EFFECT OF ANTENATAL DEPRESSIVE SYMPTOMS ON WOMEN'S ACCESS TO HEALTHCARE AND PERINATAL COMPLICATIONS: A POPULATION-BASED STUDY IN RURAL ETHIOPIA

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ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

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A Dissertation submitted to the School of Graduate Studies of Addis Ababa University in partial fulfilment of the requirements for the Degree of Doctor of Philosophy (Ph.D.) in Mental Health Epidemiology

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Effect of Antenatal Depressive Symptoms on Women's Access to Healthcare and Perinatal Complications: A Population-Based Study in Rural Ethiopia

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LIST OF SUB-STUDIES

This PhD dissertation is a compilation of the following three sub-studies, the first cross-sectional and the remaining two prospective, which will be referred to in the text by their Roman numerals.

I. Bitew T, Hanlon C, Kebede E, Medihn G, Fekadu A. Antenatal depressive symptoms and maternal health care utilisation: A population-based study of pregnant women in Ethiopia. BMC Pregnancy and Childbirth 2016;16:301

II. Bitew T, Hanlon C, Kebede E, Honikman S, Onah M, and Fekadu A. Antenatal depressive symptoms and utilisation of delivery and postnatal care: A prospective study in Rural Ethiopia. BMC Pregnancy and Childbirth 2017;17:206

III. Bitew T, Hanlon C, Kebede E, Honikman S, Fekadu A. Antenatal depressive symptoms and perinatal complications: A prospective study in rural Ethiopia. BMC Psychiatry 2017; 17:301

ACRONYMS AND ABBREVIATION

ANC:	Antenatal Care
ANDS:	Antenatal Depressive Symptoms
cOR:	crude Odds Ratio
aOR:	adjusted Odds Ratio
cRR:	crude Risk Ratio
aRR:	adjusted Risk Ratio
CIDI:	Composite International Diagnostic Interview
DC:	Delivery Care
FGD:	Focus Group Discussion
GA:	Gestational Age
ICD-10:	International Classification of Diseases: The ICD-10 Classification of Mental and Behavioral Disorders
IPV:	Intimate Partner Violence
KI:	Key Informants
LMIC:	Low and Middle Income countries
NVD:	Normal Vaginal Delivery
MMR:	Maternal Mortality Ratio
PHQ-9:	Patient Health Questionnaire-9
PRIME:	Program for Improving Mental Healthcare
SES:	Socio-Economic Status
SNNPR:	Southern Nations Nationalities and People's Region
UK:	United Kingdom
WHO:	World Health Organization

GLOSSARY OF DEFINITIONS AND CONCEPTS

Maternal health care use: Is a general term that indicates the use of healthcare services by mothers, such as use of antenatal care services, institutional delivery, postnatal care as well as attending emergency health care for pregnancy related emergencies.

Antenatal care utilisation: refers to the mothers' use of antenatal care services for reasons related to pregnancy that was explained in respect to number of antenatal care visits. It was classified as scheduled and non-scheduled antenatal care (ANC) visits based on the WHO's recommendation of antenatal care schedules, which proposes that the first ANC attendance should take place before the sixteenth week of gestation; second ANC attendance between weeks 24 and 28; third ANC between weeks 30 and 32; and fourth ANC visit between weeks 36 and 40.

Unscheduled ANC attendance: represents ANC visits out of the WHO's recommended time intervals. Women who initiated ANC visits between 24 and 28 weeks of gestation and continued the remaining visits as recommended were considered to have had non-scheduled ANC for the first visit but to have had scheduled ANC visits for the remaining ANC schedules. Similarly, women who initiated ANC visits between 30 and 32 weeks of gestation were classified as having non-scheduled ANC visits for the first two visits but, scheduled ANC visits for the third visit. Women who initiated ANC 36 and 40^{th} weeks of gestation were considered as having non-scheduled ANC visits for first to third ANC visits but as having scheduled ANC visit for the fourth ANC visit. Finally, the numbers of scheduled and non-scheduled ANC visits were counted for each respondent.

Delivery care utilisation: refers to one of the elements of maternal health care use that specifically refers to the mother's delivery in health care institution instead of delivering at home without skilled birth attendant.

Postnatal care utilisation: in this document, it refers to the number of postnatal care visits within four weeks after delivery. It was based on WHO's recommendation of use of postnatal care to check maternal and neonatal health within four weeks of delivery in which most neonatal deaths occur.

Perinatal complications: Refers to self-reported complications that may occur during pregnancy, labour and at postpartum, and included reports of oedema, blurred vision, severe abdominal pain, abnormal vaginal discharge, burning sensation at urination, severe headache, convulsion, haemorrhage, unconsciousness and fever that could occur during pregnancy or at postpartum. It also includes labour complications such as premature rupture of membrane, prolonged labour, tear and retained placenta (30 minutes or more).

Adverse perinatal outcomes: It indicates adverse pregnancy outcomes such as spontaneous abortion and stillbirth that were combined as "pregnancy loss". It also included death of a neonate after live birth within 28 days of delivery (neonatal mortality).

Antenatal Depressive symptoms: It refers to whether a woman had probable antenatal depressive symptoms, based on a locally validated version of Patient Health Questionnaire (PHQ-9), which is a measure of depressive symptoms based on Diagnostic and Statistical Manual of mental disorders IV (DSM IV).

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ABSTRACT

Background

Maternal Mortality in Low and Middle Income Countries (LMICs) remains a major public health challenge despite the encouraging achievement of the fifth Millennium Development Goal (MDG-5). Almost all (99.0%) of the global maternal deaths occur in LMICs where there are high resource constraints and low access to health care services. In Sub-Saharan Africa, more than half of perinatal women have no access to maternal healthcare services. The situation is reflected in Ethiopia where only 34% of women attended for antenatal care (ANC) and skilled practitioners attended only 26% of deliveries in 2015. Mental disorders, especially depressive disorders, are also common affecting about one in seven perinatal women. Perinatal depression has been shown to be an independent risk factor for maternal healthcare service utilisation on behalf of the child but there has been little exploration of its potential impact on utilisation of maternal healthcare services.

Objective

The main objective of this study was to investigate the impact of antenatal depressive symptoms on utilisation of maternal healthcare services (antenatal care, uptake of institutional delivery and postnatal care use) and its effect on perinatal complications.

Methods

Study Design: The study that formed the basis of this thesis was a population-based study that comprises three sub-studies linked to three main outcomes. Sub-study-I was a cross-sectional study carried out at the initiation of the prospective study. Sub-study-II and III were prospective follow-ups of participants identified with probable depression in sub-study-I to assess impact of depressive symptoms on (a) institutional delivery and postnatal care use; b) perinatal complications respectively.

Participants: The participants were pregnant women in their second and third trimester residing in Sodo District, Gurage Zone, Southern Nations, Nationalities and Peoples Region of Ethiopia. Eligibility Criteria included: (1) Age 15 years and above; (2) permanent residence as defined by continuous residence in the area for at least the preceding six months;

(3) Able to provide informed consent; (4) Not having hearing or cognitive impairment to the extent of impairing capacity to give informed consent or to communicate adequately.

Assessments: During baseline assessment, at the second and third trimesters of pregnancy, participants were screened for antenatal depressive symptoms and background demographic and socio-economic information along with other potential confounders such as intimate partner violence, social support, history of chronic medical conditions and adverse perinatal outcomes. Antenatal depressive symptoms were assessed using a locally validated version of the Patient Health Questionnaire-9 (PHQ-9). Participants scoring five or more on the PHQ-9 were considered to have probable antenatal depression. ANC attendance and pregnancy related emergency healthcare visits were cross-sectional outcomes that were assessed as part of the initial baseline assessment. At a median of eight weeks after childbirth, the participants were re-interviewed about their place of delivery, attendance of postnatal care services and whether they had experienced an of perinatal and postpartum complications.

Statistical Analysis: Poisson and Negative binomial regression models were used for cross-sectional evaluation of the association of antenatal depressive symptoms with antenatal service use and pregnancy related emergency healthcare provider visits. Binary logistic regression was used to examine the association of antenatal depressive symptoms with early initiation and adequacy of ANC services. Binary logistic regression was also used to examine association of antenatal depressive symptoms with uptake of institutional delivery, having assisted delivery and women's experience of perinatal complications.

Results

Participant Characteristics: Among study participants, 98.7% were married, 67.5% were non-literate, 92.2% were rural residents and the mean age of the participants was 26.8 years. The majority (64.8%) of women initiated ANC visits (37.0% by 16 weeks gestation) and nearly two-thirds (62.3%) delivered in healthcare institutions.

Baseline (Cross-sectional) Study: At PHQ-9 cut-off of five or more, 29.5% of baseline participants and 28.7% of followed up participants had probable antenatal depression. Women with depressive symptoms had an increased risk of having greater number of un-scheduled ANC visits (adjusted Risk Ratio (aRR)=1.41, 95% CI: 1.20, 1.65). These group of women also had an increased number of emergency healthcare provider visits to both

traditional healthcare providers (aRR=1.64, 95% CI: 1.17, 2.31) and biomedical healthcare providers (aRR=1.31, 95% CI: 1.04, 1.69) for pregnancy-related emergencies.

Prospective Studies: Women with probable antenatal depression also had increased odds of reporting institutional birth [adjusted Odds Ratio (aOR) =1.42, 95% Confidence Interval (CI): 1.06, 1.92] and increased odds of reporting having had an assisted delivery (aOR=1.72, 95% CI: 1.10, 2.69) than women without these symptoms. In sub-group analysis of women with institutional deliveries, the increased odds of institutional delivery was associated with emergency reasons during labour (aOR = 1.62, 95% CI: 1.09, 2.42) rather than pre-planning to deliver in healthcare institutions. Furthermore, there was increased odds of pregnancy (OR=2.44, 95% CI: 1.84, 3.23), labour (OR= 1.84 95% CI: 1.34, 2.53) and postpartum (OR=1.70, 95% CI: 1.23, 2.35) complications among these group of women compared to women without antenatal depressive symptoms. However, antenatal depressive symptoms were not significantly associated with early initiation of ANC or postnatal care visits, pregnancy loss or neonatal mortality.

Conclusion

Establishment of a system for detection, referral and treatment of antenatal depression, integrated within existing antenatal care, has the potential to reduce treatment costs and promote efficiency of the health care system through increased use of scheduled ANC and planned uptake of institutional delivery. It also has potential to reduce perinatal complications, thus contributing to a reduction in maternal morbidity and mortality, as well as improved neonatal health. But, further studies should ensure whether early detection and treatment of depressive symptoms may reduce the risk of perinatal complications.

1. INTRODUCTION

1.1. Background of the Study

Maternal mortality remains a major public health challenge in low and middle income countries (LMICs) despite the encouraging achievements of the millennium development goals (MDGs) (1, 2). Almost all (99%) of global maternal deaths occur in LMICs settings (3). The Sub-Saharan countries make about 15% of the global population while contributing to about 56% global maternal deaths (3, 4) indicating marked global inequity. Ethiopia alone contributes to between three and five percent of global maternal mortality (5, 6).

During 1990 to 2015, operation period of MDGs, estimated maternal mortality ratio fell by 44% in LMICs from the baseline of 1990 (7). This is a significant achievement; however, fell remarkably short of the target of the fifth MDG that aimed to reduce maternal mortality ratio by 75% for every country from the ratio of 1990 (1, 2). Similarly, the maternal mortality reduced from 871 per 100,000 live births in 1990 to 416 per 100,000 live births in 2016 (about 53% reduction from the 1990 baseline estimate) (8). The post Millennium Development Goal consensus, termed 'Sustainable Development Goal' (SDG), aims to reduce global maternal mortality to 70 per 100,000 live births by 2030 from the 2015 baseline estimate of 216 maternal deaths per 100,000 live births (9).

Maternal health and healthcare indicators like maternal mortality, antenatal and delivery care utilization are poor in LMICs compared to HICs (10). It has been consistently demonstrated that high maternal mortality in LMICs was associated with low maternal health service utilization practices such as high rates of home delivery and poor utilisation of family planning services (3, 11, 12). Besides poor maternal healthcare facilities issues such as low quality and inadequate healthcare service facilities (13), low access to contraceptives (3, 4) are linked to poor maternal healthcare use in these settings. In a study that compared maternal healthcare utilisation rates of Low, Middle and High Income Countries, there was sharply low ANC utilisation and high maternal mortality in Low Income Countries (450-2100 deaths per 100,000 live births) compared to middle income countries (210-1000 deaths per 100,000 live births) and high income countries (only 15 deaths per 100,000 live births)

(10). According to the same author, antenatal care coverage was 64-99% in middle development-index countries and 28-94% in low human development index countries. Similarly, births attended by skilled health personnel was 98%, 39-94% and 6-68% in high, middle and low human development index countries respectively (10).

As a result poor maternal healthcare use in LMICs, clinically unmanaged avoidable direct causes of obstetric complications such as hemorrhage, infection, unsafe abortion, hypertension and obstructed labor contribute to 70% to 80% of maternal mortality in these countries (10, 14-17). In composite measures of clinically diagnosed obstetric complications in hospitals, the obstetric complications range from 18% in Ghana (18) to 20% in Pakistan (19). There were also estimates that about 25% of Ethiopian women attending antenatal care (20) and about 15% of all pregnant women suffer from some kind of obstetric problems (20-22).

Within Ethiopia, approximately three-quarters of maternal deaths are considered to be the result of undetected and untreated antenatal causes of obstetric complications, such as haemorrhage (23), infection (23), unsafe abortion, hypertension (23) and obstructed labour (24-26). To reduce the risk of pregnancy and obstetric complications, the World Health Organization recommends women to attend at least four antenatal visits during pregnancy and deliver at a health facility (3). Nevertheless, maternal health service utilisation during pregnancy and institutional delivery in Ethiopia (27-34) and in the continent of Africa in general (4) remains inadequate. During 2000-2009, only 47% of births had been attended by skilled personnel while only 44% of the mothers had at least four antenatal care visits on the continent of Africa compared to 96% institutional delivery and 100% antenatal care (ANC) attendance in the West (35). In Ethiopia only 34% and 32% of women attended antenatal care in 2011 and in 2016 respectively (8). Moreover, in spite of tremendous healthcare service improvement during 1997-2005 in Ethiopia (36) in which one primary healthcare facility became accessible for every 25,000 households and a health post (a community-based healthcare facility) for every 5,000 households, only 11.7% of women delivered in healthcare facilities in 2011 (6) and, 26% in 2016 (8). We hypothesized antenatal depression as one of the potential barriers of maternal healthcare utilisation among many supply side and demand side barriers.

Depression in the perinatal period is also an important public health challenge (37-42). During pregnancy, depression is estimated to affect about 20% of pregnant women in LMICs (43-47), compared to about 10% in high-income countries (HIC) (2, 48). In LMICs, the prevalence of depression during pregnancy (antenatal depression) varies from 20-39% (43 , 45, 49-51) and causes adverse effects both on perinatal women (42, 52) and the newborn (53, 54). Increased functional impairment (42, 43, 52), increased malnutrition (55), food insecurity (56), increased somatic complaints (42, 57, 58), increased health risk behaviours and reduced self-care (59-61) are some of the well-established adverse effects of antenatal depression on perinatal women.

Studies from HIC demonstrated an association between antenatal depression and preeclampsia (62, 63), pregnancy and labor complications (64), premature contraction, increased use of analgesics and increased nausea during pregnancy (65). A few studies from LMICs have also reported that antenatal depression was associated with increased risk of prolonged labor (41, 66), preeclampsia (66, 67) and increased risk of preterm birth (39, 40, 68).

There is also accumulating evidence of adverse impacts of antenatal depression on the newborn (39, 40). The adverse effects of antenatal depression on child growth, health and behavioral outcomes, as well as perinatal outcomes independent of postnatal depression, have been well documented (53, 54, 69). Low birth weight has been associated with antenatal depression in some (40, 69), but not all (41, 70), studies. Studies from Asia found positive association of antenatal depression with low birth weight (69, 71, 72) while a study in Africa found non-significant association (41). No association between antenatal depression and neonatal mortality has been observed (66), but depression prior to pregnancy was associated with increased odds of stillbirth (73).

1.2. Statement of the Problem

Adequate maternal healthcare utilisation is a key strategy to prevent and treat perinatal complications and so to improve the risk of maternal morbidity and mortality (3). There is global consensus that improved access and practice of maternal healthcare services improves timely detection and treatment of direct causes of perinatal complications and so improves the risk of maternal morbidity and mortality. Nonetheless, maternal healthcare utilisation

practices such as antenatal care, delivery care and postnatal care service utilisation in LMICs setting remains poor (7, 26). For example, less than half of antenatal women who attended antenatal care elivered in healthcare facilities in Africa (8). In Ethiopia only about a quarter of women delivered in healthcare facilities and nearly one-third of perinatal women attended recommended number of ANC services in 2015/16 (8) despite considerable efforts to attain MDG. Almost all (99%) of global maternal mortality occurs in these settings (3) and timely undetected and/or inadequately treated perinatal complications such as infection, haemorrhage, unsafe abortion, hypertension and obstructed labour contribute 70-80% of maternal mortality in LMICs (13, 23, 26, 29, 74). Although these complications may be prevented by improving the uptake of maternal health care services as recommended by the World Health Organization (WHO) (3), the rate of maternal healthcare utilisation in LMICs settings remains poor (27, 28, 75-79).

Generally, maternal morbidity and mortality, mostly attributed to poor access to maternal healthcare services, are well established public health challenges in LMICs. There is also accumulating evidence that maternal depression is a significant public health challenge with adverse effects on functioning, self-care and productivity, child health and development, family cohesion, medical costs and somatic illnesses (80). Antenatal depression affects about 15-30% of women in LMICs (43, 50, 81-83). In a recent systematic review, antenatal depression was 19.2% in LMICs and 17.2 using diagnostic tools (84).

Antenatal depression also has the potential to impact utilisation of maternal health services negatively independent of socio-economic and demographic factors and thereby to contribute to increased perinatal complications due to several behavioural features associated with depression. Loss of motivation and interest in common activities including self-care (53, 85); reduced social support (86, 87), increased cognitive deficit to make decisions and evaluate alternatives (88), reduced adherence to healthcare practitioner recommendations (60, 89) and disability (42, 53) that are linked to depression might negatively impact healthcare service use of the mothers. Somatic symptoms, which are inseparable from depression (42, 57, 58), affect maternal healthcare use (60). This implies that antenatal depression is a potential predictor of maternal health or wellbeing through its effects on women's coping strategies, self-care, social support and dietary habits (55). Moreover, antenatal depression is a potential risk factor for increased perinatal complications through

increased food insecurity and malnutrition (55) and non-adherence to medical recommendations (60).

Antenatal depression is a predictor of postnatal depression (90-92). The increased impact of postnatal depression on maternal healthcare utilisation after birth has been documented (93-95) while only a few studies were conducted to investigate the impact of antenatal depression on maternal healthcare use and perinatal complications. These few studies were almost exclusively conducted in high-income countries. These studies investigating the impact of antenatal depressive symptoms on health service utilisation in high-income countries have reported increased association between antenatal depression and unscheduled gynecological and obstetrician visits (37, 96), although no association was seen with initiation of antenatal care visits (97). In studies examining the adequacy of antenatal care utilisation, defined as attendance for 50% or more of the expected ANC reviews (96, 98), no association was found between antenatal depression and adequacy of ANC use.

One study was identified from Ghana; however, reported non-significant association between antenatal depression and maternal healthcare utilisation although important potential confounders like comorbid illnesses and pregnancy complications were not controlled for. Generally, the potential effect of antenatal depression on maternal healthcare utilisation and perinatal complications has not been explored in LMICs. Existing studies focused on various socio-economic and demographc determinants of low maternal health care utilisation (99-101) and unmanaged perinatal complications in LMICs. Evidence supporting the potential impact of antenatal deprssion on maternal healthcare use and perinatal complications in LMICs context is generally inadequate.

1.3. Rationale and significance of the study

Improved detection and treatment of antenatal depressive symptoms, albeit not prioritized in LMICs settings (102), is hypothesized to improve behavioural manifestations associated with depression such as non-adherence to treatment recommendations, disability, food insecurity and malnutrition, loss of self-care (53, 85); reduced social support (86, 87), increased somatic symptoms (42, 57, 58) and thus increase rates of planned maternal healthcare utilisation and perinatal outcomes. Evidence supporting the potential impact of antenatal deprssion on maternal healthcare use and perinatal complications in LMICs context, is generally important

for designing future intervention strategies for antenatal depression to improve women's maternal healthcare service use and so their risk of perinatal complications. Because of lack of sufficient evidence to demonstrate the association between antenatal depressive symptoms and maternal healthcare utilisation, intervention of antenatal depression was not prioritized in LMICs settings to improve maternal healthcare use and perinatal outcomes.

There is a need to generate contextually relevant evidence in LMICs settings to demonstrate the association so that healthcare planners can prioritize interventions for maternal depression to improve maternal healthcare use and perinatal outcomes. Indeed, future intervention strategies in LMICs settings require evidence of the effect of antenatal depression on maternal health care utilisaton during pregnancy, childbirth and during postpartum to support prioritization of mental health care in women in general.

Thus, this study was aimed at investigating the effect of antenatal depressive symptoms on healthcare seeking behaviors of the mothers as well as the effect of antenatal depression on perinatal complications. Therefore, the results of this study will be helpful to clinicians, healthcare planners and future researchers to decide on intervention strategies of antenatal depression so as to improve maternal and neonatal health through improved healthcare use.

In addition, it will help as a source of information about the health seeking behaviors of women for investors who are interested in providing pharmaceutical products and healthcare services. The study also helps officials in the health sector to decide the professional mix of work force needed to solve problems related to maternal mortality like mental healthcare and biomedical healthcare workers. It would also help the health sector officials decide on whether to focus on institutional level factors of maternal healthcare use or individual level factors of maternal healthcare utilisation. Finally, it will be of vital importance to researchers in providing inputs for further research.

2. LITERATURE REVIEW

The literature review describes the epidemiology of antenatal depression, the effect of antenatal depression on maternal healthcare use (antenatal care use, uptake of delivery care and postnatal care utilization) and the effect of antenatal depressive symptoms on incidence of perinatal complications. Narrative review was carried out using broad search terms linked to the main outcomes: antenatal care utilisation, delivery care utilisation, postnatal care utilisation and perinatal complications. PubMed, Medline and PsycInfo were the main search engines.

2.1. The Nature and Epidemiology of Perinatal Depression

In general, depressive disorders alone within the general population account for two-fifth of the burden of diseases caused by mental and substance use disorders (103). It generally contributes a substantial proportion of years lived with disability globally (42, 53). In the World Health Organization (WHO) Global health estimates, depressive disorders were the single largest contributors to non-fatal health loss with more than 80% of this non-fatal disease burden in LMICs (104). It contributes to the non-fatal health loss through increased impaired functioning and increased disability (42, 55), reduced wellbeing and quality of life, which finally results in increased morbidity and poor productivity. Thus, work days lost due to disability linked to depressive disorders is high across the globe. Besides, costs incurred to healthcare were higher among people with depression (93, 105-107) due to increased emergency healthcare visits and non-adherence to treatment recommendations (60, 89). In rural Ethiopia, depression is among the most top 10 causes of disease burden (108).

Depression also increases the risk of death from both suicide (109), worsened general medical conditions and increased treatment costs through reduced self-care and non-adherence to treatment recommendations (89). It worsens existing medical conditions through reduced patients' coping mechanism to chronic and fatal diseases and increased medical non-adherent healthcare visits (60, 89) reduced self-care and social support (86). As a result of reduced coping mechanisms, depressive disorders either worsens existing medical conditions such as cardiac problems (85) and diabetes (106) or increases vulnerability to these conditions. Among cardiac patients who received collaborative care for both depression and medical condition, improved symptoms of depression and medical conditions

were obtained, which confirms that untreated depression worsens or increases patients' vulnerability to medical conditions (110).

There is also cumulating evidence about the public health challenges of depression among perinatal women (37-42, 51, 83) and their newborns (39, 111). During pregnancy, depression is associated with adverse effects both concerning the health of the mothers (62-64) and the behavior and health of the newborn (53, 54, 112). Antenatal depression impairs functionality of mothers (42, 53), psychomotor activity (113), and may lead to unhealthy lifestyles and reduced coping with events and stresses (53, 87). It is also associated with increased pessimism, cognitive impairment and withdrawal from social networks (89) as well as sleep disturbances (114).

Depression during pregnancy increases risk of suicide, disability (42, 52), malnutrition (55) and food insecurity (56), reduced social support (87) and self-care (59-61) and is main risk factor for postnatal depression (90, 92). Antenatal depression is also associated with low birth weight (68), preterm birth (39, 40, 68), late initiation of breast feeding (39) and adverse child behavioral outcomes (115) in addition to the immense individual suffering of women with depression. In studies of HICs, depression during pregnancy also increases medical costs through increased obstetric emergency healthcare visits and non-adherence to scheduled antenatal care visits (94, 116).

2.1.1. Prevalence of Perinatal Depression

Depression is very common psychiatric illness especially among perinatal women. One in seven women globally (117); one in three to one in five perinatal women in LMICs and about one in ten in High Income Countries (HICs) are affected by depression during perinatal period (2). In a systematic review of thirteen papers in LMICs, the weighted mean prevalence of antenatal depression was 15.6% with greater prevalence (19.7%) in samples that used screening tools (83). But, the prevalence of antenatal depression varied according to settings. For example, depressed mood during pregnancy was 39% using Edinburgh postnatal Depression Scale (EPDS) (51); 22% using Mini-International Neuropsychiatric Interview-Plus (MINI) and 21.0% using Beck Depression Inventory (BDI) (81) in South Africa. In studies that used PHQ-9, the prevalence of antenatal depression was 26.6% in Ghana and 32.9% in Cote d'voire (43). On the other hand, antenatal depression was 29.9% in

a cross-sectional survey in Viet Nam (45) and 26.3% in a facility based study that used EPDS (92). Antenatal depression was 32.8% using self-reported questionnaire (50) in a longitudinal study and 13.5% in a study using MINI, in Brazil.

The prevalence of depression in Ethiopia also varied according to settings, population and measurement tools used. In a population based study in Addis Ababa using Symptom Reporting Questionnaire (SRQ), the prevalence of depression was 25.9% in non-perinatal women with higher estimate (34%) among youth group of women (118). In a study of non-pregnant women in Ethiopia, Butajira, a neighboring district to our study area, using Composite International Diagnostic Interview (CIDI), a 12-month prevalence of depression was 4.4% (119). A lower prevalence in the Butajira study might be due to low prevalence among non-pregnant population compared to pregnant women as demonstrated in USA (120) and due to use of diagnostic instrument to assess depression in that sample. Higher prevalence of antenatal depressive symptoms was reported using screening tools; however, 19.9% by using EPDS at cut off 13 or more (44). In a study that used Beck Depression Inventory in northern Ethiopia the prevalence of antenatal depression was 23.0% (121). A 12% prevalence of antenatal common mental disorders (depression and anxiety) based on self-reported questionnaire (SRQ) during pregnancy was reported in Butajira, a neighboring district to our study (46). The prevalence of antenatal depression was also reported different across various stages of pregnancy. In a systematic review aimed to identify the point prevalence of antenatal depression across the three trimesters of pregnancy, the prevalence for the first, second, and third trimesters was 7.4%, 12.8% and 12.0%, respectively (122). Nevertheless, a study in China found opposing results where antenatal depression measured by the Center for Epidemiologic Studies-Depression Scale was higher during the first trimester than in the second trimester (123). Generally, literature indicates that the prevalence of antenatal depression was high especially in Low and Middle Income countries (LMICs) regardless of getational age.

2.1.2. Potential risk factors of antenatal depression

Depression is an affective disorder that is predicted by various factors: individual level factors, family level factors and community level factors. Among individual level predictors of depression are socio-economic factors such as educational level, occupation and income

(45, 48, 51, 83); demographic factors such as urban or rural residence (119), marital status (45, 83) and psychological factors like negative life events (48, 83). However, the impact of socio-economic factors on depression remains inconsistent. Studies in Viet Nam, South Africa and systematic reviews have indicated that antenatal depression is affected by socioeconomic factors like poverty (11, 83), low income (51), lack of education and permanent job (83). Nevertheless, a systematic review reported that socioeconomic status measured by a composite measure of education and occupation was not associated with antenatal depression (48).

Perinatal factors, such as unintended pregnancy (45, 48), still birth and infant death were associated with increased maternal depression. But, the effect of maternal age, parity, ethnicity, history of ANC attendance and abortion on depression were found to be inconsistent (48) though younger age predicted maternal depression in studies in South Africa (51, 83). Furthermore, another study in Butajira, Ethiopia, indicated that functional impairment during pregnancy was associated with increased depressive symptoms (41). Among family level and community level predictors, experiencing life events such as illness in family, economic crisis in family, marital disharmony (45, 47) and rural residence (11, 45) were associated with increased depressive symptoms.

Two cross-sectional surveys in Viet Nam (11, 45) and another survey in South Africa as well as systematic reviews in Viet Nam reported consistent association of intimate partner violence with increased antenatal depression (11, 45, 48, 51, 83). A systematic review also revealed that unsupportive husbands or less family cohesion were associated with increased antenatal depression (83).

Table 1 Potential risk factors of antenatal depression

Factors	Author	Design	Country	Sample size	CI of OR
Partner support (Unsupportive, alcoholic, quarrelsome, uninvolved)	Fisher, 2010 (45)	Survey	Viet Nam	199	*significant
	Fisher, 2012 (83)	Review	Multi-country		2.00–9.40
	Hartley, 2011 (51)	Survey	South Africa	1062	*significant
	Fisher, 2012 (83)	Review	LIC &LMIC+		1.96-9.44
	Lancaster, 2010 (48)	Review	Multi-country	7139 in 9 studies	*significant
Intimate partner violence	Hartley, 2011 (51)	Survey	South Africa	1062	1.33 -2.21
	Fisher, 2010 (45)	Survey	Viet Nam	392	1.12–3.96
	Fisher, 2011 (11)	Cohort	Viet Nam	199	*~2 times
	Fisher, 2012 (83)	Review	LIC &LMIC+	Not stated	2.30-25.90
	Fisher, 2012 (83)	Review	LIC &LMIC	Not stated	2.11-6.75
	Lancaster, 2010 (48)	Review	Multi-country	3738 in 7 papers	*significant
Maternal autonomy	Fisher, 2011 (11)	Cohort	Viet Nam	199	1.05–10.71
Lack of Social support with in-laws and family	Lancaster, 2010 (48)	Review	Multi-country	5752 in 17 studies	*significant
	Fisher, 2012 (83)	Review	LIC &LMIC+	Not stated	*significant
	Hartley, 2011 (51)	Survey	South Africa	1062	*significant
Cultural barriers (belief in super natural attacks)	Hanlon, 2010 (86)	Qualitative	Butajira	25	not applicable
Birth before marriage	Hanlon, 2010 (86)	Qualitative	Butajira	1065	not applicable
Gender stereotypes	Fisher, 2010 (45)	Survey	Vet Nam	199	*significant

CI figures not given in the studies

LIC=Low Income Countries; LMICs: Lower Middle Income Countries

Among community level predictors of antenatal depression, lack of social support (48), maternal beliefs in supernatural attacks during pregnancy and unfavorable societal beliefs about pregnancy before marriage (124), gender stereotypes (11) and lack of maternal autonomy (11, 125) were associated with increased depressive symptoms.

2.2. Help seeking behaviors of mothers

Five major causes of maternal death (abortion, infection, ruptured uterus, hemorrhage and eclampsia and preeclampsia), which could have been managed in healthcare facilities, accounted for about 80% of maternal deaths worldwide (10, 14-17). The WHO suggested antenatal care utilisation, uptake of delivery care in healthcare facilities and postnatal care use as key strategies to manage these avoidable causes of maternal morality and adverse perinatal outcomes (2, 3). A large study that investigated the impact of maternal healthcare utilisation on maternal mortality for over 45 Sub-Saharan African countries (10) demonstrated that uptake of institutional delivery and antenatal care utilisation each reduced about one-third of maternal mortality. The study concluded that the high rate of maternal mortality in Sub-Saharan countries was a result of lack of access to maternal healthcare

services (126). In the continent of Africa, only 47% of women attended recommended number of ANC attendances and only 44% of deliveries were assisted in healthcare facilities (35). This is very low when it is compared to that of HICs, where all women attended the recommended number of ANC attendance and 96% of the mothers delivered in healthcare facilities (4). Thus, maternal mortality is very low in these HICs. Maternal healthcare utilisation in Ethiopia, however, remains very poor and the resulting maternal mortality remains very high (6, 8). Only 32% of antenatal women had recommended number of Antenatal Care (ANC) visits and only 26% of women delivered in healthcare facilities in 2016 (8) as indicated in the Table 2 below.

Table 2. Antenatal and delivery care utilization

Country/continent	Coverage		
	ANC utilization (4 ANCs or more)	**Delivery care utilization**	**Source**
HICs	100.0%	96.0%	WHO, 2011 (4)
Africa	44.0%	47.0%	WHO, 2011 (4)
Ethiopia	32.0%	26.0%	CSA, 2016 (8)
Ethiopia	26.7%	62%	CSA, 2000 (127)
Ethiopia	34.4%	11.7%	CSA , 2011 (6)
Ethiopia	30.3%	11.6%	CSA, 2005 (5)

Prior to the introduction of the health extension programme (36), institutional delivery rates in Ethiopia were very low (6). Despite variation across settings, few studies in Amhara region consistently demonstrated that both antenatal care and delivery care utilisation were extremely low (100, 128). A study in Gondar reported only 7.2% of institutional deliveries (129) while a study from western Gojjam reported only 12.1% of institutional deliveries (77). Recent trends indicate improving rates, especially in southern Ethiopia, with nearly 50% of women in community-based samples, and nearly three-quarters of women in urbanized areas delivering in healthcare facilities (130-132).

As a result of poor maternal healthcare use in LMICs settings, a large proportion of maternal and neonatal deaths occur during the 48 hours after delivery (6). As a key strategy of reducing maternal and neonatal mortality, WHO recommended at least one postnatal visit within 48 hours after delivery or at least two postnatal care visits within seven days of delivery (6). However, postnatal care utilization in Ethiopia is 7%, which is very poor, only

seven percent. Along with various other predictors, one of the factors that affects postnatal care utilisation was antenatal care utilization itself (95) and the culture of the community in the study area, where postnatal women are not allowed to go out of their home until about three weeks after delivery due to fear of attack by supernatural forces (133).

Antenatal care utilisation and institutional delivery have been widely studied. Nevertheless, measurement of antenatal care utilisation was more complex and varied by era of study. Earlier studies simply assessed antenatal care utilisation uni-dimensionally as the general number of visits to healthcare providers. Most of these studies did not distinguish scheduled ANCs from unscheduled emergency healthcare provider visits. Recent studies considered the timing (initiation) as well as frequency (number) of ANC visits during pregnancy in assessing use of antenatal care. This was the basis for the Kotlchuk's measure of adequacy of antenatal care utilization (134). Thus, KI is a composite measure that combines both frequency and initiation of antenatal care in determining adequacy of antenatal care utilisation (134). According to Kotlchuk (134), adequacy of antenatal care use were categorized into, "inadequate", "intermediate", "adequate" and "intensive" antenatal care users.

Participants were categorized in to "inadequate antenatal care users" if either they start initial antenatal care visits after 16 week of gestation or had below 50% of the recommended number of antenatal care visits adjusted to recommended number of antenatal care visits in a given gestational age. On the other hand, they were grouped under "intermediate", "adequate" and "intensive" antenatal care users if they had initiated antenatal care before 16th week of gestation and, respectively had attended 50%-79%, 80%-110% and more than 110% of a recommended number of antenatal care visits adjusted on gestational age (134). However, the limitation of KI was its insensitivity to adherence to antenatal schedules and it also categorizes women without any antenatal care visits in "inadequate care users" group. As a result, a woman who had three health facility visits during the first 16 weeks could be categorized as adequate antenatal care user though the woman had no antenatal care visits in the second and third trimesters.

2.3. The impact of depression on Health seeking behaviors

Some studies, though limited to HICs, have demonstrated that postnatal depression was associated with increased maternal healthcare use on the side of the mother (96) as well as the child (39, 111); less satisfaction with healthcare services (116), increased somatic symptoms and non-adherence to medical recommendations (60, 89) and resulting increment in health care costs (93). In a case control study in Sweden, women with postpartum depression were about two times more likely to have had 13 or more healthcare provider visits than non-depressed controls (94). Studies in UK had also found that women with postpartum depression measured by EPDS were two to nine times more likely to visit family physicians, community nurses (95), a psychiatrist social worker, postnatal depression group, pediatrician, or a general practitioner than non-depressed women (116). Because of trends of increased healthcare visits among women with postnatal depression, some researchers recommended the need for screening depression among women with repeated healthcare visits (116).

Nevertheless, the prevalence of depression is greater during pregnancy compared to during postnatal period (116, 120). In spite of this high prevalence of depression during pregnancy, only few studies investigated the potential impact of antenatal depression on maternal health care use. These few existing studies were exclusively from HICs. In these studies, antenatal depression was associated with increased obstetrician visits (37) and planned Caesarian Section utilization (37). On the other hand, a community based study in USA has reported increased delay in initiation of antenatal visits among women with antenatal depression in a bivariate model (97). These studies had emphasized either frequency of antenatal care visits or initiation of antenatal care alone, however.

Two more hospital based studies in Atlanta (96) and Minnesota (98), on the other hand, have computed Kotlchuk's Index (KI) to determine adequacy of antenatal care utilisation. The above studies from Atlanta (96) and Minnesota (98) have found non-significant effect of current antenatal depression on adequacy of antenatal care utilization measured by KI, but depression before pregnancy (98). Furthermore, the USA studies were either based on a small sample (154 women) or had low response rate (68%).

There was lack of such studies in LMICs contexts as maternal healthcare use is context sensitive. The only study in Africa, from Ghana, reported non-significant association of antenatal depression with antenatal care and institutional delivery utilization (135). Potential confounders, such as pregnancy complications and chronic illness were not adjusted for in the Ghana study. The latter study did not also distinguish between planned and emergency uptake of institutional delivery. Most of these studies did not consider the different dimensions of access to health care. For example, antenatal care utilisation can have two dimensions: scheduled, unscheduled. Depression could have different effects on these components. Depression is more likely to affect women's ability to plan and to adhere to scheduled ANC visits. This is because, depression impairs women's ability to judge and evaluate alternatives during their decision-making (136, 137). In line to this, a study in Viet Nam demonstrated that fewer women with common perinatal mental disorders used protective measures like iron supplements compared to women without common perinatal mental disorders (45) implying increased non-adherence of women to medical recommendations. A cross-sectional study in Jimma also found that women's preferences of healthcare attributes was not clear compared to women without depression (138). Overall, there is insufficient data regarding the effect of antenatal depression on health care behaviors.

2.4. Common risk factors of antenatal depression and maternal health service use

Researchers have long been interested in exploring the facilitators and barriers of access to maternal health care services (139). Currently, large number of studies has been conducted to demonstrate the effect of socio-economic, demographic and obstetric characteristics of women on their healthcare utilisation (use of antenatal, delivery and postnatal care). A large number of studies have also been conducted to demonstrate risk factors of antenatal depression (27-33). In this part of literature review, the common risk factors of both antenatal depression and maternal healthcare utilisation that could potentially confound the association between the antenatal depression and the maternal healthcare utilisation are presented. Doing so was required in order to identify potential confounders of the

association between antenatal depression and maternal healthcare use so that it can be adjusted in the analysis models.

To explore the factors associated with antenatal care utilisation of the mothers, studies were searched using PubMed, Medline and PsycINFO search engines. Relevant studies that have been cited in other studies were also searched during January 2013-September, 2013. Studies that reported factors affecting access to maternal care and conducted in Ethiopia were included since maternal healthcare use is context specific. A range of search terms that were linked to outcome variables were used: “risk factors”, “antenatal care utilization”, “maternal care utilization”, “access to maternal health care”, “access to prenatal health care”, “skilled delivery care utilization”, “and delivery care utilization”. These search terms were combined by “OR”. Then, the search result was combined with “Ethiopia” by the Boolean operator “AND”. Seventeen relevant studies were obtained. From these studies, 35 factors that were supposed to affect antenatal care utilisation and 36 factors that were supposed to affect skilled delivery care utilization were identified. The detail of these predictors of maternal healthcare use is given below.

2.4.1. Potential risk factors of ANC use

Predictors of maternal healthcare use can be categorized as socio-economic, socio-demographic and obstetric factors. Antenatal care utilization of the mothers was influenced by a multiples of socio-economic factors like education (99, 100), income and wealth index (99). It is also affected by demographic factors like marital status and place of residence (100) as well as cultural and obstetric factors.

Socio-demographic and economic predictors of antenatal care utilisation: Among predictors of antenatal care utilisation, mothers’ level of education, pregnancy plan, media exposure, wealth and urban residence were most consistently associated with increased access to antenatal care use (27, 28, 78, 99, 100, 140, 141). Mothers who attended secondary level schooling had about 2-11 times better attendance of antenatal care than those not attended schooling (27, 28, 78, 99, 100, 140, 141). Increased family education (level of husband's education) and wealth measured by household assets also positively influenced maternal attendance of antenatal care (99). Besides, in a systematic review of twenty eight papers, sixteen studies had pointed out that women’s education was the best predictor of

ANC visits (142). On the other hand, lower parity, being marred, lower mother's age and non-farmer occupation were inconsistently associated with increased antenatal care utilization. Finally, most studies reported that parity and religion of the mother were not associated with access to antenatal care.

Table 3. Socio-demographic and economic predictors of Antenatal care utilization

Socio-Demographic factor	Author	Study Design	Sample size	Setting	Odds ratio (95% CI)
Age (>35 Years)	Regassa, 2011 (143)	Survey	1094	Sidama	0.374 (p<0.001)
	Birmeta, 2013 (141)	Survey	422	Holeta	0.18 (p<0.05)
Married women than unmarried	Asfaw, 2013 (101)	Survey	1113	Tigray	2.68 (1.54, 4.69)
	Mekonen Y, 2003 (100)	Survey	7,978	Ethiopia	1.40 (1.10-1.90)
Residence (Urban than rural)	Dagne, 2010 (99)	Survey	5024	Ethiopia	2.00 (1.67-2.50)
	Mekonen, 2003 (144)	Survey	1401	SNNPR	3.00 (p<0.05)
	Mekonen, 2003 (100)	Survey	7,978	Ethiopia	9.90 (7.10-13.80)
Unwanted pregnancy	Regassa, 2011 (143)	Survey	422	Holeta	0.33 (p<0.05)
	Birmeta, 2013 (141)	Survey	1094	Sidama	0.462 (p<0.001)
Secondary schooling compared to (illiterates)[a] or compared to (primary schooling)[b]	Dagne, 2010 (99)	Survey	5024	Ethiopia	3.20 (1.70-4.80)[b]
	Asfaw, 2013 (101)	Survey	1113	Tigray	3.38 (1.8-6.14)[a] 5.66 (2.15-14.87)[b]
	Mekonen, 2003 (100)	Survey	7,978	Ethiopia	4.0 (2.70-5.90)[b]
	Birmeta, 2013 (141)	Survey	422	Holeta	2.65 (p<0.05)
Family education (more educated)	Asfaw, 2013 (101)	Survey	1113	Tigray	1.30 (0.99-1.75)
	Dagne, 2010 (99)	Survey	5024	Ethiopia	10.95 (5.20 -23.07)
Wealth (rich than poor)	Dagne, 2010 (99)	Survey	5024	Ethiopia	3.70 (2.70-4.80)
	Worku, 2013 (76)	Survey	384	Gondar	0.83 (0.54, 1.27)
	Birmeta, 2013 (141)	Survey	422	Holeta	6.85 (p<0.05)

Among socio-demographic predictors, marital status and residence were two variables in this category that predicted mothers' utilisation of antenatal care (99, 100). There is consistent evidence that antenatal care utilisation by skilled personnel among rural women was very low compared to urban residents (99, 144). Mothers living in urban areas attended antenatal care by skilled persons two to nine times more than those residing in rural areas do (99, 100). Studies conducted in Tigray areas and all over Ethiopia, show that married women had greater odds of attending antenatal care than unmarried ones (100).

The high disparity in antenatal care utilization among rural and urban women may be related to low education level of mothers in rural areas and lack of access to health services for rural mothers compared to urban residents. Table 4 below is a summary of a relatively consistent set of predictors of antenatal care utilisation.

Table 4 summary of potential risk factors of access to antenatal care utilization

	Identified risk factors	Total number of studies	Number of studies finding association	
		n	n	%
1	Age	6	3	50.0
2	Parity	6	1	16.7
3	Education (secondary schooling	5	4	**80.0**
4	Marital status	4	2	50.0
5	Occupation	4	2	50.0
6	Intended pregnancy	3	3	**100.0**
7	Religion	3	1	33.3
8	Distance	2	1	50.0
9	Perinatal complications	2	1	50.0
10	Media Exposure	2	2	**100.0**
11	Residence	2	2	**100.0**
12	Increased Wealth/income	2	2	**100.0**

As shown in 4 above, increased educational level, intended pregnancy, urban residence, having media exposure and increased income or wealth index were positively associated with antenatal care utilisation while increased parity was associated with reduced antenatal care utilisation. On the other hand, evidences about the association of age, marital status, occupation, religion and distance were inconsistently associated with antenatal care utilisation.

2.4.2. Potential common risk factors of antenatal depression and ANC use

In order to identify potential confounders, literature was also reviewed to investigate whether those predictors of the outcome variable summarized in Table 4 above would predict exposure variable (antenatal depression). Among socio-economic factors, lack of education was associated with antenatal depression (83) while it was associated with reduced antenatal care utilization (27, 28, 78, 99, 100, 140, 141). Increased income was associated with increased antenatal care utilization (99) while it was associated with reduced antenatal depression (11, 83). Rural residence was associated with increased depression (11, 45) and reduced maternal health care use (99, 144). Being married was associated with increased antenatal care use (100) and reduced odds of having antenatal depression in Ethiopia (45, 83). Social factors such as negative life events and poor social support (48) influenced antenatal care attendance (48, 83) as well as depressive symptoms (45, 47). Unintended pregnancy was associated with increased maternal depression (45, 48) and reduced antenatal

care use (143). Intimate partner violence was associated with increased antenatal depression (11, 45, 48, 51, 83) while no study was found to demonstrate its association with maternal health care use. But, the effect of maternal age, parity, ethnicity, ANC attendance and abortion on depression were found to be inconsistent (48) though younger age was reported to be a risk factor for antenatal depression (48) and increased antenatal care use (141, 143).

2.4.3. Risk factors of institutional delivery

In 17 articles obtained from electronic search, 36 factors that were supposed to affect skilled delivery care utilization of the mothers were identified. But, only 20 of those factors were most relevant and reported in more than one study. Higher level of education (27, 28, 78, 128, 140, 143, 145), having experience of attending antenatal care (27, 78, 128), women with more autonomy, higher level of husband education, higher wealth index (34, 128), more media exposure and experience of obstetric complications were associated with increased use of skilled delivery care in health facilities. Variables related to socio-economic, socio-demographic, obstetric issue, healthcare service characterstics and cognitive and cultural barriers were associated with institutonal delivery care use.

Socio-economic factors and Delivery Care Utilization: The comparison of socioeconomic factors against delivery care utilization by skilled personnel has also indicated that higher education was consistently associated with two to six times increased attendance of delivery care by skilled personnel (27, 28, 78, 128, 140, 143, 145). Furthermore, increased educational level of the family like that of the husband was associated with increased delivery care utilization of skilled assisted delivery care (78). Studies in Gondar and Afar region had found owning TV and increased income were also associated with increased use of skilled assisted delivery care (34, 128).

Table 5 Socio-demographic factors of Delivery Care Utilization

Demographic factor	Study Design	Design	Sample size	Setting	Odds ratio (95% CI)
Urban residence than rural	Abebe, 2012 (27)	Survey	324	Bahirdar	3.6 (1.4-9.0)
	Amano, 2012 (78)	Survey	855	Arsi	2.27 (1.17, 4.40)
	Mekonen, 2003 (144)	Survey	1401	SNNPR	*Higher for Urban
	Fikre, 2012 (146)	Survey	506	Oromia	32.30(17.84, 58.50)
	Abera, 2011 (28)	Survey	1089	Arsi	8.50 (5.10,13.9)
	Survey (128)	Survey	1065	Dabat	8.8 (5.32, 14.46)]
	Birmeta, 2013 (129)	Survey	1,242	North	0.30 (0.08, 1.04)
Religion Christianity to Muslim	Fenta 2005 (34)	Survey	642	Afar region	2.77 (1.80,4.27)
Age (women of age <20 years	Amano, 2012 (78)	Survey	855	Arsi	6.06 (1.54, 23.78)
Education of mothers (Secondary Schooling than illiteracy)	Abebe, 2012 (27)	Survey	324	Bahirdar	4.20 (1.63-11.27)
	Asres, 2008 (140)	Survey	554	SNNPR	3.26 (1.51-7.06)
	Regassa, 2011 (143)	Survey	1094	Sidama	*Higher for literates
	Amano, 2012 (78)	Survey	855	Arsi	4.31 (1.62, 11.46)
	Abera 2011 (28)	Survey	1089	Arsi	6.90 (1.7,12.8)
	Mengesha, 2013 (128)	Survey	1065	Dabat Gondar	2.80 (1.29, 3.68)
	Fenta, 2005 (34)	Survey	642	Afar region	5.26 (3.12,8.92)
	Asfaw, 2010 (101)	Survey	1113	Tigray	6.00 (2.15-14.87)
	Mekonen, 2012 (145)	Survey	478	Afar	*Better in educated
	Dagne, 2010 (99)	Survey	5024	Ethiopia	3.20 (1.70-4.80)
	Teferra, 2012 (77)	Survey	371	West Gojjam	11.98(3.46, 41.40)
	Nigussie, 2004 (129)	Survey	1,242	North Gondar	2.3 (1.13, 4.9)
	Birmeta, 2013 (141)	Survey	422	Holeta town	3.60 (p<0.01)
Work status (working)	Dagne, 2010 (99)	Survey	5024	Ethiopia	1.20 (1.00-1.40)
Family education (literate than illiterate)	Amano, 2012 (78)	Survey	855	Arsi	2.77 (1.07, 7.19)
	Asfaw, 2013 (101)	Survey	1113	Tigray	6.1 (1.90-11.18)
	Dagne, 2010 (99)	Survey	5024	Ethiopia	1.50 (1.30-1.80)
	Nigussie, 2004 (129)	Survey	1,242	North Gondar	10.8 (6.5, 18.4)
Wealth index (higher wealth index)	Fenta, 2005 (34)	Survey	642	Afar region	2.59 (1.55,5.00)
	Worku, 2013 (76)	Survey	384	Gondar	1.21 (0.71, 2.05)
	Mengesha, 2013 (128)	Survey	1065	Dabat Gondar	2.5 (1.32, 4.76)]
	Dagne, 2010 (99)	Survey	5024	Ethiopia	3.70 (2.70-4.80)
	Nigussie, 2004 (129)	Survey	1,242	North Gondar	25.00 (12.50, 50.00)
	Birmeta, 2013 (141)	Survey	422	Holeta town	2.69 (p<0.001)

** Actual odds ratio figures not given; * p<0.05*

In a study in Oromia, educational level of mothers was positively associated with utilization of institutional delivery services (146). However, it has been found in one of the studies in Ethiopia (99) that secondary schooling of the mother was not significantly associated related with use of delivery care assistance in the rural sample. This may be due to small sample size in secondary schooling in rural areas.

Socio-demographic factors of Delivery care utilization: Just like antenatal care utilization, urban mothers attend birth by skilled personnel in healthcare facilities two to nine times more than rural women do (27, 28, 78, 100, 128, 146). This may be due to better access of health service and education in urban areas than rural areas. Rural residence is consistently reported with increased home delivery. Though not consistent, religion and age of the mother were also associated with delivery care utilization by skilled personnel (34, 78).

2.4.4. Obstetric Factors Affecting Delivery Care Utilization

Among obstetric factors, delivery service utilization by skilled personnel in health facilities was three to five times greater among women with experience of ANC attendance than women without experience of antenatal care (27, 78, 101, 128). On the other hand, antenatal care utilisation in Afar region was found to be associated with reduced delivery care utilisation in health facilities (34). A study in Oromia region has again indicated that antenatal care utilisation did not show significant relationship with delivery care utilization in health facilities (146). This exceptional finding in Oromia and Afar studies may be due to methodological variations.

The Oromia study and others also show that pregnancy related health problems, previous history of prolonged labor, and decision made by husbands or relatives showed significantly positive association with utilisation of institutional delivery services (146).

Table 6 Obstetric factors affecting Delivery Care Utilization

Obstetric factors	Author	Study Design	Sample size	Setting	Odds ratio (95% CI)
Antenatal care attendance compared to non-attendance	Dagne, 2010 (99)	Survey	5024	EDHS	5.10 (3.50, 7.20)
	Assfaw, 2010 (101)	Survey	1113	Tigray	4.60 (1.90, 11.18
	Abebe, 2012 (27)	Case-control	108	Bahirdar	8.70 (2.2, 33.30)
	Amano, 2011 (78)	Survey	855	Arsi	4.18 (2.54, 6.89)
	Abera, 2011 (28)	Survey	1089	Arsi	4.50 (2.20, 8.90)
	Fikrie, 2012 (146)	Survey	506	Oromia	0.98 (0.52, 1.80)
	Fenta, 2005 (34)	Survey	642	Afar region	0.21 (0.13, 0.35)
	Megesha, 2013 (128)	Survey	1065	Dabat	2.8 (1.56, 4.98)
	Assefaw, 2010 (101)	Survey	1113	Tigray	4.61 (1.90, 11.18)
	Birmeta, 2013 (141)	Survey	422	Holeta town	7.40 (p<0.01)
Parity>4	Asres, 2008 (140)	Survey	554	SNNPR	0.21 (0.10, 0.43)
	Dagne, 2010 (99)	Survey	5024	Ethiopia	0.50 (0.40, 0.60)
Parity (low)	Amano, 2011 (78)	Survey	855	Arsi	2.41 (1.17, 4.97)
	Abera, 2011 (28)	Survey	1089	Arsi	0.18 (0.08, 0.42)
	Abebe, 2012 (27)	Case-control	108	Bahirdar	1.30(0.70, 2.40)
	Birmeta, 2013 (141)	Survey	422	Holeta town	2.84 (p>0.05)
Complications	Asres, 2008 (140)	Survey	554	SNNPR	33.78 (16.44, 69.39)

Abbreviation: DHS= Demographic Health Survey; SNNPR=Southern Nations Nationalities and Peoples Region

In addition, beliefs about the causes of disease (101, 139, 147), differences in power among males and females in a family where female headed families had increased delivery care utilisation than male headed families (30, 99, 125), cultural, demographic and economic factors (147, 148) knowledge about signs of obstetric complications during pregnancy (144, 149) affect delivery healthcare seeking behavior of women.

2.4.5. The Effect of Service Characteristics on Delivery Care utilization

Limited facilities with scarce skilled attendants and functional emergency obstetric care services in most LICs are located in urban centers (144, 149) whereas the majority of the population live in rural areas. As a result, rural residence is one of consistently reported factor that is associated with reduced antenatal care utilization of mothers and increased home delivery compared to urban residence (27, 28, 74, 78, 101, 140, 143, 144).

Generally, lack of facilities like transportation and nearby health institutions in rural areas resulted in delays of maternal healthcare seeking and care-seeking for obstetric emergencies increasing (144, 149) preventable maternal deaths. According to the WHO, lack of equity in healthcare resources, efficiency and effectiveness are major challenges among existing scarce

healthcare facilities. In one mixed study design for example, the authors identified lack of appropriate communication, supervision and communication; shortage of budget, geographic terrain, inability to mobilize the community in some areas were found as major problems to improve maternal healthcare utilisation (32).

2.4.6. Cognitive and Cultural barriers of Delivery Care utilization

In addition to socio-economic and demographic factors, there are also cognitive and cultural barriers that impede mothers to use assisted delivery by trained personnel. A mixed design study in Kembata Tembaro (150), a cross-sectional survey in North-west of Ethiopia (77) and the Ethiopian Demographic Survey (6) had reported that some of the reasons for home delivery were the need for closer attention from relatives; considering home as usual place of delivery; experiencing unexpected labor; not being sick at time of delivery; family influence and lack of transportation. Likewise, it had been found in a multilevel analysis in the Gondar study that factors operating at individual level like awareness about the importance of skilled delivery assistance as well as "kebele" level factors play a significant role in determining utilization of skilled maternal health services (75). However, these studies may have recall biases as they were based on retrospective self-reported evidence of the respondents. Inability to judge the severity of morbidities and distance/transport problems were some of the reasons why most of the mothers with obstetric complications were not utilizing delivery care in health facilities (76). A summary list of relatively consistent set of predictors of institutional delivery care utilisation is summarized in Table 7.

Table 7 summary of predictors skilled delivery care utilization of the mothers

	Identified risk factors	Total number of studies conducted	Number of studies finding association	
		n	n	%
1	Education	**12**	11	**91.7**
2	Parity	**9**	5	55.6
3	Age	**8**	1	12.5
4	Antenatal care use	**7**	6	**85.7**
5	Occupation	**7**	4	57.1
6	Residence	**7**	5	71.4
7	Women Autonomy	**5**	4	**80.0**
8	Family Education	**4**	3	**75.0**
9	Religion	**4**	3	**75.0**
10	Wealth/Income	**4**	3	**75.0**
11	Attitude	**3**	2	66.7
12	Distance	**3**	2	66.7
13	Husband Occupation	**3**	2	66.7
14	Marital Status	**3**	1	33.3
15	Media Exposure	**3**	3	**100.0**
16	Abortion	**2**	0	0.0
17	Husband Attitude of ID/ANC*	**2**	2	100.0
18	Knowledge of Danger signs	**2**	1	50.0
19	Obstetric complications	**2**	2	100.0
20	Intended Pregnancy	**2**	2	100.0

* *ID=Institutional Delivery*

2.4.7. Common risk factors of antenatal depression and institutional delivery

Variables that were identified to be associated with institutional delivery care utilisation were also cross-checked to determine if they have association with antenatal depression, the exposure. Among socio-economic factors, lack of education was associated with antenatal depression (83) while it was protective factor for attendance of delivery care by skilled personnel (27, 28, 78, 128, 140, 143, 145). Increased income predicted increased use of skilled assisted delivery care (34, 128) and reduced antenatal depression (11, 83). Among socio-demographic factors, rural residence was associated with increased depression (11, 45) and reduced institutional delivery use (27, 28, 78, 100, 128, 146). On the other hand, younger age increased antenatal depression (48) and so institutional delivery care utilization by skilled personnel (34, 78) while increased parity (27, 99, 140, 141, 143) and increased experience of antenatal care in health facilities (27, 78, 101, 128) reduced institutional

delivery. Education, income, residence and parity were potential confounders of the association between antenatal depression and institutional delivery care use.

2.5. The effect of depression on perinatal complications and outcomes

To determine the effect of antenatal depression on obstetric complications, 21 papers were reviewed. The papers were identified from PubMed, Medline and PsycINFO by using search terms: "antenatal depression" AND "Obstetric Complications"; "antenatal depression" AND "Preterm Birth"; "Antenatal depression" AND "Stillbirth"; "antenatal depression" AND "Abortion". The search result of these four search steps were combined by the Boolean operator “OR”. The search process resulted in 660 articles out of which 613 were excluded at title stage because they were not relevant to our study. Twenty-six of the articles were removed after reading the abstracts and one article (151) was removed after reading the full article because it was about the risk factors of stillbirth excluding depression as a confounding factor. The review was made by using remaining twenty-one articles.

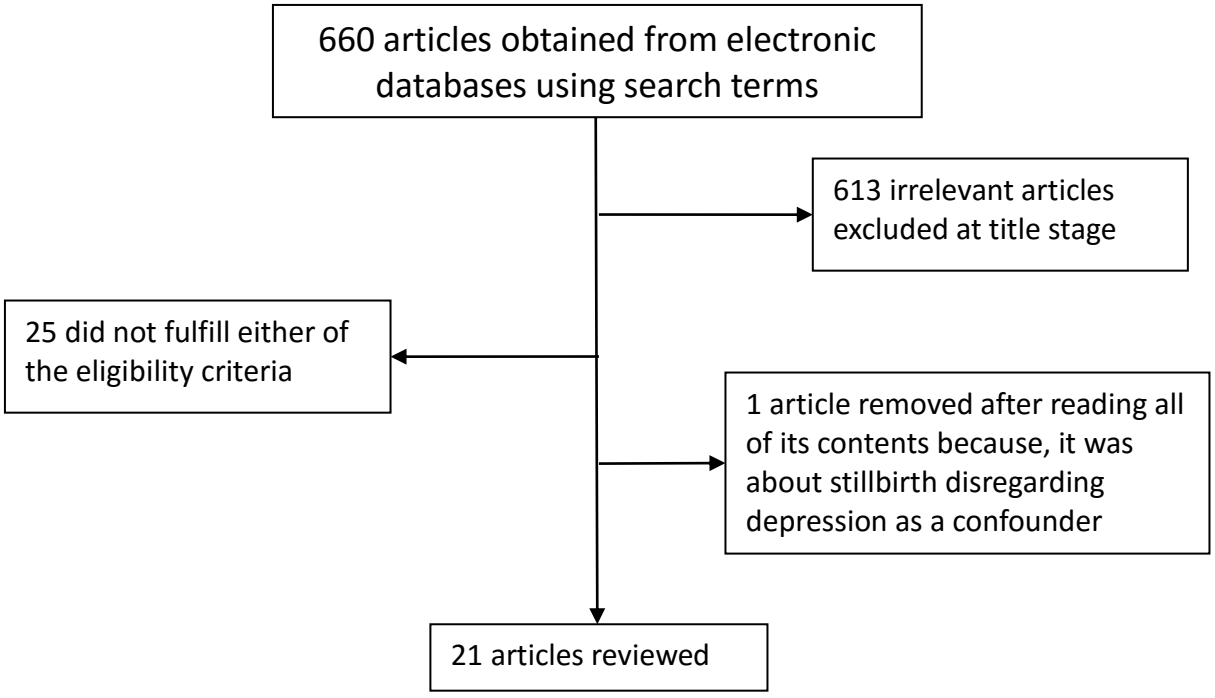


Figure *1 PRISMA diagram*

Among twenty-one articles reviewed, two of them were cross-sectional surveys (152, 153) which had been conducted in USA, three of them were case-controls (67, 69, 94) which had been conducted in Peru, Sweden and China and the remaining 16 of them (37, 38, 61, 62, 64-

66, 73, 114, 123, 154-159) were cohort studies out of which four or one-fourth of them were conducted in developing countries.

There was about two times increased risk of nausea/vomiting (37, 65), prolonged labor (37) and use of drugs and analgesics during pregnancy and during perinatal period (37, 65) compared to women without antenatal depression. Antenatal depression was also associated with increased risk of bleeding, infection, operative deliveries and use of vaginal instruments during delivery (53).

In relation to preeclampsia, studies found inconsistent results. Out of four studies reviewed (37, 62, 67), a prospective population-based study in Finland (62) and a case control study in China (67) found that moderate and major depression were associated with two to three fold increased preeclampsia, which is one of the major causes of maternal mortality in Ethiopia (24). On the other hand, a cohort study reported insignificant association between antenatal depression and preeclampsia (37).

Conversely, a prospective clinical based study in China demonstrated that history of induced abortion was associated with depression in the first trimester (123). Similarly, pre-existing hypertension and diabetes affected antenatal depression in USA (59, 61). Studies have also demonstrated that obstetric complications have increased risk of postnatal depression (152, 155).

In respect to perinatal outcomes, a retrospective clinical based evidence in China reported that current untreated antenatal depression was not significantly associated with perinatal death, pregnancy termination and miscarriages (73). A cohort study in Butajira, Ethiopia and a cohort study in North Carolina have indicated that there was no association between antenatal depression and stillbirth (124). Depression was not also significantly associated with preterm delivery (157).

In respect to how depression affects perinatal outcomes, literatures focus on two hypotheses. The first hypothesis is that depression affects the hormonal system through-hypothalamus-pituitary-adrenal axis, which then affects the biochemical of the body that may affect the uterine environment such as the corticotrophin hormones, serotonin and cortisol levels (114, 160). The second hypothesis assumes that depression affects the physical (114), social (87) and psychological functioning (42, 53) of women by distorting the women's ability to

function and cope in the environment. The implication is therefore, as the woman's coping skills and cognitions are distorted by depression, she becomes vulnerable to accidents and physical illness that may affect her uterine environment.

Table 8 The association between Antenatal depression and perinatal outcomes

Obstetric complications	author	Study Design	Sample size	Setting	Association	Design
Spontaneous Abortion	Ban, 2012 (73)	Cohort		UK	Yes	Cohort
	Josefsson, 2002 (94)	Case control	132	Sweden	No	Case control
	Huang, 2012 (123)	Cohort	7017	China	No	Cohort
Preterm deliveries	Suezanne, 2001 (158)	Longitudinal	1,399	France	Yes	Longitudinal
	Savitz, 2001 (157)	Cohort	1962	North Carolina	No	Cohort
	Alder, 2011 (65)	Cohort	137	Switzerland	Yes	Cohort
	Benute, 2010 (154)	Cohort	326	Brazil	No	Cohort
	Dayan, 2002 (38)	Cohort	634	France	Yes	Cohort
	Field,2010 (114)	Case control	676	Peru	Yes	Case control
	Suzanne, 2001 (157)	Cohort	1499	Maryland	Yes	Cohort
	Suri, 2007 (159)	Cohort	90	California	No	Cohort
Prolonged labor	Hanlon, 2009 (41)	Cohort	1065	Butjira	Yes	Cohort
	Qiao, 2012 (66)	Cohort	546	China	Yes	
Stillbirth	Hanlon, 2009 (41)	Cohort	1065	Butajira	No	Cohort
	Ban, 2012 (73)	Cohort	512,574	UK	No	Cohort

Most studies, however, were carried out in high-income countries where there are relatively low adverse perinatal coutcomes. Furthermore, pre-existing obstetric complications were not controlled for in most studies.

There are various factors that can affect perinatal complications. In line with this, a cohort study in Miami from the national statistics has found that increased maternal age (35 and more) was associated with increased chronic hypertension, diabetes, primary Caesarean section, excessive labor bleeding, pregnancy hypertension and preterm birth (161).

Similarly, a systematic review of studies from high-income countries has indicated that advanced maternal age is associated with increased stillbirth, low birth weight and preterm delivery (162). In other studies, it has been consistently found that increased pregnancy complications and outcomes are associated with increased intimate partner violence (163). The authors have reported that women who suffer physical violence face two to three times increase in Cesarean delivery, fetal distress, premature rupture of membrane, low birth weight and preterm birth (163). History of adverse perinatal outcomes like stillbirth also

predicted increased risk of miscarriage, preeclampsia, low birth weight, induction of labor, emergency and elective Caesarean section, and still births compared with the control-group (151).

2.6. Conceptual and Theoretical Framework

Health behaviors are actions that either prevent diseases or maintain the wellbeing of the individuals (139). Health-seeking behaviors can be either health promoting behavior or behavior that helps prevent health risk behaviors like substance abuse. Understanding ways of promoting desirable health behaviors and preventing undesirable or health risk behaviors among the members of the society is important (139, 164). Behaviorists focus on the role of reinforcement such as providing effective and quality services at low cost in order to encourage mothers to seek health care services (12, 164). However, behavioral theories disregard the individuals' capacity to decide and take care of themselves.

Unlike behaviorists, the social cognitive theories assume humans as capable of constructing personal beliefs and attitudes that govern their health behaviors. The proponents of these theories like Albert Bandura believe that there is a continuous, dynamic interaction between the individual, the environment, and behavior (165), where the individual learns health promoting behaviors from the environment through observation (30, 139).

Health Belief Model is another cognitive theory of health seeking behaviors. It assumes that individual perceptions about severity of illness, susceptibility to illness, and perceived benefits of taking recommended actions mediated by the socio-economic and demographic factors are determinants of one's health behaviors (12, 139). However, cognitive theories also focus only on personal cognitive factors of health behaviors ignoring institutional and political factors. Thus, the most comprehensive model of health behaviors that we preferred to use for this study and thesis was the ecological model. The ecological model assumes that health behavior is multi-dimensional and affected by multi-level factors (personal, family, community level factors as well as governmental policies).

The model below involves four categories of variables: antenatal depression, healthcare utilization, perinatal complications and the modifiers. The antenatal depression is an independent variable, which influences both healthcare utilization behaviors and so pregnancy outcomes. The three main variables (antenatal depression, healthcare utilization

behaviors and perinatal complications) are mediated by modifying or barrier variables. Each of the four variables is explained as follows.

Antenatal Depression: An independent variable that is hypothesized to influence health seeking behaviors of mothers, their perinatal complications as well as outcomes.

Health seeking behaviors: This variable includes Antenatal care attendance, institutional delivery care utilization, postnatal care utilization and emergency healthcare seeking behaviors of the mothers during pregnancy and at postpartum. Antenatal care attendance according to WHO refers to attendance of counseling service and medical check-ups for the health of the mother and the unborn baby. WHO recommends at least four antenatal care attendances initiated within 16 weeks of gestation for each mother throughout pregnancy where, two of them are at the final week of pregnancy. There are two dimensions in antenatal care: timing (initiation of antenatal care and frequency or the number of ANC visits. Kotlchuk's (134) measure of adequacy of ANC is a measure of the two dimensions of ANC. According to Kotlchuk's Index (KI), ANC is said to be adequate when a woman attends at least 50% of expected ANC attendances and initiates ANC within 16 weeks of gestation (134). The intention of antenatal care is to check for the wellbeing of the mother and the fetus. Evidence has been documented that antenatal care at the health facility reduces maternal mortality and morbidity (10).. The second subcategory of health behaviors is uptake of institutional delivery that refers to women's giving birth in healthcare facilities assisted by skilled personnel instead of delivering at home. It was classified as home delivery or institutional delivery. Third, postnatal care refers to the use of postnatal services, in which at least two checkups after birth are recommended to assess the health of the mother and the neonate regardless of sickness. Finally, emergency healthcare seeking behaviors refer to health seeking behaviors of mothers from a list of traditional and modern healthcare providers for any type of illness because of emergencies during their pregnancy. Birth preparedness refers to a preparatory activity of selecting a skilled birth attendant, arranging articles needed for safe birth, identifying where to go in case of emergencies, and arranging money and transport for safe delivery.

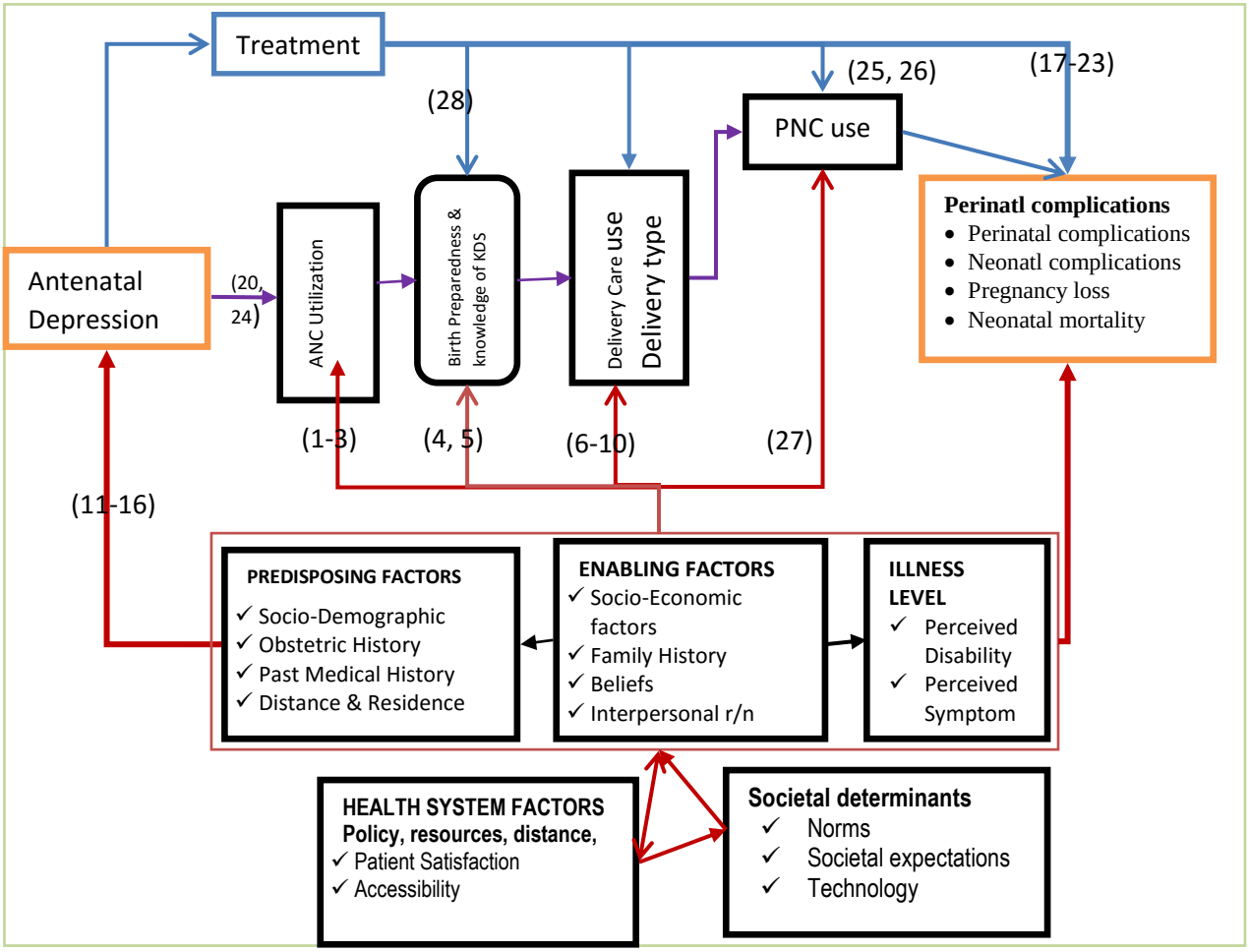


Figure 2. A conceptual framework of the effect of antenatal depression on access to health care and perinatal complications; Numbers are references for the individual paths.

Perinatal complications and outcomes: is one of the outcomes and relates to observations during pregnancy, delivery and during postpartum periods as determined at the follow up assessment. It includes both perinatal complications of the mothers and the neonates. Perinatal complications consisted of a selected list of danger signs that are easily recognized by non-clinical persons and which may be indicative of perinatal complications during pregnancy as well as delivery and postpartum. The perinatal outcomes related to the neonate in this paper refer to outcomes on the fetus or the neonate.

Potential confounding variables: These variables include different categories of variables that could act as confounders or modifiers of the relationship between antenatal depression and the two major outcome categories: health seeking behaviors of the mothers as well as perinatal complications.

Different researchers have categorized these variables in different ways. Some have categorized them as demographic, socioeconomic, cultural and structural variables. Others have categorized them as patient related and service related. Authors like Babaloa in Nigeria, have classified them as individual level factors, household level factors, structural factors and community level factors (31). Anderson and Newman (2005) had sub-classified individual level variables into three subcategories: predisposing factors, enabling factors and perceived illness level factors. The predisposing factors include socio-demographic factors (age, marital status, religion, ethnicity), family interactions (intimate partner violence, social support, women's autonomy), life threatening events, substance abuse, pregnancy intention, beliefs (perceptions about causes of illness and treatment options, pregnancy intention and knowledge about obstetric complications) and obstetric history as well as past medical history (166).

The enabling factors include socio-economic factors such as income, education, occupation and wealth as well as community issues like residence. These variables enable the predisposing factors to have influence over the main exposure variable. The perceived illness level factors include factors such as perceived disability and perceived symptoms of illness that encourage mothers to utilize maternal health services.

2.7. Concluding remarks: the evidence gap

There is consistent evidence about the effect of antenatal depression on hypertensive disorders, prolonged labor and increased use of Caesarean Delivery. There is also consistent evidence about the impact of a history of adverse perinatal outcomes on antenatal depression while evidence supporting the reverse is inconsistent.

There are only a few studies from high-income countries to demonstrate the impact of antenatal depression on antenatal care utilisation. Some of these studies were small sample studies; had high non-response rate and/ or did not control potential confounders like comorbid illnesses and pregnancy complications. On top of this, most existing studies in Ethiopia including EDHS used one-dimensional measurement of antenatal care utilization which is not a recommended way of measuring adequacy of antenatal care (134). Currently, the Kotlchuk's two-dimensional Index has been in use since 1994 to measure the adequacy of antenatal care.

The potential impact of antenatal depression on uptake of institutional delivery is not documented. We could find only one study that investigated the impact of antenatal depression on uptake of institutional delivery. The study needs to be replicated since it didn't control for some important potential confounders and it didn't distinguish planned versus emergency institutional delivery. Thus, further replication of the association between antenatal depression and maternal healthcare utilization (antenatal care use, uptake of institutional delivery and postnatal care utilisation) is important in LMICs settings controlling potential confounders identified in the literature review section. Because of poor maternal healthcare services and poor maternal healthcare records in LMICs settings in general, no adequate studies were documented about the impact of antenatal depressive symptoms on perinatal complications. In this thesis report, we documented the impact of antenatal depressive symptoms on maternal healthcare utilisation and perinatal complications.

3. OBJECTIVES OF THE STUDY AND RESEARCH QUESTIONS

3.1. General Objective

The general objective of this study is to examine the impact of antenatal depression on health care utilization (antenatal care utilisation, emergency healthcare utilisation during pregnancy, uptake of delivery and postnatal care utilisation) and perinatal complications of women. There were three sub-studies that are linked to three specific objectives, which have been listed below.

3.2. Specific Objectives

Specifically, the study was guided by the following specific objectives that are linked to three sub-studies.

1) To examine the association of antenatal depressive symptom with antenatal care utilisation, specifically initiation, and adequacy of antenatal care utilisation and emergency help seeking behaviours during pregnancy **(Sub-Study-I)**
2) To investigate the impact of antenatal depressive symptoms on uptake of institutional delivery (pre-planned and emergency) and postnatal care utilization **(Sub-Study-II)**
3) To examine the impact of antenatal depressive symptoms on perinatal complications **(Sub-Study-III)**

3.3. Research Questions

The following basic questions were raised.

Sub-study I:

1. Does antenatal care utilisation significantly differ among women as a function of antenatal depression?
    a. Does the women's initiation and the adequacy of antenatal care utilisation significantly differ as a function of antenatal depression?
    b. Does the number of unscheduled and total number of antenatal care visits differ for women with and without antenatal depressive symptoms?
    c. Do women's pregnancy related emergency help seeking behaviours differ between women with and without antenatal depression?

Sub-study II

2. What is the impact of antenatal depression on the uptake of institutional delivery and on postnatal care utilization?
    a. Is there any significant difference in respect to uptake of institutional delivery as a function of antenatal depression?
    b. Among women who delivered in health facilities, do antenatal depressive symptoms predict greater odds of emergency institutional delivery compared to planned institutional delivery?
    c. Does postpartum care utilization (initiation, frequency) significantly differ among women with and without antenatal depression?

Sub-study III

3. What is the impact of antenatal depression on perinatal complications?
    a. Do self-report of perinatal complications of women significantly differ between women with and without antenatal depression?
    b. Do adverse perinatal outcomes related to neonates differ as a function of antenatal depression?

4. METHODS

4.1. Setting

The study was conducted in Sodo district, Gurage Zone, Southern Nations Nationalities and People's Region (SNNPR) of Ethiopia. The Sodo District is located about 103 km south of the capital of the country, Addis Ababa. The Sodo district is divided administratively into 58 kebeles or sub-districts, the smallest administrative unit in Ethiopia. Most of the sub-districts of Sodo are rural except four urban sub-districts located on the main road from Addis Ababa to Hawasa, the capital of SNNPR.

The population of the district was estimated to be 161,952 persons (79,356 men; 82,596 women) in 2007 with only 7% percent of the population in urban areas (167). The majority of the inhabitants belong to the Sodo Gurage ethnic group (85%) (168, 169). The remaining population is mostly Oromo and Amhara in ethnicity (169). The official language of the region and the district is Amharic.

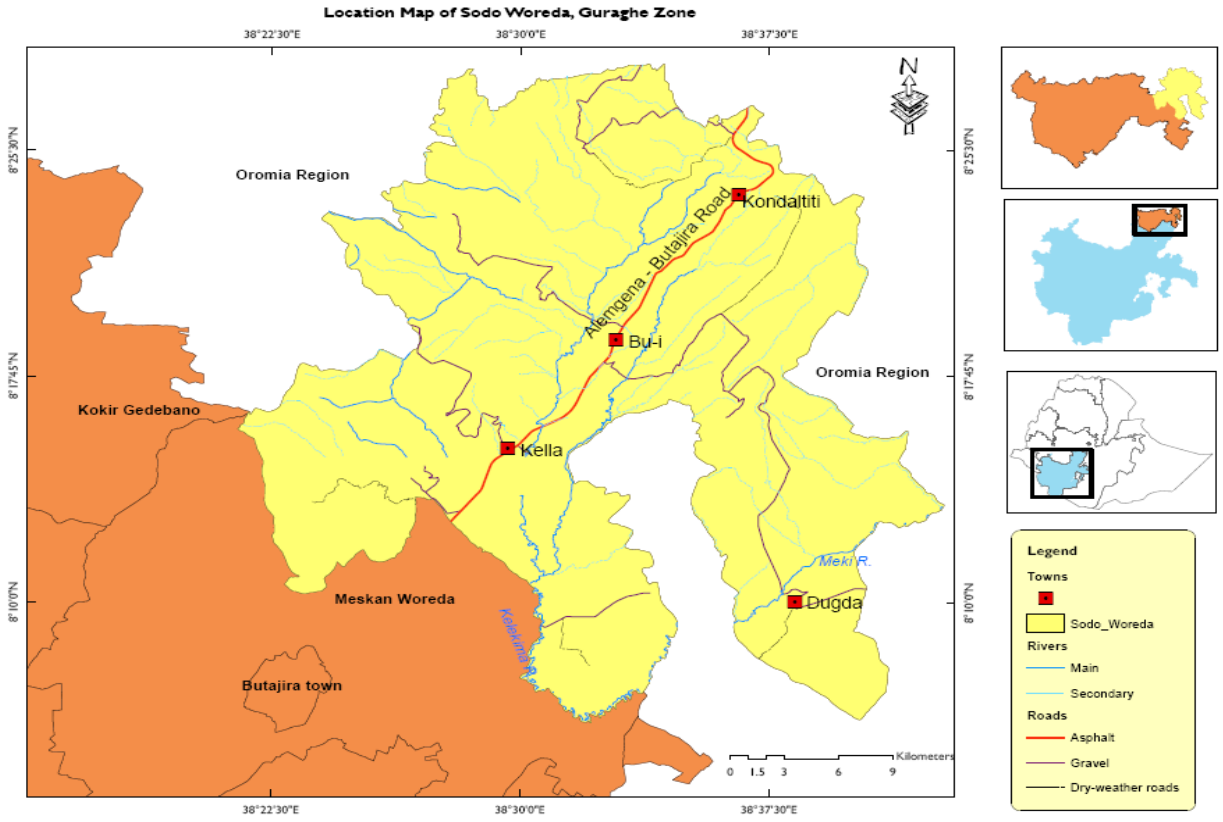


Figure 3. Map of study area

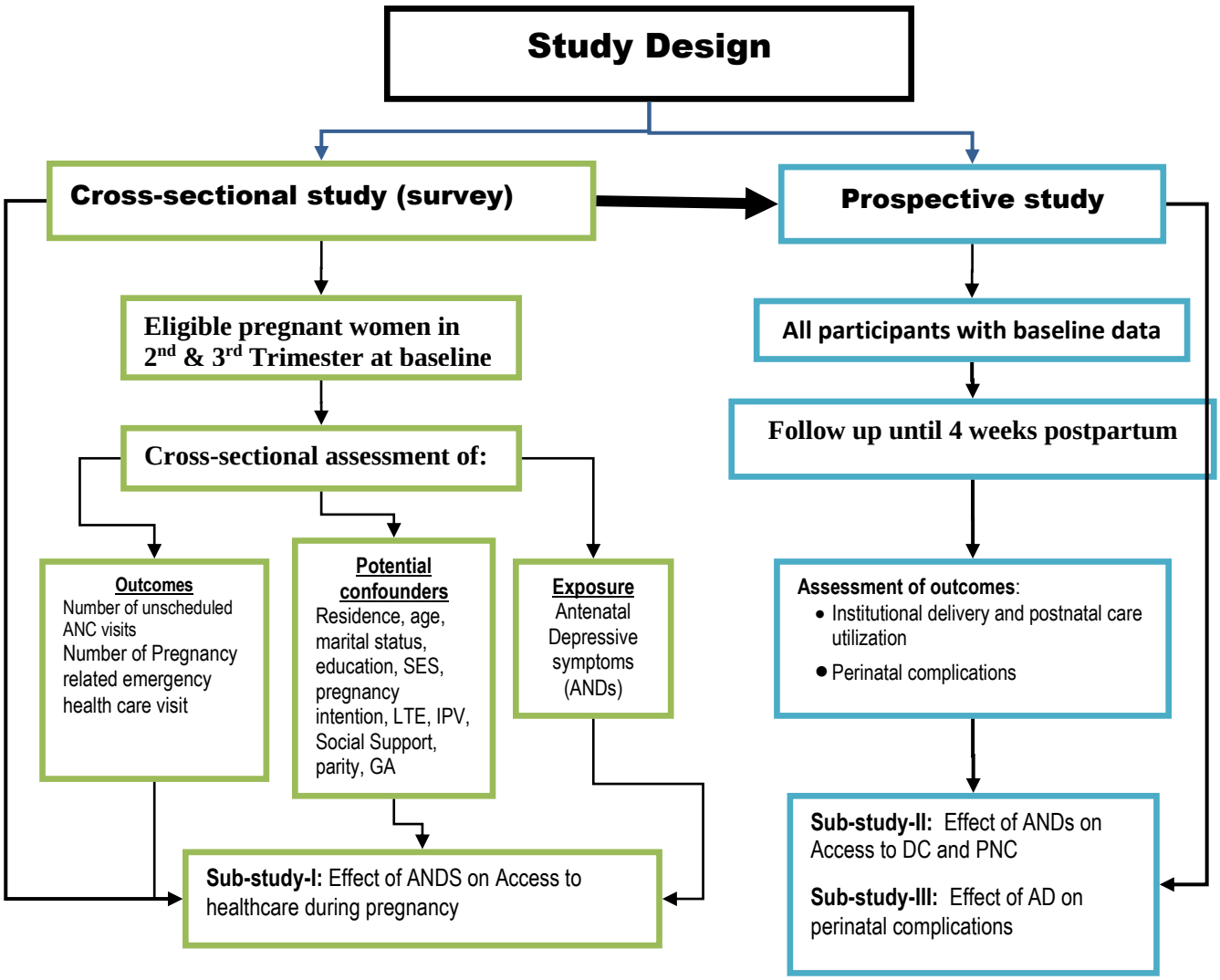
There is varied topography in Sodo (40% plains, 7% mountainous, 30% undulating and 23% valleys). Small-scale farming, cattle breeding and trading is main mode of subsistence in the area. “Enset” (false banana) is common in the area especially in the highlands of Sodo. Enset is a drought resistant plant, which is relatively easy to grow. It is very common plant in the Gurage community in general whose roots or lower parts of stem are processed to convert it into edible food. However, the process of converting enset into food is very labor intensive. Production of teff, wheat, sorghum and legumes also take place in the lowland areas of Sodo.

The district has been characterized by relatively low primary school enrollment (41%) and a relatively low total fertility rate (3.5 per women) compared to the national total fertility rate (4.6 children per women) (8) or compared to total fertility rate in Burji Zone in the same region where total fertility rate is estimated to be 7.3 per woman (169). There are eight health centers (primary health care facilities), and a newly established district level hospital. Every sub-district has a health-post (a grass root level health facility) that is staffed by two female Health Extension Workers (HEWs). Through home-to-home visits, HEWs are tasked with community health education and promotion activities. They also are key community level healthcare staff who facilitate family planning, immunizations and monitor maternal health care services (antenatal care, delivery care and postnatal care) of the mothers and maintain maternal healthcare records in health posts. In support of these activities, HEWs coordinate with the health education volunteers, a community-based network of health education volunteers, each of whom supports five families. The members of the health education volunteers are required to notify HEWs of all pregnant women in their respective areas.

Sodo is also a location where the PRIME-Ethiopia (Program for Improving Mental Healthcare) is implemented. PRIME is a UK funded project aimed to generate evidence for the best approaches for integrating mental healthcare in primary healthcare facilities for selected priority disorders: psychosis, depression, alcohol abuse and epilepsy (170). With the consideration of non-existence of perinatal mental health services, the programme also aimed at integrating maternal mental health with an emphasis on the unique needs of women in the perinatal period (170). This PhD project was nested within the PRIME project as the independent work of the candidate. Before implementation of PRIME mental healthcare, psychiatric patients were refered to neibouring district hospital for mental healthcare.

4.2. Study Design

A population-based study was employed consisting of an initial cross-sectional survey followed by a prospective follow-up of women with probable antenatal depression and their controls (women without probable antenatal depression).



SES=Socio-economic status; IPV=Intimate Partner Violence; OCs= Obstetric complications; ANC= Antenatal care Utilisation; ANDs = Antenatal Depressive Symptoms

Figure 4. Study Design

In total there were three sub-studies, as indicated above. In sub-study-I, the potential impact of antenatal depressive symptoms on access to maternal healthcare service utilisation during pregnancy was evaluated cross-sectionally. In sub-study-II, the potential impact of antenatal depressive symptoms on institutional delivery and postnatal care service utilisation was

assessed prospectively. In sub-study-III, the potential impact of antenatal depressive symptoms on perinatal complications was assessed as part of the prospective study (Figure 4).

4.3. Sample Size Determination

EpiInfo version 7 software (EpiInfo; CDC, 2000) was used to estimate the sample size assuming a statistical power of 80% with a two tailed 5% margin of error for three dependent variables (ANC use, delivery care use and composite pregnancy complications). The following requirements and assumptions were used for the sample size estimation for a two-tailed confidence level of 95%;

(1) a statistical power of 80%,

(2) a 19.9% prevalence of antenatal depression by using EPDS at cut off 13 or more (44)

(3) a 11.7% utilization rate of skilled delivery care in the general sample (6) and 34% antenatal care utilisation (6)

(4) a 10% difference in uptake of institutional delivery among exposed and unexposed, which was supposed to be clinically significant;

(5) 2:1 ratio of non-exposed (non-depressed) to exposed (depressed) women. A two to one ratio for women with and without antenatal depressive symptoms was used based on the rates of antenatal depression cited in the literature for LMICs settings (43-45, 49-51).

Outcome Variable	outcome in unexposed	Expected difference	Unexposed: exposed	1-β	A	Sample size		
						exposed	unexposed	Total
Antenatal visits	34%	10	2:1	80	.05	**276**	551	**827**
Skilled Delivery care use	11.7%	10	2:1	80	.05	151	301	452
One or more Adverse Maternal or perinatal Outcomes	25%	10	2:1	80	.05	240	479	719
Total number of women to be screened for antenatal depression at baseline to get 276 women with antenatal depression (276/19.9% = about 1387 assuming 19.9% prevalence of antenatal depression)								1387

With the above assumptions, ANC utilization as the dependent variable yielded the greatest sample size: 276 women with depressive symptoms, the exposure or independent variable. To obtain 276 pregnant women with antenatal depressive symptoms, assuming a prevalence of 19.9% (44), 1387 pregnant women needed to be screened for depression.

Thus, the largest sample of women with exposure was obtained when attendance of antenatal care was assumed as primary outcome variable than considering neither of the other two outcomes. Therefore, about 1,387 (276/19.9%) women were estimated to be screened for antenatal depression to obtain the required number of women with exposure (276 women with antenatal depressive symptoms).

4.4. Sampling Method

A total of 1355 antenatal women were identified within three months between September and November 2014 out of which 44 women were within the first trimester of pregnancy and were not eligible within the limited recruitment period. Thus, the remaining 1311 eligible antenatal women were recruited using complete case sampling until the sample size approaches the estimate within the three months period. Thus, the remaining 1311 eligible antenatal women were screened for antenatal depressive symptoms and were assessed for baseline characteristics during pregnancy. All of the 1311 baseline participants formed the cohort for prospective studies (171).

During follow up, 11 women from the initial sample refused follow-up interview; 27 were lost to follow up; 30 didn't deliver until the end of the follow up time and one died during labour. Thus, a total of 1,240 women were interviewed at a median of 8th week after delivery (with interquartile range of 6-11 weeks after delivery). However, 11 more postnatal women from those that were not available for face-to-face interview were accessible by telephone, and were interviewed about delivery setting and mode of delivery. Thus, a total of 1251 participants were prospectively interviewed about delivery setting and mode of delivery with follow-up attrition rate of 4.6% as shown in Figure 5. Thus, the participants lost to follow up in sub-study II constituted: 24 who didn't deliver until end of the follow up time; 22 not identified after birth; 11 refused follow up interview; one died during labour and two who had missing data for outcome measures (Figure 5).

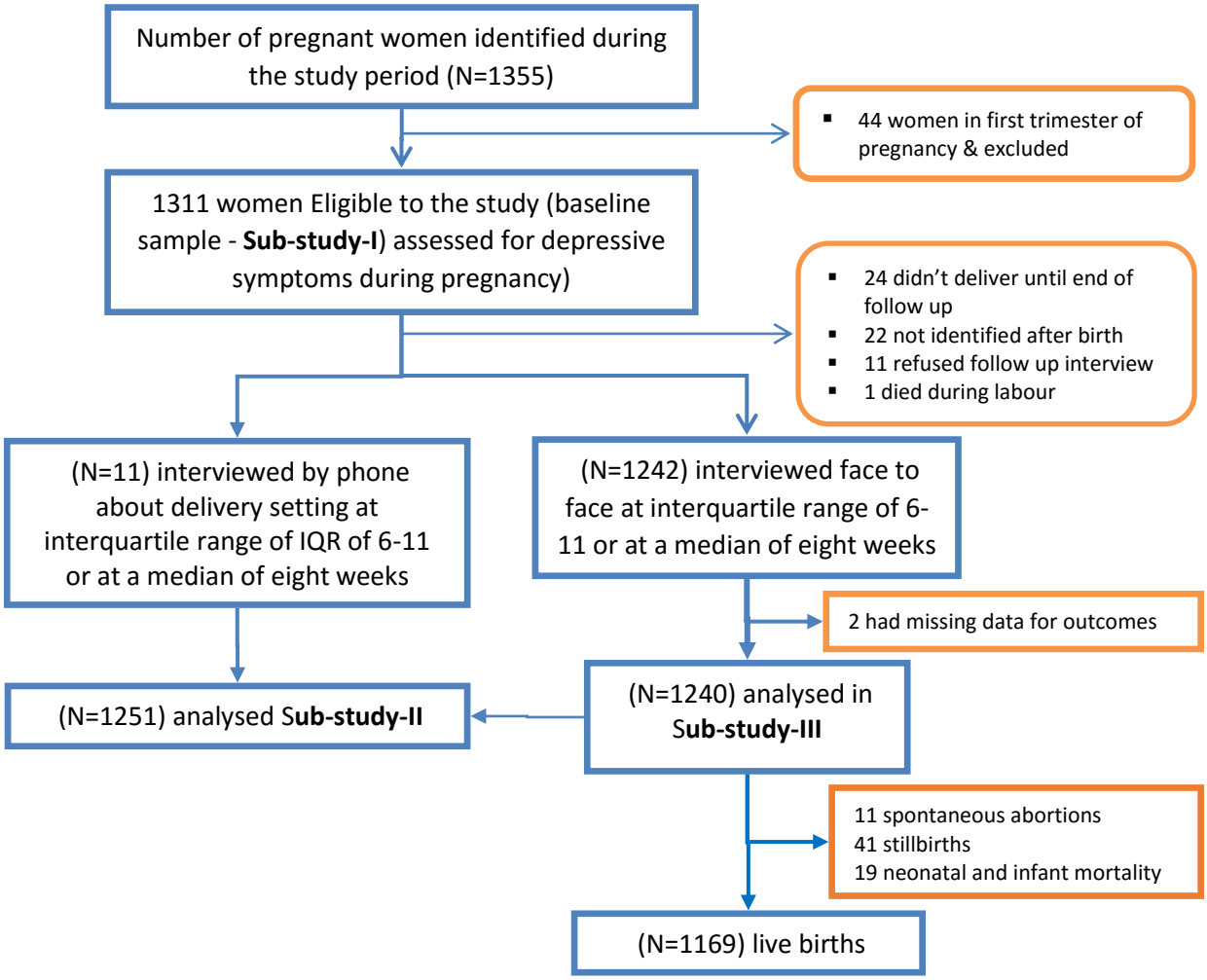
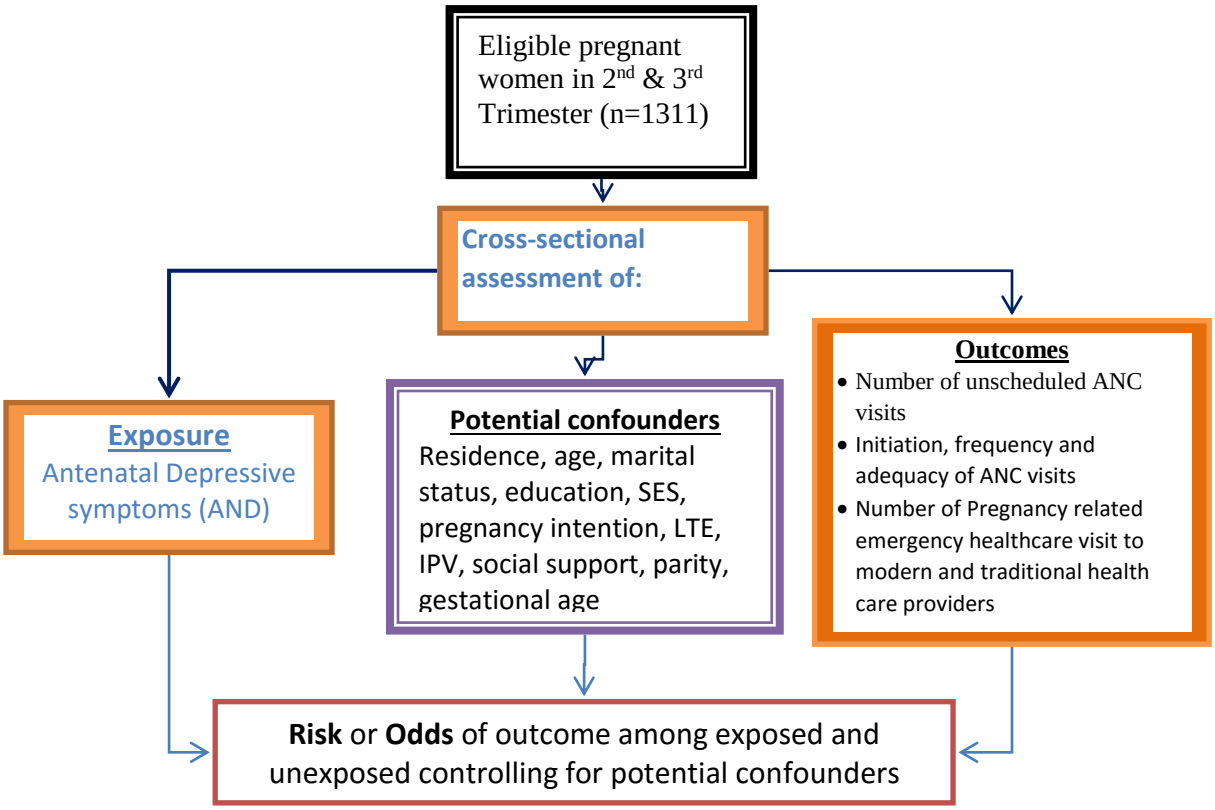


Figure 5. Participant recruitment and follow up flow diagram

4.5. Sub-study I: Initial Cross-sectional Survey

A cross-sectional evaluation of baseline population-based data allowed examinination of the association between antenatal depressive symptoms and maternal healthcare utilisation during pregnancy (Figure 4). The spectrum of maternal healthcare utilisation during pregnancy includes antenatal care utilisation (timing, frequency and adequacy) and pregnancy related emergency healthcare utilisation (Figure 5).



KEY: SES=Socio-economic status; IPV=Intimate Partner Violence; OCs= Obstetric complications; GA= Gestational Age; LTE= Life Threatening Events

Figure 6 A diagram of cross-sectional study design

4.5.1. Study Participants

Pregnant women in the second or third trimester who were living within Sodo district were potential participants. Eligibility criteria for participation in the study included: (1) being in the second or third trimester of pregnancy; (2) permanent residence as defined by continuous residence in the area for at least the preceding six months; (3) no hearing or cognitive impairment that would affect their capacity to communicate adequately and; (4) the ability to provide informed consent. The Civil Code of Ethiopia stipulates that a person under age of 18 is legally minor and be under administration of the guardian. But, it has been stated in the Ethiopian civil code (172) that the legal minority of such person is not applicable when a person gets married. Furthermore, a minor of 15-18 years is entitled to be legally capable with the decision of a family council (172). As a result, pregnant women above 15 years of age were also included in the study considering the lower average age of marriage in the study area, which is about 16 years (169).

4.5.2. Procedures of Participant Identification

HEWs, health education volunteers, community leaders and pregnant women themselves acted as key informants to identify all pregnant women living in their sub-district and these women identified by the key informants formed a sampling frame. The data collectors then carried out home visits to the identified pregnant women, gave them information about the study, obtained informed consent and then conducted the interview. A minimum of three visits were carried out before considering participants 'unavailable' or 'unidentifiable'.

4.5.3 Outcome variables

The cross-sectional outcome was maternal healthcare utilisation during pregnancy: antenatal care utilisation and emergency healthcare utilisation for pregnancy complications. There were four dimensions within antenatal care: initiation of antenatal care (i.e., time of the first ANC visit, frequency of ANC attendance, adequacy of ANC attendance and adherence to ANC schedules). The total number of ANC visits within a given gestational age (GA) was categorised as scheduled and non-scheduled ANC visits. A list of available emergency healthcare providers visits of these antenatal women in the study area (173) was also grouped into traditional and modern healthcare providers visits.

4.5.4. Assessment

Assessment of Outcomes: Utilisation of ANC services was assessed in relation to four dimensions of antenatal care: initiation of antenatal care (i.e., time of the first ANC visit, frequency of ANC attendance, adequacy of ANC attendance and adherence to ANC schedules.

Initiation of ANC and frequency of ANC attendance were assessed by items in a self-report questionnaire asking about the gestational age at which the women attended for each of their ANC visits. Any ANC initiated before or at the 16^{th} week of gestation was labeled as "timely initiation" and visits after this time or non-initiation were labeled "late" based on WHO recommendations. Adherence to ANC attendance schedules was estimated in relation to WHO guidance, which proposes that the first ANC attendance should take place before the sixteenth week of gestation; second ANC attendance between weeks 24 and 28; third ANC between weeks 30 and 32; and fourth ANC visit between weeks 36 and 40. Any visits out of these proposed intervals were considered to be non-scheduled. Women who initiated ANC

visits between 24 and 28 weeks of gestation and continued the remaining visits as recommended were considered to be non-adherent for the first ANC schedules but adherent for the remaining ANC schedules. Finally, the numbers of scheduled and non-scheduled ANC visits were counted for each respondent. Respondents were asked about the number of emergency contacts for pregnancy complications with a range of specified types of traditional healers or biomedical health service providers available in the area (173).

The frequency of antenatal care visits was expressed as the ratio of the number of actual ANC visits to the total number of ANC visits recommended by WHO at the given gestational age. WHO proposes one, two, three and four ANC contacts for women at the 16th, 28th, 32nd and 40th week of gestation respectively. Finally, a ratio of 125% or more of the recommended number of ANC visits was categorized as "increased use of ANC" and otherwise as "expected use of ANC". Adequacy of ANC use was also categorized based on Kotlchuk's index (134). Women with 50% or more ANC attendance and timely initiation (during or before the 16th week of gestation), as defined by WHO, were described as receiving "adequate ANC" while those with either late initiation or less than a 50% expected attendance of ANC were defined as receiving "inadequate ANC ".

Table 9 Categories of Kotlchuk's adequacy of antenatal care utilization

Health Service utilisation	Category	Measures
Initiation	Late	After 16th week of gestation and no initiation at all
	Timely	Before 16th week of gestation
Frequency of ANC visits	Increased use	≥125% ANC
	Frequent	< 125% expected ANC
Adequacy of ANC (initiation + frequency of visits)	Adequate	Before 16 weeks and ≥ 50% ANC
	Inadequate	After 16 weeks OR <50% ANC or both

To assess emergency healthcare utilisation for pregnancy complications, respondents were asked about the number of emergency contacts for pregnancy complications with a range of specified types of traditional healers or biomedical health service providers available in the area (173).

Exposure: Antenatal depressive symptoms (an exposure variable) were assessed with a locally validated Amharic version of the Patient Health Questionnaire (PHQ-9) (174). In studies from high-income countries, the cut-off scores indicating possible major depressive disorder cluster around 10 points (175), however, validation studies of the PHQ-9 in rural

areas of low-income countries of sub-Saharan Africa, have found a lower optimal cut-off point. In Ethiopia, the PHQ-9 has been validated in antenatal women (unpublished; personal communication, Dr Fikirte Girma, 2016) and in primary care settings in the neighbouring district of the current study, with the optimal cut-off point indicating probable depression identified as 5 or more in primary care attendees (176). In this study that compare the psychometric properties of PHQ-9 with SRQ-20 and K10, the PHQ-9 had better Sensitivity (83.3) and specificity (74.7) compared with the other instruments. In a community sample of postnatal women in Ghana, the optimal cut-off to indicate probable depression was also 5 or more (135). Therefore, in this study, a PHQ score of 5 or more was taken to indicate probable antenatal depression. The PHQ-9 was found to have good internal consistency (Cronbach's alpha=0.81) and excellent intra-class correlation of 0.92 in a study of 926 outpatients in a major referral hospital in Addis Ababa, Ethiopia (118). Measures of depression specific to the perinatal period were considered; however, a validation study in rural Ethiopia concluded that Edinburgh Postnatal Depression Scale had low criterion validity and poor internal consistency (177). Although previous Ethiopian studies had used the locally-validated Self-Reporting Questionnaire (SRQ-20) for measurement of common mental disorders (46), the PHQ-9 was preferred due to its focus on depressive symptoms (177).

Potential confounders: Potential confounders such as socio-economic status (SES), intimate partner violence (IPV), social support, marital status, parity, gestational age, residence, education, pregnancy intention, life threatening experiences and history of past adverse perinatal outcomes were also assessed at baseline. A review of literature identified the following potential confounders of the association between exposure and outcome: pregnancy intention, economic factors, intimate partner violence, social support, stressful life events and previous adverse perinatal outcomes. Thus, these variables were assessed in order to statistically control their potential confounding effects.

1. Socio-economic and Demographic variables: Closed ended questions were used to assess socio-demographic data such as age, religion, marital status, residence and ethnicity as well as socio-economic issues like education (measured in number of completed grades) and family income. Family income was assessed by asking the estimated annual income for agrarians; daily income for daily laborers and monthly income for traders and employees.

Annual and daily income estimates were then converted into monthly income estimates, which was finally divided into tertiles and labelled as “high”, “medium”, and “low” income categories.

2. Intimate partner violence (IPV): IPV, also referred to as domestic violence was assessed using a five item scale, the Women's Abuse Screening Test (WAST) (178, 179). The scale was chosen for its brevity and the acceptability of the wording. The WAST has been shown to have good specificity of 91.4% and predictive validity of 92.4% compared to the Conflict Tactic scale version 2.0 in Ohio (179) with a cutoff greater than one, at least for one of its items. Its score ranges 0-16 where a score greater than one indicates the presence of domestic violence.

4. Social Support: Social support was measured using the Oslo Social Support Scale (OSSS-3) (180), a three item scale which asks about concern from others, ease of getting help and the number of supporting persons that participants can count on. Its score ranges from 3-14. The scale was originally developed in Netherlands and has been used widely, including in Ethiopia. A study in Norway categorized the scores into three as: “poor social support” 3-8, “moderate support” 9-11 and “strong support” 12-14 (180).

5. Life events: The List of Threatening Experiences (LTE): Stressful life events were measured with the list of threatening experiences (LTE), a 12-item self-report questionnaire. The LTE was administered to assess life events, which were associated with the onset of depression. The LTE is normally self-reported questionnaire with a list of 12 threatening events that invite a dichotomous response of yes (for experiencing the event in the 6-months leading to the interview) or no (for not experiencing the event during the same time-period). The number of life events were counted for each respondent and recorded as a value ranging from 0 to 12. The List of Threatening events scale has good test-retest reliability and internal consistency (181). The instrument had been used in Ethiopia and found to have convergent validity with perinatal depression setting (168).

6. Past adverse perinatal outcomes and indicators of current ‘high risk’ pregnancy: The literature indicates that past experience of adverse perinatal outcomes like stillbirth, miscarriage and neonatal mortality increase the chance of maternal depression (123) and obstetric complications (151) during the subsequent pregnancy. Thus, respondents were

asked about the number of previous stillbirths, miscarriages, neonatal and infant mortality. The items were adapted from the Ethiopian Demographic Health Survey of 2011 (6), where 'none' was recorded as zero for each item. The items are also under use to predict risks of obstetric complications in clinical settings in Ethiopia. Besides, information about medical history like HIV, TB, renal, cardiac diseases, hypertension, anemia or gastritis were asked in questionnaires.

7. Substance Abuse: Substance use is a potential confounder of the relationship between antenatal depression and perinatal outcomes and perinatal complications. Since alcohol is easily accessible and common in the study area, it was assessed using the Fast Alcohol Screening Test (FAST) which has four items. FAST has high test-retest reliability (80%) inter-rater coefficients (77%) and high concurrent and predictive values (182). It had also sensitivity and specificity of 91.7% and 90.2% respectively against an interview diagnosis of alcohol dependence (182). The FAST score ranges from 0 to 16, where a score of three or more indicates hazardous or harmful drinking (182).

8. Pregnancy intention: An item from the Ethiopian Demographic Health Survey (5, 6) was used to ask whether the woman wanted the pregnancy (labeled as "wanted") or would have preferred it to happen at a future date (labeled as "mistimed") or if she had never wanted to be pregnant at all (labeled as "unwanted").

9. Accessibility of health services: Increased women's perception of accessibility of and quality of health facility was three to five time associated with increased women's attended delivery in healthcare facility (183). Access to healthcare facility was also a risk factor for depression in previous studies. Thus, accessibility of healthcare was measured by using seven items scale asking respondents about the level of difficulty and distance to reach the nearest health facility and travel time to their respective nearest health facility, as well as affordability and availability of health care facilities (183). The items of the scale asked the respondents about distance to health facility and travel time to their respective nearest health facility rated as long, quite moderate and short. It also asks access to transport to the health facility (difficult, moderately difficult, and not at all difficult); cost of transport to health facility and fees charged to women in health facilities as (affordable, moderately affordable and not affordable) as well as opening hours and availability of the health providers (183).

4.5.5. Data Analysis

Data were analysed using the Statistical Packages for Social Sciences, version 20 (SPSS 20; IBM Corp 2012) and Stata version 13 (Stata Corp, 2013). Because of robust follow up process, the number of missing data was minimal and thus, complete case analysis was used.

Residence was categorized into urban/rural; marital status into married and single (never married, divorced and widowed) categories; Educational level into "non-literate", "primary schooling (Grade 1-8)" and "Secondary Schooling" (Grade 9 and above) categories. Monthly household income was categorized into tertiles as "high", "medium", and "low" income categories. The profile of predictors and outcomes was described using simple descriptive summary values.

Poisson regression was used to cross-sectionally evaluate the association between antenatal depressive symptoms and components of antenatal care use (number of non-scheduled and total number of ANC visits) after testing the assumption of equality of the variance and the mean. Negative binomial regression was used to examine the association between antenatal depressive symptoms and number of traditional and biomedical emergency health care provider visits. Gestational age was controlled as an offset variable in all poisson and negative binomial regression models. Binary logistic regression was used to test the association of antenatal depressive symptoms with frequency, adequacy and timely initiation of antenatal health care use. Our strict data quality control mechanism reduced the number of missing data. Thus complete case analysis was used for missing data.

4.5.6. Data Quality Assurance

As strategies of data quality assurance, due attention was given during training the data collectors, supervision of data collection process, data entry and pilot process and results of data collection instruments and methods. There were forty data collectors and four supervisors, all of whom had previous experience of data collection for other projects in the same district. All data collectors along with four supervisors were recruited from the local community. Completion of General School Leaving Examination at Grade 10 was the minimum educational level of the data collectors. Most of them had either certificate or Diploma in various areas like community healthcare. Among the supervisors, one had BA degree and the remaining had diploma in various disciplines.

Data collection was conducted after two days of training. The training was aimed to reduce respondent bias like social desirability bias by helping trainees understand the contents of the questionnaire, objectives and ethical issues relevant to the study. Lectures, demonstrations and role plays were the methods used to train the data collectors. The focus of training was therefore, on administration of the instruments, the objectives of the study and ethical issues.

The main coordinator of the study closely supervised and monitored the data collection process through weekly meetings with the data collectors and supervisors and telephone calls. Completed questionnaires were checked carefully on a daily basis for consistency, adherence to instructions and missing data, first by the supervisors, then by main coordinator and finally by the data entry clerks. Questionnaires deemed to have problems were returned back to the data collectors for investigation, and if necessary for correction or reassessment. Finally, data were computerized using a double data entry with EpiData version 3.1 (EpiData; CDC, 2000) while data collection was proceeding.

A pilot test was conducted on 100 pregnant women taken from some selected kebeles. It was aimed to test understandability of the items, to take lessons of practical field experience, data entry, data analysis as well as to test internal consistency of the tools. Accordingly, improvement was made on tools of data collection, data collection process as well as data analysis techniques.

The pilot data indicated that Crombach's alpha internal consistency of the tools were close to their original validation studies. The Crombach's alpha internal consistency for Women's Abuse Screening Test (WAST) was 0.81; Outpatient Health Service Satisfaction Questionnaire (OPHAC) with 13 items (alpha =0.81); Birth preparedness with six items (0.78); WHO Disability Assessment Scale (WHODAS 12) (0.86) and PHQ9 (0.72) and Perceived access to healthcare scale was 0.79.

Skip points that were observed to be misleading during administration of pilot interview were modified. In the pilot questionnaire, items that asked dates of each ANC visit were observed to be difficult to be remembered. Thus, only gestational age at which each ANC visit was undertaken was asked in the main study. Some items asking personal details about the data collection process like time and appointment dates were in the front page of the questionnaire before pilot study. We transferred these items to final part of the questionnaire to save time.

Practical lessons about ways of monitoring data collection and data entry strategies were leaned that helped to improve in the main study.

Women were to be asked after 6 weeks of their delivery. But, practically, it has been observed that strictly waiting until 6 weeks increases loss to follow up of the participants at the end of follow up time and increases the chance of recall bias. Thus, four weeks postpartum was supposed to be optimal time enabling to distinguish postpartum blues from postnatal depression (184). A long list of healthcare providers that was asked in the pilot study was grouped as modern, traditional and religious in the main study with detiled list in brackets each group of healthcare providers.

An assessment tool to assess khat use of women was used in the pilot study. But, khat was unavailable in Sodo. Almost zero prevalence was observed in the pilot data. No production of khat in the study setting and no use of it due to its inaccessibility and due to strict religious backgrounds. Thus, an instrument aimed to assess khat was removed from main study. Finally, data reporting was made in adherence to a STROBE statement checklist (185) to maintain standard of reporting for cross-sectional data.

4.6. Sub-studies II & III: Prospective Studies

The prospective study consisted of all pregnant women in their 2nd and 3rd trimesters with or without depression identified through the initial cross-sectional survey. These participants were then, prospectively interviewed regarding their uptake of institutional delivery care and postnatal care utilisations as well as their experience of perinatal complications at a median of eight weeks after childbirth as described in Figure 7.

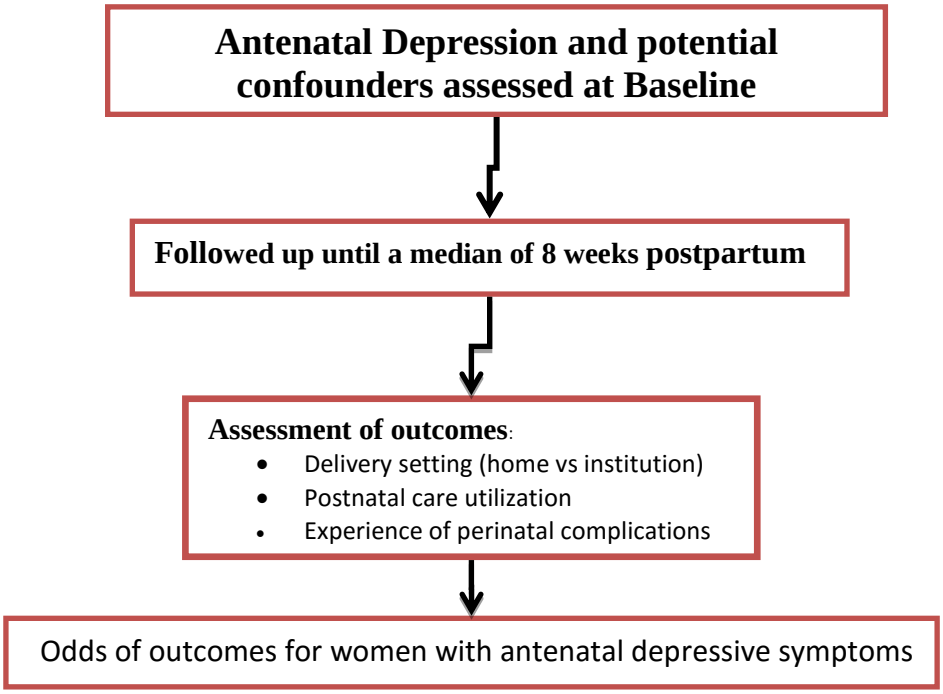


Figure 7. A Diagram of prospective study design

4.6.1. Outcomes variables

Main outcomes were whether delivery occurred in a healthcare institution or at home without skilled birth attendatnt; (2) whether delivery in a healthcare setting was planned or due to an emergency (3) (4) whether delivery was assisted or spontaneous vaginal, whether postnatal care was utilized and (5) whether there was expereince of perinatalcomplications.

4.6.2. Assessment

Outcomes assessment: The outcome variables were prospectively assessed at a median of eight weeks postpartum (interquartile range of 6-11 weeks postpartum) using the lay interviewer-administered questionnaires. The delivery setting was dichotomized into home delivery (home or Traditonal Birth Attendant's home) vs. institutional delivery (health post, health center, private clince or hospital). The method of delivery was dichotomised as spontaneous vaginal delivery (SVD) or assisted delivery (instrumental vaginal delivery or Caesarean Section). Women who delivered in healthcare institutions were also asked whether this had been planned, or had arisen due to labour complications where the latter responses were subsequently coded as 'unplanned /emergency'). Postnatal care utilization was rated

positive if there was at least one visit to a healthcare professional within four weeks of delivery.

Finally, items adapted from the Ethiopian Demographic and Health Survey (6) were used to collect the data about potential perinatal complications. Self-reported perinatal complications included a list of key danger signs during pregnancy, including bleeding, swollen hands/face, blurred vision, convulsions, high fever, loss of consciousness, severe abdominal pain, premature rupture of membranes, and discharge with unusual odour, pain during urination, severe headache and severe weakness. "Yes" was recorded for having the symptoms and "No" for not having the symptoms.

Self-reported measures of perinatal complications were used since maternal healthcare service use and maternal healthcare record systems in Ethiopia are very poor. Self-reported measures also have potential to assess perceived ill health of the participants. It is of note that, mothers in such settings are considered to be reliable sources of information about perinatal complications than clinical records (186).

Adverse perinatal outcomes such as stillbirth, spontaneous abortion and neonatal mortality were also assessed based in gestational age at which the outcome event occurred. It includes abortion and stillbirth (187, 188), neonatal death (death within 28 days after live-birth). Participants whose pregnancy ended before 28 weeks of gestation was defined as "spontaneous abortion" and after 28 weeks to term was defined as "stillbirth" (187, 188). In this study too, death of any live birth within 28 days was defined as "neonatal mortality" and death after 28 days of live birth was termed as infant mortality. Stillbirth and spontaneous abortion were combined and were termed as pregnancy loss.

Exposure and potential confounders: The exposure variable in all sub-studies was antenatal depressive symptoms which were assessed at baseline using a locally validated version of PHQ-9. Potential confounders were assessed during baseline data collection (see Sub-study-I).

4.6.3. Data analysis

Stata version 13.1 (Stat Corp, 2013) was used to analyse the data. The number of women lost to follow up was 4.6%. Thus, complete case analysis was used for the follow-up data

analyses given the relatively low rate of attrition during follow up based on recommendations that attrition rate of up to 5% would have minimal impact on statistical analysis (189, 190).

Binary logistic regression was used to test the association of antenatal depressive symptoms with uptake of institutional delivery as well as women's experience of each of perinatal complications and pregnancy outcomes. Socio-demographic and socioeconomic variables, interpersonal and life adversities (IPV, lack of social support), obstetric and medical conditions (experience of adverse perinatal outcomes, pregnancy complications, comorbid medical conditions, pregnancy intention, experience of institutional delivery and birth preparedness) were included in all analyses as potential confounders.

As an option to summarize the results and for ease of interpretation, the number of indicator of pregnancy complications were counted and dichotomized into "none" for those without any symptoms and "one or more" for those with one or indicators of pregnancy. This was also done for indicators of labour complications and postpartum complications as well. Finally, binary logistic regression was employed to determine the odds of each of indicators of perinatal complications and experience of adverse perinatal outcomes (pregnancy loss and neonatal mortality). Background socio-demographic and socioeconomic data was described. Baseline and follow up samples were compared to using chi squared two sample proportion test to examine if the proportion of cases in the two samples was similar.

4.6.4. Data Quality Assurance

The baseline data quality assurance was described under the methods section of Sub-study I. The same procedures of supervision, monitoring and data entry procedures were conducted during prospective data collection. The data collection was closely monitored by the coordinator of the study through weekly meetings and regular telephone calls. Completed questionnaires were first checked by the supervisors, followed by the coordinator of the study and finally by the data entry clerks for consistency and missing data. Questionnaires deemed to have missing or inconsistent data were returned back to the data collectors for reinvestigation. Data reporting was made in adherence to a STROBE statement checklist (185) to maintain standard of reporting for cohort data.

4.7. Summary of study objectives and methods

The study objectives along with the study designs, exposure and outcome variables and method of data analysis employed are presented in table 10.

Table 10. Summary of study objectives and methods

Sub-Study	Exposures	outcome	Sample size	Analysis method
I (Cross-sectional)	Antenatal depressive symptoms	- Initiation of ANC visits - Frequency and adequacy of ANC visits - Number of unscheduled ANC visits	1311	Binary logistic regression Poisson and Negative Binomial regression
II (Prospective)	Antenatal depressive symptoms	- Uptake of institutional delivery - Postnatal care utilisation	1251	Binary logistic regression
III (Prospective)	Antenatal depressive symptoms	- Indicators of perinatal complications Indicators of neonatal complications - Adverse pregnancy outcomes (pregnancy loss, neonatal mortality)	1240	Binary logistic regression

4.8. Ethical consideration

Ethical clearance was obtained from the Scientific Committee of the Department of Psychiatry and then from the Institutional Review Board of the College of Health Sciences, Addis Ababa University (ref. number: 024/14/psy dated 23/03/14). Written consent to participate was indicated by a thumb print. A total of 155 women (105 with suicidal ideation and or with major depressive symptom and 50 with major depressive symptoms alone as assessed by an item in PHQ-9) were referred to the newly introduced mental health service within primary health care services for further mental health assessment and treatment for free.

5. RESULTS

The results of the study are presented under three sub-headings based on the component sub-studies: Sub-Study-I, Sub-Study-II and Sub-Study-III. The Characteristics of participants and the details of the findings has been presented for each of the sub-studies. Results were summarized in tables and interpretations of these results were given in text immediately after or before the tables.

5.1. Sub-Study-I: Antenatal Depressive symptoms and ANC use

In this cross-sectional evaluation of baseline data, an analysis was made for a total of 1311 baseline participants. The characteristics of participants and the detail of the findings are given in the following sub-sections.

5.1.1. Characteristics of participants

Among baseline participants, 98.6% were married, 67.0% were non-literate and 92.1% were rural residents (Table 11). Forty-four percent of the participants had unintended pregnancy (36.2% unwanted and 7.8% mistimed) and 27.2% had a history of adverse perinatal outcomes during their previous pregnancy and 29.5% of baseline participants had a PHQ-9 score of five or more, indicating possible depression. Nearly one-third (37.7%) had initiated ANC by 16 weeks gestation and 34.3% fulfilled criteria for adequate antenatal care.

Table 11. *Characteristic of respondents-Paper-I (N=1311)*

Characteristics	Values	n	%
Marital Status	†Single	18	1.4
	Married	1293	98.6
Pregnancy Intention	Unwanted	475	36.2
	Mistimed	102	7.8
	Wanted	734	56.0
Monthly Income category	High	429	32.7
	Medium	423	32.3
	Low	459	35.0
Residence	Rural	1208	92.1
	Urban	103	7.9
Mother's Education	Grade 9-12 and above	53	4.0
	Grade 1-8	380	29.0
	Non-literate	878	67.0
Patient Health Questionnaire Status	PHQ ≥ 5	387	29.5
	PHQ < 5	924	70.5
Use of ANC during Past Pregnancy	Yes	793	60.5
	No	518	39.5
Number of Chronic Illnesses	One or more	440	33.6
	None	871	66.4
Past experience of adverse perinatal outcomes	1 or more	356	27.2
	None	955	72.8
Number of ANC Visits	Never initiated ANC	461	35.2
	Once or more	850	64.8
Self-reported pregnancy complications	None	655	50.1
	One or more	656	49.9
Adequacy of Antenatal Care	*Inadequate	861	65.7
	*Adequate	450	34.3
Time of Initiation of ANC	Timely (Up to 16th week of gestation)	455	37.7
	Late or never initiated	856	62.3

**Inadequate= less than 50% of expected ANC attendance or late initiation*
**Adequate= more than 50% of expected ANC attendance and timely initiation*
†= unmarried, divorced, widowed
Mean age = 26.8 years

5.1.2. Antenatal depressive symptoms and non-scheduled ANC visits

Depressive symptoms during pregnancy were associated significantly with greater number of non-scheduled ANC visits (aRR= 1.41, 95% CI: 1.20, 1.65) and increased number of total ANC visits (aRR=1.23, 95% CI: 1.12, 1.36) in a multivariable regression model (Table 12).

Table 12. The bivariate and multivariable analysis of antenatal depression and ANC utilisation

Variables	Total number of ANC Visits		Number of Non-scheduled ANC visits	
	CRR (95% CI)	aRR (95% CI)	CRR (95% CI)	aRR (95% CI)
Antenatal Depression: PHQ-9 ≥ 5	1.12 (1.02, 1.23)*	1.23 (1.12, 1.36)**	1.21 (1.04, 1.40)*	1.41 (1.20, 1.65)**
PHQ-9 < 5	1	1	1	1
Accessibility of Health facility	1.06 (1.03, 1.09)*	1.04 (1.02, 1.06)**	1.09 (1.04, 1.23)**	1.06 (1.02, 1.09)**
Marital Status: Single	1.03 (0.72, 1.47)	0.99 (0.69, 1.42)	1.13 (0.60, 2.15)	1.04 (0.59, 1.82)
Married	1	1	1	1
Residence: Rural	0.65 (0.51, 0.83)*	0.85 (0.72, 1.01)	0.50 (0.40, 0.61)**	0.65 (0.51, 0.85)**
Urban	1	1	1	1
Income: High	1.15 (0.97, 1.37)	1.13 (1.00, 1.26)*	1.37 (1.11, 1.70)*	1.29 (1.07, 1.56)*
Medium	1.06 (0.89, 1.26)	1.03 (0.92, 1.15)	1.13 (0.89, 1.43)	1.05 (0.88, 1.26)
Low	1	1	1	1
Education: Grade 9-12 and above	1.79 (1.28, 2.50)**	1.16 (0.92 (1.48)	2.06 (1.52, 2.81)**	0.99 (0.69, 1.43)
Grade 1-8	1.27 (0.90, 1.49)	1.08 (0.96, 1.20)	1.13 (0.89, 1.43)	1.10 (0.92, 1.32)
Non-literate	1	1	1	1
Intimate Partner Violence	1.01 (0.98, 1.03)	1.01 (0.99, 1.03)	1.00 (0.97, 1.03)	1.00 (0.97, 1.02)
Social Support	1.02 (0.99, 1.06)	1.02 (1.00, 1.04)	1.03 (0.99, 1.08)	1.03 (0.99, 1.07)
Number of Life threatening Events	1.01 (0.96, 1.06)	1.01 (0.98, 1.04)	1.05 (0.98, 1.17)	1.05 (1.00, 1.10)
Parity	0.93 (0.90, 0.96)**	0.94 (0.92, 0.97)**	0.89 (0.85, 0.94)**	0.91 (0.86, 0.95)**
Pregnancy Intention: Unwanted	0.75 (0.65, 0.88)**	0.84 (0.75, 0.93)**	0.75 (0.61, 0.91)*	0.89 (0.75, 1.06)
Mistimed	0.89 (0.68, 1.17)	0.91 (0.77, 1.09)	0.78 (0.56, 1.10)	0.86 (0.64, 1.15)
Wanted	1	1	1	1
Adverse Perinatal outcomes: ≥1 [b]	0.90 (0.77, 1.06)	0.94 (0.84, 1.04)	0.79 (0.64, 0.97)*	0.85 (0.71, 1.02)
ANC visit in past pregnancy: ≥1 [b]	1.08 (0.94, 1.25)	1.19 (1.08, 1.31)**	1.10 (0.91, 1.33)	1.28 (1.09, 1.51)*
Chronic Medical conditions: ≥1 [b]	1.08 (0.94, 1.25)	1.07 (0.97, 1.17)	1.14 (0.95, 1.37)	1.10 (0.95, 1.28)

** Statistically significant at < 0.05; ** Statistically significant at < 0.001; b= reference group was "none"*

Variables related to accessibility issue of healthcare facility predicted increased number of both unscheduled and total number of ANC visits. Among these access issues, accessibility of the primary healthcare facility positively predicted greater number of both non-scheduled (aRR= 1.06 95% CI: 1.02, 1.09) ANC visits and total number of ANC visits (aRR=1.04, 1.02, 1.06). Second variable related to accessibility, rural residence, was associated with reduced total number of ANC visits (aRR = 0.85, 95% CI: 0.72, 1.01) and unscheduled ANC visits (aRR = 0.65, 95% CI: 0.51, 0.85). Women with experience of ANC use in the past pregnancy had increased number of non-scheduled ANC visits (aRR= 1.28, 95% CI: 1.09, 1.51) as well as total number of ANC visits (aRR= 1.19, 95% CI: 1.08, 1.31) compared to those without experience of ANC use. Higher family income also predicted increased use of non-scheduled ANC (aRR = 1.29, 95% CI: 1.07, 1.56) and total number of ANC visits (aRR = 1.13, 95% CI: 1.00, 1.26). But, rural residence (aRR = 0.65, 95% CI: 0.51, 0.85) and each increment in parity (aRR= 0.91, 95% CI: 0.86, 0.95) were associated with reduced non-scheduled ANC visits (Table 12).

5.1.3. Antenatal depressive symptoms and initiation and adequacy of ANC use

Having antenatal depressive symptoms was associated with increased odds of having ANC attendance beyond expected in ANC schedules (aOR= 1.86, 95% CI: 1.29, 2.68). Increased access to the healthcare facility (aOR= 1.16, 95% CI: 1.07, 1.25) and experience of ANC in previous pregnancy (aOR= 1.65, 95% CI, 1.14, 2.41) were associated with increased ANC visits beyond expected in ANC schedules. Increasing parity (aOR= 0.84, 95% CI: 0.75, 0.94) was associated with lower than expected ANC attendance. Increased parity (aOR= 0.90, 95% CI: 0.83, 0.96) and unwanted pregnancy (aOR= 0.63, 95% CI: 0.48, 0.83) were associated with lower adequacy in use of ANC (Table 13).

Table 13. The Association between antenatal depressive symptoms and adequacy of ANC use

Variables	Timely Initiation of ANC		ANC Visits higher than expected in a given Gestational Age		Adequacy of ANC Use	
	cOR (95% CI)	aOR (95% CI)	COR (95% CI)	aOR (95% CI)	cOR (95% CI)	AOR (95% CI)
PHQ-9 Score: PHQ-9 ≥ 5	1.10 (0.93, 1.24)	1.24 (0.95, 1.63)	1.45 (1.05, 2.05)*	1.86 (1.29, 2.68)*	1.09 (0.0.85, 1.39)	1.24 (0.94, 1.62)
PHQ-9 <5	1	1	1	1	1	1
Access to Healthcare	1.10 (1.04, 1.15)**	1.07 (1.02, 1.13)*	1.18 (1.10, 1.27)**	1.16 (1.07, 1.25)**	1.10 (1.04, 1.15)**	1.07 (1.02, 1.13)*
Marital Status: Married	1.20 (0.46, 3.12)	1.26 (0.47, 3.39)	1.31 (0.38, 4.58)	1.08 (0.29, 3.98)	0.96 (0.36, 2.56)	1.03 (0.37,2.86)
Single	1	1	1	1	1	1
Residence: Rural	0.47 (0.31, 0.70)**	0.80 (0.48, 1.32)	0.39 (0.24, 0.62)**	0.62 (0.34, 1.14)	0.48 (0.32, 0.72)**	0.82 (0.49, 1.36)
Income: High	1.14 (0.87, 1.51)	1.08 (0.80, 1.47)	1.19 (0.81, 1.75)	1.18 (0.77, 1.820)	1.16 (0.88, 1.54)	1.09 (0.80, 1.48)
Medium	1.11 (0.84, 1.46)	1.05 (0.78, 1.40)	1.05 (0.71, 1.57)	0.97 (0.64, 1.47)	1.11 (0.84, 1.47)	1.04 (0.78, 1.40)
Low	1	1	1	1	1	1
Education: Non-literate	0.32 (0.18, 0.57)**	0.64 (0.32, 1.26)	0.39 (0.20, 0.76)*	1.06 (0.45, 2.50)	0.32 (0.18, 0.56)**	0.59 (0.29, 1.20)
Elementary Schooling	0.46 (0.26, 0.82)*	0.61 (0.30, 1.23)	0.60 (0.30, 1.19)	1.10 (0.49, 2.47)	0.44 (0.25, 0.79)*	0.61 (0.31, 1.20)
Secondary Schooling	1	1	1	1	1	1
Intimate Partner Violence	1.01 (0.97, 1.05)	1.02 (0.97, 1.06)	1.03 (0.99, 1.07)	1.02 (0.96, 1.08)	1.00 (0.97, 1.04)	1.01 (1.00, 1.06)
Social Support	1.04 (0.98, 1.10)	1.03 (0.97, 1.10)	1.00 (0.93, 1.09)	1.00 (0.92, 1.09)	1.04 (0.98, 1.04)	1.04 (0.97, 1.11)
Number of Life Threatening Events	1.04 (0.96, 1.13)	1.04 (0.95, 1.14)	1.04 (0.94, 1.16)	1.02 (.91, 1.16)	1.04 (0.96, 1.07)	1.04 (0.95, 1.14)
Parity	0.87 (0.82, 0.92)**	0.89 (0.83, 0.96)*	0.84 (0.77, 0.91)**	0.84 (0.75, 0.94)*	0.87 (0.82, 0.92)**	0.90 (0.83, 0.96)*
Pregnancy Intention: Unwanted	0.54 (0.42, 0.69)**	0.65 (0.49, 0.86)*	0.62 (0.43, 0.88)*	0.78 (0.52, 1.15)	0.52 (0.40,0.67)**	0.63 (0.48, 0.83)*
Mistimed	1.03 (0.67, 1.59)	1.11 (0.71, 1.71)	0.80 (0.43, 1.49)	0.84 (0.44, 1.60)	1.04 (0.68, 1.59)	1.11 (0.72, 1.72)
Wanted	1	1	1	1	1	1
Any Previous Use of ANC: Yes [b]	1.01 (0.80, 1.28)	1.14 (0.88, 1.47)	1.24 (0.89, 1.74)	1.65 (1.14, 2.41)*	1.04 (0.82, 1.31)	1.18 (0.91, 1.52)
Past Adverse obstetric history: ≥1 [b]	0.98 (0.76, 1.26)	1.08 (0.82, 1.43)	0.72 (0.49, 1.06)	0.74 (0.49, 1.12)	0.96 (0.74, 1.24)	1.06 (0.80, 1.41)
Chronic Medical conditions: ≥1 [b]	*1.30 (1.03, 1.64)	1.28 (1.00, 1.62)*	1.06 (0.77, 1.47)	1.03 (0.73, 1.45)	1.30 (1.03, 1.63)*	1.27 (1.00, 1.62)

* Statistically significant at < 0.05; ** Statistically significant at < 0.001; b= reference was "none"

However, antenatal depressive symptoms were not associated with timely initiation of ANC visits although there was a positive trend (aOR=1.24, 95% CI: 0.95, 1.63) (Table 13). Increased accessibility of the health facility (aOR = 1.07, 95% CI: 1.02, 1.13) and having one or more chronic condition (aOR =1.28, 95% CI: 1.00, 1.62) were associated significantly with increased timely initiation of ANC. Increased parity (aOR=0.99, 95% CI: 0.83, 0.96) and unwanted pregnancy (aOR=0.65, 95% CI: 0.49, 0.86) were significantly associated with delayed initiation of ANC from the recommended time.

5.1.4. Antenatal depressive symptoms and emergency health care use

Antenatal depressive symptoms were associated with increased number of traditional emergency healthcare provider visits (aRR=1.64, 95% CI: 1.17, 2.31), biomedical healthcare provider visits (aRR=1.32, 95% CI: 1.04, 1.69) and increased number of total emergency healthcare provider visits (aRR=1.44, 95% CI: 1.16, 1.80) (Table 14).

Table 14. The association between antenatal depression and Number of emergency health care visits during pregnancy

Variables	Number of Traditional health care provider visits		Number of Modern health care provider visits		Number of either of both health care provider visits	
	cRR (95% CI)	aRR (95% CI)	cOR (95% CI)	aRR (95% CI)	cOR (95% CI)	aRR (95% CI)
PHQ 9 Score: PHQ ≥ 5	2.15 (1.70, 2.71)**	1.64 (1.17, 2.31)*	1.29 (1.03, 1.62)*	1.32 (1.04, 1.69)*	1.63 (1.33, 1.99)**	1.44 (1.16, 1.80)*
PHQ < 5	1	1	1	1	1	1
Access to Healthcare	0.94 (0.89, 0.98)*	1.07 (1.00, 1.14)	1.10 (1.06, 1.17)**	1.11 (1.06, 1.17)**	1.04 (1.00, 1.08)	1.08 (1.03, 1.13)*
Marital Status: Single	0.19 (0.03, 1.37)	0.13 (0.01, 1.26)	1.17 (0.50, 2.74)	1.33 (0.56, 3.17)	0.75 (0.32, 1.72)	0.84 (0.35, 1.97)
Married	1	1	1	1	1	1
Residence: Rural	1.47 (0.86, 2.51)	3.87 (1.54, 9.74)*	060 (0.40, 0.92)*	0.79 (0.46, 1.34)	0.96 (0.71, 1.29)	1.17 (0.70, 1.95)
urban	1	1.00	1	1.00	1	1.00
Income: High	4.44 (3.33, 5.93*	4.40 (2.89, 6.69)**	1.52 (1.15, 1.99)*	1.34 (1.00, 1.79)*	2.20 (1.72, 2.82)	1.93 (1.48, 2.51)**
Medium	1.35 (0.95, 1.91)	1.97 (1.26, 3.08)*	1.00 (0.76, 1.32)	0.98 (0.74, 1.30)	1.11 (0.87, 1.43)	1.18 (0.91, 1.5)
Poor	1	1	1	1	1	1
Education: Secondary Schooling	0.98 (0.52, 1.84)	0.81 (0.25, 2.66)	1.50 (0.83 2.71)	0.96 (0.45, 2.06)	1.27 (0.73, 2.20)	0.92 (0.45, 1.88)
Elementary Schooling	0.92 (0.72, 1.78)	1.07 (0.68, 1.7)	0.85 (0.66, 1.10)	0.86 (0.63, 1.16)	0.96 (0.77, 1.20)	0.96 (0.73, 1.28)
Non-literate	1	1	1	1	1	1
Intimate Partner Violence	1.13 (1.10, 1.16)**	1.15 (1.09, 1.21)**	1.00 (0.96, 1.04)	0.99 (0.95, 1.03)	1.07 (1.04, 1.11)**	1.05 (1.02, 1.09)*
Social Support	0.96 (0.91, 1.01)	1.00 (0.92, 1.09)	1.04 (0.99, 1.10)	1.05 (0.99, 1.12)	1.01 (0.96, 1.06)	1.03 (0.97, 1.09)
Number of Life Threatening Events	1.30 (1.25, 1.350)**	1.27 (1.16, 1.39)**	1.10 (1.02, 1.17)*	1.07 (1.00, 1.16)	1.16 (1.09, 1.23)**	1.10 (1.03, 1.18)*
Parity	1.17 (1.11, 1.23)**	1.04 (0.94, 1.14)	1.04 (0.99, 1.10)	1.03 (0.95, 1.11)	1.07 (1.03, 1.13)**	1.04 (0.98, 1.11)
Pregnancy Intention: Unwanted	1.94 (1.53, 2.451)**	1.26 (0.86, 1.85)	0.95 (0.75, 1.21)	0.94 (0.72, 1.23)	1.17 (0.95, 1.44)	0.97 (0.76, 1.24)
Mistimed	1.18 (0.76, 1.84)	0.72 (0.39, 1.34)	0.97 (0.64, 1.47)	0.98 (0.63, 1.51)	0.99 (0.68, 1.44)	0.89 (0.60, 1.32)
Wanted	1	1	1	1	1	1
Past Adverse obstetric history: Yes [b]	0.71 (0.55, 0.92)*	0.53 (0.36, 0.80)*	1.10 (0.86, 1.40)	1.05 (0.81, 1.37)	0.97 (0.78, 1.21)	0.89 (0.70, 1.14)
Chronic Medical conditions: Yes [b]	3.51 (2.73, 4.51)**	2.86 (2.03, 4.03)**	1.58 (1.26, 1.98)*	1.46 (1.15, 1.84)**	2.14 (1.75, 2.63)**	1.84 (1.49, 2.28)**

* Statistically significant at < 0.05; ** Statistically significant at < 0.001; b= reference was "none"

Having a chronic medical condition and higher income were associated with increased emergency healthcare provider visits of any type (traditional, biomedical and total number of healthcare visits). Increased number of traditional emergency healthcare provider visits was associated with rural residence (aRR=3.87, 95% CI: 1.54, 9.74), being in a high income category (aRR= 4.40, 95% CI: 2.89, 6.69) and medium income categories (aRR= 1.07, 95% CI: 1.26, 3.08). Each increment in intimate partner violence score (aRR= 1.15, 95% CI: 1.09, 1.21), in number of life threatening events (aRR= 1.27, 95% CI: 1.16, 1.39) and having one or more chronic medical conditions (aRR= 2.86, 95% CI: 0.03, 4.03) were also associated with increased number of traditional emergency healthcare provider visits. A history of adverse perinatal outcomes was associated with lower traditional healthcare provider visits (aRR= 0.53, 95% CI: 0.36, 0.80).

The number of biomedical healthcare provider visits was also positively associated with increased access to healthcare facility (aRR= 1.34 95% CI: 1.00, 1.79), being in high-income category (aRR= 1.46, 95% CI: 1.15, 1.84) and having one or more chronic medical conditions (aRR= 1.11, 95% CI: 1.06, 1.17) (Table 14). A history of adverse perinatal outcomes was not associated with emergency help-seeking from a modern healthcare provider (aRR= 1.05, 95% CI: 0.81, 1.37) (Table 14).

5.2. Sub-study II: Prospective study

The characterstics of prospective participants, the impact of antenatal depressive symptoms on uptake of institutional delivery, assisted delivery, use of panned institutional delivery and postnatal care utilisation has been presented here under prospective studies (sub-studies II).

5.2.1. Characteristics of participants

The characteristics of participants are presented in Table 15. The majority of (98.7%) women were married; 91.9% were rural; 67.5% were non-literate; 12.2% had previous experience of institutional delivery; 28.7% had PHQ-9 score of five or more indicating probable depressive symptoms. These and other selected baseline characteristics were similar in both baseline and follow up samples. Institutional delivery rate was 62.6% and 21.7% of these institutional deliveries was unplanned and was due to emergency reasons and the remaining 78.3% was planned during pregnancy). Delivery was assisted for 10.7% of the participants and nearly half of the participants reported having at least one or more of potential composite perinatal complications.

Table 15. Characteristics of participants

Characteristics		Baseline (N=1311) N (%)	Followed Up (N=1251) N (%)	chi2 (p-value)
PHQ Status	PHQ < 5	924 (70.5)	892 (71.3)	0.2098 (p = 0.647
	PHQ ≥ 5	387 (29.5)	359 (28.7)	
Marital Status	Married	1293 (98.6)	1,235 (98.7)	0.0432 (p = 0.835)
	†Single or formerly married or unmarried	18 (1.4)	16 (1.3)	
Residence	Urban	103 (7.9)	101 (8.1)	0.0411 (p = 0.839)
	Rural	1208 (92.1)	1150 (91.9)	
Household Income	High	459 (35.0)	438 (35.0)	0.1109 (p = 0.946)
	Medium	423 (32.3)	397 (31.7)	
	Low	429 (32.7)	416 (33.3)	
Mother's Education	Non-literate	878 (67.0)	844 67.5)	0.0714 (p=0.965)
	Primary Schooling (Grade 1-8)	380 (29.0)	357 (28.5)	
	Grade 9 & more	53 (4.0)	50 (4.0)	
Experience of Intimate Partner Violence	None	573 (43.7)	552 (44.1)	0.0453 (p= 0.831)
	One or more in life time	738 (56.3)	699(55.9)	
Pregnancy Intention	Wanted	734 (56.0)	701 (56.0)	0.1168 (p = 0.943)
	Mistimed (wanted but not now)	102 (7.8)	93 (7.4)	
	Unwanted	475 (36.2)	457 (37.3)	
Self-reported Pregnancy Complications	None	655 (50.1)	632 (50.5)	0.0594 (p = 0.808)
	One or more	656 (49.9)	619 (49.5)	
Chronic Illness	None	871 (66.4)	824 (66.4)	0.0001(0 = 0.994)
	One or more	440 (33.6)	416 (34.6)	
Previous institutional delivery	Yes	160 (12.2)	152 (12.2)	0.0018 (p = 0.967)
	No/primiparous	1,151 (87.8)	1099 (87.8)	
Delivery Care Utilisation	Home delivery	--	468 (37.4)	--
	Institutional delivery	--	783 (62.6)	--
Type of Delivery	Normal vaginal	--	1115 (89.1)	--
	Assisted or operative	--	136 (10.7)	--
One or more Postnatal care Visits	: No	--	568 (45.8)	--
	Yes	--	672 (54.2)	--
Reason for use of inst. delivery	Planned	--	612 (78.3)	--
	Unplanned (due to emergency)	--	171 (21.7)	--

†Single Marital Status= unmarried, widowed, divorced); Married=living with marital partner and married but living separate; Income was categorized into tertiles as low, medium and high

5.2.2. Antenatal depressive symptoms and uptake of delivery and postnatal care

The association between antenatal depressive symptoms and uptake of institutional delivery of women is presented in Table 16. In the bivariate analysis, uptake of institutional delivery was not associated significantly with having antenatal depressive symptoms (cOR =1.09, 95% CI: 0.85, 1.41). A statistically significant association of pregnancy intention [mistimed pregnancy (cOR=0.62, 95% CI: 0.40, 0.96) and unwanted pregnancy (cOR=0.64, 95% CI: 0.51, 0.82)] and having comorbid illness (cOR= 1.32, 95% CI: 1.04, 1.67) with institutional delivery utilisation in unadjusted model disappeared in a fully adjusted model. The remaining predictors that were significantly

associated with the outcome in unadjusted model were also significantly associated with the outcome in the multivariable model.

Table 16. Institutional Delivery care use as a function of antenatal depressive symptoms

Variables	Odds of Institutional delivery (vs. home) (n=1251)		Odds of unplanned Institutional delivery (vs. Planned)(n=783)	
	(cOR, 95% CI)	(aOR, 95% CI)	(cOR, 95% CI)	(aOR, 95% CI)
Depressive Symptoms: PHQ9≥5	1.09 (0.85, 1.41)	**1.42 (1.06, 1.92)***	**1.57 (1.10, 2.35)***	**1.62 (1.09, 2.42)***
Access to Health Facility	**1.16 (1.10, 1.22)****	**1.10 (1.04, 1.16)***	0.97 (0.90, 1.04)	0.99 (0.91, 1.07)
Marital Status: Single	0.77 (0.28, 2.07)	0.70 (0.24, 2.06)	0.45 (0.06, 3.60)	0.37 (0.04, 3.10)
Residence: Rural	**0.13 (0.06, 0.27)****	**0.39 (0.18, 0.89)***	1.02 (0.60, 1.72)	0.78 (0.39 1.56)
Household Income: Low	1		1	
Medium	1.13 (0.85, 1.49)	0.89 (0.65, 1.20)	1.44 (0.95, 2.19)	**1.67 (1.07, 2.60)***
High	1.31 (0.99, 1.73)	1.05 (0.77, 1.45)	1.03 (0.68, 1.58)	1.37 (0.86, 2.18)
Educ. Level: Non-literate	1		1	
Primary Schooling	**2.25 (1.71, 2.95)****	**1.51 (1.10, 2.08)***	0.70 (0.48, 1.02)	0.65 (0.41, 1.01)
≥ Secondary	**19.01 (4.59, 78.71****	3.99 (0.87, 18.27)	0.73 (0.34, 1.55)	0.57 (0.22, 1.51)
Intimate Partner violence	0.97 (0.94, 1.01)	0.97 (0.93, 1.02)	0.98 (0.92, 1.04)	0.95 (0.89, 1.02)
Social Support	1.01 (0.95, 1.07)	0.95 (0.88, 1.01)	**0.90 (0.83, 0.98)***	0.93 (0.85, 1.02)
Institutional Delivery of previous baby: Yes	**3.62 (2.30, 5.68)****	**2.21 (1.36, 3.58)***	1.15 (0.93, 1.43)	1.39 (0.85, 2.26)
Birth Preparedness	**1.5(1.32, 1.56)****	**1.32 (1.20, 1.46)****	**0.81 (0.72, 0.92)***	**0.81 (0.71, 0.93)***
Parity (Birth Order)	**0.83 (0.79, 0.88)****	**0.90 (0.84, 0.97)***	1.00 (0.92, 1.08)	0.93 (0.83, 1.03)
Pregnancy Intention: Wanted	1		1	
Mistimed	**0.62 (0.40, 0.96)***	0.70 (0.44, 1.11)	0.86 (0.42, 1.77)	0.87 (0.41, 1.83)
Unwanted	**0.64 (0.51, 0.82)****	0.84 (0.64, 1.11)	1.03 (0.71, 1.48)	0.95 (0.63 1.43)
Symptoms of Pregnancy Comp.: ≥1	0.88 (0.70, 1.11)	0.88 (0.68, 1.15)	1.16 (0.83, 1.64)	1.01 (0.69, 1.47)
Chronic medical conditions: ≥1	**1.32 (1.04, 1.67)***	1.23 (0.95, 1.59)	0.99 (0.70, 1.39)	0.96 (0.67, 1.38)

* significant at <0.05, ** significant at < 0.001

In the adjusted model (Table 16), women with antenatal depressive symptoms had 1.42 times increased odds of delivering in healthcare institutions (aOR=1.42, 95% CI: 1.06, 1.92). Each increment in access to a healthcare facility (aOR=1.10, 95% CI: 1.04, 1.16), primary level education (compared to no education) (aOR = 1.51, 95% CI: 1.10, 2.08), delivering the previous baby in a health care institution (aOR= 2.21, 95% CI: 1.36, 3.58) and each increment in birth preparedness score (aOR=1.32, 95% CI: 1.20, 1.46) were associated with increased odds of institutional delivery. Rural residence (aOR=0.39, 95% CI: 0.18, 0.89) and increasing parity (aOR=0.90, 95% CI: 0.84, 0.97) were associated with reduced odds of institutional delivery.

In sub-group analysis of women with institutional delivery, there was greater odds of unplanned institutional delivery utilisation due to emergency reasons among women with antenatal depressive symptoms as compared to planned institutional delivery (aOR=1.62, 95% CI: 1.09, 2.42) (Table 16). Being in medium income category (aOR = 1.67, 95% CI: 1.07, 2.60) was associated with increased odds of unplanned institutional delivery due to emergency reasons while each increment in birth preparedness score (aOR=0.81, 95% CI: 0.81, 0.71, 0.93) was associated with reduced odds of unplanned institutional delivery.

5.2.3. Method of Delivery as a function of antenatal depressive symptoms

In the bivariate model, having antenatal depressive symptoms was not associated with assisted delivery (cOR=1.31, 95% CI: 0.90, 1.91) (Table 17). The bivariate association of assisted delivery with birth preparedness (cOR=1.21, 95% CI: 1.07, 1.36) and with unwanted pregnancy (cOR=0.54, 95% CI: 0.36, 0.82) disappeared in the adjusted model.

Table 17. Having assisted delivery and use of postnatal care vs antenatal depressive symptoms

	Assisted delivery vs NVD		Postnatal care use	
Variables	**(cOR, 95% CI)**	**(aOR, 95% CI)**	**(cOR, 95% CI)**	**(aOR, 95% CI)**
Depressive Symptoms: PHQ9≥5	1.31 (0.90, 1.91)	**1.72 (1.10, 2.69)***	1.12 (0.87, 1.43)	1.13 (0.85, 1.50)
Access to Health Facility	**1.18 (1.09, 1.29)****	**1.11 (1.02, 1.22)***	**1.05 (1.00, 1.10)***	1.01 (0.96, 1.06)
Marital Status: Single	2.79 (0.89, 8.76	2.33 (0.66, 8.17)	0.74 (0.27, 2.04)	0.71 (0.24, 2.16)
Residence: Rural	**0.18 (0.11, 0.29)****	**0.39 (0.21, 0.75)***	**0.60 (0.39, 0.93)***	1.42 (0.82, 2.46)
Income per family: Low	1	1	1	1
Medium	0.91 (0.58, 1.42)	0.72 (0.45, 1.17)	0.97 (0.74, 1.28)	0.91 (0.68, 1.21)
High	1.06 (0.69, 1.62)	0.80 (0.48, 1.34)	1.12 (0.86, 1.47)	0.98 (0.72, 1.33)
Educational Level: Non-literate	1	1	1	1
Primary Schooling	**2.62 (1.78, 3.88)****	1.29 (0.81, 2.06)	1.19 (0.92, 1.53)	1.0 (0.79, 1.43)
≥ Secondary	**10.85 (5.84, 20.16)****	**2.40 (1.02, 5.67)***	**4.03 (1.93, 8.41)****	**3.23 (1.34, 7.77)***
Intimate Partner violence	0.97 (0.91, 1.03)	0.95 (0.88, 1.02)	**1.09 (2.04, 1.13)****	**1.11 (1.06, 1.16)****
Social Support	1.00 (0.92, 1.09)	1.03 (0.93, 1.14)	1.01 (0.95, 1.06)	0.99 (0.93, 1.05)
Institutional Delivery of last baby	**2.07(1.31, 3.27)***	1.40 (0.82, 2.37)	-	**--**
ANC visits	**--**	--	**1.72 (1.40, 2.12)****	**1.42 (1.14, 1.76)***
Birth Preparedness	**1.21 (1.07, 1.36)***	1.01 (0.87, 1.17)	**1.32 (1.21, 1.43)****	**1.30 (1.18, 1.42)****
Parity	**0.65 (0.58, 0.73)****	**0.72 (0.62, 0.82)****	0.96 (0.91, 1.02)	1.01 (0.94, 1.08)
Pregnancy Intention: Wanted	1	1	1	1
Mistimed	0.62 (0.29, 1.31)	0.87 (0.39, 1.95)	1.27 (0.81, 1.99)	1.26 (0.79, 2.01)
Unwanted	**0.54 (0.36, 0.82)***	1.01 (0.63, 1.62)	0.80 (0.63, 1.02)	0.86 (0.66, 1.13)
Symptoms of Pregnancy Comp.: ≥1	**1.48 (1.03, 2.12)***	**1.54 (1.01, 2.34)***	0.90 (0.72, 1.12)	0.85 (0.66, 1.10)
Chronic medical conditions: ≥1	1.38 (0.96, 1.97)	1.47 (0.99, 2.19)	0.94 (0.74, 1.18)	0.84 (0.66, 107)

** significant at <0.05, ** significant at < 0.001*

After adjusting for potential confounding variables (Table 17), women with antenatal depressive symptoms had 1.72 times increased odds of assisted delivery than women without antenatal depressive symptoms (aOR=1.72, 95% CI: 1.10, 2.69). Factors that remained significantly associated with increased odds of assisted delivery in the adjusted model were increased access to health care facilities (aOR=1.11, 95% CI: 1.01, 1.22) and having one or more symptoms of pregnancy complications (aOR=1.54, 95% CI: 1.01, 2.34). Rural residence (aOR=0.39, 95% CI: 0.21, 0.75) and increasing parity (aOR=0.72, 95% CI: 0.62, 0.82) were associated with reduced odds of assisted delivery.

5.2.4. Postnatal care use as a function of antenatal depressive Symptoms

Rural residence (cOR=0.60, 95% CI: 0.39, 0.93) was associated with reduced odds of having at least one postnatal care visit, while increased access to healthcare facilities and secondary school level education (cOR=4.03, 95% CI: 1.93, 8.41) were associated with increased odds of postnatal care visits (cOR=1.05, 95% CI: 1.00, 1.10). Each increment in intimate partner violence score (cOR=1.09, 95% CI: 1.04, 1.13), increased number of expected ANC visits (cOR=1.72, 95% CI: 1.40, 2.12) and increased birth preparedness scores (cOR=1.32, 95% CI: 1.21, 1.43) were associated with increased odds of at least one or more postnatal care visits in the bivariate model (Table 17).

Table 18. Summary of all prospective outcome and predictor variables from adjusted models

Predictor Variables	**Institutional delivery(vs. home) (n=1251)**	**Emergency vs Pre-planned Institutional delivery (n=783)**	**Assisted vs NVD**	**One or more PNC Visits**
	(aOR, 95% CI)	**(aOR, 95% CI)**	**(aOR, 95% CI)**	**(aOR, 95% CI)**
Depressive Symptoms: PHQ9≥5	**1.42 (1.06, 1.92)***	**1.62 (1.09, 2.42)***	**1.72 (1.10, 2.69)***	1.13 (0.85, 1.50)
Access to Health Facility	**1.10 (1.04, 1.16)***	0.99 (0.91, 1.07)	**1.11 (1.02, 1.22)***	1.01 (0.96, 1.06)
Marital Status: Single	0.70 (0.24, 2.06)	0.37 (0.04, 3.10)	2.33 (0.66, 8.17)	0.71 (0.24, 2.16)
Residence: Rural	**0.39 (0.18, 0.89)***	0.78 (0.39 1.56)	**0.39 (0.21, 0.75)***	1.42 (0.82, 2.46)
Household Income: Low	1	1	1	1
Medium	0.89 (0.65, 1.20)	**1.67 (1.07, 2.60)***	0.72 (0.45, 1.17)	0.91 (0.68, 1.21)
High	1.05 (0.77, 1.45)	1.37 (0.86, 2.18)	0.80 (0.48, 1.34)	0.98 (0.72, 1.33)
Educ. Level: Non-literate	1	1	1	1
Primary Schooling	**1.51 (1.10, 2.08)***	0.65 (0.41, 1.01)	1.29 (0.81, 2.06)	1.0 (0.79, 1.43)
≥ Secondary	3.99 (0.87, 18.27)	0.57 (0.22, 1.51)	**2.40 (1.02, 5.67)***	**3.23 (1.34, 7.77)***
Intimate Partner violence	0.97 (0.93, 1.02)	0.95 (0.89, 1.02)	0.95 (0.88, 1.02)	**1.11 (1.06, 1.16)****
Social Support	0.95 (0.88, 1.01)	0.93 (0.85, 1.02)	1.03 (0.93, 1.14)	0.99 (0.93, 1.05)
Institutional Delivery of previous baby: Yes	**2.21 (1.36, 3.58)***	1.39 (0.85, 2.26)	1.40 (0.82, 2.37)	**--**
ANC visits	--	--	--	**1.42 (1.14, 1.76)***
Birth Preparedness	**1.32 (1.20, 1.46)****	**0.81 (0.71, 0.93)***	1.01 (0.87, 1.17)	**1.30 (1.18, 1.42)****
Birth order (parity)	**0.90 (0.84, 0.97)***	0.93 (0.83, 1.03)	**0.72 (0.62, 0.82)****	1.01 (0.94, 1.08)
Pregnancy Intention: Wanted	1	1	1	1
Mistimed	0.70 (0.44, 1.11)	0.87 (0.41, 1.83)	0.87 (0.39, 1.95)	1.26 (0.79, 2.01)
Unwanted	0.84 (0.64, 1.11)	0.95 (0.63 1.43)	1.01 (0.63, 1.62)	0.86 (0.66, 1.13)
Symptoms of Pregnancy Comp.: ≥1	0.88 (0.68, 1.15)	1.01 (0.69, 1.47)	**1.54 (1.01, 2.34)***	0.85 (0.66, 1.10)
Chronic medical conditions: ≥1	1.23 (0.95, 1.59)	0.96 (0.67, 1.38)	1.47 (0.99, 2.19)	0.84 (0.66, 107)

** significant at <0.05, ** significant at < 0.001*

Having depressive symptoms during pregnancy was not significantly associated with having one or more postnatal care visits in either the bivariate or multivariable analysis (aOR=1.13, 95% CI: 0.85, 1.51) (Table 17). Having secondary level education (aOR=3.23, 95% CI: 1.34, 7.77), increased intimate partner violence (aOR=1.11, 95% CI: 1.06, 1.16), increased number of ANC visits (aOR=1.42, 95% CI: 1.14, 1.76) and increased birth preparedness (aOR=1.30, 95% CI: 1.18, 1.42) were significantly associated with increased odds of having postnatal care visits in both the bivariate and adjusted model. Rural residence and access to health facility were associated in the bivariate analysis but became non-significant in the multivariable analysis.

5.3. Sub-study III: Prospective study

From the sample size that constituted the baseline sample size of 1311 antenatal women, 11 of them refused follow-up interview; 27 were lost to follow up; 30 didn't deliver until the end of the follow up time and one died during labour. Thus, a total of 1,240 women were interviewed face-to-face at a median of 8th week after delivery (with interquartile range of 6-11 weeks after delivery. Thus, the attrition rate for Sub-study-III was 4.6% as shown in Figure 5.

5.3.1. Characteristics of participants

Among those participants that were followed-up at all-time points, nearly half of them (48%) were in the second trimester and the remaining were in the third trimester. More than one quarter of women (28.7%) had a PHQ-9 score of five or more indicating probable depression (20.9% had PHQ-9 score of 5-9 and 7.8% had PHQ-9 score of 10 or more) and 6.0% of them had reported hazardous level use of alcohol. Pregnancy was unintended in 43.8% of women, with 36.5% of pregnancies unwanted and 7.3% mistimed. The mean score of intimate partner violence was 2.1 (standard deviation (SD) of 2.9). The mean parity of participants was 2.7, SD = 2.1 (Table 19). Selected baseline characteristics of women in both samples (baseline sample and follow up sample) were similar (Table 19).

Table 19. Characteristics of baseline and followed up follow up participants in paper III

Characteristics		Baseline (N=1311)	Followed up (N=1240)	Pearson Chi²
Variables	**Values**	**N (%)**	**N (%)**	
Marital Status	†Single	18 (1.4)	15 (1.2)	0.1331 (p = 0.715)
	Married	1293 (98.6)	1225 (98.8)	
Pregnancy Intention	Unwanted	475 (36.2)	453 (36.5)	0.1823 (p = 0.913)
	Mistimed	102 (7.8)	91 (7.3)	
	Wanted	734 (56.0)	696 (56.1)	
Monthly Income category	High	429 (32.7)	414 (33.4)	0.1700 (p = 0.919)
	Medium	423 (32.3)	392 (31.6)	
	Low	459 (35.0)	434 (35.0)	
Residence	Rural	1208 (92.1)	1142 (92.1)	0.0700 (p = 0.790)
	Urban	103 (7.9)	98 (7.9)	
Mother's Education	Grade 9-12 and above	53 (4.0)	48 (3.9)	0.2185 (p = 0.897)
	Grade 1-8	380 (29.0)	351 (28.3)	
	Non-literate	878 (67.0)	841 (67.8)	
Patient Health Questionnaire Status	PHQ ≥ 5	387 (29.5)	356 (28.7)	0.2024 (p = 0.653)
	PHQ < 5	924 (70.5)	884 (71.3)	
Number of Chronic Illnesses	One or more	440 (33.6)	419 (33.5)	0.0014 (p= 0.971)
	None	871 (66.4)	832 (66.5)	
Self-reported pregnancy complications	None	655 (50.1)	627 (50.6)	0.0926 (p = 0.761)
	One or more	656 (49.9)	613 (49.4)	
Birth order	Nulliparous	254 (19.4)	226 (18.2)	0.5506 (p = 0.759)
	Primipara	193 (14.7)	185 (14.9)	
	Multipara	864 (65.9)	829 (66.8)	
Alcohol use	Non-users	875 (64.7)	828 (66.8)	0.0134 (p= 0.993)
	Mild level users	359 (27.4)	338 (27.3)	
	Harmful level users	77 (5.9)	74 (6.0)	
Pregnancy loss	Yes	--	52 (4.3)	
	No	--	1169 (75.7)	
Neonatal mortality	Yes	--	19 (1.6)	
	No	--	1169 (98.4)	

†Single Marital Status= unmarried, widowed, divorced); Married=living with marital partner and married but living separate; Income was categorized into tertiles as low, medium and high; Social support score: minimum=3; Maximum=14; Mean=10.68; SD=2.00; Number of ANC visits: minimum=0; Maximum=8; Mean=1.524; SD=1.50

5.3.2. Antenatal depressive symptoms and perinatal complications

The association of antenatal depressive symptoms with incidence of self-reported perinatal complications is presented in Table 20. Scoring five or more on the PHQ-9 was associated with increased odds of self-reported pregnancy complication such as oedema (aOR = 2.68, 95% CI: 1.87, 3.83)], blurred vision (aOR = 1.89 95% CI: 1.41, 2.54), severe abdominal pain (aOR = 2.29, 95% CI: 1.73, 3.04). There was also increased odds of abnormal vaginal discharge (aOR = 2.08, 95% CI: 1.44, 2.98), burning sensation at urination (aOR = 1.67, 95% CI: 1.19, 2.34) and severe headache (aOR = 1.96, 95% CI: 1.49, 2.58) among these group of women. When a composite of pregnancy complications

was considered, there was also a more than two times increased odd of one or more (composite) pregnancy complications among women with antenatal depressive symptoms (aOR = 2.44, 95% CI: 1.84, 3.23).

As presented in Table 20, women with antenatal depressive symptoms had increased odds of labour complications like severe headache (aOR=1.84, 95% CI: 1.37, 2.46), convulsion (aOR = 1.42, 95% CI: 1.07, 1.87), haemorrhage (aOR = 1.74, 95% CI: 1.31, 2.33) and unconsciousness (aOR = 1.48, 95% CI: 1.00, 2.19). These group of women also had increased odds of fever (aOR = 1.98, 95% CI: 1.48, 2.64), premature rupture of membranes (aOR = 1.81, 95% CI: 1.11, 2.92), prolonged labour (aOR = 1.98, 95% CI: 1.43, 2.73) and retained placenta (aOR = 1.57, 95% CI: 1.08, 2.30) (Table 20). Women with antenatal depressive symptoms also had increased odds of one or more (composite) labour complications (aOR = 1.84, 95% CI: 1.34, 2.53).

Among women with antenatal depressive symptoms, there was increased odds of all potential postpartum complications. As presented in Table 20, there was increased odds of oedema (aOR=2.37, 95% CI: 1.39, 4.04), blurred vision (aOR=1.74, 95% CI: 1.29, 2.36), severe abdominal pain (aOR=1.61, 95% CI: 1.21, 2.15) and burning sensation at urination (aOR=1.59, 95% CI: 1.16, 2.18) among women with antenatal depression. The odds of severe headache (aOR=1.68, 95% CI: 1.24, 2.25), convulsion (aOR=1.69, 95% CI: 1.24, 2.32), haemorrhage (aOR=1.60, 95% CI: 1.22, 2.17), unconsciousness (aOR=2.45, 95% CI: 1.25, 4.80) and fever (aOR=1.87, 95% CI: 1.37, 2.54) was also greater among these group of women (Table 20). Women with antenatal depressive symptoms also had increased odds of composite postpartum complications (aOR=1.70, 95% CI: 1.23, 2.35) in the multivariable model (Table 20).

In the multivariable model (Table 20), neonates of women with depressive symptoms had increased odds of difficulty of breathing or fast breathing (aOR = 1.70, 95% CI: 1.12, 2.58) and convulsions or spasms (aOR = 1.72, 95% CI: 1.12, 2.65) compared to women without depressive symptoms according to women's self-reported measures. But, the association of antenatal depressive symptoms with composite neonatal complications became marginally non-significant in the multivariable model (OR=1.30, 95% CI: 0.99, 1.73) (Table 20). However, when severity of antenatal depressive symptoms was considered, the odds of each of the potential perinatal complications (maternal and neonatal) did not consistently increase with severity (Table 21). In the multivariable

model, antenatal depressive symptoms were not associated with pregnancy loss (aOR = 1.26, 95% CI: 0.65, 2.44) or neonatal mortality (aOR = 2.03, 95% CI: 0.73, 5.63) (Table 21).

Table 20. Impact of Antenatal depressive symptoms (at PHQ-9 cut off five) on each of indicators of perinatal complications

Symptoms of perinatal complications	aOR (95% CI) of maternal perinatal complications			aOR (95% CI) of neonatal perinatal complications
	During Pregnancy	During Labour	Up to 7 days Postpartum	
Oedema	2.68 (1.87, 3.83)	--	2.37 (1.39, 4.04)	--
Blurred vision	1.89 (1.41, 2.54)	--	1.74 (1.29, 2.36)	--
Severe abdominal pain	2.29 (1.73, 3.04)	--	1.61(1.21, 2.15)	--
Abnormal discharge	2.08 (1.44, 2.98)	--	1.42 (0.99, 2.02)	--
Burning sensation at urination	1.67 (1.19, 2.34)	--	1.59 (1.16, 2.18)	--
Severe headache	1.96 (1.49, 2.58)	1.84 (1.37, 2.46)	1.68 (1.24, 2.25)	--
Convulsion	--	1.42 (1.07, 1.87)	1.69 (1.24, 2.32)	--
Haemorrhage	--	1.74 (1.31, 2.33)	1.60 (1.22, 2.17)	--
Unconsciousness	--	1.48 (1.00, 2.19)	2.45 (1.25, 4.80)	--
Fever	--	1.98 (1.48, 2.64)	1.87 (1.37, 2.54)	--
Premature Rupture of Membrane	--	1.81 (1.11, 2.92)	--	--
Prolonged labour	--	1.98 (1.43, 2.73)	--	--
Tear	--	1.19 (0.72, 1.99)	--	--
Retained placenta (30 min)	--	1.57 (1.08, 2.30)	--	--
Difficulty or Fast Breathing	--	--	--	**1.70 (1.12, 2.58)***
Yellow Skin/Eye Color (Jaundice)	--	--	--	1.08 (0.53, 2.19)
Poor Sucking or Feeding	--	--	--	0.76 (0.39, 1.50)
Pus, Bleeding around Umbilical Cord	--	--	--	1.38 (0.94, 2.01)
Skin Lesions Or Blisters	--	--	--	1.18 (0.77, 1.80)
Convulsions/Spasms/Rigidity	--	--	--	**1.72 (1.12, 2.65)***
Lethargy/Unconsciousness	--	--	--	1.11 (0.51, 2.39)
Red or Swollen Eyes With Pus	--	--	--	1.50 (0.80, 2.80)
One or more of any complications	**2.44 (1.84, 3.23)**	**1.84 (1.34, 2.53)**	**1.70 (1.23, 2.35)**	1.30 (0.98, 1.73)

Controlled for alcohol use, residence, marital status, household income, education, intimate partner violence, life threatening events, number of ANC visits, parity, pregnancy intention, chronic conditions, and previous experience of adverse perinatal outcomes in all models and after adjusting for presence of one or more of any pregnancy complications symptoms and delivery complications symptoms in modelling each of labour complication symptoms and postpartum complication symptoms respectively.

Women with antenatal depressive symptoms also had increased odds of a composite of perinatal complications during pregnancy (aOR=2.44, 95% CI: 1.84, 3.23), during labour (aOR=1.84, 95% CI: 1.34, 2.53) and at postpartum (aOR=1.70, 95% CI: 1.23, 2.35) in multivariable model (Table 20). Being in low-income category was consistently

associated with increased odds of composite measures of perinatal complications during pregnancy, during labour and at postpartum.

Table 21. Impact of ANDs (categorized at cut of 5 and 10) on each of perinatal complications

	Indicators of perinatal complications	aOR (95% CI)		
		Mild Depression	Major depression	Risk/protective factor
Pregnancy complications	Edema	2.86 (1.95, 4.17)**	2.15 (1.19, 3.88)*	†Mild Alcohol use
	Blurred vision	2.11 (1.54, 2.91)**	1.33 (0.80, 2.20)	†(IPV, LTET, history perinatal mortality)
	Severe headache	1.81 (1.34, 2.45)**	2.47 (1.57, 3.90)**	†(Primary schooling, increased LTET)
	Severe abdominal pain	2.41 (1.78, 3.27)**	1.96 (1.23, 3.13)*	
	Abnormal discharge	2.17 (1.48, 3.20)**	1.78 (0.98, 3.24)	×High income
	Burning sensation at urination	1.50 (1.04, 2.18)*	2.24 (1.32, 3.79)*	
	One or more of any symptoms	2.47 (1.81, 3.38)**	2.34 (1.44, 3.82)*	×(ANC use and high income)
Labour complications	Haemorrhage	1.94 (1.42, 2.64)**	1.22 (0.75, 1.98)	×(secondary schooling and more)
	Convulsion	1.49 (1.10, 2.01)*	1.21 (0.76, 1.91)	×higher parity, †pregnancy complications
	Severe headache	1.87 (1.36, 2.57)**	1.72 (1.07, 2.78)*	×primary schooling, †pregnancy comps.
	Unconsciousness	1.51 (0.99, 2.29)	1.39 (0.74, 2.61)	†pregnancy complications
	Fever	2.01 (1.47, 2.74)**	1.88 (1.17, 2.99)*	×Primary schooling, ×parity, †preg. comps
	Premature Rupture of Membrane	2.00 (1.21, 3.31)**	1.26 (0.56, 2.83)	†having comorbid conditions
	Prolonged labour	2.10 (1.48, 2.96)**	1.62 (0.95, 2.76)	†ANC Use, ×parity, †pregnancy comps.
	Tear	1.01 (0.56, 1.83)	1.72 (0.82, 3.61)	†Mild Alcohol use, ×parity, †preg. comps.
	Retained placenta (30 min)	1.66 (1.11, 2.49)*	1.29 (0.69, 2.42)	†pregnancy comps.
	One or more of any symptoms	2.12 (1.48, 3.04)**	1.20 (0.71, 2.01)	×parity, †pregnancy comps.
Postnatal complications	Haemorrhage	1.51 (1.11, 2.06)*	1.98 (1.23, 3.20)*	×Rural, †medium income, †primary schooling, †unwanted pregnancy, †history perinatal mortality
	Edema	2.18 (1.23, 3.87)	3.03 (1.36, 6.75)*	†Intimate partner violence, †labour comps.
	Blurred vision	1.72 (1.24, 2.39)*	1.87 (1.15, 3.04)*	×Rural, ×increased income and education, †mistimed pregnancy, †labour comps.
	Convulsion	1.71 (1.22, 2.41)*	1.59 (0.94, 2.68)	×Rural, ≥secondary schooling, †labour comp.
	Severe headache	1.40 (1.01, 1.94)*	2.95 (1.81, 4.78)**	×Prim schooling, †increased LTET, †labour comps
	Unconsciousness	2.27 (1.10, 4.70)*	2.98 (1.16, 7.64)*	†increased LTET, †labour complications
	Severe abdominal pain	1.54 (1.13, 2.11)*	1.87 (1.16, 3.01)*	×Alcohol use, ×high income, †labour comps
	Abnormal discharge	1.35 (0.92, 1.99)	1.59 (0.90, 2.80)	†labour comps
	Burning sensation at urination	1.20 (0.84, 1.71)	3.20 (1.97, 5.19)**	×higher income, †secondary schooling, †labour comps
	Fever	1.74 (1.24, 2.43)*	2.45 (1.49, 4.02)**	Incm3-, ocdt2di+
	One or more of any symptoms	1.33 (0.94, 1.88)	4.16 (2.11, 8.20)**	×Mild alcohol use, ×high income and education, ×use of ANC, †labour comps
Neonatal complications	Difficulty or Fast Breathing	1.67 (1.07, 2.60)*	2.19 (1.18, 4.06)*	†Intimate partner violence
	Yellow Skin/Eye Color (Jaundice)	1.34 (0.64, 2.79)	0.95 (0.30, 3.05)	×Increased parity, †unwanted pregnancy, † history perinatal mortality
	Poor Sucking or Feeding	0.72 (0.32, 1.61)	1.38 (0.54, 3.53)	†Mild alcohol use
	Pus, Bleeding, around Umbilical Cord	1.61 (1.08, 2.40)*	1.66 (0.91, 3.01)	×High income
	Skin Lesions Or Blisters	1.38 (0.89, 2.15)	1.08 (0.53, 2.20)	†Comorbid conditions
	Convulsions/Spasms/Rigidity	2.08 (1.33, 3.26)*	1.79 (0.90, 3.53)	† history perinatal mortality
	Lethargy/Unconsciousness	1.19 (0.51, 2.78)	1.75 (0.59, 5.19)	
	Red or Swollen Eyes With Pus	1.54 (1.14, 2.07)	1.52 (0.95, 2.43)	×High income
	Difficulty or Fast Breathing	1.67 (1.07, 2.60)*	2.19 (1.18, 4.06)*	†intimate partner violence

Reference group: women with minimal depression; † = risk factor; × = protective factor

After controlling for alcohol use, residence, marital status, family income, educational level, intimate partner violence (IPV), life threatening events (LTET), parity, pregnancy intention, previous history of adverse events, pregnancy complications and chronic medical conditions.

With regard to the neonate, there was increased odds of difficulty of or fast breathing (aOR = 1.70, 95% CI: 1.12, 2.58) and convulsions or spasms (aOR = 1.72, 95% CI: 1.12, 2.65) among women with exposure compared to women without exposure in multivariable model (Table 21).

But, the association of antenatal depressive symptoms with composite neonatal complications became marginally non-significant in multivariable model (aOR=1.30, 95% CI: 0.99, 1.73) as reported in Table 21. But, increased odds of pus or bleeding around umbilical cord (cOR = 1.78, 95% CI: 1.26, 2.52) found in the bivariate model disappeared in the multivariable model (aOR = 1.38, 95% CI: 0.94, 2.01) (Table 21). When severity of antenatal depressive symptoms was considered, the odds of each of potential perinatal complications (maternal and neonatal) did not consistently increase with severity however (Table 21). In the multivariable model, antenatal depressive symptoms were not associated with pregnancy loss (aOR = 1.26, 95% CI: 0.65, 2.44) or neonatal mortality (aOR = 2.03, 95% CI: 0.73, 5.63) (Table 21).

Table 22. *Antenatal Depressive symptoms vs adverse perinatal outcomes*

Characteristics	Pregnancy loss		Neonatal mortality		Any or both	
	(cOR, 95% CI)	**(aOR, 95% CI)**	**(cOR, 95% CI)**	**(aOR, 95% CI)**	**(cOR, 95% CI)**	**(aOR, 95% CI)**
Depressive Symptoms: PHQ9≥5	1.12 (0.61, 2.05)	1.26 (0.65, 2.44)	1.83 (0.73, 4.60)	2.03 (0.73, 5.63)	1.29 (0.77, 2.14)	1.44 (0.82, 2.53)
Residence: Rural	1.44 (0.44, 4.72)	2.25 (0.44, 11.42)	omitted	omitted	2.00 (0.62, 6.49)	2.84 (0.60, 13.22)
House hold Income: High	0.94 (0.49, 1.81)	0.84 (0.42, 1.70)	1.22 (0.41, 3.67)	1.43 (0.45, 4.56)	1.01 (0.57, 1.78)	0.97 (0.53, 1.79)
Medium	0.77 (0.38, 1.54)	0.72 (0.35, 1.47)	1.10 (0.35, 3.43)	1.20 (0.38, 3.82)	0.84 (0.46, 1.54)	0.83 (0.45, 1.54)
Low	1	1	1	1	1	1
Educational Level: Secondary +	1.51 (0.45, 5.09)	2.66 (0.46, 15.24)	omitted	1.00	1.08 (0.32, 3.59)	2.21 (0.53, 1.88)
Primary Schooling	0.95 (0.51, 1.80)	1.02 (0.49, 2.11)	0.85 (0.30, 2.38)	0.99 (0.31, 3.18)	0.92 (0.54, 1.59)	1.01 (0.42, 11.40)
Non-literate	1	1	1	1	1	1
Intimate Partner violence	**0.85 (0.74, 0.98)***	**0.85 (0.73, 0.98)***	**0.98 (0.83, 1.15)**	0.99 (0.82, 1.18)	**0.89 (0.80, 0.99)***	**0.89 (0.79, 1.00)**
Threatening life events	0.84 (0.65, 1.08)	0.86 (0.65, 1.14)	0.87 (0.58, 1.30)	0.82 (0.53, 1.29)	0.84 (0.68, 1.05)	0.84 (0.66, 1.08)
Parity	0.98 (0.86, 1.12)	1.01 (0.85, 1.19)	1.07 (0.87, 1.32)	1.03 (0.80, 1.33)	1.00 (0.90, 1.13)	1.01 (0.88, 1.17)
Pregnancy Intention: Wanted	1	1	1	1	1	1
Mistimed	0.89(0.31, 2.57)	1.00 (0.34, 2.96)	0.63 (0.08, 4.90)	0.55 (0.07, 4.41)	0.82 (0.32, 2.12)	0.86 (0.32, 2.27)
Unwanted	0.62 (0.33, 1.17)	0.61 (0.31, 1.20	0.75 (0.28, 2.01)	0.61 (0.22, 1.73)	0.65 (0.38, 1.12)	0.61 (0.34, 1.09)
History of adverse perinatal outcomes	1.48 (0.82, 2.66)	1.66 (0.89, 3.11)	1.63 (0.64, 4.18)	1.47 (0.54, 3.98)	1.52 (0.92, 2.51)	1.61 (0.94, 2.76)
pregnancy complications	1.21 (0.69, 2.10)	1.37 (0.74, 2.54)	1.15 (0.46, 2.85)	1.00 (0.45, 2.23)	1.19 (0.74, 1.92)	1.28 (0.75, 2.17)
other comorbid illness	0.91 (0.53, 1.54)	0.89 (0.51, 1.55)	1.12 (0.52, 2.42)	1.07 (0.39, 2.90)	-	0.93 (0.58, 1.48)

6. DISCUSSION

Antenatal depressive symptoms and self-reported perinatal complications were common in the study area. Nearly 30.0% of antenatal women had depressive symptoms; 64.8% of women initiated ANC and 62.3% of women delivered in healthcare institutions. More than half of the participants reported having at least one or more of self-reported perinatal complications. Having depressive symptoms was associated independently with increased number of non-scheduled ANC visits, increased risk of presentations for emergency healthcare to both traditional and modern healthcare providers during pregnancy. Having antenatal depressive symptoms also predicted greater odds of uptake institutional delivery compared to home delivery and greater odds of assisted delivery compared to normal vaginal delivery. In sub-group analysis of women with institutional delivery, there was an increased odds of unplanned institutional delivery compared to planned institutional delivery among women with antenatal depressive symptoms. There was also consistent and strong association of antenatal depressive symptoms with self-reported perinatal complications, both for the mother and the neonate. However, antenatal depressive symptoms were not significantly associated with pregnancy loss or neonatal mortality.

6.1. Prevalence of antenatal depressive symptoms

The prevalence of depressive symptoms among antenatal women varies across LMIC studies. Our finding of a relatively high prevalence of depressive symptoms (29.5%) during pregnancy accorded with studies in Ghana (26.6%) and Cote d'voire (32.9%) which used the same measure, PHQ-9 (43 , 49). Studies in South Africa (51), Vietnam (45) and Southern Brazil (50) using other screening tools (Self-Reporting Questionnaire and Edinburgh Postnatal Depression Scale) also reported rates of antenatal depressive symptoms of 30-39%. Higher rate of antenatal depression (22%) was also reported using Mini-International Neuropsychiatric Interview-Plus (MINI) in South Africa (81).

However, the prevalence of antenatal depressive symptoms in this study was higher than that seen in previous community-based studies from Ethiopia. In a study from south-western Ethiopia (44), which used the Edinburgh Postnatal Depression Scale (not validated for a rural Ethiopian population) the prevalence of antenatal depression was found to be 19.9%. However, in a study in Butajira (a district on the southern border of Sodo) the prevalence of

depressive and anxiety symptoms measured with the validated Self Reporting Questionnaire (SRQ-20) was found to be 12.0% (46). Normal symptoms of pregnancy, which overlap with depressive symptoms in PHQ-9 may explain the relatively high prevalence of antenatal depressive symptoms in our study. Nonetheless, we have also noted the importance of somatic symptoms in the presentation of perinatal depression in this population (42). Despite these variations, depressive symptoms in the perinatal period are important public health issues in LMICs, with the potential to affect not only health and functioning but also healthcare service use. Increased fear of childbirth and survival (86, 191, 192), increased worries of supernatural demon attacks during pregnancy (86, 191, 192) and PHQ-9 symptoms associated with normal symptoms of pregnancy might explain the relatively high prevalence of antenatal depression reported in these LMICs settings and in our study.

6.2. Maternal Healthcare Utilisation

Prior to the introduction of the health extension programme (36), and until 2011, rates of institutional delivery and rates of women initiating ANC in Ethiopia were very low (6). Recent trends indicate improving rates, especially in southern Ethiopia, with nearly 50% of women in community-based samples and nearly three-quarters of women in urbanized areas delivering in health facilities (130-132). There is also an encouraging trend in the initiation of ANC among antenatal women (8). Our study finding that over 60% of women deliver in an institution is in-line with this positive trend. Nearly one third of women initiated ANC in our study that accorded with the findings in EDHS 2016 (8) in which over 60% of women initiated ANC.

Generally, there is lack of evidence about prevalence and incidences of perinatal complications in LMICs settings due to poor maternal healthcare coverage and poor maternal healthcare records in clinical settings. In our self-reported measure of perinatal complications, more than half of participants reported having at least one or more of perinatal complications. This finding accorded with other similar non-clinical studies. In these studies which reported patient defined perinatal complications, almost 50% of the participants reported some type of illness during pregnancy (19). Similarly, in a study of non-severe maternal morbidity in Malawi and Pakistan, more than 50% of women reported of having at least one pregnancy complications, infective or non-infective (193).

6.3. Antenatal Depressive Symptoms and Antenatal care utilization (Sub-study-I)

6.3.1. Antenatal depression and frequency of ANC attendance

This study was unique in that it demonstrated increased risk of non-scheduled ANC visits and so total number of ANC visits in women with antenatal depressive symptoms using a relaltively large sample with minimal loss to follow up. It also prospectively demonstrated increased odds of pregnancy related emergency healthcare visits to modern and traditional healthcare providers, unplanned institutional delivery and increased perinatal complications. This finding, increased non-scheduled ANC visits and total number of ANC visits in women with antenatal depressive symptoms, was broadly consistent with the few reports from high-income countries (37, 96). Our finding is also in keeping with meta-analyses and systematic reviews of depression in the general population where depression was associated with about three times increased non-adherence to medical recommendations (59, 60). It has been hypothesized that depression is associated with increased non-adherence to medical recommendations due to its impact on patients' motivation and expectation about potential benefit and harm of medical recommendations (89). The increased non-scheduled ANC visits among women with depressive symptoms may be explained by: (a) somatic symptoms of depression motivating them to seek help or and; (b) reduced self-care, social support and functioning among this group of women, which could worsen perinatal complications and so increases unscheduled ANC visits. Our finding of an increased number of total ANC visit among women with depressive symptoms was mainly through non-scheduled ANC visits. Our result about the increased number of ANC visits among women with high income category also supports the study in Ghana (194).

6.3.2. Antenatal depressive symptoms and initiation and adequacy of ANC use

In the current study, antenatal depressive symptoms were not associated significantly with initiation of ANC visits in either bivariate or multivariable models. This differs from the finding of delayed initiation of ANC in depressed women in the USA (97). Timely initiation of ANC for some women might have preceded the onset of depressive symptoms since we recruited women in the second and third trimesters and consequently screened depressive symptoms after 16th week of gestation (a cut off time point of timely or delayed initiation of

ANC) for most women. This might be the reason for the non-significant finding of the association between antenatal depressive symptoms and initiation of ANC in our study.

Antenatal depressive symptoms were associated with a higher overall number of ANC visits than expected but non-significantly associated with adequacy of antenatal care visits after adjusting for potential confounders. The study replicated the non-significant association of antenatal depression and adequacy of antenatal health care visits in hospital based studies from the USA (96, 98).

6.3.3. Antenatal depressive Symptoms and emergency health care use

The finding of a significant association between antenatal depressive symptoms and number of emergency visits to traditional and biomedical healthcare provider visits is in keeping with hospital-based studies in Australia (116), Sweden (37) and the USA (96). In those countries, antenatal depressive symptoms were associated with increased obstetrician visits and increased use of planned Caesarean section (37, 96). Studies have also demonstrated that postnatal depression has similar effect on healthcare utilization among postnatal women (95, 116). In the general population, depression is known to impact increased non-adherence to medical recommendations among patients with chronic illnesses (60). Thus, our study is unique in that it demonstrated similar impact of antenatal depressive symptoms on healthcare use among antenatal women.

Various explanations have been provided to understand increased emergency health care provider visits. First, reduced self-care (89), social support (87) and reduced cognition and motivation (136, 137) among people with depressive symptoms increase their vulnerability to other medical conditions and complications that consequently increase the chance of needing emergency intervention (89). Second, women with depressive symptoms may delay timely help-seeking due to reduced social support (87), lower satisfaction with health care services (116), poorer motivation and memory of schedules (136, 137) and reduced self-care (89) which means that the condition is more likely to progress and lead to presentation as an emergency. Third, women with depression may worry more about perinatal symptoms (86, 191, 192) so that they seek emergency care. This has been reported previously in postnatal women in HICs, in which emergency healthcare utilization may be increased substantially,

including visits to psychiatrists, paediatricians, general practitioners and traditional providers (95, 116).

6.4. Antenatal Depressive symptoms and uptake of institutional and postnatal care (sub-study-II)

We hypothesized that antenatal depressive symptoms would be associated with a reduction in women's uptake of institutional delivery through reduced self-care, social support and reduced women's adherence to healthcare practitioners' recommendations. However, we found a significant increase in uptake of institutional delivery among women with antenatal depressive symptoms independent of pregnancy complications and comorbid medical conditions. This contradicted our hypothesis. Increased emergencies related to labour complications, as obtained in our sub-group analysis of women with institutional delivery, might explain this contradiction.

The increased odds of assisted delivery and uptake of emergency institutional delivery among women with antenatal depressive symptoms supports others' findings that women with depressive symptoms have an increased risk of labour complications (38, 63, 64, 153). We found the main reasons for institutional delivery to be 'prolonged labour' and or 'referral due to labour complications' among women with antenatal depressive symptoms. Our findings reflect those of a study in Ghana where antenatal depression was associated with assisted delivery and other perinatal complications, including prolonged labour, vaginal tears, loss of consciousness, heavy vaginal bleeding, surgery to repair or remove the womb and blood transfusion (135). Similarly, a previous community based cohort study in Ethiopia (41) and studies in China (66) and Ghana (135) demonstrated that antenatal depression was associated with prolonged labour or non-progressive preterm contractions (63). Studies in Peru (67) and in Finland (62) also demonstrated increased odds of preeclampsia among women with antenatal depression while studies in California (153) and Canada (63) demonstrated increased odds of infection among this group of women. These perinatal complications are thus, more likely to increase emergency institutional delivery and assisted delivery among women with depressive symptoms. There are also biological explanations for the association of depression with perinatal complications. In these explanations, depression is purported to hyper-stimulate Hypothalamus-Pituitary-Adrenal (HPA) axis to produce

hormones that have adverse effects on the uterine environment (195-197). Furthermore, studies have demonstrated that women with antenatal depressive symptoms are more likely to have somatic complaints, co-morbid medical conditions (59, 60) and other perinatal complications (39, 41, 154, 198) as well as increased fear of childbirth and worries about death and survival at labour (86, 192) which may increase the likelihood of institutional deliveries in this group.

But, our study did no replicate the non-significant finding of the association between antenatal depression and institutional delivery in Ghana (135) which may be due to controlling potential cofounders like comorbid medical conditions, pregnancy complications and history of adverse perinatal complications.

Our study showed that rural residence was associated with reduced odds of institutional delivery use and reduced odds of having assisted delivery, while increased access to health care was associated with increased odds of institutional delivery and having an assisted delivery. These results support consistently findings from others' work (27, 28, 78, 100, 128, 131, 146, 199, 200). Increased parity was associated with reduced odds of institutional delivery and assisted delivery, which is also consistent with other local studies (100, 146, 199, 200). This may be due to decreased likelihood of prolonged labour with increase in parity.

6.5. Antenatal Depressive symptoms and Perinatal Complications (sub-study-III)

Depressive symptoms weere found to be associated with up to three times increased odds of almost all self-reported symptoms of perinatal complications during pregnancy, delivery and postpartum. The associations of antenatal depressive symptoms with pregnancy loss and neonatal mortality were non-significant. The study found consistently strong association of antenatal depressive symptoms with all self-reported perinatal complications in LMICs settings where there is lack objective evidence about perinatal complications. The finding have future importance in designing intervention strategies for antenatal depressive symptoms so as to improve the risk of perinatal complications.

The increased odds of self-reported perinatal complications in our study supports studies in HICs where antenatal depression was associated with a pre-eclampsia (62, 63) and a wide range of other individual and combined pregnancy complications such as gestational

hypertension, premature rupture of membranes, and various infections (urinary tract infections, cervical, vaginal, intra-amniotic infections) (63, 64). Our study also supports increased association of antenatal depressive symptoms with individual and combined delivery complications (assisted delivery, non-progressive labor, shoulder dystocia, postpartum hemorrhage, meconium, and suspected sepsis) (63), premature contraction, use of analgesics and increased nausea during pregnancy(65).

Few existing studies in LMICs also demonstrated that antenatal depression was associated with increased risk of prolonged labor (41, 66, 135), assisted deliveries, labor and delivery complications such as vaginal tear, unconsciousness, heavy vaginal bleeding during delivery and at postpartum, fever, malodorous vaginal discharge and leaking urine or faeces (135) as well as preeclampsia (66, 67).

The strong association of antenatal depressive symptoms with self-reports of perinatal complications may be explained by changes in life style (53), increased disability (42, 52), malnutrition (55) and food insecurity (56), reduced social support (87) and self-care (59-61) among women with antenatal depressive symptoms that delay timely healthcare seeking resulting in worsened perinatal complications among these group of women. Thus, depression may either worsen existing complications or increase vulnerability of women for developing complications (infection, hypertension, unsafe abortion) by reducing women's self-care, social support and functioning. But evidence regarding the impact of depression on perinatal complications through biochemical changes is mixed (160).

Although we did not not enquire about pre-eclampsia specifically, the significantly higher rate of symptoms like oedema, blurred vision and convulsion among women with antenatal depressive symptoms suggests the risk of pre-eclampsia (62, 63, 66, 67). The findings of the increased odds of symptoms of fever and pain during urination and abdominal pain also suggest the risk of infection may be increased among women with antenatal depressive symptoms (63, 153). It can also be linked to increased effect of depression on pelvic inflammatory diseases reported in the general population (201).

Our finding about the increased odds of prolonged labour among women with depressive symptoms replicated the findings of cohort studies in Ghana (135), Ethiopia (41) and China (66). It also supports the increased risk of shoulder dystocia and assisted delivery reported in

HICs (63). The association between antenatal depressive symptoms and prolonged labor in LMIC settings may be explained partly by reduced self-efficacy to push during labor due to fear of childbirth in a setting where there is increased maternal mortality. It may also be explained by malnutrition that may disable the normal progression of labor. Increased odds of intra-partum and postpartum haemorrhage and unconsciousness in our study also accorded with the findings in Ghana that reported increased loss of consciousness and heavy vaginal bleeding at and after birth among women with antenatal depression (135).

Our finding of a strong association between antenatal depressive symptoms and perinatal complications may also be explained by somatic symptoms associated with depression. These somatic symptoms are highly prevalent among people with mild and moderate depression group compared to people with severe depression group (a group characterized by motor retardation rather than somatization) (80). Mild depression, compared to major depression, is again higher among pregnant women than non-pregnant women (120) implying higher prevalence of somatic symptoms among these group of women which could be presented as perinatal complications.

Our finding of an increased odds of potential neonatal complication also accords with findings in other settings of increased risk of both severe neonatal illness (135) and risk of fetal distress (64) among women with antenatal depression. But, our study didn't support the non-significant odds of fetal distress reported in China (66).

The non-significant finding of the association between antenatal depressive symptoms and adverse perinatal outcomes in our study may be due to low statistical power. Nevertheless, a large sample size cohort study in Ghana has also reported non-significant association of PHQ-9 assessed antenatal depressive symptoms with stillbirth and neonatal mortality (135). Similarly another study in UK (73) has demonstrated that it was rather depression prior to pregnancy than current antenatal depression that predicted stillbirth. The other studies (41, 64, 66) also reported non-significant findings though they too may have been limited by low statistical power.

7. STRENGTHS AND LIMITATIONS

This study assessed an important public health issue with good methodological rigor. It distinguished planned and unplanned maternal healthcare use and used robust methods to identify participants in a community setting. The study has found an important finding of the association between antenatal depressive symptoms and unplanned or unscheduled maternal healthcare utilisation to design future intervention strategies of antenatal depression so as to improve maternal healthcare use, perinatal complications and maternal mortality. Both perinatal depression and perinatal service utilisation may be linked to each other and maternal mortality. The study strength of the study was it prospectively investigated the potential effect of antenatal depressive symptoms on uptake of instructional delivery and the odds of experiencing perinatal complications using a relatively large sample size and minimum attrition rate at follow up. Besides, the study used a locally validated measure of antenatal depressive symptoms in a population-based setting, which reduces potential of selection bias that is common in facility-based studies.

The findings of the study are also generalizable to a wider population since the study was conducted in geographical setting where there all climatic conditions. The study setting was selected by PRIME, a UK funded project that aims to implement integrated mental healthcare in primary healthcare facilities for selected priority disorders (170). This PhD project was carried out as part of preparatory work to investigate the impact of antenatal depressive symptoms on maternal healthcare utilization and perinatal complications.

Although selection bias was minimized in this population based study, recall bias is an important issue because of low literacy and poor record keeping in this predominantly rural population. Nevertheless, the risk of recall bias of outcome variables such as number of ANC visits was minimized by conducting interviews about ANC visits during the antenatal period and adjusting gestational age in the statistical analyses. The assessment of prospective outcome variables such as indicators of perinatal complications immediately four to twelve weeks postpartum has also minimized the risk of respondent recall bias. The risk of social desirability bias was minimized by training the data collectors so that they would clearly explain about the study and its objective to the participants before conducting interview, encouraging them to be frank in their responses.

Though we used robust method to identify all cases during the study period, we cannot be certain whether all pregnant women in the district have been identified. Furthermore, we assessed women's adherence to WHO's recommendations on ANC attendance but not the adherence of health professionals to WHO's recommendations to ANC.

Our study did not also consider the cultural beliefs of women about seeking postnatal care where women are not encouraged to leave their homes until two weeks postpartum. This might explain the insignificant result of the association between antenatal depressive symptoms and postnatal care utilization.

Our measures of potential perinatal complications were non-clinical since the healthcare record system and health care use by women in LMICs like Ethiopia is poor (5, 6, 76). But, the measures had potential to assess perceived ill health of the participants a neglected area of healthcare despite currently promoted patient-centred healthcare philosophy in the study area and around the world. Thus, we cannot be certain whether strong association, we obtained, between antenatal depressive symptoms and perinatal complications had biological origin or whether it was due to associated somatic symptoms.

However, the relatively strong association of antenatal depressive symptoms with potential perinatal complications in our study may be explained by greater levels of somatic symptoms among these women, attrition bias and the overlap of normal symptoms of pregnancy with depressive symptoms. However, we have previously noted for this population that somatic symptoms, as a presentation of perinatal depression relates to disability and morbidity (42).

There is consistent evidence about the inseparability of depression and somatisation, with somatization being an important manifestation of depression (57). The association between antenatal depressive symptoms and self-reported perinatal complications in the postnatal period may be due to negative symptom recall bias among women with postnatal depressive symptoms. However, it is important to note that about 60% of maternal mortality occurs during the postpartum period indicating increased complications within this period (21) associated with persisting depressive symptoms. Classification bias is also likely to occur during scrrening of antenatal depressive symptoms at cut off five or more.

8. CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion

The study offers an insight to healthcare planners about the increased effect of antenatal depressive symptoms on the increase of unscheduled antenatal care visits and emergency institutional delivery care utilization. Our finding of a strong association between antenatal depressive symptoms and use of ANC services, mostly through unscheduled visits, is important to design strategies to maximize scheduled ANC visits of women in these settings where it is important to use funds and resources efficiently. As a result of non-scheduled ANC visits associated with antenatal depressive symptoms, the limited services available for antenatal women could be overwhelmed. Secondly, the increase in unscheduled visits could potentially be associated with undetected and untreated pregnancy complications as a result of inadequately programmed antenatal care. Such unscheduled visits could expose women to unnecessary medical interventions, resulting side effects and costs. The increased odds of unplanned institutional delivery due to emergency reasons and use of assisted delivery among women with antenatal depressive symptoms was also more likely due to labour complications among such women. Antenatal depressive symptoms also appear to have a considerable effect on self-reported perinatal complications.

8.2. Recommendiations

The findings of the study have the following clinical, policy and future research implications.

Clinical implications: Antenatal depressive symptoms were associated with increased unscheduled ANC visits, emergency healthcare provier visits, unplanned institutional delivery due to emergency reasons and use of assited delivery. Thus, establishing a system for improved detection, referral and treatments of antenatal depression may promote efficiency in the healthcare system and may potentially reduce morbidity, mortality and healthcare costs.

Policy implications: The increased effect of antenatal depressive symptoms on perinatal complications and unscheduled maternal healthcare utilisation also implies the need for designing strategies to integrate perintal mental healthcare services within primary healthcare.

Future research: Further research is required controlling the effect of healthcare providers' adherence to WHO's ANC schedules to ascertain the association between antenatal depressive symptoms and unscheduled healthcare vists. Further studies should also look at whether early detection and treatment of antenatal depressive symptoms would reduce the risk of perinatal complications by ruling out the role of history of depression before pregnancy and considering to minimize potential of classification bias.

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References

1. Waage J, Banerji R, Campbell O, Chirwa E, Collender G, Dieltiens V, et al. The Millennium Development Goals: a cross-sectoral analysis and principles for goal setting after 2015. Lancet 2010; 376:991.

2. WHO. Millenium development goal 5: Improving maternal health. Geneva: WHO, Department of Mental Health and Substance Abuse 2008.

3. WHO. Trends in maternal mortality: 1990 to 2010. Geneva: WHO; 2012.

4. WHO. Health situation analysis in the African region: Atlas of health statistics. Brazzaville: WHO Regional Office for Africa; 2011.

5. CSA. Ethiopian Demographic and Health Survey. Addis Ababa: Central Statistical Authority; 2005.

6. CSA. Ethiopia demographic and health survey 2011. Addis Ababa: Central Statistical Authority; 2011.

7. WHO. Trends in maternal mortality: 1990 to 2015. Geneva: The Maternal Mortality Estimation Inter-Agency Group; 2015.

8. CSA. Ethiopia demographic and health survey. Addis Ababa: Central Statistical Authority; 2016.

9. Kutesa. Transforming our world: The 2030 agenda for sustainable development. New York: United Nations General Assembly; 2015.

10. Alvarez J, Gil R, Hernández V, Gil A. Factors associated with maternal mortality in Sub-Saharan Africa: an ecological study. BMC Public Health 2009; 9:462.

11. Fisher J, Mello M, Izutsu T, Tran T. The Ha Noi expert statement: Recognition of maternal mental health in resource constrained setting is essential for achieveing the milinium development goals. International Journal of Mental Health Systems 2011; 5(2):1.

12. Redding C, Rossi J., Velicer W, Prochaska J. Health behavior models. The International Electronic Journal of Health Education 2000; 3(special issue):180.

13. Khan K, Wojdyla D, Say L, Gülmezoglu M, Van L. WHO analysis of causes of maternal death: A systematic Review. Lancet 2006; 367:1066.

14. Kwast B, Rochat R, Kidane-Mariam. Maternal mortality in Addis Ababa, Ethiopia. Studies in family planning 1986; 17(6):288.

15. Kwast B, Stevens J. Viral hepatitis as a major cause of maternal mortality in Addis Ababa, Ethiopia. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics 1987; 25(2):99.

16. Kwast B., Liff J. Factors associated with maternal mortality in Addis Ababa, Ethiopia. International journal of epidemiology 1988; 17(1):115.

17. Berhan Y., Berhan A. Review of maternal mortality in Ethiopia: A story of the past 30 years. Ethiop J Health Sciences 2014; (Speicla Issue):3.

18. Sloan N, Amoaful E, Arthur P, Winikoff B. Validity of self reported obstetri complications in rural Ghana. J Health Popul. Nutr. 2001; 19(2):45.

19. Midhet F. Prevalence and determinants of self-reported morbidity among pregnant women in rural areas of Pakistan. International Journal of Health Sciences 2007; 1(2):243.

20. MoH. Ethiopia basic emergency obstetric and newborn care: Training manual. Addis Ababa: MoH; nd.

21. EHNRI. Baseline evaluation of maternal and newborth healthcare services in 25 selected woredas 2013.

22. JHPIEGO. Monitoring birth preparedness and complication readiness tools and indicators for maternal and newborn health. Maternal and Neonatal Health 2004.

23. Mersha A, Jira C, Demessie S. Community based study on maternal mortality in Jimma town, south western Ethiopia. Indian journal of public health 1996; 40(2):30.

24. Garomssa H, Dwivedi A. Maternal mortality in Ambo Hospital: a five year retrospective review. Ethiopian Journal of Reproductive Health 2008; 2(1).

25. Gaym A. Maternal mortality studies in Ethiopia--magnitude, causes and trends. Ethiop Med J 2009; 47(2):95.

26. Say L, Chou D, Gemmill A, Tuncalp O, Moller A, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Global health 2014; 2(6):323.

27. Abebe F. Factors associated with home delivery in Bahirdar, Ethiopia: A case control study. BMC Research Notes 2012; 5:653.

28. Abera M, G/mariam A, Belachew T. Predictors of safe deliery serice utilizion in Arsi Zone, South-East Ethiopia. Ethiop J Health Sciences 2011; 21:95.

29. Ahmed F, Moussa K, Petterson K, Asamoah B. Assessing knowledge, attitude, and practice of emergency contraception: a cross- sectional study among Ethiopian undergraduate female students. BMC Public Health 2012; 12:110.

30. Aktar S. Healthcare seeking Behavior for safe motherhood: Findings from rural Bangladesh. Bangladesh e-Journal of Sociology 2012; 9(2):57.

31. Babalola S, Fatusi F. Determinants of use of maternal health services in Nigeria - looking beyond individual and household factors. BMC Pregnancy and Childbirth 2009; 9:43.

32. Bradley E, Byam P, Alpern, Thompson J, Zerihun A, Abeb Y, et al. A systems approach to improving rural care in Ethiopia. PLoS ONE 2012; 7(4):e35042.

33. Farnes C, Beckstrand, Callister. Help-seeking behaviors in childbearing women in Ghana, West Africa. International Nursing Review 2011; 58:491.

34. Fenta M. Assesment of factors affecting utilization of maternal health care services in Ayssaita and Dubti towns, Afar regional state of north east Ethiopia. 2005.

35. Lincetto O, Mothebesoane-Anoh S, Gomez P, Munjanja S Antenatal care: Opportunities of the newborn in Africa. Chapter 2n.d.

36. El-Saharty S, Kebede S, Olango P, Siadat B. Ethiopia: Improving health service delivery. Health, Nutrition, Population Discussion Papeer 2009.

37. Andersson L, Sundstrom-Poromaa I, Wulff M, Astrom M, Bixo M. Implications of antenatal depression and anxiety for obstetric outcome. Obstetrics & Gynecology 2004; 104(3):467.

38. Dayan J, Creveuil C, Herlicoviez M, Herbel C, Baranger E, Savoye C, et al. Role of anxiety and depression in the onset of spontaneous preterm labor. American Journal of Epidemiology 2002; 155(4):293.

39. Grigoriadis S, VanderPorten E, Mamisashvili L, Tomlinson G, Dennis C, Et a. The impact of maternal depression during pregnancy on perinatal outcomes: A systematic review and meta-analysis. Journal of Clinical Psychiatry 2013; 74(4):321.

40. Grote N, Bridge J, Gavin A, Melville J, Iyengar S, Katon W. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Arch Gen Psychiatry 2010; 67(10):1012.

41. Hanlon C, Medihin G, Alem A, Tesfaye F, Lakew Z, Worku B. Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: The P-MaMiE Population-based cohort study. Tropical Medicine and International Health 2008; 14(2):156.

42. Senturk V, Hanlon C, Medihin G, Dewey M, Araya M, Alem A, Prince M, Stewart R. Impact of Perinatal somatic and common mental disorder symptoms on functioning on Ethiopian Women: The P-MaMiE population based cohort study. Journal of Affective Disorders 2012; 136:340.

43. Bindt C., Appiah-Poku J., Te Bonle M., Schoppen S., Feldt T., Barkmann C., et al. Antepartum depression and anxiety associated with disability in African women: cross-sectional results from the CDS study in Ghana and Cote d'Ivoire. PLoS One 2012; 7(10):48396.

44. Dibaba Y., Fantahun M., Hindin M. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. BMC Pregnancy and Childbirth 2013; 13:135.

45. Fisher J, Tran T, La B, Kriitma K, Rossenthal D, Tran T. Common perinatal mental disorders in northern Viet Nam: Community prevalence and health care use. Bull World Health Organ 2010; 88:737.

46. Medihin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Lakew Z, et al. The effect of maternal common mental disorders on infant undernutrition in Butajira, Ethiopa: P-MaMiE study. BMC Psychiatry 2010; 10:32.

47. Shakya R, Situala S, Shyangwa P. Depression during pregnancy in a tertiary care center of eastern Nepal. J Nepal Med Assoc 2008; 47(171):128.

48. Lancaster C, Gold K, Flynn H, Yoo H, Marcus S, Davis M. Risk factors for depressive symptoms during pregnancy: a systematic review. Am J Obstet Gynecol. 2010; 202(1):5.

49. Guo N, Bindt C, Te Bonle M, Appiah-Poku J, Koffi M, Posdzich S, et al. Association of antepartum and postpartum depression in Ghanaian and Ivorian women with febrile illness in their offspring: A prospective birth cohort study. American Journal of Epidemiology 2013; 178(9):1394.

50. Anselmi L, Barros F, Minten G, Gigante D, Horta B, Victora C. prevalence and early deteminants of common mental disorders in the 1982 birth cohort, Pelotas, South Brazil. Rev Saude Publica 2008; 42(12):26.

51. Hartley M, Tomlinson M, Greco E, Comulada S, Stewart J, Roux J Mbewu N & Rotheram-Borus N. Depressed mood in pregnancy: Prevalence and correlates in two Cape Town peri-urban settlements. Reproductive Health 2011; 8:9.

52. Peltzer K, Szrek H, Ramlagan S, Leite R, Chao L. Depression and social functioning among HIV-infected and uninfected persons in South Africa. AIDS Care 2015; 27(1):41.

53. Bonari L, Pinto N, Einarson A, Steinereir M, Koren G. Perinatal risks of untreated depression during pregnancy. Canadian Journal of Psychiatry 2004; 49(11):726.

54. Stein A, Pearson R, Goodman S, Rapa E, Rahman A, McCallum M, et al. Effects of perinatal mental disorders on the fetus and child. Lancet 2014; 384:1800.

55. Saeed A, Raana T, Saeed AM, Humayun A. Effect of antenatal depression on maternal dietary intake and neonatal outcome: a prospective cohort. Nutrition journal 2016; 15(1):64.

56. Heyningen T, Myer L, Onah M, Tomlinson M, Field S, Honikman S. Antenatal depression and adversity in urban South Africa. J Affect Disord 2016; 203:121.

57. Hanlon C MG, Alem A, Araya M, Abdulahi A, Tesfaye M, Wondimagegn D, Patel V, Prince M. Detecting perinatal common mental disorders in Ethiopia: validation of self reporting questionaire and Edinburgh postnatal depression scale. Journal of Affective Disorders 2008; 108:251.

58. Tesfaye M, Hanlon C, Wondimagegn D, Alem A. Detecting Posnatal common mental disorders in Addis Ababa, Ethiopia: Validation of the Edinburgh Postnatal depression scale and Kessler scales. Journal of Affective Disorders 2009; 122:102.

59. Katon J, Russo J, Gavin A, Melville J, Katon W. Diabetes and depression in pregnancy: Is there an association? Journal of Women's Health 2011; 20(7).

60. Katon W. Epidemiology and treatment of depression in patients with chronic medical illness. Dialogues in Clinical Neuroscience 2011; 13 (1):7.

61. Katon W, Russo J, Melville J, Katon J, Gavin A. Depression in pregnancy is associated with pre-existing but not pregnancy-induced hypertension. Gen Hosp Psychiatry 2012; 34(1):9.

62. Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. Obstetrics and gynecology 2000; 95:487.

63. Lutsiv O, McKinney B, Foster G, Taylor V, Pullenayegum E, McDonald S. Pregnancy complications associated with the co-prevalence of excess maternal weight and depression. International Journal of Obesity 2015; 39: 1710.

64. Jablensky A, Morgan V, Zubrick S, Bower C, Yellachich L. Pregnancy, delivery, and neonatal complications in a population cohort of women with schizophrenia and major affective disorders. The American journal of psychiatry 2005; 162(1):79.

65. Alder J, Fink N, Urech C, Hosli I, Bitzer J. Identification of antenatal depression in obstetric care. Archives of gynecology and obstetrics 2011; 284(6):1403.

66. Qiao Y, Wang J, Li J, Wang J. Effects of depressive and anxiety symptoms during pregnancy on pregnant, obstetric and neonatal outcomes: a follow-up study. Journal of Obstetrics and Gynaecology 2012; 32:237.

67. Qiu C, Sanchez S, Lam N, Garcia P, Williams M. Associations of depression and depressive symptoms with preeclampsia: results from a Peruvian case-control study. BMC women's health 2007; 7:15.

68. Jarde A, Morais M, Kingston D, Giallo R, MacQueen GM, Giglia L, et al. Neonatal outcomes in women with untreated antenatal depression compared with women without depression: A systematic review and meta-analysis. JAMA psychiatry 2016; 73(8):826.

69. Rahman A, Bunn J, Lovel H, Creed F. Association between antenatal depression and low birthweight in a developing country. Acta Psychiatr Scand. 2007; 115: 481.

70. Husain N, Munshi T, Jafri J, Husain M, Parveen A, Saeed Q, et al. Antenatal depression is not associated with low-birth weight: a study from urban Pakistan. Frontiers in Psychiatry 2014; 5:175.

71. Patel V, Prince M. Maternal psychological morbidity and low birthweight in India. BJP 2006; 188:284.

72. Niemi M, falkenberg T, Petzold M, Chuc N, Patel V. Symptoms of antenatal common mental disorders, preterm birth and low birthweight: prospective cohort study in a semi rural district of Vietnam. Tropical Medicine and International Health 2013; 18(6):687.

73. Ban L, Tata L, West J, Fiaschi L, Gibson J. Live and non-live pregnancy outcomes among women with depression and anxiety: A population-based study. PLoS One 2012; 7(8):e43462.

74. Alemayehu M, Belachew T, T T. Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia BMC Pregnancy and Childbirth 2012; 12:6.

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

76. Worku A, Yalew A, Afework M. Maternal complications and women's behavior in seeking care from skilled providers in north gondar, Ethiopia. PLoS One 2013; 8(3):e60171.

77. Teferra A., Alemu F., Woldeyohannes S. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, North West of Ethiopia: A community - based cross sectional study. BMC Pregnancy and Childbirth 2012; 12:74.

78. Amano A, Gebeyehu A, Birhanu Z. Institutional delivery service utilization in Munisa Woreda, South East Ethiopia: a community based cross-sectional study. BMC Pregnancy and Childbirth 2012; 12:105.

79. Costello A, Azad K, Barnett S. An alternative strategy to reduce maternal mortality. Lancet 2006; 368:1477.

80. Illechukwu L. Psychiatry in Africa: Special problems and unique feature. Transcultural Psychiatric Research Review 1991; 28:169.

81. Brittain K, Myer L, Koen N, Koopowitz S, Donald KA, Barnett W, et al. Risk factors for antenatal depression and associations with infant birth outcomes: Results from a South African birth cohort study. Paediatric and perinatal epidemiology 2015; 29(6).

82. Choi J, Chung H, Han G. Patient outcomes according to COPD action plan adherence. Journal of Clinical Nursing 2014; 23(5-6):883.

83. Fisher J, Mello M, Patel V, Rahman A, Tran T, Holtn S, et al. Prevalence and determinants of common perinatal mentala disorders in low income and lower middle income countries: A systematic review. Bull World Health Organ 2012; 90:139.

84. Woody C, Ferraria A, Siskindb D, Whiteford H, Harris M. A systematic review and meta-regression of the prevalence and incidence of perinatal depression. Journal of Affective Disorders 2017; 219 86.

85. Carney R., Freedlanda K., Millerb G., Jaffec A. Depression as a risk factor for cardiac mortality and morbidity A review of potential mechanisms. Journal of Psychosomatic Research 2002; 53:897.

86. Hanlon C, Whitley R, wondimagegn D, Alem A, Prince M. Between life and death: exploring the socio-cultural aspect of antenatal mental distress in rural Ethiopia. Arch Womens Ment Health 2010; 13(5):385.

87. Zuckerman B, Amaro H, Bauchner H, Cabral H. Depressive symptoms during pregnancy: relationship to poor health behaviors. Am J Obstet Gynecol. 1989; 160(5):1107.

88. Calderon J, Flores P, Babul M, Aguirre JM, Slachevsky A, Padilla O, et al. Systemic lupus erythematosus impairs memory cognitive tests not affected by depression. Lupus 2014; 23(10):1042.

89. DiMatteo R, Lepper H, Croghan T. Depression is a risk factor for noncompliance with medical treatment meta-analysis of the effects of anxiety and depression on patient adherence. Arch Intern Med. 2000; 160:2101.

90. Kamo T. Perinatal depression: The meaning of the paradigm shift from "postnatal" to "perinatal". Seishin shinkeigaku zasshi = Psychiatria et neurologia Japonica 2015; 117(11):902.

91. Siu B, Leung S, Patrick L, Hung S, Hara M. Antenatal risk factors for postnatal depression: A prospective study of Chinese women at maternal and child birth centeres. BMC Psychiatry 2012; 12(22).

92. Choi S, Park Y, Park I, Ko H, Shin J. Impact of antenatal depression on perinatal outcomes and postpartum depression in Korean women. J Res Med Sci 2014; 19(9):807.

93. Callahan E, Bertakis K, Azari R, Robbins J, Helms J, Leigh P. Association of higher costs with symptoms and diagnosis of depression The Journal of Family Practice 2002; 51(6):540.

94. Josefsson A, Angelsioo L, Berg G, Ekstrom CM, Gunnervik C, Nordin C, et al. Obstetric, somatic, and demographic risk factors for postpartum depressive symptoms. Obstet Gynecol 2002; 99(2):223.

95. Dennis C. Influence of depressive symptomatology on maternal health service utilization and general health. Arch Womens Ment Health 2004; 7:183.

96. Magriples U, Kershaw T, Rising S, Massey Z, Ickovics J. Prenatal health care beyond the obstetrics service: Utilization and predictors of unscheduled care. Am J Obstet Gynecol. 2008; 198(1):751.

97. Chandler D. Late entry into prenatal care in a rural setting. J Midwifery Womens Health 2002; 47:28.

98. Kim H, Mandell M, Crandall C, Kuskowski M, Dieperink B, Buchberger R. Antenatal psychiatric illness and adequacy of prenatal care in an ethnically diverse inner-city obstetric population. Arch Womens Ment Health 2006; 9(2):103.

99. Dagne E. Role of socio-demographic factors on utilization of maternal health care services in Ethiopia. 2010.

100. Mekonnon Y., Mekonne A. Factors influencing the use of maternal healthcare services in Ethiopia. J Health Popul Nutr 2003; 21(4):374.

101. Assfaw Y. Determinants of antenatal care, institutional delivery and skilled birth attendant utilization in Samre Saharti District, Tigray, Ethiopia. International journal for equity in health 2013; 12:30.

102. Baron E, Hanlon C, Mall S, Honikman S, Breuer E, Kathree T, et al. Mental health in primary care in five low and middle income countries: a situtational analysis. BMC health services research 2016; 16(53):1293.

103. Whiteford H., Degenhardt L., Rehm J., Baxter A., Ferrari A., H. E, et al. Global burden of disease attributable to mental and substance use disorders: fi ndings from the Global Burden of Disease Study 2010. Lancet 2013.

104. WHO. Depression and other common mental disorders: Global health estimates. Geneva: WHO; 2017.

105. Andersson L, Sundstrom-Poromaa I, Wulff M, Astrom M, Bixo M. Implications of antenatal depression and anxiety for obstetric outcome. Obstet Gynecol 2004; 104(3):467.

106. Kalsekar I, Madhavan S, Amonkar M, Scott V, Douglas S, Makela E. The effect of depression on health care utilization and costs in patients with type 2 diabetes. Managed care interface 2006; 19(3):39.

107. Roberts J, Sword W, Watt S, Gafni A, Krueger P, Sheehan D, et al. Costs of postpartum care: examining associations from the Ontario mother and infant survey. The Canadian Journal of Nursing Research 2001; 33(1):19.

108. Abdulahi, Haile-Mariam, Kebede. Burden of disease analysis in rural Ethiopia. Ethiopian Medical Journal 2001; 39.

109. Michel-Wolfromm H. The psychological factor in spontaneous abortion. Journal of Psychosomatic Research 1968; 12(1):67.

110. Huffman J, Mastromauro C, Gillian Sowden G, Fricchione G, Healy B, J. J. Impact of a depression care management program for hospitalized cardiac patients. Circ Cardiovasc Qual Outcomes 2011; 4:198.

111. Grote N, Bridge J, Gavin A, Melville J, Iyengar S, Katon W. A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight, and Intrauterine Growth Restriction. *Arch Gen Psychiatry* 2010 7(10):1012.

112. Rahman A., Bunn J, Lovel H, Creed F. Association between antenatal depression and low birthweight in a developing country. Acta Psychiatr Scand 2007; 115:481.

113. WHO. Classification of mental and behavioural disorders: Diagnostic criteria for research world1993.

114. Field T, Diego M, Hernandez M. Prenatal depression effects and interventions: A review. Infant Behav Dev. 2010; 33(4): 409.

115. Gavin A., Holzman C., Siefert K., Tian Y. Maternal depressive symptoms, depression and psychiatric medication use in relation to risk of preterm delivery. NIH Public Access 2009; 19(5):325.

116. Webster J, Pritchard M, Linnane J, Roberts J, Hinson J, Starrenburg S. Postnatal depression: use of health services and satisfaction with health-care providers. J Qual Clin Pract. 2001; 21(4):144.

117. ACOG. Screening for perinatal depression. Obstet Gynecol 2015; 125(5):1268.

118. Gelaye B, Williams M, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res. 2013.

119. Deyessa N, Berhane Y, Alem A, Hogberg U, Kullgern G. Depression among women in rural Ethiopia as related to socioeconomic factors: A community-based study on women in reproductive age groups Scandinavian Journal of Public Health 2008; 36:589.

120. Ashley J, Harper B, Arms-Chavez C, LoBello S. Estimated prevalence of antenatal depression in the US population. Arch Womens Ment Health 2016; 19(2):395.

121. Ayele TA, Azale T, Alemu K, Abdissa Z, Mulat H, Fekadu A. Prevalence and associated factors of antenatal depression among women attending antenatal care service at Gondar University Hospital, northwest Ethiopia. PLoS One 2016; 11(5):0155125.

122. Bennett H, Einarson A, Taddio A, Koren G, Einarson T. Prevalence of depression during pregnancy: Systematic review. Obstetrics & Gynecology 2004; 103(4):698.

123. Huang Z, Hao J, Su1 P, Huang K, Xin X, Cheng D, Xiao L, et al. The impact of prior abortion on anxiety and depression symptoms during a subsequent pregnancy: Data from a population-based cohort study in China. Bulletin of Clinical Psychopharmacology 2012; 22(1):51.

124. Hanlon C, Whitley R, wondimagegn D, Alem A, Princem M. Postnatal mental distress in relation to socio-cultural practices of child birth: An exploratory qualitative study from Ethiopia. Social Science and Medicine 2009; 69:1211.

125. Woldemichael G. Women's autonomy and maternal health seeking behvior in Ethiopia. Maternal and child health journal 2010; 14(6):988.

126. Ahmed S, Creanga A, Gillespie D, Tsui A. Economic status, education and empowerment: Implications for maternal health Service utilization in developing countries. PLoS ONE 2010; 5(6).

127. CSA. Ethiopian demographic and health survey. Addis Ababa: Central Statistical Authority; 2000.

128. Mengesha Z, Biks G, Ayele T, Tessema G, Koye D. Determinants of skilled attendance for delivery in northwest Ethiopia: a community based nested case control study. BMC Public Health 2013; 13:130.

129. Nigussie M, Haile Mariam D, Mitike G. Assessment of safe delivery service utilization among women of childbearing age in north Gondar Zone, north west Ethiopia. Ethiop.J.Health Dev. 2004; 18(3):145.

130. Daniel O, Desalegn S. Institutional delivery service utilization and associated factors among child bearing age women in Goba woreda. Ethiopia. Journal of Gynecology and Obstetrics 2014; 2(4): 63.

131. Gedefaw A, Muluken A, Tesfaye S. Factors associated with Institutional delivery service utilization among mothers in Bahir Dar City administration, Amhara region: a community based cross sectional study. Reproductive Health 2014; 11:22.

132. Hailemichael F, Woldie M, Tafese F. Predictors of institutional delivery in Sodo town, southern Ethiopia. Afr J Prm Health Care Fam Med. 2013; 5(1):544.

133. Hanlon C, Medihin G, Alem A, Araya M, Abdulahi A, Tomlinson M, et al. Socio-cultural practices in Ethiopia: association with onset and persistence of postnatal common mental disorders. British Journal of Psychiatry 2010b; 197:468.

134. Kotelchuck M. The adequacy of prenatal care utilization index: Its us distribution and association with low birthweight. Public Health Brief 1994; 9.

135. Weobong B, Asbroek A, Soremekun S, Manu A, Owusu-Agyei S, Prince M, et al. Association of antenatal depression with adverse consequences for the mother and newborn in rural Ghana: Findings from the don population-based cohort study. PLoS ONE 2014; 9(12):e116333.

136. Airaksinen E, Larsson M, Forsell L. Cognitive functions in depressive disorders: evidence from a population-based study. Psychological Medicine 2004; 34:83.

137. Nauatin M, Mitchel P, Goodwin G. Cognitive deficits in depression: A review article. BJP 2001; 178:200.

138. Paczkowski M, Kruk M, Tessema F, Tegegn A, Galea S. Depressive symptoms and posttraumatic stress disorder as determinants of preference weights for attributes of obstetric care among Ethiopian women. PLoS ONE 2012; 7(10):46788.

139. Goshomi U. Relationship between knowledge of complications and health seeking behaviour among pregnant women with pregnancy induced hypertension aged 18 to 28 years at Chitungwiza Central Hospital. 2009.

140. Asres A. Assemsment of factors associaated with Safe delivery service utilizaion among women of childbearng age in Sheka zone, SNNPR, south west of Ethiopia. Masters thesis. Addis Ababa: Addis Ababa University; 2008. p. 69.

141. Birmeta K., Dibaba Y, D. W. Determinants of maternal health care utilization in Holeta town, central Ethiopia. BMC health services research 2013: 13:256.

142. Simkhada B, Teijlingen E, Porte M & Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. Journal of Advanced Nursing 2007; 6(13).

143. Regassa N. Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. African Health Sciences 2011; 11(3):390

144. Mekonnen Y. Patterns of maternity care service utilization in Southern Ethiopia: Evidence from a community and family survey. Ethiop.J.Health Dev. 2003; 17(1):27.

145. Mekonnen M, Yalew K, Umer J, Melese M. Determinants of delivery practices among Afar pastoralists of Ethiopia. Pan African Medical Journal 2012; 13:17.

146. Fikre A., Demissie M. Prevalence of institutional delivery and associated factors in Dodota Woreda (district), Oromia regional state, Ethiopia. Reproductive Health 2012; 9:33.

147. Chaundhury N, Moran A, Alam A, Ahsan K, others. Beliefs and Practices during preganancy and child birth in urban slums of Dhaka, Bangladesh. *BMC Public Health* 2012; 12.

148. CSA. Maternal health care behaviors in Ethiopia: Ethiopian demographic health survey. Addis Ababa: Ethiopian society of population studies; 2005.

149. Kabakyenga J, Östergren P, Turyakira E, Pettersson K. Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. Reproductive Health 2011; 8:33.

150. Shiferaw S, Spigt M, Godefrooij M, Melkamu Y, Tekie M. Why do women prefer home births in Ethiopia? BMC Pregnancy and Childbirth 2013; 13:5.

151. Bassam A, Khunda S, Hussam E. Obstetric outcome of subsequent pregnancy following intrauterine death. Fac Med Baghdad 2011; 53.

152. Brandon A, Trivedi M, Hynan L, Miltenberger P, Labat D, Rifkin J, et al. Prenatal depression in women hospitalized for obstetric risk. J Clin Psychiatry 2008; 69(4):635.

153. Thornton D, Guendelman S, Hosang N. Obstetric complications in women with diagnosed mental illness: The relative success of California's county mental health system. Health Services Research 2010; 45:1.

154. Benute G, Nomura R, Siracuza R, Fraguas Jr R, Lucia M, Zugaib M. Depression during pregnancy in women with a medical disorder: risk factors and perinatal outcomes. Clinics 2010; 65(11):1127.

155. Filippi V, Goufodji S, Sismanidis C, Kanhonou L, Fottrell E, Ronsmans C, et al. Effects of severe obstetric complications on women's health and infant mortality in Benin. Tropical Medicine and International Health 2010; 15(6):733.

156. Katon W, Russo J, Melville J, Katon J, Gavin A. Depression in pregnancy is associated with pre-existing but not pregnancy-induced hypertension Gen Hosp Psychiatry 2012; 34(1):6.

157. Savitz D, Hertz-Picciotto, Siega-Riz, McMahon & Buekens. Maternal stress and preterm birth. American Journal of Epidemiology 2003; 157(1).

158. Suezanne T, Sherman J, Prince C. Maternal prenatal depressive symptoms and spontaneous preterm births among african-american women in Baltimore, Maryland. 2001.

159. Suri. R, Altshuler L, Hellemann G, Burt V, Aquino A, J M. Effects of antenatal depression and antidepressant treatment on gestational age at birth and risk of preterm birth. The American journal of psychiatry 2007; 164:1206.

160. Mossner R, Mikova O, Koutsilieri E, Saoud M, Ehlis A. Consensus paper of the WFSBP task force on biological markers (review): Biological markers in depression The World Journal of Biological Psychiatry 2007; 8(3):141.

161. Luke B, Brown M. Elevated risks of pregnancy complications and adverse outcomes with increasing maternal age. Human Reproduction 2007; 22(5):1264.

162. Carolan M, Frankowska D. Advanced maternal age and adverse perinatal outcome: A review of the evidence Australian Journal of Primary Health 2011; 17:48.

163. Faramarzi M, Esmaelzadeh S, Mosavi S. Prevalence, maternal complications and birth outcome of physical, sexual and emotional domestic violence during pregnancy. Acta Medica Iranica 2013; 43(2):115.

164. Schwarzer R. Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. Applied Psychology: An Introduction to International Review 2008; 57(1):1.

165. Rosenstock I, Strecher V, Becker M. Social learning theory and the health belief model. Health Education Quarterly 1988; 15(2):175.

166. Anderson R., Newman J. Societal and individual determinants of medical care utilization in the United States. The Milbank Quarterly 2005; 83(4):1.

167. CSA. Statistical Abstracts (2011/2012): Annual Statistical Reports. 2011.

168. Fekadu A, Medhin G, Selamu M, Hailemariam M, Alem A, Giorgis TW, et al. Population level mental distress in rural Ethiopia. *BMC Psychiatry* 2014; 14:194.

169. CSA. Statistical Report on population Size and Characterstics: Resullts for SNNPR. Addis Ababa: Central Satistical Authority; 2010.

170. Prime Ethiopia: Description of mental health plan intervention packages. 2013.

171. Bitew T, Hanlon C, Kebede E, Medihn G, Fekadu A. Antenatal depressive symptoms and maternal health care utilisation: A population-based study of pregnant women in Ethiopia. BMC Pregnancy and Childbirth 2016; 16:301.

172. የኢትዮጵያ ንጉስ ነገስት የፍትብሔር ሕግ. አዲስ አባባ: የኢሕዲሪ መንግስት; 1953.

173. Selamu M, Asher L, Hanlon C, Medihin G, Hailemariam M, Patel V, et al. Beyond the biomedical: Community resources for mental health care in rural Ethiopia. PLoS ONE 2015; 10:5.

174. Kroenke K, Spitzer R, Wiliams J. Validity of a brief depression severity measure. J Gen Intern Med 2001; 16:606.

175. Manea L, Gilbody S, McMillan D. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. CMAJ 2012; 184(3):191.

176. Hanlon C, Medhin G, c, Selamu M, Breuer E., Worku B, Hailemariam H, et al. Validity of brief screening questionnaires to detect depression in primary care in Ethiopia. Journal of Affective Disorders 2015; 186:32.

177. Hanlon C, Medihin G, Alem A, Araya M, Abdulahi A, Tesfaye M ea. Measuring common mental disorders in women in ethiopia: Reliability and construct validity of comprehensive psychopathological rating scale. Soc Psychiatry Psychiaric Epidemiology 2008; 43:653.

178. Rabin R., Jennings J., Campbell J., Bair-Merritt M. Intimate partner violence screening tools. American Journal of Prev Med. 2009; 36 (5):439.

179. Zink T, Levin L., Putnam F., Beckstrom A. Accuracy of five domestic violence screening questions with nongraphic language. Clinical Pediatrics 2007; 46(2):127.

180. Boen H. Characteristics of senior centre users – and the impact of a group programme on social support and late-life depression. Norsk Epidemiologi 2012; 22(2):261.

181. Brugha T, Cragg D. The List of Threatening Experiences: the reliability and validity of a brief life events questionnaire. Acta Psychiatr Scand 1990; 82(1):77.

182. Hodgson R, Alwyn T, John B, Smith A, Newcombe A, Morgan C. The Fast Alcohol Screening Test. Alcohol & Alcoholism 2002; 37(1):61.

183. Fotso J., Mukiira C. Perceived quality of and access to care among poor urban women in Kenya and their utilization of delivery care: harnessing the potential of private clinics? Health policy and planning 2011:1.

184. Yeung A, Feldman G, Fava M. Self-management of depression: A manual for mental health and primary care professionals. UK: Cambridge University Press; 1994.

185. Von Elm E, Altman D, Egger M, Pocock S, Gøtzsche P, Vandenbroucke J. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. Epidemiology 2007; 18(6):800.

186. Oakley A, Rajan L, Robertson P. A comparison of different sources of information about pregnancy and childbirth. Journal of biosocial science 1990; 22(4):477.

187. Ngoc N, Merialdi M, Abdel-Aleem H, Carroli G, Purwar M, Zavaleta N ea. Causes of stillbirth and early neonatal deaths: Data from 7993 pregnancies in six developing countries. Bull World Health Organ 2006; 84:699.

188. Blencowe H, Cousens S, Jassir F, Chou L, Hogan D, Shiekh S, et al. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis. Lancet Glob Health 2016; 4:e98.

189. Fewtrell M, Kennedy K, Singhal A, Martin R, Ness A, Hadders-Algra M, et al. How much loss to follow up is acceptable in long terp randomized controlled trials and prospective studies. Arch Dis Child 2008; 93(6):458.

190. Kristman V, Manno, M., Cotte, P. Loss to follow-up in cohort studies: how much is too much? European Journal of Epidemiology 2004; 19:751.

191. Mwape L, McGuiness T, Dixey R, Johnson S. Socio-cultural factors surounding mental distress during the perinatal period in Zambia: a qualitative investigation. International Journal of Mental Health Systems 2012; 6:12.

192. Stewart R, Umar E, Gleadow-Ware S, Creed F, Bristow K. Perinatal distress and depression in Malawi: an exploratory qualitative study of stressors, supports and symptoms Arch Womens Ment Health 2015; 18:177.

193. Zafar S, Jean-Baptiste R, Rahman A, Neilson J, Broek N. Non-life threatening maternal morbidity: Cross sectional surveys from Malawi and Pakistan. PLoS ONE 2015; 10(9).

194. Arthur E. Wealth and antenatal care use: implications for maternal health care utilisation in Ghana. Health Economics Review 2012; 2:14.

195. Chrousos G, Torpy D, P. G. Interactions between the hypothalamic-pituitary-adrenal axis and the female reproductive system: clinical implications. Ann of Intern Med 1998; 129:229.

196. Sandman C, Wadhwa P, Dunkel-Schetter C, Chicz-DeMet A, Belman J, Porto M ao. Psychobiological influences of stress and HPA regulation on the human fetus and infant birth outcomes. Ann N Y Acad Sci 1994; 739:198.

197. Smith R, Cubis J, Brinsmead M, Lewin T, Singh B, Owens P ao. Mood changes, obstetric experience and alterations in plasma cortisol, beta-endorphin and corticotrophin releasing hormone during pregnancy and the puerperium. Journal of Psychosomatic Research 1990; 34(1):53.

198. Zeleke B, Ayele T, Woldetsadik M, Bisetegn T, Adane A. Depression among women with obstetric fistula, and pelvic organ prolapse in northwest Ethiopia. BMC Psychiatry 2013; 13:236.

199. Geneti K. Statistical analysis of determinants of maternal institutional delivery service utilization in Ethiopia. American Journal of Theoretical and Applied Statistics 2015; 4(3):71.

200. Fekadu M, Regassa N. Skilled delivery care service utilization in Ethiopia: analysis of rural-urban differentials based on national demographic and health survey (DHS) data. African Health Sciences 2014; 14(4):974.

201. Berk M, Williams L, Jacka F, Oneil A, Pasco J, al e. So depression is an inflamatory disease, but where does the inflamation come from? BMC Medicine 2013; 12:200.

APPENDICES

APPENDIX A: Sub-study- I. ANDs and maternal healthcare use

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RESEARCH ARTICLE Open Access

Antenatal depressive symptoms and maternal health care utilisation: a population-based study of pregnant women in Ethiopia

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Abstract

Background: Depressive symptoms during pregnancy can have multiple adverse effects on perinatal outcomes, including maternal morbidity and mortality. The potential impact of antenatal depressive symptoms on maternal health care use, however, has been little explored in low and middle-income countries (LMICs). This paper investigates whether maternal health care utilisation varies as a function of antenatal depressive symptoms.

Methods: In a population-based cross-sectional survey, 1311 women in the second or third trimesters of pregnancy were recruited in Sodo district, Gurage Zone, southern Ethiopia. Depressive symptoms were measured using a locally validated version of the Patient Health Questionnaire (PHQ-9). The association between antenatal depressive symptoms and number of antenatal care (ANC) visits was examined using Poisson regression and the association of depression symptoms with emergency health care visits using negative binomial regression. Binary logistic regression was used to investigate the association of depressive symptoms with initiation, frequency and adequacy of antenatal care.

Results: At PHQ-9 cut off of five or more, 29.5 % of participants had depressive symptoms. The majority (60.5 %) of women had attended for one or more ANC visits. Women with depressive symptoms had an increased risk of having more non-scheduled ANC visits (adjusted Risk Ratio (aRR) = 1.41, 95 % CI: 1.20, 1.65), as well as an increased number of emergency health care visits to both traditional providers (aRR = 1.64, 95 % CI: 1.17, 2.31) and biomedical providers (aRR = 1.31, 95 % CI: 1.04, 1.69) for pregnancy-related emergencies. However, antenatal depressive symptoms were not significantly associated with initiation of ANC.

Conclusions: Increased non-scheduled ANC and emergency health care visits may be indicators of undetected depression in antenatal women, and have the potential to overwhelm the capacity and resources of health care systems, particularly in LMICs. Establishment of a system for detection, referral and treatment of antenatal depression, integrated within existing antenatal care, may reduce antenatal morbidity and treatment costs and promote efficiency of the health care system.

Keywords: Maternal health care use, Antenatal care utilization, Antenatal care, Antenatal depression, Maternal depression, Sub-Saharan Africa, Ethiopia

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Background

Maternal mortality remains a major public health challenge despite the encouraging changes achieved through the Millennium Development Goals [1, 2]. Nearly 99 % of global maternal deaths occur in low- and middle-income countries [1]. High maternal mortality is attributed to low antenatal health service utilization [3–7], high rates of home delivery [8–12] and low use of family planning services [1, 13]. Ethiopia contributes to between 3 and 5 % of global maternal mortality [5, 14]. Within Ethiopia, approximately three-quarters of these deaths are considered to be the result of undetected and untreated antenatal causes of obstetric complications, such as hemorrhage [15], infection [15], unsafe abortion, hypertension [15] and risk factors for obstructed labor [16–18]. To reduce the risk of pregnancy and obstetric complications, the World Health Organization recommends that women should attend at least four antenatal visits during pregnancy and deliver at a health facility [1].

In the African region, between 2000 and 2009, only 47 % of births were attended by skilled personnel and only 44 % of pregnant women had at least four antenatal care visits [19]. The situation is of major concern in Ethiopia [3, 4, 8, 11, 20–22], where only 11.7 % of births are attended by skilled health personnel, only 34 % of pregnant women attend for the recommended number of antenatal care visits [5] and there has been inadequate reduction in maternal mortality [23]. The total number of disability adjusted life years (DALYs) attributed to maternal mortality (10.6 %) in a rural area of Ethiopia exceeded that of malaria (10.4 %), tuberculosis (7 %), depression (6.5 %) or HIV (3.5 %) [24].

Maternal mortality and morbidity are established global public health challenges, but evidence is also emerging of the public health importance of maternal depression [25–30]. Antenatal depression is estimated to affect about 20 % of pregnant women in LMICs [31–35], compared to about 10 % in high-income countries [36, 37]. The adverse effects of maternal depression on productivity of mothers, child growth, health and behavioral outcomes, as well as perinatal outcomes, have been well documented [38–40].

Antenatal depressive symptoms have the potential to impact negatively upon health service utilization and thereby contribute to increased perinatal complications and maternal mortality. However, studies investigating the impact of antenatal depressive symptoms on health service utilization have been small in number and conducted almost exclusively in high-income countries. In these studies, antenatal depression has been found to be associated with increased unscheduled gynecological and obstetrician visits [25, 41], although no association was seen with initiation of antenatal care visits [42]. In studies examining the adequacy of antenatal care utilization, defined as attendance for 50 % or more of the expected ANC reviews [41, 43], no association was found between antenatal depression and adequate use of ANC. In the only study from Africa that the authors are aware of, a non-significant association was found between antenatal depression and antenatal care attendance [44].

There is, therefore, a clear gap in understanding the impact of depressive symptoms on antenatal care use, particularly in LMICs where perinatal outcomes are poor. Improved detection and treatment of antenatal depression is not prioritized in most LMIC health systems [45] but may improve ANC use, and therefore obstetric outcomes. Indeed, better evidence is needed to support greater priority to mental health care. In this paper, we report findings from a study that aimed to investigate whether antenatal depressive symptoms are associated with initiation, frequency and adequacy of ANC visits, and adherence with recommended schedules of ANC visits, in a rural Ethiopian setting. We hypothesised that ANC utilisation would vary as a function of antenatal depressive symptoms.

Methods

The study was a cross-sectional, population-based survey.

Study setting

The study was conducted in the Sodo District, Gurage Zone, Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia, located about 100 km from the capital, Addis Ababa. The district is administratively divided into 58 kebeles or sub-districts (54 rural and four urban), the smallest administrative unit in Ethiopia. Sodo has a varied topography (40 % plains, 7 % mountainous, 30 % undulating and 23 % valleys) and agriculture is the main mode of subsistence in the area (Tafesse, 2002, personal communication). The population of the district was estimated to be 161,952 persons (79,356 men; 82,596 women) in 2007 [46]. The majority of the inhabitants belong to the Sodo Gurage ethnic group (85 %) [47, 48]. The remaining population are mostly Oromo and Amhara in ethnicity [48]. The official language of the region and the district is Amharic.

Sample size estimation and recruitment of participants

A total of 1311 women were recruited into the study between September and November 2014. Eligibility criteria for women were as follows: (1) in the second or third trimester of pregnancy; (2) continuous residence in the area for at least the preceding 6 months; (3) not having hearing or cognitive impairment to the extent of impairing capacity to communicate adequately, and (4) giving informed consent to take part in the study.

EpiInfo version 7 software (EpiInfo; CDC, 2000) was used to estimate the sample size assuming a statistical

power of 80 % with a two tailed 5 % margin of error for three dependent variables (ANC use, delivery care use and pregnancy complications). ANC utilization as the dependent variable yielded the greatest sample size: 276 women with depressive symptoms, the exposure or independent variable, assuming 34 % antenatal care utilization [5] among the unexposed and a 6 % difference between exposed and unexposed groups. To obtain 276 pregnant women with antenatal depressive symptoms, assuming a prevalence of 19.9 % [32], 1387 pregnant women needed to be screened for depression.

Locating participants

In the Ethiopian health system, community-based health workers (Health Extension Workers; HEWs) are responsible for health prevention and promotion activities. HEWs collect community-based data for the health information system, especially information about maternal health. During their 3-monthly house-to-house visits of the population living in their sub-district, they are expected to identify and monitor pregnant mothers and to keep accurate and up-to-date maternal records in the health posts (primary care facilities at the sub-district level). In addition, the health development army (a community-based network of health education volunteers, each of whom covers five families) are required to report pregnant women in their respective units to the HEWs. For this study, HEWs, health development army leaders, community leaders and pregnant women themselves acted as key informants to identify all pregnant women living in their sub-district. The data collectors then carried out home visits to the identified pregnant women, gave them information about the study, obtained informed consent and then conducted the interview. Women were visited three times before they were considered unavailable to participate in the study.

Data collection and quality control

There were 40 data collectors and four supervisors, all of whom had previous experience of data collection for other projects in the same district. The data collectors were trained for 2 days by the main study co-ordinator (TB) on administration of the instruments, the objectives of the study and ethical issues. Lectures, demonstrations and role plays were the methods used to train the data collectors. The main coordinator of the study also held weekly meetings with the data collectors and supervisors. The conduct of the study was closely monitored and supervised. Completed questionnaires were checked carefully on a daily basis for consistency, adherence to instructions and missing data, first by the supervisors, then by main coordinator and finally by the data entry clerks. Questionnaires deemed to have problems were returned back to the data collectors for investigation, and if necessary for correction or reassessment. Finally, data were computerized using a double data entry with EpiData version 3.1 (EpiData; CDC, 2000).

Measurement

Outcomes

Utilisation of ANC services was assessed in relation to four dimensions of antenatal care: initiation of antenatal care (i.e., time of the first ANC visit), frequency of ANC attendance, adequacy of ANC attendance and adherence to ANC schedules.

Initiation of ANC and frequency of ANC attendance were assessed by an item in a self-report questionnaire asking about the gestational age at which the women attended for each of their ANC visits. Any ANC initiated before or at the 16th week of gestation was labeled as "timely initiation" and visits after this time were labeled "late" based on WHO recommendations. Adherence to ANC attendance schedules was estimated in relation to WHO guidance, which proposes that the first ANC attendance should take place before the 16th week of gestation; second ANC attendance between weeks 24 and 28; third ANC between weeks 30 and 32; and fourth ANC visit between weeks 36 and 40. Any visits out of these proposed intervals were considered to be non-scheduled. Women who initiated ANC visits between 24 and 28 weeks of gestation and continued the remaining visits as recommended were considered to be non-adherent for the first ANC schedules but adherent for the remaining ANC schedules. Finally, the numbers of scheduled and non-scheduled ANC visits were counted for each respondent. Respondents were asked about the number of emergency contacts for pregnancy complications with a range of specified types of traditional healers or biomedical health service providers available in the area [49].

The frequency of antenatal care visits was expressed as the ratio of the number of actual ANC visits to the total number of ANC visits recommended by WHO at the given gestational age. WHO proposes one, two, three and four ANC contacts for women at the 16th, 28th, 32nd and 40th week of gestation, respectively. Finally a ratio of 125 % or more of the recommended number of ANC visits was categorized as "increased use of ANC" and otherwise as "expected use of ANC". Adequacy of ANC use was also categorized based on Kotlchuk's index [50]. Women with 50 % or more ANC attendance and timely initiation (during or before the 16th week of gestation), as defined by WHO, were described as receiving "adequate ANC" while those with either late initiation or less than a 50 % expected attendance of ANC were defined as receiving "inadequate ANC".

Exposure

Antenatal depressive symptoms were assessed with a locally validated Amharic version of the Patient Health Questionnaire (PHQ-9) [51]. A score of five or more was considered to be indicative of high antenatal depressive symptoms (the optimal score for increased probability of major depressive disorder in the criterion validation study). In Ethiopia, the PHQ-9 was found to have good internal consistency (Cronbach's alpha = 0.81) and excellent intra-class correlation of 0.92 in a study of 926 outpatients in a major referral hospital in Addis Ababa [52]. Measures of depression specific to the perinatal period were considered; however, a validation study in rural Ethiopia concluded that Edinburgh Postnatal Depression Scale had low criterion validity and poor internal consistency [53]. Although previous Ethiopian studies had used the locally-validated Self-Reporting Questionnaire (SRQ-20) for measurement of common mental disorders [34], the PHQ-9 was preferred due to its focus on depressive symptoms [53].

Potential confounders

Intimate partner violence (IPV) was assessed using a five item scale, the Women's Abuse Screening Test (WAST) [54, 55]. The scale was chosen for its brevity and the acceptability of the wording. Social support was measured using the Oslo Social Support Scale (OSSS-3) [56], a three item scale which asks about concern from others, ease of getting help and the number of supporting persons that participants can count on. Stressful life events were measured with the list of threatening experiences (LTE), a 12-item self-report questionnaire. The LTE has good test-retest reliability and internal consistency [57]. Both the OSSS-3 and LTE have been used in a community based study in the same setting [47].

Respondents were asked about the number of previous stillbirths, miscarriages, neonatal and infant mortality. The items were adapted from the Ethiopian Demographic Health Survey of 2011 [5]. Women were also asked whether they had chronic medical conditions, including HIV, tuberculosis, renal or cardiac diseases, hypertension, anemia or gastritis. Items asking the number of emergency health care provider visits to biomedical and traditional health care providers were used to assess women's emergency health care use for pregnancy-related complications.

An item from the Ethiopian Demographic Health Survey was used to ask whether the woman wanted the pregnancy (labeled as "wanted") or would have preferred it to happen at a future date (labeled as "mistimed") or if she had never wanted to be pregnant at all (labeled as "unwanted"). Accessibility of health care was measured by using seven items asking respondents about the level of difficulty and distance to reach the nearest health facility and travel time to their respective nearest health facility, as well as affordability and availability of health care facilities [58]. Finally, self-reported pregnancy complications included a list of key danger signs during pregnancy, including bleeding, swollen hands/face, blurred vision, convulsions, high fever, loss of consciousness, severe abdominal pain, premature rupture of membranes, and discharge with unusual odor, pain during urination, severe headache and severe weakness. Closed ended questions were used to assess socio-demographic and socio-economic variables, including residence, marital status, estimated monthly income and educational level of participants.

Data analysis

Data were analysed using the Statistical Packages for Social Sciences, version 20 (SPSS 20; IBM Corp 2012) and Stata version 13 (Stata Corp, 2013). A total of eight missing data [PHQ (1 missing), IPV (3 missing), accessibility to health care facility (3 missing) and LTE (1 missing)] were found. We included an average of observed scores of a respective variable to fill the missed item in the variables. Residence was categorized into urban/rural; marital status into married and single (never married, divorced and widowed) categories; Educational level into "non-literate", "primary schooling (Grade 1–8)" and "Secondary Schooling" (Grade 9 and above) categories. Monthly income was categorized into tertiles as "high", "medium", and "low". The profile of predictors and outcomes was described using simple descriptive summary values.

Poisson regression was used to examine the association between antenatal depressive symptoms and components of antenatal care use (number of non-scheduled and total number of ANC visits) after testing the assumption of equality of the variance and the mean. Negative binomial regression was used to examine the association between antenatal depressive symptoms and number of traditional and biomedical emergency health care provider visits. Socio-demographic and socioeconomic variables, interpersonal and life adversities, obstetric and medical conditions were included in all analyses as potential confounders. Gestational age was controlled as an offset variable in all poisson and negative binomial regression models. Binary logistic regression was used to test the relation between antenatal depressive symptoms and frequency, adequacy and initiation of antenatal health care use.

Results

Amongst 1321 women identified as potentially eligible, 44 were excluded because they were in the first trimester of pregnancy; three refused participation and seven couldn't be accessed despite three trials to find from their location.

Characteristics of participants

Among study participants 98.6 % were married, 67.0 % were non-literate, and 92.1 % were rural residents. The mean age was 26.8 years (Table 1). With respect to ANC attendance, 60.5 % had initiated ANC (37.0 % by 16 weeks gestation). About one third of women fulfilled criteria for adequate antenatal care. Nearly 30.0 % of women had PHQ-9 score of five or more, indicating probable depression. Forty four percent of the participants reported an unintended pregnancy (36.2 % unwanted and 7.8 % mistimed) and 27.0 % had a history of adverse perinatal outcomes during their previous pregnancy.

Antenatal depressive symptoms and adherence to ANC visits

Depressive symptoms during pregnancy were associated significantly with increased risk of having more non-scheduled ANC visits (aRR = 1.41, 95 % CI: 1.20, 1.65) and an increased number of total ANC visits (aRR = 1.23, 95 % CI: 1.12, 1.36) (Table 2).

Greater accessibility of the primary health care facility was associated with increased risk of having more non-scheduled ANC visits (aRR = 1.06 95 % CI: 1.02, 1.09) as well as with an increased number of total ANC visits (aRR = 1.04, 1.02, 1.06). Similarly, women with experience of ANC use in the past pregnancy had increased risk of more non-scheduled ANC visits (aRR = 1.28,

Table 1 Characteristic of respondents ($N = 1311$)

Characteristics	Values	Number	Percent
Marital Status	[c]Single	18	1.4
	Married	1293	98.6
Pregnancy Intention	Unwanted	475	36.2
	Mistimed	102	7.8
	Wanted	734	56.0
Monthly Income category	High	429	32.7
	Medium	423	32.3
	Low	459	35.0
Residence	Rural	1208	92.1
	Urban	103	7.9
Mother's Education	Grade 9–12 and above	53	4.0
	Grade 1–8	380	29.0
	Non-literate	878	67.0
Patient Health Questionnaire Status	PHQ ≥ 5	387	29.5
	PHQ < 5	924	70.5
Use of ANC during Past Pregnancy	Yes	793	60.5
	No	518	39.5
Number of Chronic Illnesses	One or more	440	33.6
	None	871	66.4
Past experience of adverse perinatal outcomes	1 or more	356	27.2
	None	955	72.8
Number of ANC Visits	Never initiated ANC	461	35.2
	Once or more	850	64.8
Self-reported pregnancy complications	None	655	50.1
	One or more	656	49.9
Adequacy of Antenatal Care	[a]Inadequate	861	65.7
	[b]Adequate	450	34.3
Time of Initiation of ANC	Timely (Up to 16th week of gestation)	455	37.7
	Late (After 16th week of gestation)	856	62.3

Mean age = 26.8 years
[a]Inadequate = less than 50 % of expected ANC attendance or late initiation
[b]Adequate = more than 50 % of expected ANC attendance and timely initiation
[c]Unmarried, divorced, widowed

Table 2 The association of antenatal depression with total and non-scheduled number of ANC visits

Characteristics		Total number of ANC Visits		Number of Non-scheduled ANC visits	
		CRR (95 % CI)	ARR (95 % CI)	CRR (95 % CI)	ARR (95 % CI)
Antenatal Depression:	PHQ-9 ≥ 5	1.12 (1.02, 1.23)[a]	1.23 (1.12, 1.36)[b]	1.21 (1.04, 1.40)[a]	1.41 (1.20, 1.65)[b]
	PHQ-9 < 5	1	1	1	1
Accessibility of Health facility		1.06 (1.03, 1.09)[a]	1.04 (1.02, 1.06)[b]	1.09 (1.04, 1.23)[b]	1.06 (1.02, 1.09)[b]
Marital Status:	Single	1.03 (0.72, 1.47)	0.99 (0.69, 1.42)	1.13 (0.60, 2.15)	1.04 (0.59, 1.82)
	Married	1	1	1	1
Residence:	Rural	0.65 (0.51, 0.83)[a]	0.85 (0.72, 1.01)	0.50 (0.40, 0.61)[b]	0.65 (0.51, 0.85)[b]
	Urban	1	1	1	1
Income:	High	1.15 (0.97, 1.37)	1.13 (1.00, 1.26)[a]	1.37 (1.11, 1.70)[a]	1.29 (1.07, 1.56)[a]
	Medium	1.06 (0.89, 1.26)	1.03 (0.92, 1.15)	1.13 (0.89, 1.43)	1.05 (0.88, 1.26)
	Low	1	1	1	1
Education:	Grade 9–12 and above	1.79 (1.28, 2.50)[b]	1.16 (0.92 (1.48)	2.06 (1.52, 2.81)[b]	0.99 (0.69, 1.43)
	Grade 1–8	1.27 (0.90, 1.49)	1.08 (0.96, 1.20)	1.13 (0.89, 1.43)	1.10 (0.92, 1.32)
	Non-literate	1	1	1	1
Intimate Partner Violence		1.01 (0.98, 1.03)	1.01 (0.99, 1.03)	1.00 (0.97, 1.03)	1.00 (0.97, 1.02)
Social Support		1.02 (0.99, 1.06)	1.02 (1.00, 1.04)	1.03 (0.99, 1.08)	1.03 (0.99, 1.07)
Number of Life threatening Events		1.01 (0.96, 1.06)	1.01 (0.98, 1.04)	1.05 (0.98, 1.17)	1.05 (1.00, 1.10)
Parity		0.93 (0.90, 0.96)[b]	0.94 (0.92, 0.97)[b]	0.89 (0.85, 0.94)[b]	0.91 (0.86, 0.95)[b]
Pregnancy Intention:	Unwanted	0.75 (0.65, 0.88)[b]	0.84 (0.75, 0.93)[b]	0.75 (0.61, 0.91)[a]	0.89 (0.75, 1.06)
	Mistimed	0.89 (0.68, 1.17)	0.91 (0.77, 1.09)	0.78 (0.56, 1.10)	0.86 (0.64, 1.15)
	Wanted	1	1	1	1
Adverse Perinatal outcomes: ≥1[c]		0.90 (0.77, 1.06)	0.94 (0.84, 1.04)	0.79 (0.64, 0.97)[a]	0.85 (0.71, 1.02)
ANC visit in past pregnancy: ≥1[c]		1.08 (0.94, 1.25)	1.19 (1.08, 1.31)[b]	1.10 (0.91, 1.33)	1.28 (1.09, 1.51)[a]
Chronic Medical conditions: ≥1[c]		1.08 (0.94, 1.25)	1.07 (0.97, 1.17)	1.14 (0.95, 1.37)	1.10 (0.95, 1.28)

[a]Statistically significant at < 0.05
[b]Statistically significant at < 0.001
[c]Reference group was "none"

95 % CI: 1.09, 1.51) as well as total number of ANC visits (aRR = 1.19, 95 % CI: 1.08, 1.31) compared to those without experience of ANC use. Each increment in parity was associated with reduced risk of non-scheduled ANC visits (aRR = 0.91, 95 % CI: 0.86, 0.95) and a lower total number of ANC visits (aRR = 0.94, 95 % CI: 0.92, 0.97). Rural residence and low income were associated with reduced levels of non-scheduled ANC visits.

Antenatal depressive symptoms and initiation, frequency and adequacy of ANC use

Antenatal depressive symptoms were associated with increased odds of ANC attendance beyond that recommended in ANC schedules (aOR = 1.86, 95 % CI: 1.29, 2.68). Increased access to the health facility (aOR = 1.16, 95 % CI: 1.07, 1.25) and experience of ANC in a previous pregnancy (aOR = 1.65, 95 % CI, 1.14, 2.41) were associated with increased ANC visits. Increasing parity (aOR = 0.84, 95 % CI: 0.75, 0.94) was associated with lower than expected ANC attendance. Increased parity (aOR = 0.90, 95 % CI: 0.83, 0.96) and unwanted pregnancy (aOR = 0.63, 95 % CI: 0.48, 0.83) were associated with lower levels of adequate ANC care (Table 3).

Antenatal depressive symptoms were not associated with timely initiation of ANC visits (aOR = 1.24, 95 % CI: 0.95, 1.63) (Table 3). Increased accessibility of the health facility (aOR = 1.07, 95 % CI: 1.02, 1.13) and having one or more chronic conditions (aOR = 1.28, 95 % CI: 1.00, 1.62) were associated significantly with increased timely initiation of ANC. Increased parity (aOR = 0.99, 95 % CI: 0.83, 0.96) and unwanted pregnancy (aOR = 0.65, 95 % CI: 0.49, 0.86) were associated significantly with delayed initiation of ANC.

Antenatal depressive symptoms and emergency health care use

Antenatal depressive symptoms were associated with increased risk of a greater number of traditional emergency health care provider visits (aRR = 1.64, 95 % CI: 1.17, 2.31), biomedical health care provider visits (aRR =

Table 3 The association of antenatal depression with initiation of ANC, frequency of ANC follow ups and adequacy of ANC

Characterstics		Initiation of ANC		ANC Visits higher than expected in a given Gestational Age		Adequacy of ANC Use	
		COR (95 % CI)	AOR (95 % CI)	COR (95 % CI)	AOR (95 % CI)	COR (95 % CI)	AOR (95 % CI)
PHQ 9 Score: PHQ-9 ≥ 5		1.10 (0.93, 1.24)	1.24 (0.95, 1.63)	1.45 (1.05, 2.05)[a]	1.86 (1.29, 2.68)[a]	1.09 (0.085, 1.39)	1.24 (0.94, 1.62)
		1	1	1	1	1	1
Access to Healthcare		1.10 (1.04, 1.15)[b]	1.07 (1.02, 1.13)[a]	1.18 (1.10, 1.27)[b]	1.16 (1.07, 1.25)[b]	1.10 (1.04, 1.15)[b]	1.07 (1.02, 1.13)[a]
Marital Status:	Married	1.20 (0.46, 3.12)	1.26 (0.47, 3.39)	1.31 (0.38, 4.58)	1.08 (0.29, 3.98)	0.96 (0.36, 2.56)	1.03 (0.37,2.86)
	Single	1	1	1	1	1	1
Residence: Rural		0.47 (0.31, 0.70)[b]	0.80 (0.48, 1.32)	0.39 (0.24, 0.62)[b]	0.62 (0.34, 1.14)	0.48 (0.32, 0.72)[b]	0.82 (0.49, 1.36)
Income:	High	1.14 (0.87, 1.51)	1.08 (0.80, 1.47)	1.19 (0.81, 1.75)	1.18 (0.77, 1.820)	1.16 (0.88, 1.54)	1.09 (0.80, 1.48)
	Medium	1.11 (0.84, 1.46)	1.05 (0.78, 1.40)	1.05 (0.71, 1.57)	0.97 (0.64, 1.47)	1.11 (0.84, 1.47)	1.04 (0.78, 1.40)
	Low	1	1	1	1	1	1
Education:	Non-literate	0.32 (0.18, 0.57)[b]	0.64 (0.32, 1.26)	0.39 (0.20, 0.76)[a]	1.06 (0.45, 2.50)	0.32 (0.18, 0.56)[b]	0.59 (0.29, 1.20)
	Elementary Schooling	0.46 (0.26, 0.82)[a]	0.61 (0.30, 1.23)	0.60 (0.30, 1.19)	1.10 (0.49, 2.47)	0.44 (0.25, 0.79)[a]	0.61 (0.31, 1.20)
	Secondary Schooling	1	1	1	1	1	1
Intimate Partner Violence		1.01 (0.97, 1.05)	1.02 (0.97, 1.06)	1.03 (0.99, 1.07)	1.02 (0.96, 1.08)	1.00 (0.97, 1.04)	1.01 (1.00, 1.06)
Social Support		1.04 (0.98, 1.10)	1.03 (0.97, 1.10)	1.00 (0.93, 1.09)	1.00 (0.92, 1.09)	1.04 (0.98, 1.04)	1.04 (0.97, 1.11)
Number of Life Threatening Events		1.04 (0.96, 1.13)	1.04 (0.95, 1.14)	1.04 (0.94, 1.16)	1.02 (.91, 1.16)	1.04 (0.96, 1.07)	1.04 (0.95, 1.14)
Parity		0.87 (0.82, 0.92)[b]	0.89 (0.83, 0.96)[a]	0.84 (0.77, 0.91)[b]	0.84 (0.75, 0.94)[a]	0.87 (0.82, 0.92)[b]	0.90 (0.83, 0.96)[a]
Pregnancy Intention:	Unwanted	0.54 (0.42, 0.69)[b]	0.65 (0.49, 0.86)[a]	0.62 (0.43, 0.88)[a]	0.78 (0.52, 1.15)	0.52 (0.40,0.67)[b]	0.63 (0.48, 0.83)[a]
	Mistimed	1.03 (0.67, 1.59)	1.11 (0.71, 1.71)	0.80 (0.43, 1.49)	0.84 (0.44, 1.60)	1.04 (0.68, 1.59)	1.11 (0.72, 1.72)
	Wanted	1	1	1	1	1	1
Previous Use of ANC: ≥1[c]		1.01 (0.80, 1.28)	1.14 (0.88, 1.47)	1.24 (0.89, 1.74)	1.65 (1.14, 2.41)[a]	1.04 (0.82, 1.31)	1.18 (0.91, 1.52)
Past Adverse obstetric history: ≥1[c]		0.98 (0.76, 1.26)	1.08 (0.82, 1.43)	0.72 (0.49, 1.06)	0.74 (0.49, 1.12)	0.96 (0.74, 1.24)	1.06 (0.80, 1.41)
Chronic Medical conditions: ≥1[c]		[a]1.30 (1.03, 1.64)	1.28 (1.00, 1.62)[a]	1.06 (0.77, 1.47)	1.03 (0.73, 1.45)	1.30 (1.03, 1.63)[a]	1.27 (1.00, 1.62)

[a]Statistically significant at < 0.05
[b]Statistically significant at < 0.001
[c]Reference was "none"

1.32, 95 % CI: 1.04, 1.69) and increased number of total emergency health care visits (aRR = 1.44, 95 % CI: 1.16, 1.80) (Table 4).

Having a chronic medical condition and higher income were associated with increased emergency health care visits of any type (traditional, biomedical and total number of health care visits). Increased number of traditional emergency health care provider visits was associated with rural residence (aRR = 3.87, 95 % CI: 1.54, 9.74), being in a high income category (aRR = 4.40, 95 % CI: 2.89, 6.69) and medium income categories (aRR = 1.07, 95 % CI: 1.26, 3.08), increased intimate partner violence (aRR = 1.15, 95 % CI: 1.09, 1.21), increased number of threatening life events (aRR = 1.27, 95 % CI: 1.16, 1.39) and having one or more chronic medical conditions (aRR = 2.86, 95 % CI: 0.03, 4.03). A history of adverse perinatal outcomes was associated with a lower risk of traditional health care visits (aRR = 0.53, 95 % CI: 0.36, 0.80) but not associated with emergency help-seeking from biomedical health care providers (aRR = 1.05, 95 % CI: 0.81, 1.37) (Table 4).

An increased number of biomedical health care provider visits was also associated with increased access to health care facility (aRR = 1.34 95 % CI: 1.00, 1.79), high income (aRR = 1.46, 95 % CI: 1.15, 1.84) and having one or more chronic medical conditions (aRR = 1.11, 95 % CI: 1.06, 1.17) as shown in Table 4.

Discussion

In this community-based survey from rural Ethiopia, nearly one-third of antenatal women had high levels of depressive symptoms. Antenatal depressive symptoms were associated independently with increased number of non-scheduled ANC visits, and increased presentations for emergency health care. There was no association between antenatal depressive symptoms and initiation and adequacy of ANC.

Table 4 The association of antenatal depression and Number of traditional, modern and total number of emergency health care provider visits during pregnancy

Characteristics		Number of Traditional health care provider visits		Number of Modern health care provider visits		Number of either of both health care provider visits	
		cRR (95 % CI)	aRR (95 % CI)	cOR (95 % CI)	aRR (95 % CI)	cOR (95 % CI)	aRR (95 % CI)
PHQ 9 Score:	PHQ ≥ 5	2.15 (1.70, 2.71)[b]	1.64 (1.17, 2.31)[a]	1.29 (1.03, 1.62)[a]	1.32 (1.04, 1.69)[a]	1.63 (1.33, 1.99)[b]	1.44 (1.16, 1.80)[a]
	PHQ < 5	1	1	1	1	1	1
Access to Healthcare		0.94 (0.89, 0.98)[a]	1.07 (1.00, 1.14)	1.10 (1.06, 1.17)[b]	1.11 (1.06, 1.17)[b]	1.04 (1.00, 1.08)	1.08 (1.03, 1.13)[a]
Marital Status:	Single	0.19 (0.03, 1.37)	0.13 (0.01, 1.26)	1.17 (0.50, 2.74)	1.33 (0.56, 3.17)	0.75 (0.32, 1.72)	0.84 (0.35, 1.97)
	Married	1	1	1	1	1	1
Residence:	Rural	1.47 (0.86, 2.51)	3.87 (1.54, 9.74)[a]	0.60 (0.40, 0.92)[a]	0.79 (0.46, 1.34)	0.96 (0.71, 1.29)	1.17 (0.70, 1.95)
	Rural	1	1.00	1	1.00	1	1.00
Income:	High	4.44 (3.33, 5.93[a]	4.40 (2.89, 6.69)[b]	1.52 (1.15, 1.99)[a]	1.34 (1.00, 1.79)[a]	2.20 (1.72, 2.82)	1.93 (1.48, 2.51)[b]
	Medium	1.35 (0.95, 1.91)	1.97 (1.26, 3.08)[a]	1.00 (0.76, 1.32)	0.98 (0.74, 1.30)	1.11 (0.87, 1.43)	1.18 (0.91, 1.5)
	Poor	1	1	1	1	1	1
Education:	Secondary Schooling	0.98 (0.52, 1.84)	0.81 (0.25, 2.66)	1.50 (0.83 2.71)	0.96 (0.45, 2.06)	1.27 (0.73, 2.20)	0.92 (0.45, 1.88)
	Elementary Schooling	0.92 (0.72, 1.78)	1.07 (0.68, 1.7)	0.85 (0.66, 1.10)	0.86 (0.63, 1.16)	0.96 (0.77, 1.20)	0.96 (0.73, 1.28)
	Non-literate	1	1	1	1	1	1
Intimate Partner Violence		1.13 (1.10, 1.16)[b]	1.15 (1.09, 1.21)[b]	1.00 (0.96, 1.04)	0.99 (0.95, 1.03)	1.07 (1.04, 1.11)[b]	1.05 (1.02, 1.09)[a]
Social Support		0.96 (0.91, 1.01)	1.00 (0.92, 1.09)	1.04 (0.99, 1.10)	1.05 (0.99, 1.12)	1.01 (0.96, 1.06)	1.03 (0.97, 1.09)
Number of Life Threatening Events		1.30 (1.25, 1.350)[b]	1.27 (1.16, 1.39)[b]	1.10 (1.02, 1.17)[a]	1.07 (1.00, 1.16)	1.16 (1.09, 1.23)[b]	1.10 (1.03, 1.18)[a]
Parity		1.17 (1.11, 1.23)[b]	1.04 (0.94, 1.14)	1.04 (0.99, 1.10)	1.03 (0.95, 1.11)	1.07 (1.03, 1.13) [b]	1.04 (0.98, 1.11)
Pregnancy Intention:	Unwanted	1.94 (1.53, 2.451)[b]	1.26 (0.86, 1.85)	0.95 (0.75, 1.21)	0.94 (0.72, 1.23)	1.17 (0.95, 1.44)	0.97 (0.76, 1.24)
	Mistimed	1.18 (0.76, 1.84)	0.72 (0.39, 1.34)	0.97 (0.64, 1.47)	0.98 (0.63, 1.51)	0.99 (0.68, 1.44)	0.89 (0.60, 1.32)
	Wanted	1	1	1	1	1	1
Past Adverse obstetric history: Yes[c]		0.71 (0.55, 0.92)[a]	0.53 (0.36, 0.80)[a]	1.10 (0.86, 1.40)	1.05 (0.81, 1.37)	0.97 (0.78, 1.21)	0.89 (0.70, 1.14)
Chronic Medical conditions: Yes[c]		3.51 (2.73, 4.51)[b]	2.86 (2.03, 4.03)[b]	1.58 (1.26, 1.98)[a]	1.46 (1.15, 1.84)[b]	2.14 (1.75, 2.63)[b]	1.84 (1.49, 2.28)[b]

[a]Statistically significant at < 0.05
[b]Statistically significant at < 0.001
[c]Reference was "none"

Prevalence of antenatal depressive symptoms

The prevalence of depressive symptom s among antenatal women varies across LMIC studies. Our finding of a relatively high prevalence of depressive symptoms (29.5 %) during pregnancy accorded with studies from South Africa [59], Ghana [31], Viet Nam [33] and south Brazil [60] where the prevalence of antenatal depression was 39, 26, 29.9 and 32.8 %, respectively. However, the prevalence of antenatal depressive symptoms in this study was higher than that seen in previous community studies from Ethiopia. In a study from south-western Ethiopia [32], which used the Edinburgh Postnatal Depression Scale (not validated for a rural Ethiopian population) the prevalence of antenatal depression was found to be 19.9 %. However, in a study in Butajira (a district on the southern border of Sodo) the prevalence of depressive and anxiety symptoms measured with the validated Self Reporting Questionnaire (SRQ-20) was found to be 12.0 % [34]. Normal symptoms of pregnancy which overlap with depressive symptoms in PHQ-9 may explain the relatively high prevalence of antenatal depressive symptoms in our study. Nonetheless, we have also noted the importance of somatic symptoms in the presentation of perinatal depression in this population [30]. Despite these variations, depressive symptoms in the perinatal period are important public health issues in LMICs, with the potential to affect not only health and functioning but also service use.

Antenatal depression and ANC attendance

Our finding of increased non-scheduled ANC visits and total number of ANC visits in women with antenatal depressive symptoms were broadly consistent with the few reports from high income countries [25, 41, 61]. Increased non-scheduled ANC visits in our study is also in keeping with meta-analyses and systematic reviews of

depression in general, where depression was associated with around a three times increase in non-adherence to medical recommendations [62, 63]. The increased non-scheduled ANC visits among women with depressive symptoms may be explained by somatic symptoms of depression motivating them to seek help. Our finding of an increased number of total ANC visits among women with depressive symptoms was mainly through non-scheduled ANC visits. The increased number of ANC visits among women with higher socio-economic status is in keeping with a study from Ghana [64].

Antenatal depressive symptoms vs initiation and adequacy of ANC use

In the current study, antenatal depressive symptoms were not associated significantly with initiation of ANC visits in either univariate or multivariable models. This differs from the finding of delayed initiation of ANC in depressed women in the USA [42]. Timely initiation of ANC for some women might have preceded the onset of depressive symptoms since we recruited women in the second and third trimesters and consequently screened depressive symptoms after 16th week of gestation (a cut off time point of timely or delayed initiation of ANC) for most women. This might be the reason for the non-significant finding of the association between antenatal depressive symptoms and initiation of ANC in our study.

Antenatal depressive symptoms were associated with a higher overall number ANC visits than expected but non-significantly associated with adequacy of antenatal care visits after adjusting for potential confounders. The study replicated the non-significant association of antenatal depression and adequacy of antenatal health care visits in hospital based studies from the USA [41, 43].

Antenatal depressive symptoms and emergency health care use

The finding of a significant association between antenatal depressive symptoms and number of emergency visits to traditional and biomedical health care provider visits is in keeping with hospital-based studies in Australia [65], Sweden [25] and the USA [41]. In those countries, antenatal depressive symptoms were associated with increased obstetrician visits and increased use of planned Caesarean section [25, 41].

Various explanations have been provided to understand increased emergency health care provider visits. First, reduced self-care [63], social support [66] and reduced cognition and motivation [67, 68] among people with depressive symptoms increase their vulnerability to other medical conditions and complications that consequently increase the chance of needing emergency intervention [63]. Second, women with depressive symptoms may delay timely help-seeking due to reduced social support [66], lower satisfaction with health care services [65], poorer motivation and memory of schedules [67, 68] and reduced self-care [63] which means that the condition is more likely to progress and lead to presentation as an emergency. Third, women with depression may worry more about perinatal symptoms [69–71] so that they seek emergency care. This has been reported previously in postnatal women in HICs, in which emergency healthcare utilization may be increased substantially, including visits to psychiatrists, paediatricians, general practitioners and traditional providers [65, 72].

Although selection bias was minimized in this population based study, recall bias is an important issue because of low literacy and poor record keeping in this predominantly rural population. Nevertheless, by conducting the study in the antenatal period, the risk of recall bias is reduced especially for measurement of the outcome variables. The risk of social desirability bias was minimized by training the data collectors so that they would clearly explain about the study and its objective to the participants before conducting interview, encouraging them to be frank in their responses. Though we used robust method to identify all cases during the study period, we cannot be certain whether all pregnant women in the district have been identified. Furthermore, we assessed women's adherence to WHO's recommendations on ANC attendance but not the adherence of health professionals to WHO's recommendations to ANC.

Conclusions

This study offers an insight to health planners about the potential effects of antenatal depressive symptoms on antenatal service utilization. Our finding of a strong association between antenatal depressive symptoms and use of ANC services, mostly through non-scheduled visits, is important, given the relatively high prevalence of depressive symptoms in this population. First, the limited service available for antenatal women could be overwhelmed. Secondly, the increase in non-scheduled visits could potentially be associated with undetected and untreated pregnancy complications as a result of inadequate antenatal care. Thirdly, depressive symptoms are associated with an increase in medically unexplained somatic complaints [63, 73], which may result in increased non-scheduled visits. Thus, establishing a system for improved detection, referral and treatments of antenatal depression may promote efficiency in the health system and may potentially reduce morbidity, mortality and cost.

Abbreviations

ANC: Antenatal care; ANDS: Antenatal depressive symptoms; aOR: adjusted Odds Ratio; aRR: adjusted Risk Ratio; ARR: Adjusted Risk Ratio; CI: Confidence Interval; CRR: Crude Risk Ratio; GA: Gestational age; LMIC: Low and middle income countries; LMP: Last Menstrual period

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Availability of data and materials
The datasets generated and analysed during the current study are not publicly available at present. (1) Data were collected as part of a cross-country study and will be available for further cross-country work; (2) This was also part of a PhD project and the student needs to use the data for his PhD work before data could be made available; (3) We have not received consent from participants to share the data on the web but, will be available from the corresponding author on reasonable request.

Authors' contributions
TB, CH, EK and AF were involved in designing the study. TB, CH and AF participated in data collection. TB, CH, GM and AF participated in analysis. TB prepared first draft. TB, CH, EK, GM and AF revised drafts of the paper. TB, CH, GM, AF read and approved the final manuscript.

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Competing interests
The authors declare that they have no competing interests.

Consent for publication
Not applicable.

Ethics approval and consent to participate
Ethical clearance (ref. number: 024/14/psy dated 23/03/14) was obtained from the Institutional Review Board of the College of Health Sciences, Addis Ababa University. Informed consent was obtained from all participants after explanation about the study. A total of 155 women (105 with suicidal ideation and 50 with symptoms of major depression as assessed by the PHQ-9) were referred to the nearby health center where mental health services were available.

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References

1. WHO. Trends in Maternal Mortality: 1990 to 2010. Geneva: WHO, UNICEF, UNFPA and The World Bank estimates; 2012.
2. Hogan M, Foreman K, Naghavi M, Ahn S, Wang M, Makela S, et al. Maternal Mortality for 181 Countries, 1980–2008: A systematic analysis of progress towards Millenium Development Goal 5 (MDG-5). Lancet. 2010;375(9726):1609–23.
3. Aktar S. Health Care Seeking Behavior for safe motherhood: Findings from Rural Bangladesh. Bangladesh e-J Soc. 2012;9(2):57–70.
4. Babalola S, Fatusi F. Determinants of use of maternal health services in Nigeria–looking beyond individual and household factors. BMC Pregnancy Childbirth. 2009;9:43.
5. CSA. Ethiopia Demographic and Health Survey. Addis Ababa: ICF International; 2011.
6. Regassa N. Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. Afr Health Sci. 2011;11(3):390–7.
7. Simkhada B, Teijlingen E, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. J Adv Nurs. 2007;6(13):244–60.
8. Abebe F. Factors associated with home delivery in Bahirdar, Ethiopia: A case control study. BMC Res Notes. 2012;5:653.
9. Worku A, Fantahun M. Factors affecting utilization of skilled maternal care in Northwest Ethiopia: a multilevel analysis. BMC Int Health Hum Rights. 2013;13:20.
10. Worku A, Yalew A, Afework M. Maternal Complications and Women's Behavior in Seeking Care from Skilled Providers in North Gondar, Ethiopia. PLoS One. 2013;8(3):e60171.
11. Abera M, G/mariam A, Belachew T. Predictors of safe deliery serice utilizion in Arsi Zone, South-East Ethiopia. Ethiop J Health Sci. 2011; 21(Special Issue):95–106.
12. Tefera A, Alemu FM, Woldeyohannes SM. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, North West of Ethiopia: A community–based cross sectional study. BMC Pregnancy Childbirth. 2012;12:74.
13. Fisher J, de Mello MC, Izutsu T, Tran T. The Ha Noi Expert Statement: Recognition of Maternal Mental Health in Resource Constrained is essential for achieveing the milinium development goals. Int J Ment Heal Syst. 2011;5:2.
14. CSA. Ethiopia: Improved Capacity of Training Institutions for Health Workers. Addis Ababa: Ethiopian society of population studies; 2005.
15. Mersha A, Jira C, Demessie S. Community based study on maternal mortality in Jimma town, south western Ethiopia. Indian J Public Health. 1996;40(2):30–4.
16. Garomssa H, Dwivedi A. Maternal mortality in Ambo Hospital: a five year retrospective review. Ethiop J Reprod Health. 2008;2(1):1–13.
17. Gaym A. Maternal mortality studies in Ethiopia—magnitude, causes and trends. Ethiop Med J. 2009;47(2):95–108.
18. Say L, Chou D, Gemmill A, Tuncalp O, Moller A, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health. 2014;2(6):323–33.
19. WHO. Health Situation Analysis in the African Region: Atlas of Health Statistics. In: Africa WRof, editor. 2011.
20. Ahmed F, Moussa K, Petterson K, Asamoah B. Assessing knowledge, attitude, and practice of emergency contraception: a cross-sectional study among Ethiopian undergraduate female students. BMC Public Health. 2012;12:110.
21. Bradley E, Byam P, Alpern R, Thompson J, Zerihun A, Abeb Y, et al. A Systems Approach to Improving Rural Care in Ethiopia. PLoS ONE. 2012; 7(4):e35042.
22. Farnes C, Beckstrand RL, Callister LC. Help-Seeking Behaviors in Childbearing women in Ghana, West Africa. Int Nurs Rev. 2011;58:491–7.
23. Berhan Y, Berhan A. Review of Maternal Mortality in Ethiopia: A story of the past 30 years. Ethiop J Health Sci. 2014;(Speicla Issue):3–14.

24. Abdulahi H, Mariam DH, Kebede D. Burden of Disease Analysis in Rural Ethiopia. Ethiop Med J. 2001;39:271–81.
25. Andersson L, Sundstrom-Poromaa I, Wulff M, Astrom M, Bixo M. Implications of antenatal depression and anxiety for obstetric outcome. Obstet Gynecol. 2004;104(3):467–76.
26. Dayan J, Creveuil C, Herlicoviez M, Herbel C, Baranger E, Savoye C, et al. Role of anxiety and depression in the onset of spontaneous preterm labor. Am J Epidemiol. 2002;155(4):293–301.
27. Grigoriadis S, VonderPorten EH, Mamisashvili L, Tomlinson G, Dennis CL, et al. The Impact of Maternal Depression during pregnancy on Perinatal Outcomes: A systematic Review and Meta-analysis. J Clin Psychiatry. 2013; 74(4):e321–41.
28. Grote N, Bridge J, Gavin A, Melville J, Iyengar S, Katon W. A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight, and Intrauterine Growth Restriction. Arch Gen Psychiatry. 2010; 67(10):1012–24.
29. Hanlon C, Medihin G, Alem A, Tesfaye F, Lakew Z, Worku B. Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: The P-MaMiE Population-based cohort study. Trop Med Int Health. 2008; 14(2):156–66.
30. Senturk V, Hanlon C, Medihin G, Dewey M, Araya M, Alem A, Prince M, Stewart R. Impact of Perinatal somatic and common mental disorder symptoms on functioning on Ethiopian Women: The P-MaMiE population based cohort study. J Affect Disord. 2012;136:340–3349.
31. Bindt C, Appiah-Poku J, Te Bonle M, Schoppen S, Feldt T, Barkmann C, et al. Antepartum depression and anxiety associated with disability in African women: cross-sectional results from the CDS study in Ghana and Cote d'Ivoire. PLoS One. 2012;7(10):e48396.
32. Dibaba Y, Fantahun M, Hindin M. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. BMC Pregnancy Childbirth. 2013;13:135.
33. Fisher J, Tran T, La B, Kriitma K, Rossenthal D, Tran T. Common Perinatal Mental disorders in Northern Viet Nam: Community Prevalence and Health Care Use. Bull World Health Organ. 2010;88:737–45.
34. Medihin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Lakew Z, et al. The effect of Maternal common mental disorders on infant undernutrition in Butajira, Ethiopa: P-MaMiE study. BMC Psychiatry. 2010;10:32.
35. Situala S, Shakya R, Shyangwa P. Depression during Pregnancy in a Tertiary Care Center of Eastern Nepal. J Nepal Med Assoc. 2008;47(171):128–31.
36. Lancaster C, Gold K, Flynn H, Yoo H, et al. Risk factors for depressive symptoms during pregnancy: a systematic review. Am J Obstet Gynecol. 2010;202(1):5–14.
37. WHO. Millenium Development Goal 5: Improving maternal health. Geneva: Department of Mental Health and Substance Abuse; 2008.
38. Bonari L, Pinto N, Einarson A, Steinereir M, Koren G. Perinatal Risks of Untreated Depression During Pregnancy. Can J Psychiatry. 2004;49(11):726–35.
39. Rahman A, Bunn J, Lovel H, Creed F. Association between antenatal depression and low birthweight in a developing country. Acta Psychiatr Scand. 2007;115:481–6.
40. Stein A, Pearson R, Goodman S, Rapa E, Rahman A, McCallum M, et al. Effects of perinatal mental disorders on the fetus and child. Lancet. 2014; 384:1800–19.
41. Magriples U, Kershaw T, Rising S, Massey Z, Ickovics J. Prenatal health care beyond the obstetrics service: Utilization and predictors of unscheduled care. Am J Obstet Gynecol. 2008;198(1):75.e1–e7.
42. Chandler D. Late Entry into Prenatal care in a Rural Setting. J Midwifery Womens Health. 2002;47:28–34.
43. Kim H, Mandell M, Crandall C, Kuskowski M, Dieperink B, Buchberger R. Antenatal psychiatric illness and adequacy of prenatal care in an ethnically diverse inner-city obstetric population. Arch Womens Ment Health. 2006;9(2):103–7.
44. Weobong B, Asbroek A, Soremekun S, Manu A, Owusu-Agyei S, Prince M, et al. Association of Antenatal Depression with Adverse Consequences for the Mother and Newborn in Rural Ghana: Findings from the DON Population-Based Cohort Study. PLoS ONE. 2014;9(12):e116333.
45. Baron E, Hanlon C, Mall S, Honikman S, Breuer E, Kathree T, et al. Mental health in primary care in five low and middle income countries: a situtational analysis. BMC Health Serv Res. 2016;16:53. doi:10.1186/s12913-016-1291-z.
46. CSA. Statistical Abstracts (2011/2012): Annual Statistical Reports. 2011.
47. Fekadu A, Medhin G, Selamu M, Hailemariam M, Alem A, Giorgis TW, et al. Population level mental distress in rural Ethiopia. BMC Psychiatry. 2014;14:194.
48. CSA. The 2007 Poulation and Housing Census of Ethiopia: Resullts for SNNPR. In: Statistical Report on population Size and Characterstics. 2010. Part I.
49. Selamu M, Asher L, Hanlon C, Medihin G, Hailemariam M, Patel V, et al. Beyond the Biomedical: Community resources for mental health care in rural Ethiopia. PLoS ONE. 2015;10(5):e0126666.
50. Kotelchuck M. The Adequacy of Prenatal Care Utilization Index: Its US Distribution and Association with Low Birthweight. Public Health Brief. 1994;9(9).
51. Kroenke K, Spitzer R, Wiliams J. Validity of a Brief Depression Severity Measure. J Gen Intern Med. 2001;16:606–13.
52. Gelaye B, Williams M, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res. 2013;210(2):653–61.
53. Hanlon C, Medihin G, Alem A, Araya M, Abdulahi A, Tesfaye M. Measuring Common Mental Disorders in Women in Ethiopia: Reliability and construct Validity of Comprehensive Psychopathological rating Scale. Soc Psychiatry Psychiaric Epidemiol. 2008;43:653–9.
54. Rabin R, Jennings J, Campbell J, Bair-Merritt M. Intimate Partner Violence Screening Tools. Am J Prev Med. 2009;36(5):439–45.
55. Zink T, Levin L, Putnam F, Beckstrom A. Accuracy of Five Domestic Violence Screening Questions With Nongraphic Language. Clin Pediatr. 2007;46(2):127–34.
56. Boen H. Characteristics of senior centre users–and the impact of a group programme on social support and late-life depression. Norsk Epidemiologi. 2012;22(2):261–9.
57. Brugha TS, Cragg D. The List of Threatening Experiences: the reliability and validity of a brief life events questionnaire. Acta Psychiatr Scand. 1990;82(1):77–81.
58. Fotso J, Mukiira C. Perceived quality of and access to care among poor urban women in Kenya and their utilization of delivery care: harnessing the potential of private clinics? Health Policy Plan. 2011;1–11.
59. Hartley M, Tomlinson M, Greco E, Comulada S, Stewart J, Roux J, Mbewu N, Rotheram-Borus N. Depressed mood in pregnancy: Prevalence and correlates in two Cape Town peri-urban settlements. Reprod Health J. 2011;8:9.
60. Anselmi L, Barros F, Minten G, Gigante D, Horta B, Victora C. Prevalence and early deteminants of common mental disorders in the 1982 birth cohort, Pelotas, South Brazil. Rev Saude Publica. 2008;42(12):26–33.
61. Alder J, Fink N, Urech C, Hosli I, Bitzer J. Identification of antenatal depression in obstetric care. Arch Gynecol Obstet. 2011;284(6):1403–9. Epub 2011/03/23. eng.
62. Katon W. Epidemiology and treatment of depression in patients with chronic medical illness. Dialogues Clin Neurosci. 2011;13(1):7–23.
63. DiMatteo R, Lepper H, Croghan T. Depression Is a Risk Factor for Noncompliance With Medical Treatment Meta-analysis of the Effects of Anxiety and Depression on Patient Adherence. Arch Intern Med. 2000;160:2101–7.
64. Arthur E. Wealth and antenatal care use: implications for maternal health care utilisation in Ghana. Heal Econ Rev. 2012;2:14.
65. Webster J, Pritchard M, Linnane J, Roberts J, Hinson J, Starrenburg S. Postnatal depression: use of health services and satisfaction with health-care providers. J Qual Clin Pract. 2001;21(4):144–8.
66. Zuckerman B, Amaro H, Bauchner H, Cabral H. Depressive symptoms during pregnancy: relationship to poor health behaviors. Am J Obstet Gynecol. 1989;160(5):1107–11.
67. Airaksinen E, Larsson M, Forsell L. Cognitive functions in depressive disorders: evidence from a population-based study. Psychol Med. 2004;34:83–91.
68. Nauatin M, Mitchel P, Goodwin G. Cognitive Deficits in Depression: A review article. BJP. 2001;178:200–6.
69. Hanlon C, Whitley R, Wondimagegn D, Alem A, Prince M. Between life and death: exploring the socio-cultural aspect of antenatal mental distress in rural Ethiopia. Arch Womens Ment Health. 2010;13(5):385–93.
70. Stewart R, Umar E, Gleadow-Ware S, Creed F, Bristow K. Perinatal distress and depression in Malawi: an exploratory qualitative study of stressors, supports and symptoms. Arch Womens Ment Health. 2015;18:177–85.
71. Mwape L, McGuiness T, Dixey R, Johnson S. Socio-cultural factors surounding Mental distress during the perinatal period in Zambia: a qualitative investigation. Int J Ment Health Syst. 2012;6(12):1–10.
72. Dennis C. Influence of depressive symptomatology on maternal health service utilization and general health. Arch Womens Ment Health. 2004;7:183–91.
73. Mogga S, Prince M, Alem A, Kebede D, Stewart R, Glozier N, et al. Outcome Of major Depression In Ethiopia Population-Based Study. Br J Psychiatry. 2006;189:241–6.

APPENDIX B: Sub-study- II. ANS and uptake of Institutional delivery

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Antenatal depressive symptoms and utilisation of delivery and postnatal care: a prospective study in rural Ethiopia

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Abstract

Background: Uptake of delivery and postnatal care remains low in Low and Middle-Income Countries (LMICs), where 99% of global maternal deaths take place. However, the potential impact of antenatal depression on use of institutional delivery and postnatal care has seldom been examined. This study aimed to examine whether antenatal depressive symptoms are associated with use of maternal health care services.

Methods: A population-based prospective study was conducted in Sodo District, Southern Ethiopia. Depressive symptoms were assessed during pregnancy with a locally validated, Amharic version of the Patient Health Questionnaire (PHQ-9). A cut off score of five or more indicated possible depression. A total of 1251 women were interviewed at a median of 8 weeks (4–12 weeks) after delivery. Postnatal outcome variables were: institutional delivery care utilization, type of delivery, i.e. spontaneous or assisted, and postnatal care utilization. Multivariate logistic regression was used to examine the association between antenatal depressive symptoms and the outcome variables.

Results: High levels of antenatal depressive symptoms (PHQ score 5 or higher) were found in 28.7% of participating women. Nearly two-thirds, 783 women (62.6%), delivered in healthcare institutions. After adjusting for potential confounders, women with antenatal depressive symptoms had increased odds of reporting institutional birth [adjusted Odds Ratio (aOR) =1.42, 95% Confidence Interval (CI): 1.06, 1.92] and increased odds of reporting having had an assisted delivery (aOR = 1.72, 95% CI: 1.10, 2.69) as compared to women without these symptoms. However, the increased odds of institutional delivery among women with antenatal depressive symptoms was associated with unplanned delivery care use mainly due to emergency reasons (aOR = 1.62, 95% CI: 1.09, 2.42) rather than planning to deliver in healthcare institutions.

Conclusion: Improved detection and treatment of antenatal depression has the potential to increase planned institutional delivery and reduce perinatal complications, thus contributing to a reduction in maternal morbidity and mortality.

Keywords: Antenatal depressive symptoms, Delivery care use, Postnatal care use, Assisted delivery, Planned institutional delivery, Ethiopia

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Background

Depressive disorders constitute a public health challenge that contributes a substantial proportion of years lived with disability, globally [1, 2]. In World Health Organization (WHO) Global health estimates, depressive disorders were single largest contributors to non-fatal health loss with more than 80% of this non-fatal disease burden in Low and Middle Income Countries (LMICs) [3]. In the general population, depression is associated with a number of adverse impacts, including poorer quality of life [4], physical ill-health [2, 4], reduced adherence to medical recommendations [5, 6], increased use of health care services [7] arising because of increased medically unexplained symptoms [5], reduced social support, increased worries [8], co-morbid illness [5], and increased health risk behaviours and reduced self-care [9].

Among perinatal women, depression is additionally associated with particular adverse public health consequences [2, 10–14] such as adverse effects on perinatal outcomes and the growth, health and development of the child [1, 15, 16], as well as adverse effects on maternal health. During pregnancy, depression has multiple negative effects independent of postnatal depression [1, 15, 16] and is highly prevalent, with estimates ranging from 10 to 20% [17–22] worldwide, while higher prevalence levels are reported in LMICs (20%–39%) [17, 18, 23–27]. Most maternal deaths (99% of global maternal deaths) occur in LMICs [28, 29] due to undetected and/or inadequately treated complications such as infection, haemorrhage, unsafe abortion, hypertension and obstructed labour [28, 30–33]. These complications are mostly preventable by improving the uptake of maternal health care services [34, 35] in general, and through the improvement of skilled delivery in health care facilities, in particular [36–40]. The WHO has proposed skilled institutional delivery as a key strategy towards reducing maternal deaths across the globe [41].

Established factors associated with institutional delivery in Ethiopia are higher levels of education for the woman [34, 37, 38, 42–44] or her partner [29, 34], better socioeconomic status [43], urban residence [34, 37, 38, 43, 45, 46], previous experience of attending antenatal care [34, 37, 43, 47], increased women's autonomy [48, 49], media exposure, and prior experience of obstetric complications [50, 51]. However, the impact of maternal depression on women's use of maternal health care has received little attention in the literature. The authors were only able to identify one relevant study from Ghana [22] where no association was found between antenatal depression and uptake of institutional delivery, although the analysis did not control for important confounders, such as comorbid medical conditions and obstetric complications.

Investigating the potential impact of antenatal depressive symptoms on uptake of delivery care and postnatal care utilisation is essential to design future intervention strategies in LMIC settings, where perinatal outcomes are poor [52] and prevalence of antenatal depressive symptoms high [19, 21]. We hypothesized that antenatal depressive symptoms would, independent of socioeconomic and demographic factors, reduce uptake of institutional delivery and postnatal care due to several behavioural features associated with depression: loss of motivation and interest in common activities including self-care [9]; reduced social support [8], increased cognitive deficit to make decisions and evaluate alternatives [53] and reduced adherence to healthcare practitioner recommendations [5, 6]. Thus, improved detection and treatment of antenatal depressive symptoms, albeit not prioritized [54], is hypothesized to shift these behavioural manifestations and thus increase rates of planned institutional delivery and improve maternal and perinatal outcomes.

Thus, this study aimed to investigate prospectively the association between women's antenatal depressive symptoms, uptake of institutional delivery (planned and unplanned), and postnatal care utilisation after controlling for socioeconomic, demographic, obstetric and medical factors.

Methods

Study design and setting

A population-based, prospective study was conducted in Sodo District, located in the Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia. The district has 54 rural and four urban sub-districts (*"kebeles"*), the smallest administrative unit in Ethiopia. The official language of the region and the district is Amharic. An estimate of about 161,000 people (79,000 men; 82,000 women) resided in Sodo in 2007. The majority of the inhabitants belong to the Sodo Gurage ethnic group (85%), with the remaining population being mostly Oromo and Amhara in ethnicity [52]. Agriculture is the main economic activity within the region.

Cohort identification

The cohort was formed by recruiting all consenting pregnant women in the district in their second and third trimester of pregnancy, between early September and end of November 2014. In the current Ethiopian healthcare system, community based health workers (Health Extension Workers, HEWs) are tasked with community health prevention and promotion activities. They are also tasked with identification and monitoring of pregnant women and to keep accurate and up-to-date maternal records in health posts (frontline primary healthcare facility staffed by HEWs).

In support of these activities, HEWs coordinate with the health development army, a community-based network of health education volunteers, each of whom covers five families. The members of the health development armies are required to notify HEWs of all pregnant women in their respective areas. In this study, HEWs, members of health development armies, kebele chairmen and pregnant women themselves acted as key informants to identify all pregnant women in their respective sub-districts. Through home to home visits of identified women, the data collectors obtained informed consent from potential participants and conducted the baseline interviews. A minimum of three visits were carried out before considering participants 'unavailable' or 'unidentifiable'.

Eligibility criteria for participation in the study included: (1) being in the second or third trimester of pregnancy; (2) continuously resident in the area for a minimum of 6 months; (3) no hearing or cognitive impairment that would affect their capacity to communicate adequately; (4) giving informed consent.

Sample size

Sample size was estimated using EpiInfo version 7 [55] assuming a statistical power of 80% with a two tailed 5% margin of error; 11.7% of institutional delivery utilization among women without antenatal depression [52]; a 10% difference between women with and without antenatal depressive symptoms, which was assumed to be clinically significant. A three to one ratio for women with and without antenatal depressive symptoms was used based on the rates of antenatal depression cited in the literature for LMICs settings [17–19, 23–25]. On this basis, the target sample size was 1174 pregnant women (294 with antenatal depressive symptoms and 880 women without antenatal depressive symptoms). However, all 1311 antenatal baseline participants (356 with antenatal depressive symptoms and 955 without antenatal depressive symptoms) formed the cohort for this study [56].

Data collection and quality control

Data collection was conducted by trained interviewers using an Amharic version of the questionnaires. Forty experienced data collectors and four supervisors were trained for 2 days by the main coordinator of the study (TB) on administration of the instruments, objectives of the study and ethical issues. Training methods included lectures, demonstrations and role-plays. TB closely monitored and supervised the conduct of the study through weekly meetings with the data collectors and supervisors. Completed questionnaires were checked carefully for consistency, adherence to instructions and missing data, first by the supervisors and then by the coordinator and data entry clerks. The data were double entered using EpiData version 3.1 [55] while data collection was proceeding. Completed questionnaires deemed missing or inconsistent were returned back to data collectors for investigation and correction. Data reporting was made in adherence to a STROBE statement checklist [57] to maintain standard of reporting for cohort data.

Measurement

Outcome variables

Main outcomes were whether delivery occurred in a healthcare institution or at home without skilled birth attendatnt; (2) whether delivery in a healthcare setting was planned or unplanned and (3) whether postnatal care was utilized. The outcome variables were prospectively assessed at a median of 8 weeks postpartum (interquartile range of 6–11 weeks postpartum) using the lay interviewer-administered questionnaires. The delivery setting was dichotomized into home delivery vs. institutional delivery. The method of delivery was dichotomised as spontaneous vaginal delivery (SVD) or assisted delivery (instrumental vaginal delivery or Caesarean Section). Women who delivered in health care institutions were also asked whether this had been planned, or had arisen "due to prolonged labour", and or "due to referral linked to complications" (the latter two responses were subsequently coded as 'unplanned'). Postnatal care utilization was rated positive if there was at least one visit to a health care professional within 4 weeks of delivery.

Primary exposure

The primary exposure was the occurrence of depressive symptoms antenatally. A locally validated Amharic version of the Patient Health Questionnaire (PHQ-9) [58] was used to screen for antenatal depressive symptoms at baseline, during the second and third trimesters of pregnancy. In studies from high-income countries, the cut-off scores indicating possible major depressive disorder cluster around 10 points [59], however, validation studies of the PHQ-9 in rural areas of low-income countries of sub-Saharan Africa, have found a lower optimal cut-off point. In Ethiopia, the PHQ-9 has been validated in antenatal women and in primary care settings in the neighbouring district of the current study, with the optimal cut-off point indicating probable depression identified as 5 or more in primary care attendees [60]. In a community sample of postnatal women in Ghana, the optimal cut-off to indicate probable depression was also 5 or more [22]. Therefore, in this study, a PHQ score of 5 or more was taken to indicate probable antenatal depression.

Potential confounders

Potential confounding variables were reviewed from the literature and assessed at baseline, during the second

and third trimesters of pregnancy. A five item scale, the Women's Abuse Screening Test (WAST) [61, 62] was used to assess intimate partner violence (IPV). WAST was chosen for its brevity and the acceptability of the wording. A score of one or more on WAST indicates women who have experienced IPV [61, 62]. A three item scale, the Oslo Social Support scale (OSS-3) [63], was used to assess social support. The OSS-3 scale has been used in a community based study in the same setting [64].

Questions from the 2011 Ethiopian Demographic Health Survey (EDHS) were used to collect information on previous stillbirth, spontaneous abortion, neonatal and infant mortality, and comorbid medical conditions, including HIV, tuberculosis, renal or cardiac diseases, hypertension, anaemia or gastritis. Pregnancy intention was coded as 'intended' if the woman intended the pregnancy to happen; 'mistimed' if the woman would have preferred the pregnancy to have happened at a future date and 'unwanted' if the woman did not want to be pregnant at all. The number of antenatal care (ANC) visits was also asked and it was adjusted to gestational age by dividing the number of actual ANC visits by expected number of ANC contacts for a given gestation [one, two, three and four ANC contacts were expected for women at 16th, 28th, 32nd and 40th weeks of gestation respectively based on WHO recommendations [41]]. Birth preparedness was also assessed using items taken from EDHS and other similar studies that asked mothers whether they had planned the means of transport, prepared a delivery kit, identified a health facility and obtained the money required for expenses during delivery [50, 52, 65].

A seven-item scale was used to assess the accessibility of health care facilities for women. This tool assessed the level of difficulty, distance to reach the nearest health facility, and travel time taken as well as affordability and availability of health facilities [66]. Pregnancy complications were assessed using a list of key danger signs during pregnancy as obtained from the EDHS [52]. Close-ended questions were used to assess socio-demographic and socio-economic variables, including residence, marital status, estimated monthly income and educational level of participants.

Data analysis

Stata version 13.1 (Stat Corp, 2013) was used to analyse the data. Monthly income was divided into tertiles and labelled as "high", "medium", and "low" income categories. The profile of exposures and outcomes was described using simple descriptive summary values. The number of women lost to follow up was 4.6% including missing data in outcome variables of seven women (Fig. 1). Thus, complete case analysis was used as it was suggested that less than 5% lost to follow up was of little concern [67, 68].

Binary logistic regression was used to examine the association between antenatal depressive symptoms and the outcome variables. Bayesian Information Criterion (BIC) test was used to test model goodness of fit as a result of which 'number of ANC visits' was removed from two models. Socio-demographic and socioeconomic variables, interpersonal and life adversities (IPV, lack of social support), obstetric and medical conditions (experience of adverse perinatal outcomes, pregnancy complications, comorbid medical conditions, pregnancy intention, experience of institutional delivery and birth preparedness) were included in all analyses as potential confounders.

Ethical considerations

Ethical approval (ref. number: 024/14/psy dated 23/03/14) was obtained from the Institutional Review Board of the College of Health Sciences, Addis Ababa University. Women with a very high level of depressive symptoms (PHQ-9 ≥ 15) and those with suicidal ideation, as assessed by a particular item in the PHQ-9, were referred to health centres to access free primary care-based mental health services. Women with a PHQ-9 score above the validated cut off were not referred to health care facilities to avoid causing unnecessary concern among women with false positive symptoms, as the PHQ-9, as a screening tool, has low positive predictive validity [58, 69, 70].

Results

From a baseline of 1311 pregnant participants, a total of 1251 women were prospectively interviewed (n = 1240 face to face and n = 11 by phone) about their delivery setting, method of delivery and postnatal care utilization with a response rate of 95.5% (Fig. 1). Women who were in the baseline sample were not significantly different from women who were in the follow-up sample with respect to selected baseline variables (Table 1).

Characteristics of the participants

Most women were married (98.7%), were rural residents (91.9%) and were illiterate (67.5%). Nearly two thirds of women (62.6%) delivered in health institutions. Over half of the women (55.6%) reported experiencing some form of intimate partner violence in their life time and 43.8% had an unintended pregnancy (7.3% mistimed and 37.3% unwanted) (Table 1).

Antenatal depressive symptoms and institutional delivery

High levels of antenatal depressive symptoms (PHQ score 5 or higher) were found in 28.7% of participating women. In the adjusted model (Table 2), women with high levels of antenatal depressive symptoms had increased odds of delivering in health care institutions

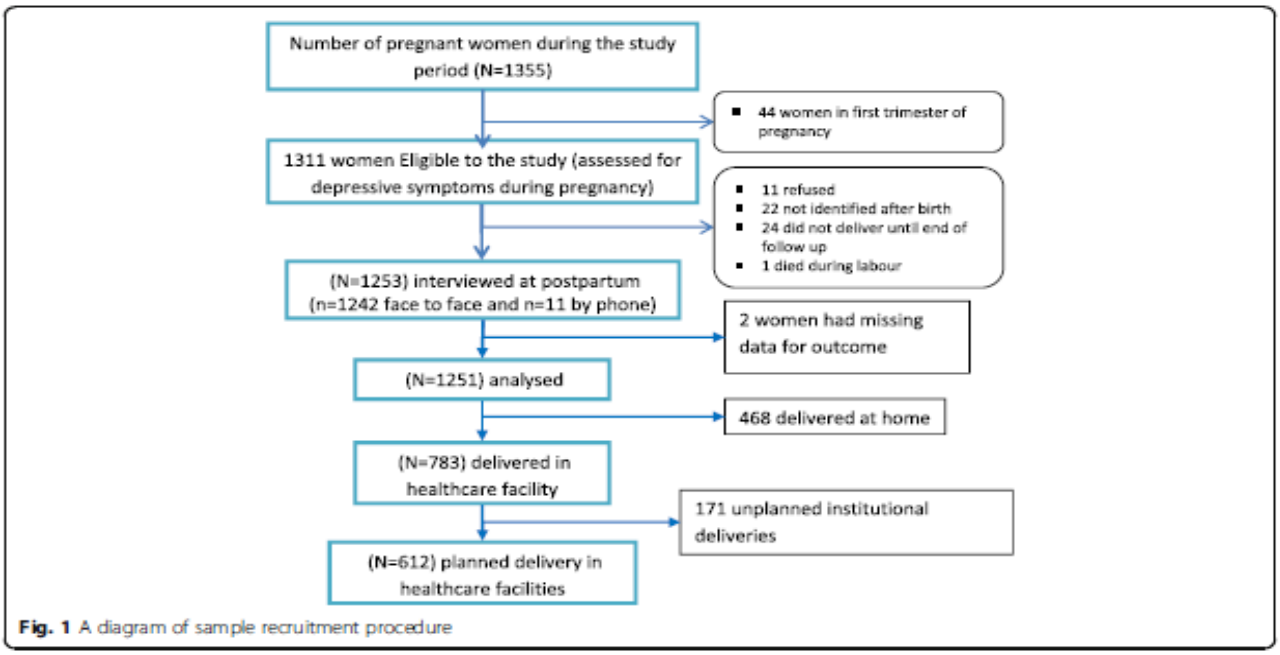

Fig. 1 A diagram of sample recruitment procedure

[adjusted Odds Ratio (aOR) =1.42, 95% Confidence Interval (CI): 1.06, 1.92] independent of pregnancy complications and comorbid medical conditions. Increased access to a health care facility (aOR = 1.10, 95% CI: 1.04, 1.16), primary level education (compared to no education) (aOR = 1.51, 95% CI: 1.10, 2.08), having a previous delivery in a health care institution (aOR = 2.21, 95% CI: 1.36, 3.58) and increased birth preparedness (aOR = 1.32, 95% CI: 1.20, 1.46) were also associated with increased odds of institutional delivery. Rural residence (aOR = 0.39, 95% CI: 0.18, 0.89) and increasing parity (aOR = 0.90, 95% CI: 0.84, 0.97) were associated with reduced odds of institutional delivery.

Among women who delivered in healthcare institutions, there was greater odds of unplanned institutional delivery, mainly due to emergency reasons such as prolonged labour and bleeding, among those with antenatal depressive symptoms (aOR = 1.62, 95% CI: 1.09, 2.42) (Table 2). Among other predictors, being in the medium income category (aOR = 1.67, 95% CI: 1.07, 2.60) was associated with increased odds of unplanned institutional delivery while each increment in birth preparedness score (aOR = 0.81, 95% CI: 0.81, 0.71, 0.93) was associated with reduced odds of unplanned institutional delivery as compared with planned institutional delivery.

Method of delivery and antenatal depressive symptoms

After adjusting for potential confounding variables (Table 3), women with antenatal depressive symptoms had increased odds of assisted delivery compared to women without antenatal depressive symptoms (aOR = 1.72, 95% CI: 1.10, 2.69). Factors that remained significantly associated with increased odds of assisted delivery in the adjusted model were increased access to health care facilities (aOR = 1.11, 95% CI: 1.02, 1.22); having a secondary level education (aOR = 2.40, 95% CI: 1.02, 5.67) and having one or more symptoms of pregnancy complications (aOR = 1.54, 95% CI: 1.01, 2.34). Rural residence (aOR = 0.39, 95% CI: 0.21, 0.75) and increasing parity (aOR = 0.72, 95% CI: 0.62, 0.82) were associated with reduced odds of assisted delivery.

Postnatal care utilization and antenatal depressive symptoms

Women having a secondary level education (aOR = 3.23, 95% CI: 1.34, 7.77), increased intimate partner violence (aOR = 1.11, 95% CI: 1.06, 1.16), increased number of antenatal care (ANC) visits (aOR = 1.42, 95% CI: 1.14, 1.76) and an increased birth preparedness score (aOR = 1.30, 95% CI: 1.18, 1.42) had increased odds of having postnatal care visits in both the univariate and adjusted models (Table 3).

Discussion

In this prospective, population-based study from rural Ethiopia, 28.7% of pregnant women were screened to have symptoms of depression. These women had significantly increased odds of unplanned utilisation of institutional delivery care, mostly due to emergency presentations rather than planning to deliver in a healthcare facility. Assisted

Table 1 Characteristics of participants ($N = 1251$)

Characteristics		Baseline ($N = 1311$) N (%)	Followed Up ($N = 1251$) N (%)	chi2 (p-value)
PHQ Status	PHQ < 5	924 (70.5)	892 (71.3)	0.2098 ($p = 0.647$
	PHQ ≥ 5	387 (29.5)	359 (28.7)	
Marital Status	Married	1293 (98.6)	1235 (98.7)	
	single, divorced or widowed	18 (1.4)	16 (1.3)	0.0432 ($p = 0.835$)
Residence	Urban	103 (7.9)	101 (8.1)	0.0411 ($p = 0.839$)
	Rural	1208 (92.1)	1150 (91.9)	
Household Income*	High	459 (35.0)	438 (35.0)	
	Medium	423 (32.3)	397 (31.7)	0.1109 ($p = 0.946$)
	Low	429 (32.7)	416 (33.3)	
Mother's Education	Non-literate	878 (67.0)	844 67.5)	
	Primary Schooling (Grade 1–8)	380 (29.0)	357 (28.5)	0.0714 ($p = 0.965$)
	Grade 9 & more	53 (4.0)	50 (4.0)	
Experience of Intimate Partner Violence	None	573 (43.7)	552 (44.1)	0.0453 ($p = 0.831$)
	One or more in life time	738 (56.3)	699(55.9)	
Pregnancy Intention	Wanted	734 (56.0)	701 (56.0)	
	Mistimed (wanted but not now)	102 (7.8)	93 (7.4)	0.1168 ($p = 0.943$)
	Unwanted	475 (36.2)	457 (37.3)	
Self-reported Pregnancy Complications	None	655 (50.1)	632 (50.5)	0.0594 ($p = 0.808$)
	One or more	656 (49.9)	619 (49.5)	
Chronic Illness	None	871 (66.4)	824 (66.4)	0.0001(0 = 0.994)
	One or more	440 (33.6)	416 (34.6)	
Previous institutional delivery	Yes	160 (12.2)	152 (12.2)	0.0018 ($p = 0.967$)
	No/primiparous	1151 (87.8)	1099 (87.8)	
Delivery Care Utilisation	Home delivery	–	468 (37.4)	–
	Institutional delivery	–	783 (62.6)	–
Type of Delivery	Normal vaginal	–	1115 (89.1)	–
	Assisted or operative	–	136 (10.7)	–
One or more Postnatal care Visits	No	–	568 (45.8)	–
	Yes	–	672 (54.2)	–
Reason for use of inst. delivery	Planned	–	612 (78.3)	–
	Unplanned	–	171 (21.7)	–

Single Marital Status = unmarried, widowed, divorced
*Income was categorized into tertiles as low, medium and high
CS Caesarian Section

delivery was also significantly greater in women with antenatal depressive symptoms.

Overall, the prevalence of antenatal depressive symptoms in our study is consistent with studies in Ghana (26.3%) and Cote d'Ivoire (28.3%) which used the same measure [18, 23]. Studies in South Africa [25], Vietnam [17] and Southern Brazil [24] using other screening tools (Self-Reporting Questionnaire and Edinburgh Postnatal Depression Scale) also reported rates of antenatal depressive symptoms of 30–39%.

Prior to the introduction of the health extension programme [71], and until 2011, institutional delivery rates in Ethiopia were very low [52]. Recent trends indicate improving rates, especially in southern Ethiopia, with nearly 50% of women in community-based samples, and nearly three-quarters of women in urbanized areas delivering in health facilities [72–74]. Our study finding that over 60% of women deliver in an institution is in-line with this positive trend.

We hypothesized that antenatal depressive symptoms are associated with a reduction in women's uptake of institutional delivery through reduced self-care, social support and reduced women's adherence to healthcare practitioners' recommendations. In contradiction with

Table 2 Use of Institutional Delivery care as a function of antenatal depressive symptoms

Variables	Odds of Institutional delivery (vs. home) (*n* = 1251)		Odds of unplanned Institutional delivery (vs. Planned)(*n* = 783)	
	(cOR, 95% CI)	(aOR, 95% CI)	(cOR, 95% CI)	(aOR, 95% CI)
Depressive Symptoms: PHQ9 ≥ 5	1.09 (0.85, 1.41)	1.42 (1.06, 1.92)*	1.57 (1.10, 2.35)*	1.62 (1.09, 2.42)*
Access to Health Facility	1.16 (1.10, 1.22)**	1.10 (1.04, 1.16)*	0.97 (0.90, 1.04)	0.99 (0.91, 1.07)
Marital Status: Single	0.77 (0.28, 2.07)	0.70 (0.24, 2.06)	0.45 (0.06, 3.60)	0.37 (0.04, 3.10)
Residence: Rural	0.13 (0.06, 0.27)**	0.39 (0.18, 0.89)*	1.02 (0.60, 1.72)	0.78 (0.39 1.56)
Household Income:				
Low	1	1	1	1
Medium	1.13 (0.85, 1.49)	0.89 (0.65, 1.20)	1.44 (0.95, 2.19)	1.67 (1.07, 2.60)*
High	1.31 (0.99, 1.73)	1.05 (0.77, 1.45)	1.03 (0.68, 1.58)	1.37 (0.86, 2.18)
Educ. Level:				
Illiterate	1	1	1	1
Primary Schooling	2.25 (1.71, 2.95)**	1.51 (1.10, 2.08)*	0.70 (0.48, 1.02)	0.65 (0.41, 1.01)
≥ Secondary	19.01 (4.59, 78.71**	3.99 (0.87, 18.27)	0.73 (0.34, 1.55)	0.57 (0.22, 1.51)
Intimate Partner violence	0.97 (0.94, 1.01)	0.97 (0.93, 1.02)	0.98 (0.92, 1.04)	0.95 (0.89, 1.02)
Social Support	1.01 (0.95, 1.07)	0.95 (0.88, 1.01)	0.90 (0.83, 0.98)*	0.93 (0.85, 1.02)
Institutional Delivery of previous baby: Yes	3.62 (2.30, 5.68)**	2.21 (1.36, 3.58)*	1.15 (0.93, 1.43)	1.39 (0.85, 2.26)
Birth Preparedness	1.5(1.32, 1.56)**	1.32 (1.20, 1.46)**	0.81 (0.72, 0.92)*	0.81 (0.71, 0.93)*
Parity (Birth Order)	0.83 (0.79, 0.88)**	0.90 (0.84, 0.97)*	1.00 (0.92, 1.08)	0.93 (0.83, 1.03)
Pregnancy Intention:				
Wanted	1	1	1	1
Mistimed	0.62 (0.40, 0.96)*	0.70 (0.44, 1.11)	0.86 (0.42, 1.77)	0.87 (0.41, 1.83)
Unwanted	0.64 (0.51, 0.82)**	0.84 (0.64, 1.11)	1.03 (0.71, 1.48)	0.95 (0.63 1.43)
Symptoms of Pregnancy Comp.: ≥1	0.88 (0.70, 1.11)	0.88 (0.68, 1.15)	1.16 (0.83, 1.64)	1.01 (0.69, 1.47)
Comorbid medical conditions: ≥1	1.32 (1.04, 1.67)*	1.23 (0.95, 1.59)	0.99 (0.70, 1.39)	0.96 (0.67, 1.38)

*significant at <0.05, **significant at <0.001
Access to health care facility score: minimum = 5; Maximum = 15; Mean = 11.98; SD = 2.40
Birth Preparedness score: Minimum = 0; Maximum = 4; Mean = 1.61; SD = 1.42
Intimate Partner violence score: minimum = 9; Maximum = 16; Mean = 2.14; SD = 2.88
Social support score: minimum = 3; Maximum = 14; Mean = 10.68; SD = 2.00
Parity score: minimum = 0; Maximum = 12; Mean = 2.74; SD = 2.09

our hypothesis, we found a significantly increase in uptake of institutional delivery among women with antenatal depressive symptoms independent of pregnancy complications and comorbid medical conditions. Increased emergencies related to labour complications might explain this contradiction.

The increased odds of assisted delivery and uptake of unplanned institutional delivery among women with antenatal depressive symptoms supports others' findings that women with depressive symptoms have an increased risk of labour complications [11, 75–77]. We found the main reasons for institutional delivery of women with antenatal depressive symptoms to be emergencies related to labour complications endorsed as 'prolonged labour' and or 'referral due to labour complications'. Our findings reflect those of a study in Ghana where antenatal depression was associated with assisted delivery and other perinatal complications, including prolonged labour, vaginal tears, loss of consciousness, heavy vaginal bleeding, surgery to repair or remove the womb and blood transfusion [22]. Similarly, a previous community based cohort study in Ethiopia [14] and studies in China [78] and Ghana [22] demonstrated that antenatal depression was associated with prolonged labour or non-progressive preterm contractions [76]. Studies in Peru [79] and in Finland [80] also demonstrated increased odds of preeclampsia among women with antenatal depression while studies in California [77] and Canada [76] demonstrated increased odds of infection among this group of women. These perinatal complications are thus, more likely to increase unplanned institutional delivery and assisted delivery among women with depressive symptoms. There are also biological explanations for the association of depression with perinatal complications. In these explanations, depression is purported to hyper stimulate Hypothalamus-Pituitary-

Table 3 Having assisted delivery and use of postnatal care vs antenatal depressive symptoms

Variables	Assisted delivery vs SVD		Postnatal care use	
	(cOR, 95% CI)	(aOR, 95% CI)	(cOR, 95% CI)	(aOR, 95% CI)
Depressive Symptoms: PHQ9 ≥ 5	1.31 (0.90, 1.91)	1.72 (1.10, 2.69)*	1.12 (0.87, 1.43)	1.13 (0.85, 1.50)
Access to Health Facility	1.18 (1.09, 1.29)**	1.11 (1.02, 1.22)*	1.05 (1.00, 1.10)*	1.01 (0.96, 1.06)
Marital Status: Single	2.79 (0.89, 8.76	2.33 (0.66, 8.17)	0.74 (0.27, 2.04)	0.71 (0.24, 2.16)
Residence: Rural	0.18 (0.11, 0.29)**	0.39 (0.21, 0.75)*	0.60 (0.39, 0.93)*	1.42 (0.82, 2.46)
Income per family:				
Low	1	1	1	1
Medium	0.91 (0.58, 1.42)	0.72 (0.45, 1.17)	0.97 (0.74, 1.28)	0.91 (0.68, 1.21)
High	1.06 (0.69, 1.62)	0.80 (0.48, 1.34)	1.12 (0.86, 1.47)	0.98 (0.72, 1.33)
Educational Level:				
Illiterate	1	1	1	1
Primary Schooling	2.62 (1.78, 3.88)**	1.29 (0.81, 2.06)	1.19 (0.92, 1.53)	1.0 (0.79, 1.43)
≥ Secondary	10.85 (5.84, 20.16)**	2.40 (1.02, 5.67)*	4.03 (1.93, 8.41)**	3.23 (1.34, 7.77)*
Intimate Partner violence	0.97 (0.91, 1.03)	0.95 (0.88, 1.02)	1.09 (2.04, 1.13)**	1.11 (1.06, 1.16)**
Social Support	1.00 (0.92, 1.09)	1.03 (0.93, 1.14)	1.01 (0.95, 1.06)	0.99 (0.93, 1.05)
Institutional Delivery of last baby: Yes	2.07(1.31, 3.27)*	1.40 (0.82, 2.37)	-	-
Number of Antenatal Care visits visits adjusted to Gestational Age	-	-	1.72 (1.40, 2.12)**	1.42 (1.14, 1.76)*
Birth Preparedness	1.21 (1.07, 1.36)*	1.01 (0.87, 1.17)	1.32 (1.21, 1.43)**	1.30 (1.18, 1.42)**
Parity	0.65 (0.58, 0.73)**	0.72 (0.62, 0.82)**	0.96 (0.91, 1.02)	1.01 (0.94, 1.08)
Pregnancy Intention:				
Wanted	1	1	1	1
Mistimed	0.62 (0.29, 1.31)	0.87 (0.39, 1.95)	1.27 (0.81, 1.99)	1.26 (0.79, 2.01)
Unwanted	0.54 (0.36, 0.82)*	1.01 (0.63, 1.62)	0.80 (0.63, 1.02)	0.86 (0.66, 1.13)
Symptoms of Pregnancy Comp.: ≥1	1.48 (1.03, 2.12)*	1.54 (1.01, 2.34)*	0.90 (0.72, 1.12)	0.85 (0.66, 1.10)
Comorbid medical conditions: ≥1	1.38 (0.96, 1.97)	1.47 (0.99, 2.19)	0.94 (0.74, 1.18)	0.84 (0.66, 1.07)

*significant at <0.05, **significant at <0.001
Access to health care facility score: minimum = 5; Maximum = 15; Mean = 11.98; SD = 2.40
Birth Preparedness score: Minimum = 0; Maximum = 4; Mean = 1.61; SD = 1.42
Intimate Partner violence score: minimum = 9; Maximum = 16; Mean = 2.14; SD = 2.88
Social support score: minimum = 3; Maximum = 14; Mean = 10.68; SD = 2.00
Number of ANC visits: minimum = 0; Maximum = 8; Mean = 1.524; SD = 1.50
Parity score: minimum = 0; Maximum = 12; Mean = 2.74; SD = 2.09

Adrenal (HPA) axis to produce hormones that have adverse effects on the uterine environment [81–83].

Furthermore, studies have demonstrated that women with antenatal depressive symptoms are more likely to have somatic complaints, co-morbid medical conditions [6, 84] and other perinatal complications [12, 14, 85, 86] as well as increased fear of childbirth and worries about death and survival during labour [8, 87] which may increase the likelihood of institutional deliveries in this group.

Our study showed that rural residence was associated with reduced odds of institutional delivery and reduced odds of having assisted delivery, while increased access to health care was associated with increased odds of institutional delivery and having an assisted delivery. These results support consistently findings from others' work [34, 37, 38, 43, 45, 46, 73, 88, 89]. Increased parity was associated with reduced odds of institutional delivery and assisted delivery, which is also consistent with other local studies [45, 46, 88, 89]. This may be due to decreased likelihood of prolonged labour with increase in parity.

The strength of our study is that it was prospective and used a locally validated measure of depressive symptoms. Selection bias was also minimized in this population-based study as a robust method was used to identify all cases during the study period. However, we cannot be entirely certain if all eligible participants in the district were identified during the time period of the study. Respondent recall bias was minimized by measuring outcome variables within 6–11 weeks of birth. Furthermore, a broader range of confounders such as pregnancy complication and co-morbid illnesses were controlled in our models.

Our study did not however, consider the cultural beliefs of women regarding seeking postnatal care. This is pertinent in rural Ethiopia where women are not encouraged to leave their homes until 2–3 weeks postpartum. This might explain the non-significant finding in the association between antenatal depressive symptoms and postnatal care utilization. Because of the low predictive value of PHQ-9 [69, 70], as a screening tool, it is likely that a proportion of PHQ-9 positive women do not meet criteria for a diagnosis of depression. Nonetheless, we found an important association of antenatal depressive symptoms with maternal health care utilization.

Conclusion

Among women with antenatal depressive symptoms, there was increased odds of institutional delivery in general, and increased unplanned institutional delivery utilisation mainly due to emergency reasons. Assisted delivery was also increased among this group of women, which might have been due to labour complications. Thus, improved detection and treatment of antenatal depression has the potential to increase planned institutional delivery and reduce perinatal complications, thus contributing to a reduction in maternal morbidity and mortality, as well as improved neonatal health.

Abbreviations

ANC: Antenatal Care; aOR: adjusted Odds Ratio; CI: Confidence Interval; cOR: crude Odds Ratio; CS: Caesarian Section; LMIC: Low and Middle Income Countries; SVD: Spontaneous Vaginal Delivery; WHO: World Health Organization

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Availability of data and materials

The datasets generated and analysed during the current study are not publicized at present. (1) Data were collected as part of a cross-country study and will be available for further cross-country work; (2) This was also part of a PhD project and the student needs to use the data for his PhD work before data could be made available; (3) We have not received consent from participants to share the data on the web but, will be available from the corresponding author on reasonable request.

Authors' contributions

Involved in the development of the proposal: TB, CH, AF, EK. Participated in data collection: TB, CH, AF. Participated in analysis: TB, CH, AF, SH, MO. Prepared the draft: TB, AF, CH, SH, MO. Revised drafts of the paper: TB, AF, CH, EK, SH, MO. All authors have read and approved the final version of this manuscript.

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Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Ethical approval (ref. number: 024/14/psy dated 23/08/14) was obtained from the Institutional Review Board of the College of Health Sciences, Addis Ababa University. Written consent (with thumb prints for non-literates) was obtained from all participants after explanation about the study. Women with very high level of depressive symptoms (PHQ-9 ≥ 15) and those with suicidal ideation, as assessed by an item in the PHQ-9, were referred to health centres to access free primary care-based mental health services.

Publisher's Note

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References

1. Bonari L, Pinto N, Einarson A, Steinereir M, Koren G. Perinatal risks of untreated depression during pregnancy. Can J Psychiatr. 2004;49(11):726–35.
2. Senturk V, Hanlon C, Medihin G, Dewey M, Araya M, Alem A, et al. Impact of Perinatal somatic and common mental disorder symptoms on functioning on Ethiopian women: the P-MaMiE population based cohort study. J Affect Disord. 2012;136:340–9.
3. WHO. Depression and other common mental disorders: global health estimates. Geneva: WHO; 2017.
4. Noel P, Williams J, Unutzer J, Worchel J, Lee S, Cornell J, et al. Depression and comorbid illness in elderly primary care patients: impact on multiple domains of health status and well-being. Ann Fam Med. 2004;2(6):555–62.

5. DiMatteo R, Lepper H, Croghan T. Depression is a risk factor for noncompliance with medical treatment meta-analysis of the effects of anxiety and depression on patient adherence. Arch Intern Med. 2000; 160:2101–7.
6. Katon W. Epidemiology and treatment of depression in patients with chronic medical illness. Dialogues Clin Neurosci. 2011;13(1):7–23.
7. Beekman A, Deeg D, Braam A, Tilburg W. Consequences of major and minor depression in later life : a study of disability, well-being and service utilization. Psychol Med. 1997;27:1397–409.
8. Hanlon C, Whitley R. Wondimagegn D, Alem a, Prince M. Between life and death: exploring the socio-cultural aspect of antenatal mental distress in rural Ethiopia. Arch Womens Ment Health. 2010;13(5):385–93.
9. Carney R, Freedlanda K, Milleth G, Jaffec A. Depression as a risk factor for cardiac mortality and morbidity a review of potential mechanisms. J Psychosom Res. 2002;53:897–902.
10. Andersson L, Sundstrom-Poromaa I, Wulff M, Astrom M, Bixo M. Implications of antenatal depression and anxiety for obstetric outcome. Obstet Gynecol. 2004;104(3):467–76.
11. Dayan J, Creveuil C, Herlicoviez M, Herbel C, Baranger E, Savoye C, et al. Role of anxiety and depression in the onset of spontaneous preterm labor. Am J Epidemiol. 2002;155(4):293–301.
12. Grigoriadis S, VanderPorten E, Mamisashvili L, Tomlinson G, Dennis C. Et a. The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis. J Clin Psychiatry. 2013; 74(4):321–41.
13. Grote N, Bridge J, Gavin A, Melville J, Iyengar S, Katon W. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Arch Gen Psychiatry. 2010; 67(10):1012–24.
14. Hanlon C, Medihin G, Alem A, Tesfaye F, Lakew Z, Worku B. Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: the P-MaMiE population-based cohort study. Trop Med Int Health. 2008; 14(2):156–66.
15. Rahman A, Bunn J, Lovel H, Creed F. Association between antenatal depression and low birthweight in a developing country. Acta Psychiatr Scand. 2007;115:481–6.
16. Stein A, Pearson R, Goodman S, Rapa E, Rahman A, McCallum M, et al. Effects of perinatal mental disorders on the fetus and child. Lancet. 2014; 384:1800–19.
17. Fisher J, Tran T, La B, Kriitma K, Rossenthal D, Tran T. Common perinatal mental disorders in northern Viet Nam: community prevalence and health care use. Bull World Health Organ. 2010;88:737–45.
18. Bindt C, Appiah-Poku J, Te Bonle M, Schoppen S, Feldt T, Barkmann C, et al. Antepartum depression and anxiety associated with disability in African women: cross-sectional results from the CDS study in Ghana and cote d'Ivoire. PLoS One. 2012;7(10):48396.
19. Dibaba Y, Fantahun M, Hindin M. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural southwestern Ethiopia. BMC Pregnancy Childbirth. 2013;13:135.
20. Shakya R, Situala S, Shyangwa P. Depression during pregnancy in a tertiary care center of eastern Nepal. J Nepal Med Assoc. 2008;47(171):128–31.
21. Medihin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Lakew Z, et al. The effect of maternal common mental disorders on infant undernutrition in Butajira, Ethiopia: P-MaMiE study. BMC Psychiatry. 2010;10:32.
22. Wesbong B, Asbroek A, Soremekun S, Manu A, Owusu-Agyei S, Prince M, et al. Association of antenatal depression with adverse consequences for the mother and newborn in rural Ghana: findings from the don population-based cohort study. PLoS One. 2014;9(12):e116333.
23. Guo N, Bindt C, Te Bonle M, Appiah-Poku J, Koffi M, Posdzich S, et al. Association of antepartum and postpartum depression in Ghanaian and Ivorian women with febrile illness in their offspring: a prospective birth cohort study. Am J Epidemiol. 2013;178(9):1394–402.
24. Anselmi L, Barros F, Minten G, Gigante D, Horta B, Victora C. Prevalence and early determinants of common mental disorders in the 1982 birth cohort, Pelotas, South Brazil. Rev Saude Publica. 2008;42(12):26–33.
25. Hartley M, Tomlinson M, Greco E, Comulada S, Stewart J, Roux J, et al. Depressed mood in pregnancy: prevalence and correlates in two Cape town peri-urban settlements. Reprod Health. 2011;8:9.
26. Fisher J, Mello M, Patel V, Rahman A, Tran T, Holtn S, et al. Prevalence and determinants of common perinatal mentala disorders in low income and lower middle income countries: a systematic review. Bull World Health Organ. 2012;90:139–49.
27. Lancaster C, Gold K, Flynn H, Yoo H, Marcus S, Davis M. Risk factors for depressive symptoms during pregnancy: a systematic review. Am J Obstet Gynecol. 2010;202(1):5–14.
28. Say L, Chou D, Gemmill A, Tuncalp O, Moller A, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Global Health. 2014;2(6):323–33.
29. WHO. Trends in maternal mortality: 1990 to 2015. Geneva: The Maternal Mortality Estimation Inter-Agency Group; 2015.
30. Ahmed F, Moussa K, Petterson K, Asamoah B. Assessing knowledge, attitude, and practice of emergency contraception: a cross- sectional study among Ethiopian undergraduate female students. BMC Public Health. 2012;12:110.
31. Alemayehu M, Belachew T, T T. Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia. BMC Pregnancy Childbirth. 2012;12:6.
32. Mersha A, Jira C, Demessie S. Community based study on maternal mortality in Jimma town, south western Ethiopia. Indian J Public Health. 1996;40(2):30–4.
33. Khan K, Wojdyla D, Say L, Gülmezoglu M, Van L. WHO analysis of causes of maternal death: a systematic review. Lancet. 2006;367:1066–74.
34. Amano A, Gebeyehu A, Birhanu Z. Institutional delivery service utilization in Munisa Woreda, south East Ethiopia: a community based cross-sectional study. BMC Pregnancy Childbirth. 2012;12:105.
35. Costello A, Azad K, Barnett S. An alternative strategy to reduce maternal mortality. Lancet. 2006;368:1477–9.
36. Worku A, Fantahun M. Factors affecting utilization of skilled maternal care in Northwest Ethiopia: a multilevel analysis. BMC Int Health Hum Rights. 2013;13:20.
37. Abebe F. Factors associated with home delivery in Bahirdar, Ethiopia: a case control study. BMC Res Notes. 2012;5:653.
38. Abera M, G/mariam A, Belachew T. Predictors of safe delivery serice utilizion in Arsi zone, south-East Ethiopia. Ethiop J Health Sci 2011;21:95–106.
39. Teferra A, Alemu F, Woldeyohannes S. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, north west of Ethiopia: a community - based cross sectional study. BMC Pregnancy Childbirth. 2012;12:74.
40. Worku A, Yalew A, Afework M. Maternal complications and women's behavior in seeking care from skilled providers in north gondar, Ethiopia. PLoS One. 2013;8(3):e60171.
41. WHO. Trends in maternal mortality: 1990 to 2010. Geneva: WHO; 2012.
42. Regassa N. Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. Afr Health Sci. 2011;11(3):390–7.
43. Mengesha Z, Biks G, Ayele T, Tessema G, Koye D. Determinants of skilled attendance for delivery in northwest Ethiopia: a community based nested case control study. BMC Public Health. 2013;13:130.
44. Mekonnen M, Yalew K, Umer J, Melese M. Determinants of delivery practices among afar pastoralists of Ethiopia. Pan Afr Med J. 2012;13:17.
45. Mekonnon Y, Mekonne A. Factors influencing the use of maternal healthcare services in Ethiopia. J Health Popul Nutr. 2003;21(4):374–82.
46. Fikre A, Demissie M. Prevalence of institutional delivery and associated factors in Dodota Woreda (district), Oromia regional state, Ethiopia. Reprod Health. 2012;9:33.
47. Tsegay Y, Gebrehiwot T, Goicolea I, Edin K, Lemma H, Sebastian MS. Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. Int J Equity Health. 2013 May 14;12(1):30.
48. Aktar S. Healthcare seeking behavior for safe motherhood: findings from rural Bangladesh. Bangladesh e-J Sociol. 2012;9(2):57–70.
49. Woldemichael G. Women's autonomy and maternal health seeking behvior in Ethiopia. Matern Child Health J. 2010;14(6):988–98.
50. Kabakyenga J, Östergren P, Turyakira E, Pettersson K. Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. Reprod Health. 2011;8:33.
51. Mekonnen Y. Patterns of maternity care service utilization in southern Ethiopia: evidence from a community and family survey. Ethiop J Health Dev. 2003;17(1):27–33.
52. CSA. Ethiopia demographic and health survey 2011. Addis Ababa: Central Statistical Authority; 2011.

53. Calderon J, Flores P, Babul M, Aguirre JM, Slachevsky A, Padilla O, et al. Systemic lupus erythematosus impairs memory cognitive tests not affected by depression. Lupus. 2014;23(10):1042–53.
54. Baron E, Hanlon C, Mall S, Honikman S, Breuer E, Kathree T, et al. Mental health in primary care in five low and middle income countries: a situational analysis. BMC Health Serv Res. 2016;16(53):1293–316.
55. CDC. Advanced management and analysis of data using EpiInfo for windows. 2000.
56. Bitew T, Hanlon C, Kebede E, Medhin G, Fekadu A. Antenatal depressive symptoms and maternal health care utilisation: a population-based study of pregnant women in Ethiopia. BMC Pregnancy Childbirth. 2016;16:301.
57. Von Elm E, Altman D, Egger M, Pocock S, Gøtzsche P, Vandenbroucke J. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. Epidemiology. 2007;18(6):800–4.
58. Kroenke K, Spitzer R, Williams J. Validity of a brief depression severity measure. J Gen Intern Med. 2001;16:606–13.
59. Manea L, Gilbody S, McMillan D. Optimal cut-off score for diagnosing depression with the patient health questionnaire (PHQ-9): a meta-analysis. CMAJ. 2012;184(3):191–6.
60. Hanlon C, Medhin G, Selamu M, Breuer E, Worku B, Hailemariam H, et al. Validity of brief screening questionnaires to detect depression in primary care in Ethiopia. J Affect Disord. 2015;186:32–9.
61. Rabin R, Jennings J, Campbell J, Bair-Merritt M. Intimate partner violence screening tools. Am J Prev Med. 2009;36(5):439–45.
62. Zink T, Levin L, Putnam F, Beckstrom A. Accuracy of five domestic violence screening questions with nongraphic language. Clin Pediatr. 2007;46(2):127–34.
63. Boen H. Characteristics of senior centre users – and the impact of a group programme on social support and late-life depression. Norsk Epidemiologi. 2012;22(2):261–9.
64. Fekadu A, Medhin G, Selamu M, Hailemariam M, Alem A, Giorgis T, et al. Population level mental distress in rural Ethiopia. BMC Psychiatry. 2014;14:194.
65. JHPIEGO. Monitoring birth preparedness and complication readiness tools and indicators for maternal and newborn health. Maternal and Neonatal Health. 2004. http://reprolineplus.org/resources/monitoring-birth-preparedness-and-complication-readiness-tools-and-indicators-maternal-and (199.230.115.126). Accessed 26 June 2017.
66. Fotso J, Mukiira C. Perceived quality of and access to care among poor urban women in Kenya and their utilization of delivery care: harnessing the potential of private clinics? Health Policy Plan. 2011:1–11.
67. Fewtrell M, Kennedy K, Singhal A, Martin R, Ness A, Hadders-Algra M, et al. How much loss to follow up is acceptable in long terp randomized controlled trials and prospective studies. Arch Dis Child. 2008;93(6):458–61.
68. Kristman V, Manno M, Cotte P. Loss to follow-up in cohort studies: how much is too much? Eur J Epidemiol. 2004;19:751–60.
69. Gelaye B, Williams M, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. Psychiatry Res. 2013;
70. Hanlon C, Medihin G, Selamu M, Breuer E, Worku B, Hailemariam M, et al. Validity of brief screening questionaire to detect depression in primary care in Ethiopia. J Affect Disord. 2015;186:32–9.
71. El-Saharty S, Kebede S, Olango P, Sladat B. Ethiopia: Improving health service delivery. Health, Nutrition, Population Discussion Papeer. 2009. http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/EthiopiaHealthSystemDelivery.pdf. Accessed 26 June 2017.
72. Daniel O, Desalegn S. Institutional delivery service utilization and associated factors among child bearing age women in Goba woreda. Ethiopia J Gynecol Obstet. 2014;2(4):63–70.
73. Gedefaw A, Muluken A, Tesfaye S. Factors associated with institutional delivery service utilization among mothers in Bahir Dar City administration, Amhara region: a community based cross sectional study. Reprod Health. 2014;11:22.
74. Hailemichael F, Woldie M, Tafese F. Predictors of institutional delivery in Sodo town, southern Ethiopia. Afr J Prm Health Care Fam Med. 2013; 5(1):544.
75. Jablensky A, Morgan V, Zubrick S, Bower C, Yellachich L. Pregnancy, delivery, and neonatal complications in a population cohort of women with schizophrenia and major affective disorders. Am J Psychiatry. 2005; 162(1):79–91.
76. Lutsiv O, McKinney B, Foster G, Taylor V, Pullenayegum E, McDonald S. Pregnancy complications associated with the co-prevalence of excess maternal weight and depression. Int J Obes. 2015;39:1710–6.
77. Thornton D, Guendelman S, Hosang N. Obstetric complications in women with diagnosed mental illness: the relative success of California's county mental health system. Health Serv Res. 2010;45:1.
78. Qiao Y, Wang J, Li J, Wang J. Effects of depressive and anxiety symptoms during pregnancy on pregnant, obstetric and neonatal outcomes: a follow-up study. J Obstet Gynaecol. 2012;32:237–40.
79. Qiu C, Sanchez S, Lam N, Garcia P, Williams M. Associations of depression and depressive symptoms with preeclampsia: results from a Peruvian case-control study. BMC Womens Health. 2007;7:15.
80. Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. Obstet Gynecol. 2000; 95:487–90.
81. Chrousos G, Torpy D, P G. Interactions between the hypothalamic-pituitary-adrenal axis and the female reproductive system: clinical implications. Ann of Intern Med. 1998;129:229–40.
82. Sandman C, Wadhwa P, Dunkel-Schetter C, Chicz-DeMet A, Belman J, ao PM. Psychobiological influences of stress and HPA regulation on the human fetus and infant birth outcomes. Ann N Y Acad Sci. 1994;739:198–210.
83. Smith R, Cubis J, Brinsmead M, Lewin T, Singh B, ao OP. Mood changes, obstetric experience and alterations in plasma cortisol, beta-endorphin and corticotrophin releasing hormone during pregnancy and the puerperium. J Psychosom Res. 1990;34(1):53–69.
84. Katon J, Russo J, Gavin A, Melville J, Katon W. Diabetes and depression in pregnancy: Is there an association?. Journal of Women's Health. 2011;20(7): 983–9.
85. Benute G, Nomura R, Siracuza R, Fraguas R Jr, Lucia M, Zugaib M. Depression during pregnancy in women with a medical disorder: risk factors and perinatal outcomes. Clinics. 2010;65(11):1127–31.
86. Zeleke B, Ayele T, Woldetsadik M, Bisetegn T, Adane A. Depression among women with obstetric fistula, and pelvic organ prolapse in northwest Ethiopia. BMC Psychiatry. 2013;13:236.
87. Stewart R, Umar E, Gleadow-Ware S, Creed F, Bitstow K. Perinatal distress and depression in Malawi: an exploratory qualitative study of stressors, supports and symptoms. Arch Womens Ment Health. 2015;18:177–85.
88. Geneti K. Statistical analysis of determinants of maternal institutional delivery service utilization in Ethiopia. Am J Theoretical App Stat. 2015; 4(3):71–7.
89. Fekadu M, Regassa N. Skilled delivery care service utilization in Ethiopia: analysis of rural-urban differentials based on national demographic and health survey (DHS) data. Afr Health Sci. 2014;14(4):974–84.

APPENDIX C: Sub-study- III. ANDS and Perinatal complications

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Antenatal depressive symptoms and perinatal complications: a prospective study in rural Ethiopia

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Abstract

Background: Antenatal depressive symptoms affect around 12.3% of women in in low and middle income countries (LMICs) and data are accumulating about associations with adverse outcomes for mother and child. Studies from rural, low-income country community samples are limited. This paper aims to investigate whether antenatal depressive symptoms predict perinatal complications in a rural Ethiopia setting.

Methods: A population-based prospective study was conducted in Sodo district, southern Ethiopia. A total of 1240 women recruited in the second and third trimesters of pregnancy were followed up until 4 to 12 weeks postpartum. Antenatal depressive symptoms were assessed using a locally validated version of the Patient Health Questionnaire (PHQ-9) that at a cut-off score of five or more indicates probable depression. Self-report of perinatal complications, categorised as maternal and neonatal were collected by using structured interviewer administered questionnaires at a median of eight weeks post-partum. Multivariate analysis was conducted to examine the association between antenatal depressive symptoms and self-reported perinatal complications.

Result: A total of 28.7% of women had antenatal depressive symptoms (PHQ-9 score ≥ 5). Women with antenatal depressive symptoms had more than twice the odds of self-reported complications in pregnancy (OR=2.44, 95% CI: 1.84, 3.23), labour (OR= 1.84 95% CI: 1.34, 2.53) and the postpartum period (OR=1.70, 95% CI: 1.23, 2.35) compared to women without these symptoms. There was no association between antenatal depressive symptoms and pregnancy loss or neonatal death.

Conclusion: Antenatal depressive symptoms are associated prospectively with self-reports of perinatal complications. Further research is necessary to further confirm these findings in a rural and poor context using objective measures of complications and investigating whether early detection and treatment of depressive symptoms reduces these complications.

Keywords: Antenatal depressive symptoms, Perinatal complications, Prospective study, Rural and low income, Ethiopia

Background

Antenatal depression affects about 10% of women in High Income Countries (HICs) [1, 2], in Low and Middle Income Counties (LMICs) is higher, with some variation across studies. In these settings, the prevalence varies from 5% to nearly 40% [3–7] with a meta-analysis in 2004 of 17 studies from LMICs reporting a prevalence of 15.5% [2].

Antenatal depression is associated with increased functional impairment [8, 9], reduced self-care [10–12] and increased somatic complaints [9, 13, 14], which rise the risk of perinatal complications. Studies in HICs have reported association of antenatal depression with pre-eclampsia [15, 16], pregnancy and labor complications [17], premature contraction, increased use of analgesics and increased nausea during pregnancy [18]. Few studies from LMICs reported that antenatal depression was

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associated with increased risk of prolonged labor [19, 20], preeclampsia [20, 21] and increased risk of prolonged pregnancy [20].

There is accumulating evidence of adverse impacts of antenatal depression on the newborn [22, 23]. Low birth weight has been associated with antenatal depression in some [23, 24], but not all [19, 25], studies. No association between antenatal depression and neonatal mortality has been observed [20], but depression prior to pregnancy was associated with increased odds of stillbirth [26].

Most studies investigating the association between antenatal depression and perinatal complications were conducted in high income countries. Evidence about the impact on perinatal complications from rural community samples in LMICs is limited despite the high prevalence of both antenatal depression [5, 7] and perinatal complications [27–29] in such settings. Previous studies were limited by not controlling adequately for potential confounders, such as past history of adverse perinatal outcomes and chronic illnesses.

In our baseline study from a rural Ethiopian community, antenatal depressive symptoms were associated with increased non-scheduled antenatal care visits and pregnancy-related emergency visits [30], which indicates the possibility of an association of antenatal depressive symptoms with perinatal complications. The current study, therefore, aimed to investigate the effect of antenatal depressive symptoms on self-reported perinatal complications in rural Ethiopian women.

Methods

Study Design and setting

A population-based prospective study was conducted in Sodo district, southern Ethiopia, located approximately 100km from the capital city Addis Ababa. The district has a population of about 160,000 people and is divided into 58 sub-districts ('*kebeles*'), four urban and 54 rural. Agriculture is the main source of income and the official language in the district is Amharic.

There are eight health centres (primary healthcare facilities) in the district and a health post for every sub-district. The health post is frontline primary healthcare facility staffed by community-based healthcare workers, Health Extension Workers (HEWs). HEWs are responsible for performing health prevention and promotion activities, to identify and monitor pregnant mothers and to maintain up-to-date maternal records in health posts. Members of health development army, a community-based network of health education volunteers each of whom covers five families, are also required to report pregnant women in their respective units to HEWs.

Cohort Recruitment

The cohort was established by recruiting all consenting eligible pregnant women. These were women in their second and third trimesters of pregnancy, permanently residing in the study area at least for the preceding six months and without any cognitive and or hearing impairment that impaired adequate communication.

A network of community based healthcare workers (Health Extension Workers, HEWs), community based-healthcare education volunteers, and kebele chairmen and pregnant women themselves acted as key informants to identify all antenatal women in their respective sub-districts. The data collectors then conducted interview through home to home visits of identified women after informed consent had been obtained. Data collectors would declare potential participants "untraceable" after three recruiting visits had been unsuccessful.

A total of 1,355 women were identified within a three-month period, between early September and end of December, 2014. Of these, 44 identified antenatal women were in the first trimester of pregnancy and so were non-eligible [30]. Thus, a total of 1311 women were eligible and invited to participate. All eligible participants were prospectively followed up until 4–12 weeks (a median of eight weeks) after delivery. Four weeks was considered as an optimal time point to distinguish postpartum depression from postpartum blues as defined in DSM IV [31] and to reduce chance of recall bias.

Sample size

The aforementioned sample size was estimated using EpiInfo version 7 [32] which was used to estimate the sample size for another paper [30] assuming statistical power of 80% and a 95% confidence interval. For this, a 19.9% prevalence of antenatal depressive symptoms [33] and a 34% antenatal care utilisation [34] as an outcome variable were used, assuming a 10% difference between women with and without antenatal depression.

Data quality control and reporting

Forty experienced data collectors along with four supervisors conducted the data collection process after two days of training. All the data collectors were recruited from the local community and they had a minimum educational level of Grade 10. Most of them had either certificate or Diploma in relevant fields such as community healthcare. Among the supervisors, one had a Bachelor degree and the remaining had Diplomas in various related disciplines. The training was aimed to reduce respondent bias like social desirability bias by helping trainees understand the contents of the questionnaire, objectives and ethical issues relevant to the study. The data collection was closely monitored by the coordinator of the study through weekly meetings and regular telephone calls. Completed questionnaires were first checked by the supervisors, followed by the coordinator of the study and finally by the data entry clerks for consistency and missing data.

Questionnaires deemed to have missing or inconsistent data were returned back to the data collectors for reinvestigation. Data were double entered using EpiData version 3.1 [32]. Data was reported in adherence to a checklist from STROBE statement [35] to maintain standard of reporting cohort data.

Measurement

Outcome variables

The outcome variables were self-reported perinatal complications. The perinatal period is mostly defined as extending from 22 weeks of gestation to seven days after birth [36]. In this study, we used 'perinatal complications' to represent complications of the mother or the neonate that occurred between two weeks prior to childbirth and seven days after birth to reduce potential of recall bias. Perinatal complications were self-reported since both maternal healthcare services and maternal healthcare records in Ethiopia have major limitations [34, 37–39] and women have been shown to be more reliable source of such information [40].

Items adapted from the Ethiopian Demographic and Health Survey [34] were used to collect the data about potential perinatal complications. The instrument explored symptoms indicative of pregnancy complications two weeks prior to childbirth such as swollen hands/face, blurred vision, severe abdominal pain, discharge with unusual odor, pain during urination, severe headache, severe weakness. The following potential labour complications were explored: severe bleeding, severe headache, convulsions, high fever, loss of consciousness, labor lasting more than 12 hours, placenta not delivered within 30 minutes of the baby, tear, and premature rupture of membranes. Postpartum complications included: severe bleeding, blurred vision, convulsions, swollen hands and or face, high fever, malodorous vaginal discharge, loss of consciousness, severe headache, pain during urination, severe weakness, and difficulty of breathing and severe abdominal pain. Finally, complications affecting the neonate included: difficulty of breathing, yellow skin or eye color, poor sucking, pus or bleeding around umbilical cord, skin lesions or blisters, convulsions or rigidity, unconsciousness, red or swollen eyes with pus, any physical impairment and any physician diagnosed illness.

Adverse perinatal outcomes, including stillbirth, spontaneous abortion and neonatal mortality, were also assessed. Loss of pregnancy before 28 weeks of gestation was defined as "spontaneous abortion" and after 28 weeks "stillbirth" [41, 42]. Death of any live birth within 28 days was defined as "neonatal mortality".

Primary exposure

For antenatal depressive symptoms, the primary exposure variable, assessment was made using a locally validated version of the Patient Health Questionnaire (PHQ-9) [43, 44] at a cut off of five or more indicating probable depression. Both the primary exposure and potential confounding variables were assessed at baseline, in the second trimester and the early third trimester [30].

Potential confounding variables

Potential confounders of the association between antenatal depression and perinatal complications, such as pregnancy intention, intimate partner violence, any chronic medical condition, receipt of care, life events and history of complications, were identified from the literature. Pregnancy intention was assessed using an item from Ethiopian Demographic Health Survey (EDHS) that asks whether mothers wanted to have the current pregnancy ("wanted") or wanted to delay ("mistimed") or never wanted it at all ("unwanted") [34, 38]. Intimate partner violence was assessed using the Women's Abuse Screening Test (WAST) with a five item scale [45]. Its score ranges 0-16 and a score greater than one indicates the presence of domestic violence [45].

The number of antenatal care visits was also recorded. The number of physician-diagnosed chronic medical conditions, including tuberculosis, HIV, renal disease and cardiac disease, were counted for each woman and recorded as "none" for those without any chronic medical conditions and "one or more" otherwise. Participants were also asked if they had a history of death of a child in the perinatal period, "history of adverse perinatal outcomes". The number of threatening life events was assessed using a 12 item scale which has been adapted and used previously in Ethiopia [46]. Alcohol use was assessed using a four item scale, the Fast Alcohol Screening Test (FAST) [47]. The FAST score ranges from 0 to 16, where a score of three or more indicates hazardous or harmful drinking [47]. Socio-demographic and economic variables, including marital status, residence (rural/urban), monthly household income and level of education were also assessed. Household income was categorized into tertiles as "low", "medium" and "high" income categories. Marital status was categorized as "married" or "single" since the number of unmarried, widowed and divorced women was small.

Data analysis

Stata statistics software (version 13.1, Stata Corp, College Station, Texas) was used for data analysis. Spontaneous abortion and stillbirth were combined as "pregnancy loss" as the numbers were small. Two sample proportion test was used to explore whether baseline sample and follow-up samples differ in respect to selected baseline variables. Binary logistic regression was employed to compare the odds of pregnancy loss, neonatal mortality and experience of each of the self-reported perinatal complications for

women with and without antenatal depressive symptoms. As an option to summarize the results and for ease of interpretation, the number of self-reported pregnancy complications were counted and dichotomized into "none" for those without any of the complications and "one or more" for those with one or more pregnancy complications. Similarly, the number of labour and postpartum complications was also dichotomized into "none" for those without any of respective complications and "one or more" for those with one or more respective complications. We combined these complications since maternal complications are often comorbid with one another [16, 17]. The total number of missing data for outcomes and loss to follow up was 71 (5.4%) including 30 women who didn't deliver until end of follow up time. Thus, complete case analysis was used as it was suggested that less than 5% lost to follow up was with little concern [48, 49].

Results

Cohort characteristics

Out of 1311 pregnant women recruited into the study at baseline, 1240 (94.6%) were again interviewed at the follow-up time-point (median of eight weeks; interquartile range of 6-11 weeks postpartum) (Figure 1). Women in the complete follow-up sample were not significantly different in their baseline characteristics from the baseline sample. Of those followed-up at all-time points, nearly half of them (48%) were in the second trimester and the remaining were in the third trimester. More than one quarter of women (28.7%) had a PHQ-9 score of five or more indicating probable depression (20.9% had PHQ-9 score of 5-9 and 7.8% had PHQ-9 score of 10 or more) and 6.0% of them had reported hazardous level use of alcohol. Pregnancy was unintended in 43.8% of women, with 36.5% of pregnancies unwanted and 7.3% mistimed. The mean score of intimate partner violence was 2.1 (standard deviation (SD) of 2.9). The mean parity of participants was 2.7, SD = 2.1 (Table 1).

Antenatal depressive symptoms and potential perinatal complications

Scoring five or more on the PHQ-9 was associated with increased odds self-reports of pregnancy complications such as oedema [adjusted odds ratio (aOR = 2.68, 95% CI: 1.87, 3.83)], blurred vision (aOR = 1.89 95% CI: 1.41, 2.54), severe abdominal pain (aOR = 2.29, 95% CI: 1.73, 3.04), abnormal vaginal discharge (aOR = 2.08, 95% CI: 1.44, 2.98), burning sensation at urination (aOR = 1.67, 95% CI: 1.19, 2.34) and severe headache (aOR = 1.96, 95% CI: 1.49, 2.58) (Table 2). There was a more than two times increased odd of one or more (composite) pregnancy complications among women with antenatal depressive symptoms (aOR = 2.44, 95% CI: 1.84, 3.23).

Women with antenatal depressive symptoms had increased odds of labour complications [severe headache (aOR=1.84, 95% CI: 1.37, 2.46), convulsion (aOR = 1.42, 95% CI: 1.07, 1.87), haemorrhage (aOR = 1.74, 95% CI: 1.31, 2.33), unconsciousness (aOR = 1.48, 95% CI: 1.00, 2.19), fever (aOR = 1.98, 95% CI: 1.48, 2.64), premature rupture of membranes (aOR = 1.81, 95% CI: 1.11, 2.92), prolonged labour (aOR = 1.98, 95% CI: 1.43, 2.73) and retained placenta (aOR = 1.57, 95% CI: 1.08, 2.30)] (Table 2). Women with antenatal depressive symptoms also had increased odds of one or more (composite) labour complications (aOR = 1.84, 95% CI: 1.34, 2.53).

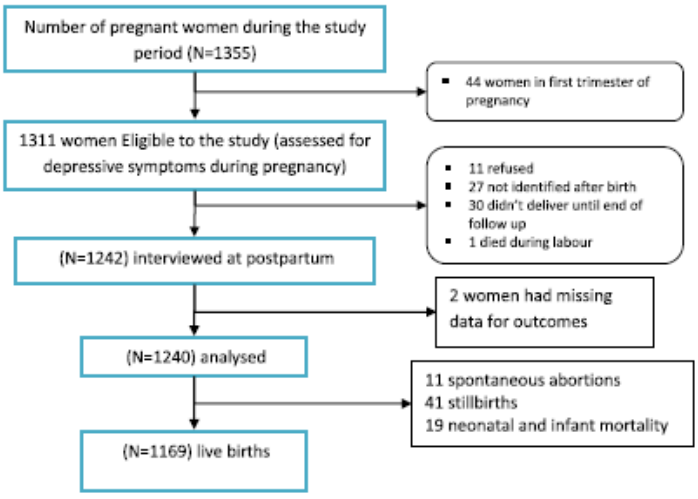

Fig. 1 Diagram to show participant recruitment process

Table 1 Characteristics of participants

Characteristics		Baseline (*N*=1311)	Followed up (*N*=1240)	Pearson Chi^2
Variables	Values	N (%)	N (%)	
PHQ-9 Status	PHQ < 5	924 (70.5)	884 (71.3)	0.2024 (p = 0.653)
	PHQ ≥ 5	387 (29.5)	356 (28.7)	
Marital Status	Married	1293 (98.6)	1225 (98.8)	0.1331 (p = 0.715)
	[a]Single	18 (1.4)	15 (1.2)	
Residence	Urban	103 (7.9)	98 (7.9)	0.0700 (p = 0.790)
	Rural	1208 (92.1)	1142 (92.1)	
Alcohol use	Non-users	875 (64.7)	828 (66.8)	0.0134 (p= 0.993)
	Mild level users	359 (27.4)	338 (27.3)	
	Harmful level users	77 (5.9)	74 (6.0)	
Household Income	High	429 (32.7)	414 (33.4)	0.1700 (p = 0.919)
	Medium	423 (32.3)	392 (31.6)	
	Low	459 (35.0)	434 (35.0)	
Mother's Education	Non-literate	878 (67.0)	841 (67.8)	0.2185 (p = 0.897)
	Grade 1-8	380 (29.0)	351 (28.3)	
	Grade 9-12 and above	53 (4.0)	48 (3.9)	
Parity	Nulliparous	254 (19.4)	226 (18.2)	0.5506 (p = 0.759)
	Primipara	193 (14.7)	185 (14.9)	
	Multipara	864 (65.9)	829 (66.8)	
Pregnancy intention	Wanted	734 (56.0)	696 (56.1)	0.1823 (p = 0.913)
	Mistimed	102 (7.8)	91 (7.3)	
	Unwanted	475 (36.2)	453 (36.5)	
Pregnancy complications	None	655 (50.1)	627 (50.6)	0.0926 (p = 0.761)
	One or more	656 (49.9)	613 (49.4)	
Chronic illness	None	871 (66.4)	832 (66.5)	0.0014 (p= 0.971)
	One or more	440 (33.6)	419 (33.5)	
Perinatal outcomes	Live birth	–	1169 (94.3)	–
	Pregnancy loss	–	52 (4.2)	
	Neonatal mortality		19 (1.5)	

[a]Single Marital Status= unmarried, widowed, divorced); Married = living with marital partner and married but living separate; Income was categorized into tertiles as low, medium and high; Social support score: minimum = 3; Maximum = 14; Mean=10.68; SD=2.00; Number of ANC visits: minimum = 0; Maximum= 8; Mean = 1.524; SD=1.50

Among women with antenatal depressive symptoms, there was increased odds of all postpartum complications [edema (aOR=2.37, 95% CI: 1.39, 4.04), blurred vision (aOR=1.74, 95% CI: 1.29, 2.36), severe abdominal pain (aOR=1.61, 95% CI: 1.21, 2.15), burning sensation at urination (aOR=1.59, 95% CI: 1.16, 2.18), severe headache (aOR=1.68, 95% CI: 1.24, 2.25), convulsion (aOR=1.69, 95% CI: 1.24, 2.32), haemorrhage (aOR=1.60, 95% CI: 1.22, 2.17), unconsciousness (aOR=2.45, 95% CI: 1.25, 4.80) and fever (aOR=1.87, 95% CI: 1.37, 2.54)] (Table 2). Women with antenatal depressive symptoms also had increased odds of composite postpartum complications (aOR=1.70, 95% CI: 1.23, 2.35) in the multivariate model (Table 2).

In the multivariate model (Table 2), neonates of women with depressive symptoms had increased odds of difficulty of breathing or fast breathing (aOR = 1.70, 95% CI: 1.12, 2.58) and convulsions or spasms (aOR = 1.72, 95% CI: 1.12, 2.65) compared to women without depressive symptoms according to women's self-reported measures. But, the association of antenatal depressive symptoms with composite neonatal complications became marginally non-significant in the multivariate model (OR=1.30, 95% CI: 0.98, 1.73) (Table 2). However, when severity of antenatal depressive symptoms was considered, the odds of each of the potential perinatal complications (maternal and neonatal) did not consistently increase with severity (Table 3). In the multivariate model, antenatal depressive symptoms were not associated with pregnancy loss (aOR = 1.26, 95% CI: 0.65, 2.44) or neonatal mortality (aOR = 2.03, 95% CI: 0.73, 5.63) (Table 4).

Table 2 Impact of having antenatal depressive symptoms on each of self-reported perinatal complications

Self-Reported Perinatal Complications	During Pregnancy		During Labour		Up to 7 days Postpartum		Neonatal	
	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)	n (%)	aOR (95% CI)
Edema	172 (13.8)	2.68 (1.87, 3.83)	–	–	70 (5.6)	2.37 (1.39, 4.04)	–	–
Blurred vision	293 (23.6)	1.89 (1.41, 2.54)	–	–	301 (24.3)	1.74 (1.29, 2.36)	–	–
Severe abdominal pain	349 (28.2)	2.29 (1.73, 3.04)	–	–	382 (30.8)	1.61 (1.21, 2.15)	–	–
Abnormal discharge	163 (13.2)	2.08 (1.44, 2.98)	–	–	187 (15.1)	1.42 (0.99, 2.02)	–	–
Burning sensation at urination	201 (16.2)	1.67 (1.19, 2.34)	–	–	257 (20.7)	1.59 (1.16, 2.18)	–	–
Severe headache	398 (32.1)	1.96 (1.49, 2.58)	340 (27.4)	1.84 (1.37, 2.46)	338 (27.3)	1.68 (1.24, 2.25)	–	–
Convulsion	–	–	491 (39.6)	1.42 (1.07, 1.87)	257 (20.7)	1.69 (1.24, 2.32)	–	–
Haemorrhage	–	–	378 (30.5)	1.74 (1.31, 2.33)	420 (33.8)	1.60 (1.22, 2.17)	–	–
Unconsciousness	–	–	152 (12.3)	1.48 (1.00, 2.19)	41 (3.3)	2.45 (1.25, 4.80)	–	–
Fever	–	–	368 (29.8)	1.98 (1.48, 2.64)	274 (22.1)	1.87 (1.37, 2.54)	–	–
Premature Rupture of Membrane	–	–	92 (7.4)	1.81 (1.11, 2.92)		–	–	–
Prolonged labour	–	–	264 (21.3)	1.98 (1.43, 2.73)		–	–	–
Tear	–	–	92 (7.4)	1.19 (0.72, 1.99)		–	–	–
Retained placenta (30 min)	–	–	66 (13.4)	1.57 (1.08, 2.30)		–	–	–
Difficulty or Fast Breathing	–	–	–	–	–	–	129 (11.0)	1.70 (1.12, 2.58)
Yellow Skin/Eye Color (Jaundice)	–	–	–	–	–	–	45 (3.8)	1.08 (0.53, 2.19)
Poor Sucking or Feeding	–	–	–	–	–	–	48 (4.1)	0.76 (0.39, 1.50)
Pus, Bleeding around Umbilical Cord	–	–	–	–	–	–	162 (13.8)	1.38 (0.94, 2.01)
Skin Lesions Or Blisters	–	–	–	–	–	–	129 (10.1)	1.18 (0.77, 1.80)
Convulsions/Spasms/Rigidity	–	–	–	–	–	–	115 (9.8)	1.72 (1.12, 2.65)
Lethargy/Unconsciousness	–	–	–	–	–	–	35 (3.0)	1.11 (0.51, 2.39)
Red or Swollen Eyes With Pus	–	–	–	–	–	–	53 (4.5)	1.50 (0.80, 2.80)
One or more of any symptoms	700 (56.4)	2.44 (1.84, 3.23)	826 (66.6)	1.84 (1.34, 2.53)	804 (64.8)	1.70 (1.23, 2.35)	418 (35.6)	1.30 (0.98, 1.73)

N = total sample size; n = number of cases having perinatal complications (% = percentage of cases having perinatal complications)
Controlled for alcohol use, residence, marital status, household income, education, intimate partner violence, life threatening events, number of ANC visits, parity, pregnancy intention, chronic conditions, and previous experience of adverse perinatal outcomes in all models and after adjusting for presence of one or more of any pregnancy complications symptoms and delivery complications in modelling each of labour complications and postpartum complication respectively.

Discussion

Antenatal depressive symptoms and self-reported perinatal complications were common in the study area. More than half of participants reported having at least one or more of self-reported perinatal complications. In similar non-clinical studies, which reported patient defined perinatal complications, almost 50% of the participants reported some type of illness during pregnancy [50]. Similarly, a study of non-severe maternal morbidity in Malawi and Pakistan reported that 50.1% and 53% of women respectively reported having at least one pregnancy complications, infective or non-infective [29].

Depressive symptoms found to be associated with up-to three times increased odds of almost all self-reported symptoms of perinatal complications during pregnancy, delivery and postpartum. The associations of antenatal depressive symptoms with pregnancy loss and neonatal mortality were non-significant. The study found consistently strong association of antenatal depressive symptoms with all self-reports of perinatal complications in LMICs settings where there is lack objective evidence about perinatal complications. The finding has future importance in designing intervention strategies of antenatal depressive symptoms so as to improve the risk of perinatal complications.

The increased odds of self-reports of perinatal complications among women with antenatal depressive symptoms in our study supports studies in HICs where antenatal depression was associated with a pre-eclampsia [15, 16], wide range of other individual and combined pregnancy complications such as gestational hypertension, premature rupture of membranes, and various infections (Urinary Tract Infections, cervical, vaginal, intra-amniotic infections) [16, 17]. Our study also supports increased association of antenatal depressive symptoms with individual and combined delivery complications (assisted delivery, non-progressive labor, shoulder dystocia, postpartum hemorrhage, meconium,

Table 3 Impact of Antenatal depressive symptoms on each of perinatal complications

	Potential perinatal complications	OR (95% CI)		
		Mild Depression	Major depression	Risk/protective factors
Pregnancy complications	Edema	2.86 (1.95, 4.17)	2.15 (1.19, 3.88)	[a]Mild Alcohol use
	Blurred vision	2.11 (1.54, 2.91)	1.33 (0.80, 2.20)	[a](IPV, LTET, history perinatal mortality)
	Severe headache	1.81 (1.34, 2.45)	2.47 (1.57, 3.90)	[a](Primary schooling, increased LTET)
	Severe abdominal pain	2.41 (1.78, 3.27)	1.96 (1.23, 3.13)	
	Abnormal discharge	2.17 (1.48, 3.20)	1.78 (0.98, 3.24)	[b]High income
	Burning sensation at urination	1.50 (1.04, 2.18)	2.24 (1.32, 3.79)	
	One or more of any symptoms	2.47 (1.81, 3.38)	2.34 (1.44, 3.82)	[b](ANC use and high income)
labour complications	Haemorrhage	1.94 (1.42, 2.64)	1.22 (0.75, 1.98)	[b](secondary schooling and more)
	Convulsion	1.49 (1.10, 2.01)	1.21 (0.76, 1.91)	[b]higher parity, †pregnancy complications
	Severe headache	1.87 (1.36, 2.57)	1.72 (1.07, 2.78)	[b]primary schooling, †pregnancy comps.
	Unconsciousness	1.51 (0.99, 2.29)	1.39 (0.74, 2.61)	[a]pregnancy complications
	Fever	2.01 (1.47, 2.74)	1.88 (1.17, 2.99)	[b]Primary schooling, ×parity, †preg. comps
	Premature Rupture of Membrane	2.00 (1.21, 3.31)	1.26 (0.56, 2.83)	[a]having comorbid conditions
	Prolonged labour	2.10 (1.48, 2.96)	1.62 (0.95, 2.76)	[a]ANC Use, ×parity, †pregnancy comps.
	Tear	1.01 (0.56, 1.83)	1.72 (0.82, 3.61)	[a]Mild Alcohol use, ×parity, †preg. comps.
	Retained placenta (30 min)	1.66 (1.11, 2.49)	1.29 (0.69, 2.42)	[a]pregnancy comps.
	One or more of any symptoms	2.12 (1.48, 3.04)	1.20 (0.71, 2.01)	[b]parity, †pregnancy comps.
postnatal complications	Haemorrhage	1.51 (1.11, 2.06)	1.98 (1.23, 3.20)	[b]Rural, †medium income, †primary schooling, †unwanted pregnancy, †history perinatal mortality
	Edema	2.18 (1.23, 3.87)	3.03 (1.36, 6.75)	[a]Intimate partner violence, †labour comps.
	Blurred vision	1.72 (1.24, 2.39)	1.87 (1.15, 3.04)	[b]Rural, ×increased income and education, †mistimed pregnancy, †labour comps.
	Convulsion	1.71 (1.22, 2.41)	1.59 (0.94, 2.68)	[b]Rural, ≥secondary schooling, †labour comp.
	Severe headache	1.40 (1.01, 1.94)	2.95 (1.81, 4.78)	[b]Prim schooling, †increased LTET, †labour comps
	Unconsciousness	2.27 (1.10, 4.70)	2.98 (1.16, 7.64)	[a]increased LTET, †labour complications
	Severe abdominal pain	1.54 (1.13, 2.11)	1.87 (1.16, 3.01)	[b]Alcohol use, ×high income, †labour comps
	Abnormal discharge	1.35 (0.92, 1.99)	1.59 (0.90, 2.80)	[a]labour comps
	Burning sensation at urination	1.20 (0.84, 1.71)	3.20 (1.97, 5.19)	[b]higher income, †secondary schooling, †labour comps
	Fever	1.74 (1.24, 2.43)	2.45 (1.49, 4.02)	Incm3-, increased labour comps
	One or more of any symptoms	1.33 (0.94, 1.88)	4.16 (2.11, 8.20)	[b]Mild alcohol use, ×high income and education, ×use of ANC, †labour comps

Table 3 Impact of Antenatal depressive symptoms on each of perinatal complications *(Continued)*

neonatal complications	Difficulty or Fast Breathing	1.67 (1.07, 2.60)	2.19 (1.18, 4.06)	[a]Intimate partner violence
	Yellow Skin/Eye Color (Jaundice)	1.34 (0.64, 2.79)	0.95 (0.30, 3.05)	[b]Increased parity, †unwanted pregnancy, † history perinatal mortality
	Poor Sucking or Feeding	0.72 (0.32, 1.61)	1.38 (0.54, 3.53)	[a]Mild alcohol use
	Pus, Bleeding, around Umbilical Cord	1.61 (1.08, 2.40)	1.66 (0.91, 3.01)	[b]High income
	Skin Lesions Or Blisters	1.38 (0.89, 2.15)	1.08 (0.53, 2.20)	[a]Comorbid conditions
	Convulsions/Spasms/Rigidity	2.08 (1.33, 3.26)	1.79 (0.90, 3.53)	[a] history perinatal mortality
	Lethargy/Unconsciousness	1.19 (0.51, 2.78)	1.75 (0.59, 5.19)	
	Red or Swollen Eyes With Pus	1.54 (1.14, 2.07)	1.52 (0.95, 2.43)	[b]High income
	Difficulty or Fast Breathing	1.67 (1.07, 2.60)	2.19 (1.18, 4.06)	[a]intimate partner violence

Reference group: women with minimal depression; [a] = risk factor; [b] = protective factor
After controlling for alcohol use, residence, marital status, family income, educational level, intimate partner violence (IPV), life threatening events (LTET), parity, pregnancy intention, previous history of adverse events, pregnancy complications and chronic medical conditions.

Table 4 Antenatal Depressive symptoms vs adverse perinatal outcomes

Characteristics	Pregnancy loss		Neonatal mortality		Either pregnancy loss or neonatal mortality	
	(cOR, 95% CI)	(aOR, 95% CI)	(cOR, 95% CI)	(aOR, 95% CI)	(cOR, 95% CI)	(aOR, 95% CI)
Depressive Symptoms: PHQ9≥5	1.12 (0.61, 2.05)	1.26 (0.65, 2.44)	1.83 (0.73, 4.60)	2.03 (0.73, 5.63)	1.29 (0.77, 2.14)	1.44 (0.82, 2.53)
Residence: Rural	1.44 (0.44, 4.72)	2.25 (0.44, 11.42)	omitted	omitted	2.00 (0.62, 6.49)	2.84 (0.60, 13.22)
House hold Income: High	0.94 (0.49, 1.81)	0.84 (0.42, 1.70)	1.22 (0.41, 3.67)	1.43 (0.45, 4.56)	1.01 (0.57, 1.78)	0.97 (0.53, 1.79)
Medium	0.77 (0.38, 1.54)	0.72 (0.35, 1.47)	1.10 (0.35, 3.43)	1.20 (0.38, 3.82)	0.84 (0.46, 1.54)	0.83 (0.45, 1.54)
Low	1	1	1	1	1	1
Educational Level: Secondary +	1.51 (0.45, 5.09)	2.66 (0.46, 15.24)	omitted	1.00	1.08 (0.32, 3.59)	2.21 (0.53, 1.88)
Primary Schooling	0.95 (0.51, 1.80)	1.02 (0.49, 2.11)	0.85 (0.30, 2.38)	0.99 (0.31, 3.18)	0.92 (0.54, 1.59)	1.01 (0.42, 11.40)
Non-literate	1	1	1	1	1	1
Intimate Partner violence	0.85 (0.74, 0.98)	0.85 (0.73, 0.98)	0.98 (0.83, 1.15)	0.99 (0.82, 1.18)	0.89 (0.80, 0.99)	0.89 (0.79, 1.00)
Threatening life events	0.84 (0.65, 1.08)	0.86 (0.65, 1.14)	0.87 (0.58, 1.30)	0.82 (0.53, 1.29)	0.84 (0.68, 1.05)	0.84 (0.66, 1.08)
Parity	0.98 (0.86, 1.12)	1.01 (0.85, 1.19)	1.07 (0.87, 1.32)	1.03 (0.80, 1.33)	1.00 (0.90, 1.13)	1.01 (0.88, 1.17)
Pregnancy Intention: Wanted	1	1	1	1	1	1
Mistimed	0.89(0.31, 2.57)	1.00 (0.34, 2.96)	0.63 (0.08, 4.90)	0.55 (0.07, 4.41)	0.82 (0.32, 2.12)	0.86 (0.32, 2.27)
Unwanted	0.62 (0.33, 1.17)	0.61 (0.31, 1.20	0.75 (0.28, 2.01)	0.61 (0.22, 1.73)	0.65 (0.38, 1.12)	0.61 (0.34, 1.09)
History of adverse perinatal outcomes	1.48 (0.82, 2.66)	1.66 (0.89, 3.11)	1.63 (0.64, 4.18)	1.47 (0.54, 3.98)	1.52 (0.92, 2.51)	1.61 (0.94, 2.76)
pregnancy complications	1.21 (0.69, 2.10)	1.37 (0.74, 2.54)	1.15 (0.46, 2.85)	1.00 (0.45, 2.23)	1.19 (0.74, 1.92)	1.28 (0.75, 2.17)
other comorbid illness	0.91 (0.53, 1.54)	0.89 (0.51, 1.55)	1.12 (0.52, 2.42)	1.07 (0.39, 2.90)	-	0.93 (0.58, 1.48)

and suspected sepsis) [16], premature contraction, use of analgesics and increased nausea during pregnancy [18].

Few existing studies in LMICs also demonstrated that antenatal depression was associated with increased risk of prolonged labor [19, 20, 51], assisted deliveries, labor and delivery complications such as vaginal tear, unconsciousness, heavy vaginal bleeding during delivery and at postpartum, fever, malodorous vaginal discharge and leaking urine or faeces [51] as well as preeclampsia [20, 21].

The strong association of antenatal depressive symptoms with self-reports of perinatal complications may be explained by changes in life style [52], increased disability [8, 9], malnutrition [53] and food insecurity [54], reduced social support [55] and self-care [10–12] among women with antenatal depressive symptoms that delay timely healthcare seeking resulting in worsened perinatal complications among these group of women. Thus, depression may either worsen existing complications or increase vulnerability of women for developing complications (infection, hypertension, unsafe abortion) by reducing women's self-care, social support and functioning. But evidence regarding the impact of depression on perinatal complications through biochemical changes is mixed [56].

Although we did not enquire about pre-eclampsia specifically, the significantly higher rate of symptoms like oedema, blurred vision and convulsions around two weeks before birth among women with antenatal depressive symptoms suggests an elevated risk of pre-eclampsia, which is borne out in the literature from other settings [15, 16, 20, 21]. The findings of the increased odds of symptoms of fever and pain during urination and abdominal pain also suggest the risk of infection may be increased among women with antenatal depressive symptoms [16, 57]. It can also be linked to increased effect of depression on pelvic inflammatory diseases reported in the general population [58].

Our finding about the increased odds of prolonged labour among women with depressive symptoms replicated the findings of cohort studies in Ghana [51], Ethiopia [19] and China [20]. It also supports the increased risk of shoulder dystocia and assisted delivery reported in HICs [16]. The association between antenatal depressive symptoms and prolonged labor in LMIC settings may be explained partly by reduced self-efficacy to push during labor due to fear of childbirth in a setting where there is increased maternal mortality. It may also be explained by malnutrition that may disable normal progression of labor. Increased odds of intra-partum and postpartum haemorrhage and unconsciousness in our study also accorded with the findings in Ghana that reported increased loss of consciousness and heavy vaginal bleeding at and after birth among women with antenatal depression [51].

Our finding of strong association between antenatal depressive symptoms and perinatal complications may

also be explained by somatic symptoms associated with depression. These somatic symptoms are highly prevalent among people with mild and moderate depression group compared to people with severe depression group (a group characterized by motor retardation than somatization) [59]. Mild depression, compared to major depression, is again higher among pregnant women than non-pregnant women [60] implying higher prevalence of somatic symptoms among these group of women which could be presented as perinatal complications.

Our finding of an increased odds of potential neonatal complication also accords with findings in other settings of increased risk of both severe neonatal illness [51] and risk of fetal distress [17] among women with antenatal depression. But, our study didn't support the non-significant odds of fetal distress reported in China [20].

The non-significant finding of the association between antenatal depressive symptoms and adverse perinatal outcomes in our study may be due to low statistical power. Nevertheless, a large sample size cohort study in Ghana has also reported non-significant association of PHQ-9 assessed antenatal depressive symptoms with stillbirth and neonatal mortality [51]. Similarly another study in UK [26] that distinguished current antenatal depression, from pre-existing depression prior to pregnancy, demonstrated that current antenatal depression was not a predictor of stillbirth. The other studies [17, 19, 20] also reported non-significant findings though they too may have been limited by low statistical power. Nevertheless, our study did not distinguish current antenatal depressive symptoms from prior-pregnancy depressive symptoms. However, the current study was part of a bigger project aimed to initiate integration of mental healthcare in primary healthcare facility. Thus, prior to the commencement of the study, there was no accessible mental healthcare service in the area for women to get medical prescriptions or other healthcare interventions for mental health problems.

The strength of our study was it was population based prospective design with greater chance of generalizability to all perinatal women. Our use of a locally validated measure of antenatal depressive symptoms increased validity of exposure. However, the relatively strong association of the antenatal depressive symptoms with potential perinatal complications in our study may be explained by greater levels of somatic symptoms among these women, attrition bias and the overlap of normal symptoms of pregnancy with depressive symptoms. However, we have previously noted for this population that somatic symptoms, as a presentation of perinatal depression relates to disability and morbidity [9]. There is consistent evidence about the association of depression and somatisation, with somatization being an important manifestation of depression [13]. These two disorders co-occur together and were termed as 'common mental disorders' [5, 9, 13, 14, 19, 61, 62]. The association between antenatal depressive symptoms and self-reported perinatal complications in the postnatal period may be due to negative symptom recall bias among women with postnatal depressive symptoms. However, it is important to note that about 60% of maternal mortality occurs during the postpartum, indicating increased complications within this period [63] that are associated with antenatal depressive symptoms persisting to postpartum.

With the poor quality health record system in Ethiopia [34, 37–39], we were required to rely on self-report of the participants to document perinatal complications. This self-report may reflect either under or over-reporting of complication types, severity or timing of outcome events. But, the measures had potential to assess perceived ill health of the participants, a neglected area of healthcare despite currently promoted patient-centred healthcare philosophy in the study area and around the world. Data collectors would declare potential participants "untraceable" after three recruiting visits had been unsuccessful. It is possible that these participants were 'untraceable' due to their being depressed and or due to physical health problems.

Conclusion

Antenatal depressive symptoms appear to have considerable effect on self-reported perinatal complications. Further studies should look at whether early detection and treatment of antenatal depressive symptoms would reduce the risk of perinatal complications.

Abbreviations

aOR: adjusted Odds Ratio; CI: Confidence Interval; cOR: crude Odds Ratio; EPDS: Edinburgh Postnatal Depression Scale; HICs: High Income Countries; LBW: Low Birth Weight; LMIC: Low and Middle Income Countries; PHQ-9: Patient Health Questionnaire-9; SRQ: Self Reporting Questionnaire; UK: United Kingdom; USA: United States of America

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Availability of data and materials

The datasets generated and analysed during the current study are not publicized at present. [1] Data were collected as part of a cross-country study and will be available for further cross-country work; [2] This was also part of a PhD project and the student needs to use the data for his PhD work before data could be made available; [3] We have not received consent from participants to share the data on the web but, will be available from the corresponding author on reasonable request.

Consent for publication
Not applicable.

Authors' contributions
TB, CH, EK and AF Involved in the development of the proposal; TB, CH and AF participated in data collection; TB, CH, SH and AF participated in analysis; TB, CH and AF prepared the draft; TB, CH, EK, SH and AF revised drafts of the paper. All authors read and approved the final manuscript.

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Ethics approval and consent to participate
Ethical approval (ref. number: 024/14/psy dated 23/03/14) was obtained from the Institutional Review Board of Addis Ababa University, College of Health Sciences. Written, informed consent was obtained from all literate participants. Non-literate participants indicated consent with a thumb print. Women with high antenatal depressive symptom scores (PHQ-9 score of 15 or more) and those with suicidal ideation experiences were referred to primary health care facilities, where PRIME project (programme for improving mental health care) provided further investigation and treatment for free. Women with PHQ-9 score of 10-14 were not referred for further treatment and evaluation to avoid potential incidence of worries among those with false positives since PHQ-9 has low positive predictive value [43, 44, 64].

Competing interests
The authors declare that they have no competing interests.

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References
1. Hendrick V. Evaluation of mental health and depression during pregnancy. Psychopharmacol Bull. 1998;34:297–9.
2. Bennett H, Einarson A, Taddio A, Koren G, Einarson T, et al. Systematic Review The American College of Obstetricians and Gynecologists. 2004;103(4)
3. Anselmi L, Barros F, Minten G, Gigante D, Horta B, Victora C. prevalence and early determinants of common mental disorders in the 1982 birth cohort, Pelotas, South Brazil. Rev Saude Publica. 2008;42(12):26–33.
4. Castro E, Couto T, Cardoso MN, Brancaglion MY, Faria GC, Garcia FD, et al. Antenatal depression: Prevalence and risk factor patterns across the gestational period. J Affect Disord. 2016;192:70–5.
5. Fisher J, Mello M, Patel V, Rahman A, Tran T, Holtn S, et al. Prevalence and Determinants of Common Perinatal Mentala Disorders in low income and lower middle income Countries: A systematic Review. Bulletin of WHO. 2012;90:139–49.
6. Fisher J, Tran T, La B, Kriitma K, Rossenthal D, Tran T. Common Perinatal Mental disorders in Northern Viet Nam: Community Prevalence and Health Care Use. Bulletin of WHO. 2010;88:737–45.
7. Hartley M, Tomlinson M, Greco E, Comulada S, Stewart J, Roux J, Mbewu N, Rotheram-Borus N. Depressed mood in pregnancy: Prevalence and correlates in two Cape Town peri-urban settlements. Reproductive Health. 2011;8:9.
8. Peltzer K, Szrek H, Ramlagan S, Leite R, Chao LW. Depression and social functioning among HIV-infected and uninfected persons in South Africa. AIDS Care. 2015;27(1):41–6.
9. Senturk V, Hanlon C, Medihin G, Dewey M, Araya M, Alem A, Prince M, Stewart R. Impact of Perinatal somatic and common mental disorder symptoms on functioning on Ethiopian Women: The P-MaMiE population based cohort study. Journal of Affective Disorders. 2012;136:340–9.
10. Katon J, Russo J, Gavin A, Melville J, Katon W. Diabetes and Depression in Pregnancy: Is There an Association? Journal of Women's Health. 2011;20(7)
11. Katon W. Epidemiology and treatment of depression in patients with chronic medical illness.Dialogues in Clinical Neuroscience. 2011;13(1):7–23.
12. Katon W, Russo J, Melville J, Katon J, Gavin A. Depression in Pregnancy is Associated with Pre-existing but not Pregnancy-induced Hypertension. *Gen Hosp Psychiatry*. 2012;34(1):9–16.
13. Hanlon CMG, Alem A, Araya M, Abdulahi A, Tesfaye M, Wondimagegn D, Patel V, Prince M. Detecting Perinatal Common Mental disorders in Ethiopia: validation of self reporting questionaire and Edinburgh postnatal depression scale. *Journal of Affective Disorders*. 2008;108:251–62.
14. Tesfaye M, Hanlon C, Wondimagegn D, Alem A. Detecting Posnatal common mental disorders in Addis Ababa, Ethiopia: Validation of the Edinburgh Postnatal depression scale and Kessler scales. Journal of Affective Disorders. 2009;122:102–8.
15. Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. Obstetrics and gynecology. 2000;95:487–90.
16. Lutsiv O, McKinney B, Foster G, Taylor V, Pullenayegum E, McDonald S. Pregnancy complications associated with the co-prevalence of excess maternal weight and depression. International Journal of Obesity. 2015;39:1710–6.
17. Jablensky A, Morgan V, Zubrick S, Bower C, Yellachich L. Pregnancy, Delivery, and Neonatal Complications in a Population Cohort of Women With Schizophrenia and Major Affective Disorders. The American journal of psychiatry. 2005;162(1):79–91.
18. Alder J, Fink N, Urech C, Hosli I, Bitzer J. Identification of antenatal depression in obstetric care. Archives of gynecology and obstetrics. 2011;284(6):1403–9.
19. Hanlon C, Medihin G, Alem A, Tesfaye F, Lakew Z, Worku B. Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: The P-MaMiE Population-based cohort study. Tropical medicine and international health. 2008;14(2):156–66.
20. Qiao Y, Wang J, Li J, Wang J. Effects of depressive and anxiety symptoms during pregnancy on pregnant, obstetric and neonatal outcomes: a follow-up study. Journal of Obstetrics and Gynaecology. 2012;32:237–40.
21. Qiu C, Sanchez S, Lam N, Garcia P, Williams M. Associations of depression and depressive symptoms with preeclampsia: results from a Peruvian case-control study. BMC women's health. 2007;7:15.
22. Grigoriadis S, VanderPorten E, Mamisashvili L, Tomlinson G, Dennis C. Et a. The Impact of Maternal Depression during pregnancy on Perinatal Outcomes: A systematic Review and Meta-analysis. Journal of Clinical Psychiatry. 2013;74(4):321–41.
23. Grote N, Bridge J, Gavin A, Melville J, Iyengar S, Katon W. A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight, and Intrauterine Growth Restriction. Arch Gen Psychiatry. 2010;67(10):1012–24.

24. Rahman A, Bunn J, Lovel H, Creed F. Association between antenatal depression and low birthweight in a developing country. Acta Psychiatr Scand. 2007;115:481–6.
25. Husain N, Munshi T, Jafri J, Husain M, Parveen A, Saeed Q, et al. Antenatal depression is not associated with low-birth weight: a study from urban Pakistan. frontiers in Psychiatry. 2014;5(175).
26. Ban L, Tata L, West J, Fiaschi L, Gibson J. Live and Non-Live Pregnancy Outcomes among Women with Depression and Anxiety: A Population-Based Study. *PLoS One*. 2012;7(8)
27. Sloan N, Amoaful E, Arthur P, Winikoff B. Validity of Self reported obstetri complications in Rural Ghana. J Health Popul Nutr. 2001;19(2):45–51.
28. Sontakke PR, Reshmi R. D S. Obstetric Morbidity among Currently Married Women In Selected States of India. The Journal of Family Welfare. 2009;55(2)
29. Zafar S, Jean-Baptiste R, Rahman A, Neilson JP. NR vdB. Non-Life Threatening Maternal Morbidity: Cross Sectional Surveys from Malawi and Pakistan. PLoS ONE. 2015;10(9)
30. Bitew T, Hanlon C, Kebede E, Medihn G, Fekadu A. Antenatal depressive symptoms and maternal health care utilisation: A population-based study of pregnant women in Ethiopia. *BMC Pregnancy and Childbirth*. 2016;16:301.
31. APA. Diagnostic and Statistical Manusl of Mental Disorders (DSM IV). USA: Association of American Psychiatry; 2005.
32. CDC. Advanced Management and Analysis of Data Using Epi Info for Windows. 2000.
33. Dibaba Y, Fantahun M, Hindin M. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. BMC Pregnancy and Childbirth. 2013;13:135.
34. CSA. Ethiopia Demographic and Health Survey 2011. In: CSA, editor. Addis Ababa, Ethiopia: ICF International, Calverton, Maryland, USA; 2011.
35. von Elm EAD, Egger M, Pocock SJ, Gøtzsche PC. Vandenbroucke JP; STROBE Initiative.. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)statement: guidelines for reporting observational studies. Epidemiology. 2007;18(6):800–4.
36. Nguyen R, Wilcox A. Terms in reproductive and perinatal epidemiology: 2. Perinatal terms. J Epidemiol Community Health. 2005;59:1019–21.
37. CSA. Ethiopian Demographic and Health Survey. 2000.
38. CSA. Ethiopia: Improved Capacity of Training Institutions for Health Workers. Ethiopian society of population studies. 2005.
39. Worku A, Yalew A, Afework M. Maternal Complications and Women's Behavior in Seeking Care from Skilled Providers in North Gondar. Ethiopia. PLoS One. 2013;8(3):e60171.
40. Oakley A, Rajan L, Robertson P. A comparison of different sources of information about pregnancy and childbirth. Journal of biosocial science. 1990;22(4):477–87.
41. Ngoc N, Merialdi M, Abdel-Aleem H, Carroli G, Purwar M. Zavaleta N ea. Causes of stillbirth and early neonatal deaths: Data from 7993 pregnancies in six developing countries. Bulletin of World health Organization. 2006;84:699–705.
42. Blencowe H, Cousens S, Jassir F, Chou L, Hogan D, Shiekh S, et al. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis. Lancet Glob Health. 2016;4:e98–108.
43. Gelaye B, Williams M, Lemma S, Deyessa N, Bahretibeb Y, Shibre T, et al. Validity of the patient health questionnaire-9 for depression screening and diagnosis in East Africa. *Psychiatry Res*. 2013;
44. Kroenke K, Spitzer R, Wiliams J. Validity of a Brief Depression Severity Measure. J Gen Intern Med. 2001;16:606–13.
45. Zink T, Levin L, Putnam F, Beckstrom A. Accuracy of Five Domestic Violence Screening Questions With Nongraphic Language. Clinical Pediatrics. 2007;46(2):127–34.
46. Brugha TS, Cragg D. The List of Threatening Experiences: the reliability and validity of a brief life events questionnaire. Acta Psychiatr Scand. 1990 Jul; 82(1):77–81.
47. Hodgson R, Alwyn T, John B, Smith A, Newcombe A, Morgan C. The Fast Alcohol Screening Test. *Alcohol & Alcoholism*. 2002;37(1):61–6.
48. Fewtrell M, Kennedy K, Singhal A, Martin R, Ness A, Hadders-Algra M, et al. How much loss to follow up is acceptable in long terp randomized controlled trials and prospective studies. *Arch Dis Child*. 2008;93(6):458–61.
49. Kristman V, Manno M, Cotte P. Loss to follow-up in cohort studies: how much is too much? European Journal of Epidemiology. 2004;19:751–60.
50. Midhet F. Prevalence and Determinants of Self-reported Morbidity among Pregnant Women in Rural Areas of Pakistan. International Journal of Health Sciences. 2007;1(2)
51. Weobong B, Asbroek A, Soremekun S, Manu A, Owusu-Agyei S, Prince M, et al. Association of Antenatal Depression with Adverse Consequences for the Mother and Newborn in Rural Ghana: Findings from the DON Population-Based Cohort Study. *PLoS ONE*. 2014;9(12):e116333.
52. Bonari L, Pinto N, Einarson A, Steinereir M, Koren G. Perinatal Risks of Untreated Depression During Pregnancy. Canadian Journal of Psychiatry. 2004;49(11):726–35.
53. Saeed A, Raana T, Saeed AM, Humayun A. Effect of antenatal depression on maternal dietary intake and neonatal outcome: a prospective cohort. Nutrition journal. 2016;15(1):64.
54. Heyningen T, Myer L, Onah M, Tomlinson M, Field S, Honikman S. Antenatal depression and adversity in urban South Africa. J Affect Disord. 2016 Oct; 203:121–9.
55. Zuckerman B, Amaro H, Bauchner H, Cabral H. Depressive symptoms during pregnancy: relationship to poor health behaviors. American journal of obstetrics and gynecology. 1989;160(5):1107–11.
56. Mossner R, Mikova O, Koutsilieri E, Saoud M, Ehlis A. Consensus paper of the WFSBP Task Force on Biological Markers (Review): Biological Markers in Depression. The World Journal of Biological Psychiatry. 2007;8(3):141–74.
57. Thornton D, Guendelman S, Hosang N. Obstetric Complications in Women with Diagnosed Mental Illness: The Relative Success of California's County Mental Health System. Health Services Research. 2010;45:1.
58. Berk M, Williams L, Jacka F. oneil A, Pasco J, al e. So depression is an inflamatory disease, but where does the inflamation come from? BMC Medicine. 2013;12:200.
59. Illechukwu L. Psychiatry in Africa: Special problems and unique feature. Transcultural psychiatric Research Review. 1991;28:169–218.
60. Ashley JM, Harper BD, Arms-Chavez CJ, LoBello SG. Estimated prevalence of antenatal depression in the US population. Arch Womens Ment Health. 2016 Apr;19(2):395–400.
61. Medihin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Lakew Z, et al. The effect of Maternal common mental disorders on infant undernutrition in Butajira. Ethiopa: P-MaMiE study. BMC Psychiatry. 2010;10:32.
62. Hanlon C, Medihin G, Alem A, Araya M, Abdulahi A. Tesfaye M ea. Measuring Common Mental Disorders in Women in Ethiopia: Reliability and construct Validity of Comprehensive Psychopathological rating Scale. *Soc Psychiatry Psychiatric Epidemiology*. 2008;43:653–9.
63. EHNRI. Baseline evaluation of Maternal and Newborth healthcare services in 25 Selected Woredas2013.
64. Hanlon C, Medihin G, Selamu M, Breuer E, Worku B, Hailemariam M, et al. Validity of brief screening questionaire to detect depression in primary care in Ethiopia. Journal of Affective Disorders. 2015;186:32–9.

Appendix D: Information Sheet (English Version)

INFORMATION SHEET FOR PARTICIPANTS

IRB Reference Number: 024/14/psy dated 23/03/14

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Hello! My name is _____ and I am working with Addis Ababa University. We are conducting a research on maternal health care utilization in Sodo District, Guragie Zone, Ethiopia. We would like to invite you to participate in this original research project. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

We are going to ask you information about your maternity health care utilization and your experience in relation to pregnancy and delivery. In addition to our current interview, we will also ask you similar questions after your delivery. The information we collect will help planning health services. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team.

- **Aims of the research**

This study is primarily looking at the the potential barriers of maternal health care utilization during pregnancy, delivery and after birth. It tries to look at the relation between maternal mental health problems and its effect on maternal health care utilization as well as adverse obstetric outcomes.

- **Who are we recruiting?**

We are including pregnant women with consent who are at least in the second trimester and permanently residing in the study area. We will also be interviewing health workers and key members of the community like Traditional Birth Attendants, who have better awareness about the maternal health care utilization issue.

- **What will happen if you agree to take part?**

One of our data collectors will either come to your place of work or your home and ask you some questions. The questions will be asking about your own experience of maternal health care utilization and obstetric complications during pregnancy, delivery and postpartum and your own

perrception health care utilization and obstetric commplications. The interview will take about one hour.

- **Risks of being in the study**

We don't expect that the interview will cause you any difficulties. On rare occasions, people might be upset by the questions that are being asked. If you are distressed by the questions then you do not have to answer the question and the interview can be stopped. But, also note that the information is secured and be accessable to only our survey team.

- **Possible benefits**

We hope that the information obtained will help to improve the quality and quantity of maternal health care services like antenatal care services, delivery care services and postpartum care services. We hope that it will fundamentally benefit to improve the health care of the mothers and the newborn. Once the study is completed, we will let you know what we found, either by inviting you to a meeting or giving you a leaflet.

- **What we will do with your data**

The questionnaires will not include your name so nobody except the project co-ordinators (Ato Tesera Bitew) and project data managers will know the information that belongs to you.

We will keep the questionnaires in a locked cupboard.

If you take part in the tape-recorded interview, we will make sure that the tapes do not include your name or identifying information. The tapes will be kept in a locked cupboard. Once the interview tapes have been written down, and the data has been analysed, the tapes will be cleared.

After the end of this study, the information you tell us may be used by other researchers, but they will not be able to identify you in any way.

Main researcher: You can contact the main researcher for any other detailed information using the following address at working hours.

- Ato Tesera Bitew, PhD candidate in Addis Ababa University, Department of Psychiatry
- Tel number 0911 17 36 56

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

If this study has harmed you in any way you can contact the Institutional Review Board, Addis Ababa University, using the details below for further advice and information:

Institutional Review Board, School of Medicine, Addis Ababa University

Telephone number: 0115-5538734

- You may withdraw your data from the project at any time up until it is transcribed for use in the final report.
- If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form.

CONSENT FORM FOR PARTICIPANTS IN RESEARCH STU

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: The Impact of Antenatal Depression on Women's Access to Health Care and Maternal and Perinatal outcomes

"Program for Improving Access to Maternal Health Care"

Addis Ababa University Research Ethics Committee Ref:

.....

Thank you for considering taking part in this research. The person organizing the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

- *I understand that if I decide at any time during the research that I no longer wish to participate, or for my child to participate, in this project, I can notify the researchers involved and withdraw from it immediately without giving any reason. Furthermore, I understand that I will be able to withdraw my data up until they are published.*
- *I consent to the processing of my personal information for the purposes explained to me. I understand that such information will be handled in accordance with the terms of the national data protection rules.*
- *If I am selected to be interviewed in more detail then, I consent to that interview being audio-taped.*
- *The information you have submitted will be published as a report. Please note that confidentiality and anonymity will be maintained and it will not be possible to identify you from any publications.*
- *I agree that the research team may use anonymized data for future research.*

Participant's Statement:

I _____, *agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves***.**

Signed _____ *Date* _____

***Witness Statement (in event that participant is not literate)**:*

I _____, agree that the research project named above has been explained to _____ (participant) to her satisfaction and that she agrees to take

part in the study. Both the notes written above and the Information Sheet about the project have been read to her, and she understands what the research study involves.

Signed _____ *Date* _____

Investigator's Statement:

I, _____*, confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the participant.*

Signed _____ *Date* _____

APPENDIX E: Information Sheet (Amharic Version)

ለተሳታፊዎች የተዘጋጀ ቅጽ

IRB Reference Number፡ **024/14/psy**

የዚህ የመለያ ወረቀት ግልባጭ በእጅዎ ይደርሳል

በዚህ የጥናት ፕሮጀክት እንዲሳተፉ ተጋብዘዋል። ተሳትፎዎት በፍላጎት ላይ ብቻ የተመሰረተ መሆን አለበት፣ በጥናቱ ላለመሳተፍ ከመረጡ የሚያስከትለው ችግር የለም። በጥናቱ ለመሳተፍ ከመወሰንዎ በፊት ጥናቱ ለምን እንደሚሰራና የእርስዎ ተሳትፎ ምን እንደሚያካትት መረዳቱ አስፈላጊ ነው። እባክዎ ከዚህ በታች የተሰጡ መረጃዎችን በጥንቃቄ ለማንበብ ጊዜ ይውሰዱ ከፈለጉም ከሌሎች ጋራ ይወያዩበት። ግልጽ ያልሆነ ነገር ካለና የበለጠ መረጃ ከፈለጉ ሊጠይቁን ይችላሉ።

- ✓ **<u>የምርምሩ አላማ</u>**

ጥናቱ የነፍሰ-ጡር እናቶችን የሕክምና አገልግሎት አጠቃቀም፤ በእርግዝናና በወሊድ ጊዜ ስለሚያጋጥማቸው ችግሮችና ከእነዚህ ችግሮች ጋር የተያያዙ የአእምሮ ህመምን ይመለከታል። ጥናቱ በነፍሰ-ጡር እና በወለዱ እናቶች ላይ ስለሚከሰተው የአእምሮ ህመም ሲሆን የአእምሮ ህመሙ በእናቶችም ሆነ በሚወለደው ህፃን ላይ ስለሚያስከትለው ጉዳት እንዲሁም በእናቶች የህክምና አገልግሎት አጠቃቀም ላይ ስለሚያስከትለው ውጤትም ያካትታል።

- ✓ **<u>በጥናቱ እንዲሳተፉ የሚመረጡት እነ ማን ናቸው</u>**

ከላይ በተጠቀሰው ርእስ ላይ በዋነኝነት መረጃ ሊሰጡን የሚችሉት ነፍሰ-ጡር እና የወለዱ እናቶች ቢሆኑም ሌሎች መረጃው ይኖራቸዋል ብለን የምናስባቸው ሰዎችም ይካተታሉ። የጤና ባለሙያዎችን፤ የማህበረሰብ መሪዎችን፤ የሃይማኖትና የባህል ሃኪሞችን እና በአእምሮ ህመም የተነሳ የሚሰቃዩ እናቶችንና ቤተሰቦቻቸውን እናነጋግራለን።

- ✓ **<u>በጥናቱ ለመሳተፍ ቢስማሙ ምን ይደረጋል</u>**።

ከመረጃ ሰብሳቢዎቻችን አንዱ በስራ ቦታዎ ወይም ቤትዎ ድረስ በመምጣት አንዳንድ ጥያቄዎች ይቀርብሎታል መጠይቆቹ ነፍሰ-ጡር እናቶች ስለሚያገኙት እርዳታ ያለዎትን ልምድና እውቀት እንዲያካፍሉ ይጋብዛሉ። ከእርግዝናና ከወሊድ ጋር ተያይዞ የሚከሰቱ የአእምሮና የጤና ችግሮችን እና እናቶች የሚያስፈልጋቸውን ህክምና እንዳያገኙ ስለሚያደርጓቸው ጉዳዮች ይጠየቃሉ። ቃለ መጠይቁ ወደ አንድ ሰአት ገደማ ይወስዳል። እርስዎ የሚፈቅዱ ከሆነ ቃለ ምልልሱን በመቅረጸ ድምጽ እንቀዳዋለን።

- ✓ **<u>በጥናቱ መሳተፍ ምን ጉዳት ይኖረዋል</u>**?

በቃለመጠይቁ መሳተፍ የሚያስከትለው ችግር የለም።ቢሆንም አንዳንድ ሰዎች በሚነሱ ጥያቄዎች ሊረበሹ ይችሉ ይሆናል። እርስዎ በጥያቄዎቹ ደስተኛ ካልሆኑ መልስ ይሰጡ ዘንድ አይገደዱም። ቃለ መጠይቁም ዕዚሁ ላይ መቆም ይችላል።፣

የሚገኘው መረጃ በኢትዮጵያም ሆነ በሌሎች ሀገሮች ያለውን የአእምሮ ጤና አገልግሎት እንደሚያሻሽለው ተስፋ እናደረጋለን።

ጥናቱ ሲጠናቀቅ ግኝታችንን ለማወቅ ይችሉ ዘንድ እርስዎን እንጋብዞታለን። አጭር የመረጃ ጽሁፍ እንሰጥዎታለን ወይም በወረዳው ውስጥ ለህዝብ እንዲገለጽ እናደርጋለን።

- ✓ **<u>በሰጡን ቅድመ መረጃ ምን እናደርግበታለን?</u>**

ጥያቄዎቹ የእርስዎን ስም አያካትቱም። ስለዚህ ከፕሮጀክቱ አስተባባሪ አቶ ተሠራ ቢተው እና የፕሮጀክቱ የመረጃ ሰራተኞች ውጪ ማንም ሌላ ሰው መረጃው የእርስዎ ስለመሆኑ የሚያውቀው አይኖርም ።

የመረጃ ሰነዶቹን በሚቆለፉ መሳቢያ / መደርደርያ / እናስቀምጣለን።

ለድምጸ መቅረጹ ፍቃደኛ ከሆኑ ስምዎትንና እርስዎነቶን የሚያሳውቅ መረጃዎች አይቀረጹም።

መቅረጸ ድምጹም በሚቆለፍ መደርደረያ ውስጥ ይቆለፍበታል።

በመቅረፀ ድምጽ የተያዘው ቅድመ መረጃ ወደ ጽሑፍ ከተቀየረ በኋላ እና ከተተነተነ በኋላ በድምጽ የተቀረጸው ይሰረዛል።

ከጥናቱ ማለቅ በኋላ የሰጡን መረጃ ሌሎች ተመራማሪዎች ይጠቀሙበት ይሆናል። ግን በማንኛውም መንገድ መረጃ የሰጠውን ሰው መለየት እናዳይችሉ ይደረጋል።

<u>ዋና አጥኚዎች</u>

የጥናቱን አስተባባሪ አቶ ተሠራ ቢተው ሲሆን ሊያገኙ ከፈለጉ ሞባይል ቁጥር 0911 17 36 56 በመጠቀም በስራ ሰአት በማንኛውም ቀን ሊደውሉልን ይችላሉ። በጥናቱ መሳተፍ የእርስዎ ውሳኔ ጉዳይ ይሆናል። በጥናቱ ለመሳተፍ ከወሰኑ በማንኛውም ሰአት ምክንያት መስጠት ሳይጠበቅብዎት በነጻነት ተሳትፎውን ማቋረጥ ይችላሉ።

ይህ ጥናት በማንኛውም መንገድ ጉዳት ካደረሰብዎት የአ.አ ዩኒቨርሲቲ የህክምና ፋኩልቲ የስነምግባር (ኢቲክስ) ተቋማዊ የክለሳ ቦርድን በስልክ ቁጥር 0115-553 87 34 ማነጋገር ይችላሉ።

<u>ማስታወሻ</u>፡ . ወደ መጨረሻ ሪፖርትነት እስኪቀየር ድረስ በፈለጉት ሰአት መረጃዎን ከፕሮጀክቱ ሊያወጡ ይችላሉ።

. በጥናቱ ለመሳተፍ ከወሰኑ ይህን የመረጃ ቅጽ ይሰጥዎትና ስምምነት ግን በፊርማ እንዲያረጋግጡ ይጠየቃሉ።

APPENDIX F: Consent Form (English version)

CONSENT FORM

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: The Impact of Antenatal Depression on Women's Access to Health Care and Maternal and Perinatal outcomes

"Program for Improving Access to Maternal Health Care"

Addis Ababa University Research Ethics Committee Ref: .....

Thank you for considering taking part in this research. The person organizing the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

- *I understand that if I decide at any time during the research that I no longer wish to participate, or for my child to participate, in this project, I can notify the researchers involved and withdraw from it immediately without giving any reason. Furthermore, I understand that I will be able to withdraw my data up until they are published.*
- *I consent to the processing of my personal information for the purposes explained to me. I understand that such information will be handled in accordance with the terms of the national data protection rules.*
- *If I am selected to be interviewed in more detail then, I consent to that interview being audio-taped.*
- *The information you have submitted will be published as a report. Please note that confidentiality and anonymity will be maintained and it will not be possible to identify you from any publications.*
- *I agree that the research team may use anonymized data for future research.*

Participant's Statement:

I _____, *agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves***.**

Signed _____ *Date* _____

***Witness Statement (in event that participant is not literate)**:*

I _____, agree that the research project named above has been explained to _____ (participant) to her satisfaction and that she agrees to take

part in the study. Both the notes written above and the Information Sheet about the project have been read to her, and she understands what the research study involves.

Signed _____ *Date* _____

Investigator's Statement:

I, _____*, confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the participant.*

Signed _____ *Date* _____

APPENDIX G: Consent Form (Amharic Version)

በጥናቱ ላይ ስለመሣተፍ የስምምነት መግለጫ ቅፅ

<u>የጥናቱ ርዕስ፡- የቅድመ-ወሊድ ድባቴ በእናቶች የጤና አጠቃቀምና በወሊድና በፅንሰ ላይ ስለሚፈጥረው ተፅዕኖ</u>

"Programme for improving Mental Health care (PRIME)"

የአ.አ.ዩ የምርምር ስነ-ምግባር ኮሚቴ መለያ ቁጥር **024/14/psy**

በዚህ ምርምር ለመሳተፍ ስላሰቡ እናመሰግናለን። በምርምሩ ለመሳተፍ ከመወሰንዎ በፊት ምርምሩን የሚመራው ሰው ስለፕሮጀክቱ ማብራሪያ ሊሰጥዎ ይገባል። እባክዎ ከመረጃው ወረቀት ወይም ከተደረገልዎት ገለጻ የመነጨ ጥያቄ ካለዎት በምርምሩ ለመሳተፍ ከመወሰንዎ በፊት ጥናቱን የሚያካሂደውን ግለሰብ ይጠይቁ በእጅዎ ይኖር ዘንድ እና በፈለጉ ጊዜ እንዲያመሳክሩበት የዚህ የስምምነት ቅጽ ግልባጭ ይሰጥዎታል።

- በማንኛውም ጊዜ በምርምሩ ላለመሳተፍ ከወሰንኩኝ ፀ ለምርምሩ ለሚያካሂዱት ወይም ወኪሎቻቸው ማሳወቅ እንደምችልና ምንም ምክንያት ሳላቀርብ ከምርምሩ እራሴን ላገል እንደምችል ተረድቻለሁ። ከዚህም ባሻገር ጥናቱ እስኪታተም ድረስ የሰጠሁትን ቅጽ መረጃዎች ማውጣት እንደምችል ተረድቻለሁ።
- የሰጠሁት የግል መረጃ ለተገለፀልኝ አላማ ጥቅም ላይ ይውል ዘንድ ተስማምቻለሁ።
- በጥልቀት ቃለ መጠይቁን ለመስጠት ከተመረጥኩ ቃለ መጠይቁ በመቅረጸ ድምጽ ይቀዳ ዘንድ እስማማለሁ።
- የሰጡን መረጃ እንደ ሪፖርት ይታተማል። የሚሰጡን መረጃ ሚስጥራዊነት እንደሚጠበቅና ከሚወጡትም ሪፖርቶች ማንነቶን ለማወቅ እንደማይቻል ልናረጋግጥ እንወዳለን።
- የምርምር ቡድኑ ቅድመ መረጃውን ለወደፊት ምርምር ሊጠቀም እንደሚችል እስማማለሁ።
- የተሳታፊው መግለጫ_____

እኔ _____የተባልኩኝ ግለሰብ ከላይ የተጠቀሰው የምርምር ፕሮጀክት በበቂ ሁኔታ ተብራርቶልኝ በጥናቱ ለመሳተፍ ተስማምቻለሁ። ከላይ የተጻፉትን ማሳሰቢያዎች እና ስለፕሮጀክቱ የሚገልጽ የመረጃ ወረቀት አንብቤ ጥናቱ የሚያካትተውን ተረድቻለሁ።

ፊርማ _____ ቀን _____

የምስክር ቃል (ተሳታፊው ያልተማረ ከሆነ)

እኔ _____ የተባልኩኝ ግለሰብ ከላይ የተጠቀሰው የምርምር ፕሮጀክት በበቂ ሁኔታ ለ _____ ተብራርቶላቸው በምርምሩ ለመሳተፍ ተስማምተዋል። ከላይ የተጻፉ ማሳሰቢያዎች እና ስለፕሮጀክቱ የሚገልጽ የመረጃ ወረቀት የተነበበላቸው ሲሆን ጥናቱ የሚያካትታቸውንም ጉዳዮች ተረድተዋል።

ፊርማ _____ ቀን _____

<u>የቃለ መጠይቅ አቅራቢ ቃል፡-</u>

እኔ_____ የጥናቱን ምንነትፀ የሚፈልጋቸውን ነገሮችና በጥናቱ መሳተፍ ሊያከትል የሚችለውን ችግር (አግባብ ካለው) የሚችለውን ጉዳዮች(አስፈላጊ ሲሆን) ለተሳታፊው በጥንቃቄ አብራርቻለሁ።

ፊርማ _____ ቀን _____

Appendix H: Baseline Maternal Health care Utilization and Obstetric complications Questionnaire

Section 1. Eligibility Criteria (put "X" in parenthesis)

Note: if the potential participant is less than 15 years or her gestation is less than 3 months or if she has hearing or cognitive impairment to the extent of impairing adequate communication, thank the interviewee and end the interview.

	Criteria	Include	Exclude	CODE
101	Age	____ Years	If less than 15	AGE
102	Current Gestational Age	___ Months	If less than 3	GA
103	Any hearing or cognitive disability (observation)(lived for six months or more)?	[ ] No	If [ ] Yes	DIS

Section two: PARTICIPANT IDENTIFYING DETAILS

201	Name of participant	✍ _____	PNAM
202	Participant's Husband Name	✍ _____	HNAM
203	Kebele of current residence	✍ Kebele _____ ✍ Village _____	KEB GOT
204	Will you go to your parents for delivery? [0] Yes [1] No	If yes, Keb _____ vilage _____	KEBA
205	ANC Registration number (See: client pregnancy registration card) - if any	✍ _____	PCAR
206	Medical Record Number (MRN) (see: patient treatment card in hospital or health center)	✍ _____	TCAR
207	Name of health institution where you get treatment _____	✍ _____	TPLA
208	Tel. number (house hold's or neighbor)	✍ _____	TEL

Section 3: General Information

1.1. Socio-demographic Information

301	How old were you during your first marriage in completed years? ✍ /_____/ Years	AGEM
302	What is your Marital Status? [1] Single [2] Married [3] Divorced [4] widowed [5] cohabiting [6] Married but living apart	MARIT
303	What is your **religion**? [1] Orthodox Christian [2] Muslim [3] Protestant [4] Catholic [9] Other	RELIG
304	What is your **ethnicity**? [1] Guragie [2] Oromo [3] Amhara [4] other _____	ETHN
305	**Education** (What is your level of education)? [1] Illiterate [2] Literate but no formal education [3] Grade 1-4 [4] Grade 5-8 [5] Grade 9-10 [6] Grade 11-12 [7] Certificate [8] Diploma [9] BA/BSc [10] MA/MSc and above	EDUCM
306	What is your main **occupation**? [1] House wife [2] Daily Laborer [3] Farmer [4] Employee [5] Student [6] Trader/Merchant [7] unemployed [8] Pensioned [97] other [specify _____]	OCCM
307	**Husband's Occupation (**What is the main occupation of your husband?) [1] unemployed [2] Daily Laborer [3] Farmer [4] Trader/Merchant [5] Student [5] Employee [77] Other	OCCH
308	**Education** (What is your husband's level of education)? [1] Illiterate [2] Literate but no formal education [3] Grade 1-4 [4] Grade 5-8 [5] Grade 9-10 [6] Grade 11-12 [7] Certificate [8] Diploma [9] BA/BSc [10] MA/MSc and above	EDUCH

309	Total number of persons in you family /_____/	FAMS
310	How many hectares of farm land do you have? ✍_____ hectares	MASA
311	Relative wealth (Compared to others in the Kebele, how do you see your economic Standing?) [1] Poor [2] Average [3] Better off	WELZR
312	**Income** (What is the amount of your household income? **For daily labourers**: Birr /✍_____ per day **For employees:** Birr /✍_____ per month **For farmers :** Birr /✍_____per year	INCOM

Section 4: Interpersonal Relations

4.1. WAST (IPV)

No matter how well a couple gets along, there are times when they disagree. Couples get annoyed with the other person, or just have spats or fights because they're in a bad mood or tired of for some other reason. They also use many different ways of trying to settle their differences. I'm going to ask what you and your partner might feel when you have an argument.

401	How do you and your partner work out arguments? [0] no difficulty [1] some difficulty [2] great difficulty	**IPV1**
402	In general, how do you describe your relationship? [0] no tension [1] some tension [2] a lot of tension	**IPV2**
403	How is your partner treating you and the kids? [0] always well [1] well most of the time [2] neutral [3] not well most of the time [4] never well	**IPV3**
404	Do you feel safe in your current relationship? [0] always safe [1] safe most of the time [2] neutral [3] not safe most of the time [4] never safe	**IPV4**
405	Considering your current partners, friends, or any past partners or friends, are there anyone who is making you feel unsafe now? [0] always safe [1] safe most of the time [2] neutral [3] not safe most of the time [4] never safe	**IPV5**

4.2. OSLO 3-item social support scale

The following 3 questions ask about how you experience your social relationships. The inquiry is about your immediate personal experience. Please circle the option that represents your experience.

412	How many people are so close to you that you can count on them if you have serious personal problems (choose one option)? [1] None [2] 1 or 2 [3] 3-5 [4] more than 5	OSS1
413	How much concern do people show in what you are doing (choose one option)? [5] A lot concern and interest [4] Some concern and interest [3] Uncertain [2] Little concern and interest [1] No concern and interest	OSS2
414	How easy is it to get practical help from neighbors if you should need it (choose one option)? [5] Very easy [4] Easy [3] Possible [2] Difficult [1] Very difficult	OSS3

4.3. Experience of Threatening Events

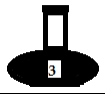
In the next questionnaire, I will read a list of potential unpleasant events you might have faced during the last 12 months. Please, respond "Yes" if you had faced the event in the past 12 months; "No" if not.

		Yes	No	code
415	In the last 6 months, have you yourself suffered a **serious illness**, injury or an assault?	[1]	[0]	LESI
416	In the last 6 months has a **serious illness**, injury or assault happened to a close **relative**?	[1]	[0]	LESCR
417	In the last 6 months has your spouse, parent or child died?	[1]	[0]	LEDF
418	In the last 6 months has a close family friend or **another relative died**?	[1]	[0]	LEDR
419	In the last 6 months have you had a separation due to marital difficulties?	[1]	[0]	LEDIV
420	In the last 6 months have you **broken off a steady friendship** or relationship?	[1]	[0]	LEBR
421	In the last 6 months have you had **a serious problem with a close friend**, neighbour or relative?)	[1]	[0]	LESP
422	In the last 6 months have you had a major **financial crisis** (serious money	[1]	[0]	LEFC
423	In the last 6 months have you lost or had anything stolen which mattered a lot to	[1]	[0]	LELo
424	In the last 6 months have you had any problems with the police or courts?	[1]	[0]	LECo
425	In the last 6 months has your husband been not been able to work?	[1]	[0]	LESU
426	In the past 6 months, have you had a physical **fight with your spouse**?	[1]	[0]	LEFS

Section 5 Substance Abuse

5.1. FAST

1 bottle whisky/vodka



1 Birlie Teje

1 Melekia Arekie

1 Glass Woin

1 Bottle Beer

1 Jambo Draft

1 bottle woin

1 can Tella

501	How often do you have six or more drinks on one occasion? [0] Never ☞ **Sec. 3.3** [1] once or less per month ☞ **Sec. 3.3** [2] Monthly [3] weekly [4] Daily	FAST1
502	How often during the last year have you been unable to remember what happened the night before because you have been drinking? [0] Never [1] once or less per month [2] Monthly [3] weekly [4] Daily	FAST2
503	How often during the last year have you failed to do what was normally expected of you because of drinking? [0] Never [1] once or less per month [2] Monthly [3] weekly [4] Daily	**FAST3**
504	In the last year has a relative or friend or a doctor or other health worker been concerned about your drinking or suggested you cut down? 0] Never [1] once or less per month [2] Monthly [3] weekly [4] Daily	FAST4

Section 6: Experience of Past Maternal Health Care use and past obstetric complications

6.1. Past Maternal health care utilization

601	Have you ever had another pregnancy? [1] 1st ☛ Q407 [1] **2nd** [1] **3rd** [1] **4th** [1] **5th** [1] **6th** [1] **7th** [1] **8th** [1] **9th and more**	GRAV
602	Did you see anyone for antenatal care during your last pregnancy? [1] YES [0] NO ☛**Q 405**	ANCDP
603	How many (ANC) visits did you attend during your last pregnancy? Number of ANC visits ✍ _____	ANCQP
604	Where did you attend most of your antenatal care attendances? [1] Home [2] Health post [3] Health center [4] Hospital [5] TBA's Home	ANCPP
605	Where did you deliver your last birth, which was before this pregnancy? [1] Home [2] Health post [3] Health center [4] Clinic [5] Hospital [66] other _____	**DCHIP**
606	After you delivered for the last baby, did someone check on your health? [1] YES [0] NO ☛ **Sec. 5**	**PNCDP**
607	How many (PNC) visits did you attend in health facilities after delivery of the last baby? Number of ANC visits ✍ _____	**PNCQ**

Section 7. Obstetric and Medical History

7.1. Obstetric History

701		How many children do you have now /___/	PARIT
702	What was the outcome of your earlier pregnancies in your life? **(ASK FOR EACH ITEM AND PUT NUMBERS ON THE SPACE PROVIDED. RECORD "00" FOR "NONE")**	a. How many miscarriages have you had / ___/	ABOR
		b. How many fetuses borne Dead / ___/	STILL
		c. How many died on birthday / ___/	MORTP
		d. How many died within 28 days after live birth / ___/	MORTN
		e. How many died after 42 days of birth /___/	MORTI
703	How old is the last child now?		SPAC

7.2. *Past obstetric complications*

The following are list of symptoms of obstetric complications that could occur during pregnancy, delivery or after delivery. Thus, you are required to respond whether you had experience of these symptoms during past pregnancy, delivery or in the first 6 weeks after delivery.

712	During the last pregnancy, did you experience any serious health problems related to pregnancy? [1] YES [0] NO **FQ714**			
713	What problems did you experience during your last pregnancy?			
a	Severe vaginal Bleeding	[1] Yes	[0] No	BLEDP
b	Swollen Hands/ Face	[1] Yes	[0] No	EDMAP
c	Blurred Vision	[1] Yes	[0] No	BLURP
d	Convulsions	[1] Yes	[0] No	CONVP
e	Loss of Consciousness	[1] Yes	[0] No	UNCOP

714	During labor and birth of last birth, did you experience any serious health problems related to birth? [1] YES [0] NO **FQ716**			**OCD**
715	What problems did you experience? PUT [X] IN PARENTHESIS FOR PROMPT RESPONSES. THEN, ASK WHETHER SHE EXPERIENCED THE REMAINING COMPLICATIONS.			
a	Massive Bleeding	[1] Yes	[0] No	BLEDD
b	Convulsions	[1] Yes	[0] No	CONVD
c	Loss of Consciousness	[1] Yes	[0] No	UNCOD
d	Labor lasting >12 hours	[1] Yes	[0] No	PROLD
e	Placenta not delivered 30 minutes after baby	[1] Yes	[0] No	PLACD
f	Tear/episiotomy	[1] Yes	[0] No	TEARD

Postpartum complications

716	During the 2 days after the birth of your last child, did you experience any serious health problems related to the birth? [1] YES [0] NO **FQ718**			**OC7N**
717	What problems did you experience? (CIRCLE ALL RESPONSES GIVEN.) THEN PROBE: Did you experience [ANY REMAINING COMPLICATIONS]?			
a	Severe vaginal bleeding	[1] Yes	[0] No	BLEDA
b	Blurred Vision	[1] Yes	[0] No	BLURA
c	Convulsions	[1] Yes	[0] No	CONVA
d	Swollen Hands/Face	[1] Yes	[0] No	SWOLA
e	High fever	[1] Yes	[0] No	FEVA
f	Malodorous Vaginal Discharge	[1] Yes	[0] No	DISCHA
g	Loss Of Consciousness	[1] Yes	[0] No	UNCOA

7.3. Medical History

731	Have you ever admitted due to blood pressure in past pregnancy? [1] Yes [0] No	**HYPER**
732	1. Have you ever expereinced fistula in past pregnancies? [1] Yes [0] No	**FISTL**
	2. Are you currently suffering from diabetes? [1] Yes [0] No	**DIAB**
	3. Are currently suffering from any renal disease? [1] Yes [0] No	**RENL**
	4. Are you currently suffering from any cardiac disease? [1] Yes [0] No	**CARD**
	5. Any othe disease (ex TB, arthiritis, HIV, Asthma, etc.) ✍_____	**OTHR**

7.4. Current Pregnancy

741	What is the current stage of gestation? ✍ /____/	GA
742	When was the last date of menstruation? ✍ Date/_____/Month_____yyyy_____	LMP
743	When is your expected date of delivery? ✍ Date/_____/Month_____yyyy_____	EDD
744	Was your current pregnany wanted? [[1] Yes [0] N	WANT
745	is your current pregnancy on scheduled time? [1] Yes [0] No	TIME

7.5. Complications during pregnancy

751	During this pregnancy, did you experience any serious health problems related to the pregnancy? [1] YES [0] NO ☞ **Sec. 3.2**			**OCP**
A	What problems did you experience?			
B	Bleeding	[1] YES	[0] NO	BLEED1
C	Swollen Hands/Face	[1] YES	[0] NO	EDEMA1
D	Blurred Vision	[1] YES	[0] NO	VISION1
E	Convulsions	[1] YES	[0] NO	CONV1
F	High Fever	[1] YES	[0] NO	FEVER1
G	Loss of Consciousness	[1] YES	[0] NO	UNCON1
H	Severe Abdominal Pain	[1] YES	[0] NO	PAIN
I	Water Breaks 12 hours before birth	[1] YES	[0] NO	PROM
J	Discharge with unusual odor	[1] YES	[0] NO	DISCH1
K	Pain during urination	[1] YES	[0] NO	ITCH1
L	Severe Headache	[1] YES	[0] NO	HEAD1
M	Severe weakness	[1] YES	[0] NO	WEAK1
N	Other (Specify) _____	[1] YES	[0] NO	

7.6. Help-seeking for complications during pregnancy

761	Did you ever seek any help (traditional or modern) for these problems? [0] No [1] Yes		HSP1
762	Which of the following health care providers did you visit for your current pregnancy complications? Please tell me the number of visits if any, for each of health care providers. Record "00" for none.	**Visited during Pregnancy?** **How many times? Record "0" for "NONE".**	Code
1	Traditional birth Attendant/Relative/Friend	✍___ Visits	GHCTRAD
2	Health Officer/Nurse/Midwife/ Pharmacist	✍___ Visits	GHCHO
3	General medical doctor or Specialist (non-psych) medical doctor	✍___ Visits	GHCMD
4	Traditional Healer /Tankway	✍___ Visits	GHCTANQ
5	Religious persons or holy water	✍___ Visits	GHCREL
6	Mental health professional, eg Psychiatrist, psychiatric nurse, counselor, social worker	✍___ Visits	GHCMHP
7	Health post / health extension worker	✍___ Visits	GHCHEW
8	Other (specify) _____	✍___ Visits	GHCOTH
	Total number of visits	✍___ Visits	GHCTOT
763	What treatment were you given? (describe)		BEN1
764	Did you take the treatment as advised? [0] No [1] Yes		ADHE
765	How much did [831] help you? [0] Did not help at all [1] Helped a bit [2] Helped a lot		HSBEN

Section 8. perceptions

8.1. Perceived access to care at the nearest health facility (accessibility)

801	Distance to health facility is: [1] long [2] Moderate [3] Short	DIST
802	Travel time to health facility is: 1] long [2] Moderate [3] Short)	TRAVEL
803	Transport to health facility is: [1] Difficult [2] Moderately difficult [3] Not at all difficult	TRAN
804	Opening hours at health facility is: [1] Not suitable [2] Moderately suitable [3] Suitable)	HOUR
805	Doctors'/midwives' availability in the work place: [1] Not available [2] Moderately available [3] Available)	DOCT
806	How would you express the level of fear about forthcoming labor? 0 1 2 3 4 5 6 7 8 9 10	FEAR
807	What is you nearest healthcare facility? [1] Health post [2] health centre [3] hospital	HFNB

Section 9: Mental Distress

9.1. PHQ

I will ask you how often you experienced the following problems over the last 2 weeks. Your response could be often (2-6 days); several days (7-11 days); every day (12-14 days) depending on statements I read.

		Not at all	Several days	Nearly half the days	Every day
901	Little interest or pleasure in doing things	[1]	[2]	[3]	[4]
902	Feeling down, depressed, or hopeless	[1]	[2]	[3]	[4]
903	Trouble falling or staying asleep, or sleeping too much	[1]	[2]	[3]	[4]
904	Feeling tired or having little energy	[1]	[2]	[3]	[4]
905	Poor appetite or overeating	[1]	[2]	[3]	[4]
906	Feeling bad about yourself - or that you are a failure or have let yourself or your family down	[1]	[2]	[3]	[4]
907	Trouble concentrating on things, such as reading the newspaper or watching television	[1]	[2]	[3]	[4]
908	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	[1]	[2]	[3]	[4]
909	Thoughts that you would be better off dead or of hurting yourself in some way	[1]	[2]	[3]	[4]
910	ADD PHQ SCORE FORM 701-709. Total Score _____ = ___ + ___ + ___)				

9.2. Help seeking behavior for depression

926	[IF TOTAL PHQ9 SCORE ≥5, ASK THE FOLLOWING] As we discussed above, you feel some problems related to loss of interest in duties. How long it is since you recognized the problem for the first time? ✍ ___ weeks ago OR ✍____Months OR ✍____Years ago	**PREXST**
927	Did you seek assistance for this problem? [1] YES [0] NO [9] DON'T KNOW	**CARE1**
928	How long after you first noticed these problems, did you <u>first</u> seek help for these problems? ✍ ___ Days ago ✍____weeks ago ✍____Months ago	**CARE2**
929	Who did you <u>first</u> seek help from when you sought help for the first time? [1] Traditional healer/awaki/tenquai/birth attendant [2] Holy water Church/mosque/Religious or spiritual advisor [3] Health post (health extension worker) [4] Health Centre/Hospital/Pharmacist [5] Specialist hospital	**CARE3**
930	Did you adhere for the treatment prescribed? [0] Yes [1] No	**ADH**
931	Which of the above healthcare providers helped you best? _____	**BEN**

9.3. WHODAS-12

The following items are about your health status in the last 30 days. I will read the statement about your health for you to answer by saying "none", "mild moderate", "severe" or "extreme".
In the past 30 days how much difficulty did you have in...

	None=0; Mild=1; Moderate=2; Severe=3; Extreme=4						
941	Standing for long periods such as 30 minutes?	0	1	2	3	4	F01
942	Taking care of your household responsibilities?	0	1	2	3	4	F02
943	Learning a new task, for example learning how to get to a new	0	1	2	3	4	F03
944	How much of a problem did you have joining in community activities (for example festivities, religious or other activities) in the same way as anyone can?	0	1	2	3	4	F04
945	How much have you been emotionally affected by your health problem?	0	1	2	3	4	F05
946	Concentrating on doing something for ten minutes?	0	1	2	3	4	F06
947	Walking a long distance such as a kilometer or equivalent?	0	1	2	3	4	F07
948	Washing your whole body	0	1	2	3	4	F08
849	Getting dressed	0	1	2	3	4	F09
950	Dealing with people you do not know	0	1	2	3	4	F10
951	Maintaining friendship?	0	1	2	3	4	F11
952	Your day to day work?	0	1	2	3	4	F12

Sum the above scores =____ Time Interview Ended: Hour: _____ Minute: _____

Section 10: Health Utilization Behavior

10.1: ANC Utilization

1001	Did you see anyone for antenatal checkup during the current pregnancy? [0] No ☞ Q806 [1] Yes		ANCDT
1002	Where did you attend your **first** Antenatal Checkup (ANC) visit? [1] Home [2] Health Post [3] Health center [4] Private Clinic [5] Hospital [66] Other ____		ANCPL
1003	How many antenatal visits did you attend during this pregnancy? NO. OF TIMES = ✍ ____ [98] DON'T KNOW		ANCQT
a	What was your gestational age during the first ANC visit?	✍_____ months	GA1
b	What was your gestational age during the second ANC visit?	✍_____ months	GA2
c	What was your gestational age during the third ANC visit?	✍_____ months	GA3
d	What was your gestational age during the fourth ANC visit?	✍_____ months	GA4

10.2. Patient Healthcare Experiences in Outpatient setting (O-PAHC)

The following statements are about some things people say about medical care. Please listen to the statements as I will be reading for you, keeping in mind the medical care you were receiving recently. If you have not received care recently, think about what you would expect if you needed care today. We are interested in your feelings, good and bad, about the medial car you have received.

Your response can be **Strongly Agree (SA); Agree (A); Uncertain (UC); Disagree (DA); Strongly Disagree (SDA).** Note: CIRCLE THE RESPONSES.

	Items	Strongly Disagree	Disagree	Agree	Strongly Agree	CODE
1016	During this visit, nurses treat me with courtesy and respect	[1]	[2]	[3]	[4]	PHN1
1017	During this visit, nurses listen to me carefully	[1]	[2]	[3]	[4]	PHN2
1018	During this visit, nurses explain things in a way I could understand	[1]	[2]	[3]	[4]	PHN3
1019	During this visit, doctors/HO treat with courtesy and respect	[1]	[2]	[3]	[4]	PHD1
1020	During this visit, doctors listened to me carefully	[1]	[2]	[3]	[4]	PHD2
1021	During this visit, doctors explained things in a way I could understand	[1]	[2]	[3]	[4]	PHD3
1022	Outpatient department was clean	[1]	[2]	[3]	[4]	PHE1
1023	Bathrooms/latrines were clean (leave blank if not applicable)	[1]	[2]	[3]	[4]	PHE2
1024	I had enough time to discuss my medical problem with the doctor/health officer or nurse	[1]	[2]	[3]	[4]	PHC1
1025	Given information in an understandable way regarding symptoms or health problems	[1]	[2]	[3]	[4]	PHC2
1026	Given information in an understandable way regarding symptoms or health problems	[1] No		[2] Yes		PHC3
1027	Did the health staff explain what medication was for?	[1] No		[2] Yes		PHC4
1028	Did the health staff explain possible medication side effects in a way you could understand?	[1] No		[2] Yes		PHC5

8.3. Birth preparedness

For your current delivery, did you do any of the following?				
For your current delivery, had you accomplished any of the following practices?				
1029	Identified institution with 24 hour emergency services	[1] YES	[0] NO	**BPPREP**
1030	Saved money for delivery	[1] YES	[0] NO	**BPMON**
1031	Identified means of transportation	[1] YES	[0] NO	**BPTRASP**
1032	Prepare delivery kits/materials like towels	[1] YES	[0] NO	**BPKITS**

INTERVIEWER VISITS			
	1	2	3
DATE			
INTERVIEWER'S NAME			
VISIT RESULT*			
1 = Completed 2 = Household Absent later 3 = Time and Date Set for later 4 = House Not Found 5 = Respondent lacks capacity due sickness 6 = Incomplete Interview 7 = Refused 8 = Other: (Specify): _____			
NEXT VISIT: DATE			
TIME			

	NAME	DATE	SIGNATURE
Field-edited by:			
Keyed by:			

To be filled by supervisors		
Participant ID NO.		**QNO**
Name of Health Post		**CNAME**
Interviewer Name		**INTNAME**
Interviewer ID		**INTID**
Date of Interview	DD/MM/YYYY	**CID**
Time Interview Started		**DATE**
Time Interview ended	____Hr : _____min Morning/afternoon	**TIME**
Field Supervisor		**SUPID**

Data collector's opinion

_____

_____

_____

APPENDIX I: Baseline Questionnaire (Amharic Version)

የመጠይቅ ቁጥር (QID)፡ /___/____/____/___/ **የነፍሰ-ጡር እናቶች የጤና አገልግሎት አጠቃቀምና …..**

<u>መጠይቅ አንድ፡</u> የነፍሰ-ጡር እናቶች የጤና አገልግሎት አጠቃቀምና ከወሊድ ጋር የተያያዙ ችግሮች

<u>ክፍል 1፡ የተሳታፊ መምረጫ ጥያቄዎች</u>

ማስታወሻ፡- ከዚህ በታች ያሉት ሦስቱ ጥያቄዎች በጥናቱ ተሳታፊ የሚሆኑትን ነፍሰ-ጡር እናቶችን ለመለየት የሚያስችሉ ናቸው። ተጠያቂዋ ‹‹**መጠይቁ አይቀጥልም**›› ከሚለው መደዳ ሥር ያሉትን በጥናቱ ለመሳተፍ የማያበቁ ቅድመ-ሁኔታዎችን ካሟላች እዚህ ላይ [X] ምልክት አድርግ/ጊና አመስግነሽ/ህ ተሰናበት/ች።

	ጥያቄ	መልስ	መጠይቁ አይቀጥልም	Code
101	ዕድሜዎ ስንት ነው?	/✍_____ዓመት/	[ ] ከ15 በታች ☛**አመስግነህ/ሽ ተሰናበት/ች**	AGE
102	አሁን የስንት ወር ነፍሰ-ጡር ነዎት?	✍_____	[ ] ከ3 ወር በታች ☛**አመስግነህ/ሽ ተሰናበት/ች**	GA
103	☹ ለመግባባት በሚያስቸግር ደረጃ የመስማት ወይም የመናገር ችግር አለባቸው?	[0] አዎ ☛ [1] የለባቸውም	[ ] አዎ ☛**አመስግነህ/ሽ ተሰናበት/ች**	DIS

☹ = ***ይህ ምልክት ከጥያቄው ጎን ካለ ጥያቄው በቃል ሳይጠየቅ አጠቃላይ የተጠያቂዎችን ሁኔታ በመገንዘብ የሚሞላ ነው።።***

ክፍል 2፡ የተሳታፊ ግላዊ መረጃ

201	የተጠያቂ ስም	✍ _____	PNAM
202	የተጠያቂ ባለቤት (የአባወራ) ስም	✍ _____	HNAM
203	አሁን የሚኖሩበት ቀበሌ ስም	✍ ቀበሌ _____ ✍ ጎጥ _____	KEB GOT
204	ለመውለድ ወደ ወላጅ ቤተሰብ ይሄዳሉ ወይ? [0] አዎ [1] አልሄድም	አዎ ☞ ወላጅ ቤተሰብ የሚኖሩበት፡ ቀበሌ ✍ _____ ጎጥ ✍ _____	
205	የእርግዝና መከታተያ ካርድ ቁጥር (ካለ)	✍ _____	PCAR
206	የህክምና ካርድ ቁጥር (ካለ)	✍ _____	TCAR
207	የታከሙበት የጤና ተቋም ስም *(በአሁኑ እርግዝና ወቅት ታክመው ከሆነ ብቻ)*	✍ _____	TPLA
208	**የእርስዎ** የስልክ ቁጥር /ከሌለዎ **ሌላ ስልክ** ቁጥር **ማስታወሻ፡-** *ስልኩ የተጠያቂ ከሆነ ‹**የእርስዎ**› የሚለውን ካልሆነ ግን ‹**ሌላ ስልክ**› የሚለውን አስምር/ሪ።*	✍ _____	TEL

ክፍል 3: አጠቃላይ መረጃ

301	መጀመሪያ **ጋብቻ ሲመሰርቱ** ዕድሜዎ ስንት ዓመት ነበር?	/✍ _____/ ዓመት	AGEM
302	**የጋብቻ ሁኔታ** [1] ያላገባች [2] በትዳር ላይ [3] በፍቺ የተለየያች [4] በሞት የተለያየች [5] ያለ ህጋዊ ጋብቻ አብራ የምትኖር [6] ያገባች ግን በሥራ ምክንያት አብራ የማትኖር		MARIT
303	**ሐይማኖትዎ?** [1] ኦርቶዶክስ ክርስቲያን [2] እስልምና [3] ፕሮቴስታንት [4] ካቶሊክ [9] ሌላ ✍		RELIG
304	**ብሔር** (ብሔርዎ ምንድን ነው?) [1] ጉራጌ [2] ኦሮሞ [3] አማራ [4] ሌላ ✍ _____		ETHN
305	**የትምህርት ሁኔታ** (የትምህርት ደረጃዎ ምንድን ነው)? [1] ምንም አልተማርኩም		EDUCM

	[2] ማንበብና መፃፍ እችላለሁ ግን መደበኛ ትምህርት የለኝም(ለምሳሌ፣ መሰረተ ትምህርት የተማሩ) [3] 1ኛ-4ኛ ክፍል [4] 5ኛ-8ኛ ክፍል [5] 9ኛ-10ኛ ክፍል [6] 11ኛ-12ኛ ክፍል [7] ሰርተፍኬት [8] ዲፕሎማ [9] የመጀመሪያ ዲግሪ [10] ማስትርስ እና ከዚያ በላይ	
306	**ስራዎ** (በዋናነት ገቢ የሚያገኙበት ወይም ጊዜዎን የሚያሳልፉበት ስራ) ምንድንነው? [1] የቤት እመቤት [2] ወዝ አደር/ የጉልበት ሥራ [3] አርሶ አደር/ግብርና [4] የግል ወይም የመንግስት ተቀጣሪ [5] ተማሪ [6] ነጋዴ [7] ስራ አጥ [8] ጡረተኛ [97] ሌላ [ይገለፅ] /✍ _____/	OCCM
307	**የባለቤትዎ ሥራ** ምንድነው? [1] ስራ አጥ [2] ወዝ አደር/ የጉልበት ሥራ [3] አርሶ አደር [4] ነጋዴ [5] ተማሪ [6] የመንግስት/የግል ሰራተኛ [7] ጡረተኛ [97] ሌላ [ይገለፅ] /✍ _____/	OCCH
308	**የባለቤትዎ የትምህርት ደረጃ** (የባለቤትዎ የትምህርት ደረጃ ምንድን ነው?) [1] ምንም አልተማሩም [2] ያለመደበኛ ትምህርት ማንበብና መፃፍ ይችላሉ [3] 1ኛ-4ኛ ክፍል [4] 5ኛ-8ኛ ክፍል [5] 9ኛ-10ኛ ክፍል [6] 11ኛ-12ኛ ክፍል [7] ሰርተፍኬት [8] ዲፕሎማ [9] የመጀመሪያ ዲግሪ [10] ማስተርስ እና ከዚያ በላይ	EDUCH
309	ጠቅላላ የቤተሰብ ብዛት ስንት ነው? /✍ _____/	FAMS
310	ስንት ጥማድ የእርሻ ወይም የሰብል መሬት አለዎት? ✍ /_____ /	MASA
311	በአካባቢዉ ካሉ ሌሎች ቤተሰቦች ጋር ሲነፃጸር በሃብት ደረጃ የራስዎን ቤተሰብ የት ያስቀምጡታል? [1] ዝቅተኛ [2] መካከለኛ [3] ጥሩ ኑሮ ያለው	WELZR
312	**የገቢ ሁኔታ** (የቤተሰብዎ የቀን/የወር/የዓመት ገቢ ምን ያህል ነው?) **<u>ማስታዎሻ</u>፡ *ለነጋዴ/ለቀን ሰራተኛ የቀን ገቢ፤ ለተቀጣሪ የወር ገቢ እን ለገበሬ የዓመት ገቢ ይጠየቅ።።***	INCOM
	ለነጋዴ/ለወዝ አደር፡ የቀን ገቢ ✍_____ ብር	
	ለተቀጣሪ፡ የወር ገቢ ✍_____ ብር	
	ለአርሶ አደር፡ የዓመት ገቢ ✍_____ ብር	

ክፍል 4፡ ስለማህበራዊ ግንኙነት

4.1. WAST (IPV)

በትዳር ምንም ያህል መዋደድ/መፋቀር ቢኖርም አልፎ አልፎ ግን አለመስማማት አይጠፋም። ስለሆነም እርስዎ ከባለቤትዎ ጋር ባልተስማሙ ጊዜ የሚሰማዎትን **ስሜት** ከዚህ በታች እጠይቅዎታለሁ።

401	ከባለቤትዎ ጋር ባልተስማሙ ጊዜ ችግሩን ለመፍታት ምን ያህል ያስቸግርዎታል? [0] ምንም ችግር የለም [1] የተወሰነ ችግር አለ [2] በጣም ችግር አለ	**IPV1**
402	በአጠቃላይ ከባለቤትዎ ጋር ያለዎት ቤተሰባዊ/ማህበራዊ/ ግንኙነት መሻከር እርስዎን ምን ያህል ያስጨንቅዎታል? [0] ምንም አያስጨንቅም [1] የተወሰነ ያስጨንቃል [2] በጣም ያስጨንቃል	**IPV2**
403	ባለቤትዎ ለእርስዎና ለልጆችዎ የሚያደርጉትን እንክብካቤ እንዴት ይገልጹታል? [0] ሁልጊዜ ጥሩ ነው [1] ብዙ ጊዜ ጥሩ ነው [2] ጥሩ ወይም መጥፎ የሚባል አይደለም [3] ብዙ ጊዜ ጥሩ አይደለም [4] በፍጹም ጥሩ አይደለም	**IPV3**
404	አሁን ከባለቤትዎ ጋር ባለዎት ቤተሰባዊ/ማህበራዊ/ ግንኙነት ምን ያህል ሥጋት ይሰማዎታል? [0] ሁልጊዜ ከሥጋት ነፃ ነኝ [1] ብዙ ጊዜ ከሥጋት ነፃ ነኝ [2] አስጊ ነው ወይም አይደለም ለማለት ያስቸግራል [3] ብዙ ጊዜ የሰጋኛል [4] ሁልጊዜ ያሰጋኛል	**IPV4**
405	ከባለቤትዎ ወይም ሌሎች የቤተሰብ አባላት ጋር ያለዎት ማህበራዊ ግንኙነት ምን ያህል ያሰጋዎታል? [0] ሁልጊዜ ከሥጋት ነፃ ነኝ [1] ብዙ ጊዜ ከሥጋት ነፃ ነኝ [2] አስጊ ነው ወይም አይደለም ለማለት ያስቸግራል [3] ብዙ ጊዜ የሰጋኛል [4] ሁልጊዜ ያሰጋኛል	**IPV5**

4.2. OSLO 3-item social support scale

የሚከተሉት 3 ጥያቄዎች ደግሞ ከቤተሰብዎም ሆነ ከጎሮቤትዎ ጋር ያለዎትን ማህበራዊ ግንኙነት በተመለከተ ይሆናል። እባክዎ ለጥያቄዎቹ ከተሰጡት ምርጫዎች የእርስዎን ማህበራዊ ሁኔታ የሚመለከተውን ይምረጡ።

412	በህይወትዎ ዉስጥ **የቅርብ** የሆኑ፤ ችግርዎትንና ደስታዎትን የሚካፈሉ ስንት ሰዎች አሉ; [1] ማንም [2] 1 ወይም 2 [3] ከ 3-5 [4] ከ5 በላይ	OSS1
413	ሌሎች ሰዎች እርስዎ በሚያደርጓቸው ነገሮች ላይ ምን ያህል **የሚጨነቁልዎትና የሚያስቡልዎት** ይመስልዎታል; [5] በጣም ይጨነቁልኛል/ያስቡልኛል [4] በመጠኑ ይጨነቁልኛል/ያስቡልኛል [3] እርግጠኛ መሆን አልችልም [2] ብዙም አያስቡልኝም [1] ጨርሶ አያስቡልኝም	OSS2
414	ከጎረቤትዎ **እርዳታ** ባስፈለገዎ ጊዜ እገዛ ማግኘት ምን ያህል ቀላል ነው; [5] በጣም ቀላል [4] ቀላል [3] ቀላል ባይሆንም ርዳታ ማግኘት እችላለሁ [2] ከባድ ነው [1] በጣም ከባድ ነው	OSS3

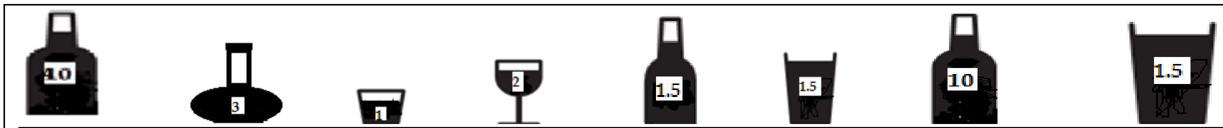
4.3. በሰው ላይ ሊደርሱ የሚችሉ መጥፎ የህይወት አጋጣሚዎች (ላሽቋቋ ቂሶ ማሻቂስሮቋስቃሽቃሺ_ቦቅስቂሽስቃሰስቋ)

ከዚህ በታች በሁሉም ሰው ላይ ሊደርሱ የሚችሉ መጥፎ አጋጣሚዎች ተጠቅሰዋል። ስለዚህ ቀጥሎ የተጠቀሱት ገጠመኞች ባለፉት 6 ወራት ውስጥ አጋጥሞዎት ከሆነ **ችአዎአ** ካላጋጠሞዎት ደግሞ **ችየለምአ** በማለት ይመልሱ።

		አዎ	የለም	ሰቂሳስ
415	ባለፉት 6 ወራት ውስጥ እርስ- ላ□ ከበድ ያለ ህመም፣ □አካል ጉዳት ወይም ድብደባ አጋጥሞዎት ነበር?	ረ1ሪ	ረ0ሪ	ሏመህ
416	ባለፉት 6 ወራት ውስጥ በቅርብ □ሞት- ላ□ ከበድ ያለ ህመም፣ ትብ□ባ ወይም የአካል ጉዳት ደርሶ ነበር?)	ረ1ሪ	ረ0ሪ	ሏመሑሑሐ
417	ባለፉት 6 ወራት □ስ□ በቤተሰብ መካከል፤ ማለትም ባለቤትዎ፣ ከወላጆችዎ አንዱ ወይም ከላጆችዎ አንዱ (አንዱ) □ሞቱ ሰ□	ረ1ሪ	ረ0ሪ	ሏ
418	ባለፉት 6 ወራት ውስጥ □ሞተብ- ቅርብ □□ኛ የሆነ ሰው ወይም	ረ1ሪ	ረ0ሪ	ሏሐ
419	ባለፉት 6 ወራት □ስ□ በትዳር ውስጥ በተፈጠረ አለመስማማት ምክንያት ከባለቤትዎ ተለ□□ተ□ □□ቃሉ?	ረ1ሪ	ረ0ሪ	ሏህሞ
420	ባለፉት 6 ወራት □ስ□ የቅርብ ወዳጅነት ወይንም ጓደኝነት	ረ1ሪ	ረ0ሪ	ሏሑሐ

421	**ባለፉት 6 ወራት ውስጥ በእርስ- ፤ በቅርብ □□ኞች- ፣ □ረቤቶች- ወይንም ዘመዶችዎ መካከል ጠንካር የለ ችግር (ወይም ጠብ)**	**ሬ1ሪ**	**ሬ0ሪ**	**ኗመሓ**
422	**ባለፉት 6 ወራት ውስጥ ከአቅምዎ በላይ የሆነ ከባድ የገንዘብ ችግር**	**ሬ1ሪ**	**ሬ0ሪ**	**ኗ-**
423	**ለፉት 6 ወራት ውስጥ ትልቅ ግምት የሚሰጡት ዕቃ** ወይም **ንብረት ቷአቶብዎት** ወይም **ተሰርቆብዎት ያውቃል?**	**ሬ1ሪ**	**ሬ0ሪ**	**ኗላቂ**
424	**ባለፉት 6 ወራት ውስጥ □ን□ል-ነ□ ች□ር □□ም ፍርድ ቤት የማ የስኪዮ ችግር ነበረብዎት?**	**ሬ1ሪ**	**ሬ0ሪ**	**ኗ-ቂ**
425	**ባለፉት 6 ወራት ውስጥ** ባለቤትዎ **ስራ □ተ□ (ስራ አ□ ሆነ□)** ወይም **ስራ መስራት አቅተቸ□ □ነበረበት ሁኔታ ነበር?**	**ሬ1ሪ**	**ሬ0ሪ**	**ኗመም**
426	**ባለፉት 6 ወራት ውስጥ** ከባለቤትዎ **ጋር ተደበድበው** የውቃሉ?	**ሬ1ሪ**	**ሬ0ሪ**	**ኗመ**

ክፍል 5: ስለአልኮል መጠጦች (FAST)



1 ጠርሙስ 1 ጣሳ ውስኪ/ቮድካ/ጂን ጠላ	**1 ብርሌ ጠጅ**	**1 መለኪያ አረቄ**	**1 ብርጭቆ ወይን**	**1 ጠርሙስ ቢራ**	**1 ጆምቦ ድራፍት/**	**1 ጠርሙስ ወይን**

501	አንዴ መጠጣት ከጀመሩ እስከ 6 መለኪያ ወይም ከዚያ በላይ በየስንት ጊዜው ይጠጣሉ? [0] ጠጥቸ አላውቅም ☛ **ክፍል 6** [1] በወር 1 ጊዜና ከዚይ በታች ☛ **ክፍል 6** [2] በየወሩ [3] በየሳምንቱ [4] በየቀኑ	FAST1
502	ባለፈው ዓመት ውስጥ በመጠጥ ምክንያት የተከሰተውን ነገር ለማስታወስ **በየስንት ጊዜው** ተቸግረዋል? [0] አይ፤ ለማስታወስ አልተቸገርሁም [1] በወር 1 ጊዜና ከዚይ በታች [2] በየወሩ [3] በየሳምንቱ [4] በየቀኑ	FAST2
503	ባለፈው ዓመት ውስጥ በመጠጣትዎ ምክንያት በየስንት ጊዜው መስራት ያለብዎትን ሳይሰሩ ቀርተዋል? [0] በመጠጥ ምክንያት ያመለጠኝ ሥራ የለም [1] በወር 1 ጊዜና ከዚይ በታች [2] በየወሩ [3] በየሳምንቱ [4] በየቀኑ	FAST3
504	ዘመድ/ወዳጅ/ የጤና ባለሙያ መጠጥ እንዲያቆሙ መክሮዎት ያውቃል? [0] አይ፤ በፍጹም [1] በወር 1 ጊዜና ከዚይ በታች [2] በየወሩ [3] በየሳምንቱ [4] በየቀኑ	FAST4

ክፍል 6: Experience of Past Maternal Health Care Utilization and past obstetric complications

6.1. **የእናቶች የጤና አገልግሎት አጠቃቀም ልምድ**

601	የአሁኑ እርግዝና በህይወትዎ **ለስንተኛ** ጊዜዎ ነው? [1] የመጀመሪያ ጊዜ ☞ **ንዑስ ክፍል 7.3** [2] የ2ኛ ጊዜ [3] የ3ኛ ጊዜ [4] የ4ኛ ጊዜ [5] የ5ኛ ጊዜ [6] የ6ኛ ጊዜ [7] የ7ኛ ጊዜ [8] የ8ኛ ጊዜ [9] የ9ኛ ጊዜና ከዚያ በላይ	GRAV
602	የመጨረሻ ልጅዎን ነፍሰ-ጡር ሆነው በጤና ተቋም ውስጥ **የቅድመ-ወሊድ ምርመራ** አድርገው ያውቃሉ? [1] አዎን [0] የለም ☞ **ጥያቄ ቁ. 605**	ANCDP
603	የመጨረሻ ልጅዎን ነፍሰ-ጡር ሆነው ስንት ጊዜ የቅድመ-ወሊድ ምርመራ ክትትል **አድርገዋል**? /✍____ **ጊዜ**/	ANCQP
604	የመጨረሻ ልጅዎን ነፍሰ-ጡር ሆነው አብዛኛውን የቅድመ-ወሊድ ክትትል ምርመራ ያደረጉት **የት** ነበር? [1] የልምድ አዋላጅ ቤት [2] ጤና ኬላ [3] ጤና ጣቢያ [4] የግል ክሊኒክ [5] ሆስፒታል [66] ሌላ (የገለፅ) /✍----------/	ANCPP
605	የመጨረሻ ልጅዎትን **የት ነበር የወለዱት?** [1] ቤት [2] ጤና ኬላ [3] ጤና ጣቢያ [4] የግል ክሊኒክ [5] ሆስፒታል [66] ሌላ (የገለፅ) /✍----------/	**DCHIP**
606	የመጨረሻ ልጅዎትን ከወለዱ በኋላ በጤና ተቋም ለራስዎና ለልጅዎ የጤና ክትትል አድርገዋል? [1] አዎን [0] የለም ☞ ክፍል 7	**PNCDP**
607	የመጨረሻ ልጅዎን ከወለዱ በኋላ ስንት ጊዜ የድኅረ-ወሊድ የጤና ክትትል አድርገዋል? /✍_____ ጊዜ/	**PNCQ**

ክፍል 7፡ የስነ-ተዋልዶና የሕክምና ታሪክ (Obstetric and Medical History)

7.1. የቀድሞ የስነ-ተዋልዶ ሁኔታ (Obstetric History)

701	አሁን በህይወት ያሉ ልጆችዎ ስንት ናቸው? /✍ _____/		PARIT
702	***<u>ማስታወሻ</u>፡ ውርጃ ወይም የህፃን ሞት ለአጋጥማቸው እናቶች ‹ስንት ጊዜ› ከሚለው መደዳ ብዛቱን ይፃፉ። አለበለዚያ ‹00› ይፃፉ***		
a.	**ከ5 ወር በታች** የሆነ ጽንስ ስንት ጊዜ አስወርዶዎት ያውቃል?	**ስንት ጊዜ?** /✍____/	MISCR
b.	**5 ወር እና ከዚያ** በላይ የሆነ **ጽንስ** ስንት ጊዜ አስወርዶዎት ያውቃል?	**ስንት ጊዜ?** / ✍____/	STILL
c.	**በወሊድ ዕለት** የህፃን ሞት ስንት ጊዜ አጋጥሞዎት ያውቃል?	**ስንት ጊዜ?** / ✍____/	MORN1
d.	**ከተወለደ ከ6 ሳምንት በታች** የሆነ የህፃን ሞት ስንት ጊዜ ተከስቶብዎት ያውቃል?	**ስንት ጊዜ?** /✍____/	MORN2
e.	ዕድሜ **ከ6 ሳምንት እስከ አንድ ዓመት** የሆነ የህፃን ሞት ስንት ጊዜ አጋጥሞዎት ያውቃል?	**ስንት ጊዜ?** / ✍____/	MORTI
703	በዕድሜ በጣም ትንሹ/ሿ ልጅዎ አሁን ዕድሜው/ዋ ስንት ነው? /✍ _____ ዓመት/		SPAC

7.2. በቀደሙ የእርግዝና እና ወሊድ ጊዜ የነበሩ የጤና ችግሮች *(Past obstetric complications)*

712	በዕድሜ የመጨረሻ (በጣም ትንሹን/ሻን ልጅ) ልጅ ***<u>ነፍሰ-ጡር ሆነው</u>*** በእርግዝናው ምክንያት የተከሰቱ ከባድ የጤና ችግሮች ነበሩ? [1] አዎ [0] የለም ☞ **ጥያቄ ቁ. 714**			**OCP**
713	***እባክዎ የመጨረሻ ልጅዎን (በዕድሜ ትንሹ/ሿ ን) ልጅዎን ነፍሰ-ጡር ሆነው የህመም ምልክቶቹ ከነበሩ ‹‹አዎ›› ካልነበሩ ደግሞ ‹‹የለም›› በማለት ይመልሱ።***			
a	ከማህፀን የደም መፍሰስ	[1] **አዎ**	[0] **የለም**	BLEDP
b	የፊት ወይም የእጅ እብጠት	[1] **አዎ**	[0] **የለም**	EDMAP
c	ብዥ ያለ እይታ	[1] **አዎ**	[0] **የለም**	BLURP
d	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONVP
e	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCOP

714	የመጨረሻ ልጅዎን ***<u>ለመውለድ ምጥ</u>*** ላይ እያሉ ከወሊድ ጋር ተያይዞ የተከሰተ ከባድ የጤና ችግር ነበር? [1] **አዎ** [0] **የለም** ☞ **ጥያቄ ቁ. 716**			**OCD**
715	የመጨረሻዎን ልጅዎን (በዕድሜ ትንሹን/ሻን ልጅ) ***<u>ሲወልዱ</u>*** ከሚከተሉት የጤና ችግሮች የትኞቹ ነበሩ?			
a	ከፍተኛ የደም መፍሰስ	[1] **አዎ**	[0] **የለም**	BLEDD
b	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONVD

c	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCOD
d	ከ12 ሰዓት በላይ የቆየ ምጥ	[1] **አዎ**	[0] **የለም**	PROLD
e	የእንግዴ ልጅ ከግማሽ ሰዓት (ከ30 ደቂቃ) በላይ መዘግየት	[1] **አዎ**	[0] **የለም**	PLACD
f	በወሊድ ጊዜ የሚከሰት ውጫዊ የማህፀን ክፍል መጎዳት/tear	[1] **አዎ**	[0] **የለም**	TEARD
g	የእንሽርት ውሃ ከፈሰሰ በኋላ ከ12 ሰዓት በላይ የወሊድ መዘገየት	[1] **አዎ**	[0] **የለም**	PROMP

716	የመጨረሻ ልጅዎን (በዕድሜ ትንሹን/ሻን ልጅ) **<u>በወለዱ በ6 ሳምንታት ውስጥ</u>** ማንኛውም ከባድ የሆነ የጤና ችግር አጋጥሞዎት ነበር? [1] **አዎ** [0] **የለም** ☞ **ንዑስ ክፍል 7.3**			**OCPN**
717	ከሚከተሉት እናቶች ከወለዱ በኋላ ከሚከሰቱ የጤና ችግሮች የትኞቹ ነበሩብዎት?			
a	ከማህፀን ከፍተኛ ደም መፍሰስ	[1] **አዎ**	[0] **የለም**	BLEDA
b	ብዥ ያለ እይታ	[1] **አዎ**	[0] **የለም**	BLURA
c	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONVA
d	የፊት ወይም የእጅ እብጠት	[1] **አዎ**	[0] **የለም**	SWOLA
e	ከፍተኛ ትኩሳት	[1] **አዎ**	[0] **የለም**	FEVA
f	ከማህፀን የሚወጣ ሽታ ያለው ፈሳሽ	[1] **አዎ**	[0] **የለም**	DISCHA
g	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCOA

7.3. ስለጠቅላላ የጤና ሁኔታ (Medical History)

731	የመጨረሻ ልጅዎን ነፍሰ-ጡር እያሉ በደም ግፊት ምክንያት ተኝተው ታክመው ያውቃሉ? [1] አዎ [0] የለም	**HYPER**
732	a. በፊስቱላ ወይም በወሊድ ምክንያት የቀዶ ጥገና ተሰርቶልዎት ያውቃል? [1]አዎ [0] የለም	**FISTL**
	b. በአሁኑ ሰዓት የሚያስቸግርዎት የቆየ **የስኳር በሽታ** አለብዎት? [1]አዎ [0] የለም	**DIAB**
	c. በአሁኑ ሰዓት የሚያስቸግርዎት የቆየ **የኩላሊት በሽታ** አለብዎት? [1]አዎ [0] የለም	**RENL**
	d. በአሁኑ ሰዓት የሚያስቸግርዎት የቆየ **የልብ በሽታ** አለብዎት? [1]አዎ [0] የለም	**CARD**
	e. ሌላ (ለምሳሌ **አስም፤ ቲቢ፤ ቁርጥማት፤ ኤች አይ ቪ፤** ወዘተ.) ካለ (ይገለፅ) ✍_____	**OTHR**

7.4. ስለአሁኑ እርግዝና

741	አሁን የስንት ወር ነፍሰ ጡር ነዎት? **የእርግዝና ጊዜ በወር** ✍ /____/	GA
742	የመጨረሻ የወር አበባ ያዩበት ቀን መቼ ነበር? ✍ ቀን /_____/ ወር _____ዓ.ም /_____/	LMP
743	የሚወልዱበት ቀን መቼ ይሆናል ብለው ይጠብቃሉ? ✍ ቀን /_____/ ወር _____ዓ.ም /_____/	EDD
744	የአሁኑ እርግዝና የተፈለገ ነበር? [0] አዎ [1] ጭራሽ ማርገዝ አልፈለጉም ነበር ☞ ጥያቄ ቁ. 751	WANT
745	የአሁኑ እርግዝና በተፈለገው ሰዓት ነው? [0] አዎ [1] ትንሽ ማዘገየት እፈልግ ነበር (misstimed)	TIME

7.5. ከአሁኑ እርግዝና ጋር የተያያዙ የጤና ችግሮች (*Complications during current pregnancy*)

751	**ከአሁኑ እርግዝናዎ ጋር ተያይዞ ከሚከተሉት የጤና ችግሮች ውስጥ የትኞቹ ነበሩብዎ?**			
a	ከማህፀን ደም መፍሰስ	[1] **አዎ**	[0] **የለም**	BLEED1
b	የፊት ወይም የእጅ እብጠት	[1] **አዎ**	[0] **የለም**	EDEMA1
c	ብዥ ያለ እይታ	[1] **አዎ**	[0] **የለም**	VISION1
d	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONV1
e	ከፍተኛ ትኩሳት	[1] **አዎ**	[0] **የለም**	FEVER1
f	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCON1
g	ከተለመደው በተለየ መልኩ ከፍተኛ የሆድ ህመም	[1] **አዎ**	[0] **የለም**	PAIN1
h	ውሃማ ወይም አረንጓዴ ፈሳሽ ከማህፀን መፍሰስ	[1] **አዎ**	[0] **የለም**	DISCH1
i	በሚሸኑበት ጊዜ የሚሰማ የማቃጠል ህመም	[1] **አዎ**	[0] **የለም**	ITCH1
j	ከባድ የራስ ምታት	[1] **አዎ**	[0] **የለም**	HEAD1
k	ከፍተኛ የድካም ስሜት	[1] **አዎ**	[0] **የለም**	WEAK1
l	ሌላ (ይገለፅ) ✍_____	[1] **አዎ**	[0] **የለም**	**OTHS**

7.6. ከአሁኑ እርግዝና ጋር ለተያያዙ የጤና ችግሮች የህክምና እርዳታ ስለመፈለግ ሁኔታ

761	***[ከላይ ለተጠቀሱት ከአሁኑ እርግዝና ጋር ለተያያዙ ችግሮችች 751 (a - l) ቢያንስ ለአንዱ ‹አዎ› ካሉ የሚከተሉትን ጠይቅ/ጠይቂ።]***		
	ለላይ ለተጠየቁት ችግሩ መፍትሔ ለማግኘት ማንኛውንም ህክምና (ለምሳሌ፡- ፀበል፤ ልምድ አዋላጅ፤ ሀኪም፤ ወዘተ) አማክረው ያውቃሉ? [0] አዎ [1] አይ ☞ **ክፍል 8**		ADV
762	***በአሁኑ እርግዝና ወቅት ለአጋጠሞዎት የጤና ችግር፤***	[ምንም ካላማከሯቸው ‹‹00›› ፃፍ/ፊ።]	
	[1] የልምድ አዋላጅ/ጓደኛ/ዘመድን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHTBA
	[2] የባህል ሃኪም/አዋቂ/ጠንቋይን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHTHP
	[3] ፀበል/ ቤተክርስቲያን/መስጊድ/ሃይማኖታዊ ወይም መንፈሳዊ አማካሪን	✍_____ ጊዜ	GHREL
	[4] ጤና ኬላ (የ ጤ. ኤ. ሰ.)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHHP
	[5] ጤና ጣቢያ/ ሆስፒታል/ ስፔሻላይዝድ ሆስፒታልን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHHC
	[66] ሌላ (ይገለፅ) ✍ _____	✍_____ ጊዜ	OTHR
763	ለመፍትሄ የሄዱበት ስፍራ ወይም ሰው [በ762 ከመለሱት] የተሻለ የረዳዎት የትኛው ነው? _____ **(ከነኑ ያለውን ቁጥር ብቻ ፃፍ/ፊ)፡ ፡**		BEN1
764	የጀመሩትን ህክምና ሁሉ እንደታዘዘሎት ነበር የተከታተሉት? [0] አዎ [1] አይ የለም		ADHE
765	ነፍሰ-ጡር መሆንዎን ካወቁ ጊዜ ጀምሮ ባህላዊም ሆነ ዘመናዊ የህክምና ቀጠሮዎችን ሰርዘው ያውቃሉ? [0] አይ [1] አዎ ☞ በግምት ስንት ጊዜ? ✍_____ ቀጠሮዎች ***የተሰረዘ ቀጠሮ ከሌለ*** *‹‹00›› **ይጻፍ።***		APP1

ክፍል 8፡ Perceived access to care at the nearest health facility (accessibility)

801	በእርስዎ አስተያየት ከቤትዎ እስከ በአቅራቢያዎ ወደ ሚገኘው የጤና ተቋም ድረስ ያለው ርቀት ምን ያህል ነው? [1] ሩቅ [2] መካከለኛ [3] ቅርብ	DIST
802	በአቅራቢያዎ ወደ ሚገኘው የጤና ተቋም ለመድረስ ምን ያህል ሰዓት ይወስድብዎታል? [1] ብዙ ሰዓት [2] መካከለኛ [3] ትንሽ	TRAV
803	በአቅራቢያዎ ወደ ሚገኘው የጤና ተቋም ለመድረስ የትራንስፖርት አገልግሎት የማግኘት ዕድልዎ ምን ያህል ነው? [1] በጣም አስቸጋሪ [2] አስቸጋሪ [3] አያስቸግርም	TRAN

804	በአቅራቢያዎ የሚገኘው የጤና ተቋም የሚከፈትበት ሰዓት ለእናቶች ምን ያህል ምቹ ነው? [1] ምቹ አይደለም [2] መካከለኛ [3] በጣም ምቹ	HOUR
805	በእርስዎ አስተያየት ሐኪሞች ወይም አዋላጅ ነርሶች በተፈለጉበት ሰዓት ከሥራ ቦታቸው ይገኛሉ? [1] አይገኙም [2] አልፎ አልፎ አይገኙም [3] ሁልጊዜ ይገኛሉ	DOCT
806	አሁን ስለቀጣዩ ወሊድ/ምጥ ሲያስቡ ምን ያህል **ፍርሃት/ጭንቀት** ይሰማዎታል? 0 1 2 ም ም በጣም አነስተኛ 3 4 አነስተኛ 5 6 መጠነኛ 7 8 ከፍተኛ 9 10 በ ም ከፍተኛ	FEAR
807	በቅርበት የሚገኘው የጤና ተቋም ስም **[1]** ጤና ኬላ **[2]** ጤና ጣቢያ **[3]** ሆስፒታል)	HFNB

ክፍል 9: PHQ-9 and WHODAS12

LKñ*ƒ* **G<K*ƒ* dU"ታት** Ÿ²=I **በታች** ለU²[´^†¬ **እያንዳንዳቸው †Óa‹ ለስንት ቀናት ተ**†Ó[¬) እ"Å'u` እÖÃp-ታKG<::		
901	**ባለፉት ሁለት ሳምንታት ውስጥ** የእለት ተእለት ተግባርዎን ለማከናወን (ለመስራት) ያለዎት ተነሳሽነት ለምን ያህል ቀን ቀንሶ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ1
902	**ባለፉት ሁለት ሳምንታት ውስጥ** የመከፋት፣ የመደበት ወይም ተስፋ የመቁረጥ ስሜት ለምን ያህል ቀን ይሰማዎ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ2
903	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን እንቅልፍ አልወስድዎ ብሎ ወይም በደንብ መተኛት አቅቶዎት ወይም እንቅልፍ እየበዛብዎት ይቸገሩ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ3
904	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን የድካም ወይም የአቅም ማነስ ስሜት ይሰማዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ4
905	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን የምግብ ፍላጎትዎ ከተለመደዉ በላይ ጨምሮ ወይም ቀንሶብዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ5
906	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን ራስዎን የመጥላት ወይም ዋጋ የለኝም የማለት ወይም ራሴንም ሆነ ቤተሰቤን አሳዝኛለሁ/አሳፍሬያለሁ/ የሚል ስሜት ተሰምቶዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ6
907	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን በሚሰሩት ስራ ላይ ሃሳብዎን መሰብሰብ/ልብ የማለት ችግር (ለምሳሌ፡ ከሰዎች ጋር ሲጨዋወቱ ትኩረት ሰጥቶ ማዳመጥ) አስቸግሮዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ7
908	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን ለሌሎች ሰዎች እስከሚታወቅ ድረስ በእንቅስቃሴዎ ወይም በንግግርዎ በጣም ቀስ ብለዉ ወይም በተቃራኒዉ መረጋጋት አቅቶዎት፣ አንድ ቦታ አርፎ መቀመጥ ወይም መቆም እስከማይችሉ ሆነዉ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ8

909	**ባለፉት ሁለት ሳምንታት ውስጥ** ብሞት ይሻላል ብለዉ አስበዉ ወይም ራስዎን በሆነ መንገድ ሊጎዱ አስበዉ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQ9
910	ተጠየቀው ለጥያቄ ቁጥር 909 ላይ 1 ወይም ከዚያ በላይ ከመረጡ ወደ ሳይካትሪ ነርስ ሪፈር **ማስታወሻ፡ *የPHQ-9 ድምር ውጤት* ከ5 በታች ከሆነ ☛ ክፍል 9.3** ***የPHQ-9 ድምር ውጤት* 10 እና ከዚያ በላይ ከሆነ ተጠያቂዋ የጤና አገልግሎት እንድያገኙ መረጃ ይሰጣቸው።**	PHQT

9.2. Help-Seeking for Antenatal Depression

926	ከላይ በተደረገው መጠይቅ የተወሰነ በሥራ ላይ ፍላጎት የመቀነስ ምልክቶች እንዳሉ ያመለክታል። ይህንን ችግር ለመጀመሪያ ጊዜ በራስዎ ካስተዋሉት ምን ያህል ጊዜ ነው? ☐ ___ ሳምንት አካባቢ ወይም ☐____ወር አካባቢ ወይም ☐____ዓመት አካባቢ		**PEXT**
927	ከጥያቄ ቁጥር 926 ለተጠቀሰው ችግር የሕክምና እርዳታ ለማግኘት ሞክረው ነበር? [1] አዎ [0] የለም **☛ ንዑስ ክፍል 9.3**		**CAR**
928	ይህን ችግር ለመጀመሪያ ጊዜ ካስተዋሉ በኋላ በምን ያህል ጊዜ ውስጥ የሕክምና ዕርዳታ ለማግኘት ሞከሩ? ☐____ ቀናት አካባቢ ☐ ___ ሳምንት አካባቢ ወይም ☐____ወር አካባቢ		**CAR2**
929	ለችግሩ መፍትሔ ለማግኘት የሚከተሉት የህክምና አገልግሎት ሰጪዎች ስንት ጊዜ አማክረው ነበር? **ምንም ካላማከሯቸው ‹00› ይፃፉ።**	ስንት ጊዜ አማክረዋል?	
	[1] ባህላዊ (ለምሳሌ፡ ልምድ አዋላጅ፤ ጠንቋይ፤ አዋቂ)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	**TRAD**
	[2] ሐይማኖታዊ (ምሳሌ፡ ፀበል፤ ሃይማኖታዊ ምክር)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	**RELG**
	[3] ጤና ኬላ/የጤና ኤክስቴንሽን ባለሙያን ስንት ጊዜ አማክረዋል?	✍ _____ ጊዜ	**HEW**
	[4] ዘመናዊ (ለምሳሌ፡ ጤና ጣቢያ፤ ሆስፒታል ፤ፋርማሲስት)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	**MOD**
	ሌላ (ይገለፅ) ✍ _____	✍_____ ጊዜ	**OTH**
930	የጀመሩትን ህክምና ሁሉ እንደታዘዘሎት ነበር የተከታተሉት? [0] አዎ [1] አይ የለም		**ADH**
931	ለመፍትሄ የሄዱበት ስፍራ ወይም ሰው [በ929 የመለሱት] የተሻለ የረዳዎት የትኛው ነው? _____ *(ከአማራጮች ጎን ያለውን ቁጥር ብቻ ፃፍ/ፊ)። ምንም መፍትሄ የሰጠ ህክምና ከሌለ ‹‹00›› ፃፍ/ፊ)።*		BEN

9.3. WHODAS-12

ይህ መጠይቅ ሰዎች በጤና እክል ምክንያት ስለሚኖራቸዉ ችግር ይሆናል፡፡ የጤና እክል ስል በሽታ ወይም ህመም፣ሌሎች ለአጭር ወይም ለረጅም ጊዜ የሚቆዩ የጤና ችግሮች፣ ጉዳቶች፣ የአእምሮ ወይም የመንፈስ መታወክ፣ እንዲሁም ከመጠጥ እና ከእጽ ጋር የተገናኙ ችግሮችን ይሆናል፡፡ ቃለ-መጠይቆቹን ሲመልሱ **ሁሉንም የጤና ችግሮችዎን** እንዲያስቡ እፈልጋለሁ፡፡ ***ጥያቄዎቹን ሲመልሱ ያለፉትን 30 ቀናት እያስታወሱ ይሆን፡፡***

941	ባለፉት 30 ቀናት ውስጥ የጤናዎትን አጠቃላይ ሁኔታ እንዴት ይመዝኑታል? [1]በጣም ጥሩ [2]ጥሩ [3] መካከለኛ [4]የከፋ [5]						ALL
	ጥያቄዎቹን ሲመልሱ እነዚህን 5 የችግር ደረጃዎች ይጠቀሙ፡፡ **ምንም ችግር የለም** = [1] **አነስተኛ ችግር** = [2] **መካከለኛ ችግር** = [3] **ከፍተኛ ችግር** = [4] **በጣም ከፍተኛ ችግር** = [5] **ባለፉት 30 ቀናት የሚከተሉትን ሲያደርጉ ምን ያህል ይቸግርዎት ነበር?**						
942	**<u>ረዘም ላለ ጊዜ መቆም</u>** ምን ያህል ይቸግርዎት ነበር? ለምሳሌ	[1]	[2]	[3]	[4]	[5]	STAND
943	የቤት ዉስጥ **<u>ሃላፊነቶችን መወጣት</u>** ምን ያህል ይቸግርዎት	[1]	[2]	[3]	[4]	[5]	RESP
944	**<u>አዲስ ነገር ወይም ስራ</u>** ለመማር **<u>ይቸገሩ ነበር</u>**? (ለምሳሌ የእርሻ ስራ፣ [illegible] ወዘተ...)	[1]	[2]	[3]	[4]	[5]	LEARN
945	**<u>በማህበራዊ እንቅስቃሴ</u>** ዉስጥ (ለምሳሌ፡- ዓመት በዓል፣ ድግስ፣ ለቅሶ፣ እድር፣ [illegible] ወዘተ) ላይ እንደ ሌላው ሰው	[1]	[2]	[3]	[4]	[5]	SOCIAL
946	የርስዎ የጤና ችግር ምን ያህል **<u>ስሜትዎት ላይ ተጽእኖ</u>**	[1]	[2]	[3]	[4]	[5]	EMOT
	ባለፉት 30 ቀናት የሚከተሉትን ሲያደርጉ ምን ያህል ይቸግርዎት ነበር?						
947	በሚሰሩት ስራ ላይ **<u>ሀሳብዎን ለጥቂት ጊዜ (ለ10 ደቂቃ) ያህል መሰብሰብ</u>** ይቸገሩ ነበር?	[1]	[2]	[3]	[4]	[5]	CONC
948	**<u>ረዘም ያለ ርቀት ለመጓዝ</u>** ምን ያህል ይቸገሩ ነበር? ምሳሌ የሩብ ሰአት መንገድ (1ኪ.ሜትር)	[1]	[2]	[3]	[4]	[5]	WALK
949	**<u>ሰዉነትዎን መታጠብ</u>** ምን ያህል ይቸግርዎት ነበር?	[1]	[2]	[3]	[4]	[5]	SHOW
950	**<u>ልብስዎትን መልበስ</u>** ምን ያህል ይቸግርዎት ነበር?	[1]	[2]	[3]	[4]	[5]	DRESS
951	ከማያዉቋቸዉ ሰዎች ጋር ተግባብቶ **<u>ጉዳይ መፈጸም</u>** ምን ያህል ይቸግርዎት ነበር?	[1]	[2]	[3]	[4]	[5]	DEAL
952	**<u>በጓደኝነት መቆየት</u>** ምን ያህል ይቸግርዎት ነበር?	[1]	[2]	[3]	[4]	[5]	FRIEND

953	የዕለት ተዕለት **<u>ስራዎን ወይም ትምህርትዎን ለማከናወን</u>** ምን ያህል ይቸግርዎት ነበር?	[1]	[2]	[3]	[4]	[5]	DAILY
954	በአጠቃላይ እነዚህ ችግሮች በህይወትዎ ጣልቃ እየገቡ ምን ያህል	[1]	[2]	[3]	[4]	[5]	INTERF

ክፍል 10: Health Utilization Behavior

10.1: ANC Utilization

የሚከተሉት ጥያቄዎች የቅድመ ወሊድ (ከመውለድዎ በፊት) የጤና አገልግሎት አጠቃቀምዎን ይመለከታሉ። ጥያቄዎቹን ሳነብልዎት ከተሰጡት አማራጮች አንዱን ይምረጡ።

1001	ለአሁኑ የእርግዝና የቅድመ-ወሊድ ምርመራ አድርገው ያውቃሉ? [1] አዎ [2] የለም ☞ ክፍል **10.3**		ANCDT
1002	የመጀመሪያው የቅድመ ወሊድ ምርመራ ያደረጉት የት ነበር? [1] ጤና ኬላ [2] ጤና ጣቢያ [3] የግል ክሊኒክ [4] ሆስፒታል [4] ሌላ /✍ ----------/		ANCPL
1003	በዚሁ የእርግዝና ወቅት ስንት ጊዜ ለቅድመ-ወሊድ ምርመራ ወደ ጤና ተቋም ሄደዋል? ✍ /_____ **ጊዜ**/		ANCQT
a.	የመጀመሪያ የቅድመ-ወሊድ ምርመራ ሲያደርጉ **የስንት ወር ነፍስ-ጡር** ነበሩ?	✍ የ_____ ወር	GA1
b.	የሁለተኛ የቅድመ-ወሊድ ምርመራ ሲያደርጉ **የስንት ወር ነፍስ-ጡር** ነበሩ?	✍ የ_____ ወር	GA2
c.	የሦስተኛ የቅድመ-ወሊድ ምርመራ ሲያደርጉ **የስንት ወር ነፍስ-ጡር** ነበሩ?	✍ የ_____ ወር	GA3
d.	የአራተኛ የቅድመ-ወሊድ ምርመራ ሲያደርጉ **የስንት ወር ነፍስ-ጡር** ነበሩ?	✍ የ_____ ወር	GA4

10.2. Patient Healthcare Experiences in Outpatient setting (O-PAHC)

የሚከተሉተ ጥያቄዎች የጤና ተቋማት የጤና አገልግሎት አሰጣትን ይመለከታሉ። ጥያቄዎቹን ሳነብልዎት ከአሁን በፊት የተሰጠዎትን የእናቶች የጤና አገልግሎት እያስታወሱ **በጣም አልስማማም፤ አልሰማማም፤ እስማማለሁ፤ በጣም እስማማለሁ** በማለት ለጥያቄዎቹ መስማማት አለመስማማትዎን ይግለፁልኝ።

ወደ ጤና ተቋም ለሕክምና በሄዱ ጊዜ፤		**አዎ**	**በከፊል**	**አይ**	
1016	አዋላጅ ነርሶቹና ሐኪሞቹ በአግባቡና በአክብሮት **አስተናግደዎታል**?	[3]	[2]	[1]	PHN1
1017	አዋላጅ ነርሶቹና ሐኪሞቹ በጥንቃቄ አዳምጥዎታል?	[3]	[2]	[1]	PHN2
1018	አዋላጅ ነርሶችና ሐኪሞቹ ነገሮችን ለመረዳት ቀላል በሆነ መንገድ **አስረድተዎታል**?	[3]	[2]	[1]	PHN3
1019	አዋላጅ ነርሶችና ሐኪሞቹ በእርግዝና ጊዜ የሚከሰቱ ችግሮችን ለማወቅ **ችሎታ አላቸው**?	[3]	[2]	[1]	PHD1
1020	አዋላጅ ነርሶችና ሐኪሞቹ በምርመራ ወቅት ለታካሚዎቹ **ነፃነት ይሰጣሉ**?	[3]	[2]	[1]	PHD2
1021	በጤና ተቋሙ ውስጥ የእርግዝና ጊዜ ችግሮችን ለመለየት የሚያስችሉ **መሳሪያዎች ይገኛሉ**?	[3]	[2]	[1]	PHD3
1022	የመቆያ፤ የቅድመ-ወሊድ ምርመራና የመዋለጃ ክፍሎቹ **ንፁህና በቂ** ነው።	[3]	[2]	[1]	PHE1
1023	የህመሙ ሁኔታና ምልክቶቹ በቀላሉ መረዳት በምችለው መንገድ **ተገልጸልዎታል**?	[3]	[2]	[1]	PHE2
1024	የጤና ተቋሙ ሽንት ቤትና የመታጠቢያ ክፍሎቹ **ንጹህ** ናቸው?	[3]	[2]	[1]	PHC1
1025	ሐኪሞቹ ችግርዎትን ለመነጋገር **በቂ ጊዜ** ሰጥጠው ያዳምጣሉ?	[3]	[2]	[1]	PHC2
1026	የህመሙ ሁኔታና ምልክቶቹ እርስዎ በቀላሉ መረዳት በሚችሉት መንገድ ተገልጸልዎታል?	[3]	[2]	[1]	PHC3
1027	የጤና ተቋም ሠራተኞቹ መድሃኒቱ ለምን እንደታዘዘ ገልጸውልዎታል?	[3]	[2]	[1]	PHC4
1028	የጤና ተቋም ሠራተኞቹ የመድሃኒቱ የጎንዮሽ ችግሮችን ግልፅ በሆነ መንገድ አስረድተዎታል?	[3]	[2]	[1]	PHC5

10.3. Birth preparedness

ለወሊድ ጊዜ የሚከተሉትን ነገሮች አዘጋጅተዋል?				
1029	24 ሰዓት አገልግሎት የሚሰጥ የሚወልዱበትን የጤና ተቋም ለይተዋል?	[1] **አዎ**	[0] **የለም**	**BPPR**
1030	ለወሊድ ጊዜ ህክምና የሚሆን ገንዘብ ቆጥበዋል?	[1] **አዎ**	[0] **የለም**	**BPSAV**
1031	ለወሊድ ወደ ጤና ተቋም ለመድረስ የመጓጓዣ ዘዴ ለይተዋል ?	[1] **አዎ**	[0] **የለም**	**BPTRN**
1032	ለወሊድ የሚያስፈልጉ ነገሮችን እንደፎጣ ወይም ንፁህ ጨርቅ አዘጋጅተዋል?	[1] **አዎ**	[0] **የለም**	**BPKIT**

ለመረጃ ሰብሳቢ ብቻ

	ቀን		**የመጠይቁ ውጤት***
ለመጠየቅ የመጅመሪያ ሙክራ			[1] ተጠናቋል [2] አልተጠናቀቀም **Fምክንያት ባጭሩ** _____ ቀጣዩ የቀጠሮ ቀን @_____ @ሰዓት……
ለመጠየቅ ሁለተኛ ሙክራ			[1] ተጠናቋል [2] አልተጠናቀቀም **Fምክንያት ባጭሩ** _____ ቀጣዩ የቀጠሮ ቀን @_____ @ሰዓት……
ለመጠየቅ ሶስተኛ ሙክራ			[1] ተጠናቋል [2] አልተጠናቀቀ **Fምክንያት ባጭሩ** _____ ቀጣዩ የቀጠሮ ቀን @_____ @ሰዓት……
የመረጃ ሰብሳቢ (የጠያቂ) ተ.ቁ.	@_____		**IDINT**
መጠይቅ የተካሄደበት ቀን	@_____ቀን _____ ወር _____ዓ.ም		**DATIN**

የመረጃ ሰብሳቢ አስተያየት፦_____

የመረጃ ሰብሳቢ (የጠያቂ)፡- ስም _____ፊርማ _____ ቀን _____

በፊልድ ተቆጣጣሪ የሚሞላ		
የመስክ ተቆጣጣሪ ተ.ቁ.	@_____	**IDSUP**
የመስክ ሥራ ተቆጣጣሪ	ስም @_____ፊርማ @ _____ ቀን @ _____	
የመስክ ተቆጣጣሪ አስቴተያየት	በአጠቃላይ የመጠይቁ አሞላል፤ [5] እጅግ በጣም በጥንቃቄ [4] በጣም በጥንቃቄ [3] በመጠኑ በጥንቃቄ [2] ከአጥጋቢ በታች የሆነ አሞላል [1] በጣም ከአጥጋቢ በታች [0] እጅግ በጣም ከአጥጋቢ በታች @ምክንያት ባጭሩ _____	OPEN

Appendix J: Follow up Questionnaire (English Version)

የመጠይቅ ቁጥር (QID)፡ /__/____/____/___/ Questionnaire for postnatal women …..

Questionnaire for postnatal women ….

Section I. Introduction

	Eligibility Criteria	
101	Is the mother alive [1] Yes [0] No	LIVE
102	How long is since your delivery? _____ weeks (appoint if <4wks)	6WEK
103	If the mother is not alive what was the cause of her death? [1] something related to labour [2] accident (ex car) [3] other disease (ex cancer) [4] other	MMR

Section II. Participant personal Information

201	Particiaptn Name: _____	PNAM
202	Husband's Name: _____	HNAM
203	Kebele _____ Got _____	ADDR
204	ANC card Number: _____	PCARD
205	Medical registration number: _____	TCAR
206	Name of institution of delivery _____ (write "home" if at home)	INSD

Section III: Healthcar Utilization and Pregnancy Outcome

3.1. Pregnancy Outcome

301	When did you deliver? _____date_____month _____ Year	BDATE
302	How was your health after birth? 0 1 2 — V.Good; 3 4 — Good; 5 6 — undecided; 7 8 — bad; 9 10 — Very bad	POT2
303	Is the child born alive? [1] Yes [0] No	OUTPT
304	Sex of the Child? [1] Male [2] Female If twins, state their sexes _____	SEX
305	How long was it since you delver until you initiate breastfeeding? _____ hours	BFINT
306	Are you currently breastfeeding your child [1] Yes [0] No	BFCO
307	Have you ever fed your child other than breast (sugar, cowmilk, butter, etc)? [1] Yes [0] No	BFEXC
308	If "Yes" for Q307, how old was the child when you initiate food other than milk? Ans: _____wekks	EXCD

Note: Ask the following questions if and only if the participaant's answer for Q303 is "No". Otherwise skip to next section

311	When did this pregnancy loss occur? [1] before 7th month of gestation [2] after 7th month of gestation [3] at 9th month of gestation (during labor) [4[after live birth at term [5] about one moth after live birth	ABSTIL
312	What was the cause of pregnancy loss? [1] Accident [2] medical advice [3] My or Family Decision [4] other _____	REAB
313	Who helped you during pregnancy loss? [1] healthcare worker [2] traditional healer [3] Traditonal birth attendant [4] nobody [5] other_____	

Delivery Care Utilization

314	Where did you deliver? [1] Home ☞ **Sec 1.3** [2]] Health post [3] Health center [4] Hospital [6] other _____	**DCU04**
315	If your delivery was at health institution (health post, health center or hospital), how you preferred it? [3] Referral [2] Delayed labor [1] Already planned	**DCU05**
316	Delivery type: [1] Normal [3] CS [2] Instrumental	**DCU06**
317	Who assisted your delivery? [1] Doctor [2] Nurse/ Midwife/HO [3] HEW [4] Family/Relative [5] Self	**DCU07**
318	How much did [person in [317] help you? [0] Did not help at all [1] Helped a bit [2] Helped a lot	**DCU08**
319	Overall, how satisfied were you with the delivery service you received? [0] Not satisfied at all [1] Somewhat satisfied [2] Satisfied a lot	**DCU09**

3.3. Postnatal Care Utilization

320	After you gave birth, did someone check on your health? [1] YES [0] NO ☞ **1.4**	**PCU23**
321	How many postnatal care visits did you attend after delivery of the current baby? ✍___visits	**QPNC**
322	Who did you attend the first postnatal care visit for the current baby? [1] Health post [2] Private Clinic [3] Health center [4] Hospital [5] Home	**PCU25**

Section 4: Obstetric Complications

4.1. Complications 1- week prior to labor and delivery

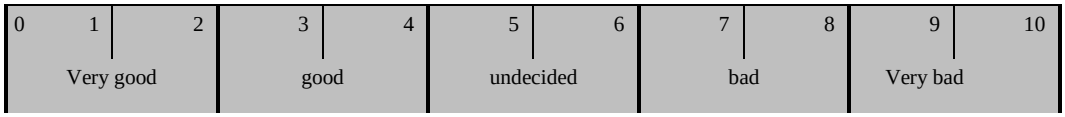
	What problems did you experience? PUT [X] IN PARENTHESIS FOR PROMPT RESPONSES. THEN, ASK WHETHER SHE EXPERIENCED THE REMAINING COMPLICATIONS.			
401.1	Swollen Hands/Face	[1] YES	[0] NO	EDEMA2
401.2	Blurred Vision	[1] YES	[0] NO	VISION2
401.3	Severe Abdominal Pain	[1] YES	[0] NO	PAIN2
401.4	Discharge with unusual odor	[1] YES	[0] NO	DISCH2
401.5	Pain during urination	[1] YES	[0] NO	ITCH2
401.6	Severe Headache	[1] YES	[0] NO	HEAD2
401.7	Severe weakness	[1] YES	[0] NO	WEAK2
401.8	Other (Specify) _____	[1] YES	[0] NO	Oth2

4.2. Help-seeking for complications 1-2 weeks prior to delivery

421	Did you ever seek any help (traditional or modern) for these problems? [0] No ☞ 3.4 [1] Yes		ADV
422	Which of the following health care providers did you visit for your current pregnancy complications? Please tell me the number of visits if any, for each of health care providers. Record "00" for none.	**Visited during Pregnancy?** **How many times? Record "0" for "NONE".**	Code
a.	Traditional birth Attendant/Relative/Friend	✍___ Visits	GHCTRAD
b.	Traditional Healer /Tankway	✍___ Visits	GHCTANQ
c.	Religious persons	✍___ Visits	
d.	Health post / health extension worker	✍___ Visits	GHCHEW
e.	Health Officer/Nurse/Midwife/ Pharmacist/doctor	✍___ Visits	GHCHO
	Total number of visits	✍___ Visits	GHCTOT
423	What treatment were you given? (describe)		HSTRE
424	Overall, how satisfied were you with the treatment you received? [0] Not satisfied at all [1] Somewhat satisfied [2] Satisfied a lot		HSSTF

4.3. Complications during labor and delivery

432	During labor and birth, did you experience any serious health problems related to birth? [1] YES [0] NO ☞**Sec 3.2**			
	What problems did you experience? PUT [X] IN PARENTHESIS FOR PROMPT RESPONSES. THEN, ASK WHETHER SHE EXPERIENCED THE REMAINING COMPLICATIONS.			
432.1	Severe Bleeding	[1] YES	[0] NO	BLEED2
432.2	Severe Headache	[1] YES	[0] NO	HEAD2
432.3	Convulsions	[1] YES	[0] NO	CONV2
432.4	High Fever	[1] YES	[0] NO	FEVER2
432.5	Loss of Consciousness	[1] YES	[0] NO	UNCON2
432.6	Labor Lasting >12 Hours	[1] YES	[0] NO	PROL
432.7	Placenta not delivered 30 minutes after baby	[1] YES	[0] NO	PLACEN
432.8	Tear/Episiotomy	[1] YES	[0] NO	TEAR
432.9	Premature rupture of membrane	[1] YES	[0] NO	PROM
432.10	Other (Specify) _____	[1] YES	[0] NO	

432.11	How was your health during delivery of this child? 	EXP2

4.4. Help-seeking for complications during delivery

441	Did you ever seek any help (traditional or modern) for these delivery complications? [0] No ☞ 3.4 [1] Yes		ADVD
442	Which of the following health care providers did you visit for your current pregnancy complications? Please tell me the number of visits if any, for each of health care providers. Record "00" for none.	**How many times? Record "0" for "NONE".**	Code
a.	Traditional birth Attendant/Relative/Friend	✍___ Visits	GHCTRAD
b.	Traditional Healer /Tankway	✍___ Visits	GHCTANQ
c.	Religious persons	✍___ Visits	
d.	Health post / health extension worker	✍___ Visits	GHCHEW
e.	Health Officer/Nurse/Midwife/ Pharmacist/doctor	✍___ Visits	GHCHO
	Total number of visits	✍___ Visits	GHCTOT
443	What treatment were you given? (describe)		HSTRE
444	Overall, how satisfied were you with the treatment you received? [0] Not satisfied at all [1] Somewhat satisfied [2] Satisfied a lot		HSSTF

4.5. Postpartum complications

451	During the 2 days after the birth of your child, did you experience any serious health problems related to the birth? [1] YES [0] NO ☞**Sec 3.4**			**OC73**
451.1	Severe Bleeding	[1] YES	[0] NO	BLEED3
451.2	Blurred Vision	[1] YES	[0] NO	VISION3
451.3	Convulsions	[1] YES	[0] NO	CONVUL3
451.4	Swollen Hands/Face	[1] YES	[0] NO	EDEMA3
451.5	High Fever	[1] YES	[0] NO	FEVER3
451.6	Malodorous Vaginal Discharge	[1] YES	[0] NO	DISCH3
451.7	Loss Of Consciousness	[1] YES	[0] NO	UNCON3
451.8	Severe Headache	[1] YES	[0] NO	HEAD3
451.9	Pain during urination	[1] YES	[0] NO	ITCH3
451.10	Severe weakness	[1] YES	[0] NO	WEAK3
451.11	Difficulty of breathing	[1] YES	[0] NO	BRIZ3
451.12	Severe abdomenal pain	[1] YES	[0] NO	PAIN3
451.13	Other (Specify) _____	[1] YES	[0] NO	
451.14	How was your health within seven days after birth of your child? 0 1 2 3 4 5 6 7 8 9 10 Very good good undecided bad Very bad			EXP3

Help-seeking for complications at postpartum

461	Did you ever seek any help (traditional or modern) for these delivery complications? [0] No ☞ 3.4 [1] Yes		ADVA
462	Which of the following health care providers did you visit for your current pregnancy complications? Please tell me the number of visits if any, for each of health care providers. Record "00" for none.	**How many times? Record "0" for "NONE".**	Code
a.	Traditional birth Attendant/Relative/Friend	✍___ Visits	GHCTRAD
b.	Traditional Healer /Tankway	✍___ Visits	GHCTANQ
c.	Religious persons	✍___ Visits	
d.	Health post / health extension worker	✍___ Visits	GHCHEW
e.	Health Officer/Nurse/Midwife/ Pharmacist/doctor	✍___ Visits	GHCHO
	Total number of visits	✍___ Visits	GHCTOT
463	Which service provicer helped you most? _____		HSTRE
464	Did you attend the treatment as prescribed? [1] No [0] Yes		HSSTF

4.7. Neonatal complications

353	During the 7 days after the birth, did the child experience any of the following health problems?			
a.	Difficulty or Fast Breathing	[1] YES	[0] NO	BRIZ4
b.	Yellow Skin/Eye Color (Jaundice)	[1] YES	[0] NO	JAUND
c.	Poor Sucking or Feeding	[1] YES	[0] NO	SUCK
d.	Pus, Bleeding, around Umbilical Cord	[1] YES	[0] NO	PUS
e.	Skin Lesions Or Blisters	[1] YES	[0] NO	BLIST
f.	Convulsions/Spasms/Rigidity	[1] YES	[0] NO	CONV4
g.	Lethargy/Unconsciousness	[1] YES	[0] NO	LETH
h.	Red or Swollen Eyes With Pus	[1] YES	[0] NO	RED
i.	Any physical impairement	[1] YES	[0] NO	POT3
j.	Any physician diagnosed illness	[1] YES	[0] NO	POT4
k.	Other (Specify) _____	[1] YES	[0] NO	

4.8. Help-seeking for neonatal complications

481	Did you ever seek any help (traditional or modern) for these delivery complications? [0] No ☞ 3.4 [1] Yes		ADVA
482	Which of the following health care providers did you visit for your current pregnancy complications? Please tell me the number of visits if any, for each of health care providers. Record "00" for none.	**How many times? Record "0" for "NONE".**	Code
a.	Traditional birth Attendant/Relative/Friend	✍___ Visits	GHCTRAD
b.	Traditional Healer /Tankway	✍___ Visits	GHCTANQ
c.	Religious persons	✍___ Visits	
d.	Health post / health extension worker	✍___ Visits	GHCHEW
e.	Health Officer/Nurse/Midwife/ Pharmacist/doctor	✍___ Visits	GHCHO
	Total number of visits	✍___ Visits	GHCTOT
484	Did you attend the treatment as prescribed? [1] No [0] Yes		HSSTF

Section 5: Depression and Functioning

5.1. PHQ

I will ask you how often you experienced the following problems over the last 2 weeks. Your response could be often (2-6 days); several days **(7-*11* days); every day (*12-14* days) depending on statements I read.

		Not at all	Several days	Nearly half the days	Every day
501	Little interest or pleasure in doing things	[0]	[1]	[2]	[3]
502	Feeling down, depressed, or hopeless	[0]	[1]	[2]	[3]
503	Trouble falling or staying asleep, or sleeping too much	[0]	[1]	[2]	[3]
504	Feeling tired or having little energy	[0]	[1]	[2]	[3]
505	Poor appetite or overeating	[0]	[1]	[2]	[3]
506	Feeling bad about yourself - or that you are a failure or have let yourself or your family down	[0]	[1]	[2]	[3]
507	Trouble concentrating on things, such as reading the newspaper or watching television	[0]	[1]	[2]	[3]
508	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	[0]	[1]	[2]	[3]
509	Thoughts that you would be better off dead or of hurting yourself in some	[0]	[1]	[2]	[3]
510	ADD PHQ9 ITEMS FROM Q401-409. Score = _____				

(For office coding:)

520	Have you ever used alcohol during your pregnancy of the current baby? [0] No [1] Yes	**ALCO**
521	If you answere in Q520 was "yes", how often? [1] once per two months [2] monthly [3] twice per month [4] weekly [5] twice per week [6] Daily	**ALCOF**
522	How many units did you dring once you start drinking? _____ units	

5.3. WHODAS-12

The following items are about your health status in the last 30 days. I will read the statement about your health for you to answer by saying "none", "mild moderate", "severe" or "extreme".

In the past 30 days how much difficulty did you have in...

	None=0; Mild=1; Moderate=2; Severe=3; Extreme=4						
537	Standing for long periods such as 30 minutes?	0	1	2	3	4	F01
538	Taking care of your household responsibilities?	0	1	2	3	4	F02
539	Learning a new task, for example learning how to get to a new	0	1	2	3	4	F03
540	How much of a problem did you have joining in community activities (for example festivities, religious or other activities) in the same way as anyone can?	0	1	2	3	4	F04
541	How much have you been emotionally affected by your health problem?	0	1	2	3	4	F05
542	Concentrating on doing something for ten minutes?	0	1	2	3	4	F06
543	Walking a long distance such as a kilometer or equivalent?	0	1	2	3	4	F07
544	Washing your whole body	0	1	2	3	4	F08
545	Getting dressed	0	1	2	3	4	F09
546	Dealing with people you do not know	0	1	2	3	4	F10
547	Maintaining friendship?	0	1	2	3	4	F11
548	Your day to day work?	0	1	2	3	4	F12

Sum the above scores =____ Time Interview Ended: Hour: _____ Minute: _____

INTERVIEWER VISITS			
	1	2	3
DATE			
INTERVIEWER'S NAME			
RESULT*			
*** RESULT CODES:** 1 = Completed; 2 = Household Absent; 3 = Time and Date Set for later; 4 = Dwelling Not Found; 5 = Respondent severely sick; 6 = Incomplete Interview; 7 = Refused; 8 = Other: (Specify):_____			
NEXT VISIT: DATE			
TIME			

	NAME	DATE	SIGNATURE
Field-edited by:			
Office-edited by:			
Keyed by:			

To be filled by supervisors		
Participant ID NO.		**QNO**
Name of Health Post		**CNAME**
Interviewer Name		**INTNAME**
Interviewer ID		**INTID**
Date of Interview	DD/MM/YYYY	**CID**
Time Interview Started		**DATE**
Time Interview ended	Hr : min Morning/afternoon	**TIME**
Field Supervisor		**SUPID**

APPENDIX K: Follow up Questionnaire (Amharic Version)

የመጠይቅ ቁጥር (QID)፡ /___/____/____/____/

የእመጫት እናቶች የጤና አገልግሎት አጠቃቀምና …..

ክፍል 1፡ መግቢያ

	መስፈርት	
101	☹ እናትየዋ በህይወት አሉ? [1] **አዎ** [0] የሉም ☞ **ጥያቄ ቁጥር 103**	LIVE
102	ከወለዱ ስንት ሳምንት ሞላ? ✍ _____ ሳምንት ከ4 ሳምንት በታች ከሆነ **አመስግነሽ/ህ ተሰናበት/ች)**	6WEK
103	☹ እናትየዋ በህይወት ከሌሉ የሞቱት በምን ምክንያት ነበር? [1] ከወሊድ/ከምጥ ጋር በተያያዘ [2] በድንገተኛ አደጋ (ምሳሌ፡ የመኪና አደጋ) [3] በሌላ በሽታ (ምሳሌ፡ ቲቢ፤ ካንሰር፤ ወዘተ.) [4] **ሌላ** ……..	MMR
	☹ **እናትየዋ በህይወት መኖሯን በቃል ሳትጠይቅ/ቂ በሰላምታ ጊዜ አረጋግጥ/ጭ።።**	

ክፍል 2፡ የተጠያቂ ግላዊ መረጃ

201	የተጠያቂ ስም	✍ _____	PNAM
202	የተጠያቂ ባለቤት (የአባወራ/ ስም	✍ _____	HNAM
203	አሁን የሚኖሩበት ቀበሌ ስም	✍ ቀበሌ _____ ጎጥ ✍ _____	ADDR
204	የእርግዝና መከታተያ መዝገብ ቁጥር (ካለ)	✍ _____	PCAR
205	የህክምና ካርድ ቁጥር (ካለ)	✍ _____	TCAR

206	የወለዱት በጤና ተቋም ውስጥ ከሆነ የወለዱበት የጤና ተቋም ስም (ከቤት ለወለዱት ‹‹ቤት› በማለት፤ ከልምድ አዋላጅ ቤት ለወለዱት ደግሞ ‹‹ልምድ አዋላጅ ቤት›› በማለት ይፃፉ)።	✍ _____	INSD

ክፍል 3: የጤና አገልግሎት አጠቃቀምና የእርግዝና ውጤት (Health Care Utilization and Pregnancy Outcomes)

3.1. የእርግዝና ውጤት *(Pregnancy Outcome)*

301	የአሁኑን ህፃን መቼ ወለዱ? ቀን ✍_____ ወር ✍_____ ዓ.ም. ✍_____	BDATE
302	ከወሊድ በኋላ እስከአሁን ያለውን የጤናዎትን ሁኔታ እንዴት ይገልፁታል? 0 1 2 በ.ጥሩ | 3 4 ጥሩ | 5 6 ጥሩ/መጥፎ አይደለም | 7 8 መጥፎ | 9 10 በጣም መጥፎ	POT2
303 ☹ ህፃኑ በህይወት ተወልዷል? [1] አዎ [0] የለም ☞ ጥያቄ ቁ. 311		OUTPT
304 የህፃኑ/ኗ ፆታ ምንድነው? [1] ወንድ [2] ሴት *መንታ ከሆኑ የመንታዎቹ ፆታ ይገለፅ።* _____		SEX
305 ለአሁኑ ህፃን ጡት ማጥባት የጀመሩት ከወለዱ ከስንት ሰዓታት በኋላ ነበር? ✍ ከ_____ሰዓታት በኋላ		BFINT
306 አሁንም ለህፃኑ ጡት እያጠቡ ነው? [1] የለም [0] አዎ		BFCO
307 ለህፃኑ ማንኛውንም ተጨማሪ ምግብ (የላም ወተት፤ ቅቤ፤ ስኳር፤ ወዘተ) ሰጥጠው ያውቃሉ? [0] የለም [1] አዎ ☞ ምን ዓይነት ምግብ? ✍_____		BFEXC FODT
308 ለጥያቄ 307 መልስዎ ‹አዎ› ከሆነ ለህፃኑ ተጨማሪ ምግብ መስጠት የጀመሩት ህፃኑ/ኗ የስንት ሳምንት እያለ ነበር? ✍ የ_____ ሳምንት		EXCD

<u>ማስታወሻ</u>፡ ከ311-313 ያሉት ጥያቄዎች የሚጠየቁት ጥያቄ ቁጥር 303 ላይ ‹‹የለም›› ለአሉት (ጽንስ ለወረደባቸው ወይም ህፃን ለሞተባቸው እናቶች) ብቻ ነው።

311	ጽንሱ የወረደው ወይም የህፃኑ ህይወት ያለፈው መቼ ነበር? [1] ገና 7 ወር ሳይሞላው [2] ከ7 ወር የእርግዝና ጊዜ በኋላ [3] በ9ኛው ወር (በምጥ ጊዜ) ☞ ጥ.ቁ. 314 [4] በህይወት ከተወለደ በኋላ በአንድ ወር ውስጥ ☞ ጥ.ቁ. 314 [5] በህይወት ከተወለደ አንድ ወር በኋላ ☞ ጥ.ቁ. 314	ABSTIL
312	ጽንሱ የተቋረጠው በምን ምክንያት ነበር? [1] በድንገት (ሳይታሰብ) [2] በሐኪም ምክር *(ለምሳሌ ለጤናዎ አስጊ ሲሆን)* [3] በራሴ/በቤተሰብ ውሳኔ [33] ሌላ ✍_____	REAB
313	ጽንሱ ሲቋረጥ የረዳዎት ማን ነበር? [1] የጤና ባለሙያ [2] የባህል ሐኪም [3] ዘመድ/የልምድ አዋላጅ [4] ማንም አልረዳኝም [5] ሌላ ✍_____	PAAB

3.2. በወሊድ ጊዜ የጤና አገልግሎት አጠቃቀም (*Delivery Care Utilization*)

314	የት ነበር የወለዱት? [1] ቤት (የራስዎ፤ የቤተሰብ፤ ወዘተ.) ☞ Sec 3.3 [2] ጤና ኬላ [3] ጤና ጣቢያ [4] ሆስፒታል [5] ሌላ (ይገለፅ) ✍----------	DCU04
315	የወለዱት በጤና ተቋም ውስጥ (ጤና ኬላ፤ ጤና ጣቢያ ወይም ሆስፒታል) ከሆነ ለምን ጤና ተቋምን መረጡ? [1] በቅድሚያ ስለታቀደበት [2] ምጡ ከባድ ስለነበር (ስለዘገየ/የደም መፍሰስ ስለነበር) [3] ሪፈር ስለተፃፈልኝ [4] ሌላ (ይገለፅ) ✍----------	DCU05
316	በጤና ተቋም ውስጥ የወለዱ ከሆነ እንዴት ነበር የወለዱት? [1] በማማጥ ብቻ [2] አነስተኛ የማህፀን አካባቢ ቀዶ ጥገና [3] የሚስብ መሣሪያ በመጠቀም [4] በሆድ ቀዶ ጥገና [5] ሌላ (ይገለፅ) ✍----------	DCU06

317	የአሁኑን ህፃን ሲወልዱ ማን ነበር የረዳዎት? [1] ሐኪም [2] ነርስ/አዋላጅ ነርስ/ጤና መኮንን [3] የጤና ኤክስቴንሽን ባለሙያ [4] ቤተሰብ/ዘመድ [5] ማንም አልረዳኝም [6] ሌላ (ይገለፅ) ✍----------	DCU07
318	ከላይ (ጥያቄ ቁጥር 317) በጠቀሱልኝ አዋላጅዎ የተሰጠዎት እርዳታ ምን ያህል ጠቀመኝ ይላሉ? [0] [እንዲያውም ጎድቶኛል [1] ምንም አልጠቀመኝም [2] የተወሰነ ጠቅሞኛል [3] ህይወቴን አተረፈው	DCU08
319	በአጠቃላይ ከላይ (ጥያቄ ቁጥር 317) በጠቀሱልኝ አዋላጅዎ የተሰጠዎት እርዳታ ምን ያህል እረክተዋል? [0] በጣም ረክቻለሁ [1] መካከለኛ [2] ምንም አላረካኝም	DCU09

3.3. ከወለዱ በኋላ የእናቶች የጤና አገልግሎት አጠቃቀም *(Postnatal Care Utilization)*

320	ከወለዱ በኋላ ጤናዎትን ለመመርመር ወይም ልጅዎን ለማስከተብ ወደ ጤና ተቋም ሄደዋል? [0] የለም ☞ Sec. 4 [1] አዎ	PCU23
321	የአሁኑን ህፃን ከወለዱ በኋላ <u>ስንት ጊዜ</u> ለድህረ-ወሊድ ክትትል ወደ ጤና ተቋም ሄደዋል? ✍ _____ ጊዜ	QPNC
322	የመጀመሪያ የድህረ-ወሊድ ክትትሉን <u>የት</u> ነበር ያደረጉት? [1] ጤና ኬላ [2] የግል ክሊኒክ [3] ጤና ጣቢያ [4] ሆስፒታል [5] ቤቴ	PCU25

ክፍል 4፡ ከወሊድ ጋር የተያያዙ የጤና ችግሮችና የእናቶች የጤና ገልግሎት አጠቃቀም (Obstetric Complications & …)

4.1. ከወሊድ ቀን 1-2 ሳምንት ቀደም ብለው የሚከሰቱ የጤና ችግሮች (Complications prior to labor and delivery)

	ከዚህ በተች የተዘረዘሩት ከወሊድ ዕለት 1-2 ሳምንት ቀደም ብሎ ሊከሰቱ የሚችሉ የህመም ምልክቶች ናቸው። ስለዚህ የአሁኑን ህፃን ሲወልዱ የህመም ምልክቶቹ ከነበሩ ‹**አዎ**› ካልነበሩ ደግሞ ‹**የለም**› በማለት ይመልሱ።			
401.1	የፊት ወይም የእጅ እብጠት	[1] **አዎ**	[0] **የለም**	EDEMA2
401.2	ብዥ ያለ እይታ	[1] **አዎ**	[0] **የለም**	VISION2
401.3	ከተለመደው በተለየ መልኩ ከፍተኛ የሆድ ህመም	[1] **አዎ**	[0] **የለም**	PAIN2
401.4	ውሃማ ወይም አረንጓዴ ፈሳሽ ከማህፀን መፍሰስ	[1] **አዎ**	[0] **የለም**	DISCH2
401.5	በሚሸኑበት ጊዜ የሚሰማ የማቃጠል ህመም	[1] **አዎ**	[0] **የለም**	ITCH2
401.6	ከባድ የራስ ምታት	[1] **አዎ**	[0] **የለም**	HEAD2
401.7	ከፍተኛ የድካም ስሜት	[1] **አዎ**	[0] **የለም**	WEAK2
401.8	ሌላ (ይገለፅ) ✎_____	[1] **አዎ**	[0] **የለም**	OTHS

ማስታወሻ፡ [ከላይ ከ401.1 - 401.8 ለተጠየቁት የጤና ችግሮች መልስ ለሁሉም ‹‹የለም›› ከሆነ ወደ ክፍል 4.3 ዝለል/ዝለይ።]

4.2. ከወሊድ 1-2 ሳምንት ቀደም ብሎ (በእርግዝና ጊዜ) ለሚከሰቱ ችግሮች የጤና አገልግሎት ስለመፈለግ

421	***ከወሊድ ቀን ትንሽ ቀደም ብሎ*** ለተከሰተው የጤና ችግር መፍትሔ ለማግኘት ባህላዊም ሆነ ዘመናዊ ህክምና ባለሙያ (ለምሳሌ፡- ፀበል፤ ሀኪም፤ የልምድ አዋላጅ፤ ወዘተ.) አማክረው ያውቃሉ? [0] የለም ☞ Sub-Sec. 4.3 [1] አዎ		ADV
422	***ከወሊድ ቀን ትንሽ ቀደም ብሎ*** ለአጋጠሞዎት የጤና ችግር፤	ምንም ካላማከሯቸው ‹00› ይፃፉ	HSP2
	[1] ልምድ አዋላጅ/ጓደኛ/ዘመድን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	TBAP
	[2] የባህል ሃኪም/አዋቂ/ጠንቋይን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	THPP
	[3] ፀበል/ ቤተክርስቲያን/መስጊድ/ሃይማኖታዊ ወይም መንፈሳዊ አማካሪን?	✍_____ ጊዜ	HOLP
	[4] ጤና ኬላ (የ ጤ. ኤ. ሰ.)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	HPP
	[5] ጤና ጣቢያ/ ሆስፒታል/ ስፔሻላይዝድ ሆስፒታልን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	HCP
	[66] ሌላ (ይገለፅ) _____	✍_____ ጊዜ	OTHR
423	ለመፍትሄ የሄዱበት ስፍራ ወይም ሰው [በ422 ከመለሱት] የተሻለ የረዳዎት የትኛው ነው? ✍_____ (ከአማራጮቹ ጎን የተገፀውን ቁጥር ብቻ ፃፍ/ፊ)። ምንም መፍትሄ የሰጠ ከሌለ ‹00› ፃፍ/ፊ)።		BENOC
424	ህክምናውን እንደታዘዘሎት ነበር የተከታተሉት? [0] አዎ [1] አይ የለም		HSN6

4.3. በወሊድ ጊዜ የሚከሰቱ ችግሮች (Complications during labor and delivery)

432	ከዚህ በተች የተዘረዘሩት በወሊድ ዕለት ሊከሰቱ የሚችሉ የህመም ምልክቶች ናቸው። ስለዚህ የአሁን ህፃን (በዕድሜ በጣም ትንሹ/ሿን) ሲወልዱ የህመም ምልክቶቹ ከነበሩ ‹**አዎ**› ካልነበሩ ደግሞ ‹**የለም**› በማለት ይመልሱ።			
432.1	ከፍተኛ የደም መፍሰስ (በሐኪም የተነገረ)	[1] **አዎ**	[0] **የለም**	BLEED2
432.2	ከፍተኛ የራስ ምታት	[1] **አዎ**	[0] **የለም**	HEAD2
432.3	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONV2
432.4	ከፍተኛ ትኩሳት	[1] **አዎ**	[0] **የለም**	FEVER2
432.5	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCON2
432.6	ከ12 ሰዓት በላይ የቆየ ምጥ	[1] **አዎ**	[0] **የለም**	PROL
432.7	የእንግዴ ልጅ መዘገየት	[1] **አዎ**	[0] **የለም**	PLACEN
432.8	በወሊድ የሚፈጠር የውጫዊ የብልት ክፍል መጎዳት	[1] **አዎ**	[0] **የለም**	TEAR
432.9	የእንሽርት ውሃ ከፈሰሰ በኋላ ከ12 ሰዓት በላይ የወሊድ መዘገየት	[1] **አዎ**	[0] **የለም**	PROM
432.10	ሌላ (ይገለፅ) ✍_____	[1] **አዎ**	[0] **የለም**	OTH
432.11	በአጠቃላይ ይሄን ልጅዎን ሲወልዱ የነበረውን የጤናዎትን ሁኔታ እንዴት ይገልፁታል? 0 1 | 2 ቢጥሩ | 3 4 ጥሩ | 5 6 መጥፎ/ ጥሩ አይደለም | 7 8 መጥፎ | 9 10 በጣም መጥፎ			EXP2

<u>ማስታወሻ</u>፡ [ከላይ <u>ከ432.1</u> - 432..10 ለተጠየቁት የጤና ችግሮች መልስ <u>ለሁሉም ‹‹የለም››</u> ከሆነ ወደ <u>ክፍል 4.5</u> ዝለል/ዘለይ።]

4.4. በወሊድ ጊዜ ለሚከሰቱ የጤና ችግሮች አማራጭ የጤና አገልግሎት ስለመፈለግ

441	***በወሊድ ጊዜ*** ለአጋጠመዎት የጤና ችግር መፍትሔ ለማግኘት ባህላዊም ሆነ ዘመናዊ ህክምና ባለሙያ (ለምሳሌ፡- ፀበል፤ ሀኪም፤ የልምድ አዋላጅ፤ ወዘተ.) አማክረው ያውቃሉ? [0] የለም ☞ Sub-Sec. 4.5 [1] አዎ		ADVD
442	***በወሊድ ጊዜ*** ለአጋጠሞዎት የጤና ችግር፤	ምንም ካላማከሯቸው ‹00› ይፃፉ።	HSD2
	[1] ልምድ አዋላጅ/ጓደኛ/ዘመድን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	TBAD
	[2] የባህል ሃኪም/አዋቂ/ጠንቋይን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	THPD
	[3] ፀበል/ ቤተክርስቲያን/መስጊድ/ሃይማኖታዊ ወይም መንፈሳዊ አማካሪን?	✍_____ ጊዜ	HOLD
	[4] ጤና ኬላ (የ ጤ. ኤ. ሰ.)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	HPD
	[5] ጤና ጣቢያ/ ሆስፒታል/ ስፔሻላይዝድ ሆስፒታልን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	HCD
	[66] ሌላ (ይገለፅ)_____	✍_____ ጊዜ	OTHRD
443	ለመፍትሄ የሄዱበት ስፍራ ወይም ሰው [በ442 ከመለሱት] የተሻለ የረዳዎት የትኛው ነው? ✍_____ (ከአማራጮቹ ጎን የተገፀውን ቁጥር ብቻ ፃፍ/ፊ)። ምንም መፍትሄ የሰጠ ከሌለ ‹00› ፃፍ/ፊ)።		BEND
444	ህክምናውን እንደታዘዘሎት ነበር የተጠቀሙት? [0] አዎ [1] አይ የለም		HSD6

4.5. ከወሊዱ በኋላ የሚከሰቱ ችግሮች (Postpartum complications)

451	ከወለዱ በኋላ በ7 ቀናት ውስጥ ከዚህ በታች የተዘረዘሩት የህመም ምልክቶች ከነበሩ ‹**አዎ**› ካልነበሩ ደግ‹ ‹**የለም**› በማለት ይመልሱ።			
451.1	ከማህፀን ከፍተኛ ደም መፍሰስ	[1] **አዎ**	[0] **የለም**	BLED3
451.2	ብዥ ያለ እይታ	[1] **አዎ**	[0] **የለም**	VISIN3
451.3	መንዘፍዘፍ	[1] **አዎ**	[0] **የለም**	CONV3
451.4	የፊት ወይም የእጅ እብጠት	[1] **አዎ**	[0] **የለም**	EDEM3
451.5	ከፍተኛ ትኩሳት	[1] **አዎ**	[0] **የለም**	FEVE3
451.6	ከማህፀን የሚወጣ ሽታ ያለው ፈሳሽ	[1] **አዎ**	[0] **የለም**	DISCH3
451.7	ራስን መሳት	[1] **አዎ**	[0] **የለም**	UNCN3
451.8	ከፍተኛ የራስ ምታት	[1] **አዎ**	[0] **የለም**	HEAD3
451.9	በሚሸኑበት ጊዜ የማቃጠል ስሜት	[1] **አዎ**	[0] **የለም**	ITCH3
451.10	ከፍተኛ የድካም ስሜት	[1] **አዎ**	[0] **የለም**	WEAK3

451.11	ለመተንፈስ መቸገር	[1] **አዎ**	[0] **የለም**	BRIZ3
451.12	ከተለመደው በተለየ መልኩ ከፍተኛ ከእምብርት በታች ህመም	[1] **አዎ**	[0] **የለም**	ABDM
451.13	ሌላ (ይገለፅ) ✎_____	[1] **አዎ**	[0] **የለም**	OTH

451.14 በአጠቃላይ የአሁኑን ልጅ ከወለዱ በኋላ በ7 ቀናት ውስጥ የነበረውን **የጤናዎትን** ሁኔታ እንዴት ይገልፁታል? EX3

0 1 2	3 4	5 6	7 8	9 10
በ.ጥሩ	ጥሩ	መጥፎ/ጥሩ አይደለም	መጥፎ	በጣም መጥፎ

ማስታወሻ፡ [ከላይ ከ451.1 - 451.13 ለተጠየቁት የጤና ችግሮችች መልስ ለሁሉም ‹‹የለም›› ከሆነ ወደ ክፍል 4.7 ዝለል/ዝለይ።]

4.6. ከወሊድ በኋላ ለሚከሰቱ የጤና ችግሮች የህክምና እርዳታ ስለመፈለግ (Help seeking for labor complications)

461	***ከወለዱ በኋላ*** ለአጋጠሞዎት የጤና ችግር መፍትሔ ለማግኘት ባህላዊም ሆነ ዘመናዊ ህክምና ባለሙያ (ለምሳሌ፡- ፀበል፤ ሀኪም፤ የልምድ አዋላጅ፤ ወዘተ.) አማክረው ያውቃሉ? [0] የለም ☞ Sub-Sec. 4.7 [1] አዎ		ADVA
462	***ከወለዱ በኋላ በእርስዎ ወይም*** በህፃኑ ላይ ለአጋጠሞዎት የጤና ችግር፤	**ምንም ካላማከሯቸው ‹00› ይፃፉ።።**	HSA2
	[1] ልምድ አዋላጅ/ጓደኛ/ዘመድን ስንት ጊዜ አማክረዋል?	✎_____ ጊዜ	TBAA
	[2] የባህል ሃኪም/አዋቂ/ጠንቋይን ስንት ጊዜ አማክረዋል?	✎_____ ጊዜ	THPA
	[3] ፀበል/ ቤተክርስቲያን/መስጊድ/ሃይማኖታዊ ወይም መንፈሳዊ አማካሪን?	✎_____ ጊዜ	HOLA
	[4] ጤና ኬላ (የ ጤ. ኤ. ሰ.)ን ስንት ጊዜ አማክረዋል?	✎_____ ጊዜ	HPA
	[5] ጤና ጣቢያ/ ሆስፒታል/ ስፔሻላይዝድ ሆስፒታልን ስንት ጊዜ አማክረዋል?	✎_____ ጊዜ	HCA
	[66] ሌላ (ይገለፅ) _____	✎_____ ጊዜ	OTHRA
463	ለመፍትሄ የሄዱበት ስፍራ ወይም ሰው [በ442 ከመለሱት] የተሻለ የረዳዎት የትኛው ነው? ✎_____ (ከአማራጮቹ ጎን የተገፀውን ቁጥር ብቻ ፃፍ/ፊ)። ምንም መፍትሄ የሰጠ ከሌለ ‹00› ፃፍ/ፊ)።		BENA
464	ህክምናውን እንደታዘዘሎት ነበር የተጠቀሙት? [0] አዎ [1] አይ የለም		HSA6

4.7. ስለጨቅላ ህፃናት ጤና (Neonatal complications) (ህፃኑ በህይወት ካለ ብቻ የሚጠየቅ)

471	ከዚህ በታች ከተዘረዘሩት ምልክቶች መካከል የትኞቹ በህፃኑ ላይ በተወለደ በ7 ቀናት ውስጥ ይታዩ ነበር?			
a	ለመተንፈስ መቸገር ወይም በጣም በፍጥነት መተንፈስ	[1] አዎ	[0] የለም	BRIZ4
b	ቢጫማ ቆዳ ወይም የዐይን ቀለም ለውጥ	[1] አዎ	[0] የለም	JAUND
c	ጡት አለመጥባት	[1] አዎ	[0] የለም	SUCK4
d	እትብቱ አካባቢ መድማት ወይም መግል መታየት	[1] አዎ	[0] የለም	PUS4
e	የቆዳ መሟሸሽ	[1] አዎ	[0] የለም	BLIST4
f	መንዘፍዘፍ/መንቀጥቀጥ/ሰውነቱ ግትር ማለት	[1] አዎ	[0] የለም	CONV4
g	ንቁ አለመሆን/ሲነካ አለመንቀሳቀስ/ራስን መሳት	[1] አዎ	[0] የለም	LETH4
h	የዐይን መቅላትና የቅንድብ ማበጥ/ከዐይን መግል የመሰለ ፈሳሽ መውጣት	[1] አዎ	[0] የለም	RED4
i	በህፃኑ ላይ ማንኛውም ዓይነት የሚታይ የአካላዊ ችግር (በአይን፤ ጆሮ፤ እጅና አግር፤ ወይም በሌላ የሰውነት ክፍል) አለ ወይ?	[1] አዎ	[0] የለም	POT3
j	በህፃኑ አካል ላይ የማይታይ ግን በሀኪም የተነገረ ችግርስ አለ ወይ?	[1] አዎ	[0] የለም	POT4
k	ሌላ (ይገለፅ) _____	[1] አዎ	[0] የለም	OTH

ማስታወሻ፡ [ከላይ ከ471a - 471i ለተጠየቁት የጤና ችግሮችች መልስ ለሁሉም ‹‹የለም›› ከሆነ ወደ ክፍል 4.9 ዝለል/ዝለይ።]

4.8. በጨቅላዎች ላይ ለሚከሰቱ የጤና ችግሮች የህክምና አገልግሎት ስለመፈለግ

481	ለችግሩ መፍትሔ ለማግኘት ባህላዊም ሆነ ዘመናዊ ህክምና ባለሙያ (ለምሳሌ፡- ፀበል፤ ሀኪም፤ የልምድ አዋላጅ፤ ወዘተ.) አማክረው ያውቃሉ? [0] የለም ☞ Sub-Sec. 4.9 [1] አዎ		ADVN5
482	በህፃኑ ላይ ለአጋጠሞዎት የጤና ችግር፤		
	[1] ልምድ አዋላጅ/ጓደኛ/ዘመድን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHTBA5
	[2] የባህል ሃኪም/አዋቂ/ጠንቋይን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHTHP5
	[3] ፀበል/ ቤተክርስቲያን/መስጊድ/ሃይማኖታዊ ወይም መንፈሳዊ አማካሪን?	✍_____ ጊዜ	GHHOL5
	[4] ጤና ኬላ (የ ጤ. ኤ. ሰ.)ን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHHP5
	[5] ጤና ጣቢያ/ ሆስፒታል/ ስፔሻላይዝድ ሆስፒታልን ስንት ጊዜ አማክረዋል?	✍_____ ጊዜ	GHHC5
	[66] ሌላ (ይገለፅ) _____	✍_____ ጊዜ	OTHR5
483	ህክምናውን እንደታዘዘሎት ነበር የተጠቀሙት? [0] አዎ [1] አይ የለም		HSN6

ክፍል 5፡ Mental Distress (Depression and Functioning)

5.1. PHQ

LKñƒ G<Kƒ dU”ታች Ÿ²=I በታች ለU²[´^†¬ እያንዳንዳቸው †Óa‹ ለስንት ቀናት ተ†Ó[¬) እ”Å’u` እÖAp-ታKG<::		
501	**ባለፉት ሁለት ሳምንታት ውስጥ** የእለት ተእለት ተግባርዎን ለማከናወን (ለመስራት) ያለዎት ተነሳሽነት ለምን ያህል ቀን ቀንሶ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA1
502	**ባለፉት ሁለት ሳምንታት ውስጥ** የመከፋት፣ የመደበት ወይም ተስፋ የመቁረጥ ስሜት ለምን ያህል ቀን ይሰማዎ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA2
503	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን እንቅልፍ አልወስድዎ ብሎ ወይም በደንብ መተኛት አቅቶዎት ወይም እንቅልፍ እየበዛብዎት ይቸገሩ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA3
504	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን የድካም ወይም የአቅም ማነስ ስሜት ይሰማዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA4
505	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን የምግብ ፍላጎትዎ ከተለመደዉ በላይ ጨምሮ ወይም ቀንሶብዎትነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA5
506	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን ራስዎን የመጥላት ወይም ዋጋ የለኝም የማለት ወይም ራሴንም ሆነ ቤተሰቤን አሳዝኛለሁ/አሳፍሬያለሁ/ የሚል ስሜት ተሰምቶዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA6
507	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን በሚሰሩት ስራ ላይ ሃሳብዎን መሰብሰብ/ትኩረት መስጠት (ለምሳሌ፡ ከሰዎች ጋር ሲጨዋወቱ ትኩረት ሰጥቶ ማዳመጥ) አስቸግሮዎት ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA7
508	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን ለሌሎች ሰዎች እስከሚታወቅ ድረስ በእንቅስቃሴዎ ወይም በንግግርዎ በጣም ቀስ ብለዉ ወይም በተቃራኒዉ መረጋጋት አቅቶዎት፣ አንድ ቦታ አርፎ መቀመጥ ወይም መቆም እስከማይችሉ ሆነዉ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ ጎደል በየቀኑ*	PHQA8
509	**ባለፉት ሁለት ሳምንታት ውስጥ** ለምን ያህል ቀን ከምኖር ብሞት ይሻላል ብለዉ አስበዉ ወይም ራስዎን በሆነ መንገድ ሊጎዱ አስበዉ ነበር; *[0] በፍፁም [1] ከ7 ቀናት ያነሰ [2] ከ7 ቀናት በላይ [3] ከሞላ* **ተጠየቀው ለጥየቄ ቁጥር 509 1 ወይም ከዘ የ በላይ ከመረጡ ወደ ሳይካትሪ ነርስ ሪፈር**	PHQA9
510	*[ከ501-509 ያለውን የPHQ-9 ውጤት ይደምሩ ።። የPHQ-9 ድምር* = ✍ __ __	PHQT
	ማስታወሻ፡- *[የPHQ-9 ውጤት 10 እና ከዚያ በላይ ከሆነ ተጠያቂዋ የሕክምና አገልግሎት እንድታገኝ መረጃ ይሰጥ።።*	
520	የአሁኑን ህፃን ነፍሰ-ጡር ሆነው የአልኮል መጠጦችን ይጠጡ ነበር? *[0]* የለም ☞ **ክፍል 5.3** *[1]* አዎ	ALCO
521	ከጥያቄ ቁጥር 520 ላይ መልስዎ ‹‹**አዎ**›› በየስንት ጊዜ ይጠጡ ነበር? *[1]* በወር ወይም በ2 ወር አንድ ጊዜ *[2]* በወር አንድ ጊዜ *[3]* በወር ሁለት ጊዜ *[4]* በሳምንት አንድ ጊዜ *[5]* በሳምንት ሁለት ጊዜ *[6]* በየቀኑ	ALCOF
522	አንዴ መጠጣት ከጀመሩ እስከ ስንት መለኪያ ይጠጣሉ? ✍_____ __ መለኪያ	

5.3. WHODAS-12

ይህ መጠይቅ ሰዎች በጤና እክል ምክንያት ስለሚኖራቸዉ ችግር ይሆናል። የጤና እክል ስል በሽታ ወይም ህመም፣ሌሎች ለአጭር ወይም ለረጅም ጊዜ የሚቆዩ የጤና ችግሮች፣ ጉዳቶች፣ የአእምሮ ወይም የመንፈስ መታወክ፣ እንዲሁም ከመጠጥ እና ከእጽ ጋር የተገናኙ ችግሮችን ይሆናል። ቃለ-መጠይቆቹን ሲመልሱ **ሁሉንም የጤና ችግሮችዎን** እንዲያስቡ እፈልጋለሁ። ***ጥያቄዎቹን ሲመልሱ ያለፉትን 30 ቀናት እያስታወሱ ይሁን።***

536	ባለፉት 30 ቀናት ውስጥ የጤናዎትን አጠቃላይ ሁኔታ እንዴት ይመዝኑታል? [1]በጣም ጥሩ [2]ጥሩ [3] መካከለኛ						ALL
	ጥያቄዎቹን ሲመልሱ እነዚህን 5 የችግር ደረጃዎች ይጠቀሙ። መጠነ ኛ ችግር የለም – [1] ኢነስተኛ ችግር – [2] መካከለኛ ችግር – [3]						
	ባለፉት 30 ቀናት የሚከተሉትን ሲያደርጉ ምን ያህል ይቸገርዎት ነበር?						
537	**ረዘም ላለ ጊዜ መቆም** ምን ያህል ይቸገርዎት ነበር? ለምሳሌ	[1	[2]	[3	[4	[5]	STAND2
538	የቤት ዉስጥ **ሃላፊነቶችን መወጣት** ምን ያህል ይቸገርዎት	[1	[2]	[3	[4	[5]	RESP2
539	**አዲስ ነገር ወይም ስራ** ለመማር **ይቸገሩ ነበር**? (ለምሳሌ የእርሻ ስራ፣ ባልትና፣ የእጅ ስራ፣ የሞባይል አጠቃቀም፣	[1]	[2]	[3]	[4]	[5]	LEARN2
540	**በማህበራዊ እንቅስቃሴ** ዉስጥ (ለምሳሌ፡- ዓመት በዓል፣ ድግስ፣ ለቅሶ፣ እድር፣ ሊቃ...ወዘተ) ልክ እንደ ሌላዉ ሰዉ መሳተፍ	[1]	[2]	[3]	[4]	[5]	SOCIAL2
541	የርስዎ የጤና ችግር ምን ያህል **ስሜትዎ ላይ ተጽእኖ**	[1	[2]	[3	[4	[5]	EMOT2
	ባለፉት 30 ቀናት የሚከተሉትን ሲያደርጉ ምን ያህል ይቸገርዎት ነበር?						
542	በሚሰሩት ስራ ላይ **ሀሳብዎን ለጥቂት ጊዜ (ለ10 ደቂቃ) ያህል**	[1	[2]	[3	[4	[5]	CONC2
543	**ረዘም ያለ ርቀት ለመጓዝ** ምን ያህል ይቸገሩ ነበር? ምሳሌ የረብ ሰአት መንገድ (1ኪ ሜትር)	[1]	[2]	[3]	[4]	[5]	WALK2
544	**ሰዉነትዎን መታጠብ** ምን ያህል ይቸግርዎት ነበር?	[1	[2]	[3	[4	[5]	SHOW2
545	**ልብስዎትን መልበስ** ምን ያህል ይቸግርዎት ነበር?	[1	[2]	[3	[4	[5]	DRESS2
546	ከማያዉቁዋቸዉ ሰዎች ጋር ተግባብቶ **ጉዳይ መፈጸም** ምን	[1	[2]	[3	[4	[5]	DEAL2
547	**በጓደኝነት መቆየት** ምን ያህል ይቸግርዎት ነበር?	[1	[2]	[3	[4	[5]	FRIEND2
548	የዕለት ተዕለት **ስራዎን ወይም ትምህርትዎን ለማከናወን** ምን	[1	[2]	[3	[4	[5]	DAILY2
549	በአጠቃላይ እነዚህ ችግሮች በህይወትዎ ጣልቃ እየገቡ ምን	[1	[2]	[3	[4	[5]	INTERF2
550	ከዚህ በፊት በሚወልዱበት ጊዜ ከበድ ያለ የአእምሮ ህመም (የሚጥል በሽታ፤ ቡዳ፤ ከባድ የአእምሮ መሳት፤ ወዘተ.) ነበረብዎት? [1] አዎ ☞ሪፈር [0] የለም						SMIP
551	ከአሁን በፊት በማንኛውም ጊዜ ከባድ የአእምሮ ህመም (የሚጥል በሽታ፤ ቡዳ፤ ከባድ የአእምሮ መሳት፤ ወዘተ.) ነበረብዎት? [1] አዎ ☞ሪፈር [0] የለም ☞ Sec. 6						SMIH

552	የነበረብሥ የአእምሮ ህመም በአካባቢሥ ምን ተብሎ ይጠራል? ✍_____	SMIN
553	ለአእምሮው ህመሙ ህክምና አግኝተው ያውቃሉ? [1] አሥ ☞ የት? ✍_____ [0] የለም	SMIT

ክፍል 6፡ ለመረጃ ሰብሳቢ ብቻ

ለመረጃ ሰብሳቢ ብቻ

	ቀን	መጠይቅ አድራጊ ስም	የመጠይቁ ውጤት*
ለመጠየቅ የመጀመሪያ መ·ክራ			[1] ተጠናቋል [2] አልተጠናቀቀም ☞ምክንያት ባጭሩ ✍_____ _____ ቀጣዩ የቀጠሮ ቀን ✍_____ ✍ሰዓት.....
ለመጠየቅ ሁለተኛ መ·ክራ			[1] ተጠናቋል [2] አልተጠናቀቀም ☞ምክንያት ባጭሩ ✍_____ _____ ቀጣዩ የቀጠሮ ቀን ✍_____ ✍ሰዓት.....
ለመጠየቅ ሶስተኛ መ·ክራ			[1] ተጠናቋል [2] አልተጠናቀቀም ☞ምክንያት ባጭሩ ✍_____ _____ ቀጣዩ የቀጠሮ ቀን ✍_____ ✍ሰዓት.....

የመረጃ ሰብሳቢ (የጠያቂ) ተ.ቁ.	✍_____	IDINT
መጠይቅ የተካሄደበት ቀን	✍_____ቀን _____ ወር _____ዓ.ም	DATIN

የመረጃ ሰብሳቢ አስተያየት፦ ✍

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APPENDIX L: Referral form for women with suicidal ideation and severe depressive symptoms (Amharic Version)

PRIME ETHIOPIA ከአዲስ አበባ ዩኒቨርስቲ እና ከፌደራል ጤና ሚኒስቴር ጋር በመተባበር

የድባቴ ችግር ለአለባቸው ነፍሰ-ጡር እናቶች ሬፈር የማድረጊያ ቅፅ

ቀን፡ _____

- ሬፈራል ለ_____ ጤና ጣቢያ
- የነፍሰ-ጡር እናት ስም : _____ ዕድሜ፡ _____ የእርግዝና ጊዜ (GA)፡ _____ ወር
- አድራሻ፡ **በደ/ብ/ክ/መ ጉራጌ ዞን ሶዶ ወረዳ** _____ ቀበሌ ነዋሪ፡፡
- ሬፈር የተደረገበት ምክንያት (**የማይመለከተው ይሰረዝ**)፡ (1) PHQ-9 Score ≥ 15 (2) ራስን ለማጥፋት አስበው ስለሚያውቁ
- PHQ-9 መጠይቅ የሞላው ግለሰብ ስም፡ _____ ፊርማ _____

<u>ለጤና ጣቢያ ሠራተኞች ብቻ</u>

ከላይ ስማቸው የተጠቀሰው ነፍሰ-ጡር እናት በድባቴ ችግር ምክንያት ሬፈር በተደረጉት መሰረት ወደ ጤና ጣቢያችን መጥተው አስፈላውን ህክምና ወይም ምክር መጠየቃቸውንና የህክምና ወይም የምክር አገልግሎቱንም ማግኘታቸውን እናረጋግጣለን፡፡

በታካሚዋ ላይ የተገኘባቸው የአእምሮ ጤና ችግር፡

_____

የተሰጣቸው ህክምና፡ _____

_____

_____

የጤና ባለሙያ ስም፡ _____ ፊርማ፡ _____

የጤና ጣቢያ ማህተም

<u>ማስታወሻ</u>፡ እባክዎ ይህ የሬፈራል ቅፅ በሁለት ኮፒ ተሞልቶ የመጀመሪው ቅፁን ይዘው ለመጡ እናት ይሰጣቸው፡፡ ሁለተኛው ኮፒ ደግሞ በነፍሰ-ጡር እናት ፋይል ጋር ተያይዞ በጤና ጣቢያው የሚቀመጥ ይሆናል፡፡

Letter of Declaration

I, undersigned, declared that this is my original work, has never been presented in this or any other university, and that all the resources and material used for the dissertation, have been fully acknowledged.

Name:

_____

Signature:

_____

Date:

_____

Place:

_____

Date of submission:

_____

This dissertation has been submitted for examination with my approval as university supervisor

Name:

_____

Signature:

_____

Date:

_____