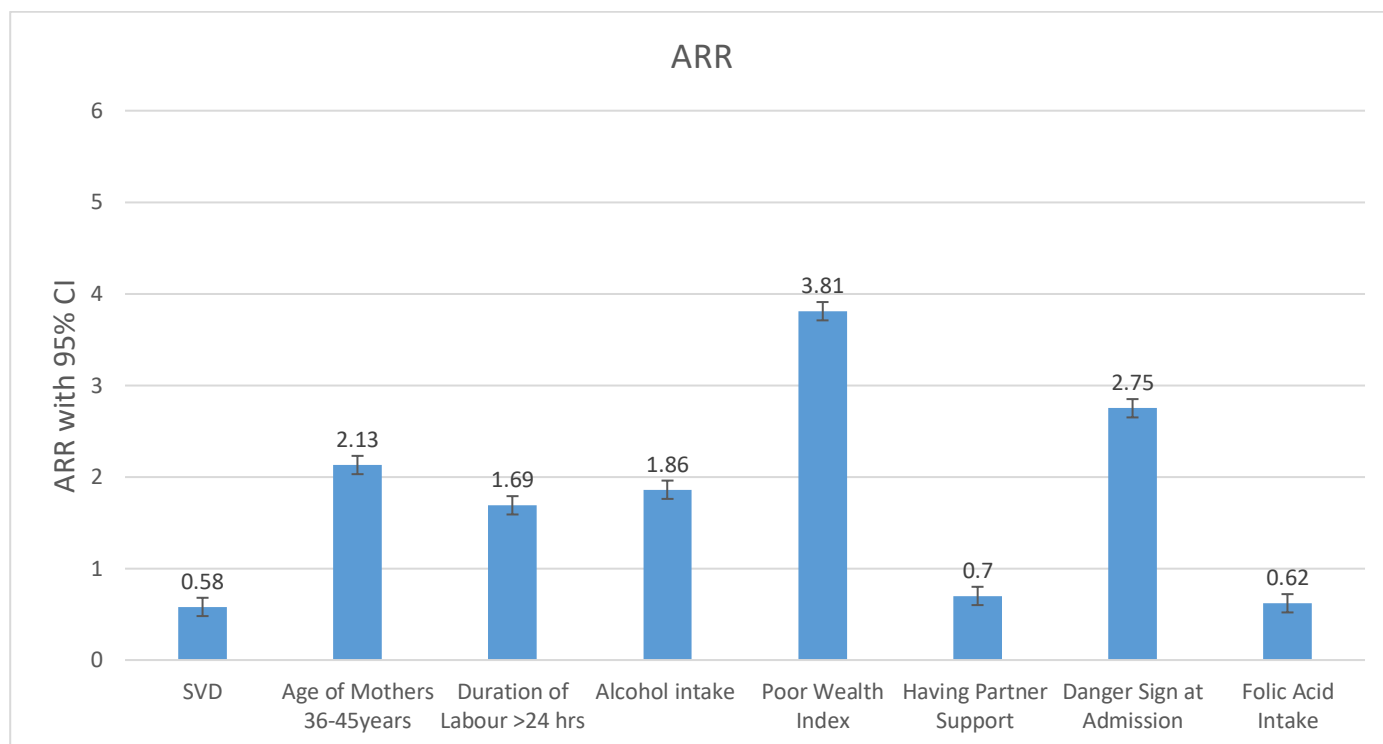


Fig 7: Factors associated with adverse maternal outcome among mothers who gave birth at public hospitals, Eastern Ethiopia, 2024

4.1. Magnitude of Adverse Fetal Outcomes

Of the total 2696 neonates born to the 2608 women, 719 (26.6%; 95% CI: 25.6-27.6) developed at least one adverse fetal outcome at discharge. Above 60% of study women developed co-existing problems. The most common adverse fetal outcome was low birth weight (50.62%), preterm birth (50.62%), and hypothermia (50.62%) affecting almost half (50.62%) combined (Fig 8) (Paper II).

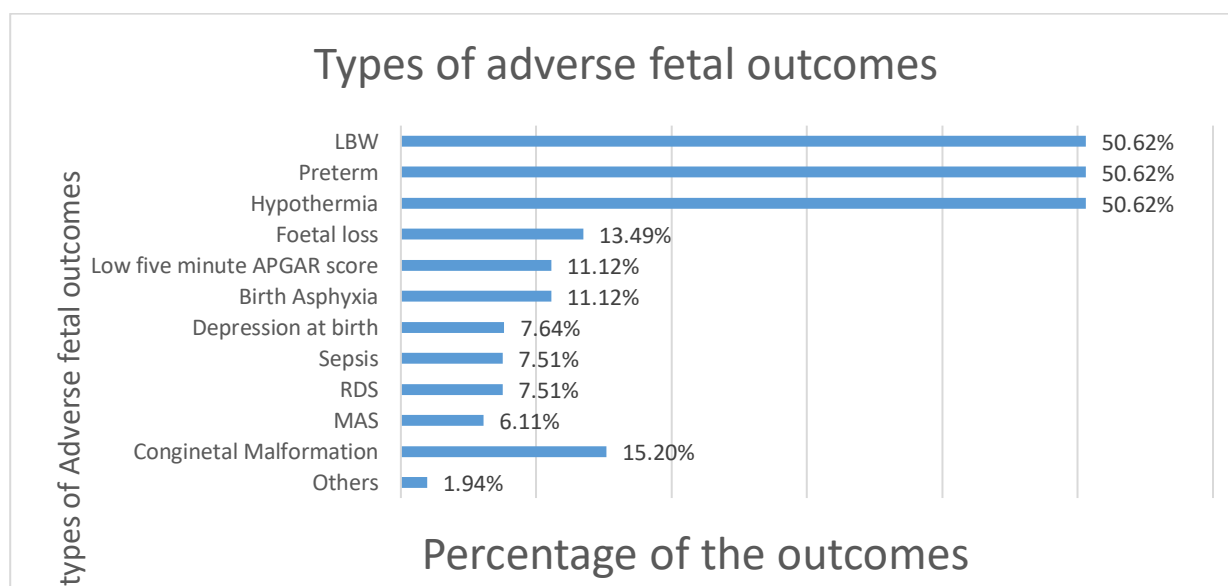


Fig 8: Neonatal outcomes among babies born in the study Hospitals, Eastern Ethiopia, 2024

Factors associated with adverse fetal outcomes

History of pregnancy complications, khat chewing, anxiety, folic acid intake, danger signs at admission, and referral status were significantly associated with adverse fetal outcomes at $p < 0.05$. Women with a history of pregnancy complications had an increased risk of adverse fetal outcomes (ARR=1.40; 95% CI: 1.14-1.72) compared to those who had no history of complications in their past pregnancies. Similarly, being diagnosed with an admission danger sign was linked to an increased risk of adverse fetal outcomes (ARR=1.73; 95% CI: 1.51-1.98) compared to no danger sign at admission.

Additionally, several factors were identified as contributing to a higher risk of adverse fetal outcomes. Women who chewed khat during pregnancy had a greater likelihood of adverse fetal outcomes (ARR=1.42; 95% CI: 1.23-1.64) compared to those who didn't chew khat during pregnancy. Moreover, those who experienced anxiety during pregnancy had an increased risk of adverse fetal outcomes (ARR=1.28; 95% CI: 1.05-1.67) compared to those who hadn't experienced anxiety during pregnancy. Furthermore, mothers referred for obstetrics management were associated with an increased risk of adverse fetal outcomes (ARR=1.45; 95% CI: 1.26-1.66) compared to non-referral mothers. Conversely, women who took folic acid during pregnancy had a 25% lower risk of adverse fetal outcomes (ARR=0.75; 95% CI: 0.63-0.90) compared to those who didn't take folic acid during pregnancy (Fig. 9) (Paper II).

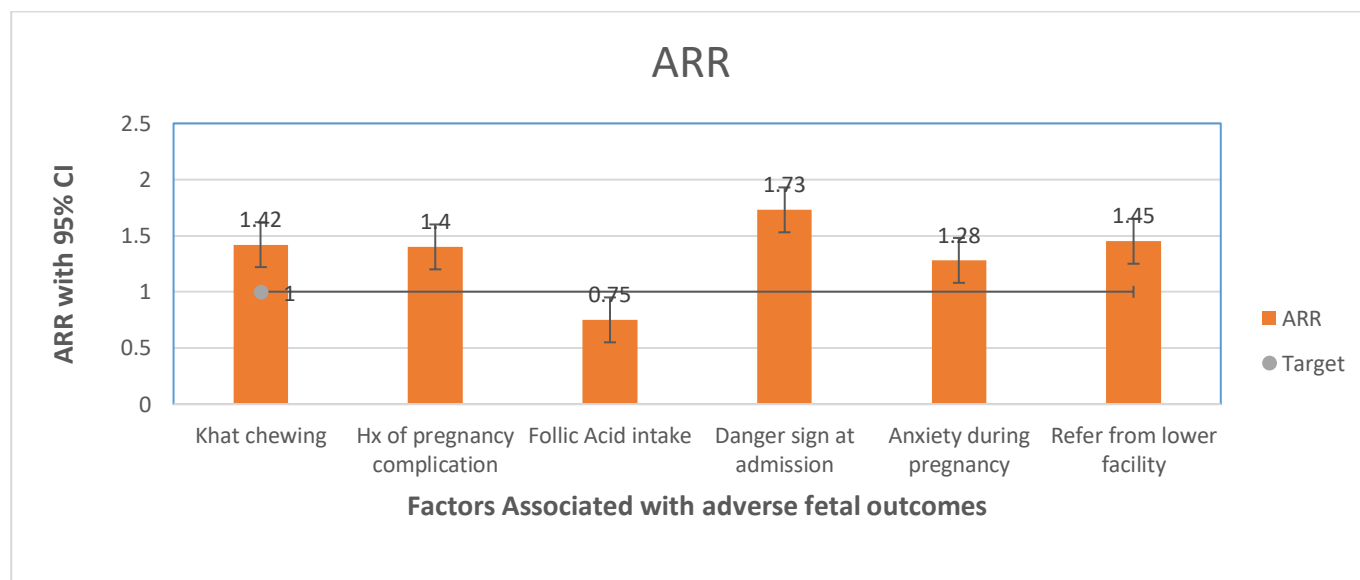


Fig 9: Factors associated with adverse fetal outcome among mothers who gave birth at public hospitals Eastern Ethiopia, 2024

4.4. Maternal coping mechanism following fetal loss

Socio-demographic and obstetric characteristics

A total of 14 women with a mean age of 25.14 (± 6.9) years were included. More than half of them were 18-35 (71.42%) years old, had no formal education (57.14%), and were multipara (57.15%) (Paper III).

Grief response and influencing factors

During the first month after fetal loss, most women had not described experiencing a spectrum of intense emotional responses, including persistent crying, feelings of loneliness, and deep anger. These manifestations of grief were shaped by a range of external factors(context), such as religious expectations and conflicts with the husband's family, as well as internal factors (conditions) like the sex of the lost child (particularly if the baby was male) and the recurrence of previous fetal losses. For some mothers, losing more than one child greatly intensifies and extends their grief, often causing a sense of hopelessness about future pregnancies. Repeated losses make the grieving process more traumatic, as past and present sorrows combine. Additionally, a strong wish for a male child can increase feelings of disappointment, making it even harder to cope. In some cases, the involvement of the husband's mother was also mentioned as contributing to greater emotional distress.

Coping with fetal loss

By the sixth month, nearly all women demonstrated effective coping, a significant increase from just eleven women at the one-month. The participants credited this progress to the adoption of diverse coping strategies. Analysis revealed four main themes underlying both improved connectedness by six months and the earlier struggles with disconnectedness: religious and spiritual practices, social support systems, personal beliefs, and cultural norms, each encompassing specific subcategories.

The coping mechanisms employed by women following fetal loss emerged across four interrelated themes, each encompassing distinct yet interconnected sub-themes. First, **self/personal resilience** was a prominent theme, with women demonstrating inner strength through *emotional support and processing*, such as personal reflection and emotional expression, and through *active life participation*, by re-engaging in household duties and daily routines to regain purpose and control. Second, the **social support network** played a vital role in recovery. Within this, *family and community interaction* provided a sense of connection and validation, while *peer sharing* allowed women to draw comfort and insight from others with similar experiences. Third, **religious and spiritual coping** surfaced as a powerful domain. Many participants found solace in *faith in divine will*, accepting their loss as part of God's greater plan, and turned to *spiritual practices* like prayer and consultation with religious figures for emotional grounding. Lastly, **cultural beliefs and practices** shaped the grieving process through

traditional mourning rituals that offered symbolic closure, and *collective family belief systems* that emphasized resilience, continuity, and shared cultural meaning. Together, these themes illustrate how coping is not singular but rather a multidimensional process anchored in individual, relational, spiritual, and cultural contexts.

Connectedness

Participants explained that coping after fetal loss was a difficult journey, demanding considerable effort. They used various strategies, which fell into four main categories: personal resilience, support from social networks, religious and spiritual practices, and cultural beliefs (Paper III).

Table 2: Themes of coping mechanisms among women who experienced fetal loss from December to May 2024(n=14)

S.no	Main theme	Category	Codes
1.	Self / personal	Emotional Support and Processing Active Life Participation	-Discussing grief & emotions -Desire for parenthood -Spending an enjoyable time with family -Discuss with partner on plan for new baby -Spending more time caring for husband & children -Shut down emotions -Encouraging oneself -Try to be stronger -Avoid talking about the event
2.	Social support networks	Family support Peer communication	-Practical assistance -Belongingness -connecting with other mothers -Encouragement from friends -Advice & guidance from peers -Mutual understanding & empathy from peers
3.	Religiosity and spirituality coping	Faith and resilience Spiritual leaders support	-Reading holy book -Offering salah(pray) -Consulting Imam/priest -Finding strength through faith -Belief in a higher purpose -Hope for future blessing -Resilience through spiritual belief -Elders' wisdom & Guidance -Spiritual advice on coping
4.	Cultural belief systems	-Coping with health crises -Social Impressiveness in	- Togetherness -provided me with supportive words -Cultural rituals for healing -Cultural narratives on grief -Cultural expectations of strength

1. **Self/Personal Resilience** Participants described their unique coping mechanisms, ranging from making oneself busy with work, socializing with others to avoid dwelling on the event, describing emotional support and processing, and active life engagement.

A 32-year-old Gravida III & para II mother expressed her experience as, *“I expressed a strong desire to engage in conversations with my husband about our life plan, as these discussions are important for our shared goals and aspirations. However, I find myself deliberately avoiding any mention of the baby we lost, since the memory of the loss seems too painful to revisit and I may be concerned about reopening wounds that have not fully healed.”*

2. **Social support networks**

Support from others after a pregnancy loss can be a vital source of comfort, reminding individuals that they are not alone and that their emotions are valid. Leaning on family and peers helps in finding strength, hope, and eventually healing. Most respondents who received such support were more likely to accept their situation and achieve a sense of calm. The sub-themes identified under this theme were family support, peer communication, and information seeking.

A 25-year-old, Gravida III & para III mother expressed her experience, *“My close friend, who had previously experienced the loss of twin babies, shared her own story with me in an attempt to convince me and offer comfort. She assured me that Allah would undoubtedly bless us with another baby.”*

3. **Religious & spiritual coping**

Participants reported that both Islam and Christianity played a key role in helping them cope with fetal loss. Religious practices such as prayer and community support offered comfort, while beliefs about the afterlife provided emotional relief. Subthemes included faith and resilience, along with guidance from spiritual leaders.

A 23 years Christian follower primi-para woman expressed her feelings about getting comfort with the aid of religious leaders as, *“I met with my priest, who blessed our home with holy water and shared biblical stories, emphasizing the importance of faith in God’s plan. He encouraged us to accept life’s challenges as lessons from God and assured us that if we trust in him, we will be blessed with the child we dream of”*

4. **Cultural belief systems**

Cultural beliefs strongly influenced how respondents coped with fetal loss. Emphasis on community togetherness provided support, comfort, and a sense of belonging that aided healing and resilience. Subthemes included coping with health crises and embracing cultural values and norms, which shaped their grieving process.

A 30-years-old gravid IV and para IV mother explained her experiences as “*My husband always warned and counselled me that our elders’ spelled going too deep into sadness since it could result in more pain and bring health hazards on the rest of our families. But after my second child was involved in a vehicle accident, I decided it was best to move on from any memories of the baby who had died*”.

Disconnectedness

Similar themes, like connectedness, emerged among women who failed to develop effective coping mechanisms (Paper III).

1. Self/Personal

Three primary sub-categories, denial, blaming self or partner, and isolation, characterize personal ineffective coping strategies. In denial, the women refused to acknowledge the reality of their loss, while participants attributed the fault for the loss to themselves or their partners among the blaming sub-themes. Some women withdrew from social interactions (isolation).

2. Social support

Most participants indicated that social support plays a crucial role in managing the emotional impact of unexpected life events, such as pregnancy loss. Despite recognizing the importance of such support, many struggled to fully access it due to their desire to avoid negative feelings associated with the situation. Under this theme, two main categories emerged: Avoidance of Family Support to recuperate from grief, and avoidance of Peer Communication on the issue.

3. Religion and Spirituality

Each participant’s journey through grief revealed the profound impact of religious and spiritual beliefs on their coping processes. However, not all individuals found solace or comfort in their faith a month after their loss. This theme encompasses two distinct yet interconnected sub-themes: Blaming God/Allah and withdrawing from Religious Activities.

4. Cultural Beliefs

According to some participants, cultural beliefs prevent them from coping with their grief and force them not to express their emotions. This societal pressure can exacerbate feelings of grief and isolation for the mother. Under this theme, there are two sub-themes were found: Against cultural values, and gender roles and expectations.

5. DISCUSSION

This study provides a comprehensive assessment of adverse feto-maternal outcomes and maternal coping in the aftermath of fetal loss. The findings demonstrate that adverse maternal outcomes were significantly more prevalent among women from lower socioeconomic backgrounds, those who consumed alcohol during pregnancy, and those admitted with clinical danger signs at admission. Adverse fetal outcomes, meanwhile, were more commonly observed among women who reported chewing khat and among those who experienced delays of 60 minutes or more before hospital referral. These factors underscore the interconnected influence of socioeconomic status, behavioral factors, and health system responsiveness on maternal and neonatal health.

5.1.1. Adverse maternal outcomes

This study found that 15.68% of women who delivered in the selected public facilities experienced adverse maternal outcomes at discharge. This study's findings on adverse maternal outcomes align with a systematic review & meta-analysis in Ethiopia reporting a 15.9% rate (Leta M, 2022c), though higher than rates reported in India (13.5%) and Northwest Ethiopia (12.3%) (Mihretie GN, 2022, Patel KK, 2021). A Northern Ethiopian study showed a higher rate of 32.6%, with anemia and pregnancy-induced hypertension affecting a significant portion of women (Tadese, 2022), likely due to differences in populations and settings. Postpartum anemia in this study exceeded common rates for developing countries (50–80%) (WHO, 2017), possibly reflecting socioeconomic and cultural factors. The 3.6% rate of postpartum hemorrhage observed falls within WHO's 1–10% range (Say, 2014), while postpartum eclampsia at 2.69% was lower than a 6.2% rate reported in Addis Ababa (Addisu Y.W, 2021), differences likely influenced by study contexts such as study setting, population, and **sample size**.

The risk of adverse maternal outcomes was 1.86 times higher among women who consumed alcohol during pregnancy compared to those who did not. Similarly, studies in Ghana and Spain found that alcohol intake during pregnancy more than doubled the risk of surgical site infections following cesarean births (Onuzo CN, 2022, Delgado-Rodríguez, 2001). Alcohol intake weakens the immune system, impairing the body's ability to fight infections after surgery (Sarkar, 2015), and can also cause deficiencies in key nutrients like vitamin C, zinc, and protein, which are essential for wound healing (Giorgia S. , 2018).

The risk of adverse maternal outcomes was 1.69 times higher among women with labor lasting more than 24 hours compared to those with shorter labor. Similarly, studies in Addis Ababa and Oslo reported

that prolonged labor more than doubled the risk of postpartum hemorrhage (Nyfløt LT, 2017, Genanew K. G., 2024). Prolonged labor can lead to uterine atony, retained placenta, and other complications that increase the likelihood of excessive bleeding after delivery (Chitnis, 2019).

Folic acid is vital during pregnancy for fetal and placental growth and to prevent anemia (Villines, 2020). In this study, the adverse maternal outcome is reduced by 38% among those who took the drug during their pregnancy. A systematic review & meta-analysis in Pakistan found a 69% reduction in maternal anemia with folate supplementation, though it did not lower postpartum hemorrhage (Aamer I., 2012). Similarly, a meta-analysis covering diverse countries showed a 50% reduction in anemia risk with folate intake (Batoool A. H, 2013). Folic acid contributes to the production of healthy red blood cells, which are crucial for oxygen transport throughout the body (Felman, 2023).

The notable reduction in adverse maternal outcomes related to folic acid use highlights the critical need for the health system to promote its use among pregnant women actively.

Additionally, partner support plays a vital role by providing emotional backing that helps lower stress and anxiety, ultimately contributing to improved maternal health outcomes (Pilkington, 2016).

In this study, partner support during pregnancy is associated with reduced odds of adverse maternal outcomes, likely by lowering stress and reducing the risk of postpartum eclampsia (Martin RCB, 2023). Vaginal delivery reduced adverse outcomes by 42%, and a multi-country survey found cesarean births were associated with a higher risk of ICU admission and maternal near-miss events (Thanh, 2019). Vaginal delivery promotes stronger uterine contractions post-delivery, helping prevent complications like uterine atony and postpartum hemorrhage (Negrini R, 2021). A mother who was diagnosed with admission danger signs such as APH, pre-eclampsia, and obstructed labour was found to be associated with adverse maternal outcomes. A study done in Norway revealed that the risk of PPH is three times higher among pregnant women who had been diagnosed with severe pre-eclampsia at admission (Nyfløt, 2017). These alarming statistics underscore the critical need for timely recognition and intervention. Similarly, a study done in southern Ethiopia showed that women who experienced complications of labour were 1.8 times more likely to experience post-partum hemorrhage (Kebede BA, 2019b). These findings collectively highlight that danger signs at admission can lead to significant delays in obstetric management, exacerbate the underlying condition, and ultimately result in adverse maternal outcomes (Oguntunde O, 2021). The finding showed that women whose age was greater than 35 years had adverse maternal outcomes. Indicating that this age group is a risk for maternal outcomes following birth. Similarly, a study done in Southern Ethiopia revealed that mothers aged 35 years and above are six times more likely to experience an adverse maternal outcome than their counterparts (Kebede BA,

2019c). Older women face increased risks during pregnancy and childbirth mainly due to biological reasons that result in placental complications and high blood pressure (Londero, 2019). This underscores the need for enhanced monitoring and tailored care strategies for older pregnant women, including regular screenings for potential complications.

5.1.2. Adverse Fetal Outcomes

It found that over one in four births experienced adverse fetal outcomes, primarily hypothermia, preterm birth, and low birth weight. Key factors associated with these outcomes included maternal anxiety during pregnancy, referrals from other facilities, presence of danger signs at admission, lack of folic acid intake during pregnancy, history of pregnancy complications, and chewing khat.

The study found that the percentage of adverse fetal outcomes was 26.6%. Among these, a combination of hypothermia, preterm birth, and low birth weight was the most significant, affecting 50.63% of newborns with adverse outcomes. Fetal loss affected 13.49% of participants, while respiratory complications (birth asphyxia, low 5-minute APGAR scores, and need for respiratory support) impacted 11.13% of newborns. This high percentage aligns with findings from Northern Ethiopia's Sekota town (27.47%)(Eshetu S., 2021) and the pooled prevalence in Ethiopia at 26.88% (Gedefaw, 2020a). However, it is higher than the magnitude reported in the Oromiya region (21%) and Kembata Tembaro Zone (13.9%)(Sisay D. , 2021) as well as the WHO estimate for developing countries at 18.5% (Lolaso, 2019, WHO, 2014), likely due to sample size and study area differences. Conversely, it is lower than studies in Amhara region Bahir Dar city (33.2%) and Dessie referral hospital (32.5%)(Cherie N, 2017, Alemayehu, 2022). The difference could be attributed to differences in sample size, study location, and number of study sites.

Furthermore, a study conducted in northwest Ethiopia showed that the most common adverse fetal outcomes were low birth weight (79.7%), preterm birth (71.5%), stillbirth (17.9%), and visible birth defects (8.9%) among affected neonates(Cherie N, 2017). These findings further emphasize the burden and variety of adverse fetal outcomes prevalent in the region and align with the current study's result.

Our findings indicate that women experiencing anxiety during pregnancy are more likely to face adverse fetal outcomes. This underscores the public health importance of routine psychological screening and mental health support for pregnant women. Clinically, it highlights the need to integrate mental health care into maternal health services to enhance pregnancy outcomes. From a policy perspective, these results support including mental health services within maternal health programs at all healthcare levels, with a focus on training providers in mental health assessment and counseling. Maternal anxiety triggers the release of stress hormones like cortisol and adrenaline, which can impair utero-placental blood flow

and fetal development (Glover V, 1999). The reduction in blood flow can result in complications such as low birth weight and developmental delays (Basel P.L, 2020).

This study revealed that the risk of adverse fetal outcomes was higher among women who chewed khat compared to their counterparts. This finding is consistent with the study conducted in eastern Ethiopia, which showed that khat chewing significantly increased the risk of preterm birth (Amsalu T. W., 2024). Similarly, research from Yemen found that khat consumption during pregnancy increased the risk of low birth weight by 44% (Ghani, 1987). Supporting this, a study in Jimma, Ethiopia, indicated that many khat chewers experienced low birth weight due to intrauterine growth retardation (Gamal S. A., 1998). Furthermore, a recent systematic review and meta-analysis in Ethiopia reported that khat use during pregnancy more than doubled the odds of low birth weight, congenital anomalies, perinatal mortality, and low APGAR scores at the fifth minute (Yitayih, 2023). Since khat contains the stimulant cathinone, which has vasoconstrictive properties, its use during pregnancy can be particularly harmful. This vasoconstriction limits the flow of oxygen and nutrients to the placenta, potentially causing restricted fetal growth and leading to several adverse fetal outcomes such as low birth weight, preterm birth, and, in severe cases, stillbirth (Wabe, 2011, Yimenu Y., 2023). Moreover, while many mothers are concerned about the harmful effects of khat chewing, cultural acceptance and social factors often complicate efforts to quit. The physiological impact of khat use during pregnancy is also associated with increased risks of maternal anemia, gestational hypertension, premature rupture of membranes, and psychological stress, all of which further contribute to poor fetal outcomes (Rampes, 2003).

Consistent with other studies, women who did not take folic acid during pregnancy were more likely to experience adverse fetal outcomes (Cherie N, 2018). Given the well-established role of folic acid in reducing adverse fetal outcomes through its critical functions in cellular division, DNA synthesis, and fetal neural tube development, ongoing advocacy for folic acid supplementation remains essential (Johnson, 2000). In the Ethiopian context, this finding has significant clinical and policy implications. Despite national efforts, adherence to folic acid supplementation among pregnant women remains low, with recent studies reporting that nearly four out of five pregnant women do not receive folic acid for the recommended duration (Hardido et al., 2023). This is influenced by factors such as late antenatal care initiation, regional disparities, and socio-cultural barriers (Temesgen H, 2024).

To address these challenges, Ethiopia's Ministry of Health has developed national guidelines emphasizing preconception and antenatal care interventions, including standardized folic acid supplementation protocols (FMOH, 2023).

5.1.2. Maternal coping mechanisms following fetal loss

The Model of Living with Grief after Pregnancy Loss provides a comprehensive framework for understanding how women emotionally and psychologically cope with fetal loss, emphasizing the need for personalized and holistic support (Patterson, 2000a). This study applied the model to explore grief and coping experiences at both the first and sixth months following fetal loss, offering a temporal perspective that captures the evolving nature of adaptation from the immediate impact to efforts toward recovery. The original framework highlights stages of grief, cognitive restructuring, emotional regulation, and social adaptation as central coping mechanisms. However, findings from this study in Eastern Ethiopia revealed several context-specific coping strategies that required modifications to better reflect local experiences (Fig. 10). Modifications made to the original model were based on key findings that emerged during the analysis. First, religious and spiritual coping were found to be a significant resource for participants. Many women frequently turned to prayer, religious readings, and belief in the divine to be the source of comfort and meaning. Religious institutions and spiritual advisors also played roles in grief resolution. As a result, “Spiritual/Religious Coping” was added as a central domain influencing both emotional and cognitive processing. Secondly, cultural beliefs and practices surrounding fetal loss, such as traditional mourning rituals and family-centered values, greatly influenced how women processed grief. This led to the inclusion of a new component titled “Cultural Coping and Belief Systems” to capture the unique role of culture in shaping coping behaviors. This enriched framework underscores the importance of culturally sensitive, holistic support to effectively address the emotional and psychological needs of bereaved women. However, in the first month following the occurrence of the problem, many women complained that cultural and religious norms that discourage openly expressing grief can lead to internalized sorrow, making it harder for women to process their emotions openly. This interplay of support and constraint shapes the complex healing journey following pregnancy loss (Cacciatore, 2010b, Tosin P., 2020). In some cultures, there is also a societal expectation to quickly “move on,” which can exacerbate feelings of isolation and hinder emotional recovery (Layne, 2003).

Women coping with pregnancy loss often use emotional detachment to manage overwhelming grief, creating psychological distance to reduce immediate pain, though this may delay emotional healing. Many found hope in anticipating future pregnancies, offering optimism and a path to recovery similar to findings among African American and Indian women (Patterson, 2000a, Gopichandran, 2018). Distraction through family responsibilities and staying busy also served as effective coping strategies, as noted in studies from the USA and India, where returning to work and caring for children helped ease grief (Gopichandran, 2018, VAN, 2012a).

Social support emerged as a critical factor in the grieving process, with many women turning to close family members, especially their spouses and mothers, for emotional comfort and stability. This aligns with research conducted in Ghana and the USA, which found that supportive relationships, particularly with partners, played a crucial role in facilitating emotional recovery after fetal loss (Lehman D., 1986, Eniola S. O., 2020). Despite the presence of family support, societal pressures often made women feel as though they needed to suppress their grief, leading to feelings of isolation. This societal pressure to "move on" was found to hinder the natural grieving process and exacerbate emotional trauma (LaRoche C., 1984) (Layne, 2003).

The study also revealed that self-blame and isolation were common among women who struggled to cope with their grief. Many participants experienced difficulty accepting the reality of the loss, blaming themselves or their partners, and isolating themselves from others, which aggravated their emotional distress. This finding was consistent with other studies that emphasized the harmful effects of self-blame and inability to communicate grief (Cacciatore, 2010b, Trulsson, 2004). The lack of open communication with partners and family, particularly in cultures where grief is a taboo subject, further delayed the healing process and made it harder for mothers to cope with their sorrow (Trulsson, 2004); (Timmermans, 2022)). Moreover, the fear of cultural or religious condemnation for expressing grief openly often led to further isolation and hindered the emotional recovery of women (Timmermans, 2022) (Cacciatore, 2010a).

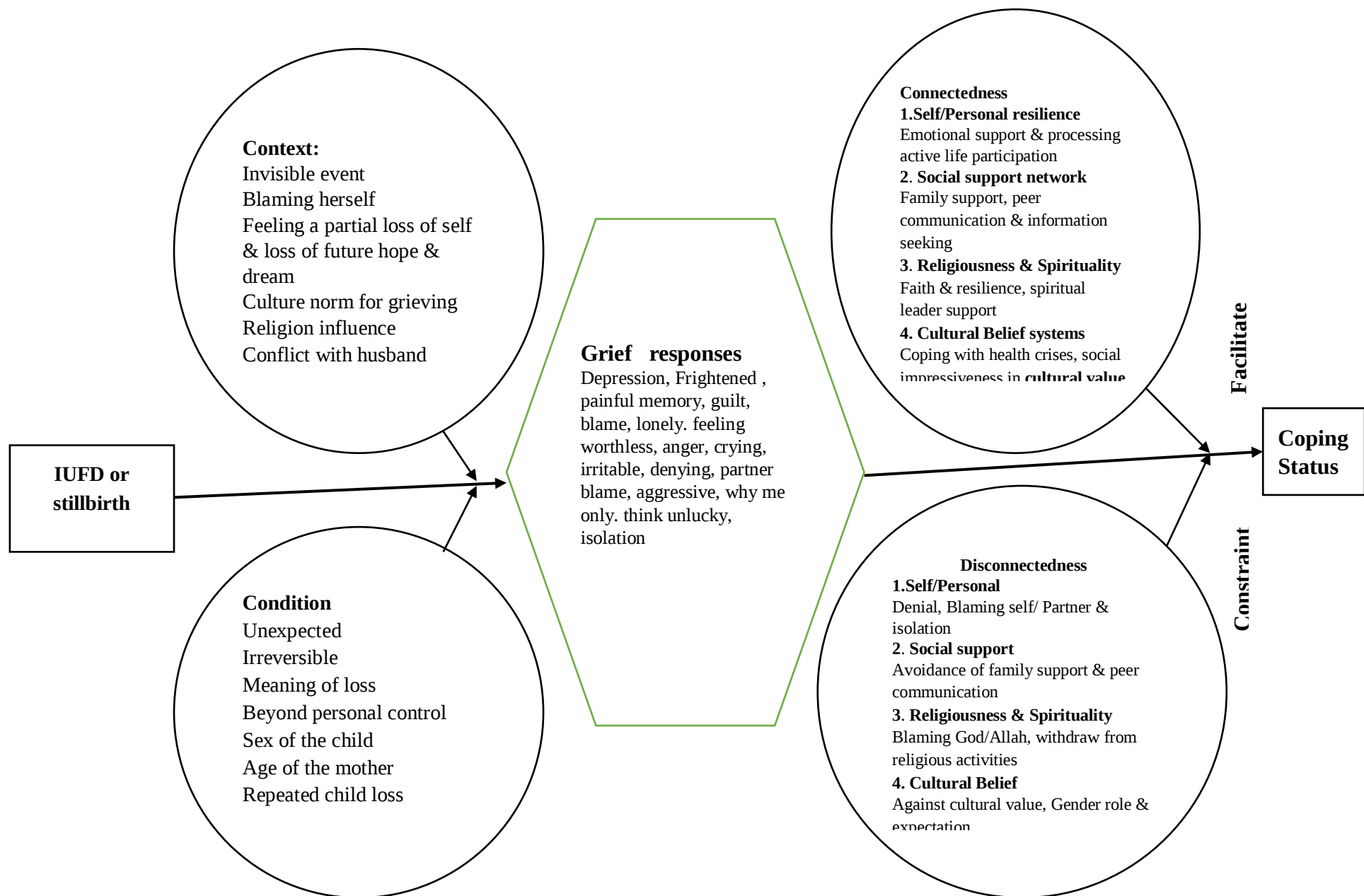


Fig 10: Adapted "Patterson's Model of Living with grief after pregnancy loss" based on data from the current study

Methodologically, the study's strengths are notable and address common limitations found in related literature. Unlike earlier studies that often relied on retrospective self-reporting, smaller sample sizes, or restricted variable assessment ((Adane et al., 2014, Teshale et al., 2021, Tamirat et al., 2021, Gedefaw et al., 2020)), this research utilized primary data collected prospectively from 2,608 women and 2,669 newborns across multiple hospitals. Enrollment at admission and follow-up until discharge ensured accuracy in documenting clinical outcomes and minimized recall bias, while the combination of interviews and chart reviews enabled immediate clarification of incomplete or inconsistent data. This robust design supports the reliability and validity of the findings.

5.2. Methodological Discussion

Cross-sectional studies observe a population at a single point in time, which makes them susceptible to bias and confounding (Cheng, 2020). To address these limitations, this study employed a rigorous design with clearly defined risks and outcomes during the planning phase. In addition to the study design, multiple standardized tools were utilized to accurately identify outcomes. Simple random sampling was applied to reduce selection bias. Furthermore, to minimize interviewer bias, the data collection tool was pre-tested, and data collectors received comprehensive training. Social desirability bias, especially pertinent in self-reported behaviors and sensitive topics such as substance use or partner support, was mitigated by ensuring participant confidentiality and using neutral, non-judgmental language in the questionnaires.

The study employed multiple techniques to help women recall their experiences of stress and anxiety. Without these strategies, the questions could generate biased results, as accurately remembering past events can be challenging (Gorlin EI, 2019). In this case, we provided clear time frames, structured interviews, and validated questionnaires to help participants recall their experiences more accurately. These methods were designed to reduce memory distortion and improve the reliability of the data. Therefore, most of the questions included in the tools required recent memory. Furthermore, Multivariate analyses were performed to control potential confounders, and multicollinearity among independent variables was assessed using variance inflation factors (VIFs) to ensure stability and validity of the regression models. Random error was minimized by calculating adequate sample sizes based on prior data and by standardizing data collection procedures to reduce measurement variability. To enhance trustworthiness and reduce other forms of bias, strategies such as member checking, peer debriefing, and accurately reflect participants' realities were used. Reflexivity was practiced by researchers to acknowledge and minimize their influence on data interpretation, thereby reducing social desirability bias in participant responses.

5.3. The Implication of Findings to Program and Policy

5.3.1. Implication to Policy

Despite Ethiopia's notable progress in maternal and newborn health, significant policy gaps remain that hinder achieving SDG 3.2's target of reducing neonatal mortality to 12 per 1,000 live births by 2030 (WHO, 2016). Our findings highlight persistent high rates of fetal death, particularly in rural and underserved areas. Based on these results, policy implications should focus on strengthening maternal and fetal health outcomes by addressing identified risk and protective factors and supporting maternal coping after fetal loss. Policies must prioritize improving access to quality prenatal and emergency obstetric care, especially in lower-level facilities, to reduce referral delays and enhance the management of maternal danger signs, which are strongly linked to adverse outcomes. Efforts should be intensified to combat harmful behaviors during pregnancy, such as khat chewing and alcohol use, through community education and supportive interventions.

Furthermore, policy frameworks should mandate and promote routine folic acid supplementation during pregnancy, given its significant protective effect against adverse maternal and fetal outcomes. In addition, policies need to support socioeconomic empowerment initiatives, recognizing that poor wealth status dramatically increases maternal risks, and incorporate partner involvement as a strategy to enhance maternal support systems. Mental health and psychosocial support must be explicitly included in maternal health policies to address coping mechanisms following fetal loss effectively. Policies should encourage culturally sensitive programs that foster connectedness through faith, social support, resilience building, and cultural acceptance while providing resources to identify and assist women exhibiting disconnectedness, such as emotional withdrawal or cultural conflict.

Overall, formulating comprehensive maternal health policies that integrate clinical risk management and psychosocial support is critical to enhancing maternal and fetal health, improving outcomes after fetal loss, and fostering holistic well-being within affected communities.

5.3.2. The Implication to the Program

Based on the study findings, the program should be designed to address both the prevention of adverse fetal-maternal outcomes and the support of maternal coping mechanisms following fetal loss. Given that factors such as pregnancy complications, anxiety during pregnancy, maternal danger signs, substance use (khat chewing, alcohol), and delayed labor are associated with increased risk of adverse outcomes, the program must prioritize early identification and management of these risk factors

through enhanced prenatal care and referral systems. Special focus should be placed on vulnerable groups, including those with poor socioeconomic status and maternal age above 35, by providing targeted interventions to reduce their risk. In addition, promoting protective factors such as folic acid supplementation, partner support, and encouraging spontaneous vaginal delivery should be integral parts of the program to improve maternal and fetal health outcomes.

Importantly, the program must also incorporate comprehensive psychosocial support to address coping following fetal loss. Recognizing the role of connectedness such as religious faith, social support, personal resilience, and cultural acceptance can guide the development of culturally sensitive counseling, peer support groups, and community engagement activities. At the same time, the program should identify and intervene when coping is characterized by disconnectedness, including emotional withdrawal, blame, and cultural conflicts, by providing mental health services in the maternity ward, facilitating family and community involvement, and fostering an environment that encourages open expression and support. By integrating these evidence-based strategies into the maternal health program, it can effectively reduce adverse feto-maternal outcomes and enhance women's coping capacities after fetal loss, ultimately improving overall maternal wellbeing and strengthening health system responsiveness.

3. Implication for nursing practice

Based on the study's findings, it is essential for nurses and midwives to enhance their assessment skills to identify women at risk of adverse feto-maternal outcomes early, particularly by recognizing maternal stress and anxiety as significant contributing factors. Understanding maternal coping mechanisms allows healthcare providers to offer tailored psychosocial support, teaching effective coping strategies that can improve maternal wellbeing throughout pregnancy and childbirth. Providing education and counseling about potential complications and stress management empowers women, reduces anxiety, and fosters positive coping behaviors. Moreover, early recognition of maladaptive coping and elevated stress levels enables timely referral to mental health services, which may help improve both maternal and fetal outcomes. Incorporating mental health evaluation and support into routine prenatal care promotes a holistic approach that addresses the physical and psychological needs of mothers. Finally, nurses and midwives play a vital role in advocating for the implementation of structured support programs and resources focused on stress reduction and coping enhancement within maternity care settings, ultimately contributing to better health outcomes for mothers and their babies.

6. CONCLUSION

This study identified a high burden of adverse maternal and fetal outcomes, including maternal complications such as anemia and postpartum hemorrhage, as well as fetal conditions like low birth weight, preterm birth, and hypothermia. These outcomes pose significant immediate and long-term health risks to women and newborns. Key protective factors were found to include vaginal delivery, partner support, and folic acid intake, while maternal anxiety during pregnancy, alcohol use, and prolonged labor were associated with increased risks. Additionally, the study highlighted diverse coping strategies employed by women after fetal loss, rooted in spirituality, cultural beliefs, social networks, and personal resilience. However, most women experienced challenges such as denial and self-blame that impeded their emotional recovery during the first month of assessment following fetal loss. Overall, these findings emphasize the complex interplay between clinical and psychosocial factors affecting maternal and neonatal health.

7. RECOMMENDATIONS

➤ Health authorities (FMOH)

1. Strengthen Early Identification and Management of High-Risk Pregnancies:

Enhance prenatal screening programs to identify women with a history of pregnancy complications, anxiety during pregnancy, and maternal danger signs promptly. Ensure timely management and referral systems, especially from lower-level facilities, to reduce adverse outcomes.

2. Promote Folic Acid Supplementation:

Scale up folic acid supplementation programs nationwide, emphasizing the significant reduction in both adverse fetal and maternal outcomes associated with its use. Integrate folic acid distribution into routine antenatal care and community health outreach.

3. Address Harmful Substance Use During Pregnancy:

Implement targeted public health campaigns and community-based interventions to reduce the use of khat and alcohol during pregnancy, focusing on education about risks and providing supportive cessation services by inviting NGO's to work on it.

4. Enhance Maternal Support Systems:

Foster programs that encourage partner involvement and social support networks, as these have been shown

to significantly reduce adverse maternal outcomes. Promote awareness and culturally sensitive approaches to enhance family and community support for pregnant women.

5. Optimize Labor and Delivery Care:

Strengthen capacity to manage prolonged labor and promote spontaneous vaginal delivery when safe and possible to reduce maternal risks. Implement training and protocols to identify and manage labor complications effectively.

6. Integrate Psychosocial Support in Maternal Health Services:

Incorporate mental health and psychosocial counseling into maternal health care to address anxiety and coping after fetal loss. Support culturally appropriate interventions that build connectedness through faith, social support, and resilience, while identifying and assisting women experiencing emotional withdrawal or cultural conflicts

➤ **Program implementers:**

Program implementers play a crucial role in enhancing health programs and developing various systems designed to improve maternal and fetal outcomes. Based on the study's findings, the following recommendations are made for program implementers to improve maternal and fetal health outcomes in Eastern Ethiopia:

1. Enhance Risk Screening and Referral Systems:

Implement routine and standardized screening protocols at all levels of care to identify women with a history of pregnancy complications, anxiety, and maternal danger signs early. Strengthen referral pathways between lower-level facilities and higher care centers to ensure timely and appropriate management.

2. Promote and Monitor Folic Acid Supplementation:

Ensure consistent availability and distribution of folic acid supplements within antenatal care programs. Monitor adherence and educate pregnant women on its benefits to reduce adverse outcomes.

3. Community-Based Substance Use Interventions:

Develop and support community outreach initiatives to educate about the risks of khat chewing and alcohol consumption during pregnancy. Offer counseling and support services aimed at reducing these behaviors.

4. Support Socioeconomic Empowerment Initiatives:

Collaborate with local organizations to integrate socioeconomic support activities for pregnant

women, particularly targeting those from low-income backgrounds. This can include linking women to income-generating projects and social protection programs.

5. Strengthen Social Support Networks:

Facilitate programs that encourage partner involvement and create peer support groups for pregnant women. Use culturally sensitive approaches to build and sustain these networks, enhancing emotional and practical support.

6. Improve Labor Management Practices:

Train healthcare providers on early detection and management of prolonged labor and encourage safe spontaneous vaginal delivery. Strengthen labor ward resources and protocols to improve maternal outcomes.

7. Integrate Psychosocial Support Services:

Incorporate mental health screening and counseling into routine maternal health services. Promote culturally appropriate coping support mechanisms after fetal loss, recognizing the importance of faith, social connectedness, and resilience while addressing signs of emotional withdrawal or cultural conflicts.

➤ **Hospitals**

Hospitals are at the frontline of managing maternal and fetal health outcomes, and they play a critical role in providing comprehensive care to pregnant women, particularly those at risk of complications. Based on the study's findings, the following recommendations are made for hospitals to improve maternal and fetal health outcomes in Eastern Ethiopia:

1. Strengthen Clinical Assessment and Monitoring:

Enhance staff capacity to routinely screen and closely monitor pregnant women for history of pregnancy complications, anxiety, maternal danger signs, and substance use such as khat and alcohol. Early detection will facilitate timely intervention and reduce adverse outcomes.

2. Improve Referral and Emergency Care Systems:

Streamline referral processes from lower-level facilities to ensure prompt and coordinated care for high-risk pregnancies. Equip emergency obstetric care units to manage maternal danger signs effectively to improve both maternal and fetal outcomes.

3. Expand Folic Acid Supplementation Coverage:

Ensure uninterrupted supply and administration of folic acid to all eligible pregnant women visiting the hospitals. Educate pregnant women on the importance of supplementation to minimize risks.

4. Enhance Supportive Care Services:

Promote involvement of partners and family members during antenatal visits and labor to strengthen social support for mothers. Develop hospital-based peer support or counseling services that focus on coping after fetal loss and maternal mental health.

5. Address Labor Management:

Implement protocols for timely identification and management of prolonged labor, encouraging safe spontaneous vaginal delivery when appropriate to reduce maternal complications.

6. Integrate Mental Health and Psychosocial Support:

Establish dedicated psychosocial support or counseling units within the hospitals to address anxiety during pregnancy and promote healthier coping mechanisms following fetal loss. Incorporate culturally sensitive approaches respecting faith and social connectedness.

7. Continuous Training and Capacity Building:

Provide regular training for healthcare providers on updated guidelines for managing high-risk pregnancies, substance use, mental health, and psychosocial support to improve care quality.

➤ **For nurses or midwives**

Nurses and midwives are at the core of maternal and fetal health care, especially in low-resource settings where they often provide the majority of direct care. They play a critical role in the prevention, detection, and management of complications during pregnancy, childbirth, and the postpartum period. Based on the study's findings, the following recommendations are made for nurses and midwives to improve maternal and fetal health outcomes:

1. Enhance Early Risk Identification:

Nurses and midwives should diligently assess pregnant women for history of pregnancy complications, signs of anxiety, and maternal danger signs during routine antenatal and labor care. Early recognition allows prompt referral and intervention to prevent adverse outcomes.

2. Promote Health Education and Counseling:

Educate pregnant women about the risks associated with khat chewing, alcohol use, and prolonged

labor. Provide guidance on the benefits of folic acid supplementation and encourage adherence during pregnancy.

3. **Support Partner and Family Involvement:**

Actively involve partners and family members in prenatal and labor care to strengthen the social support system for women, which has been shown to reduce adverse maternal outcomes.

4. **Provide Psychosocial Support:**

Offer empathetic counseling and emotional support, particularly to women experiencing anxiety or fetal loss. Facilitate connections to faith-based or community support networks, enhancing coping capacities through cultural acceptance and resilience.

5. **Improve Labor Management Practices:**

Monitor labor progress carefully using partograph and identify prolonged labor early. Support safe spontaneous vaginal deliveries whenever appropriate to minimize maternal complications.

6. **Continue Professional Development:**

Engage in ongoing training via continuous professional development (CPD) activities to update knowledge and skills related to managing high-risk pregnancies, mental health issues, and substance use during pregnancy to provide comprehensive and quality care.

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➤ **Further research:**

Based on the findings of this study, there are several key areas where further research could provide valuable insights into maternal and fetal health outcomes in Eastern Ethiopia and other similar contexts. These research efforts could help improve healthcare policies, inform intervention strategies, and contribute to global knowledge on maternal and fetal health :

- Conduct longitudinal studies to assess the long-term health outcomes of women who experience adverse maternal outcomes, such as postpartum haemorrhage, eclampsia, and anaemia.
- Conduct research into the barriers that prevent women from seeking or accessing timely care and how well existing referral systems work in rural or low-resource areas. .
- Conduct a qualitative study to explore the coping mechanisms employed by women who have faced adverse outcomes beyond fetal loss, such as following NICU admission.
- Conduct a comparative study of maternal and fetal health outcomes in primary healthcare centers, district hospitals, and tertiary hospitals to identify gaps in care, differences in complications, and outcomes at each level.

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Paper I

Adverse Maternal Outcomes among Women Delivered at Public Hospitals in Eastern Ethiopia: A Cross-Sectional Study

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Abstract

Background: An adverse maternal outcome such as anaemia, postpartum haemorrhage, and postpartum eclampsia causes a significant risk to the women. While studies on the burden of adverse maternal outcomes have been conducted in various countries, including Ethiopia, many predictors were not fully explored beyond obstetric factors. This study aimed to determine the magnitude and factors associated with adverse maternal outcomes in among women delivered at selected public hospitals in Eastern Ethiopia.

Methods: A hospital-based cross-sectional study was conducted among 2,608 randomly selected women who gave birth in six public hospitals in Eastern Ethiopia from November 2023 to March 2024. Data were collected through interview face-to-face to a couple of clinical chart reviews. Factors associated with adverse maternal outcomes were identified using bivariable and multivariable robust Poisson regression analyses. Adjusted relative risks (ARR) with 95% confidence intervals (CIs) were used to report the strength of the association. Those variables with a p-value of < 0.05 were considered statistically significant.

Results: The magnitude of adverse maternal outcome was 15.68% (95% CI: 14.70- 16.66%). A poor wealth index classification was associated with a significantly higher risk of adverse maternal outcomes ARR=4.41 (95% CI; 3.46, 5.62), having danger signs at admission ARR= 1.86 (95% CI; 1.18, 2.91), alcohol use during pregnancy ARR= 1.86 (95% CI; 1.32- 2.62), duration of labour ≥ 24 hours ARR= 1.69 (95% CI; 1.00- 2.85), and maternal age greater than 35 ARR= 1.39 (95% CI; 1.03- 1.86) increased the risk of the adverse maternal outcome. Whereas, folic acid intake during pregnancy ARR= 0.47 (95% CI; 0.38- 0.57), having partner support ARR= 0.70 (95% CI; 0.59- 0.83), and spontaneous vaginal delivery ARR= 0.58 (95% CI; 0.49- 0.68) reduces the risk of adverse maternal outcomes.

Conclusion: One in six women who gave birth in eastern Ethiopia experienced adverse maternal outcomes and was determined to be moderate when compared to the WHO projections for lower- and middle-income countries and this suggests better than the higher averages reported by WHO. Targeted interventions programs such as target education and empowerment program as well as strengthening of community health worker program helps to address socio-economic disparities and improve early

detection and management of danger signs during pregnancy which aid in averting the occurrence of the problems.

Keywords: adverse maternal outcome, adverse maternal in eastern Ethiopia, pregnancy outcomes

Introduction

The adverse maternal outcome can be explained as any pregnancy-related condition that results in maternal morbidity, potentially life-threatening conditions, maternal near misses (an event where a pregnant woman experiences severe complications during pregnancy, childbirth, or within 42 days following termination of pregnancy but survives these life-threatening condition(WHO, 2009)), or maternal deaths during or following childbirth (Guida JP, 2018). The following can be considered as an adverse maternal outcome; Intensive Care Unit (ICU) admission, anemia, length of hospital stay(>48hrs for a vaginal birth and > 72hrs for CS delivery), pregnancy-related complications (PPH, shock, uterine rupture, endometritis), perineal tear, cervical tear, blood transfusion-related of pregnancy, post-partum eclampsia, surgical site infections after cesarean section (CS)(an infection that occurs at the site of the surgical incision within 30 days following the procedure(WHO, 2018)) and maternal death (WHO, 1995, National Institute For Health and Care Excellence(NICE) 2021, Li X, 2018).

Adverse maternal outcomes represent a critical public health issue, particularly in low-and middle-income countries (LMIC) since the incidence is significantly higher compared to higher-income countries, where the healthcare resource is often limited(U. WHO and B. W. UNFPA, 2019). Key components of these outcomes include the need for intensive care unit(ICU) admission, which serves as an indicator of severe maternal health complications. This necessity is often linked to conditions such as anaemia, pregnancy-induced hypertension, and post-partum hemorrhage (PPH). Admission danger signs(specific symptoms or conditions that indicate a potential risk to the health of the pregnant woman or her fetus (WHO, 2013)) like Hypertensive disorders are the most prevalent cause of ICU admissions (Pollock W, 2010). These complications not only lead to increased maternal mortality rates but also result in prolonged hospital stays, averaging 1.3 to 6.6 days for vaginal deliveries and 2.5 to 9.3 days for cesarean sections (Oona M R Campbell 2016).

Furthermore, Surgical site infections(SSIs) following cesarean deliveries exacerbate the situation, contributing to serious complications and extended recovery times. The prevalence of SSIs varies significantly by region, with notable rates in Africa(11.91%), Ethiopia(12.32%), and North-America(3.87%)(M. Farid Mojtahedi a, 2023, Temesgen Gebeyehu Wondmeneh, 2024). Another significant concern is post-partum anaemia, which affects 50% to 80% of mothers in developing countries and is often a consequence of blood loss during delivery or inadequate iron intake, frequently requiring blood transfusions (N, 2011).

Despite global efforts to reduce maternal mortality, many women still face life-threatening conditions during and after childbirth (WHO, 2022). The World Health Organization (WHO) estimated approximately 287,000 maternal deaths worldwide in 2020, with sub-Saharan Africa reporting a maternal mortality rate of 542 deaths per 100,000 live births)(Musarandega R, 2021, Lawrence ER, 2022). Alarming, nearly 75% of these deaths are attributed to preventable complications such as severe bleeding, infections, and hypertension during pregnancy. This underscores the urgent need for improved health care interventions to address these inter-connected challenges and enhance maternal health outcomes globally(WHO, 2023a).

Adverse maternal outcomes have significant impacts on economic stability, family dynamics, national healthcare systems, and obstetrical health (Thomson K, 2021). These outcomes lead to high medical expenses, particularly in low-income settings, straining family finances (S, 2024). For example, maternal morbidity in the USA can cost up to \$86 billion annually (Sasigant So O’Neil 2022). In low-income countries, maternal deaths can reduce household income by as much as 20%, destabilizing families and affecting child care and household management (Wonjeong Jeong 2020).

At the national level, maternal morbidity and mortality increase the burden on healthcare systems, especially in resource-limited settings, leading to greater demands for services (João Paulo Souza et al., 2024). Additionally, women who experience severe complications face increased risks in future pregnancies (AP., 2021); for instance, the WHO reported that such women are 2 to 4 times more likely to develop cardiovascular diseases later in life (WHO, 2019). Thus, the study’s findings could contribute to addressing those challenges by identifying specific risk factors that influence maternal health.

Despite Ethiopia’s efforts to implement various strategies to improve maternal health, adverse maternal outcomes remain high due to multifaceted factors. Various factors influence maternal health

outcomes in Ethiopia, including healthcare-related, socio-economic, and cultural influences. Inadequate healthcare infrastructure, such as the availability of skilled birth attendants and quality maternal care services, can lead to complications during childbirth, contributing to high rates of maternal morbidity and mortality. While some studies in Ethiopia have examined adverse maternal outcomes, many of them only focus on obstetrical outcomes and neglect socio-economic and behavioural factors like alcohol intake. Studies have shown that even moderate alcohol use during pregnancy can lead to significant health issues for the mother (Popova S, 2021). Furthermore, a poor socio-economic status significantly influences the health behaviour of the mother after birth (Ngandu CB, 2020). This narrow focus restricts a holistic understanding of the complexities of maternal health challenges (Abera Biadgo, 2021) (Mesfin Tadesse, 2022, Yordanos Gizachew Yeshitila, 2022). However, this study not only looks at obstetric outcomes but integrates healthcare-related factors with socio-economic and cultural dimensions since little is known how such factors associated with adverse maternal outcomes in Ethiopia particularly in our study area. This study aims to fill those gaps by integrating a broader range of factors. Comprehending these factors contributes to the country's initiatives to decrease adverse maternal outcomes. It empowers healthcare providers to offer treatment and prevention measures for all pregnant women since every pregnancy by itself is risk, thus ensuring that every pregnant woman receives appropriate care. This research aimed to determine the magnitude and associated factors of adverse maternal outcomes among women who gave birth in selected public hospitals in Eastern Ethiopia (Salamon, 2023),

Methods

Study design and setting

This was an institutional-based cross-sectional study conducted from November 1, 2023, to March 31, 2024, in six selected public hospitals across Oromia, Somali, and Harari regional states, as well as the Dire Dawa administration in Eastern Ethiopia. Hiwot Fana Comprehensive Specialized Hospital and Jugal General Hospital from the Harari region, Bisidimo, and Haramaya General Hospitals from the Oromia Region, as well as Dil Chora Referral Hospital and Sabian General Hospital from the Dire Dawa administration, were selected randomly.

Population and sampling

All women who came to the selected hospitals for labour and delivery services and gave live birth and stillbirth were considered for the study. Data from the selected hospitals indicated that between 10,000 and 13,000 deliveries have been conducted in the six months before data collection. This study was part of a PhD research project with multiple objectives. Separate sample sizes were initially calculated for adverse maternal outcomes (2,326) and adverse fetal outcomes (2,608). The larger sample size calculated for adverse fetal outcomes was chosen to ensure adequate statistical power to detect significant associations. To strengthen the analysis, we decided to use this larger sample size to examine the magnitude and associated factors of adverse maternal outcomes as well. The sample size was allocated proportionally based on the caseload of each hospital. The calculated sample sizes were as follows: 914 for Haramaya Hospital, 522 for Hiwot Fana Specialized Comprehensive Hospital, 483 for Dil Chora Hospital, 268 for Sabian General Hospital, 260 for Jugal Hospital, and 161 for Bisidimo Hospital.

Based on this information, simple random sampling was employed to select respondents, calculating Mothers who were ineligible such as those who gave birth in other hospitals and came for management of complications or declined to participate were excluded from the study, since we were unable to track her status after the mother was referred to other hospitals. Additionally, if the mother gave birth at a different facility and later presented at our hospital, it would be challenging to accurately identify the factors contributing to the occurrence of the adverse outcomes. Furthermore, those who were transferred for specialized care from these hospitals were also excluded from the study. Subsequently, the next eligible mother undergoing the procedure was selected randomly.

Study Variable, and Data collection

The study used a structured questionnaire adapted from the literature (Adane, 2014, Teshale M, 2021, Adhena T, 2017) to ensure their relevance and applicability in the Ethiopian context. The adaptation process began by selecting appropriate measuring instruments that aligned with our research objectives and then a pilot test was conducted to assess the feasibility and clarity of the adapted tools. The questionnaire was prepared in English and was translated into the local languages (Amharic, Afan-Oromo, and Af-Somali). A tool validated by the researchers was used for the collection of the data. The tool gathers data on socio-demographics, maternal behavioural factors, past and current obstetric history, and related care characteristics. Additionally, we measured perceived stress during pregnancy using the global measure of perceived stress scale, a 14-component scale. (S., 2020) and anxiety during

pregnancy using the Kessler Psychological Distress Scale comprising 10 items (Kessler RC, 2003b). Both stress and anxiety were assessed using a five-point Likert scale, which categorized participants' experiences as follows: not at all stressful/anxious, a little bit stressful/anxious, moderately stressful/anxious, very stressful/anxious, and extremely stressful/anxious. To simplify the analysis, we implemented a threshold where ratings of 1 and 2 were classified as "not stressful/anxious" (generally considered "No"), while ratings of 3, 4, and 5 were classified as "having stress/anxiety" (generally considered "Yes"), indicating moderate to high levels of stress or anxiety. Similarly, the Turner Support Scale was used to assess partner support standard tools. This tool has four components and each component reflects a different aspect of the perceived partner support (Turner RJ, 1990) for intimate partner violence standard tool for domestic violence & abuse (Deshpande NA, 2013) was used and it has four components with a four-point Likert scale to quantify the level of violence experienced.

Maternal information such as socio-demographic characteristics, behavioural characteristics, Obstetrical characteristics, and professional factors were assessed using interviewer-administered questionnaires. All data collection procedures followed the national infection prevention guidelines (meaning that the methods used to gather data adhered to established protocols aimed at preventing infections). We utilized electronic data collection tools (Kobo toolbox v2024.2.4) and data were collected by six female BSC midwives recruited from outside the selected hospitals. Two MSc midwife supervisors were assigned to oversee the entire data collection process. The one-day training was provided for data collectors and supervisors to ensure consistency in the data collection process. The survey starts at the admission of the mother and lasts once the mother is discharged from the hospital. Women who gave birth at home or in other places and those referred to other hospitals were excluded. All data collection procedures adhered to national infection prevention guidelines.

Data were collected through face-to-face interviews with individuals with a good command of the languages. Further chart review was done for all cases. The information was kept confidential using computer-generated random identification numbers study ID which is not associated with their names or any other identifying details.

Data Quality Assurance

The questionnaire was pretested on 10% of the sample size before data collection in a similar setup at Deder Hospital (a hospital out of the study place) to check the appropriateness of the data collection tool, consistency, and participant selection, and necessary modifications were made accordingly. Data collectors were supervised throughout the data collection period, and regular feedback was provided to them based on the reviewed data to improve data collection quality. Validated tools were used for the collection of the data. The completeness and accuracy of the data were monitored daily. The principal investigator ensured the reliability of the data by randomly reviewing completed questionnaires and monitoring daily data collection activities. During data collection time, real-time checks were conducted to identify errors and ensure immediate correction.

.Data Analysis

The data for each question in the questionnaire were manually reviewed for completeness and consistency before being transferred to Stata 14 for analysis. In this study, we employed a complete case analysis, meaning that observations with any missing data for the variables included in a particular analysis were excluded. Descriptive statistics were done to characterize the study population using percentages, means, and standard deviation. Wealth index had been calculated using principal component analysis (PCA) by considering ownership of assets (like cars, and refrigerators), type of housing, and access to utilities (such as electricity and water) by interviewing a mother during a survey. A Poisson regression model with a robust variance examines the association between adverse maternal outcomes and selected variables. We chose Poisson regression for this analysis because adverse maternal outcomes are count data, representing the number of adverse events experienced by each participant since Poisson regression is specifically designed for modelling count data. We used robust variance estimation to address the issue of over dispersion in our data. Over dispersion occurs when the variance of the count data is greater than its mean, violating a key assumption of standard Poisson regression. Variable with a p-value < 0.25 in the bivariable analysis were considered for multivariable analysis. Crude risk ratios (CRRs) and adjusted risk ratios (ARRs) were calculated with 95% confidence intervals (CIs). In our study, we accounted for several potential confounders that could affect the relationship between maternal factors, such as prior birth histories, access to healthcare for antenatal care (ANC) check-ups during the current pregnancy, and other variables. By incorporating these factors into the multivariable model, we aimed to minimize the influence of confounding variables on our Adjusted Relative Risk (ARR) estimates, ensuring that our findings represent a true association. Statistically, a significant association was declared at a p-value less than 0.05 with a 95%

confidence interval. Akaike's Information Criterion (AIC) with its value of (3004.006) and Bayesian Information Criterion (BIC) with its value of (3021.605) methods were used for model selection. The fitness of the model was assessed using Hosmer–Lemeshow goodness-of-fit test. The presence of multi-collinearity was checked using VIF before fitting to the model and the variables whose VIF < 10 were selected for the final model. We calculated the VIF for each predictor variable related to adverse maternal outcomes, all satisfied the VIF values of < 10.

Operational definition of key terms related to adverse maternal outcomes

Adverse maternal outcome: PPH, hysterectomy, uterine rupture, puerperal sepsis, anaemia, bladder trauma, perineal tear, cervical tear, surgical site complications following caesarean or instrumental vaginal delivery, and maternal deaths. If the mother had one or more of the above conditions (recorded on the chart), she was considered as having adverse maternal outcomes (M., 2020, McMahon MJ, 1996, Mavrides E, 2016). This adverse outcomes were identified based on clinical diagnosis documented in the maternal chart and can be measured based on established obstetrical criteria throughout the study period.

Admission danger signs: These include haemorrhage, pregnancy-induced hypertension, infection, and obstructed and prolonged labour or if she developed at least one of nine danger signs stated in the World Health Organization (WHO) guide list and no danger sign if no sign developed (August, 2015, WHO, 2015).

Partner support(PS) : can be measured by 8 items of a partner support likert scale and if the respondent responded mean and above mean can be considered as getting partner support during pregnancy (Shah et al., 2014).

Intimate partner violence(IPV): can be measured if the women experiences either of physical , psychological or sexual violence .From 13 items(4 psychological violence ,6 physical violence and 3 sexual violence) and if the women responds at least one can be considered as a violence(Tho Nhi et al., 2019).

Stress: refers to the physiological and psychological responses that arise when individuals perceive a threat or challenge(Lazarus, 1987). We measured perceived stress during pregnancy using a 14 component global measure of perceived stress scale(Chan, 2020) and framing a question as yes/No help to capture stress during pregnancy.

Anxiety: is an emotion characterized by an unpleasant state of inner turmoil that includes feelings of dread over anticipated events(associations, 2024). We measure anxiety during pregnancy using the Kessler Psychological Distress Scale comprising 10 items(Kessler RC, 2003a) and framing a question as yes/No help to capture anxiety during pregnancy.

Ethical approval and consent to participate

Ethical clearance was obtained from the Institutional Health Research Ethical Review Committee (Ref.no. IHRERC/190/2023), College of Health and Medical Sciences, Haramaya University. The purpose, procedure and duration, possible risks, and benefits of the study were explained and informed consent was obtained from each participant. For women less than 18 years old, oral assent was taken from her but informed consent was obtained from her legal guardians for the sake of protective measures. Additionally, we sought assent from the minors themselves, ensuring they understood the study's purpose and procedures in a manner appropriate for their age. All respondents gave their informed consent, and the study was carried out in compliance with the Declaration of Helsinki. The information sheet outlined the study's title, objectives, procedures, risks, and benefits of participation. Respondents were informed of their right to decline participation or withdraw from the study at any time

Results

Socio-demographic characteristics of the respondents

A total of 2,608 women were enrolled in the study with a 100% response rate. As shown in Table 1, the majority (84.32 %) of the women were aged 15-24 years old, with a mean age of 26 (+5.1 years). The majority of respondents were urban residents (60.43%). About three-fourths of the study respondents (73.61%) were housewives, and the majority of them (98.08%) were married. Those who attended primary education accounted for 43.79%, and most (30.37%) belonged to the lowest wealth index classification.

Table 1: Socio-demographic characteristics of women delivered at selected Public Hospitals in Eastern Ethiopia, 2024(n=2,608).

Variables	N	%
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Age(years)	15-24	2,199	84.32
	≥25	409	15.68
Residency	Urban	1,576	60.43
	Rural	1,032	39.57
Ethnicity	Oromo	2,015	77.26
	Amhara	379	14.53
	Gurage	107	4.10
	Others*	107	4.10
Occupation	Government Employee	212	8.13
	Self-employee	244	9.36
	House wife	1,920	73.61
	Others**	232	8.9
Religion	Muslim	2,068	79.29
	Christian	540	20.71
Educational status	No formal education	623	23.89
	Primary education	1,142	43.79
	Secondary education	544	20.86
	Technical education	110	4.22
	Higher education	189	7.25
Educational status of the husband	No formal education	359	13.77
	Primary education	977	37.46

	Secondary education	720	27.61
	Technical education	185	7.09
	Higher education	367	14.07
Wealth index(household)	Poorest	792	30.37
	Poor	392	15.03
	Middle	449	17.22
	Rich	534	20.48
	Richest	441	16.91
Others*: Harari , Somali Others**: NGO , daily labourer			

Obstetrics-related characteristics of the respondents

Among the study respondents, as shown in Table 2, the majority (49.62%) of women were pregnant more than once, with 45.55% having a birth spacing of 24-59 months. Approximately 6.6 % of these women had a history of complications during past pregnancies, either with their baby or themselves. 71.62% of the respondents had received antenatal care, with 56.15% starting in the first trimester. Regarding danger signs upon admission, 20.17% of the women experienced them, with 24.73% being diagnosed with pregnancy abnormalities like APH, PIH, and amniotic fluid abnormalities. Of all the respondents, 27.22% were referred from private clinics and other government health facilities, with the majority (54.37%) taking more than 30 minutes to reach the health facilities. Around 87.58% of the women went into labour spontaneously, with 81.17% having a total labour duration of fewer than 12 hours .

Table 2: Obstetrics-related characteristics of women delivered at selected Public Hospitals in Eastern Ethiopia, 2024(n=2,608).

Variable		frequency	%
Gravida	Primigravida	814	31.22
	Multigravida	1294	49.61
	Grand multi-gravida	500	19.17

Indexed pregnancy	0-23months	287	11
	24-59months	1188	45.55
	≥60 months	319	12.23
Complication in past pregnancy	Yes	172	6.60
	No	1622	62.19
ANC follow-up for the this pregnancy)	Yes	1,870	71.70
	No	738	28.30
Initiation of ANC	First trimester	1049	40.22
	Second trimester	638	24.46
	Third trimester	181	6.94
Danger sign at admission	Yes	601	23.04
	No	2007	76.96
Having labour complications	Yes	602	23.08
	No	2006	76.91
Referral status	Yes	710	27.22
	No	1,898	72.78
Time to reach health facilities from the referral point (n=710)	<30min	324	45.63
	30-60min	276	38.87
	≥60min	110	15.5
Onset of labour	Spontaneous	2,284	87.58
	Induced	324	12.42

Labour duration	<12hrs	2,117	81.17
	12-24hs	401	15.38
	≥24hrs	50	1.92

Social and behavioural-related characteristics of respondents

Regarding the history of substance use, as shown in Table 3, 18.37 %, 5.18% and 1.04% of them used khat, alcohol, and either smoked cigarettes or shisha during their current pregnancy, respectively. In this study, a total of 58.63% of respondents didn't receive any partner support during their pregnancy time. Around 43.60 % and 49.50 % of the study respondents perceived to experience stress and anxiety during their pregnancy, respectively. Since stress and anxiety were assessed about her experience in the past 4 weeks before this birth and the interview was commenced after she gave birth and they can be considered as a predictive factors for adverse maternal outcomes.

Table 3: Social and behaviour experienced of study respondents during pregnancy from the study Hospitals, Eastern Ethiopia 2024

variable		frequency	%
Khat chewing	Yes	479	18.37
	No	2,129	81.63
Alcohol intake	Yes	135	5.18
	No	2,473	94.82
Cigarette (Shisha) Smoking	Yes	27	1.04
	No	2,581	98.96
Partner support	Yes	1,079	41.37
	No	1,529	58.63
Intimate partner violence	Yes	53	2.03
	No	2,555	97.97

Perceived stress	Yes	1,137	43.60
	No	1,471	56.40
Anxiety	Yes	1,291	49.50
	No	1,317	50.50

Magnitude of adverse maternal outcomes

The magnitude of adverse maternal outcomes was 15.68 %(95% CI: 14.70% - 16.66%). As shown in Table 4, the most common adverse maternal outcome was anaemia (89.97 %,) followed by postpartum haemorrhage (3.6%). Among those who experienced an adverse maternal outcome, 23.71% and 10.51% had long hospital stays following CS and vaginal birth due to PPH and post-partum Eclampsia.

Table 4: Adverse maternal outcome among women attending the study Hospitals for delivery care, Eastern Ethiopia 2024

S. no	Adverse maternal outcomes	Frequen cy	%
1.	Anaemia	368	89.97 %
2.	PPH	15	3.6%
3.	PIH(sever Pre-eclampsia/Eclampsia)	12	2.9%
4.	Endometritis	5	1.2%
5.	Hysterectomy	5	1.2%
6.	Surgical site infection(SSI)	4	1.13 %

Total	409	100
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Predictors for adverse maternal outcomes

As shown in Table 5, study respondents in poor wealth index category, maternal age greater than 35 years, drinking alcohol during pregnancy, spontaneous vaginal delivery, duration of labour lasts greater than or equal to 24 hours, having partner support during pregnancy, diagnosed as an admission danger sign, and folic acid intake during pregnancy were significantly associated with adverse maternal outcomes. Maternal aged greater than 35 years demonstrated a significantly increased risk of adverse maternal outcomes with an ARR = 2.13 (95% CI; 1.52, 2.98).

Additionally, the presence of admission danger signs was associated with increased risk of adverse maternal outcomes, with an ARR =2.75 (95%CI; 2.26, 3.35). Similarly, Pregnant women classified in the poor wealth index category faced a more than fourfold increase in the risk of adverse maternal outcomes, with an ARR = 3.81 (95%CI; 2.96, 4.89). Furthermore, Pregnant women who take alcohol during pregnancy and mothers who spent a labour duration of greater than or equal to 24 hours demonstrated a significantly increased risk of adverse maternal outcomes with an ARR = 1.86 (95% CI; 1.32, 2.62) and an ARR =1.69 (95% CI; 1.00, 2.85) respectively. However, folic acid intake during pregnancy, having partner support during pregnancy, and those experiencing a spontaneous vaginal delivery were associated with a significant reduction in the risk of adverse maternal outcomes with an ARR = 0.47 (95% CI; 0.38,0.57), ARR = 0.70 (95% CI; 0.59,0.83) and ARR = 0.58 (95% CI; 0.49,0.68) respectively .

Table 5: Predictors of adverse maternal outcome among women who gave birth at public hospitals Eastern Ethiopia, 2024

Variable		Adverse maternal outcomes		CRR (95% CI)	ARR(95% CI)	P-value
		Yes	No			
Age group	15-24	390	1809	Ref	Ref	
	25-35	76	325	2.81(1.40- 5.67)	0.87(0.68 - 1.11)	0.28
	36-45	4	4	1.06(0.85- 1.33)	2.13(1.52 - 2.98)*	<0.001

Wealth Index	Poorest	77	715	Ref	Ref	
	Poor	159	233	4.17(3.26- 5.32)	3.81 (2.96 - 4.89)*	<0.001
	Middle	37	412	0.84(0.58- 1.23)	1.12(0.77 -1.63)	0.53
	Rich	109	425	2.09 (1.60- 2.75)	1.20(0.71 - 2.01)	0.48
	Richest	38	353	2.05(1.54- 2.72)	1.32(0.77 - 2.26)	0.30
Anxiety	Yes	164	1,127	0.54(0.45-0 .65)	1.07(0.68- 1.68)	0.76
	No	306	1011	Ref	Ref	
Mode of delivery	SVD	269	1476	0.66(0.56 - 0 .77)	0.58(0.49 - 0.68)*	<0.001
	CS	201	562	Ref	Ref	
Alcohol use during pregnancy	Yes	216	97	0.27(0.13 – 0.57)	1.86(1.32 – 2.62)*	<0.001
	No	254	2041	Ref	Ref	
Duration of labour	<12 hours	400	1732	1.43(1.09 - 1.88)	1.16(0.89 - 1.49)	0.25
	12-24hrs	55	359	Ref	Ref	
	≥24 hrs	15	47	1.85(1.06 - 3.22)	1.69(1.00 - 2.85)*	0.04
Residency	Urban	216	1360	Ref	Ref	
	Rural	193	339	0.75(0.63 - 0 .88)	0.95(0.79 - 1.14)	0.58
Partner support during pregnancy	Yes	269	1260	2.17(1.75- 2.68)	0.70(0.59-0.83)*	<0.001
	No	201	378	Ref	Ref	
Danger sign at admission	Present	158	368	2.00(1.69 - 2.36)	2.75(2.26 - 3.35)*	<0.007
	Absent	312	1770	Ref	Ref	
Folic Acid intake	Yes	214	1,328	0.46(0.37-0 .56)	0.62(0.51 -0.76)*	<0.001
	No	98	228	Ref	Ref	

CRR=Cumulative risk ratio ARR= Adjusted risk ratio

Discussions

The objective of this study was to investigate the magnitude and factors for the occurrence of adverse maternal outcomes among mothers delivered at selected public hospitals. The study found that adverse maternal outcome was 15.68% (95% CI: 14.70% - 16.66%). The study revealed that adverse maternal outcomes after childbirth was anaemia (89.97 %,) followed by postpartum hemorrhage (3.6%). Among

women who experienced an adverse maternal outcome, 23.71% and 10.51% had long hospital stays following CS and vaginal birth respectively due to PPH and post-partum Eclampsia. This study identified several factors significantly associated with adverse maternal outcomes, including poor wealth index classification, maternal age greater than 35 years, drinking alcohol during pregnancy, a mode of delivery of spontaneous vaginal birth, a labour duration of ≥ 24 hrs, having partner support during pregnancy, diagnosis as an admission danger sign, and folic acid intake during pregnancy.

The overall adverse maternal outcome was 15.68% and it is considered to be moderate when compared to the WHO projections for lower- and middle-income countries reflecting that it is ongoing challenges in maternal health that need much attention. This finding is congruent with a study in southern Ethiopia that revealed that PPH's magnitude was 16.6%(Kebede BA, 2019a). Similarly, a systematic review and meta-analysis study conducted in Ethiopia on obstetrics emergency and adverse maternal and perinatal outcomes showed that the magnitude of adverse maternal outcomes became 15.9%(Leta M, 2022a).

Comparatively, a study conducted in North Ethiopia reported higher rates of adverse maternal outcomes at 32.6% (Anaemia and PIH 24.1 % and 20.7% respectively)(Tadese, 2022), these differences could be attributed to due to variation in the study population in terms of demographic and clinical characteristics as well as quality of prenatal care and access to health care services can greatly affect maternal outcomes.

The finding showed that women whose age was greater than 35 years ARR = 2.13 (95% CI; 1.52, 2.98) had adverse maternal outcomes—indicating that this age group is a risk for maternal outcomes following birth. Similarly, a study done in Southern Ethiopia revealed that mothers aged 35 years and above are six times more likely to experience an adverse maternal outcome than their counterparts (Kebede BA, 2019c). Older women face increased risks during pregnancy and childbirth mainly due to biological reasons that result in placental complications and high blood pressure (Londero, 2019). This underscores the need for enhanced monitoring and tailored care strategies for older pregnant women, including regular screenings for potential complications.

In this study, the poor wealth index with ARR = 3.81 (95%CI; 2.96, 4.89) showed an association with Adverse maternal outcomes. A systematic review and meta-analysis report from sub-Saharan Africa revealed that the maternal wealth index group of middle and rich tends to reduce the risk of

adverse maternal outcomes by 6% & 10%, respectively(Tessema, 2021) compared to the study conducted in Eastern Ethiopia. Similarly, a study done in North Western Ethiopia also showed that women from poor household wealth index have a 3.3 times risk increase for adverse maternal outcomes (Zelka, 2022). Since wealth index serves as a proxy for socioeconomic status and is often linked to access to healthcare services, nutrition, and overall health literacy(McMaughan DJ, 2020). Financial constraints and lack of transportation lead to delays in seeking or receiving appropriate medical attention during pregnancy and this increases the likelihood of complications and poor maternal outcomes(Ochieng, 2019). Thus, factors such as wealth index variation play a significant role in shaping these adverse maternal outcomes.

In the current study, women used alcohol during pregnancy with ARR = 1.86 (95% CI; 1.32, 2.62) experienced adverse maternal outcomes. Similarly, a study done in Ghana also revealed that mothers who drank alcohol during pregnancy experienced more than two fold of surgical site infections following Cs birth than their counterparts(Onuzo CN, 2022). Similarly, a study done in Spain also showed that alcohol intake during pregnancy increased the risk of surgical site infections following Cs birth than their counterparts (Delgado-Rodríguez, 2001). Pregnant women who consume alcohol during pregnancy may experience compromised immune function since alcohol can weaken the immune system, making it harder for the body to fight off infections post-surgery (Sarkar, 2015), as well alcohol may alter maternal metabolism(Mulat B, 2022) and lead to deficiencies in essential nutrients critical for wound healing such as Vit-C, Zink, and protein (AM., 1986).

A mother who was diagnosed with admission danger signs such as APH, pre-eclampsia, and obstructed labour ARR =2.75 (95%CI; 2.26, 3.35) was found to be associated with adverse maternal outcomes. A study done in Norway revealed that the risk of PPH is three times higher among pregnant women who had been diagnosed with severe pre-eclampsia at admission (Nyfløt, 2017). These alarming statistics underscore the critical need for timely recognition and intervention. Similarly, a study done in southern Ethiopia showed that women who experienced complications of labour were 1.8 times more likely to experience post-partum hemorrhage (Kebede BA, 2019b). These findings collectively highlight that danger signs at admission can lead to significant delays in obstetric management, exacerbate the underlying condition, and ultimately result in adverse maternal outcomes(Oguntunde O, 2021). Thus the systematic identification of these danger signs is crucial, as they often indicate life-threatening situations requiring immediate medical attention.

Having a labour duration of ≥ 24 hrs with ARR = 1.69 (95% CI; 1.00, 2.85) was found to be a predictor of adverse maternal outcome. Similarly, a study done in Addis Ababa Ethiopia and Oslo also revealed that mothers who experienced prolonged labour had more than twofold of experiencing PPH than their counterparts (Genanew Kassie Getahun, 2024, Nyfløt LT, 2017). Since Prolonged labour can endanger women by increasing the risk of severe maternal complications, including postpartum hemorrhage, uterine rupture and infection (Sheiner E, 2002). Furthermore, extended labour duration can result in uterine atony (failure of the uterus to contract effectively), retained placenta, and other complications that contribute to excessive bleeding after delivery (Chitnis, 2019). A study done in eastern Ethiopia among mothers who had experienced a vaginal delivery with ARR = 0.58 (95% CI; 0.49, 0.68) significantly contributes to reducing adverse maternal outcomes by 42%. Similarly, a multi-country survey showed that, compared to vaginal birth CS birth was associated with an increased risk of maternal intensive care unit admission and maternal near miss (Thanh, 2019). Studies indicate that both cesarean deliveries (CD) and operative vaginal deliveries are associated with increased risks of severe adverse maternal outcomes compared to vaginal deliveries. For instance, women undergoing primary cesarean sections have an adjusted odds ratio (aOR) of 10.59 for severe maternal outcomes, as compared to women who deliver vaginally (Kongwattanakul K, 2020). Vaginal mode of delivery is associated with lower risks of complications compared to CS. The natural process of vaginal birth promotes better uterine contractions post-delivery, which helps prevent conditions such as uterine atony and post-partum haemorrhage (Negrini R, 2021).

Folic acid is very useful for pregnant women to support the rapid growth of the placenta and foetus, and it helps to prevent anaemia (Villines, 2020). A study done in eastern Ethiopia among mothers who take folic acid during pregnancy with ARR = 0.47 (95% CI; 0.38, 0.57) reduces the occurrence of adverse maternal outcomes by 38%. Similarly, a systematic review and meta-analysis done in Pakistan on folate Supplementation during pregnancy and its effect on maternal anaemia and birth outcomes, revealed that folate supplements taken during pregnancy reduce the risk of anaemia in mothers by 69% but this study does not show a reduction of PPH (Aamer Imdad, 2012). Furthermore, another systematic review and meta-analysis were done in high, low, and middle-income countries (Hong Kong, China, and Tanzania) also revealed that folate intake during pregnancy reduces the risk of anaemia by 50% (Batoool A Haider, 2013). Folic acid helps in the production of healthy RBCs for the mother, which are essential for carrying oxygen throughout the body (Felman, 2023). The implications of these findings are significant for maternal health strategies. The substantial reduction in adverse outcomes

associated with folic acid supplementation emphasizes the need for healthcare providers to promote its use among pregnant women.

Partners provide essential emotional backing, which can help reduce stress and anxiety levels in pregnant women and contribute to better maternal health outcomes (Pilkington, 2016). A study done in eastern Ethiopia among mothers who had a partner support during pregnancy with ARR = 0.70 (95% CI; 0.59,0.83) reduced the occurrence of adverse maternal outcomes by 30%. Since partner support reduces stress during pregnancy(Martin RCB, 2023) and which entail the reduction of post-partum eclampsia(Monk C, 2020).

Strength and Limitations

The researchers employing appropriate statistical methods, such as multivariable Poisson regression with robust standard errors, allows us to control for confounding variables, strengthens the validity of the findings and accurately estimate risk ratios associated with adverse maternal outcomes. Additionally, the study's multicentre design enhances its generalizability, as it encompasses a diverse population across various healthcare settings.

The study is not without some limitations. The short follow-up period and not following women after discharge from the hospital may overlook delayed or long-term maternal health complications. Therefore, we could not monitor outcomes throughout the puerperium and may have missed events after discharge such as postpartum recovery, mental health challenges, and long-term maternal morbidity. Furthermore, variability in clinical practices across different healthcare institutions could affect how maternal care is delivered, leading to inconsistencies in outcomes. Such variability may result in differences in the management of complications during labour and delivery, which can exacerbate the risk of adverse maternal outcomes in the future as well. Self-reporting of substance use and recall bias also introduced significant limitations in this study.

Conclusion

In this study, six pregnant women experienced adverse maternal outcomes, and the overall rate of adverse maternal outcomes in Eastern Ethiopia was determined to be moderate when compared to the WHO projections for lower- and middle-income countries(WHO, 2011) and this suggests better than the higher averages reported by WHO. Anaemia being the most prevalent complication, followed by post-partum hemorrhage. Several factors were found to be significantly associated with

these adverse outcomes. Folic acid intake, vaginal mode of delivery and having a partner support during pregnancy were identified as protective factors.

In contrast, a lower wealth index, maternal age greater than 35 years, Alcohol use during pregnancy, duration of labour lasts greater than or equal to 24hours and presence of danger signs at admission were associated with an increased risk. Addressing socio-economic disparities, promoting folic acid supplementations and partner support during pregnancy, and closely monitoring high-risk pregnancies using targeted interventions programmes such as target education and empowerment program as well as strengthening community health worker programs help to address socio-economic disparities and improve early detection and management of danger signs during pregnancy which aids in averting the occurrence of the problems and would significantly help in reducing adverse maternal outcomes.

Recommendations

To enhance maternal health outcomes, it is recommended to implement community-based programs that provide free folic acid supplements to all women of reproductive age, particularly during preconception and pregnancy. These programs should integrate folic acid supplementation into routine antenatal care services, ensuring that healthcare providers actively promote its use during early pregnancy. Additionally, developing educational initiatives aimed at engaging partners in maternal health is crucial. These programs should emphasize the importance of partner support in improving maternal outcomes and encourage shared responsibilities in health-seeking behaviors and prenatal care. Community workshops can facilitate male involvement by highlighting the significance of emotional and practical support during pregnancy, including attending antenatal visits together and participating in decision-making related to maternal health.

The implication to policy and education

To address the high incidence of adverse maternal outcomes identified in the study, targeted policies should be implemented. First, support for low-income families is essential, given the significant association between a poor wealth index and an increased risk of adverse outcomes. This could involve providing financial assistance, subsidized healthcare services, and transportation support for prenatal visits. Additionally, enhancing access to comprehensive prenatal care is crucial, as early detection of danger signs at admission can lead to timely interventions. Public health policies should also focus on preventing alcohol use during pregnancy, as it significantly increases risks.

Furthermore, updated clinical guidelines for labor management are necessary to address the risks associated with prolonged labour and targeted programs for older pregnant women should be developed to meet their specific health needs. Concerning education implications, educational initiatives are vital for improving maternal health outcomes based on the study's findings. Community education programs should emphasize the importance of folic acid intake during pregnancy, promoting its use among women of reproductive age to prevent adverse outcomes. Additionally, awareness campaigns that encourage partner support can help engage male involvement in maternal health, highlighting their role in providing emotional and practical assistance during pregnancy. Training healthcare providers on recognizing danger signs and effective labour management is also crucial for improving maternal care quality. Lastly, public health campaigns should address social determinants of health that affect maternal outcomes, such as poverty and access to healthcare services, fostering a supportive environment for pregnant women.

Abbreviations

AIC Akaike's information criterion

ANC Antenatal care

APH Antepartum haemorrhage

ARR Adjusted risk ratios

BIC Bayesian information criterion

BSc Bachelor of science

CI Confidence interval

CRR Crude risk ratios

CS Caesarean section

ICU Intensive care unit

ID Identification

LMIC Low and middle-income countries

MSc Master of science

PCA Principal component analysis
PIH Pregnancy-induced hypertension
PPH Postpartum haemorrhage
SVD spontaneous vaginal delivery
VIF Variance inflation factor
WHO World Health Organization

Declarations

Consent for publication

Not applicable

Availability of Data and Material

All the data of this study are available from the corresponding author upon request

Competing interests

The authors declare that they have no conflicts of interest related to this work.

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Data Sharing Statement

The datasets utilized and analysed in this study can be obtained from the corresponding author upon reasonable request.

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Paper II

Adverse fetal outcomes among women who gave birth at public hospitals in Eastern Ethiopia:

A multicentre study

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Abstract

Fetus is said to have an Adverse fetal outcome if one of the following were detected preterm birth, asphyxia, respiratory distress, birth trauma, hypothermia, meconium aspiration syndrome, stillbirth, low birth weight, low fifth minute APGAR score, NICU admission, IUFD or early neonatal deaths(immediately after birth during data collection time .It is a major concern in developing countries, including Ethiopia. A hospital-based cross-sectional study was conducted among randomly selected 2608 women with 2696 of their neonates were enrolled from November 1, 2023, to March 31, 2024, in six public hospitals in eastern Ethiopia. Data were collected through interviews and clinical chart review. Reports were presented in relative risks with 95% CIs. The overall magnitude of adverse fetal outcomes was 26.6% (95% CI: 25.6-27.6). Factors associated with adverse outcomes were history of pregnancy complications (ARR=1.40; 95% CI 1.14-1.72), anxiety during pregnancy (ARR=1.28; 95% CI; 1.05-1.67), referral from lower facilities (ARR=1.45; 95% CI 1.26-1.66), maternal danger signs at admission (ARR=1.73; 95% CI 1.51-1.98), and chewing *khat* (ARR=1.42; 95% CI 1.23-1.64). Conversely, folic acid supplementation reduced the risk by 25% (ARR=0.75; 95% CI 0.63-0.90). More than one in four women who gave birth in eastern Ethiopia experienced adverse fetal outcomes. We recommend proper counselling to address maternal anxiety and minimise substance use in pregnancy as well as strengthening timely referral for improving fetal outcomes.

Keywords: Adverse fetal outcomes, pregnancy, predictors of adverse fetal outcome, Ethiopia

Introduction

Adverse fetal outcomes encompass a range of negative health effects that can occur during pregnancy and can lead to complications for the fetus or newborn (Alene AA, 2024). It is a major challenge in low and middle-income countries, with significant psychological and emotional challenges to the mother and family (HAaGB., 2017). Adverse fetal outcome consists of having one or more of the following: preterm birth, asphyxia, respiratory distress, birth trauma, hypothermia, meconium aspiration syndrome, stillbirth, low birth weight, low APGAR score, congenital defects, admission to neonatal intensive care unit or early neonatal deaths (death within one week) (TBaK., 2018, E., 2022). In regions like sub-Saharan Africa, including Ethiopia, the incidence of adverse fetal outcomes is disproportionately high, with several factors such as maternal health, socio-economic status, and healthcare access contributing to this burden (Souza, 2024a).

Recent studies conducted in various regions of Ethiopia show that the magnitude of adverse fetal outcomes ranges from 18.2% in southern Ethiopia to 32.5% in northeast Ethiopia depending on the settings, definitions, and study population (A., 2017, Abdo RA, 2016, Adhena T, 2017, A., 2018). Several studies emphasize that adverse fetal outcomes, including stillbirth and fetal growth restrictions, not only remain prevalent but also contribute substantially to maternal anxiety and morbidity (Voit FAC, 2022, Malhotra A, 2019). Despite the acknowledgment of this significant burden, Ethiopia's efforts to address the causes of adverse fetal outcomes have not led to a substantial reduction in their prevalence. The estimated pooled rate of adverse fetal outcomes remains high at 26.88% (2016). Factors ranging from diverse socio-demographic characteristics like age (≥ 40 years) (Louise C. Kenny, 2013) and rural residence (Gedefaw, 2020b), as well as obstetrics factors like the absence of antenatal care (12), obstetrics emergencies such as antepartum hemorrhage and pregnancy induced hypertension (13), premature rupture of membrane (14), and short intervals (15), were reported to be key predictors of adverse fetal outcomes. Existing studies often tend to focus on individual factors, failing to consider the intricate interactions of healthcare access, socioeconomic status, and behavioural, and environmental conditions (Adane AA, 2014).

To address these shortcomings, this research aimed to comprehensively assess the factors of adverse fetal outcomes at six public hospitals in eastern Ethiopia. By employing a more inclusive analysis, we sought to examine a more holistic range of variables including socio-

economic, behavioural, and mental health-related factors, which have been under-explored in previous studies.

Methods

Study design and setting

This was an institutional-based cross-sectional study conducted from November 1, 2023, to March 31, 2024, in major public hospitals in eastern Ethiopia. Six hospitals, namely Dil Chora Referral Hospital, Sabian General Hospital, Haramaya General Hospital, Bisidimo Hospital, Jugal Hospital, and Hiwot Fana Specialized University Hospitals, with an annual delivery ranging from 1600 to 5808 were included.

Population and sampling

All women who gave birth in public hospitals in eastern Ethiopia constitute the source population while those who gave birth in the selected hospitals during the study period were the study population. The required sample size was calculated by using a double population proportion formula using Open Epi software, assuming a 95% confidence interval (CI) with P1 (exposed with the outcome of adverse fetal outcome) at 4% and P2 (unexposed with the outcome) at 2%, which resulted in a relative risk (RR) of 4.82. A range of factors such as alcohol consumption during pregnancy, low income fertile, Caesarean section, and post-term pregnancy was considered a key factor (Tadesse M, 2022), and a power of 80% were used in the calculations. After accounting for a 5% non-response, the final sample size was 2608 births. Based on flow of women in each hospital, Simple random sampling was employed to select participants. Women who gave birth in other hospitals and came for management or declined to participate were excluded.

Data collection and Measurement

Data was collected using a structured questionnaire adapted from the literature (Tekelab T, 2019, Abdo RA, 2016, Adane AA, 2014). The questionnaire was prepared in English and was translated into the local languages (Amharic, Afan-Oromo, and Af-Somali). Data was collected on socio-demographic characteristics, maternal behaviours, past and current obstetric history, and related perceived stress during pregnancy (S., 2020) or anxiety (Kessler RC, 2003b). Similarly, the Turner Support Scale assessed the partner support standard tool. This tool has

four components and each component reflects a different aspect of the perceived partner support (Turner RJ, 1990) for intimate partner violence. A standard tool for domestic violence & abuse (Deshpande NA, 2013) was used and it has four components with a four-point Likert scale to quantify the level of violence experienced.

Maternal socio-demographic, behavioural, and obstetrical characteristics, and professional factors like professional type who attend the delivery were assessed using interviewer-administered questionnaires while fetal presentation, position, weight, and fetal heart rate pattern were extracted from the medical chart using a checklist. The primary outcome variable for adverse fetal outcomes was coded based on specific criteria derived from the structured questioner responses. Each adverse outcome was assigned a numerical code as 0 for no-adverse outcome and 1 as having an adverse fetal outcomes. This coding scheme allows for clear categorization and facilitates statistical analysis of the relationship between maternal and fetal factors with an adverse outcomes. We utilized electronic data collection tools (Kobo toolbox v2024.2.4) and the data were collected by trained six female BSC midwives working outside the selected hospitals. Two MSc midwives supervised the data collection process.

Data analysis

The data for each question in the questionnaire were manually reviewed for completeness and consistency before being transferred to Stata 14 for analysis. A Poisson regression model with a robust variance estimation was used to examine the association between adverse fetal outcomes and factor variables due to its suitability to count data, ability to handle over dispersions, and interpretability of results (Zou, 2004). Akaike's Information Criterion (AIC) with its value of (3004.006) and Bayesian Information Criterion (BIC) with its value of (3021.605) methods were used for model selection. The fitness of the model was assessed using the Hosmer–Lemeshow goodness-of-fit test. The presence of multi-collinearity was checked using VIF before fitting to the model and the variables whose $VIF < 10$ were selected for the final model. We calculated the VIF for each predictor variable related to adverse fetal outcomes, all satisfied the VIF values of < 10 . Variables with $p < 0.25$ in the bivariable analysis were considered for multivariable analysis. Crude risk ratios (CRRs) and adjusted risk ratios (ARRs) were calculated with 95% confidence intervals (CIs). Significant association was declared at a $p < 0.05$.

Adverse fetal outcome: at least one preterm birth, asphyxia, respiratory distress, birth trauma, hypothermia, meconium aspiration syndrome, stillbirth, low birth weight, low fifth minute

APGAR score, NICU admission, IUFD or early neonatal deaths(immediately after birth during data collection time)(WHO, 2003, Williams, 1982).

Admission danger signs: These include haemorrhage, pregnancy-induced hypertension, infection, and obstructed and prolonged labour or if she developed at least one of nine danger signs stated in the World Health Organization (WHO) guide list and no danger sign if no sign developed(August, 2015, WHO, 2015).

Results

Socio-demographic characteristics of respondents

A total of 2608 women with 2696 of their neonates were enrolled in the study. The majority (71.36 %) of the women were 20-34 years old with a mean age of 26 (± 5.1). Majority of these respondents were urban residents (60.43%), from Oromo ethnic group (77.26%), housewives (73.61%), and Muslim (79.29%) (Table-1).

Obstetrics and new-born characteristics

From the total births, 66.91% was spontaneous vaginal delivery. Most participants were multi-gravida(49.61%), with a significant proportion initiating ANC in the first trimester(40.22%). Additionally, the majority of pregnancies were term (55.36%), and a substantial number of infants had a birth weight between 2500-4000 grams(82.82%). Notably, 23.04% of mothers reported danger sign at admission, and 23.08% experienced labour complications(Table 2).

Magnitude of adverse fetal outcomes

The overall magnitude of adverse fetal outcome was 26.6% (95% CI: 25.6-27.6). The most common adverse fetal outcome was low birth weight (50.63%), preterm birth (50.63%), and hypothermia (50.63%) affecting almost half (50.63%) combined (Table 3).

Factors associated with adverse fetal outcomes

In Bivariable analysis variables such as wealth index classificat, maternal occupations, History of pregnancy complications, having danger sign at admission, khat chewing during pregnancy,

gravida, having an anxiety during pregnancy, Having labour complications, Referral from other facility, Folic acid intake, had a partner violence, and duration of labour had significantly associated with an adverse fetal outcomes. In multivariable analysis, history of pregnancy complications, khat chewing, anxiety, folic acid intake, having danger signs at admission, and referral status were significantly associated with adverse fetal outcomes at $p < 0.05$. The risk of adverse fetal outcomes was 1.40% higher (95% CI: 1.14-1.72) among women with history of pregnancy complications compared with their counterparts. Similarly, being diagnosed with an admission danger sign was linked to an increased risk of 1.73 (95% CI; 1.51-1.98) for adverse fetal outcomes. Additionally, higher risk of complications, reflected by the risk of adverse fetal outcomes was 1.42% higher (95% CI; 1.23-1.64) among women chewed khat during pregnancy compared with non-Khat chewer women. Moreover, those who experienced anxiety during pregnancy faced an even higher risk, of 1.28 (95% CI; 1.05-1.67) for adverse fetal outcomes. Furthermore, mothers referred for obstetrics management were associated with an increased risk of adverse fetal outcomes, indicated by 1.45 (95% CI; 1.26-1.66). Conversely, women who took folic acid during pregnancy had a 25% lower risk of adverse fetal outcomes (ARR=0.75; 95% CI; 0.63-0.90) (Table 3).

Discussion

This study was conducted to investigate the magnitude and factors associated with adverse fetal outcomes among women who gave birth at public hospitals in eastern Ethiopia. We found that over a quarter of births had adverse fetal outcome—mainly hypothermia, preterm birth, and low birth weight. Factors associated with adverse fetal outcomes included anxiety during pregnancy, referral from other facilities, danger signs at admission, no folic acid intake during pregnancy, history of pregnancy complications, and chewing Khat.

This finding is consistent with the study conducted in Northern Ethiopia, Sekota town, which reported an adverse perinatal outcome of 27.47% (Eshetu Seyoum, 2021), and the pooled prevalence in Ethiopia, 26.88% (Gedefaw, 2020a). However, the result is higher than other studies conducted in Oromia Region and Kembata Tembaro Zone, which reported adverse fetal outcome of 21% and 13.9%, respectively (Sisay Degno 2021). It is also higher than the WHO estimation of adverse fetal outcomes of 18.5% for developing countries (Organization., 2014, Lolaso, 2019). Conversely, our finding is lower than findings from studies conducted in the Amhara Region: Bahir Dar City (33.2%) and Dessie Referral Hospital (32.5%) (Cherie N, 2017, a, 2022).

We found that women who reported having anxiety during pregnancy was predictor of adverse fetal outcomes. This highlights important public health implications, including the need for routine psychological screening and support for pregnant women. Additionally, the findings suggest a clinical practice implication, emphasizing the importance of integrating mental health care into maternal health services to improve overall pregnancy outcomes. Maternal anxiety during pregnancy triggers the release of stress hormones such as cortisol and adrenalin, which can affect the utero-placental blood flow and fetal development(Glover V, 1999). The reduction in blood flow can result in complications such as low birth weight and developmental delays(K C A, 2020) .

women who were referred from other facilities showed association with adverse fetal outcomes. Given obstetric complications are the major reasons for referral of women during childbirth(Carolyn A. Lissu 2021), many of them might end up in adverse fetal outcomes because of delay in reaching facilities or the complications. A mother who experienced various indications for a referral and was directed to hospitals for more advanced care was associated with an increased risk of adverse fetal outcomes such as death or low APGAR score, as shown in a cross-sectional study conducted in Rwanda (Joseph Niyitegeka 2017). A cross-sectional study conducted in Addis Ababa, Ethiopia also showed that a mother who was referred from other health facilities to hospitals for the indication of obstetrics emergencies experienced adverse fetal outcomes such as NICU admission due to various factors and stillbirth(Assefa EM, 2020). This might be due to the severity of complications prompting the referrals or delay in referral, especially in cases requiring immediate attention, can exacerbate existing complications, leading to poor fetal outcomes(Autumn H. Gertz, 2022).

Our study revealed that the risk of adverse fetal outcome was higher among women chewing khat . A study in eastern Ethiopia and Yemen both found a link between khat chewing during pregnancy and adverse birth outcomes, such as preterm birth and low birth weight. (Amsalu Taye Wondemagegn, 2024). (Ghani, 1987). Research in Jimma, Ethiopia, has shown that khat chewing during pregnancy can lead to low birth weight due to intrauterine growth retardation. (Gamal S. Abd el-Aziz, 1998). A systematic review and meta-analysis in Ethiopia also found that khat consumption during pregnancy significantly increased the risk of low birth weight, congenital anomalies, perinatal mortality, and lower APGAR scores at five minutes. (Yitayih, 2023). Since khat contains the stimulant Cathinone, which has vaso-constrictive properties, in pregnant women, this effect can be particularly harmful as it limits the flow of oxygen and

nutrients to the placenta and the fetus may experience restricted growth and entails several adverse fetal outcomes such as low birth weight, preterm birth and even stillbirth in more severe cases (Yitayih Y, 2023, NT., 2011).

The result of this study indicates that having a history of pregnancy complications were associated with adverse fetal outcomes. This finding is consistent with similar studies conducted in North west (Alemayehu BA, 2022) and Northern Ethiopia(Tesfay A, 2017). Women who have faced pregnancy complications are at an increased risk for adverse fetal outcomes in subsequent pregnancies due to underlying health conditions, such as gestational diabetes mellitus or hypertension, which may lead to chronic issues later in life(MARSHALL W. CARPENTER, 2007) . Additionally, emotional factors play a role; previous complications can heighten emotional and psychological stress, negatively impacting fetal health(Traylor CS, 2020). Furthermore, the study reveals that, women diagnosed with obstetrics danger sign showed relationships with adverse fetal outcomes . However, this risk is lower than findings from cross-sectional studies in Southern and Northeast Ethiopia (Ritbano Ahmed Abdo, 2019, Cherie N, 2018), where mothers experiencing complications like pregnancy-induced hypertension and ante-partum haemorrhage were found to be three times more likely to face adverse fetal outcomes. This discrepancy may be attributed to variations in socio-economic status and access to healthcare services.

Consistent with other studies, women who didn't intake folic acid in pregnancy were more likely to have adverse fetal outcomes(Cherie N, 2018). Given the well-established importance of folic acid in reducing adverse fetal outcomes, through its crucial role in cellular deviation, DNA synthesis, and fetal neural tube development, we should continue to advocate for folic acid supplementation (Johnson, 2000).

The strength of this study includes study utilizes a robust methodology and assessing adverse fetal outcomes from healthcare access, socioeconomic status, and behavioural factors perspectives. The study is not without some limitations. First, our follow up is only until discharge or adverse fetal outcome—whichever comes first. As such, we were not able to follow for the full neonatal period and might missed outcomes after discharge. Second, assessment of both exposure and outcome at a time impede us from establishing temporal associations for example between referral and fetal outcomes.

Conclusions

Over quarter of women giving birth in the study settings experienced adverse fetal outcomes. The main factors associated with adverse fetal outcomes were history of pregnancy complication, anxiety during pregnancy, khat chewing, having admission danger sign, and referral from lower facilities. There is a need of psychosocial support for women, including counselling women about importance of avoid khat in pregnancy, improve the referral linkage among health facilities, avoid anxiety during pregnancy and strengthening folic acid supplementations during pregnancy.

Data Sharing Statement

The datasets utilized and analysed in this study can be obtained from the corresponding author upon reasonable request.

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Paper III

Coping strategies following fetal loss among women who gave birth in a health facility in eastern Ethiopia: A phenomenological approach study

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Abstract

Pregnancy is typically a joyous experience, but in low-resource settings, many pregnancies end in fetal loss, which has profound emotional and psychological effects. This is a **phenomenological qualitative study** used to investigate coping mechanisms using the **Living with Grief after Pregnancy Loss model** among purposively selected women who experienced fetal loss in two major hospitals in **Harar Town**, eastern Ethiopia.

Results: Fourteen women (mean age 25.14 years) participated. Four main themes emerged: **self/personal resilience, social support networks, religious and spiritual practices, and cultural belief systems**. Connectedness was fostered through emotional support, active life participation, and strong family and spiritual support. Disconnectedness included **denial, blaming oneself or a partner, isolation**, and avoidance of social support. Withdrawal from religious practices and cultural conflicts, such as not adhering to gender roles, hindered coping.

Conclusion: Coping with fetal loss is shaped by **spiritual, personal, social, and cultural** factors. Support from **family, religion, and community** helps women navigate grief, while **blame** and **isolation** impede recovery. These findings highlight the importance of **social capital** and suggest that a holistic approach that incorporates emotional, spiritual, and cultural support is critical for helping women cope with fetal loss.

Keywords: Grief, fetal loss, coping, Ethiopia

Introduction

Although pregnancy represents a significant journey in a woman's life, often symbolizing the realization of dreams and hopes, not all pregnancies culminate joyously. Complications during and after childbirth, including maternal deaths, and adverse pregnancy outcomes (stillbirth and neonatal deaths) represent the other face of the pregnancy experience especially in low-resource settings bringing unexpected challenges and heartbreak(Davis, 2020). According to the World Health Organization (WHO) 2021report, approximately2 million babies are stillborn each year. If current trends persist, the number of stillbirths is projected to reach 15.9 million by 2030, with nearly half of these 7.7 million (48%) occurring in sub-Saharan Africa(WHO, 2021). The statistics in Ethiopia are not different pooled stillbirth rate of 7.84 per 1000 births(Alemu, 2020) and fetal death rate of 20.7 to 30 per 1000 live births(Gedefaw, 2020b, Regassa, 2022). Fetal loss is a tragic event that can occur due to a range of factors including maternal health issues, complications during pregnancy, placental problems, and genetic abnormalities(Nathan R. Bluea, 2018). It is a deeply emotional and often unexpected event, leading to significant physical and psychological impacts for the mother and family(Siobhan Quenby, 2021).

Beyond the numbers, fetal loss is a profoundly distressing event that leads to prolonged emotional suffering, and family stress, and may isolate mothers from their support networks(Aagaard H, 2015, Al Maghaireh DA, 2016) and which may persist for a couple of months (Katherine Flach, 2022). In many low-resource settings, including Ethiopia, no support exists to help the mother and family cope with this. From failure to inform what happened and what it means for their future pregnancy plan to not showing the stillborn to the woman, several barriers exist further leading to the woman's ineffective coping or suffering in silence(Bethany Atkins 2023, Chanel van Zyl, 2021). Although there is no universally accepted coping process for women during fetal loss, it is well accepted effective coping plays a critical role in recovery(Leodoro J. Labrague, 2016, ANNEKATHRIN BERGNER 2008). Individuals cope differently, and some strategies include avoiding conversations, trying new things, taking comfort in artistic endeavours, or looking for mental models to make sense of their feelings(M., 1982, Z., 1982).

Nonetheless, some women could find it difficult to come to terms with their loss, enduringly painful memories, self-doubt, and challenges with day-to-day tasks and future planning(KCaC., 2012). Exploring effective coping strategies for women who have

experienced fetal loss is essential in nursing practice. A range of models and frameworks are utilized worldwide to provide comprehensive care and support (S., 1990, Ritscher JB, 2002, Jonas-Simpson C, 2013). Among these, the Multicultural Model of Coping addresses the diverse cultural contexts in which women cope with loss (Sara Ferná'ndez-Basanta 2019), this model emphasizes how women deal with loss in diverse cultural settings. It acknowledges that coping mechanisms are deeply influenced by cultural norms, beliefs, values, and social support structures. while the Coping Circumplex Model offers a structured approach to understanding various coping mechanisms (K, 2019). Additionally, the Model of Living with Grief after Pregnancy Loss is highly relevant to the current discussion (Patterson, 2000a). This model, developed from a study on coping mechanisms among African-American women after pregnancy loss conducted by Patterson (Patterson, 2000a), offers valuable insights for the current research. It provides a nuanced understanding of how women navigate grief, emphasizing the role of personalized and holistic support. This model is particularly suited for the present study, as it underscores the need for culturally informed interventions that cater to the emotional complexities women face after pregnancy loss (fig 1).

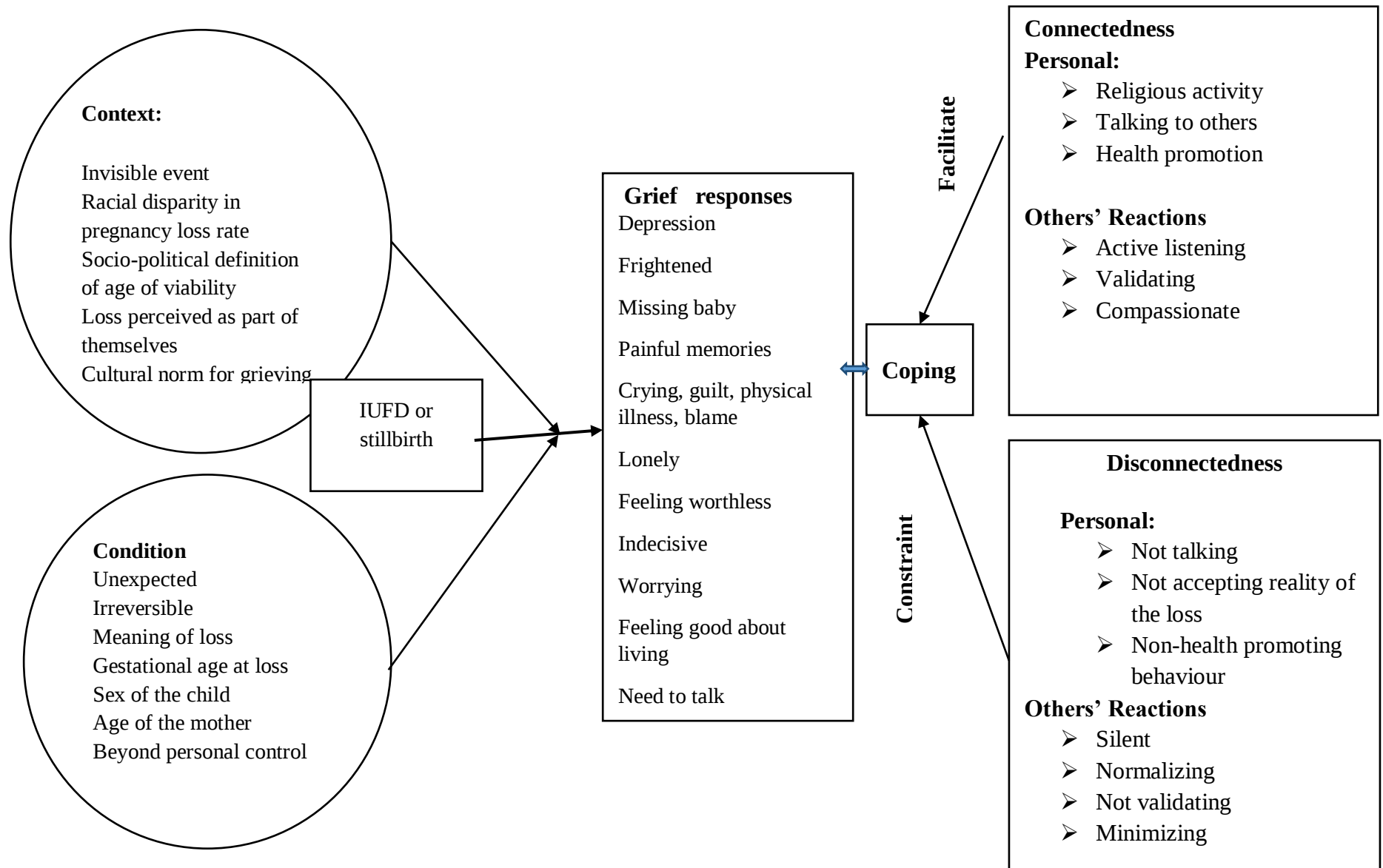


Fig 1: Model of Living with grief after pregnancy loss

Although the burden of fetal loss is well documented in Ethiopia, studies focusing beyond the number of such events are lacking. Such a notable gap in information regarding women's experience with fetal loss makes the effort toward the 2030 sustainable development goals (SDG) targets incomplete by leaving the voices of women behind. In this study, we explored women's coping strategies following fetal loss among women who gave birth in two major hospitals in eastern Ethiopia.

Methods

Study setting: The study was conducted in two major hospitals in Harar Town: Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH) and Jugal General Hospital. HFCSUH is the major referral university hospital with 5,808 births annually. It has 12 prenatal and 35 postnatal beds staffed by 16 pediatricians, 29 nurses, and 23 pediatrics residents as the only major neonatal intensive care unit during the study period. Jugal General Hospital is a general hospital with an estimated 3000 births annually. It has five prenatal and six postnatal beds staffed by one paediatrician and seven nurses. Both hospitals provide a full range of maternal and child care services, antenatal care, delivery services, postnatal care, neonatal care, and care for under five sick children (hospital(HFSUH), 2024, Hospital, bureau, 2023/24). The interview was conducted in December 2023 (first) and May 2024 (second).

Study design: A phenomenological qualitative study was employed. This approach is particularly suited to capturing rich, nuanced emotions, thoughts, and coping mechanisms that quantitative methods cannot fully understand (McLeod, 2024). We specifically used the Living with Grief after Pregnancy Loss model, a structured approach to understanding women's coping mechanisms following adverse fetal outcomes like stillbirths or IUFD(Patterson, 2000a). This model is based on the basic concepts such as connectedness and disconnectedness. Connectedness can occur when individuals engage in acceptance and emotional detachment, which can help in coping with the loss and maintaining a sense of well-being. This connectedness can also help women accept the condition more readily whereas disconnectedness deals with factors that trigger an individual not to recuperate from grief fully in life situations. This model also emphasizes the importance of holistic care provided by others or self-care practices. It underscores the diversity of coping experiences among women and aims to support their emotional and psychological well-being through personalized approaches (Van, 2001, Kersting, 2012, Amber L. Randolph, 2015, Plagg, 2024).

Research characteristics and reflexivity

The research team comprised public health professionals and nurses with a PhD degree to support data accusation and analysis. The interview was conducted by two trained experienced female assistants with at least an MSc degree. Data was analysed by ML with a close follow-up by senior researchers (MT and NA). To uphold fairness, no interactions occurred between the researchers and participants before the study commenced, thereby reducing potential power differentials.

Study population and data collection

We included women who gave birth in the two hospitals and experienced fetal loss (stillbirth or intra-uterine fetal deaths) during the study period. Women who did not have phones or were not willing to be approached after one and six months were excluded. Purposive sampling was used to select study participants considering age, and parity until saturation of information was reached. Initial contact for recruitment was made at the hospitals, where participants were provided with detailed information about the study and invited to participate. Once identified, formal consent was obtained from the women for home visits.

A semi-structured interview guide was used to collect data through in-depth interviews. The guide was Loss model (Patterson, 2000a). It solicits information on socio-demographic characteristics, emotional experience, and coping mechanisms. The tool was developed in English and then translated to local developed using previous studies on a similar topic(Sara Fernańdez-Basanta 2019, Patterson, 2000a) following the theory of Living with Grief after Pregnancy languages (Amharic and Afan Oromo) by individuals with a good command of the languages. The interview guide was pretested among women with fetal loss in Haramaya General Hospital before actual use.

Before conducting interviews at their homes, we scheduled and confirmed the appointments by calling them. To ensure the participants' privacy, the interviews were conducted in a separate room and approximately took 45-90 minutes. The same procedure was used at six months. The interview was audio recorded and complemented with note-taking. The transcripts were translated into English by the interviewers and note-takers. ML reviewed the translation and notes taken during the interview daily with close support from MT.

Data processing and analysis

The translated files were transferred to an open-code software in plain text format for coding. Both deductive and inductive logic were employed to reduce and synthesize data in five steps

of framework analysis. Initially, familiarization was achieved through repeated readings of the transcripts as they were produced. Subsequently, each transcript was reviewed line by line, with codes assigned or generated accordingly by two data coders. These codes, sharing similar meanings, were then grouped into pre-existing categories such as personal and others' reactions for coping derived from the *Living with Grief after Pregnancy Loss* model and disagreements between the data coders were resolved by discussion and collaboration. Similarly, pre-existing themes from the model were used to describe these categories. Additionally, new categories and themes such as self/personal resilience, social support networks, religious and spiritual, and cultural belief systems, emerged inductively during the analysis (Fig. 2).

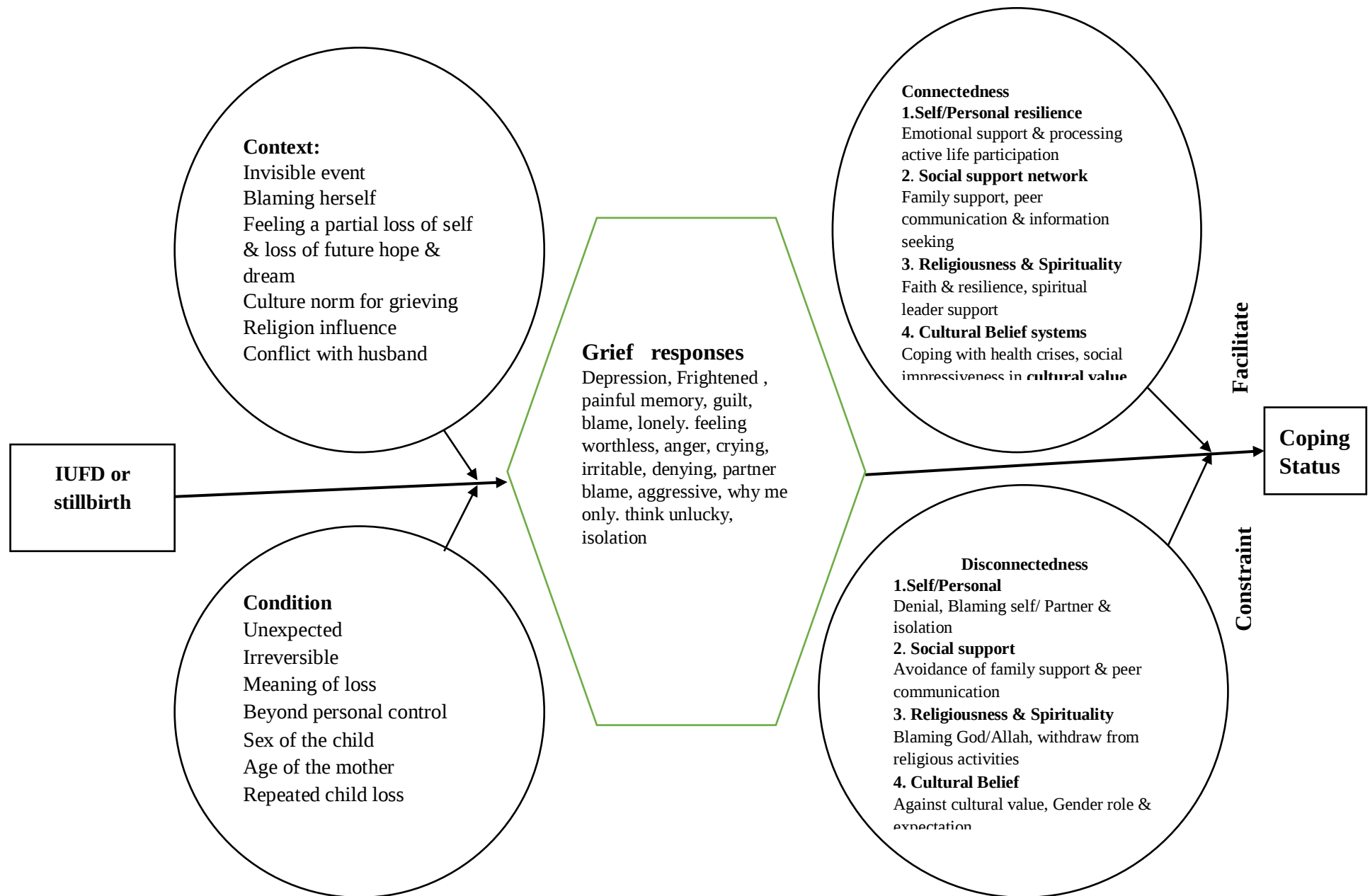


Fig 10: Adapted “Patterson’s Model of Living with grief after pregnancy loss” based on data from the current study

In the next step, indexation, the codes within each interview were examined across individual transcripts and the entire dataset, continually refining categories and themes. Charting followed, summarizing data according to categories and themes from each transcript. Interpretation of the data occurred within the context of the research questions. The analysis was conducted sometime after the initial interview and again six months later. Finally, findings were summarized and reported, with quotations used to illustrate key discoveries. Open-code software facilitated data organization and analysis, complemented by a memo system to document coding decisions throughout the analysis process (figure 2)

Data quality control

The trustworthiness of data was maintained throughout the procedure, using the four common criteria of credibility, dependability, conformability, and transferability(Elo et al., 2014).To address *credibility*, the interviewer reviewed the participants' feedback post-interview and engaged in discussions with colleagues, including the lead researcher and senior researchers. Furthermore, techniques such as prolonged engagement, spending adequate time in the field, and peer debriefing were implemented to assure credibility. This process of credibility aimed to confirm consistency with the study's objectives, methods, and protocols and maintain ongoing observation. The goal was to pinpoint the key characteristics and elements essential to the research problem or topic of interest for detailed examination(Elo et al., 2014).In respect to *dependability and conformability*, the identical procedure was implemented and meticulously recorded; a uniform interview guide was utilized for all participants, and transcripts were cross-referenced with audio recordings to validate accuracy. The presentation of findings was reinforced with excerpts from the transcripts. Field notes and comprehensive documentation of participants' non-verbal cues during interviews were leveraged to craft a rich and detailed description that speaks to *transferability*. The researcher first analysed the data and then ensured the trustworthiness of the study findings through techniques such as member checking, peer debriefing (discussing findings with colleagues), and providing a detailed audit trail of the research process through a comprehensive record of the research process and data management.

Results

Socio-demographic and obstetric characteristics

A total of 14 women with a mean age of 25.14 years were included. More than half of them were18-35(71.42%) years old, had no formal education (57.14%), and multipara (57.15%) (Table 1).

Table 1:.Socio-demographic and obstetric characteristics of participating mothers who faced a foetal loss in Eastern Ethiopia, 2024

Variables			Num ber	Percent age
Age in years	15-24		4	28.57
	25-34		8	57.14
	35-46		2	14.29
	Urban		4	28.57

Residency	Rural	10	71.43
Marital status	Married	14	100.00
Religion	Muslim	9	64.28
	Christian	5	35.72
Ethnicity	Oromo	8	57.14
	Amhara	3	21.42
	Gurage	2	14.28
	Harari	1	7.16
Education status	No formal education	8	57.14
	Primary education	4	28.57
	Technical/vocational	2	14.29
Parity	Primi-para	6	42.85
	Multi-para	8	57.15
Mode of delivery	SVD	9	64.28
	CS	5	35.72

Grief response and influencing factors

In the first month following the fetal loss, most mothers, though not all, reported experiencing a range of intense emotional reactions. These responses included crying, feelings of isolation, and profound anger, which were often tied to both external and internal factors.

Externally, the grief was shaped by contextual elements such as religious influences, which provided both comfort and pressure, and conflicts with the husband's family, which exacerbated feelings of distress and isolation. Internally, factors like the sex of the lost child, particularly when the child was male added layers of personal grief, especially when compounded by previous losses, leading to a deeper sense of despair and helplessness. These emotional reactions were not simply a reaction to the loss itself, but were influenced by the broader social and familial dynamics, as well as the mother's own personal experiences with loss.

At the first month, most women reported experiencing crying, feelings of loneliness, and anger following the event. These grief experience mainly resulted from external factors (context) such as religious influence and having a conflict with the husband’s family as well as, internal factors (conditions) such as sex of the child (being male) and repeated child loss.

For some mothers, the loss of a child, particularly when it involves the death of multiple children, significantly prolongs and intensifies their grieving process, leading to feelings of hopelessness about future pregnancies. This cumulative loss can result in a more traumatic and emotionally taxing journey for them, as the pain of past losses intertwines with the current grief. Additionally, some participants noted that the desire for a male child, can exacerbate feeling of disappointment and loss, complicating their grieving experience. In some cases, the involvement of the husband’s mother in the grieving process was mentioned as a factor that might further deepen their emotional distress.

Coping with fetal loss

At month six, almost all women displayed effective coping compared to only 11 at the first month. Participants attributed this improvement to their adoption of various coping mechanisms. Four main themes for both connectedness (that was developed at six months) and disconnectedness (that failed to cope in the first month) emerged—religiousness and spirituality, social support networks, self/personal belief, and cultural belief systems—each with distinct categories.

Connectedness

Participants described coping with the situation as a challenging process that required significant effort after fetal loss. They employed a range of strategies, which were grouped into four key themes: self/personal resilience, social support network, religious and spiritual, and cultural belief (Table 2).

Table 2: Themes of coping mechanisms among women who experienced fetal loss from December to May 2024(n=14)

S.no	Main theme	Category			Codes
1.	Self / personal	Emotional Processing	Support	and	-Discussing grief & emotions -Desire for parenthood -Spending enjoyable time with family -Discuss with partner on plan for new baby -Spending more time on caring of husband & children -Shut down emotions
		Active Life Participation			

				-Encouraging oneself
				-Try to be more strong
				-Avoid talking about the event
2.	Social support networks	Family support		-Practical assistance
		Peer communication		-Belongingness
				-connecting with other mothers
				-Encouragement from friends
				-Advice & guidance from peers
				-Mutual understanding & empathy from peers
3.	Religiousness and spirituality coping	Faith and resilience		-Reading holy book
		Spiritual leaders support		-Offering salah(pray)
				-Consulting Imam/priest
				-Finding strength through faith
				-Belief in a higher purpose
				-Hope for future blessing
				-Resilience through spiritual belief
				-Elders wisdom &Guidance
				-Spiritual advice on coping
4.	Cultural belief systems	-Coping with health crises		- Togetherness
				-provided me with supportive words
		-Social impressiveness	in	-Cultural rituals for healing
		Cultural Values / Norms		-Cultural narratives on grief
				-Cultural expectations of strength

1. Self/Personal Resilience

Participants described their unique coping mechanisms ranging from making oneself busy with work, socializing with others to avoid dwelling on the event, describing emotional support and processing, and active life engagement.

Category 1.1. Emotional Support and Processing

Talking to others emerged as a vital coping mechanism, where many women sought conversations with family members and neighbours about unrelated topics. This approach provided essential emotional support, helping them find strength and hope while distracting them from their grief and promoting healing. Most respondents found that engaging with family and peers, particularly mothers, partners, and other close family members, facilitated emotional detachment from the event and acceptance. In terms of emotional detachment and acceptance, participants expressed experiencing overwhelming emotions such as grief, sadness, anger, and confusion. Navigating these intense feelings was challenging, leading some women to emotionally detach to protect themselves from the depth of their pain. This approach facilitated their ability to manage daily life while actively confronting the significant impact of their loss, which contributed to their emotional healing and resilience over time.

A 32-year-old Gravida II, para II mother described her experience as, *“Although I usually had conversations with my husband about our life plan, I deliberately avoid mentioning this since it is too painful to remember and may take me to the problem from which I’m yet not fully healed.”*

Category 1.2. Active Life Participation:

For many women, discussing on issues focusing on the future, like future pregnancies, was a significant source of motivation and strength. By preparing physically and emotionally for future pregnancies, they were able to foster a sense of purpose and resilience, which facilitated their emotional healing and self-care. In addition, spending quality time with family members and participating in leisure activities, such as watching movies, helped them maintain a sense of normalcy and emotional well-being by offering vital distractions from their grief. This involvement in daily life not only contributed to their emotional recovery but also strengthened their bonds with loved ones, reinforcing their support networks and promoting a balanced approach to coping with their loss. As such, many under scored the importance of focusing on future possibilities and actively participating in meaningful daily like one from a 31-year-old woman below.

A 32-year-old Gravida III and para I mother described her experience as *“I’ve lost three pregnancies, including this one, and it leaves me feeling deeply disappointed. I often find myself asking, ‘Why does this happen to me?’ However, I remind myself that I’m not alone in this; many women face similar challenges and heartaches. At just 24 years old, I still have a good chance of conceiving again, which gives me hope for the future”*.

7. Social support networks

Support from others after a pregnancy loss can be a vital source of comfort, reminding individuals that they are not alone and that their emotions are valid. Leaning on family and peers helps in finding strength, hope, and eventually healing. Most respondents who received such support were more likely to accept their situation and achieve coolness. The sub-themes identified under this theme were family support, peer communication and information seeking.

Category 2.1. Family support

According to participants' reports, family support emerges as a crucial coping mechanism, providing a lifeline during their most vulnerable moments. Participants described how, following the event of pregnancy loss, their family members rallied around them, offering not only emotional support but also practical assistance. This support system played a pivotal role in alleviating feelings of isolation and insecurity, which are common during the grieving process. Family members often provided a comforting presence, creating a supportive environment that facilitated emotional healing. They engaged in meaningful conversations, offered physical help with daily tasks, and shared in the mourning process, which helped to normalize the grieving experience. This collective presence and shared experience of grief allowed participants to feel less alone in their sorrow, reinforcing their sense of belonging and emotional security. Additionally, the practical support from family members, such as helping with household responsibilities or managing day-to-day challenges, reduced the burden on grieving individuals and allowed them to focus more on their emotional recovery. The act of coming together as a family not only provided immediate relief but also contributed to long-term emotional resilience, as it fostered a sense of shared understanding and mutual support. Overall, the depth of family support highlighted in participants' accounts underscores its critical role in the grieving process, emphasizing how emotional and practical assistance from loved ones can significantly enhance coping and facilitate the journey toward healing.

A 30-year-old Gravida IV & para IV mother, "Amid my heartache from losing a baby, the unwavering support of my family has been my anchor. Their love and understanding remind me that I am not alone in this journey. Together, we navigate the pain, finding strength in one another and nurturing hope for brighter days ahead".

Category 2.2. Peer communication and information seeking.

Participants reported that connecting with other mothers who have experienced similar pregnancy losses can be an effective coping strategy. Engaging with others who share comparable experiences provides a profound sense of understanding, empathy, and solidarity. This peer support network helps alleviate feelings of isolation and validates their grief, making the mourning process feel more normalized. By sharing their stories and emotions with others who have walked a similar path, mothers find comfort in knowing they are not alone in their experiences. This connection fosters a supportive community where they can openly express their grief, exchange coping strategies, and receive emotional reassurance. The mutual understanding and shared experiences within these peer groups not only help in reducing the sense of loneliness but also contribute to a collective healing process, reinforcing their emotional resilience and facilitating their journey through grief.

A 25-year-old, Gravida III & para III mother expressed her experience, *"My close friend, who had previously experienced the loss of twin babies, shared her own story with me in an attempt to convince me and offer comfort. She assured me that Allah would undoubtedly bless us with another baby."*

8. Religious & spiritual coping

According to the report from the participants, both Islam and Christianity significantly influence many people's lives, offering comfort and support during challenging times. These religions provide teachings and rituals that assist individuals in coping with fetal loss. Adherents often turn to prayer, attend church or mosque, and seek solace from their religious communities for healing. Many women find comfort in the belief that their fetus is now in God's or Allah's hands and that they will be reunited in the afterlife. The subthemes that emerged from this discussion include faith and resilience, as well as the support of spiritual leaders.

Category 3.1. Faith and Resilience

Participants reported getting significant solace and strength in their faith to cope with the pregnancy loss since their belief provided them with a sense of purpose, comfort, and hope during this challenging time. They described how faith in a higher power and belief in a divine plan offered them calm and acceptance amidst their grief. For many, this conviction is guiding them through their hardship instilling a profound sense of resilience. This spiritual perspective helped them navigate their loss with a sense of divine support, reinforcing their ability to endure and persevere. The belief in a higher

purpose and the strength granted by their faith played a crucial role in their emotional healing, enabling them to face their grief with a renewed sense of hope and acceptance.

A 30-year-old Gravid IV and Para IV *“I attempted to heal by avoiding any conflicts with the divine entity "Allah" and dedicated a significant amount of my time to listening religious songs make me comfortable”*.

In addition to their personal belief, women reported receiving emotional and spiritual support from religious leaders, who provided comfort, guidance, and encouragement during their grieving process. They believe that spiritual connection helped them cope by offering meaning and solace in their loss, reinforcing their faith as a source of strength in their healing journey.

Category 3.2. Spiritual leaders support

The majority of participants reported turning to spiritual leaders for profound guidance and comfort during their times of grief from religious leaders. Through personal counselling and spiritual guidance, these leaders provided them with a framework to understand and process the grief. They offered not only emotional reassurance but also theological perspectives that helped them make sense of the loss and align it with a greater divine plan. This support was instrumental in reinforcing participants' faith and resilience, enabling them to integrate their grief into their spiritual lives and find solace and meaning amidst their sorrow.

A 23-year-old Christian primi woman expressed her feelings about getting comfort with the aid of religious leaders as follows: *“I met with my priest, who blessed our home with holy water and shared biblical stories, emphasizing the importance of faith in God’s plan. He encouraged us to accept life’s challenges as lessons from God and assured us that if we trust in Him, we will be blessed with the child we dreamed of”*

9. Cultural belief systems

Cultural beliefs play a crucial role in how many respondents cope with their fetal loss. They highlighted that togetherness is a foundational aspect of their community, where individuals unite to offer support and comfort during these difficult times. This sense of belonging not only fosters healing but also strengthens resilience among those grieving. The subthemes emerging from this discussion include coping with health crises and the acceptance of cultural values and norms, both of which shape their responses to loss and provide a framework for navigating their grief.

Category 4.1. Coping with health crises

Many participant reports they initially experienced profound depression after their pregnancy loss. However, their focus often shifted dramatically when confronted with health crises affecting themselves or their family members. They recognized that their belief in the link between intense grief and subsequent health problems within the family heightened the urgency of their coping strategies, making it crucial to embrace these cultural norms. Some respondents found their attention redirected due to sudden health issues or accidents involving loved ones, while others faced serious health challenges of their own after childbirth. This shift toward addressing urgent health concerns not only provided a practical distraction but also transformed their emotional landscape as they navigated the immediate challenges of these crises alongside their grief.

A 30-years-old gravid IV and para IV mother explained her experiences *"In the depths of my grief for my lost newborn, I found an unexpected source of strength when my second child faced a terrifying accident. It was in that moment of crisis that I learned to channel my pain into resilience. Despite the warnings from older family members that strong grief could lead to more problems within the family, I initially ignored their advice, only to realize later how vital it was to confront my sorrow to navigate these challenges"*.

Category 4.1. Social impressiveness in cultural norm

The majority of participants highlighted that within their cultural context, solitude and disconnection from the community are neither culturally accepted nor encouraged. Instead, there is a strong emphasis on engaging in social interactions and maintaining active socialization. This collective approach is deeply embedded in cultural norms, promoting a sense of belonging and mutual support. By adhering to these social expectations, individuals can foster community ties and uphold social harmony, which plays a crucial role in sustaining their personal well-being and emotional stability.

A 24-year Gravid II & para II mother expressed her experience *"After experiencing a devastating loss, I focused on projecting grace and strength through cultural activities like gatherings and ceremonies. These cultural norms encouraged me to maintain self-control, emotional restraint, and a positive attitude, despite personal hardships."*

Disconnectedness

Similar themes emerged among women who failed to develop effective coping mechanisms.

5. Self/Personal

Three primary sub-categories, denial, blaming self or partner, and isolation, characterize personal ineffective coping strategies. In denial, the women refused to acknowledge the reality of their loss while participants attributed the fault for the loss to themselves or their partners among the blaming sub-themes. Some women withdrew from social interactions (isolation).

Category 1.1. Denial

Women who experience intrauterine fetal death often describe an initial refusal to accept their loss, expressing that it feels overwhelmingly difficult to confront the reality of the situation. This denial acts as a protective mechanism, allowing them to cope with the intense shock and grief that accompanies such a profound loss. Many participants recount a sense of disbelief, grappling with the fear of finality and holding onto hope that things might change. This emotional struggle can lead to feelings of frustration, as they navigate their pain in a world that often seems unable to understand the depth of their sorrow. Ultimately, this initial refusal serves as a temporary refuge, reflecting the complexities of their grief journey.

A 30-year gravid IV & para IV *“Following my husband’s recommendation, I visited the health facility after noticing no fetal movement for a few days. The health providers delivered the devastating news that my baby had died in my uterus. I was in shock and disbelief, feeling numb and, unable to accept that”*

Category 1.2. Blaming self and partner

Some participants reported experiencing profound guilt and self-blame, alongside attributing responsibility for the fetal loss sometimes to their partners. This inclination to assign fault is often a natural part of the grieving process, as individuals grapple with the need to make sense of their loss and seek reasons for why it occurred. By assigning blame to themselves or others, they attempt to find some form of explanation or control over the situation. This tendency to externalize or internalize blame reflects the complexity of their emotional struggle and highlights the difficulty in reconciling their grief and understanding the cause of their loss.

A 20-year-old woman shared her experience *"I fell a deep sadness, especially when I pass the place where I fell while washing clothes during the rainy season. I can't stop thinking that this fall caused me to lose my baby. I often wonder if I had avoided that moment, maybe my child would still be here. This belief has affected me so much that we even moved to a new house to try and forget what happened"*.

Category 1.3. Isolation

Some participants described choosing to isolate themselves by avoiding discussions about their loss, perceiving such conversations as too painful and overwhelming. This preference for silence is a coping mechanism intended to shield themselves from further emotional disturbance. They believed that withdrawing from social interactions and remaining alone would facilitate their recovery. However, this isolation often intensified their emotional turmoil, as their solitude led to increased rumination and distress. Although they sought refuge in silence, this approach sometimes exacerbated their suffering, hindering their healing process by amplifying their feelings of loneliness and grief.

24 years later Gravid II's mother explained her experience *"After the event I preferred to stay at home and I didn't want to contact my neighbour and my friends because I didn't want anyone to raise the issue, and even pregnancy issues"*

6. Social support

Most participants indicated that social support plays a crucial role in managing the emotional impact of unexpected life events, such as pregnancy loss. Despite recognizing the importance of such support, many struggled to fully access it due to their desire to avoid negative feelings associated with the situation. Under this theme, two main categories emerged: Avoidance of Family Support to recuperate from grief and Avoidance of Peer Communication on the issue.

Category 2.1. Avoidance of Family Support to recuperate from grief

Participants in this study revealed that, during the period of grief following their loss, their families made earnest attempts to offer reassurance and emotional support. Despite these efforts, many participants were unwilling to accept or engage with this support. This reluctance stemmed from a complex interplay of emotions; the participants often felt overwhelmed by their grief and struggled to process their emotions, making it difficult for them to receive comfort from others. The very presence of family, while intended to provide solace, sometimes exacerbated their feelings of discomfort or inadequacy, leading them to further intensify their grief.

A 21-year-old Gravid I and Para I mother explained her experience as *"I tend to keep my emotions to myself and prefer to retreat into silence rather than discussing my issues with family members. I find that talking about my grief can feel overwhelming and draining, and sometimes, it feels like my family's attempts to comfort me only heighten my discomfort"*.

Category 2.2. Avoidance of Peer Communication on the issues

Many of the women expressed a strong desire to connect with peers, yet they didn't wish to talk specifically about the event of their fetal loss. This suggests that while they valued the sense of shared experience and emotional support, discussing the trauma directly may have been too painful or overwhelming.

A 22-year-old Gravid II and para II mother explained her experience *"I avoided discussing the issue with anyone even for my closest friends because I felt that people who hadn't experienced the same loss wouldn't truly understand what I was going through. I was afraid that their attempts to comfort me would only make things more uncomfortable and force me to relive my grief before I was ready"*.

7. Religious and Spirituality

Each participant's journey through grief revealed the profound impact of religious and spiritual beliefs on their coping processes. However, not all individuals found solace or comfort in their faith a month after their loss. This theme encompasses two distinct yet interconnected sub-themes: Blaming God/Allah and Withdrawing from Religious Activities.

Category 3.1. Blaming God/Allah

Some participants found that directing their blame towards God or Allah was a way to confront their grief and express their feelings of anger, sadness, and helplessness. This response reflects a struggle to make sense of their loss and to articulate their distress in the context of their spiritual beliefs.

A 32-year-old Gravid I mother explained her experience as *"I had been eagerly anticipating the arrival of my first child with my husband. I had been trying to conceive for years and finally, my prayer was answered when I became pregnant. But at birth, I experienced a sudden and devastating event."*

Overwhelmed with the grief and heartbreak, I found myself questioning why Allah would allow such a tragedy to happen to me”

Category 3.2. Withdraw from religious activities

Participants reported that experiencing a fetal loss profoundly affected their faith and religious practices. Many found themselves withdrawing from religious activities following such a devastating event. Additionally, feelings of anger and confusion towards their spiritual beliefs often contributed to their reluctance to engage in religious practices. For some, the rituals and communal aspects of their faith felt disconnected from their current emotional state, leading them to retreat from these practices as they navigated their grief.

A 28-years-old Gravid II Christian follower's mother expressed her feelings as

“I had always drawn strength and comfort from my faith, and my husband and I were overjoyed to share the news of my pregnancy with our church community who supported us with their prayers. However, after experiencing the loss, we struggled to reconcile our faith with the deep pain and emptiness, making it increasingly difficult to participate in religious activities, especially attending weekly church services”.

8. Cultural Beliefs

According to some participants, cultural beliefs prevent them from coping with their grief and force them not to express their emotions. This societal pressure can exacerbate feelings of grief and isolation for the mother. Under this theme, there are two sub-themes were found: Against cultural values, and gender roles and expectations.

Category 4.1. Against cultural value

The participants indicated that some cultural practices like prohibitions on visible mourning, such as restrictions on crying, enforced solitude, and limitations on public expressions of sorrow prevented them from effective coping. Such culture can severely obstruct emotional healing by compelling individuals to suppress and internalize their grief through not only preventing women from fully processing their emotions but also restricting their access to the supportive networks and communal

solace that are vital for navigating profound loss. Consequently, these cultural barriers hinder the ability to seek and receive the emotional support necessary for recovery.

A 23-year Gravid II mother expressed her experience *“I am filled with a strong desire to have a baby. But it seems like this may not come to fruition. As a result, I am feeling extremely saddened, and I wish to express my sorrow through tears while someone visited me at my home. In my culture, elders from my community often gather at my home to offer reassurance, though they discouraged me from openly expressing my emotions”*.

Category 4.2. Gender role and expectations

Participants revealed that culturally defined gender roles and expectations profoundly shape societal expectations of how women should handle fetal loss. Women are often expected to adopt nurturing roles and seek support from family, which can impose additional pressures on them. Some participants described how these gender norms can create conflicts between societal expectations and their personal emotional needs. This misalignment can heighten emotional burdens and complicate the process of finding effective coping mechanisms that truly resonate with their authentic feelings and experiences. Consequently, the pressure to conform to these prescribed roles may inhibit their ability to navigate their grief in a manner that aligns with their emotional realities.

A 22-year-old Gravid I mother expressed her experience *“I felt caught between the cultural expectations to remain strong and composed after my pregnancy loss and the intense, overwhelming grief I was experiencing. The societal pressure to fulfill traditional gender roles made it even harder to express my pain and seek the support I desperately needed”*.

Discussion

The study on coping following fetal loss was conducted to understand how individuals, particularly women, navigating the emotional and psychological challenges related with the loss of the fetus. The primary aim was to explore the coping mechanisms and the role of various factors, such as religious beliefs, social support, and cultural practices, in shaping how individuals process grief and adjust to the loss. The main finding revealed that, religious and cultural frameworks significantly influenced the coping strategies of the participants, with many internalizing grief due to societal or religious pressures to suppress open expression of sorrow. Additionally the study highlighted that while social support from family and community could provide comfort, the expectation to move on quickly often lead to feeling of isolation and hindered the healing process.

The participants in this study used emotional detachment as a coping strategy by creating a protective barrier to shield themselves from overwhelming feelings of grief and loss. This finding is consistent with a study done in the USA revealed that understanding and implementing emotional detachment and relational dynamics help them to move closer to holistic healing in their lives following the occurrence of the problem(Nursing@Georgetown, 2020).Emotional detachment creates a psychological distance from one's emotions and allows a deliberate effort to avoid emotional triggers(Qinglu Wu, 2023).

These findings revealed that reproductive readiness following a fetal loss also serves as a coping mechanism for some of the study participants. This indicated that some individuals anticipating the possibility of future pregnancies may help them deal with the loss they experienced. This finding was consistent with a study done on African American women as well the study conducted in India showed that anticipating future pregnancy serves them to cope with grief fully in life situations(Patterson, 2000a, Gopichandran, 2018). Since hope and the possibility of future pregnancy can provide women with a sense of optimism.

On the other hand, engagement in family activities and leisure time such as shared experiences and recreational pursuits that family members engage in together for enjoyment, relaxation, and bonding also acts as a coping mechanism for women who experienced a fetal loss. The results of this study demonstrated that women's busy schedules, which include taking care of their partners and children as well as keeping themselves occupied by viewing a variety of entertainment shows, are utilized by many study participants as a coping mechanism to ease their grief. This is in line with a study done in the USA & India revealed that women who faced a baby loss were returning to their work and caring for the rest of their families but this study didn't indicate watching entertaining programs served as a coping mechanism(Gopichandran, 2018, VAN, 2012a).Similarly, a study done in Pakistan also revealed that making themselves busy the whole day with household chores and working in the field serves as a coping mechanism for them(Asim, 2022).

The participants in this study consistently highlighted the importance of seeking support from family members and peers to cope with the emotional and psychological challenges of fetal loss. Many turned to their spouse and mothers (or their husband's mother), recognizing the critical role these close relationships played in offering both emotional comfort and stability during such difficult times. Furthermore, a significant number of participants expressed a strong desire to cultivate close, supportive bonds with key individuals in their lives, particularly their mothers or partners, who were

seen as central to their coping strategies. This finding aligns with research conducted in Ghana, which revealed that supportive husbands were instrumental in helping women cope, offering emotional relief that allowed them to gradually heal from the loss of their babies(Eniola Sarat Onaolapo, 2020). Similarly, a study done in the USA highlighted the crucial role of Social support in buffering the effects of trauma and mediating the grieving process (Lehman D., 1986). Regardless of cultural or geographic differences, the need for close family connections and peer support emerged as a key factor in facilitating emotional recovery and providing practical assistance during such challenging experience. Our finding also mirrors the findings from studies on African-American women in the USA, where reliance on intimate family ties was similarly crucial for emotional resilience in the face of loss(Paulina Van, 2003). Similarly, a study done in Spain emphasized the benefits of receiving informal support and engaging in discussions about loss are found to be a source of relief for women, allowing them to share experiences with understanding individuals (Fernández-Basanta, 2021). These observations suggest that, across diverse cultural and geographic contexts, strong familial connections and supportive networks are universally recognized as essential in helping individuals cope with grief and trauma, underscoring the importance of social support in the healing process.

Many participants shared that their religious and spiritual practices played a deeply meaningful role in their lives, especially during difficult moments like the loss of a fetus. For some, listening to religious songs brought comfort, offering a sense of peace and connection to something greater. Others spoke about the importance of seeking guidance from personal religious leaders, such as priests or imams, who provided both spiritual support and a sense of direction. Throughout these experiences, their belief in God/Allah emerged as a central source of strength, offering them hope and solace in the face of profound loss. Relying on religious or spiritual beliefs and activities as a source of guidance and strength is crucial for many Ethiopian women who experienced a fetal loss such as IUFD or stillbirth. This finding is consistent with a study done in the USA, Turkey, and Nigeria showed that performing religious and spiritual practices makes them feel relaxed, and peaceful and cope with grief following fetal loss(VAN, 2012b, Şimşek Çetinkaya, 2023, Tosin Popoola, 2017). This might be due to believing that nothing would reverse or change one's already happened outcomes according to religious thought.

Culture has a big impact on how women deal with losing a fetus. It frequently offers a network of support as well as a framework for comprehending and processing sorrow. The results of our study demonstrated how socialization in cultural practices and fear of future health crises occurring within the family, should the individual persist in grieving, function as coping mechanisms. This result was consistent with a South African study that found that believing in cultural thought and practices assists

women in moving to a coping level after experiencing a fetal loss (Sebola, 2023). Since culture influences the way grief is perceived and expressed as well as providing a sense of closure and comfort to mothers who have experienced fetal loss.

In the first interview majority of the study participants did not cope with grief fully situations. The primary reason for this disconnectedness is a self or personal factor which plays a crucial role in aggravating the grieving level unless properly managed. Our study findings showed that certain grieving responses such as not accepting the reality of the loss, blaming themselves or her partner, and isolating herself from her parents and the rest of the community engaged her in deep sorrow and made them not cope. This finding is in line with a study done in Norway among women who experienced stillbirth revealed that difficulty communicating their worry and cessation of verbal communication with their community and total silence endangers mothers from deep sorrow and unable to cope with stressful situations (Trulsson, 2004). The similarity of the two studies might be due to the significance of individual coping mechanisms and communication styles in the grieving process exacerbating the level of grief. Another study done in the USA, also showed that many mothers blamed themselves for the baby's death, citing their "body's failure" may deepen their sorrow level and difficult to cope early with stressful situations (Cacciatore, 2010a). Another factor that hinders grieving mothers not coping is related to social support either not wanting to communicate with others being silent or preferring not to communicate most of the time (avoiding discussing their grief with those around them). Similarly, a study done in the USA revealed that after the event some of the study participants did not attain smooth communication with their husbands, which resulted in marital dissatisfaction, and most preferred to keep silent which intensified their grief responses (LaRoche C., 1984).

Another study done in the USA found that grieving mothers often face social pressure to "move on" and forget the loss, with communities encouraging them to suppress their grief rather than express it openly. This pressure to conform can be particularly harmful, as it creates a barrier to the natural grieving process. Instead of being allowed to remember and process their emotions in their own way, these mothers may feel isolated and alienated, which can exacerbate their psychological trauma (Layne, 2003). The similarity might be attributed to the societal pressure that both grieving mothers and individuals in the broader community often face to conform to expectations of forgetting rather than engaging in the process of remembering and grieving. This societal pressure not only undermines the grieving process but can also hinder emotional healing as well as can deepen feeling of isolation, emotional pain, and even psychological trauma.

In our study, participants revealed that religious and spiritual factors play a significant role in how women cope with fetal loss, often influencing their ability to openly express grief. Both Christian and Muslim participants shared that, within their religious frameworks, expressing grief is not as such advocated and the individual who is victimized by the pain, internalizes the problem and becomes deeply saddened. Therefore, it leads them not to cope with grief following fetal loss in the early periods of the event. This finding is in line with a study done in the USA among Christian followers revealed that the church doctrine can marginalize these women not only by expressing their grief but by refusing baptism when requested by a grieving mother and these extremely traumatized and engaged in a deep sorrow (Cacciatore, 2010b). The similarity of the finding might be due to restricting individuals from expressing their grief due to religious and cultural norms that discourage the outward display of sorrows and become an obstacle for coping following a foetal loss (Timmermans, 2022).

It is common for society to expect women to be strong and resilient in the face of adversity, which prevents them not fully expressing their emotions. Our study findings showed that during the first month of the interview complaining about their culture did not express their grief as they wanted hindering them not coping early with grief situations. Similarly, a study done in Norway showed that talking about death is a cultural taboo that hinders mothers not to expressing their emotions and predisposes them to be isolated and not easily coping with grief full life situations (Trulsson, 2004).

The findings of this study on coping mechanisms following fetal loss offer significant insights for health professionals particularly nurses, policy makers, and the broader societal context. The study revealed that, religious beliefs, social support, and cultural practices play central roles in shaping how women cope with the grief resulted with the fetal loss. Many participants internalized their grief due to religious and cultural pressures that discouraged open expressions of sorrow, which hindered emotional healing and led to isolation. This highlight the importance of providing culturally sensitive care that recognizes and respects the religious and cultural frameworks with in which individuals grieve. For health care providers, understanding the coping strategies that women employ, such as emotional detachment, relying on family support, or seeking religious solace, is crucial for offering compassionate care and emotional support tailored to individual needs. Furthermore, Nurses can also provide women with comprehensive care that meets their emotional, psychological, and physical requirements when they are aware of the different ways women deal with fetal loss and their grief processes. The study also emphasized the protective role of family support, particularly from spouses and mothers, which proved vital in buffering the emotional toll of loss. For policy makers, these insights underscore the need for policies that promote family-centred support and mental health

resources ensuring that grieving individuals have access to a supportive environment that aids their recovery. Lastly, the study highlights the detrimental effects of societal pressure to “move on” quickly from grief, which can suppress the natural grieving process, leading to long term emotional and psychological distress. Therefore, creating a more open, supportive societal approach to grief that allows individuals to express their emotions and seek help is essential for improving the overall mental health outcomes following fetal loss. In conclusion, the findings stress the importance of integrating social, cultural, and emotional factors into health care practices, policies, and community support systems to foster more effective coping and healing for women experiencing fetal loss.

Conclusion

Effective coping mechanisms involve spiritual guidance, supportive social networks, personal resilience, and cultural beliefs. Conversely, disconnectedness is characterized by withdrawal from religious practices and social support, self-blame, and denial. These insights emphasize the need for comprehensive support and empathetic care for grieving women, highlighting pathways for future research and clinical interventions.

Strengths and Limitations of the Study

The study's strengths include a theory-driven approach utilizing the grief following pregnancy loss model, which provided a clear framework for analysis. By focusing on women's coping experiences during the first six months after loss, the research explored various coping mechanisms, such as emotional detachment and family support, offering a comprehensive understanding of grief. However, a limitation is that participants' emotional states, particularly during the first month of interviews, may have influenced their responses, potentially leading to under-reporting of coping strategies.

Availability of Data and Material

All the data of this study are available from the corresponding author upon reasonable request.

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Statement and Declaration

Ethical considerations

Ethical clearance was obtained from the Institutional Health Research Ethical Review Committee, at the College of Health and Medical Sciences, Haramaya University (Ref.no. IHRERC/190/2023). The purpose, procedure, duration, possible risks, and benefits of the study were explained. Then, informed consent was obtained from each participant (or their guardian if under 18). The research team was trained to manage sensitive situations, such as participants in distress, with empathy, care, and psychological support. In cases where the distress couldn't be managed by the team, participants were referred to appropriate health facilities. Throughout the process, the team ensured that participants felt respected and fully supported.

Consent to participate:

Written and verbal informed consent was taken from the participant before undertaking the interview.

Patient consent for publication: Obtained.

Conflict of interest

The authors declare that they have no conflicts of interest

Patient and public involvement:

Patients and the public were not involved in the design, or conduct, reporting, or dissemination plans of this research.

Funding sources

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Data availability statement:

Data are available upon reasonable request. The data used to support the findings of this study are available from the corresponding author upon request and included in the article.

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Annexes

:Participant Enrollment Form

Prior to enrollment of a subject, the following must occur:

1. The participants should sign informed consent.
2. The participants should meet none of the exclusion criteria.

Exclusion criteria		
	Women who give birth at home and will come to the hospital for management of complicated delivery	1. Yes 2. No
	The women with known intrauterine fetal death	1. Yes 2. No
	Women with a severe medical problem and critically ill	1. Yes 2. No
	Women with a psychiatric problem	1. Yes 2. No
	Under 18 teenagers without partner or family	1. Yes 2. No

- ❖ All response for the above mention exclusion criteria should be “No” to enroll the subjects to the study
- 3. Due to the inclusion/exclusion criteria, not all subjects that consent to the study will be enrolled
- 4 Once written consent is obtained and subject eligibility assessed, eligible subjects will be enrolled into the study
- ❖ *Subjects will be considered enrolled in the study at the time of the assignment of a patient identification number.*
- ❖ *A subject who later asks to stop or discontinue the study might be counted as a withdrawal*

: English version Questionnaire Socio-demographic and Economic Forms

- This document provides the concepts for the general questionnaire covering socio- demographic characteristics, and economic status of the participants.
- To assess the economic status, the wealth index EDHS questioner is used. The data will be collected after obtaining a consent form.
- Some pertinent information will be taken during labor and the rest question, which need critical thinking like economic question will be asked after delivery by trained midwives at selected hospitals

Questionnaire No./CODE	
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DATE OF INTERVIEW:	Time InterviewStarted:Hour: Minute: _____
INTERVIEWER NAME:	
NAME OF HEALTH FACILITY:	
	Time InterviewEnded:Hour: Minute: _____

Part I: SOCIO DEMOGRAPHIC INFORMATION(by interviewing the pregnant mother)

Code	Questionnaire	Coding categories	
SD0 1	Age	Age in years __	
SD0 2	Residence	District.....	1
		Kebele.....	2
SD0 3	Living Address	_____	
SD0 4	District	_____	
SD0 5	Religion	Muslim	1
		Orthodox	2
		Protestant	3
		Others specify -----	4
SD0 6	Marital status	Single	1
		Married and living together	2
		Married but not living together	3
		Divorced	4

		Widowed	5
SD07	If married, your husband's occupation	Daily laborer	1
		Farmer	2
		Civil servant	3
		Employed in private sector	4
		Has private business	5
		Others (specify)	6
SD08	Ethnicity	Oromo	1
		Amhara	2
		Harari	3
		Gurage	4
		Others -----	5
SD09	Educational status	No formal education	1
		Primary education (grade 1-8)	2
		Secondary education (grade 9-12)	3
		Technical/vocational	4
		Higher education	5
SD10	Occupation	Government employed	1
		Private employed	2
		NGO employed	3
		Day laborer	4
		Self-employed	5
		Housewife	6
		student	7
		Others -----	8

Wealth index(by interviewing the pregnant mother)

	What is the main source of drinking water for members of your household?	Rainwater	1
		Surface water (river, pond/lake)	2
		Covered spring	3
		Covered well	4
		Open spring	5
		Open well	6
		Pipe outside the compound	7
		Pipe in dwelling/compound	8
		Others (specify)	9
	What do you usually do to make the water safer to drink? Anything else?	Let it stand and settle	1
		Solar disinfection	2
		Use a water filter (ceramic/sand/composite)	3
		Strain through a cloth	4
		Add bleach/chlorine	5
		Boil	6
		Other (specify)	7
	How long does it take to go there, get water, and come back?	minutes	
		Don't know	9 9
	What kinds of toilet facilities do most members of your household use?	No facility/bush/field	1
		Latrine (vip)	2
		Ventilated improved pit	3
		Traditional pit toilet	4
		Flush toilet	5
		Others (specify)	6

	What type of fuel does your household mainly use for cooking?	Animal dung	1
		Wood/Straw/shrubs/grass/agr	2

		icultural crop	
		Charcoal	3
		Kerosene	4
		Biogas	5
		Liquidfied petroleum gas (LPG) or Natural gas	6
		Electricity	7
		Other (specify)	8
		No food cooked in household	7 9
Where does cooking usually done in the house, in a separate building, or outdoors?	In the house	1	
	In a separate building	2	
	outdoors	3	
	Other (specify)	3	
Does your household have?	Yes	No	
	Radio	1	0
	Electricity	1	0
	Television	1	0
	Telephone/cell phone	1	0
	Refrigerator	1	0
	An electric “mitad”	1	0
	A kerosene lamp/pressure lamp	1	0
	Bed with cotton/sponges/spring mattress	1	0
	Table	1	0
	Chair	1	0
	Own the house living in?	1	0
	Own a bicycle?	1	0
	A motorcycle?	1	0
	A car or truck?	1	0
			Hectare

	How many hectares of agricultural land do members of your household own?	We don't have agricultural	8 9
--	--	----------------------------	--------

		land	
	How many of the following animals does this household own?	Response	Number
		a) Cows/bulls	
		b) Other cattle	
		c) Horses	
		d) Donkeys	
		e) Mules	
		f) Camels	
		g) Goats	
		h) Sheep	
		g)Chickens/poultry	
		i) Beehives	
		j)We don't have these animals	8 9
	How many rooms in your house are used for sleeping?	No. of rooms	
	Does anyone in your household have a bank account?	Yes	1
		No	0

Socio-behavioral characteristics

- This questioner design to assess socio-behavioral characteristics of the women
- The information will be collected by interviewing the mother after delivery by midwives at selected hospitals

Code	Questions	Yes	No	skip
SD22	Have you ever smoked? (Cigarette or Shisha)	1	0	If no skip SD24
SD23	If yes, Did you use during the past three months	1	0	
SD24	Are you currently using tobacco/shisha?	1	0	
SD25	Have you ever drunk alcohol?	1	0	If no skip

				SD 27
	If yes, Did you drink during the past three months?	1	0	
	Are you currently drinking alcohol?	1	0	
	Have you ever chewed 'Khat'?	1	0	
	Did you use during the past three months	1	0	
	Are you currently chewing 'Khat'?	1	0	

Anxiety

- Kessler Psychological Distress Scale (K10) used to assess their anxiety level
- The information will be collected by interviewing the mother after delivery by midwives at selected hospitals

	Please tick the answer that is correct for you	All of the time (score 5)	Most of the time (score 4)	Some of the time (score 3)	A little of the time (score 2)	None of the time (score 1)
A01	In the past 4 weeks, about how often did you feel tired out for no good reason?					
A 02	In the past 4 weeks, about how often did you feel nervous?					
A03	In the past 4 weeks, about how often did you feel so nervous that nothing could calm you down?					

A 04	In the past 4 weeks, about how often did you feel hopeless?					
A 05	In the past 4 weeks, about how often did you feel restless or fidgety?					
A 06	In the past 4 weeks, about how often did you feel so restless you could not sit still?					
A07	In the past 4 weeks, about how often did you feel depressed?					
A 08	In the past 4 weeks, about how often did you feel that everything was an effort?					
A 09	In the past 4 weeks, about how often did you feel so sad that					

	nothing could cheer you up?					
	In the past 4 weeks, about how often did you feel worthless?					

Perceived Stress Scale (PSS-10)

Instructions: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way. Rated on a 5-point Likert scale: 0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Very Often

	Please indicate by circling from the likert scales	0 N e v e r	1 A l m o s t n e v e r	2 S o m e t i m e s	3 F a i r l y o f t e n	4 V e r y o f t e n
PS 01	In the last month, how often have you been upset because of something that happened unexpectedly?					
PS 02	In the last month, how often have you felt that you were unable to control the important things in your life?					
PS 03	In the last month, how often have you experienced kindness from others?					
PS 04	In the last month, how often have you felt nervous and “stressed”?					
PS 05	In the last month, how often have you felt confident about your ability to handle your personal problems?					
PS 06	In the last month, how often have you felt that things were going your way?					

PS 07	In the last month, how often have you felt the desire to support the greater good?					
PS 08	In the last month, how often have you found that you could not cope with all the things that you had to do?					
PS 09	In the last month, how often have you been kind to others?					
PS 10	In the last month, how often have you been able to control					

	irritations in your life?					
PS 11	In the last month, how often have you felt that you were on top of things?					
PS 12	In the last month, how often have you been angered because of things that were outside your control?					
PS 13	In the last month, how often have you felt that there is a lot of kindness in the world?					
PS 14	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?					

Partner support

- The information will be collected by interviewing the mother after delivery by midwives at selected hospitals

No	Items included in the 8-item partner support scale	Strongly agree	Agree	Disagree	Strongly disagree
P _a S 01	—My partner is someone I can count on for financial support if I need it				
P _a S 02	—My partner is someone I can talk with about things that are important to me				
P _a S 03	—My partner is someone who is affectionate toward me				
P _a S 04	—My partner is someone who helps me care for my child(ren)				

P _a S 05	My partner is someone who understands how I am feeling				
------------------------	--	--	--	--	--

P _a S 06	My partner is someone who talks with me and spends time with me				
P _a S 07	My partner is someone whom I can count on				
P _a S 08	My partner is someone who does things with me				

Intimate partner violence

- The information will be collected by interviewing the mother after delivery by midwives at selected hospitals

Code	Questionnaire	Coding categories		
PV01	Did your partner/ husband ever perform any violence in your life time?(physical/Psychological/sex ual)	1.yes 2.No		
PV02	Did your partner/ husband ever perform any violence during the current pregnancy?	Psychological violence	1.yes	2.No
		1.Insulted/ma de feel bad about your self		
		2. Belittled or humiliated in front of other people		
		3. Scared or intimidated on purpose		

		4. Threatened when asking friends/family		
--	--	--	--	--

PV03	Physical violence Has your partner ever:	1.Yes	2.No
	1. Slapped you or thrown something at you that could hurt you?		
	2. Pushed you or shoved or pulled your hair?		
	3. Hit you with his fist or with something else that could hurt you?		
	4. During pregnancy, hit your abdomen with a fist Or with something else?		
	5.Choked or burnt you on purpose?		
	6. Threatened to use or actually used a gun, knife, or any other weapon against you?		
PV04	Sexual violence Has your partner ever...	1.Yes	2.No
	1. Physically forced you to have sexual intercourse?		
	2. Having unwanted sexual intercourse because of fear from the partner?		
	3. Forced you to do something sexual that is degrading or humiliating?		

Part II: Past Obstetrics-Gynecology Form

- This questioner design to assess past obstetric and gynecologic history of the women.

- It develops through literature review, published tools that works for Ethiopian women and the information will be collected during labor and after delivery by midwives at selected hospitals by interviewing the mother.
- Hospital Maternal ID ----- Study ID. No-----Address-----

	Question	Categories		
	Number of pregnant (gravidity)	_____		
	Number of birth (Parity)	_____		
	Mode of delivery for the baby before this pregnancy	SVD		
		CS (ECS or emergency)		
		Operative VD (VD or FD)		
	The Place of delivery for the baby before this pregnancy	Hospital		
		Health center		
		Home		
	What was your age at your first pregnancy?	_____ years old		
	When was your last pregnancy indexed to the current pregnancy?	0–5 months before		
		6–11 month before		
		12–17 months before		
		18–23 months before		
		24–59 months before		
		60–119 months before		
		≥120 months before		
	How many live births did you have?	_____(write in number)		

	History of abortion	Yes		
		No		
	If yes, type	Spontaneous		
		Induced		
	Did you have stillbirths history in your previous pregnancies?	Yes, ---times		
		No		
	Have you experienced an infant death in your previous pregnancies ?	Yes, ____times		
		No		
	Have you experienced an early neonatal	Yes, _____times		

	death in your previous pregnancies ?	No		
	Have you experienced your birth results NICU admission of your baby in your previous pregnancies ?	Yes, _____ti mes		
		No		
	Have you experienced ICU admission in your prior delivery in your previous pregnancies ?	Yes, _____ti mes		
		No		
	Have you experienced long hospital stay in your prior delivery in your previous pregnancies?	Yes, _____ti mes		
		No		
	Have you experienced Emergency CS delivery in your prior delivery in your previous pregnancies?	Yes, _____ti mes		
		No		
	If yes for Q PO16, Have you experienced dehiscence in your previous pregnancies?	Yes, _____ti mes		
		No		
	Have you experienced preterm birth in your previous pregnancies?	Yes, _____ti mes		
		No		
	Have you experienced blood transfusion in your previous pregnancies?	Yes, _____ti mes		
		No		
	Have you experienced post-partum eclampsia in your prior delivery?	Yes, _____times		
		No		
	Family history of hypertension	yes		
		no		
	Family history of DM	yes		
		no		
	Presence of pregnancy-related complication for the baby before this pregnancy	Yes		
		No		
	If yes, which of the following?	PPH		

		Sepsis		
		blood transfusion		
		Dehiscence		
		Other specify _____		
	When you got pregnant with your current pregnancy, were you or your husband or partner doing anything to	Yes		
		No		

	keep from getting pregnant? (ex. using birth control methods.)			
	If yes to question PO25, Which of the following methods were you/your husband using before you got pregnant?	Pills		
		Injectables		
		IUCD		
		Implants		
		Condoms		
		Rythum method		

Part: III. Current Obstetric Form:

- This questioner provides the basic set of questions needed to obtain the current obstetric status of pregnant women. It has two section,
 - A.** The first of section will be collected through interviewing by train midwives at selected hospitals during labour and after delivery.
 - B.** The second section will be collected through reviewing maternal charts at selected hospitals during labour and after delivery

Hospital maternal ID _____ Study ID _____ Address _____

Cod e	Questions	Categories		Skip
CO01	Do you know the day your last menstrual period started?	Yes		If no, skip C003
		No		
CO02	If yes, what is your end menstruation date of current pregnancy	Month /Day/ Year		
CO03	How many months pregnant are you	____ Months		
CO04	Do you utilize ANC during your current pregnancy	Yes		If no skip to CO7
		No		
CO05	If yes, when did you initiate	First trimester		
		Second trimester		
		Third trimester		

CO0 6	How many times you utilize ANC during your current pregnancy	_____times		
CO0 7	Where did you receive antenatal care for the current pregnancy?	Hospital		
		Healthcenter		
		Privatehospital /clinic		

		Other(Specif y)		
CO 08	Did you take folate/folic acid supplements during pregnancy	Yes		If no skip to CO9
		No		
CO 09	If yes, for how long	_____		
CO 10	How many times did you take TAT vaccine	_____		
CO 11	Was your BP checked during a visit	Yes		If no skip to CO13
		No		
CO 12	If yes, how was it?	Norma l		
		High		
		Low		
CO 13	During any of your prenatal care visits did a doctor, midwife , or other health care worker talk with you about any of the things listed below?	Yes		
	1. How drinking alcohol or smoking cigarettes during pregnancy could affect yourbaby	1		
	2. The signs and symptoms of preterm labor (labormore than 3 weeks before the baby isdue)	1		
	3. Signs of pregnancy Complications?	1		
	4. What to do if your labor startsearly	1		
	5. What to do for Pregnancycomplication	1		
	6. Getting tested for HIV (the virus that causesAIDS)	1		
	7. Where to go fordelivery	1		
	8. Post-natal period (for instance breastfeeding,nutrition, care for the child)?	1		
	9. Possible mood changes in the postnatalperiod?	1		
CO 14	During your current pregnancy, did the healthcare providers	yes		

	told you to bring your spouse's to prenatal care?	no	
CO 15	Did your spouse/partner came to health facility for antenatal care purpose during the current	yes	
		no	

	pregnancy?		
CO16	Do you have any medical conditions not related to pregnancy?	yes	1
		no	2
CO17	If yes, what is that?	cardiac	1
		UTI	2
		other specify.....	3
		No	2
CO18	Are you currently taking any prescribed medications?	Yes	1
		No	2
CO19	If yes, what are they and how much/often do you take them per day?	_____	
CO20	Is there any complication of current pregnancy	Yes	1
		No	2
CO21	If yes for Q CO20 , types of Complication?	GHPN	1
		GDM	2
		APH	3
		Severe anemia	4
		Other specify_____	5

Part IV: Labour and delivery

Hospital ID_____Study ID_____Address_____

- This information will be collected through interview of the women
- The information will be collected during labor and delivery using maternal chart review and, observation to be filled by trained midwives at the selected hospital

Code	Question	Categories		Skip
LD01	Where do you experience labor?	Home		
		Workplace		
		Health facility		
		Other specify		
LD02	Duration of labor before hospital admission (hours)	< 12		
		12 to24		
		24to<36		
		≥36		

LD03	Diagnosis at admission	Normal, uncomplicated labor		
		Preeclampsia		
		Fever		
		Abnormal bleeding		
		Dystocic labor		
		Fetal distress		
		Previous Cs		
		Other specify		
LD04	Danger Signs at Admission			
	HIV positive?	Yes		
		No		
	Bleeding?	Yes		
		No		
	Dizziness or blurry vision?	Yes		
		No		
	Decreased fetal movement?	Yes		
		No		
	Anemia diagnosed by pallor?	Yes		
		No		
LD05	Onset of labor	Spontaneous		
		Induction		
LD06	If the onset of labor is induction, what is the reason for induction	Pregnancy of $\geq 41+0$ wk		
		PROM		
		GHPN		
		Oligohydramnios		
		GDM		
		IUGR		
		Other specify_____		
LD07	Augmentation of labor	Yes		
		No		
LD08	Status of amniotic fluid	Clear (C)		
		Meconium stained(M)		
		Bloodstained (B)		
LD09	If meconium stain, Grade	I		
		II		
		III		
LD10	Presence of premature rupture of	Yes		
		No		

	membrane (PROM)			
LD11	If yes, the time of PROM		≥ 12 hours	
			< 12 hours	
LD12	Cervical dilatation admission in cm	dilatation	< 4	
			4-6	
			6-8	
			8-10	

		10 cm (complete dilatation)	5	
LD13	Cervical effacement	____%		
LD14	Station of presenting part at admission	_____		
LD15	Presentation	<u>Cephalic</u> ,	1	
		<u>Breech</u> ,	2	
		Face	3	
		Brow	4	
		<u>Shoulder</u>	5	
LD16	Position of presenting part	OA(occiput- anterior)	1	
		OP(occiput- posterior)	2	
		unknown	9 9	
LD17	Bishop score at the time of admission	_____		
LD18	Duration of labor after admission	_____hrs.		
LD19	Types of a mode of delivery for current pregnancy	SVD	1	If SVD, skip to LD20
		Operative vaginal delivery vacuum		
		Operative vaginal delivery forceps	2	
		CS a. Emergency CS b. ECS	3	
LD20	If OPVD, what is the indication	The prolonged second stage of labor	1	
		Poor maternal power	2	

		Maternal cardiac disease	3	
		Abnormal fetal heart rate pattern	4	
		Other specify	5	
LD21	If CS, what is the indication of CS	CPD	1	
		Maternal complication	2	
		PROM	3	
		Failure of induction	4	
		Delay the second stage of labor	5	
		Short birth interval with previous CS	6	
		Poor maternal power	7	
		Mal – presentation	8	
		MAS	9	
		Fetal distress	10	
		Non reassuring fetal heart rate	11	
		Big baby	12	
		No indication /maternal request	13	
		Doctors' suggestion	14	

		Other specify		
LD22	Do you referred from HC or hospital or private clinic	Yes		
		No		
LD23	If yes , from which health facility you comes from?	hospital		
		Health center		
		private clinic		
LD24	If yes, Travel time from HC/Hosp to referral / general hospital(minutes)	_____min		
LD25	Indications for the referral	CPD		
		Maternal complication		
		PROM		
		Failure of induction		
		Delay the second stage of labor		
		Short birth interval with previous CS		
		Poor maternal power		
		Mal –presentation		
		MAS		
		Fetal distress		
		Non reassuring fetal heart rate		
		Big baby		
		No indication /maternal request		
		Doctors’ suggestion		
		Other specify		
LD26	Qualification of Health Provider who assist the delivery	Obstetrics and gynecology		
		MSc in maternity nursing		
		BSC midwife		
		Diploma midwife		
		Resident student		
		Medical intern student		
		Other specify_____		

Part V: Birth outcome Form (check list)

- This form contained the immediate outcomes of the newborn after delivery,
- All listed information will be filled with in the first hour after delivery using standard tools through maternal and neonatal chart review by trained midwives at selected hospitals

Hospital Maternal ID _____ Study.ID _____ Neonatal Hospital ID Neonatal study ID _____

Address _____

Code	Questions	Categories		Skip
BO01	Gestational age	_____		
BO02	Sex	Male	1	
		Female	2	
BO03	Weight of the newborn	_____ gm.		
BO04	Height of the newborn	_____ cm		
BO05	Head circumference	_____ cm		
BO06	Chest circumference	_____ cm		
BO07	Newborn outcome	IUFD	1	If alive skip to BO08
		Stillbirth	2	
		Early neonatal death	3	
		Alive	4	
BO08	First min Apgar score	_____		
BO09	Five min Apgar score			
BO10	Delay in initiating and maintaining respiration (depression at birth)	Yes	1	
		No	2	
BO11	Birth asphyxia	Yes	1	
		No	2	
BO12	If yes, its severity	Mild	1	
		Moderate	2	
		Sever	3	
BO13	Presence of MAS	Yes	1	
		No	2	

BO14	If yes, what is its severity	Mild	1	
		Moderate	2	
		Sever	3	
BO15	Need respiratory support	Yes	1	
		No	2	
BO16	If yes ,	Mechanical	1	

		ventilation		
		CPAP	2	
		Oxygen flow	3	
		Endo-tracheal tube	4	
		Chest compression	5	
BO17	Birth trauma	Yes	1	
		No	2	
BO18	If yes, type birth trauma	Minor trauma ⁺	1	
		Major trauma ⁺⁺	2	
BO19	Congenital malformation	Yes	1	
		No	2	
BO20	If yes, type	Minor	1	
		Major	2	
BO21	Any evidence of jaundice in the new born baby in first 24hours of life, eg. yellow palms and soles at any age.	yes	1	
		no	2	
BO22	Prematurity	yes	1	
		no	2	
BO23	Sepsis	yes	1	
		no	2	
BO24	If yes , type	Early onset of Neonatal sepsis	1	
		Late onset of Neonatal sepsis	2	
BO25	RDS	Yes	1	
		No	2	

BO26	Anaemia	Yes	1	
		No	2	
BO37	Hypothermia	Yes	1	

		No	2	
BO28	Convulsion	Yes	1	
		No	2	
BO29	Breast feeding difficulty	Yes	1	
		No	2	
BO30	Newborn admitted to NICU	Yes	1	
		No	2	
BO31	If yes indication for the admission	Prematurity	1	
		Infection	2	
		Asphyxia	3	
		Congenital malformation	4	
		Hypothermia	5	
		Hypoglycemia	6	
		Jaundice	7	
		MAS	8	
		Feeding difficulty	9	
		Other(specify)	10	
BO32	Treatment given for the Newborn	Oxygen/resuscitation		
		Kangaroo mothercare(KMC)		
		Antibiotics		
		Glucose		
		Blood transfusion		
		Other(specify)		
				
BO33	Is the newborn developing additional problem other than the admitted reason	yes	1	
		no	2	

	while the newborn at NICU?			
BO34	If yes , specify the additional developed problem.....			

BO35	If treatment is given to the newborn baby, what was the treatment outcome?	Improved & discharged safely	1	
		Referred to other health facility	2	
		Left against medical advice	3	
		death	4	
BO36	Duration of Newborn hospital stay at NICU?	days		

Note:

Minor birth trauma* includes: cephalhaematoma, superficial bruising, and soft tissue injury

Major birth trauma;** bone fracture (clavicle and clavicle and femoral, skull fracture vertebral fracture)) and nerve injury

Minor congenital⁺ malformation, fixed fringes (sandctyl), extra fingers (polydactyl), club foot, congenital hip dislocation, umbilical hernia

Major congenital malformation⁺⁺, spinal Bifida, cleft palate, hydrocephalus

Part VI: Maternal outcome Form (check list)

- This form contained the immediate outcomes of the newborn after delivery,
 - All listed information will be filled with in the first hour after delivery using standard tools through maternal chart review by trained midwives at selected hospitals
- Hospital Maternal ID_____Study.ID_____Neonatal Hospital ID Neonatal study ID_____
- Address _____

Code	Questions	Categories	Skip
------	-----------	------------	------

MO01	Is the mother delivered at this health facility or referred to higher health facility?	Delivered at this facility	1	
		Referred to higher health facility	2	
MO02	If the mother is referred to higher health facility, what was the indication for referral? (more than one answer is possible)	Prolonged labour	1	
		Fetal distress	2	
		Previous cesarean section scar	3	
		Pre-eclampsia / eclampsia	4	
		Previous fistula history	5	

		Other(specify	6	
MO03	What was the delivery type/mode of delivery?	Spontaneous vaginal delivery/normal birth	1	
		Caesarean Section	2	
		Forceps delivery	3	
		Vacuum extraction	4	
MO04	If delivery was by Caesarean Section, what was the reason for operative delivery (More than one response is possible)	Breech presentation	1	
		Failure to progress in labor	2	
		Failure to deliver	3	
		Fetal malposition	4	
		Non-reassuring fetal heart rate	5	
		Placenta previa	6	
		Other, specify...	7	
MO05	What is the maternal status after delivery?	Stable	1	
		Unstable/deteriorated	2	
		Died	3	
MO06	If the mother is not alive, what was the main cause of death diagnosed?	PPH	1	
		Hypertensive disorder(specify)	2	
		Infectious disease diagnosis(Specify):.....	3	
		Other (specify)....	4	

MO07	Does the mother have Postpartum hemorrhage (PPH)?	yes	1	
		no	2	
MO08	Does the mother have Shock?	yes	1	
		no	2	
MO09	Does the mother undergone ICU	yes	1	

	admission?	no	2	
MO 10	Does the mother develop uterine rupture?	yes	1	
		no	2	
MO 11	Does the mother develop Puerperal sepsis	yes	1	
		no	2	
MO 12	Does the mother develop breast problem	Yes	1	
		no	2	
MO 13	If yes type of breast problem	Engorgement	1	
		Cracked nipple	2	
		Mastitis	3	
		Abscess	4	
MO 14	Does the mother develop Endometritis	yes	1	
		no	2	
MO 15	Does the mother develop Anaemia	yes	1	
		No	2	
MO 16	If yes for the above question ,her aneamic classification is	No anaemia(> 10.9 g/dl)	1	
		Mild anemia (Hb 10 to 10.9 g/dl)	2	
		Moderate anemia (Hb 7 to 9.9 g/dl)	3	
		Severe anemia (Hb less than 7 g/dl)	4	
		Very severe (Hb less than 4 g/dl).	5	
MO 17	Does the mother exposed for blood transfusion?	yes	1	
		No	2	
MO 18	If the mother develop other obstetrics complications, please			

	specify it..... (like puerperal psychosis)			
MO 19	Duration of hospital stay for vaginal birth(If she delivered by vaginally)	hours		
MO 20	Duration of hospital stay for CS birth(If she delivered by CS)	days		

Assessment form

Instruction: these assessment forms to be used by the data collectors for assessing the condition of the mother and to fill on the questioner

	sign and symptom	classification
	any one of the following 1. Sudden and profuse blood loss or persistent increase blood loss 2. Faintness 3. Dizziness 4. Palpitations/tachycardia	PPH
	a) Fever b) Shivering c). Abdominal pain d). Offensive vaginal discharge	puerperal sepsis

Part VII: Maternal stress level

Procedures for handling the data collection process

The interview will be conducted from those women who are experiencing an adverse fetal outcome other than fetal death after convincing and reach on consensus after the birth of the baby. The interview will be conducted after getting a voluntary consent from her and agreement of full participation. It will be conducted in the postnatal room by the midwives.

This tool was derived from literatures which were published in international journals. **Parental Stress Scale (PSS-NICU)**

Instructions: The questions in this scale ask you to rate each item, according to how stressful the situation described in each item was for you: 0 - No experience at all with the situation or phenomenon , 1- No stress ,2 - Mild stress ,3 - Fairly moderate stress ,4 -Very stressful ,5- Extreme stress. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

	Please indicate by circling from the likert scales	0 - No experience at all with the situation or phenomenon	1 not at all stressful	2 mild stressful	3 moderately stressful	4 very stressful	5 extremely stressful
Sight and Sound							
PSS01	Presence of monitor & equipment						
PSS02	Constant noises of monitor & equipment						
PSS03	Sudden noise of monitor alarm						
PSS04	Other sick babies in the room						
PSS05	Large number of nurses and doctors in the room						
PSS06	Having a ventilator to breathe for baby						
Looks and Behaviour							
PSS07	Presence of tubes and equipment on or near my baby						
PSS08	Seeing needles and tubes being put on my baby						

P S S O 9	Unusual color of my baby (yellow/pale)						
P S S 1 0	Small size of my baby						
P S S 1 1	Wrinkled appearance of my						

	baby						
P S S 1 2	Baby fed by tube or intravenous line						
P S S 1 3	The limp or weak appearance of my baby						
P S S 1 4	Baby not crying like other babies						
P S S 1 5	Jerky movements of my baby						
P S S 1 6	Seeing my baby in pain						
P S S 1 7	Seeing my baby looking sick						
Parental role alteration							
P S S 1 8	Being separated from my baby						
P S S 1 9	Not feeding my baby myself						
P S S	Not being able to care for my baby						

2 0	myself						
P S S 2 1	Not being able to hold my baby when I want						
P S S 2 2	Feeling helpless and unable to protect my baby from painful						

	procedures						
P S S 2 3	Feeling helpless about how to help my baby during this time.						
P S S 2 4	Not having time to be along with my baby						
P S S 2 5	Sometimes forgetting what my baby looks like						
P S S 2 6	Not being able to share my baby with other family members						
P S S 2 7	Feeling that staff is closer to my baby						
Staff behaviour and communication							
P S S 2 8	Staff explaining things too fast						
P S S 2 9	Words I don't understand						

P S S 3 0	Not enough information about tests and treatments						
P S S 3 1	Not talking enough to me						

P S S 3 2	Too many different staff talking to me						
P S S 3 3	Not sure about the changes in the baby						
P S S 3 4	Staff looking worried about infant or not understanding						

Part VIII: Coping Mechanism Form

Procedures for handling the data collection process

The interview will be conducted from those women who are experiencing a perinatal death or gross congenital malformations one month later of the occurrence of the problem at her home after convincing and reach on consensus before she left the hospital immediately after the occurrence of the problem .The interview will be conducted after getting a voluntary consent from her and agreement of full participation. It will be conducted in her private class or any place based on her preference.

This tool was derived based on the concepts incorporated under multicultural model of coping after pregnancy loss .

Part I. Socio-demographic characteristics of the mother

NB: Infact the socio-demographic factor will be collected during her admission of labour and delivery, and we can collect for the second time since may be the data collector is new for qualitative data collection and easy to manipulate the data collection process.

	Questionnaire	Coding categories		
	Age	Age in years _		
	Religion	Muslim		
		Orthodox		
		Protestant		
		Others specify _____		
	Marital status	Single		
		Married and living together		
		Married but not living together		
		Divorced		
		Widowed		
	Ethnicity	Oromo		
		Amhara		
		Harari		
		Gurage		
		Others ----- ----		
		Unable to read & write		
	Educational status	Read and write only		
		1-4 Grade		
		5-8 Grade		
		9-12 grade,		
		Diploma		

		Degree and above		
	Occupational status	Government employed		
		Private employed		
		NGO employed		
		Day laborer		
		Self-employed		

		Housewife		
		Others-----		

Part II; Maternal characteristics

	Parity	_____	
	type of adverse perinatal outcome she may experience	1.stillbirth 2.newborn death 3.gross congenital malformation	
	Had you faced similar problem in your previous pregnancies?	1.Yes 0.No	
	The current mode of delivery	1. SVD 2. Operative vaginal delivery 3. ECS 4. Emergency CS	

Part IV; Guide questions (developed based on multicultural model of coping)

	Guide question for mothers who experience an adverse perinatal outcome	
	inert feeling	1. What did the loss of your pregnancy (baby) mean to you? and How did you feel it?
	Self-means	2. What inner resource did you use as a coping strategies?
	Self-means	3. What has helped you the most in dealing with your feelings(eg. Not want to meet your friends especially having babies , engage in busy life ,not want to go public places etc <u>probe:</u> Who/what helped you to feel better?
	Other-means	4. Do you need help from someone to advice or convince you?

	Religious coping	5. Do you have religious or spiritual beliefs or values? What are the major ones? How do these beliefs or values influence your behavior during stressful situations? How do you express your involvement in religious practices?
	Religious coping	6. Do you participate in religious or spiritual practices? What are the most frequent ones? How do these practices influence your behavior during stressful situations? How

		do you express your involvement for religious involvement?
	Religious coping	7. Do you think this problem was resulted due to God/Allah will and having a reason for this problem?
	Other means	8. From whom did you share experience of coping mainly? What kind of stories did you share?
	Other means	9. How do you usually handle stressful situations (e.g., talking to others or working it out by yourself)? What specifically do you usually say or do?
	Other means	10. When in a stressful situation and you talk to others, are they willing to listen to your concerns?
	Other means	11. What has helped you the most in dealing with your feelings and responses, from immediately after the loss until now?
	Disconnect edness	12. Are you engage in behavioral malpractices and were not involved in your previous history before the occurrence of this problem?(Like chewing khat ,taking alcohol , smoking shisha)
	social impact	13. What kind of social problem have you faced following the current adverse perinatal outcome?
	Inert factor	14. Following this adverse outcome , what inert factor that may disturbed you not to be stable ? (like feeling of guilty ,thinking herself as cursed ,am not luckiest person etc)
	closing	15. Is there anything else you would like to add?

Thank you very much for taking the time to answer!

Amharic Version of questioner

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Code	Questions	Categories		Skip
CO01	□□□□□ □□ □□□ □□□ □□		1	If no, skip C003
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CO02	□□ □□□ □□ □□	□□/□□/□□□		
CO03	□□□ □□□ □□□ □□	_____, □□		
CO04	□□□□□□ □□□□ □□□	□□	1	If no skip to CO7
		□□	0	
CO05	□□ □□□ □□ □□ □□□□□□	□□□□□□ □□□□□□	1	
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CO06	□□ □□□ □□ □□□□ □□□□□□	_____, □□		
CO07	□□ □□□ □□□□□ □□□□	1. □□□□□		
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CO08	□□□ □□□□□ □□ □□□ □□□	□□	1	If no skip to CO9
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CO09	□□□□□□□□□□□□	_____		
CO10	□□□□□ □□□ □□□□ □□□ □□	_____		
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CO11	□□□□□□ □□□□ □□□	Yes	1	If no skip to CO12
	□□□□□□□ □□□□□?	No	0	
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CO12		□□□□□		
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CO16	□□□□□□□ □□□□□□□ □□□□ □□□□	□□	1	
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CO17	□□ □□□□□□□ □□□□□□□ □□□□□	1.□□□□ 2.□□□□□ □□□□ □□□□□□□		
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CO18	□□□□ □□□□□□□□ □□□□□□	□□	1	If no skip to CO19
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C020	□□□□ □□□□□□ □□ □□□□□□ □□□□	□□	1	
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CO21	□□ □□□□□□□□ □□	□□□□□□□ □□□□□□	1	
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Code	Question	Categories	Skip
LD01	□□ □□ □□ □□□□□	□□□	1
		□□ □□	2
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LD02	□□ □□□□□ □□□□□□	< 12	1
	□□□ □□□ □□□ □□(	12 to24	2
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		≥36	4
LD22	□□□ □□□□ □□ □□□□□	1.□□	
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LD23	□□ □□□ □□□□ □□□ □□□	1.□□□□□□	
		2.□□ □□□	
		3.□□□ □□□□	
LD24	□□□□□□ □□□ □□□	Å□□/□□□	

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Oromifa Version of Questionnaire

Kutaa I; Hawaas-dimoogiraafii

Hospital Maternal ID ----- Study ID.No-----Address-----Tel-----

Code	Gaaffii	Deebii	
SD01	Umurii.	waggaadhaan _____ .	
SD02	Magaalaa	Magaalaa	1
		Baadiyyaa	2
SD03	Teessoo ammaa	_____	
SD04	Aanaa	_____	
SD06	Amantii	Ortodoksii	1
		Muslima	2
		Ortodoksii	3
		Biroo -----	4
SD07	Haala Gaa'elaa	Hin Heerumne	1
		Dubartii	2
		Manaa irraadu' ekan	3
		Walhii kan heerumte	4
SD08	Ishee keessatti	Oromoo	1
		Amara	2
		Harari	3
		Gurage	4
		Biroo	5
SD09	Haala barnoota	Dubbisuu fi barreessuu dadhabuu	1
		kutaa 1ffaa-4ffaa kutaa	2
		5-8ffaa kutaa	3
		9-12ffaa	4
		Dippiloomaa	5
		Dippiloomaa ol	6
SD10	Haala hojii	Hojjetaa mootummaa	1
		Hojjetaa dhaabbata dhuunfaa	2

	Hojjetaa dhaab bileemiti mootummaa	3
	Hojjetaa guyyaa	4
	Dhuunfaa hojjechuu	5
	Haadh amanaa	6
	Kan biraa-----	7

Kutaa 2ffaa: Indeeksii qabeenya ilaalchisee

SD11	Dhugaatii guddaan kan keenya	Bishaan roobaa	1
		Bishaan gubbaa (laga, haroo, bishaan kuufamaa).	2
		dallaa	3
		Miidhaa haguugame	4
		Hin sodaatin	5
		Miidhaa hinhaguugamne	6
		Alaa manaa irraa	7
		Boombuaa keessaa	8
		Kan biraa.....	
SD12	Bishaan dhugaatii akkamitti calaltu?	Taa'anii akka qabbanaa'u eeguu	1
		Filtara bishaan aduu	2
		(cirracha, asheetta, charcoal) fayyadamuu	3
		Dhuunfaa dhaan	4
		Kilooriin itti dabalu dhaan	5
		Bilcheessuun	6
		Kan biraa	
SD13	Bishaan deebifa chuuf daqiiqaa meeqa fudhata?	☐ ☐ daqiiqaa	
		An hinbeeku	99
SD14	Gosa mana fincaanii itti fayyadamtan	Meedaali yaa irratti	1
		Mana fincaanii aadaa	2

		Mana fincaanii fooyya'aa qilleensa keessa galchu	3
		Mana fincaanii bishaan bahuqabu	4
		Kan biraa	
SD15	Fayya dama humnaa akkamii irra caalaa fayyadamta?	Uumama bineensotaa	1
		Muka/qorqorroo/bosona/marga/	2
		Dhagaa boba'aa	3
		Gaazii adii	4
		Baayoo gaazii humna	5
		Siliin darii keessa jiru	6
		ibsaa	7
		Kan biraa	
		Nyaata hin bilcheessinu	79
SD16	Baay'ee eessattin yaa tabilcheessita?	mana keessatti	1
		Mana adda bahee (kitchen) keessatti	2
		muukaa	3
		Kan biraa	
SD17	Kanneen armaan gadii keessa akamtuman akeessa jira?		jiraa Hin jiru
	SD 16.1	Raadiyoo	1 0
	SD 16.2	Televijiinii	1 0
	SD 16.3	Elektirikii	1 0
	SD 16.4	LafaLafaa/Mobaayila	1 0
	SD 16.5	Fridge	1 0
	SD 16.6	Elektirikii mitadii	1 0
	SD 16.7	Kuraz/Fantaa	1 0
	SD 16.8	Siree firaashasuufii/ispoonjii/birra aqabu	1 0

	SD 16.9	Min jaala	1	0
	SD 16.10	barcuma	1	0
	SD 16.11	Dhuunfaa	1	0
	SD 16.12	Biskileetii dhuunfaa?	1	0
	SD 16.13	Mootarsaayikilii?	1	0
	SD 16.14	Konkolaataa moo tiraaktara?	1	0
SD18	Lafa qonnaa hektaara meeqa qabda?		hektaara	
			Lafa qonnaa hinqabnu	89
SD19	Bineensota mana a armaan gadittitarreeff aman keessaa meeqa qabda?		Deebii	lakk
			a) re'ee/re'ee	
			b) gaanfabiraa	
			c) Farda	
			d) Harree	
			e) Gaala	
			f) Gaala	
			g) Re'ee	
			h) Hoolaa	
			g) lokoo	
			ikan Yen	
			j) Bineensa manaa hin qabnu	89
SD20	Manni kun kutaa ciisichaam eeqaqaba?		Lakkoofsa manaa	
SD21	Maatii keessaan amni herrega baankii qabu jiraa?		Eeyyee	1
			Lakki	0

Kutaa 3ffaa: Amala dubartootaa ilaalchisee

Code	Questions	Eeyyee	Lakki
SD22	Tamboo nixuuxaa?(sigaaraa ykn hookkaa) .	1	0
SD23	Ji'oota 3n darban keessan amatam booxuuxu ture	1	0
SD24	Amma tam booxuuxa	1	0
SD25	Dhugaatii dhug deebiektaa?	1	0
SD26	Ji'oota 3n darban keessa dhugaatii dhugdee?	1	0
SD27	Amma dhugaa jirtaa	1	0
SD28	Mi'aakhata beektuu?	1	0
SD29	Ji'oota 3n darban keessatti dhan dhamtaniittu	1	0
SD30	Amma gaarii jirtaa?	1	0

Kutaa 4: Iskeelii Dhiphina Xiin-sammuu (K10)

Iskeeliin Dhiphina Xiin-sammuu Kesler (K10) [K10] safartuu salphaa dhiphinas ammuuti. Iskeeliin K10

Gaa ffilee 10 haala miiraa irratti kan of keessaa qabuyoota'u, tokkoon tokkoo nisaanii deebii qabxii shanqabu. Iskeelichi

Hamma dhiphinasaa naamurt eessuu fakkaiskiriinii gabaabaata'eeho jjeta. Meeshaan kun dhukkubsattootaa fken namuu danda'a, ykn gaaffii wwan filannoota'an hakiimaan dhukkubsataaf dubbi suudanda'u; n Haala bulchiinsa miidhaa nirragahe keessatti, safar tuun kun bakka fayyuun hindanda'amnetti (fakkeenyaaf, torbana furhangaja'akeessatti)

Dhukkubsataaf kennamuu kan danda'u yoota'u, yeroo yeroon gamaaggamuu ykn gara dhaabbilee fayyaa ispeeshaalistii kan akka ogeessaxiin-sammuutti erguun barbaachisaata'uu isaa ibsuu danda'a. Gaaffii sadii fi ja'agaaf fiikana anduraa "gonkumaa" jedhuuf deebii kennuu dhaan. Yeroo haalli akkasii uumamu gaaffiin sadiiykn ja'aofu maisaan iitiin bu'aa arga chuuqabu. Qajeelfama Tokkoon tokkoon gaaffii 'yeroo' tokko irraa hanga 'yeroo' shanittilakk aa'ama. Kanaaf gaaffilee 10 keessaa baay'een

Walumaa galatti qabxii 50 kennuu dhaanqa bxiixiqqaan 10 fi qabxii guddaa 50 kennuu dhaan.

Qabxiin gadi aanaan dhiphinasammuu sadarkaa gadi aanaa kanagarsii suyoota'uqa bxiinola aanaan ammo dhiphinasammuu dardara olaanaa garsiisa.

Hiik kaabu'aa bara 2001. Qoran noon Fayyaa Uummata Wolverine [2] qabxii kutaa (cutoff) kan akka qajeelfa maatti fayya damuu danda'ukan

Dhiphinasam muusa katta'uuf mirkaneesse. Isaan kun armaanga dittitarreef famaniiru -

Qabxii K10 Carraa dhukkubasammuu (dhiphinasammuu)

10 - 19 Gaariita'uu danda'a

20 - 24 Hanqina fayyaa giddugaleessaa qabaachuu danda'a

25 - 29 Hanqina fayyaa giddugaleessaa qabaachuu danda'a

30 - 50 Hanqina fayyaa cimaa qabaachuu danda'a

Meedeebiisirriita'eagarsiisaa-

Yeroo	Yeroo	Yerooto	Yeroo	Al
Hunda	baayye	kkotokk	muraas	tokk
a	e	o	a	omit
(Qabxi	(qabxii	(qabxii	(qabxii	i
i 5)	4)	3)	2) .	(qab
				xii
				1)

A01 1. Torban 4 darban keessatti yeroo meeqa
sababamaleeda dhabbiin sitti dhaga'ame?

A02 2. Torban 4 darban keessatti yeroo meeqa
yaaddoon sitti dhaga'ame?

A03 3. Torban 4 darban keessatti yeroo meeqaakka
malee dhiphattee homaagochuuda dhab
deeammaltee boqonnaa dhabde?

A04 4. Torban 4 darban keessatti yeroo meeqaa bdii
kutan naa sitti dhaga'ame?

A05 5. Torban 4 darban keessatti yeroo meeqa jee
qame era?

A06 6. Torban 4 darban keessatti yeroo meeqa
taa'uun baay'ee sitti ulfaate?

A07 7. Torban 4 darban keessatti yeroo meeqa
dhiphinni simudate?

A08 8. Torban 4 darban keessatti yeroo meeqa
waanhundumaaf carraaqqii akka goote sitti
dhaga'ame?

A09 9. Torban darban keessatti yeroo hammamiif
akkamalee gadditee wanti sigamma chiisuhin
dandeenye?

A10 10. Torban 4 darban keessatti yeroo meeqa gatii
akkahin qabnesitti dhaga'ame?

Kutaa 5: Qajeelfama Iskeelii Dhiphina Dhiphina

: Gaaffiiwwan iskeelii kana keessa jiran waa'ee miiraa fi yaada ji'oota muraasa darban keessa qabdan sigaafatu
.Haala tokkoon tokkoon isaa irratti yeroo meeqaakkasitti dhaga' amey knakkayaad deakka marsitusi gaafatama.
Sadarkaan kan kenname iskeelii Likert qabxii 5 qabuun yoo ta'u,

0 = gon kumaa, 1 = almost, 2 = yeroo tokko tokko, 3 = yeroo baay'ee, 4 = yeroo baay'ee.

Mee deebiisirriita'eagarsiisaa	Yero	Yeroo	Yeroo	Yeroo	Al
ati -	o	baayy	tokkotokk	muraa	tokko
	Hund	ee	o(Qabxii	sa(Qa	miti(Q
	aa	(Qabx	3)	bxii 2)	abxii
	(Qab	ii 4)			1)
	xii 5)				

PS Ji'a darbe keessa yeroo meeqa waan hinee

01 gamney knhinee gamneen mufatte?

PS Ji'a darbe keessa baay'ee waan mufatteef

02 wantoota jireen yakee keessatti
barbaachisoota'an illeeto' achuu dadhabdee?

PS Ji'a darbe keessa yeroo meeqa

03 gaarummaa/gaarummaa namoota biro irraa
argatte?

PS . Ji'a darbe keessa yeroo meeqa boqonnaa

04 dhabuun ykn yaaddoon sitti dhaga'ame?

PS Rakkoo dhuunfa akee kan baatii darbe mudate

05 furuuf dandeettii qabdu akkamittii bsita?

PS Wantoonni badaan ji'a darbemudatan hundi
06 akka tiyaaddett imilkaa'an iiru?
PS Ji'a darbe kaayyoo gaariiirratti hirmaachuu fi
07 deggeruuf carra an keessan hangamture?
PS Haal aji' ada rbe keessa waanati dandama
08 chuuhin dandeen yoqabaatte, amma garuu
dandama chuuhin dandeenye akkamittii bsita?
PS Ji'a darbe keessa yeroo meeqa namoota
09 biroof gara laafessa/garalaafin aargite jettee
yaadda?
PS Ji'a darbeaarii jireenya keekeessatti simudate
10 akkamittit o'achuu akka dandeeze akkamittii
bsita?
PS Taatee wwanji' ada rbemu datan kanneento'
11 annaa keessan ala ta'an kamiyyuu akkamittii
bsita?
PS Taatee wwanji' adarbesababa wantootato'
12 anna akee ala ta'an iinsimu fachiisan
akkamittii bsita?
PS Ji'a darbe addunyaa kanarratti hojiin gaariin
13 baay'een akkahojjetam eniamantaa?
PS Ji'a darbe keessa rakkoon baay'ee waan
14 kuufamee firraa anuuda dhabejettanii yaaddu?

Kutaan 6ffaana deeggar samichuu ilaallata

No	Gaaffii wwan gaaffilee 8 irratti hun daa'uun iskeeliiTumsaa fi	Cimseewalii gala	ani walii gala	Ani waliihin galu	Ani cimsee waliihingalu
----	--	---------------------	-------------------	----------------------	----------------------------

Deeggarsa keessatti

hammataman

PaS01 Haati manaa koo nama
deeggarsamaa lla qaana
barbaachisu argachuuf
amanamuu danda'uu dha.

PaS 02 Hiriyaan koon ama ani
waa'ee wantoo tanaaf
barbaachisoota' ani
fattihaasa uu danda'uu dha

PaS 03 Haati manaa koo namana
jaallatuu dha

PaS 04 Haati manaa koo namamu
caakoo kunuun suunna gar
gaaru dha

PaS 05 Hiriyaan koo namam
iirakoo hubatu dha

PaS 06 Hiriyaan koo namana
haasofsii seeyeroon awaliin
dabarsu dha

PaS 07 Hiriyaan koo nama ani
amanachuu danda'uu dha

PaS 08 Hiriyaan koo namawaanna
waliin hojjetu dha(Murtii
keessattin ahirmaa chisa)

Kutaa 7: Dhiibbaa karaa hiriya dhiyoo

koodii	Gosoota	Gaaffii koodii		
PV01	Hiriyaan gaa'elaa/abbaan manaakee bara jireen yakee keessatti simii dheebbe kaa?(qaama/xiin-sammuu/saal qunnamtii) .	1.Eeyyee 2.Lakki		
PV02	Hiriyaan gaa' elaa/abbaan manaakee yeroo ulfaamma jirtu simii dheebbe kaa?	Xiin-sammuu	1.Eeyyee	2.Lakki
		1. Dur of arra bsay knmiir ahamaasitti dhagahama ture		
		2.Namoota biro fuulduratti tuffii yknsal phinaan socho'aa ture		
		3.Silaa itti yaadee si doorsisa ture		
		4.Hiriyyoota/maatii kee akka hingaafannesi doorsise		
PV03	Yoomii dhaa qaamaa irra gahe, Hiriyaan gaa'ela akee:	.1.Eeyyee		2.Lakki
	1. Si rukuteey kn waan si miidhu si darbatee beekaa?			
	2. Si dhiibeey kn rifeen sake harkisee beekaa?			
	3. Waan simii dhuu danda'uun rukutameey kn rukutamee beektaa?			
	4. Yeroo ulfaa garaakee fiigichaan ykn waan biraatiin sitti dhagahamee?			
	5. Itti yaadee si ciniineeykn si gubee beekaa?			
	6. Itti yaadee qawwee, cilee ykn meeshaa waraan aakan biraatiin si doorsisee beekaa?			

PV04	Hiriyaa gaa'ela akee irrattimiidhaa saalaa raawwachuu .	.1.Eeyyee	2.Lakki
	1. Wal qunnamtii saalaa akkaraa wwattu sidir qisiisee?		
	2. Sababa soda hiriyaa gaa'ela akeetiin fedhii keetiin ala walqunnamtii saalaa raawwattee?		
	3. Kabaja guddaaosooosii fhin kenning dirqiin walqunnamtii saalaasigo dheer?		

Kutaa IV: Haala ulfaa kan darbee fi gadame essa waliin wal qabatu

- Gaaffiwwan kun Haala ulfaa kan darbee fi ga dameessa waliin walqabatu qo' achuuf qophaa' ani dha.

ID hadha hospitaal ----- ID.qorono -----tesso -----Tel-----

Koodii	Gaaffii	Filannoo	Gara itti aanutti darbuuf
PO01	Yeroo meeqa faa ulfoofte?	_____	
PO02	Ijoollee meeqa qabada kan baatii booda sirraa bahe waliin	_____	
PO03	Ilmoo kan dura haala kamiin deesse	Karaa hula gadameessaa	1
		Baqags anii (Rakkoo waan tureey knfi lannoo kiyyan)	2
		Gar gaarsa meesha ada' umsaan (VD or FD)	3
PO04	Ulfa kana eessatti da'uu barbaadda	Hospitaala	1
		Buufata Fayyaa	2

		Mana	3	
PO05	Kanaan dura sabani baqaqf attee dhalttef nijiraa?	Eeyyee	1	Lakkiy oota'e gara gaaffii PO13 darbi
		Lakki	0	
PO06	Eeyyee yoo jatte yeroo meeqaf?	Tokko	1	
		Lama	2	
		Sadii	3	
		Afoor	4	
PO07	Kanaan dura kan baqa qsattee deesseeess atti?	Hospitaala reiferaalaa	1	
		Hospitaala waliigalaa	2	
		Hospitaala sadarkaaAanaa	3	
PO08	Gosabaqaqsaniidhalchisuu	Baqaq sanii dhalchiisuu yaaliihatattamaa	1	
		Fedhaan	2	
PO9	Sababa baqa sanii ddeess isaniif	Ciniinsuu yeroon dhumuu diduu	1	
		Hullaanga dameessa fi mucaan walsimuu didu	2	
		Hulaanga ameessaa banamuudi duuu	3	
		Mucaan gadisosso'uu diduu	4	
		Kanaan duras baqaq fattee waan deesseef	5	
		Dhiibbaa dhiigaaa yeroo ulfaa	6	
		Mucaan karaa hudduu dhufuu	7	

		Daa'ima lama fi isaa olgaraattti baachuu	8	
		Ciniinsuuda wwaan calqabamehogguu addaan cit	9	
		Mucaan karaa sirriihin taaneen gara hula gadameessaa dhu fuu(Hudduuna latti)	10	
		Rakkoo obbaatii waliin wal qabatu	11	
		Sababni hin turre?Filannoo haaad haati	12	
		Kan biraaibsi	13	
		Hinbeekamu	79	
PO10	Haala mucaa kanaan dura baqaqsanii yaaluun dhalate	Lubbuu njira	1	
		Hoggusu du'e	2	
		Guyyaa muraasa booda du'e	3	
PO11	Erga baqaq satte edeessee ciniinsuun deessee beektaa?	Eeyyee	1	
		Lakki	0	
PO12	Eeyyeeyoota'ebu'aanisaa akkam ture	Milkaa 'era	1	
		Hin milkoofne	2	
PO13	Osoo baqaqsattee hindhaliin dura ciniinsuu qofaan deessee?	Eeyyee	1	
		Lakki	0	
PO14	Eeyyeeyoota'e hangam	_____		
PO15	Ulfisirraa ba'eeni beeka?	eyyee	1	
		Lakki	0	
PO16	Eeyyeeyoota'ehaala kamiin?	Ofiisaan	1	
		Dhiibbaa dhaaan	2	
PO17		Eeyyee	1	

	Mucaaa kana dura dhalatee waliin yeroo ulfa arakkoon ture eraa?	Lakki	0	
PO18	Eeyyeeyoota'ekannee narmaan ga diikeessaa kami?	Yeroo ulfaa baatii 7 boo dahiigni ba'uu	1	
		Dhiibbaa dhiigaa ulfa waliin walqabatu	2	
		Dhukkuba sukkaa raaulfa waliin walqabatu	3	
		Hanqina dhiigaa	4	
		Kan biraa yoo jiraate ibsi		
PO19	Da'umsa ulfa kan dura arratti ciniinsuun dura bishaan bubbeesirraa yaa'ee?	Eeyyee	1	
		Lakki	0	
PO20	Osoo baatii sagal hinguutiin daa'ima deessee ttaa?	Eeyyee	1	
		Lakki	0	
PO21	Mucaan akkuma dha lateen du' ejiraa?	Eeyyee	1	
		Lakki	0	
PO22	Mucaan dhalatee guyyoo amuraa saboo dadu'ejiraa?	Eeyyee	1	
		Lakki	0	
PO23	Du'amsikee waggaa meeqa walirraa fagaata	waggaa_____		
PO24	Yookan aan dura baqa qsattee deeseta' egara agarummaa waggaa meeqaa gidduutti dha	waggaa_____		

Kutaa V-Ulfa ammaa waliin kan walqabatu:

ID hadha hospitaal ----- ID.qorono -----Tesso -----Tel-----

Code	Questions	Categories		Skip
CO01		Eeyyee	1	

	Guyyaa marsaa lagu keekand humaaitti dhaabbate niyaa dattaa?	Lakki	0	Lakkiyoota' egara CO03 darbi
CO02	If yes, what is your end maturation date of current pregnancy	Month/Day/Year		
CO03	Ulfi keeji'ameeqa	Ji'a _____		
CO04	Hangaturtiulfaaaltraasawundiin	Torban_____		
CO05	Akkaa taaarmaa noliinu lfikun turban meeqa	Torban_____		
CO06	Ulfakan aafhor doffiulfaa da' umsa duraataasistee?	Eeyyee	1	Lakkiyoota' egara CO13 darbi
		Lakki	0	
CO07	Eeyyeeyoota' eyoo meegalte	Batii sadii dura	1	
		Baatii 3-6	2	
		Baatii 6 booda	3	
CO08	Ulfa kanaa fyeroomee qahorof fiigoote	Yeroo_____		
CO09	Yeroohordoffiigootu Folic acid?kiniinifudhattee?	Eeyyee	1	Lakki yoota'egara CO10 darbi
		Lakki	0	
CO10	Eeyyeeyota'eyeroohangamiif	_____		
CO11	Kittaa batii(TAT) yeroo hordoffii tara meeqa fudhate	_____		
CO12	Yeroo hordoffii gootu dhiibbaa dhiigaa kee ilaalamtee?	Eeyyee	1	Lakki yoota'egara CO14 darbi
		Lakki	0	
CO13	Eeyyeeyoota'emaal ture?	Sirrii(normal)		
		Olka'aa		
		Gadibu'aa		
CO14	Osoo hinulfaa'in dura ulfaatinni keehangam ture	_____Kg		

CO15	Ulfa kana boodaulf aatinni keeda baleraa?	Eeyyee	1	Lakki yoota'egara CO17 darbi
		Lakki	0	
CO16	Eeyyee yoo ta'e Kg meeqa?	_____Kg		
CO17	Ulfaa ti naammaa	_____Kg		
CO18	Dhee rina kan ammaa	_____Cm		
CO19	Rakkoo fayyaa kanulfa waliin wal hinqabnee qabdaa?	Eeyyee	1	
		Lakki	0	
CO20	Yerooammaorichafudhacahaajirtuqab daa?	Eeyyee	1	Lakki yoo jette gara CO22 darbi
		Lakki	0	
C021	Eeyyee yo ta'emaali? Yeroo kam fudhatta?	_____		
C022	Ulfa kanaan walqabateera kkoon jiraa?	Yes	1	
		No	0	
C023	Eeyyeeyoo ta'e kami?	Dhiibbaa dhiigaa ulfa waliin walqabatu	1	
		Dhibbee sukkaa raulfa waliin walqabatu	2	
		Dhigni karaa qaanas alaaa baatii torba booda dhan gala'uu	3	
		Hanqina hiigaa	4	
		Kan biraa ibsi_____	5	

KutaaIII;Gaaffii wwan qaje elfamaa

Code	Question	Categories	Skip
LD01	Da'umsaeessaa jalqabde?	mana keessatti	1
		Bakka hojii	2
		Dhaabbata fayyaa	3
		Kan biraa yoo jiraate ibsaa	4

LD02	Hospitaala dhu fuukee dura	< 12	1
	yeroo hangamii fudhate?	12 to24	2
		24to<36	3
		≥36	4
LD22	Ati akka reefer dhufte	1. Eeyyee	
		2. Lakki	
LD23	Yoo eeyyeeta'e deebiin	1.hospitaala irraa	
	keeeessaa ture?	2.buufata fayyaa	
		3.kilinika dhuunfaa irraa	
LD24	Hamma yeroo sifu dhate	deqeaa/sa'a	
KutaaIII;Gaaffii wwan qajeel fama			
Gaaffii qajeelfama haa dholii			
1	Ofitti carraaqqii	1. Rakkoo kana dubbachuuf carraaqqii keessoo hangamii goote	
2	Ofitti carraaqqii	2. Maal gochaa turtee dagachuuf yaaltu?	
3	Gargaarsan amoota biro tiin	3. Gorsa ykn gargaarsin amoota biroo si barbaachise	
4	Amantiiy knamantaan gargaaraa	4. Amantiiyknafuuraaykngatiiniqabdaa?	
5	Amantiiy knamantaan gargaaraa	Hirmaannaa keeso chii amantii keessatti akkamitti ibsama? Muuxannoo wwan kunmiiraa mmakeessa jirtukeessaaak Kabaatusi gargaarajetteey aaddaa?	
6	Amantiiy kn amantaan gargaaraa	Uumaan sababa qabaatee, wanti akkanaa kkata'u Godhesitti fakkaataa?Yoo akkasta' eakka mitti?	
7	Gargaarsan amoota birootiin	7.Gargaarsa namoota biro tiin kan jajjabeeffamte yoo ta'e, eenyutu caalaatti siif qoode? Muuxannoo/ seenaa dhuunfaa kkamii qooddan?	
8	Gargaarsan amoota birootiin	8.Yeroo baay'ee miiraga ddaa/yaaddoo keessa jirtutti, miiraakk asiikeessaa ba'uuf mala akkamii fayyadamta?	
9	Gargaarsan amoota birootiin	9.Miira gaddaa/yaaddoo akkasiin amoota biroof yommuu himan, isaan fedhii dhaansi dhaggeeffatuu? Sigaar gaaruuf qophiidhaa? Gorsi atii saan irraaargatte faayidaa qaba jettee yaaddaa?	

- 10
Karaan jajjabina itti argannu kan biraa

10.Yeroo haalli mucaa keessan iimii rahamaa sanahun dakeessaa bahee kaasee maaltu baay'ee na gargaare jettanii yaaddu?
- 11
Jijjiiramaa mal ajajja beessuu da dhabuun dhufu

11. Rakkoon kuno soo hinuumamin dura seenaa keessatti amala badaahin turre kanammamu datemaali?(akka alkoolii dhuguu, sigaaraa xuuxuu, hookaa fi kkf)

Somali language version of questioner

Foomka Dhaqaale-Bulshe edka

- Dukumeenti gani waxauusoo bandhigayaa fikra dahasu'aa shaguu dee ka hadlay sasi fooyin kabulsha daiy oxaa laddadhaqaa leee ka qayb galayaasha.
- Si loo qiimeeyo xaalad dadha qaale, sahanka EDHS ayaa la istic maalaa.Macluumaa dka waxaa laururin doonaa ka dib marka la helofoom kaoggo laanshaha.
- Waxoogaaxog ah ookuhab boonayaa la qaadayaa xilliga foosha, su'aasha inteeda kale ayaa loo baahanyahay,sidasu'aa ldha qaale, taasoo ay way diiyaanum ulisoo yenta babaran ka dib

Taariikhda

Wareysiga.....

.....Qaybta Kowaad: Cinwaan kaMagaca gobolka/ degma daaad kunoosha hay.....Waa maxayqa ybtamagaalada /miyigae deegaankaaga? Miyiga Magaala da Sheegmaga cagobol kaaga?.....Codeka Maga caHoo yada Aqoon siga Hooyadaee Isbitaalka ----- Aqoonsiga Waxbarasho .Maya --- Ciwaanka ----- ---Tele-----

7.16. Socio_demographic in somali

Qaybi: Tira dadadka

kodh	Su’aalo	Noocyada kodhasha	
SD01	Da’ada	Da’da iyo Sanadka _____	
SD02	Daganaanshaha	Magaalo	1
		Miyi	2
SD03	Karoch Cinwaanka	_____	
SD04	Dagamada	_____	
SD06	Diinta	Islaam	1
		Ortodhoko	2
		Protestant	3
		Kuwa kale cadee haday jirto -----	4
		-	
SD07	Xaaladda guurka ee hadda	Aan guursan	1
		Is guursaday oo wadaa nool	2
		Is guursaday lakin aan wadaa noolayn	3
		Kala tagay	4
		Carmali	5

SD08	Qawmiyada	Oromo	1
		Amhara	2
		Harari	3
		Gurage	4
		Kuwa kale -----	5
SD09	Xaaladda waxbarasho	Waxna qorin waxna akhrin	1
		1-4 Fasalka	2
		5-8 Fasalka	3
		9-12 Fasalka	4
		Diploma	5
		Degree iyo wixii ka saraysa	6
SD10	Shaqada	Shaqaaale dawladeed	1
		Shaqsi u shaqeeya	2
		Ha'yad u shaqeeya	3
		Shaqaaale maalinle	4
		Iskii u shaqayste	5
		Guri joog	6
		Kuwa kale -----	7

Part II: Wealth index

QaybII Tusma dahantida

SD11	Intra Uga Badan Biyah Aad Cabtiin Halkeet Kaheeshin?	Biyah Robka	1
		Webi Haaro Durdur	2
		Duruka Lacoday	3
		Biyaha Godka Ladabolay	4
		Biyaha Durdurka Aan Lacodin	5
		Biyaha Godka Aan Ladabolin	6
		Kasabadaa Biyaha daaradaa kabaxsan	7
		Kasabada Biyaha daaradaa dhax yaaloo	8
		kukalee	
SD12	Biyaha lacobayo Maahad kusiifeesin?	Intaan dhigno intu fedhiisanyo lyaa lasugi	1
		Dayaxda qooraahda	2
		Dayaxda qooraahda	3

			Maroo baa lugu naddifinayaa	4
			Kilorinka(biyah nadifiso	5
			Biyo karrinta	6
			kukala.....	
SD13	Biyaha intaad dhamisiid soo noqonaysaa imiisaa daqiiqo buaqaadanayaa		Daqiqqad magaraneyoo	
			magaraneyoo	99
SD14	Nooca suliga Aad istiicmaalaysiid		banaanka	1
			Kuliga dhaqanka	2
			Suliya neefbihiso Siifican lasameeyee	3
			Suliga tubada biyaha lagusameeyee	4
			kukalee	
SD15	Intaa ugu badan cu tada Aad kukarsatiin?		Saaxarada hoolah	1
			Qooriyalalee/cawus	2
			Dhuxul	3
			Gaas dAa	4
			Baayogaaska	5
			siilinderka	6
			laydh	7
			kukalee	
			Untu makarsarayno	79
SD16	Inta ugubadan cuntada halkeed kukar senaysiin		Guriga dhaxdeeda	1
			Jikad goniyyaa	2
			Dhibada	3
			kukalee.....	
	</			

	SD 16.2	Leeyd	1	0
	SD 16.3	Teelebishin	1	0
	SD 16.4	Teeleefonka guriga/mabalil	1	0
	SD 16.5	Talaajed	1	0
	SD 16.6	Daawha leeydka	1	0
	SD 16.7	Laambad/faaynuus	1	0
	SD 16.8	Siriir taudbiiga/isbonjiga/fuuraashkaa isbrinkkiiga	1	0
	SD 16.9	miis	1	0
	SD 16.10	kurrass	1	0
	SD 16.11	Guriiga	1	0
	SD 16.12	Baskiilka	1	0
	SD 16.13	motorsiiklicaa	1	0
	SD 16.14	Gaadi/hagafhagaf	1	0
SD18	Imiisa qoodidhul beer baad leediihilin		qoodii	
			Dhul ber mahayno	89
SD19	Intaa hoosta kuqoran holaha guriiga		jawaab	Tiiro
			a) saac/diibli	
			b) kuwakalee hoolaha geeskaleeh	
			c) fareska	
			d) dameer	
			e) boklo	
			f) geel	
			g) arii	
			h) idoo	
			g) digaag	

		i) gaaguura	
		j) holaha guriga mahayno	89
SD20	Guriiguimiisaa qooljiif buu leeyaahay?	☐ ☐	Itiirada guriiga
SD21	Qooykina dhaxdeeda buuga bankiga qof hayo mujiiraa ?	Haa	1
		mayaa	0

QaybIII:Question suucaaloo

Code	Questions	Haa	mayaa
SD22	Intaa dcabtaymata qaanaa(siigara mashisha	1	0
SD23	Sadaaxdabiilod Eesoodhafn aymaadcabty	1	0
SD24	Hadamaa dcabtaa	1	0
SD25	Kamriiintad cabtay mataqaanaa	1	0
SD26	Sadaax dabiilod Easoodha dnyamaa dcabtay	1	0
SD27	Hadamaad cabtaa	1	0
SD28	Jaatkainta adqayisheey mataqoonaa	1	0
SD29	Sadaaxdabilod Eesoodhafn aryqayishay	1	0
SD30	Hadamaa dqayilaysaa	1	0

Qaybta 4: Miisaanka Dhibaatada Nafsiga ah (K10)

Kesler Miisaanka Dhibaatada Nafsiga ah (K10) [K10] waacab birfududoo cidhii dhinafsiah.Miisaanka K10 Wuxuu ka kooban yahay 10 su'aa loodoo kusaabsan xaala dahadareenka, mid walbanawuxuu leeyahayja waabshan dhibcoodah.Miisaanku wuxuu u shaqee yaasidiishaasha dgaabansi loo go'aamiyo heerka walaaca.Qalabka waxaa la siinkaraa bukaanka, ama su'aalahai khtiyaariga ah waxaa u akhrin kara bukaan kabukaanka;n Marka la eegoxaala ddamaareynt adhaawaca, cabbirkawaxaa la siinkaraa bukaan-socodk ahalkaaysan ka sookabankarin

(tusaale, afar ilaa lix toddobaadgudahood) waxaanalagayaabaainaymuujisobaahida loo qabo dib-u-eegisjoogto ah ama u gudbintaxarumahacaafimaadkaeetakhasuskalehsidacilmi-nafsiga .

Saddexiyo lix su'aaloodoo ka jawaabayasu'aashiihore "marna".Marka ay xaaladahanoo kale dhacaan, saddex ama lix su'aaloodwaainaykeligoodnatiijadoodahelaan.

Tilmaamaha Su'aalkasta waxaala gutiriyaahal 'wakhti' ilaashan 'jeer'.In badan oo ka mid ah 10 su'aalood.Wadaraahan, siintadhibcaha 50 oolehuguyaraan 10 iyougubadnaan 50.Dhibcaha hooseeya waxaymuu jinayaan heerarkahoose eecidhii dhiganafsiiga ah iyo dhibcahasare waxaymuu jinayaanheerarsa reoomurugonafsi ah.

Fasiraad danatiij adii 2001dii.Daraasadda Caafimaad ka Dadweynahaee Wolverine [2] waxayan sixisay dhibcogoo yayoo loo isticmaali karo hagela gubaadho cidhiidhigana fsigaah.Kuwana yaahooskutaxan - Suurtagalnimada Dhibcaha K10 eejira dadhimirka (dhibaata danafsiiga ah)

10 - 19 Way fiicnaankartaa

20 - 24 Waxalagayaabaa in ay leeyih iindaciifnimoca afimaaddhe xdhexaad ah

25 - 29 Waxalagayaa baainaylee yihiindhaa wacdhex dhexaad ah

Fadlantilmaanjawaabtasaxd a ah .	Wagtigaoodha n (Dhibcaha 5)	Inta badan (dhibcah a 4)	Mararkaqaar (dhibcaha 3)	Dhowr Jeer(dhibcah a 2)	Marnamaah a (dhibcaha 1)
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- A0 1. Afartiitod dobaadee la
1 soodhaafay
- A0 2. 4-tii toddobaa deeugu
2 dambaysay
- A0 3. 4-tii todo baadee la
3 soodhaafay
- A0 4. 4tii todo baadee la
4 soodhaafay
- A0 5. 4-tii toddo baadee ugu
5 dambaysay
- A0 6. Afartiitod dobaadee la
6 soodhaafay
- A0 7. 4-tii todobaa dee la
7 soodhaafay
- A0 8. 4-tii todo baadee la
8 soodhaafay, imisa jeer
ayaad dareentayinaad wax
walba u samaysay dadaal?
- A0 9. 4-tii todo baadee la
9 soodhaafay, imisa jeer
ayaadaad u muru
gaysantaha yooaan waxba
kufarxikarin? ?
- A1 10. Afartiitod dobaadee la
0 soodhaafay, imisa jeer

ayaad dareentay
qiimola'aan?

Qaybta 5: Tilmaamaha Miisaanka Murugada

: Su'aalahami isaankaniwax ayku weydiinay aandar eenkaaga iyofikradaha agadhowrkii biloodde la soodhaafay .Waxaalaguw eydiindoon aainaadgoob aabininta jeer eeaadda reentay ama ka fikirtay xaaladkasta.

Qiimaynta waxaala gusameeyay 5-dhibcood Likert halka

0 = weligeed, 1 = kudhawaad, 2 = marar kaqaarkood, 3 = mararbadan, 4 = mararbadan.

Fadlantilmaanjawabtasaxda ah-

Waqtiga	Inta	Marar	Dho	Marna
oodhan	bada	kaqaar	wr	maaha
(Dhibca	n	(dhibc	jeer	(dhibc
ha 5)	(	aha 3)	(dhib	aha 1)
	dhib		caha	
	caha		2)	
	4)			

- PS 01 Immisa jeer ayaabishii la soodhaafayaad ka niyadjabtay shay lama filaan ah ama lama filaan ah?
- PS 02 Miyaadniyad jabtaybishii oreooaa dlumisayxa kamayntaxit aawaxyaabahamu hiimka u ah noloshaada?
- PS 03 Immisa jeer ayaadraxmad/ raxmad kala kulantay dadka kale bishii u dambaysay?
- PS 04 .Immisa jeer ayaaddaree ntaynasa shola'aan ama walaacbishii la soodhaafay?
- PS 05 Sideed u qeex daaaw oodaadaaa dkuxali nkart omashaak ilaadkaag ashaqsiyee dee dhacaybish iihore?
- PS 06 Dhamma anwaxya abihixumaae edhacaybis hiihoremiy ay u hirgale ensidi iaadmooday sayinay dhicidoon aan?
- PS 07 Intee bay u badan tahayinaad ka qaybqaa datooo aadtaa geertoarri mowanaags anbishiihore?
- PS 08 Sideedku sifa ynlahaydxaal adaadhaysatay shay aanad wax ka qabank arinbishii la soodhaafay, balsehaddaaanad wax ka qabankarin?
- PS 09 Immisa jeer ayaad u malaynays aainaaddadka kale u naxariis ataybishii la soodhaafay?
- PS 10 Sideedk utilmaamilahay dsidaadaw ooduguyee latayinaadxak amaysocadha diiaadnoloshaa da kala kulantay bishiihore?

- PS 11 Sideedkusi faynlah ayddhacdoka staooddhacd aybishihi oreee ka baxday gacantaada?
- PS 12 Sidee dkusifayn lahayddhacd ooyinkaaxana ajiyaybi shiihore oo ay uguwacan tahaywaxya alihiig acantaada ka baxay?
- PS 13 Ma rumaysanlahayd in wax badan oowanaag ah lagusameeya yadduunkab ishiihore?
- PS 14 Ma kula tahay in dhibaatooyin badan ay isa sootarayeenb ishiinadhaaf tayooaan ka gudbiwaayay?

Qaybta 6 waxay ka hadlaysaata ageerada lammaan aha

No	Su'aalahalag udaraycab birkaIskaas higaiyo Taag eeradaoo kusalaysan 8 su'aalood	Aadayaanuguraacsanahay	waanogolahay	kumaraacsani	Aad ayaan ugasoorjeedaa
P _a S01	Xaaskeyga waaqofaa naamini karo siuu u helotaa geeradadh aqa aleeeaan u baahanahay.				
P _a S 02	Lammaan ahayguwaa qofaansi furan ugalahadli karo waxyaab ahamuhiimka ii ah.				
P _a S 03	Xaaskay gawaa qofijecel				
P _a S 04	Xaaskayga waaqofiga caawiya daryeel kailmah ayga.				
P _a S 05	Lamma anahaygu waaqoffah madare enkayga.				
P _a S 06	Lamma anahay guwaaq ofilahadlao owaqtiil aqaata.				
P _a S 07	Lamaana hayguw aaqofaa naamini karo				
P _a S 08	Lammaana hayguwaaqof wax ilaqabta				

Qaybta 7: Saamaynkuyeelasholammaane soke

code	Qaybaha	codsiga		
PV01	Xaaskaaga/ ninkaaga weligii ma kuxadgu dbayintaa dnooshahay?(jidhahaan/ maskaxeed/ galmo)	1. Haa 2. Maya		
PV02	Xaaskaaga/ ninkaaga weligii ma kuxa dgudbayintaaad uurkaleedahay?	Cilmi-nafsiga	1. Haa	2. Maya
		1. Cay ama kudareensiianaftaada		
		2. Inuudad kahortiis akugu ceebeeyo ama kuguceebeeyo		
		3. si ula kac ah ayuukuuguhanjabaa.		
		4. Wuxuuk uuguhanj abayinaad anwayd iinasxaa btaada/ qoyskaa		
PV03	Xaas kaa gaoo kusaab sanxa dgudubkajirka:	1. Haa		2. Maya
	1. Weligaa ma kudharbaaxay ama ma kutuuray shay wax kuyeeli kara?			
	2. Weligaa ma kuriixay ama ma jiidaytimahaaga?			
	3. Weligaa ma lagudhuftay ama lagugudhuftay shay wax kuyeeli kara?			
	4. Ma kudareenta ycalooshaa dafeedh ama wax kale intiiaa duurkalahayd?			
	5. Waligaasi ula kac ah ma kuuceejisay ama kuugubay?			
	6. Miyuu waligiissi ula kac ah kuuguhan jabayqori, mindi, ama hub kale?			
PV04	Ku xadgu dubka galmada xaaskaaga.	1. Haa		2. Maya
	1. Miyuuku guqas bayinaad galmosamayso?			

	2. Ma samaysay galmoaanraali ka ahayncabs idalamaanah aagadartii?		
	3. Miyuuku guqasb ayinaa dgalmosamay soisagoon ixtiraam badan kusiin?		

Qaybta 4 Uurka Horeiyo Taariikhda Uurka

- Su'aalahan waxalooguta lagalay in laguqiimeey otaariikhda ahoreehaweenka aeeuurkaiyodhib aatooyinkadh almada.
- Iyadoo la tixraaca yosuugaa ntiihoree ecilmi-baarista, waxaykhuseys aahaweenka Itoobiya, waxaan axogtalaga sooururiya axilligafoos haamaumulis ooyinkaisbit aallada la doortay.

Code	Question	Categories	skip
PO01	Tiiradacurkale	_____	
PO02	Tiiradadhalmada	_____	
PO03	Had aka hordariqaai Imahadhashay	Makaanka 1 Qalitaan 2 Qalabkad 3 halitakalagucawyey	
PO04	Had aka horilmah agahalkeed baa kudhashay	Dhakaktarka 1 GObahacafimad ka 2 Gurigadhahdeeda 3	
PO05	Cur hadaledahay ka hortaari ikhqalitaan maadledaahay	haa 1 mayaa 0	If no skip to Q PO13
PO06	Haahaduy aahayimiisa jeer	Hal 1 Laba 2 sadox 3 Sadaxjer kabadan 4	
PO07	Qalitaankau gudanbeye eyilmahdd hashayw aahalkae	Dhakhtar kariifaraalka 1 Dhakhtarkaguud 2 Dakhtarkad hahdhad 3	
PO08	Nocaqa litaanka	inarjemsiga 1 qorshee 2	
PO9	Sababta aqalintaanka	Majirtomee 1 lficanlagufolanayo Ilmahcalos hakujirolyo 2 makankainlego Makaanku furitaanjojiyey 3 Ilmahatubad 4 amakaankabugalay Mujirataarik hdaqalitaan 5 kalagucelceliyay	

		Waqtiigac	urkadhighk	6
		armujiraa		
		Caloshaku	yalodaba	7
		dukuyimid		
		Curku	waamataanoo	8
		Foshala	gubilabinayo	9
		dhibiclamakeenin		
		Foshaaanla		10
		baranmadabada		
				11
		Iktiyaarkahoyada		12
		Kukaleha	dugirosheg	13
		lamagaranayo		79
PO10	Ilmahaugudan beyeeyq alitankak udhashey	Wunolyahay		1
		Isgomeey	dladhalay	2
		Intu dhashay	kadibdhintay	3
PO11	Ilmahaqalitanka ka dhashey kadibinad fool kudhashi dtijabomaad tijabisay	haa		1
		mayaa		0
PO12	Haahaduyahaynatijadawaamahay	Maalag	usudhay	1
		Laygu	masushain	2
PO13	Dhalmadaa qalitaamka ka horfoshamaa dkudhashay	haa		1
		mayaa		0
PO14	Haaha duyahaylm isa jeer			
PO15	Maledahay taarakhd adhiciistaa	haa		1
		mayaa		0
PO16	Haahadu yahaydh icicaynakee	waqtigisa		1
		malacashuray		2
PO17	uurkan ka hor dhibaato cur kamaa dlakulantay	Haa		1
		Mayaa		0
PO18	Haahaduy ahaykuwandh axdodawaake	Wagtigauu		1
		rkadhighmukaayimid		
		Wagtigau	urkadhighkar	2
		mukugudhacay		
		Wagtigauur	kamacaanm	3
		ukugudhacay		
		Dhiglacaan	badan	4
		mukugudhacay		
		Kukalehadujirosheg		
PO19	uurkan ka hordhibmukaa gaada ymakaanak abiyahaintu kaayimid	haa		1
		mayaa		0
PO20		haa		1

	Uurkank ahorilma waqtigasaa aan gaadinmadhashey	mayaa	<u>0</u>	
PO21	Ilmamataam ointadaddh asheymaad	haa	<u>1</u>	Part
	garanaysaa	mayaa	<u>0</u>	
	Ilma dhintay ladhlaym ujiiraa	haa	<u>1</u>	
PO22		mayaa	<u>0</u>	
	Dhalmad aakadibilm akaadhin taymujiraa	haa	<u>1</u>	
PO23		mayaa	<u>0</u>	
PO24	Imisasano bad kalafogay asidbaa _____ sanad			
PO25	Imisasano bad qalitaandhasha _____ sanad			

V_Haddadhalmadataariikhda

Code	Questions	Categories	Skip
CO01	Ugudanbay ntacadadaaar agtaynaadh aasusanna ysaa	haa mayaa	<u>1</u> <u>0</u> If no, skip C003
CO02	Haahad uyahay gormaa	Biil/maalin/sanad	
CO03	Lmikal misabilod baadtahay	_____biil	
CO04	Maad ledahayu urkaba lanka	mayaa Haa	<u>1</u> <u>0</u> If no skip to CO7
CO05	Haaha duyah aygorb aadbilabday	uurkakobaad uurkalabaad sadoxad	<u>1</u> <u>2</u> <u>3</u>
CO06	How many times you utilize ANC during your current pregnancy	_____times	
CO07	Uurkahadaleda hayda wadadhigl acantan aadqaadatay	haa mayaa	<u>1</u> <u>0</u> If no skip to CO9
CO8	Haahaduy ahaylmisa jeer	-----	
CO9	How many times did you take TAT vaccine	_____	
CO10	Dhiga maa lgucabir aymaarka dhaaa dauur katagaysay	haa mayaa	<u>1</u> <u>0</u> If no skip to CO12
CO11	Haahaduy ahaysdu aha	Muhagaa gsanaa mukordhay Hos mudhacay	<u>1</u> <u>2</u> <u>3</u>
CO12	Misaka gamusi kordhay	haa mayaa	<u>1</u> <u>0</u> If no skip to CO14
CO13	Haaha duyaaha yimisa kilo	_____Kilo	
CO14	Imisakil obatahay	_____Kilo	

CO15	Imisakil obataahay	____sentimetirka		
CO16	Imikahamum kacurka kuguyi	Haa	1	
	midmaa dleedahay	mayaa	0	
CO17	Hadada woaad qaadatid may jirtaa	Haa	1	If no skip
		mayaa	0	to CO19
CO18	Haaha duyahay sided baaduq aadanaysaa?	_____		
CO19	Uurkan hadale dahayd hibaatomu	Haa	1	
	kuguyimid	mayaa	0	
Co20	Haaha duyah aywaa mahay	Wagtiga uurka dhigmu	1	
		kuyimid		
		Wag tigacurka	2	
		dhigkarmukug uyimid		
		Wagtig auurkam acanmu	3	
		kuguyimid		
		Dhiglacaan badan	4	
		Kukaleha daadhay	5	
		sidsheg		

Part VI_Gaarsiintataariikhda

code	Question sucalo	catagories		skip
LD01	Halku kayinidfoshu	Gurilga	1	
		Gobtaasheqada	2	
		Xaruntaa caafimadka	3	
		Kukalehadaadhaysidsheg	4	
LD02	Foshuintadd	<12	1	
	haktarkaim			
	aninlahori miisaa sac	12 to 24	2	
	buraagay	24 to 36	3	
		_>36	4	
LD03	Ma ku timid garsoore	Haa	1	
		Maya	2	
LD04	Hadday haatahay,	1. Cisbitaalka	1	
	xaggeeja waabtaadu	2. Xaruntac aafimaadka	2	
	ka timid?	3. Rugtacaaf imaadka		
		gaarka ah	3	

QaybtaIII;Su'aalahahaga

Su'aashahanuunintahooyooyinka

- | | | |
|----|---|---|
| 1 | Isku-dayid | Intee in le'egayaad
Samaysay dadaalk agudaha siaad u xalliso dhibaa tadan? |
| 2 | Isku-dayid | Maxaadis kudaydayi naadkuilaa wdoadig oosamaynaya
(tusaaleahaan, inaadan la kulminas xaabtaada,
Gaaraaanku wacarruurtaleh, naftaada kucadaadina
ysashaqada, dadka, meelaha la isuguyi maado,
meelaha aanaadin, iwm. |
| 3 | Iyadaoo la kaashanayokuwa kale | 3. Waxaad u baahnaydtalo ama caawimo dadka kale |
| 4 | Ka caawidiinta ama caqiidada | 4. Ma leedahaywaxdiin ah ama caqiido ama qiyam ah? |
| 5 | Ka caawidiinta ama caqiidada | Sideelaguqeexaa ka-qaybgalkaag ahawlahadiinta?
Ma u mal aynaysaa in khibr adahaniaykaac aawiyeenina
ad ka baxdoniy addaad ahadda? |
| 6 | Ka caawidiinta ama caqiidada | 6.Haddii uuabuuru husab ablahaa, ma kula tahayin
Uurrintanook alesameeyay, haddiiaysida astahay, sidee? |
| 7 | Iyadaoo la kaashana yokuwa kale | 7. Haddiila guguqalbi qaboojiyey caawintadad ka kale, yaa
kula wadaagay khibraddau gubadan?Waayaa
ragnimo/sheekos haqsiye ednoocce ah ayaadwadaagtay? |
| 8 | Iyadaoo la kaashana yokuwa kale | Markaaadinta badan kujirton iyad damurugada/
werwerka, habnoocce ah
ayaadistic maashaasiaad ugabaxdod areenkaas? |
| 9 | Iyadaoo la kaashan ayokuwa kale | Markaaad la wadaagtod areenkamuruga daleheeda
dka kale, ma waxaykumaql aansiraalli ah, diyaar ma u
yihiniw naykuca awiyaan, ma kula tahay in taladaaad ka
heshay ay waxtarleedahay? |
| 10 | Habka kale eeraaxada | . Maxaad u malaynaysaa in uuigacaawiyay tan
iyomarkiixaalad dailmahaag udhacdaysi aanugabaxod
hammaandar eenkaasxun? |
| 11 | Isbeddelkahabdhaqankaee ay
keentayawoodikarila'aantaraaxaysiga | . Intaandh ibkaanidhicin, waamaxay dabecadi hiitaariik
hdaadahoreeeaan dhaqanxumada ahayneeha ddadhacay?
(sidacabit aankakham riga, sigaarkasigaarka, hookaha, iwm.) |

