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Adverse Maternal and Perinatal Outcomes and Its Associated Factors Among Women Admitted with Hhypertensive Ddisorders of pregnancy in public hospitals in Harari Regional State Ethiopia.

MSc THESIS

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Harar, Ethiopia

Adverse Maternal and Perinatal Outcomes and its Associated Factors among Women admitted with hypertensive disorders of pregnancy in public hospitals at Harari Regional State Ethiopia

A research thesis to be submitted to the Schools of Nursing, College of Health and Medical Sciences, Haramaya University for partial fulfillment of the requirements for the degree of Master of Science in Maternity and Neonatal Nursing

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APPROVAL SHEET

I hereby certify that I have read and evaluated this thesis entitled "*adverse maternal and perinatal outcomes and its associated factors of hypertensive disorders in pregnancy women who admitted and delivered at selected health facilities in Harar Ethiopia*" prepared under my guidance by Mohammed Damtew Ali. I recommend that it can be submitted as fulfilling the thesis requirement.

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As a member of the board of examiners of the MSc Open Thesis Defense Examination, I certify that I have read and evaluated the Thesis prepared by Mohammed Damtew Ali and examined the candidate. I recommend that the Thesis be accepted as fulfilling the thesis requirement for the degree of Masters of Science in Maternity and Neonatal Nursing.

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BIOGRAPHICAL SKETCH

My name is Mohammed Damtew Ali. I was born on Aguste 31, 1991, Tena Adjibar Woreda, South Wallo Zone, Dessie, Amhara Regional State, Ethiopia. I attended my primary education at Amba-Mariyam-Edget Fana Elementary school, secondary education at Adjibar High School and Mekdela high school, and after completed high school education until 1997. Then after I was attended Diploma (Level-4) Midwifery from 2003-2005 at Dessie Health Science College, For bachelor degree I joined Wallo University in 2006 and graduated with a BSc degree in Nursing in 2008. I have served as Midwifery working on OBS And Gyn ward at Hiwot Fana Comprehensive Specialized Hospital at Harar. After seven years of work, I enrolled to attend my master's degree in Maternity and Neonatal Nursing started on December 2021 at Haramaya University.

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LIST OF ABBREVIATIONS

ANC Antenatal Care
AOR Adjusted Odds Ratio
APGAR Appearance Grimace Pulse Rate Activity and Respiration
APH Antepartum Hemorrhage (placenta abruption)
ARF Acute Renal Failure
BP Blood Pressure
C/S Cesarian-Section (C-Section)
CHTN Chronic Hypertension
CI Confidence Interval
DBP Diastolic Blood Pressure
DIC Disseminated Intravascular Coagulopathy
EDHS Ethiopian Demographic and Health Survey
EOPE Early Onset Preeclampsia
ETB Ethiopian Birr
FGR Fetal Growth Restriction (IUGR)
GA Gestational Age
GHTN Gestational Hypertension
HELLP Hemolytic Elevated Liver enzymes and Low Platelet count
HFCSUH Hiwot Fana Comprehensive Specialized University Hospital
HMIS Health Management Information Systems
HU Haramaya University
ICU Intensive Care Unit
IHRERC Institutional Health Research and Ethics Review Committee
IOL Induction of Labor
ISSHP International Society for the Study of Hypertension in Pregnancy
IUFD Intrauterine Fetal Demise
JGL Jugel General Hospital
LBW Low Birth Wight
LMIC Low- and Middle-Income Countries
LOPE Late Onset Preeclampsia
MgSO4 Magnesium Sulphate
MM Maternal Mortality (Maternal Death)
mmHg Meli Meter Mercury
NICU Neonatal Intensive Care Unit
NM Perinatal Mortality (Perinatal Death)
OFT Organ Function Test
PE Pre-Eclampsia
PIH Pregnancy Induced Hypertension
PLTC Potentially Life-Threatening Complication
PPH Postpartum Hemorrhage
PPP Postpartum Period(day)
PP-PE/E Post-partum Preeclampsia/Eclampsia

PTB Preterm Birth
RDS Respiratory Distress Syndrome (birth asphyxia)
SBP Systolic Blood Pressure
SDGs Sustainable Development Goals
SPE Severe Pre-Eclampsia (pre-eclampsia with severity feature)
SVD Spontaneous Vaginal Delivery
WHO World Health Organization

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background: Hypertensive disorders of pregnancy remain a major global health issue because of the area of significant public health concern due to associated maternal and perinatal morbidity and mortality. There is information on maternal and perinatal adverse outcomes of hypertensive disorders of pregnancy in Eastern Ethiopia.

Objective: The objective of this study was to assess the magnitude of, adverse maternal and perinatal outcomes and its associated factors of hypertensive disorders in pregnancy women who admitted and delivered at selected health facilities in Harar Ethiopia from August 1/2018 to July 31/2023 during the data collection period from August 26/2023 to September 22/2023.

Methods: A retrospective cross-sectional study was conducted among randomly selected 703 from 4683 women who admitted to public hospitals and attended delivery in Harar Ethiopia. Data were abstracted by using structured checklist. Data was entered and cleaned using Epi Data 4.6 and then exported to Stata software version 17 for analysis. Bivariate and multivariable logistic regression models were used. Adjusted odd ratio, 95% confidence interval, and p value <0.05 was used to identify associated with adverse maternal and perinatal outcome.

Result: The overall prevalence of adverse maternal outcomes was 44.81% (95% CI: 41.08%-48.57%) and the overall prevalence of adverse perinatal outcomes was 58.18% (95% CI: 54.43%-61.85%). Having no of ANC follow up (AOR: 1.21- 2.44), primigravida (AOR: 1.44 95%CI: 1.05-1.96), referrals on arrived (AOR:1.68, 95% CI: 1.13 – 2.50), and having history of medical disease (AOR: 1.91, 95% CI: 1.28 - 2.83) was significantly associated with adverse maternal outcome. Maternal age less than 20 years, rural residence, gestational age less than 34 weeks, and mother having eclampsia was significantly associated with adverse perinatal outcome.

Conclusions: In this study, the prevalence of adverse perinatal and maternal outcomes was relatively high. ANC follow up, gravidity, referrals on arrival, and having medical history was significantly associated with adverse maternal outcome. Whereas maternal age, maternal residence, gestational age, and mother having eclampsia was significantly associated with adverse perinatal outcome

Keywords: Hypertensive Disorders of Pregnancy, Adverse outcome, Ethiopia

1. INTRODUCTION

1.1. Background

Hypertension disorders of pregnancy (HDP) is defined as an elevated arterial blood pressure (BP), systolic/diastolic >=140/90 mmHg measured in two occasions 4 to 6 hours apart during antepartum, intrapartum and postpartum periods (Múnera-Echeverri and Ruiz-Gastelum 2022) includes chronic hypertension, gestational hypertension, early and late onset pre-eclampsia, eclampsia, HELLP syndrome and postnatal preeclampsia/eclampsia (Garovic et al. 2022; Health 2020) The causes of hypertensive in pregnancy are uncertain, some researches were carried out to determine the potential risk factors for hypertensive disorders during pregnancy. Every year an estimated 287000-585000 women die worldwide as a result of pregnancy and childbirth related causes, with 50-60 % of these deaths occurring in Africa, 42% in Asia, 4% in Latin America, and 1% in an affluent countries' (WB, ET, and L 2022; Maducolil et al. 2021).

Hypertensive Disorders in pregnancy are one of the most prevalent non-communicable medical problems encountered during pregnancy which is linked to an increased risk significantly and that affect women of childbearing age, and they encompass a wide range of morbidity and lethality conditions. Hypertensive disorders in pregnancy (HDP) continue to be a major global health concern, it may complicate 12-22% of all pregnancy and occurs during antepartum, intrapartum, and postpartum (Thapa et al. 2021), making it the second most common direct cause of maternal, perinatal morbidity and dying between haemorrhage and sepsis, with the highest rates in the developing countries (WB, ET, and L 2022; Ngwenya, Jones, and Mwembe 2019).

Ethiopia currently having the agenda of sustainable development goals (SDGs) under goal-3 implies that good health and well-being, improving maternal health remains an important session of it, which is enabling to decrease global maternal mortality (MM) target goal-3.1, by less than 70 per 100,000 live births, and under goal-3.2, end up preventable deaths of the newborns to reduce the neonatal mortality (NM) to as low as at least 12 per 1,000 live births by 2030 (Willcox et al. 2020).

Therefore, one of the largest estimated numbers of maternal and perinatal deaths have been reported as a result of hypertensive disorder of pregnancy accounting 16-35.7% and 33-52.4%, respectively (Tesfa et al. 2020; Tura et al. 2020) Although early and late onset pre-eclampsia have certain pathogenic bases, in common, risk factors differ and typically result in distinct outcomes (Wadhwani et al. 2020).

Even though the only definitive management of pre-eclampsia is deliver, (Sinkey et al. 2020; Magee et al. 2022) its consequences are eclampsia (generalized tonic colonic seizure), hemolytic-elevated liver enzymes and low platelet (HELLP syndrome), hemorrhage (PPH), disseminated intravascular coagulopathy (DIC), placenta abruption (APH), acute hepatic failure (AHF), cesarian-section (C/S), acute renal failure (ARF), pulmonary edema, hypoxic cerebral damage, retinal detachment, emergency hypertension, encephalopathy hypertension, cerebral cortical blindness, circulatory collapse, and maternal ICU admission (Poudel et al. 2021; Sitharam 2022).

Perinatal adverse outcomes are premature delivery, birth asphyxia (respiratory distress), low APGAR score, low birth weight (LBW), intrauterine growth restriction (IUGR)/fetal growth restriction (FGR), intra intrauterine fetal death (IUFD), still birth, and early neonatal deaths (perinatal deaths), neonatal sepsis, NICU admission, and all are potentially fatal for both maternal and perinatal outcomes of HDP (Mandal and Roy 2021; Lyu et al. 2021)

1.2. Statement of the Problem

Hypertensive disorders of pregnancy (HDP) are a global public health burden both developed and developing countries (Maducolil et al. 2021; WB, ET, and L 2022). Actually, in the developed countries have investigated the problem in a way that covers at large and trying to manage properly, but in developing countries the issue is much difficult (Abraham et al. 2022; Health 2020). HDP is continues the most significant and unresolved problem in obstetric and gynecologic population (Thapa et al. 2021; Tahir, Iqbal, and Saeed 2020). This syndrome complicated nearly 22% of all pregnancy, and fraternally they are one of the direct lethal triads along with hemorrhage and infection/sepsis that donate outcomes substantially to maternal, perinatal morbidity and mortality (Tahir, Iqbal, and Saeed 2020).

Globally, they accounted about 1000,000 maternal and 500,000 perinatal deaths per months (Maducolil et al. 2021). The commonly reported outcomes include, cesarean delivery, preterm labor, high maternal admission and maternal deaths in Africa and LMIC (von Dadelszen et al. 2021). In Ethiopia, the overall prevalence of HDP is responsible for about 16.7%, and also Ethiopia has covers 6% of all pregnancies of 12-22% of in the world (Dhinwa et al. 2021; WB, ET, and L 2022), and also in Ethiopia, one of the largest estimated numbers of maternal and perinatal deaths have been reported as a result of HDP accounted for 20% and 33-52.4%, respectively (Wassie and Anmut 2021; Panda et al. 2021). Although, after a while, the consequences of the outcomes of maternal and perinatal morbidity and mortality due to HDP is jointly contribute may goes late neonatal mortality to under five child mortality also increase and continue the long-term complication (Stuart et al. 2022; van Baar et al. 2022).

Many studies conducted both developed and under developing countries on adverse maternal and perinatal outcomes the most devastating higher rates of morbidity and mortality are eclampsia, placenta abruption (APH), Hemolysis, Elevated Liver enzymes and Low Platelets (HELLP) syndrome, Disseminated intravascular coagulation (DIC), postpartum hemorrhage (PPH), Renal Failure, increase C/S, maternal mortality (MM), maternal ICU admission etc. and prematurity, birth asphyxia, IUGR/fetal growth restrictions (FGR), LBW, neonatal sepsis, increase NICU admission, IUFD, stillbirth, neonatal deaths, etc., respectively are the outcomes of HDP (Punyatoya Bej 1 et al. 2022; Lyu et al. 2021).

In Ethiopia, some studies show that very high maternal and perinatal outcomes due to HDP, and HDP is most contributing causal factors for high maternal and perinatal morbidity and mortality (Mersha, Abegaz, and Seid 2019). But in general, studies regarding maternal and perinatal outcome of HDP are limited in Ethiopia and available studies done on a single case of HDP like PIH, PE, or Eclampsia or only assess maternal or perinatal outcome at one time. Therefore, the magnitude maternal and perinatal adverse outcomes among mothers with hypertensive disorders during pregnancy not studied well in Ethiopia. So, this study aimed to assess magnitude of maternal and perinatal adverse outcomes and its associated factors among mothers with hypertensive disorders during pregnancy in public Hospitals at Harari Regional State Ethiopia.

1.3. Significance of the study

This study has also great significant concerning the way and role to improve most common maternal and perinatal morbidity and mortality outcomes which occur during hypertensive disorders in pregnancy, that is, prenatal, intrapartum and postpartum until 42 days after delivery complicate obstetric outcomes with HDP (Machano and Joho 2020; Bruce, Anderson, and Stark 2021). This study will be helpful for Harari Regional Health bureau and its health facilities to identify and to be aware of adverse outcomes of hypertensive disorders in pregnancy that sufficiently great improvement and also to reduce hospitalization and morbidity and mortality.

Moreover, it will be a good source of knowledge for clinicians like clinical midwifery practice, clinical educators and for the study participants to assist them in diagnosing and monitoring women with hypertensive disorders in pregnancy and as well as neonates born from hypertensive mothers and eventually enhance quality of care in the facilities in their region as well as the country as a whole. Furthermore, the data will be help as a baseline resource to conduct more studies not only in this study area, and starting point for other researchers who want to assess other working areas and regions but also Ethiopia as well.

1.4. Objectives

1.4.1. General Objective

- To assess the magnitude of adverse maternal and perinatal outcomes and its associated factors of hypertensive disorders in pregnancy (HDP) women who admitted and delivered in the public hospitals at Harari regional state Ethiopia for the last five years from August 1/2018 to July 31/2023

1.4.2. Specific objectives

- To determine the magnitude of adverse maternal outcomes among women with hypertensive disorder pregnancy.
- To assess factors associated with adverse maternal outcomes among women with hypertensive disorder of pregnancy.

- To determine the magnitude of adverse perinatal outcomes among women with hypertensive disorder pregnancy.
- To assess factors associated with adverse perinatal outcomes among women with hypertensive disorder of pregnancy.

2. LITERATURE REVIEW

2.1. The magnitude of hypertensive disorders of Pregnancy

2.1.1. Adverse Maternal Outcomes of HDP

Pregnancies complicated with hypertensive disorders are associated with maternal and perinatal adverse health outcomes (Siddique et al. 2021; Patel and Diwan 2022). HDP is associated with substantial both acute and long term maternal and neonatal complications, Severe HDP is a potentially life-threatening complication (PLTC, (Tura et al. 2020; Drechsel et al. 2022). Among others disorder categorized under HDP, pre-eclampsia and eclampsia the most prevalent severe complications, were the terms preeclampsia with severe features and eclampsia are an umbrella of Severe maternal and perinatal morbidity (like, sever hypertension, HELLP syndrome, stroke, cardiac, renal and hepatic diseases, DIC, oliguria, placenta abruption, pulmonary oedema,) and mortality and are one of the main obstetric complications that lead to adverse pregnancy outcomes, (Venkatesh et al. 2020), and maternal well-being.

The commonly reported outcomes include, cesarean delivery, preterm labor, High maternal admission and maternal deaths especially in LMIC (Ngwenya et al. 2019; von Dadelszen et al. 2021), increased induction and augmentation of labor (Drechsel et al. 2022), the favorable gestational age of pregnancy termination in severe preeclamptic-eclamptic mothers is from 37 to 40 weeks. Cesarean section was required for PE, SPE and eclampsia in 46%, 51% and 61% of patients respectively. According to WHO global survey on maternal and perinatal health, the overall In Britain, reported that there was a trend towards higher rates of caesarean section in pregnancies with hypertensive complications (Drechsel et al. 2022).

In China and Iran, caesarean delivery rate was significantly higher among women with HDP than those without it. In Nigeria women with hypertensive disorder were more likely to have a caesarean section than normotensive women, caesarean section rate among women that developed HDP in the study was 5 times higher than that of normotensive women. Women with hypertensive disorder were more likely to have induction and augmentation than normotensive women. In Nigeria; induction of labor among women with HDP was 5 times higher than that of normotensive women.

Secondary review done in USA shows that induction rate was high in hypertensive pregnancies at 35 weeks 53.6%, 36 weeks 66.7% and at 37 weeks 67.4% of gestation. A PLTC becomes a life-threatening complication (LTC) (i.e., a maternal near miss (MNM) and neonatal near miss (NNM), and the highest risk of maternal and perinatal mortality, if there are presenting signs of organ dysfunction (Prüst et al. 2021).

Pregnancy complicated by severe preeclampsia with one of the following features: cerebral symptoms (like visual disturbance, headache, right upper quadrant or epigastric pain, serum transaminase concentration >=twice normal, systolic blood pressure >=160 mm Hg, and or diastolic blood pressure >=110 mm Hg, severe thrombocytopenia (<100,000 platelets/micro), HDP is associated with substantial both acute and long-term maternal complications (Garovic et al. 2020).

The major adverse outcomes associated with preeclampsia/eclampsia are related to maternal central nervous system (CNS e.g. seizures), cerebral palsies, adult respiratory distress syndrome, HELLP syndrome, sepsis, DIC, pulmonary edema, Placental abruption (APH), PPH (bleeding related to thrombocytopenia), cardiovascular collapse, hypertensive encephalopathy, retinal detachment or cortical blindness, renal dysfunction (e.g., intracranial (cerebral) hemorrhage, hepatic (Liver) rupture or failure, renal failure), stroke, and Kidney (acute renal) failure in the worst cases cerebral oedema and the kidney deserves particular attention in the pre-eclampsia/eclampsia complication, because of the pathologic changes that can affect this vital organ during pregnancy (Li et al. 2022; de Moura et al. 2021).

Hemolysis elevated liver enzymes and low platelets (HELLP) syndrome is associated with an increased risk of maternal death and increased rates of maternal morbidities, such as pulmonary edema, acute renal failure, disseminated intravascular coagulopathy, abruptio placenta, liver hemorrhage or failure, adult respiratory distress syndrome, sepsis, and stroke. The development of HELLP syndrome in the postpartum period also increases the risk of renal failure and pulmonary edema. Renal failure complicating with eclampsia may result in prolonged renal insufficiency.

Eclampsia accounted for 67.2% of obstetrics causes of acute renal failure requiring dialysis. In addition, most common complications of eclampsia were HEELP (18.6%), liver injury 10.6%,

postpartum hemorrhage (9.6%), DIC (7.6%), and 10.2% of renal impairment. Pregnancy related complications like abruption placentae, HELLP syndrome are frequently associated and pose a risk to the mother as well as for the fetus. Research conducted in selected governmental hospitals at Addis Ababa showed that among 1089 mothers with preeclampsia/eclampsia 36% experienced at least one complication. One study stated that women older than 35 years were 2.54 times more likely to develop adverse maternal outcomes compared to those in the middle age group (20–35). Those patients with early onset of preeclampsia without severe features were 5.22 and 25.9 times more likely to develop maternal and perinatal complications respectively, compared to late-onset preeclampsia after 34 weeks.

The main adverse maternal complication outcomes were HEELP (39.5%), aspiration pneumonia (17.5%), pulmonary edema (17.5%) and abruption placenta (15.3%). Research in urban Ethiopia revealed 31.7% of the women had maternal complications of which (19.5%) progressed to preeclampsia with a severe feature. Similarly, three years of study at Ayder specialized hospital Ethiopia revealed poor maternal and perinatal outcomes were present in 40% and 25% of mothers with preeclampsia/eclampsia respectively (Yemane et al. 2021).

Disseminated Intravascular Coagulation one of the common causes of DIC is severe preeclampsia or HELLP syndrome, abruption, HEELP (Hemolysis, Elevated liver Enzymes, and Low Platelet=thrombocytopenia) syndrome, and maternal death was also considered as an adverse maternal outcome (Mostafa EL-Adl et al. 2021; Maged et al. 2020; Patel and Diwan 2022).

2.1.2. Adverse Perinatal Outcomes of HDP

In Ethiopia neonatal outcomes complication following by HDP are Premature newborn (preterm birth), low birth weight (LBW) (Getaneh et al. 2020), still births, low APGAR score, neonatal respiratory distress problems (Perinatal (birth) asphyxia, meconium aspiration syndrome (MAS) and Fetal growth restriction (FGR), Intra-uterine feta demise (IUFD), high NICU admission Neonatal Near-miss (NNM), early neonatal death and perinatal death (de Moura et al. 2021). Among the complications Low APGAR score, prematurity and LBW followed by perinatal asphyxia and neonatal sepsis are the commonest in Ethiopia. In research done at the Ayder Hospital, it was discovered that fetal outcome majorly still birth (5%), early neonatal death (3.8%),

low birth weight (23.2%), low APGAR score around 27.4% and around 18,6% were admitted to NICU.

Gestational age was also associated with the outcome variable, Pregnancies interrupted from 20 to 27 and 28 to 36 completed weeks were with high adverse perinatal outcomes when compared with pregnancies terminated from 37-40 weeks with the odds ratio of 9.6 and 5.4 respectively and also when pregnancies terminated from 37 to 40 weeks compared with pregnancies terminated at 41 and above weeks, it shows 80% less likely to develop adverse perinatal outcomes.

The study conducted at Wolaita Ethiopia in 2017 on neonatal and fetal outcomes revealed that parity, type of HDP, and high blood pressure were strongly associated with adverse fetal and neonatal outcomes. Null-parity, BP greater than 160/110, and preterm babies 5 times, while eclampsia 6 times more likely to develop adverse outcomes (Suleiman Obsa et al. 2019).

In China, the perinatal mortalities at 28-29+6 weeks of pregnancy at three regions in China were 48.93%, and at 30-31+6 weeks of pregnancy were 22.46% respectively, which were different and higher than the national average, And the perinatal mortality in East China, were 19.33%, which was lower than the national average, Therefore, for all perinatal infants, stillbirths accounted for 81.09% of perinatal infant deaths, and neonatal death accounted for 18.91% (Lyu et al. 2021; Wu and Zhang 2021). The morbidity of HDP varies widely worldwide: 0.5%-2.3% in Africa, 0.2%-6.7% in Asia, 2.8%-9.2% in Oceania, 2.8%-5.2% in Europe, 2.6%-4.0% in North America, and 1.8%-7.7% in South America and the Caribbean, Among the various subtypes of HDP, the highest is preeclampsia, which is 2.61%, and it accounts for 55.02% of the total cases (Lyu et al. 2021).

Hypertensive disorders of pregnancy were associated with a significant increase of low-birth-weight babies elsewhere Globally, the overall prevalence for low birth weight associated with preeclampsia/ eclampsia was 33.8% and it was significantly affected by pre-eclampsia/eclampsia. It was 38.9%, 52.5% and 30.5% in Africa, Asia and Latin America respectively. In 2019 a study at Haiti found that among women who had HDP, the adjusted odds of having a low-birth-weight baby were four times than for women without HDP, more than three times for stillbirths.

The rate of prematurity was reported to be 58.2% in Algeria. It was 26.7%, 27.3% and 20.9% in Africa, Asia and Latin America respectively. The highest prevalence of preterm birth associated

with preeclampsia/ eclampsia was found in Angola and it was 76%. Retrospective hospital-based study to determine feto-maternal outcomes of HDP at Yekatit-12 hospital in Ethiopia with high share of preeclampsia and eclampsia (73.6%) found that preterm deliveries were 29.5%, out of which preeclampsia and eclampsia accounted for 89%, and need for neonatal resuscitation support and referral to NICU was 15% and 11.5% respectively (Mengistu and Kuma 2020). A study at Debre Birhan referral hospital showed Preterm delivery, LBW, and IUGR happened in 35.4%, 39.4%, and 8.5% of the cases of HDP respectively; 78.6% of them were from women with severe preeclampsia.

Other complications encountered in cases of HDP included: fetal death (30.8%) of which 54.3% and 38.9% occurred by severe preeclampsia and eclampsia respectively. Research conducted at selected hospitals in the Amhara region found that 46.5% of babies from mothers with severe preeclampsia and eclampsia ended up with adverse outcomes. The main causes were stillbirth 22.6 %,13% of LBW, low APGAR score 10.8%, IUGR 4.4%, preterm birth (10.8%), and 10% of birth asphyxia. A retrospective study at Yekatit-12 teaching hospital, Ethiopia revealed that there was a statistically significant association between the severity of hypertensive disorders and prematurity (Olarinoye et al. 2021; Tabassum et al. 2022).

2.2. Factors associated with hypertensive disorders of pregnancy (HDP)

As hypertensive disorders of pregnancy are progressive and multiple cause disorders, there are different predisposing factors suspected to facilitate the development of the HDP (Ohkuchi and Ichihara 2022) There are well identified risk factors of these include socio-demographic, nutritional and lifestyle, familial, Reproductive, obstetric and Maternal medical history of illness and related variable factors like, External/Exogenous and Miscellaneous risk factors. Factors that influence outcome include gestational age at onset and delivery (Irene et al. 2021), severity of disease (Signifi et al. 2021) and whether there are coexisting conditions present, such as multiple gestation (Hayes-Ryan et al. 2020), diabetes mellitus, renal disease, thrombophilia, being overweight and having obesity or preexisting hypertension increased risk of HDP and its adverse maternal and perinatal outcome (Qasim et al. 2022; Battarbee et al. 2020).

2.2.1. Medical illness factors

Maternal specific Risk Factors and Pregnancy specific risk factors A family history of pre-eclampsia increases the risk of pre-eclampsia substantially and women whose mothers have pre-eclampsia are more likely to have pre-eclampsia (Saleem et al. 2022). A cross-sectional study conducted in Dessie Referral Hospital in Ethiopia showed that those women with family history of hypertension had about 7.2 times higher odds of developing preeclampsia.

Different studies identified chronic hypertension and gestational hypertension (GHTN) are as a risk factor for preeclampsia/eclampsia (Magee, Nicolaides, and von Dadelszen 2022; Yemane et al. 2021). Women with Pre-existing medical conditions like chronic hypertension or diabetes mellitus, those women with family history of diabetes mellitus and HTN had 2.4 times higher odds of developing preeclampsia, and the other anti-phospholipid syndrome, kidney disease, obesity and deficient nutritional status are at a substantially higher risk of pre-eclampsia (Tsakiridis et al. 2021).

WHO Global survey on maternal and perinatal health identified severe anemia as a significantly risk factor associated with higher pre-eclampsia/ eclampsia. According to study in Bahir Dar City, Ethiopia women who had anemia during the first trimester had pre-eclampsia 2.5 times higher than their counterparts (Chavan et al. 2022).

2.2.2. Reproductive factors

Women who have menstruation by age less than twelve years have the greater risk to have HDP than women who had menstruation by age more that twelve years. There are also different percentage of occurrence among married women at age less than 18 years and above 18years, among preeclamptic cases woman who married at the age of less than 18 years accounts 80% (Li et al. 2022). Studies documented that mothers inter pregnancies' interval<3 years were at a higher risk of developing preeclampsia/eclampsia (Suleiman Obsa et al. 2019).

Moreover, women who had their first conception within one year of their marriage were at risk of developing preeclampsia/eclampsia more than 10 times compared to those who had their first conception after one year of marriage Extreme maternal age In China age of >35 years was a risk

factors for HDP and Pregnant women aged 25–29 years had the lowest risk of HDP (Asefa et al. 2020). A study that shows hormonal contraceptive methods was one factors for HDP (Moreno et al. 2021).

2.2.3. Obstetric factors

Antenatal care (ANC) non-attendance and inadequate antenatal supervision or no utilization of antenatal care services were reported as a significant risk factor of preeclampsia/eclampsia. Parity (most common First pregnancy) and gravid greater than five, Study done in southern Brazil showed that, first pregnancy (nulliparous/primiparous) women have high risk to develop and the main cause of HDP. Regarding to gestational age, gestational age more than 30 weeks is the higher risk of HDP when compared to gestational age between 20-30 weeks (Venkatesh et al. 2020).

Preeclampsia in a previous pregnancy is a strong predictor of preeclampsia/eclampsia in a subsequent pregnancy, especially given an early gestational age at first delivery. However, Fetal malformations, Sex of new born (Female) are the possible risk factors to develop HDP (Saleem et al. 2022).

2.2.4. Management factors

Magnesium sulphate (MgSO4) administration has proven effective in the prevention of morbidity and mortality from hypertensive disorders. Study conducted in Tamal showed that administering antihypertensive medications to preeclamptic pregnant women improves maternal hemodynamic profile, can help reduce the risk of severe hypertension and improve maternal outcomes(di Pasquo et al. 2024). A study in Southern Ethiopia found that 40% of severe preeclampsia cases did not receive timely antihypertensive treatment, worsening outcomes(Jikamo et al. 2022).

Magnesium sulfate administration during pregnancy, for women with pregnancy induced hypertension is associated with a reduction in adverse maternal and perinatal outcomes, including seizure prevention, fetal neuroprotection, and potentially improved perinatal outcomes(Birungi et al. 2024). A study in Tigray found that only 45% of health centers had $MgSO_4$ available when needed, leading to untreated severe preeclampsia and increased eclampsia cases(Kassa et al. 2023).

2.4. Conceptual Framework

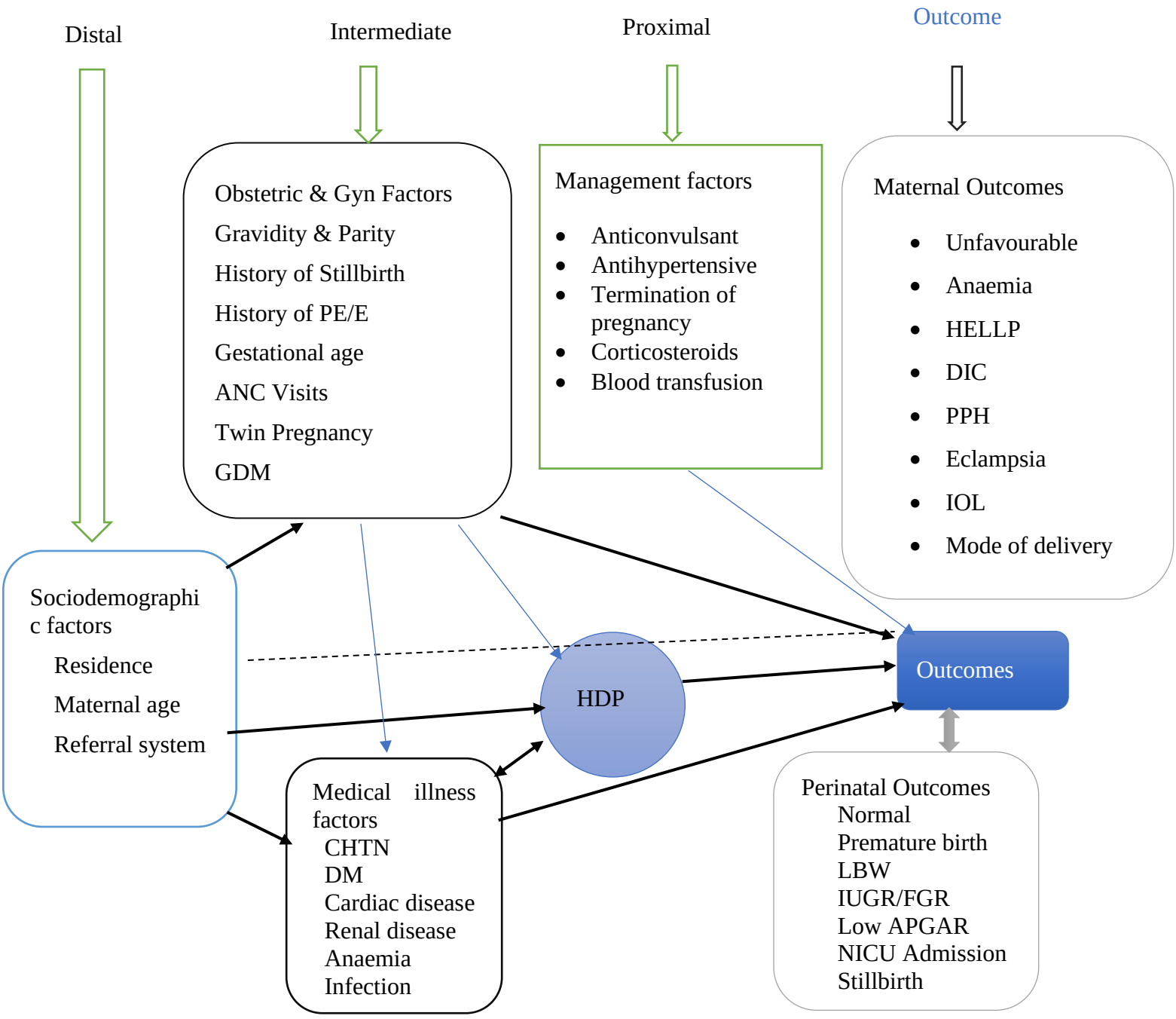

Figure 1: Conceptual Framework for the study of Adverse Maternal and Perinatal Outcomes and its Associated Factors of Hypertensive Disorders in Pregnancy (HDP) Women who admitted and delivered in Public Hospitals at Harari Regional State Ethiopia. This conceptual frame work developed by the investigator through reviewing different literatures.

3. METHODS AND MATERIALS

3.1. Study Area and Period

The study was conducted in Harari regional state at public hospitals. A 5-year retrospective cross-sectional study was conducted from the reviewing of patient medical records review of women with hypertensive disorder of pregnancy who are admitted and attended delivery from August 1/2018 to July 31/2023 was carried out at Gynaecological, Obstetrics centre and Central ICU of Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH) and Jugel General Hospital (JGH) in Harar Ethiopia during the study period from August 26/2023 to September 22/2023. Hiwot Fana is a comprehensive tertiary-hospital integrated with the College of Health and Medical Sciences of Haramaya University in Harar Whereas Jugal General Hospital is also a regional public hospital found in the same city.

3.2. Study design

Institutional based retrospective cross-sectional study design was conducted.

3.3. Population

3.3.1. Source Population

All women who delivered and admitted with Hypertensive Disorders of Pregnancy at HFCSUH and JGH in the study period.

3.3.2. Study Population

All women with HDP admitted and delivered at HFCSUH and JGH from August 1/2018 to July 31/2023.

3.4. Eligibility criteria

3.4.1. Inclusion Criteria

All women admitted who are diagnosed with HDP in HFCSUH and JGH and given birth during the study period was included.

3.4.2. Exclusion Criteria

Pregnant women's incomplete card and women admitted who are diagnosed with HDP and gave birth but who do not have a complete record (incomplete charts), come after delivery, died on arrival, lost cards and patient transferred to other hospitals was excluded from the study.

3.5. Sample Size Determination and Sampling Technique

3.5.1. Sample Size Determination for Objective One

The sample size was calculated by the using single population proportion formula by assumptions taking the prevalence and determinants of pregnancy outcomes among mothers with hypertensive disorders at Woliso Saint Luke Hospital Southwest Ethiopia 18.8% (WB, ET, and L 2022) , 95% level of confidence, margin of error 3%

$n = (Z_{\alpha/2})^2 p(1-P) = (1.96)^2 * 0.188(1-0.188) = 651.6$

$d^2 \qquad (0.03)^2$

By adding 10%= 65.2 contingency for the (non-response rate),

The Total sample size is =717 Assumptions were,

n= required sample size will be studied (the number of HDP women will be to participate in the study).

Z= 1.96 at 95% of Confidence level

p= 18.8% = (0.188) since the prevalence and determinants of pregnancy outcomes among mothers with hypertensive disorders at Woliso Saint Luke Hospital Southwest Ethiopia was 18.8% (WB, ET, and L 2022)

q= 1-p

d= absolute precision (margin of error), taken as 3% = $(0.03)^2$ = 0.0009

3.5.2. Sample Size Determination for Objective Two

A double population proportion formula is used to determine the sample size for the second objective of this study and various factors significantly associated with adverse maternal and perinatal outcome variable are considered by using Epi-info version 7 software Stat-Cal for cross-

sectional study by considering the following assumptions; 95% confidence level, the margin of error 5%, Power; 80% and 10% of non-response rate. Accordingly, for the first and second objectives the sample size is calculated and the larger sample size will be used for this study.

Table 1: Sample size determination for factors associated with adverse maternal and perinatal outcomes of HDP using for the second objective at public hospitals in Harari Regional State Ethiopia 2023.

Adverse Maternal and Perinatal outcome of HDP of Pregnancy					
Associated factor	Exposed	Unexposed	Sample	10% NR	Reference
History of PE/Eclampsia	47.8 (having history of preeclampsia/eclampsia)	21.7 (no history of preeclampsia/eclampsia)	118	130	(Asefa et al. 2020)
Gestational Age (GA)	24.7 (GA>34)	7.8 (GA<34)	172	189	(Legesse et al. 2019) (Asefa et al. 2020)
Parity	36.6 (primigravida)	17.5 (multigravida)	188	207	(Haile et al. 2021)

Then the maximum sample size for the second objective is 207 which is lower than that of sample size of first objective with sample size of 717 is greater than the sample size of the second objective. So, Generally, sample size has been calculated for the first and second objectives and the largest and the final sample size 717 is selected for the study from the first objective.

3.5.3. Sampling Technique and Sampling Procedures

The two hospitals selected purposively due to their high cases flow and by default there is no other public hospitals which are found in Harari Region except the two Hospitals. The cases that fulfil the inclusion criteria by systematic random sampling (SRS) was used to select study participants as they are diagnosed to have HDP. According to the annually report From HMIS report, admission and delivery registration books, Let say for example, a sample size of more than 8648 women with

HDP from total delivery of 45000 were expected to meeting the selection criteria for the study are include in both hospitals with in consecutive 5-years of the study period. i.e., HFCSUH has annual delivery of 5500*5-years =27500 while JGH has annual delivery of 3500*5-years =17500

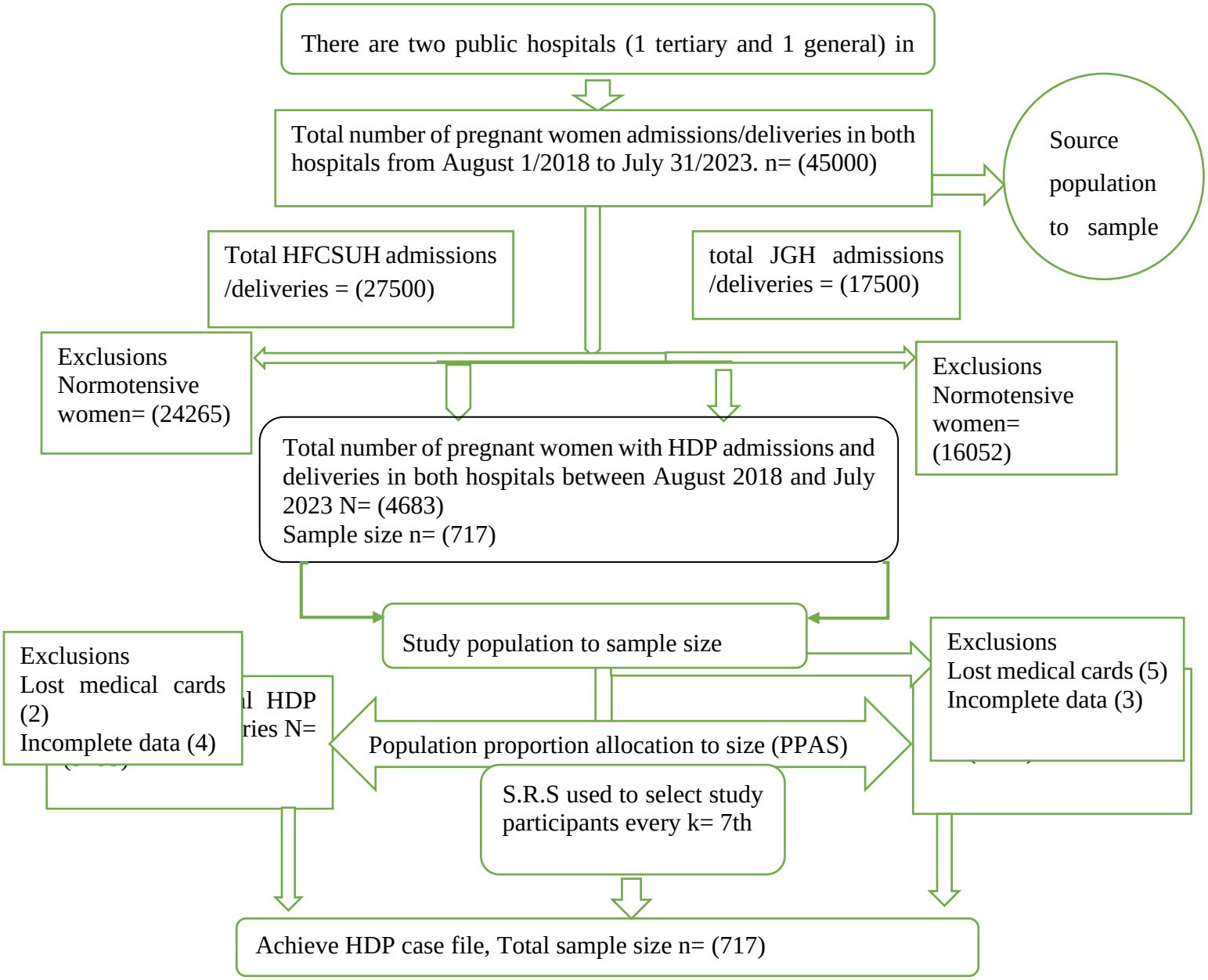

Figure 2: Schematic presentation of the sampling procedure to select study participants for Adverse Maternal and Perinatal Outcomes and its Associated Factors of Hypertensive Disorders in Pregnancy (HDP) from public Hospitals (HFCSUH and JGH) at Harari Regional State Ethiopia.

3.6. Study Variables

3.6.1. Dependent Variables

The dependent variables are HDP, adverse maternal and perinatal outcomes and its associated factors of hypertensive disorders in pregnancy (HDP) are defined as the mother and perinatal conditions after diagnosed by HDP with favorable or adverse outcomes. Favorable outcomes: patient with HDP who's managed expectantly and improved from adverse outcomes.

Adverse outcomes: Are defined as women admitted with HDP like preeclampsia/Eclampsia and managed expectantly and has at least one complication of the following.

The presence or absences of maternal adverse outcomes are will be coded as yes (1) or no (0). These included: Antepartum hemorrhage (APH) due to placenta abruption (AP), postpartum hemorrhage (PPH), and acute maternal morbidity included the diagnosis of any of the following: renal dysfunction/ failure, acute pulmonary oedema, HELLP syndrome, DIC, shock, respiratory failure, and requirement for intubation/ventilation, induction of labor (IOL), caesarean delivery (C/S), instrumental delivery (vacuum or forceps), Spontaneous Vaginal Delivery (SVD), admission to intensive care unit and maternal death. Perinatal adverse outcomes include: respiratory distress syndrome (RDS), preterm birth, still birth, low birth weight (<2500g), IUFD, perinatal death and early neonatal death.

3.6.2. Independent Variable

Socio-economic and demographic Variables: maternal age and residence area urban, rural and referral system, Reproductive and Obstetric history: parity, antenatal care follow up and visits, gestational age, multiple pregnancy, family history, early marriage, history of stillbirth, management related factors: anticonvulsant, antihypertensive, antenatal corticosteroid, antibiotics, blood transfusion, ICU admission, management option of HDP, onset of labor (spontaneous, induced, and elective c/s), and mode of delivery (SVD, C/S Instrumental VD) Pre-existing medical conditions: such as previous chronic hypertensions, DM, anemia, oliguria and history of cardiac problems.

3.7. Operational Definition of Outcome measures

Incomplete charts are a chart lack of birth summary like birth weight, Apgar score, stillbirth, IUFD, NICU admission, birth asphyxia, meconium aspiration syndrome PTB and term birth etc. and maternal admission chart, order sheet, discharge summary, delivery summary, maternal vital sign sheet, PE/Eclampsia chart, Lab request paper such as CBC, U/A, organ function test, medication sheet and discharge summary.

A pregnant woman: Is a woman who has a development of one or more offspring known as an embryo or fetus in her uterus (Mostafa EL-Adl et al., 2021).

Hypertension: Systolic blood pressure >=140mmHg and/or diastolic >=90mmHg that is measured at least two times within four hours interval (Agrawal and Wenger, 2020).

Chronic hypertension: Hypertension occurs before pregnancy or diagnosed before 20 weeks of gestation for the first time.

Chronic hypertension with superimposed preeclampsia: Occurrence of proteinuria in women with chronic hypertension before 20 weeks of gestation (Tsakiridis et al., 2021).

Pregnancy induced hypertension (PIH): Hypertension arising de novo which Elevated Bp (>=140/90 mm Hg) at or after 20 weeks of gestation without proteinuria (Gudeta and Regassa 2019).

Preeclampsia: Gestational hypertension plus proteinuria

Early onset of preeclampsia: Is defined as a pregnant women diagnosed with preeclampsia before 34 weeks of gestation (Resident -, Gainder and Debarshi, 2020).

Late onset of preeclampsia: Is defined as a pregnant women diagnosed with preeclampsia >=34 weeks of gestation

Sever preeclampsia: Blood pressure of ≥100/160mmHg in four hours apart measurement with protein urea ≥5mg urine collection and multi-organ injury (Bahri and Suheimi, 2019).

Eclampsia: Is defined as preeclampsia with convulsion (Peraçoli et al. 2019)

HELLP Syndrome: A syndrome of hemolysis (H) elevated liver enzymes (EL) and low platelet count (LP) <100,000/micro-litter (Siddiqui, Saxena *, and Gupta Kumkum 2021)

Postpartum Pre-eclampsia/Eclampsia (PP-PE/E): When diagnosed immediately after delivery the fetus and the placenta until 42 weeks of postpartum periods (Giorgione et al., 2021).

Gestational age: The duration of gestation is measured from the first day of the last menstrual period and is expressed in completed weeks

Placental abruption: Premature separation of the placenta from underlying myometrium resulting in pain, bleeding and potentially clinically significant interruption of fetal gas and nutrient exchange, is more common in women with chronic hypertension (Johnson et al. 2020).

Postpartum hemorrhage: Estimated blood loss (EBL) was defined as >=500 ml for vaginal births or >=1000 ml for cesarean births.

Hospitalization: Prolonged or increase maternal hospital stay was defined as more than 7 days.

Pregnancy outcomes: Will be defined as health condition of both the mothers and newborns after diagnosed with HDP are favorable or adverse outcomes

Maternal outcome: Will be defined as condition of the mothers after diagnosed with HDP are favorable or adverse outcomes (Asefa et al., 2020; WB, ET and L, 2022).

Favorable maternal outcomes: Maternal and perinatal well-being despite pregnant women with HDP they start spontaneously onset of Laboure, or termination of pregnancy without onset of Laboure, or managed expectantly or definitely managed or finally improved from adverse outcomes (Mandal and Roy, 2021).

Adverse maternal outcomes: Are defined as women admitted with HDP will be bad if the mothers and the neonate who had develop at least one of the following adverse maternal outcomes (abruption of placenta, HEELP syndrome, DIC, abortion/miscarriage, acute renal failure, cardiac failure, postpartum hemorrhage (PPH), stroke, pulmonary oedema, coagulopathy, abortion, prolonged hospital stays, and maternal death) (Legesse et al. 2019; WB, ET, and L 2022) and

Maternal death: The death of a woman while pregnant or within 42 completed days of termination of pregnancy irrespective of duration and site of pregnancy, from any cause related to

or aggravated by the pregnancy or by its management (direct cause) but not due to accidental or incidental causes (indirect cause). So, it is defined as women admitted with HDP in hospital and finally died at discharge (Willcox et al., 2020).

Adverse perinatal outcome: Refers to fetal/newborns who had any abnormality deviation from normal wellbeing at least one of the following complications like, low birth weight, stillbirth, intrauterine growth restriction, intrauterine fetal death (IUFD), preterm birth, low APGAR score, birth asphyxia, and NICU admission (Legesse et al., 2019; WB, ET and L, 2022).

Preterm delivery: Birth of baby after age of viability or twenty-eight weeks of gestation in Ethiopian context but before 37 completed weeks of gestation.

Preterm period: Refers to less than 37 completed weeks of gestation.

Neonatal Death: The death of a baby that occurs at less than 28 days of age with a birth weight of 500gms and more.

Low birth weight: Birth weight of less than 2500 grams. The weight of a new born infant obtained preferably with in one hour of birth.

Low-APGAR-score: <=7 within the first 1 minute and 5 minutes (Legesse et al., 2019).

Live birth: Live birth has occurred when the new born infant breathes or shows any sign of life such as, heartbeat, pulsation in the umbilical cord or movements of voluntary muscles.

Perinatal death: The death of a fetus or neonate in the perinatal period (from age of viability or twenty-eight weeks of gestation in Ethiopian context to the first week of life after birth/seven completed days after birth). It is the sum of stillbirths and early neonatal deaths (Willcox et al., 2020).

Stillbirth (Stillborn): Is defined as a baby born with no signs of life, that has died in the womb after (gestational age of ≥22 weeks, a birthweight ≥500g), or crown–heel length ≥25 cm or ≥28 week of gestation or ≥100g, or stillbirth is the fetus born with no sign of life after 28 weeks of gestational age (Magee, Nicolaides, and von Dadelszen 2022).

Early neonatal death: Is defined as the death of a live born during the first 7 days of life. Late neonatal Mortality: The death of a live born infant after 7 completed days, but before 28 completed days after birth.

Fetal growth restriction (FGR): Defined as absolute or estimated weight less than the 10th percentile for gestational age-based population norms (Sk, Santosh, and Mishra 2021).

3.8. Data Collection Methods

3.8.1. Data Collection Tool

Data was collected from record review from medical records after discharge using standardized and validated pre-tested questionnaire. A questionnaire was prepared and adopted from the other study by reviewing different literatures, which including WHO, DHS, and other documents which are related to HDP. Then using the designed structured questionnaires English version. All relevant information, data regarding HDP, clinical findings, laboratory results, and each patient's Adverse Maternal and Perinatal outcomes and its Associated Factors of HDP data was collected and extracted from the patient's history file, admission and delivery registration books in the study period.

3.8.2. Data collectors

Trained nurse and midwives collected the data under the supervision and other senior researchers from the College of Health and Medical Sciences, Haramaya University was enrolled as data collectors and supervisor respectively in the two hospitals.

3.8.3 Data Collection Procedures

After ethical clearance letter was given to HFCSUH and JGH medical directors and hospitals HMIS and confirms the legal staging of letter the medical registration number of cases are was identified and retrieve from admission and delivery registration then five card log workers are enrolled to withdraw desired records of cases.

3.9. Data Quality Control measures

To assure the quality of data, a close supervision was maintained by supervisors and the principal investigator during data collection procedures. Training was given for data collectors and

supervisors about two days before data collection. A clear explanation about the purpose of the study is provide for the secondary data at the beginning of the review. Any ambiguities or unclear ideas during the data collection process was resolved by having a discussion with data collectors, supervisors and principal investigator. Day to day activities during data collection was supervised and evaluated and errors are corrected by the investigator before the following day activities.

A pretest was conduct with 15% of the total sample size in both HFCSUH and JGH Hospitals, the data from each review of secondary data before one week of prior to the actual data collection in other hospitals in order to assure its clarity, logical sequence, feasibility, consistency and any ambiguousness of measuring important variables in the questionnaire by the data collectors and principal investigator. Then by considering based on the result of the pretest, some modifications were carried out on variable measurement, such as adding a new variable and deleting the existing variables are done when a threat in measurement feasibility (difficulty of measuring) or consistency is notice.

3.10. Data Analysis

Descriptive statistics using frequencies, percentages and Outcome summaries used to describe characteristics of participants. The maternal and perinatal outcome data was checked for completeness, coded, cleaned for inconsistencies and missing values, entered and analyses by using Stata version 17. A binary logistic regression was performed separately to identify HDP with maternal and perinatal outcomes. The observations were assumed to be independent. first a binary logistic regression is done by assuming clinically important variables and variables which are found to be associate with maternal outcome and neonatal outcomes from previous study and accordingly those variables which are significant were entered into the multivariable logistic regression model and adjusted odds ratio (AOR) with 95% confidence interval was used to describe the variable that is independent predictor of the outcome variable. Univariate logistic regression is performing to identify the association between each independent and dependent variable.

All the assumptions were assumed to be met and finally those variables which are significant in binary logistic regression analysis are regressed together. All predictor variables associated with adverse pregnancy outcomes after univariate analysis is further candidate for multivariable logistic

regressions analysis. Effect of multi-collinearity is checked and ruled-out. Finally, statistical significance and 95% confidence level are used to identify independent effect of predictor variables on maternal and perinatal outcome of mothers with HDP.

3.11. Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. The study protocol was reviewed and approved by the Institutional Health Research Ethics Review Committee (HU-IHRERC) of Haramaya University College of Health and Medical Sciences. Data was collected and extract from client folder charts women admitted with HDP and given birth in the study period. Voluntary, written, and signed informed consent was take from head of public hospitals. The information that provided was kept confidential. There was no information that was identified the participants data in particular. The findings of the study were generalized for the study community and that was not reflected anything particular of individual persons. The checklists were coded to exclude showing names. I have also informed that the hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the hospital's premises.

4. RESULTS

4.1 **Socio demographic factors**

A total of 703 out of 717 women with pregnancy induced hypertension charts were reviewed in the study with 98.32% response rate. The mean age of participants was 24.73 years (±6.3 SD) with the range of 15 to 48 years. Three hundred ninety-nine (56.76 %) women were rural residents and 460 (65.43%) women with PIH were referred from hospital and admitted to HFCSUH (Table 2).

Table 2:Socio-demographic characteristics of women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Variables	**Category**	**Frequency**	**Percent**
Age in years	<20years	156	22.19
	20–34 years	466	66.29
	>35 years	81	11.52
Residence	Urban	304	43.24
	Rural	399	56.76
Referral status on arrival	Self-referred	156	22.19
	Referred from health center	87	12.38
	Referred from hospital	460	65.43

4.2 Obstetrics and Gynaecologic factors

From total study participants, two hundred one (28.59%) of the women were multiparous and 353(50.21%) of the women were primigravida. From 703 women, 88(25.88%) were had previous history of abortion and seventy-three (10.38%) were had prior history of PIH. More than one third

(69.70%) of women were ANC follow up for the current pregnancy and of these around half (44.67%) were had at least two ANC visits (Table 3).

Table 3: Obstetrics and Gynecologic factors of women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Variables	Category	Frequency	Percent
Parity	Nullipara	362	51.49
	primipara	140	19.91
	Multipara	201	28.59
Gravidity	Primigravida	353	50.21
	Multigravida	350	49.79
History of abortion	Yes	72	21.49
	No	263	76.51
History of stillbirth	Yes	88	25.88
	No	252	74.12
ANC follow up	Yes	490	69.70
	No	213	30.30
Number of Gestations	Singleton	621	88.34
	Twin	82	11.66
Past medical history	Yes	49	6.97

	No	654	93.03
Prior history of PIH	Yes	73	10.38
	No	630	89.62
Type of pregnancy induced hypertension	GHTN	15	2.15
	Mild preeclampsia	19	2.73
	Sever preeclampsia	314	45.05
	Eclampsia	306	43.90
	Postpartum PE/EC	43	6.17

4.3 Maternal and perinatal outcomes

Trends of maternal and prenatal outcome from 2018-2023.

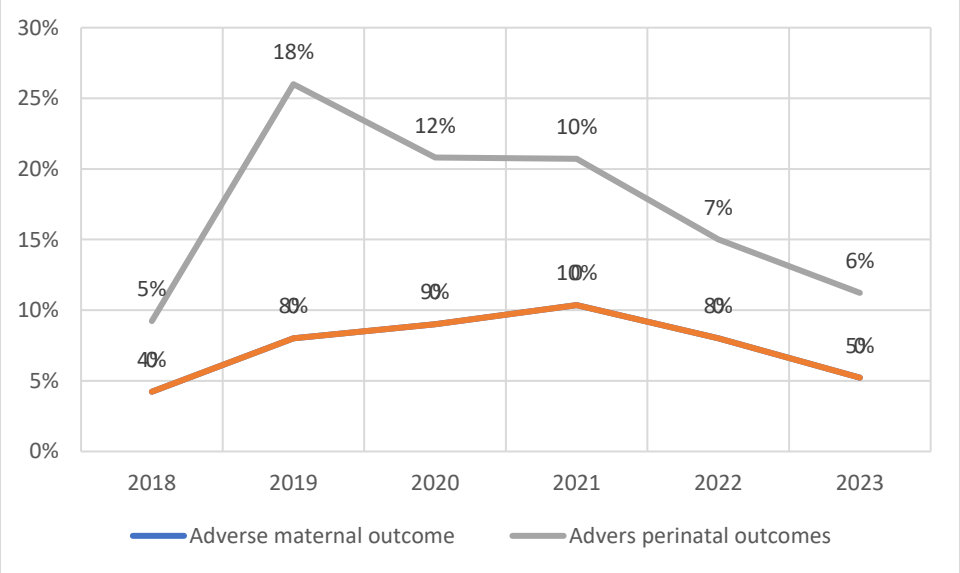

Figure 3: Trends of adverse maternal and prenatal outcome from 2018-2023.

Of 703 study participants, the overall incidence adverse maternal outcomes among the study participants were 315 (44.81%) with 95% CI, (41.08%- 48.57%). From the total of women who had adverse maternal outcomes, 70 (9.96%) had APH, 138 (19.63%) had PPH, and 169 (24.96%) were delivered by caesarean section (Table 4).

Regarding to perinatal outcomes, four hundred nine (58.18%) with 95%CI, (54.43%-61.85%) had adverse fetal outcomes. From these those with adverse outcomes, 118 (16.79%) were still birth, 324 (46.09%) were preterm birth, and 298 (42.39%) were low birth weight (Table 4).

Table 4: Maternal and perinatal outcomes of women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Outcome measures	Category	Frequency	Percent (%)
1. Maternal complications			
APH	Yes	70	9.96
	No	633	90.04
PPH	Yes	138	19.63
	No	565	80.37
HELLP	Yes	89	13.94
	No	605	86.06
Eclampsia	Yes	306	43.53
	No	397	56.47
DIC	Yes	26	4.78
	No	518	95.22
Anemia	Yes	475	87.32
	No	69	12.68
Cesarean Delivery	Yes	169	24.96
	No	534	75.96
Instrumental delivery	Vacuum	54	71.05
	Forceps	22	28.95
Maternal condition	Stable	443	63.02

	Near miss	224	31.86
	Death	36	5.12
2. Fetal complications			
Stillbirth	Yes	118	16.79
	No	588	83.64
Intrauterine growth restriction (IUGR).	Yes	60	8.53
	No	643	91.47
Preterm birth	Yes	324	46.09
	No	379	53.91
NICU admission	Yes	615	87.48
	No	88	12.5
Low APGAR score	Yes	517	73.54
	No	186	26.46
Birth Asphyxia	Yes	372	52.92
	No	331	47.08
Low birth weight	Yes	298	42.39
	No	405	57.61

4.4 Management related factors

Regarding to the management of pregnancy induced hypertension, out of 703 women six hundred eight nine (98%) were treated with anticonvulsant, 584(83.79) were treated with antihypertensive and 592(84.57%) were treated with antibiotics. Out of these three hundred six women (43.97%) were gave birth through vaginal deliveries (Table 5).

Table 5: Management related factors of women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Variables	Category	Frequency	Percent
Anticonvulsant	Yes	689	98
	No	14	2

Antihypertensive	Yes	584	83.79
	No	113	16.21
Antenatal Corticosteroids	Yes	403	57.57
	No	297	42.43
Antibiotics	Yes	592	84.57
	No	108	15.43
Blood transfusion	Yes	215	30.58
	No	488	69.42
ICU admission	Yes	36	5.12
	No	667	94.88
Management option of HDP	Expectant Management	83	11.86
	Immediate Termination	617	88.14
Onset of labor	Spontaneous	220	32.59
	Induced	317	46.96
	Elective C/S	138	20.44
Mode of delivery	SVD	306	43.97
	C/S	313	44.97
	Instrumental VD	77	11.06

4.5 Factors associated with unfavourable maternal outcomes

In the bivariate analysis at p-value of <0.25 maternal residence, ANC follow up, gravidity, and eclampsia, have shown significant association with adverse maternal outcomes. In multivariable logistic regression model, ANC follow up, gravidity, and eclampsia was significantly associated with adverse maternal outcome at p value of <0.05 significance level and 95% confidence interval.

Women who didn't had ANC follow up were 1.86 times more likely to develop adverse maternal outcome than women who had ANC follow up during pregnancy. Primigravida women were approximately 1.57 times more likely to have adverse maternal outcome than multigravida women. Women who had previous history of medical disease were 1.91 times more likely to develop

adverse maternal outcome than women who didn't history of medical disease. Women who referred from health facility to reach this hospital were 1.68 times more likely to develop adverse maternal outcome than their counterparts (Table 6).

Table 6: Factors associated with adverse maternal outcomes among women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Variable	Category	Adverse Maternal outcome		COR (95%Cl)	AOR (95%Cl)	P-value
		Yes	No			
Residence	Rural	192	207	1.36(1.00-1.84)	0.98 (0.70 -1.38)	0.939
	Urban	123	181	1	1	
ANC follow up	No	119	94	1.89(1.37-2.62)	1.86(1.31-2.64)	0.0001
	Yes	196	294	1	1	
Gravidity	Primigravida	178	175	1.58(1.17- 2.13)	1.57(1.16 - 2.15)	0.010
	Multi gravida	137	213	1	1	
Arrived by referral	Yes	283	264	1.92(1.32 - 2.79)	1.68(1.13 - 2.50)	0.004
	No	51	105	1	1	
History of Medical disease	Yes	291	267	1.85(1.26-2.72)	1.91(1.28 - 2.83)	0.001
	No	97	48	1	1	
Anaemic during this pregnancy	Yes	276	245	1.42(1.01 -2.01)	1.01(0.65 - 1.57)	0.971
	No	112	70	1	1	

4.6 Factors associated with adverse perinatal outcomes

In the bivariate analysis at p-value of <0.25 maternal age, maternal residence, ANC follow up, gestational age, mother having eclampsia, mode of arrival and having history previous PIH have shown significant association with adverse perinatal outcomes. In multivariable logistic regression model, maternal age, maternal residence, gestational age, and mother having eclampsia was significantly associated with adverse perinatal outcome at p value of <0.05 significance level and 95% confidence interval.

Neonates whose mothers from rural area were 1.59 times more likely to develop adverse perinatal outcome than neonates from urban resident women. Neonates whose mothers age less than 20

years were 1.60 times more likely to develop adverse perinatal outcome than neonates whose mothers' age from 20 to 35 years. Neonates whose mothers gave birth before 34 weeks of gestational age were 2.12 times more likely to develop adverse perinatal outcome than neonates whose mothers' who gave birth at term. Neonates whose mothers gave have eclampsia were 2.50 times more likely to develop adverse perinatal outcome than neonates whose mothers' have no eclampsia.

Table 7: Factors associated with adverse perinatal outcomes among women with PIH admitted to public hospitals in Harari regional state, Eastern Ethiopia, 2024 (n=703)

Variables	Category	Adverse Perinatal outcome		COR (95%Cl)	AOR (95%Cl)	P-value
		Yes	No			
Age	>35 years	40	32	1.04(0.64- 2.86)	1.60(1.07-2.38)	0.021
	<20years	121	52	1.97(1.35- 2.86)	1.05(0.61-1.78)	
	20–34 years	248	210	1	1	
Eclampsia	Yes	219	87	2.74(1.99- 3.76)	2.50(1.75-3.56)	0.000
	No	190	207	1	1	
Residence	Rural	260	139	1.94(1.43- 2.63)	1.59(1.13-2.23)	0.007
	Urban	149	155	1	1	
Gestational age at dx	<34	141	74	2.09(1.47- 2.97)	2.12(1.45-3.08)	0.000
	34-36	105	41	2.81(1.85- 4.27)	3.18(2.05-4.95)	0.000
	≥37	163	179	1	1	
Mode of arrival	Referral	72	84	1.87(1.30- 2.68)	1.13(0.75-1.70)	0.536
	Self	337	210	1	1	
Prior history of PIH	Yes	31	42	1	1	
	No	378	252	2.03(1.24-3.31)	1.42(0.83-2.43)	0.198

5. DISCUSSION

The study aimed to assess the magnitude of, maternal and perinatal adverse outcomes due to hypertensive disorders of pregnancy women who admitted and delivered at selected health facilities in Harar Ethiopia. Our study pointed out that the overall prevalence adverse maternal outcomes was 44.81% and adverse perinatal outcomes were found to be 58.18% of mothers. Adverse maternal outcome was significantly associated with ANC follow up, gravidity, and eclampsia. Maternal age, maternal residence, gestational age, and mother having eclampsia was associated with adverse perinatal outcome.

Our study pointed out that the overall prevalence adverse maternal outcomes was 44.81% with 95% CI, (41.08%- 48.57%). This study is consistent with the study conducted in Tigray (46.88%) (Syoum et al. 2022). Lower than the study conducted on selected tertiary hospitals in Ethiopia (80.2%) and in Addis Ababa (56.8%) (Godana et al. 2021, Tadese et al. 2024). Variations in the severity of the disease, variations in severity signs and symptoms at admission, study period, and gestational age at diagnosis could be the cause of variations in the incidence proportion of adverse outcomes between the studies. However, higher than study conducted in Jimma (37.9%) (Amare et al. 2021). This might be due to variation in the operational definition of the dependent variable and because of variation in service provided as our study encompasses primary and general hospitals in addition to this hospital.

In this study adverse perinatal outcomes were found to be 58.18% with 95% CI, (54.43%-61.85%) of mothers. This study is consistent with the study conducted in Addis Ababa 59.2% of mothers have adverse perinatal outcomes (Tadese et al. 2024). Higher than study conducted in Amhara Region referral hospitals (46.6%) and in Jimma (43.1%) (Melese et al. 2019, Amare et al. 2021). Lower than the study conducted in Tigray region 66.4% of mothers have adverse perinatal outcomes (AIMAKHU 2017). Variations in the research population, time, setup, sample size, and the caliber and standard of care offered by modern, well-equipped maternity hospitals, together with competent prenatal and obstetric care, could account for this disparity.

This study revealed primigravida women were approximately 1.57 times more likely to develop adverse maternal outcome than multigravida women. The study reported primigravida are more sufferer to HDP and its complications (Mandal et al. 2021). The other reason might be due to the

repetitive experience of pregnancy in multigravida makes them seek health service prior to the occurrence of complications and also due to the severe consequence of HDP in prim gravida and multipara(Gudeta et al. 2019).

Women who didn't had ANC follow up were 1.86 times more likely to develop adverse maternal outcome than women who had ANC follow up during pregnancy. Consistently, this is also reported on the study conducted in Waliso, Southwest Ethiopia (Hailu et al. 2022). This might be due to ANC follow up promote an early diagnosis and management of complications that could result from HDP and also creates access to information related to nutrition and the severity sign of HDP.

Women who have a history of medical diseases were at an increased risk of developing adverse maternal outcomes. This study is consistent with the study conducted in Mizan Tepi(Gudeta et al. 2019). Having a history of medical diseases such as diabetes, chronic hypertension, or kidney disease can increase the risk of developing pregnancy-induced hypertension. These underlying medical conditions can put additional strain on the body during pregnancy, making it more difficult for the body to regulate blood pressure (Fox et al. 2019).

Women who are referred from health facilities to reach the hospital due to high risk of developing adverse maternal outcomes are at an increased risk of complications associated with PIH. This study is consistent with the study conducted in Addis Ababa(Tadese et al. 2024). This could be due to the severity of their condition, the need for more frequent monitoring of blood pressure and other vital signs, or the need for interventions such as medication or delivery. There are other possible reasons for this, such as inadequate early detection of potentially maternal complications, delayed referrals, transportation issues, or living too far away from referral services (second delay). Overall, the results suggested that in order to improve maternal and perinatal outcomes, a concerted effort is required to strengthen the referral system, which includes 24-hour ambulance services and the availability of necessary medications and supplies.

The adverse perinatal outcome was 1.60 times more common among women with age less than 20 years. Consistently, this finding is reported on the study in Southwest Ethiopia (Jaleta et al. 2022). Study findings confirm a negative impact of extreme maternal ages on pregnancy (Londero et al. 2019). Teenager had higher risk of obstetric complications that end up of adverse perinatal

outcome and linked with increased incidence of hypertension, immature reproductive system, limited prenatal care, and Educational gaps (Huang et al. 2023).

The adverse perinatal outcome was 1.59 times more common among women with rural residential area than urban. Consistently, this finding is reported on the study in Southwest Ethiopia (Jaleta et al. 2022). The disparity in healthcare service distribution and utilization across urban and rural residents in low-income countries may explain this difference.

Gestational age was also associated with the adverse prenatal outcome. Pregnancies interrupted before 34 completed weeks were with high adverse perinatal outcomes when compared with pregnancies terminated from 37–40 weeks. This is also reported on study conducted in Amhara region, Ethiopia and in Ghana (Dassah et al. 2019, Melese et al. 2019). This could be related with prematurity in early weeks and placental apoptosis in late weeks which both possibly affect the perinatal outcomes.

This study implies the community education should emphasis on the significance of screening for hypertension during pregnancy, awareness of symptoms (e.g. headaches, visual disturbances, and generalized edema), and need for prompt actions if seizures happen. The HEWs should well train to pass such important information to the community.

6. STRENGTHS AND LIMITATIONS

6.1 Strengths

This study has several strengths. It examined the magnitude of maternal and perinatal outcome in the study area. The study used a review of medical records for obtaining comprehensive information about the maternal and perinatal condition.

6.2 limitations

The study also got a certain limitation, though. Temporality and causal inferences could not be established because of the nature of the cross-sectional study design.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion

In this study, the prevalence of adverse perinatal and maternal outcomes was high compared to other studies in Ethiopia. ANC follow up, gravidity, arrived on referrals, and having medical history was significantly associated with adverse maternal outcome. Whereas maternal age, maternal residence, gestational age, and mother having eclampsia was significantly associated with adverse perinatal outcome

7.2 Recommendation

Based on the study findings, we recommend the following;

For health bureau and Participant Hospitals

- Due emphasis should be given to strategies that reduce HDP related adverse maternal and neonatal outcomes.
- Socio-economic development, improving referral systems, and adequate antenatal care contact are needed to improve adverse outcomes
- Place of residence and having eclampsia should be taken into account in planning to reduce adverse prenatal outcome.

For Health care professionals

- Antepartum and intrapartum close monitoring of high-risk mothers in the maternity ward should be improved

For Future researcher

- Further long-term studies investigating the birth outcomes of women with severe pre-eclampsia symptoms are recommended

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7. ANNEXES

7.1. Information sheet and informed voluntary consent form head of institution

My name is **Mr. Mohammed Damtew Ali.** I am studying a master's degree in Maternity and Neonatal nursing at Haramaya University, college of health and medical sciences. I kindly request you to lend me your attention to explain to you about the study and your institution being selected as the study participant.

1. Title of The Study:

Adverse Maternal and perinatal outcomes and its associated factors of hypertensive disorders with pregnancy women who admitted and delivered in public Hospitals at Harari Regional State Ethiopia from August 1/2018 to July 31/2023 in Harar Ethiopia.

2. Purpose/aim of the study:

The main objective of this study is to write a thesis as a partial requirement for the fulfilment of a master's degree in Maternity and Neonatal Nursing for the principal investigator. Moreover, the result/ the findings of this study was used as evidence and input for hospitals to plan on maternal perinatal health activities, intervention programs, expand and implement training programs to improve the maternal and perinatal health outcome.

3. Procedure and Duration:

I was extracted the data by reviewed medical records of patient/mothers' files using a checklist to provide me with pertinent data that is helpful for the study. There are 56 checklists to be filled where I was full filled the checklists by reviewing patient medical record data. The reviewed one's hypertensive mother medical records was taken about 30 minutes, so I was kindly reviewed the secondary data from patient medical cards.

4. Risks and Benefits:

The risk of being participated in this study is very minimal. But that was taken a few minutes from the heads of public hospitals and data workers. There would not any direct payment when reviewed in this study. But, the findings from this research was reveal important information for health institutions and health planners.

5. Confidentiality:

The information that was provided kept confidential. There was no information that identified the participants in particular. The findings of the study were generalized for the study community and was not reflected anything particular of individual person. The checklist was coded to exclude showed names and medical number. No reference was made in written reports that could link participants to the research.

6. Rights:

Participation for this study were fully volunteered. On the behalf of the participants, the hospital administrator has the right to declare to participated or not in this study and have the right to permit or not for this study. If you decide to permit the study, and have the right to terminate the study at any time if you consider something related to the study is wrong.

7. Contact Address:

If there are any questions or inquires any time about the study or procedures, please contact in this address. Principal investigator: Mohammed Damtew Ali Cell Phone: +251-920-78-13-38 E-mail: damm0752@gmail.com Contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O. Box 235 Harar)

8. Declaration of Informed Voluntary Consent:

I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask any questions about things that may have been unclear. I have also informed that the hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the hospital's premises. Therefore, I declare my voluntary consent on behalf of ---------- hospital management to allow this study to be conducted in selected health facilities with my initials (Signature) as indicated below.

Name and Signature of head of the Hospital: _____Date _____

Name and Signature of Principal investigator: _____ Date _____.

7.2. Structured Checklist

Checklist for the assessment of Maternal and Perinatal Adverse Outcomes of Hypertensive Disorders in Pregnancy Women who admitted and delivered in public Hospitals at Harari Regional State Ethiopia. A 5-year retrospective Cross-Sectional study.

Name of health facility

1. Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH)

2. Jugel General Hospital (JGH)

Participant Woreda name----------Kebele name----------

Data collector Name ---------- Signature ----------

Supervisor Name ---------- Signature ----------

Year and Date of data collected ----------

Q. No	Checklist	Response/Possible Answer	Skip Pattern
	Part 1. Socio-demography factors data for HDP		
551.	Maternal Age	---------years	
552.	Place of residence	1. Urban 2. Rural	
553.	Referral system	1. Self-referred 2. Referred from health facility	
	Part 2. Obstetrics and Gynecologic Data for HDP		
554.	What was the Gravidity?	1. G-----	

555.	What was the Parity?	2. P---	
556.	History of Abortion/Miscarriage	1. Yes 2. No	
557.	History of Stillbirth	1. Yes 2. No	
558.	What was the Gestational age of the current pregnancy in weeks(trimesters) at diagnosis of HDP?	--------week	
559.	Did the mother have Antenatal care (ANC) follows up?	1. Yes 2. No	
560.	Number of Gestations	1. Single 2. Twin 3. Other	
	Part 3. Medical illness data for HDP		
561.	Past medical history of pregnant mother:	1. Yes 2. No	If 1 go to Q 562
562.	If yes,	1. Chronic hypertension 2. Diabetes mellitus 3. Chronic renal disease 4. Heart disease 5. Others, specify--	

563.	Dose the mother a history of HDP in the previous pregnancies?	1. Yes 2. No	If 1 go to Q 564
564.	If yes, what types of HDP were experienced?	1. GHTN (PIH) 2. Pre-eclampsia 3. Eclampsia 4. Postpartum PE/EC	
565.	Dose the Maternal medical illness during current pregnancy?	1. Yes 2. No	If 1 go to Q 566
566.	If yes, Encircle more than one answer.	1. Anemia 2. Thrombocytopenia 3. DIC 4. Pulmonary Oedema 5. Renal disease 6. Other Specify----	
	Part 4. Clinical Features		
567.	What was the Blood pressure (BP) at diagnosis systolic over diastolic (SBP/DBP)?	1. 140/90 mmHg 2. >140/90 mmHg 3. >=160/110 mmHg	
568.	Which types of HDP dose experienced in the current pregnancy?	1. PIH or GHTN 2. Mild preeclampsia (PE without severity feature)	

		3. Severe preeclampsia (PE with Severity Feature) 4. Eclampsia 5. Postpartum PE/EC	
569.	Severity of the diseases of HDP dose experienced? Encircle more than one	1. Headache 2. Epigastric pain 3. Visual disturbance 4. Oedema 5. Proteinuria 6. Convulsions/Seizure 7. Others-----	
	Part 5. Lab Investigations data for HDP		
570.	Complete blood count (CBC)	Low High 1. Hgb -------- ----- 2. Platelet --------- -------	
571.	Urine analysis (U/A) for protein	1. None 2. 1+ or trace 3. 2+ 4. ≥3+	
	Part 6. Managements and Treatment data for HDP		
572.	Dose anti-hypertensive drugs was taken? Encircle more than one.	1. Yes 2. No	
573.	Dose anti-convulsant drugs was taken?	1. Yes 2. No	

574.	Dose Corticosteroid drugs was taken?	1. Yes 2. No	
575.	Anti-Biotic drugs was taken?	1. Yes 2. No	
576.	Dose Diuretic drugs was taken	1. Yes 2. No	
577.	Dose Uterotonic Drugs were used for PPH Management? Except, Ergometrine	1. Yes 2. No	
578.	Were used for termination of pregnancy?	1. Yes 2. No	
579.	What was the Management option of HDP?	1. Expectant Management 2. Immediate Termination 3. Elective C/S 4. Other Specify-----	
580.	What was the Severe management of HDP?	1. Blood transfusion 2. C/S 3. ICU admission 4. Hospitalization 5. Other Specify---	
	Part 7. Delivery/Intrapartum and Postpartum data for HDP		
581.	What was the Onset of Laboure?	1. Spontaneous onset 2. Induction/IOL 3. Elective C/S 4. Onset plus Augmentation	

		5. Other Specify---	
582.	If not spontaneous, what was the indication for termination of pregnancy?	1. Uncontrolled BP 2. IUFD 3. APH 4. HELLP Syndrome 5. NRFHR 6. Eclampsia 7. IUGR 8. Others, specify-----	
583.	What was Mode of delivery?	1. SVD 2. Instrumental 3. C/S 4. ABD	If 2 go to Q 584 If 3 go to Q 585
584.	If Instrumental	1. Vacuum (Ventose) 2. Forceps 3. Destructive 4. Other Specify---	
585.	If caesarean section (C/S) what was the indication?	1. NRFHR 2. APH with active bleed 3. Severe preeclampsia 4. Eclampsia 5. C/S scar 6. Failed induction 7. Multiple gestation 8. Uterine rupture	

		9. Others, Specify----	
586.	What was the gestational age at delivery?	-------weeks	
	Part 8. Severe Maternal Morbidity Status data for HDP		
587.	Which type of Hemorrhagic conditions happened the mother with HDP?	1. APH 2. Abortion/Miscarriage 3. PPH 4. Uterine Rupture 5. Other specify--	
	Part 9. Maternal Outcomes of HDP data		
588.	If blood transfusion, how many units of blood were transfused?	---------units	
589.	The reasons in which complications Were the women admitted to ICU? Multiple answers are possible.	1. APH 2. PPH 3. C/S 4. Pulmonary Oedema 5. HELLP Syndrome 6. Eclampsia 7. Other Specify---	
590.	What was the Maternal conditions, when mothers with HDP?	1. Stable (Normal) 2. Maternal Near-Miss (MNM) 3. Death 4. Unknown	If 4 go to Q 591-593
591.	If maternal death, what was time of death?	1. Death On the way 2. Death At arrival	

		3. Death after admissions 4. Unknown	
592.	If maternal death, when maternal dead happened?	1. Antepartum period 2. Intrapartum period 3. Postpartum period 4. Unknown	
593.	What was the main causing factors for maternal death? With review of maternal death reports. Encircle more than one causes	1. Pre-eclampsia (PE) 2. Eclampsia 3. HELLP-Syndrome 4. Infection/Sepsis 5. Stroke 6. Renal disease 7. DIC 8. PPH 9. Pulmonary Oedema 10. Other specify---	
594.	If unfavourable, which types of HDP was more consequences effect for maternal outcomes?	1. PE without sever feature 2. PE with sever feature or S.P.E 3. Early onset PE (EOPE) 4. Late onset PE (LOPE) 5. Eclampsia 6. PPE/Eclampsia	
	Part 10. Perinatal Outcomes of HDP data		
595.	What was the New-born weight?	----------gm	

596.	What was the GA of the newborn at birth?	------- week	
597.	What was the APGAR score of the 1st and 5th minutes?	--------&--------	
598.	Was Neonatal recusations were done?	1. Yes 2. No	If 1 go to Q 599
599.	If yes, what was the outcome of resuscitation?	1. Survive 2. Death	
600.	Were the New born Admission to NICU for special care?	1. Yes 2. No	
601.	Was there Perinatal complication?	1. Yes 2. No	If 1 go to Q 602
602.	If complication were experienced, which complications were happened? Encircle more than one complication	1. Premature 2. IUGR 3. Birth Asphyxia (RDS) 4. MAS 5. Sepsis 6. Still birth 7. LBW 8. Other, specify----	
603.	What was Survival status of the new born?	1. Alive 2. Demis 3. Unknown	If 2 go to Q 604

604.	What was the women Perinatal Loss happened?	1. IUFD 2. Stillbirth 3. Early Neonatal Death	If 1go to Q 605
605.	If IUFD, what was?	1. Fresh 2. Macerated 3. Unknown	
606.	What was the main cause of perinatal death? Encircle more than one complication	1. Prematurity 2. Birth asphyxia 3. LBW 4. Sepsis 5. Other specify---	