

ADDIS ABABA UNIVERSITY



FACULTY OF MEDICINE

SCHOOL OF PUBLIC HEALTH

**TREND ANALYSIS OF PREECLAMPSIA / ECCLAMPSIA, MATERNAL AND
NEONATAL COMPLICATION AMONG WOMEN DELIVERING IN ADDIS ABABA
GOVERNMENT HOSPITALS, ETHIOPIA: ANALYSIS OF 2009-2013 DATA**

BY

MAEREG WAGNEW (BSc)

**A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY FACULTY OF MEDICINE
SCHOOL OF PUBLIC HEALTH FOR THE PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH**

JUNE, 2014

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ACRONYMS / ABBREVIATION

ANC – Antenatal Care

BMI- Body Mass Index

BP- Blood Pressure

C/S- Caesarean Section

DBP- Diastolic Blood Pressure

DIC- Disseminated Intravascular Coagulopathy

EDHS- Ethiopia Demographic Health Survey

EMONC- Emergency Maternal Obstetric and Newborn Care

EPIINFO - Epidemiological Information

GA- Gestational Age

HELLP - Hemolytic, elevated liver enzymes, and low platelet syndrome

ICU- Intensive Care Unit

IRB- Institutional Review Board

IUFD- Intra Uterine Fetal Death

IUGR- Intra Uterine Growth Retardation

MDG- Millennium Developmental Goal

SBP-Systolic Blood Pressure

SGA- Small for Gestational Age

SPSS- Statistical Package for Social Sciences

SVD- Spontaneous Vaginal Delivery

WHO- World Health Organization

ABSTRACT

Background: Worldwide the burden of preeclampsia has been the major concern particularly in developing countries including, Ethiopia. Preeclampsia is associated with substantial maternal complications, both acute and long-term. Understanding the situation of preeclampsia/eclampsia help to design appropriate intervention means for both maternal and neonatal outcomes.

Objectives: To determine the magnitude and trends of preeclampsia /eclampsia, maternal and neonatal complications among women delivering in Addis Ababa government hospital, Ethiopia.

Methods: Retrospectively, 1809 cases from 2009 to 2013 data collected by reviewing of the mothers with preeclampsia/ eclampsia medical records using data abstraction form. Data entered and cleaned using EPI info and exported to SPSS for analysis. Descriptive analyses were employed. In addition, extended Mantel Haenszel chi square was used to check linear trend.

Result: A five year average proportion of preeclampsia/ eclampsia was 4.2% [95%CI (4.02%, 4.4%)]. The proportion of preeclampsia was 2.2% in 2009 and increased to a proportion of 5.58 % in 2013 ($p < 0.001$). The percentage increase over the five years was 154%. Of the total preeclampsia/ eclampsia mothers, 36 % [95% CI (33.85%, 38.28%)] had at least maternal complication in the five years. It showed a percentage change of maternal complication over the time was 26.5% ($p < 0.01$). The major complication were HELLP syndrome 257(39.5%), aspiration pneumonia 114(17.5%), Pulmonary edema 114(17.5%), and Abrabtio placenta 100 (15.3%). In mean time, the neonatal complication was, 66.4% [95%CI (64.24%, 68.59%)] had at least one neonatal complication in the study five years. Regarding to neonatal complication, a decreasing trend in 2009 (76%) to 2013 (66%), this showed the percentage of change of neonatal complication over time was -13.2%. Still births 363 (30.2%), prematurity 395 (32.8%), respiratory distress syndrome 456 (37.9%), and low birth weight 363 (30.2%) were the commonest cause of neonatal complication.

Conclusion and recommendation: The trend of preeclampsia/ eclampsia and maternal complication over five year period were increased. In contrast, neonatal complication had a significant decrement over the past five year though still the complication of neonate is a big concern in the study. The health facility has to be strength the data keeping system and special attention should be given at all level to alleviate the burden of mothers and the neonate.

1. INTRODUCTION

Globally, an estimated 292 982 maternal deaths occur in 2013, of which 1,811 death occur in developed countries while the rest 291, 171 death occur in developing countries. Based on this report, the maternal mortality ratio is $497.4 / 100000$ live births[1]. More than 70% of maternal death are due to five major complication named hemorrhage, infection, unsafe abortion, hypertensive disorders of pregnancy including preeclampsia and eclampsia , and obstructed labor[2]. The main cause of maternal death in Ethiopia is not different from most of others developing countries. The majority of maternal deaths (61%) occur in the postpartum period, and more than half of these take place within a day of delivery, and preeclampsia is one of the cause for maternal mortality in Ethiopia [3].

Preeclampsia refers to a syndrome characterized by the new onset of hypertension and proteinuria after 20 weeks of gestation in a previously normotensive woman. Eclampsia refers to the development of grand mal seizures in a woman with gestational hypertension or preeclampsia[4].

Worldwide, the incidence of preeclampsia ranges between 2% and 10% of pregnancies. The incidence of preeclampsia, the precursor to eclampsia, varies greatly in worldwide. World Health Organization (WHO) estimates the incidence of preeclampsia to be seven times higher in developing countries (2.8% of live births) than in developed countries (0.4%). Eclampsia is also increasing the risk of maternal death both in developed (0.5-1.8%) and in developing countries as high as 15% [5].

Few studies conducted in Ethiopia showed that the prevalence of preeclampsia was around 5%. In addition to this, another study indicated that a pregnancy complicated by eclampsia was around 0.7% in the nation [6-8].

Besides adding a brick to the efforts made so far, the output of this study could also be informative and gives a window of opportunity to the government and other development practitioners to understand their progress, potentials and revisit their policies, strategies and other development initiatives.

To the best of my knowledge, there is a little or no study so far which clearly indicate the trend of maternal and child outcome among preeclampsia/ecclampsia women not only in the study areas but also in Ethiopia. Therefore, this study attempt to provide a comprehensive information in the arena and representative picture of maternal and infant outcome among preeclampsia/ecclampsia women, taking different indicators, using data extracted January 1, 2009 to December 30, 2013 hospital registration at governmental hospitals in Addis Ababa .

2. LITERATURE REVIEW

2.1. Burden of Preeclampsia

Globally, pre-eclampsia and eclampsia contribute to the death of a pregnant woman every three minutes. The incidence of preeclampsia, the precursor to eclampsia, varies worldwide and it is estimated in the ranges of between 2% and 10% of pregnancies. According to WHO estimation the incidence of preeclampsia in developing countries (2.8% of live births) are seven times higher than in developed countries (0.4%) [5]. The incidence of eclampsia in the developed countries of North America and Europe is similar and estimated to be about five to seven cases per 10,000 deliveries. On the other hand, incidence of eclampsia in developing nations varies widely, ranging from one case per 100 pregnancies to one case per 1700 pregnancies [9]. Similarly, the risk of a woman in a low-income country dying of pre-eclampsia/eclampsia as high as 300 times than a woman in a high-income country [10, 11].

In a study from the National Hospital Discharge Survey from 1988 to 1997 done in United States showed that approximately 300,000 deliveries reported that severe maternal morbidity was associated with hypertensive disorders of pregnancy. In the same survey, the overall incidence of hypertensive disorders in pregnancy were 5.9%. Meanwhile, the eclampsia was report at 1.0 per 1000 deliveries. Women with preeclampsia and eclampsia had a 3- to 25 fold increased risk of severe complications such as abruptio placentae, thrombocytopenia, disseminated intravascular coagulation, pulmonary edema, and aspiration pneumonia[12].

Severe preeclampsia is associated with increased risk of maternal mortality (0.2%) and increased rates of maternal morbidities (5%), such as convulsions, pulmonary edema, acute renal or liver failure, liver hemorrhage, disseminated intra-vascular coagulopathy, and stroke[13]. These complications are usually seen in women who develop preeclampsia before 32 weeks' gestation and in those with preexisting medical conditions[14, 15].

WHO review identified hypertension as the single leading cause of maternal mortality in industrialized countries, it account for 16% of deaths. Hypertensive disorders of pregnancy are annually responsible for about 25,000 maternal deaths in Africa, 22,000 maternal deaths in Asia, 3,800 maternal deaths in Latin America and the Caribbean and 150 maternal deaths in industrialized countries[16].

Andrea P. et al in their 14-year study period from data of Centers for Disease Control and Prevention's Pregnancy Mortality Surveillance System, 4024 pregnancy-related deaths to women at 20 weeks' or greater gestation, of these deaths 790 (19.6%) were from complications of preeclampsia or eclampsia. The pregnancy-related mortality ratio for deaths from preeclampsia and eclampsia was 1.5 pregnancy-related deaths per 100,000 live births; the overall pregnancy-related mortality ratio for deaths occurring at 20 weeks' or greater gestation was 7.5/100,000. The most frequent causes of pregnancy-related death were embolism, hemorrhage, and preeclampsia or eclampsia[17].

A prospective cross sectional study conducted from 2009-2010 in Ethiopia at Jimma specialized hospital, severe preeclampsia was the most common hypertensive disorder of pregnancy accounting for 51.9% of the cases followed by eclampsia which contributed for 23.4% of the cases[18].

The vast majority of deliveries in Ethiopia took place at home. According to EDHS 2011 only 10% of the delivery occurring in institutions[19]. Annually, an estimated 54 000–216 000 Ethiopian mothers are expected to have pre-eclampsia/eclampsia, based on the predicted prevalence of 2%–8% from a total 2.7 million deliveries per year [20].

According to the Ethiopian national Emergency Maternal Obstetric and Newborn Care (EMONC) assessment 174,561 deliveries were reported at the 797 facilities. Based on the surveyed assessment, pre eclampsia/eclampsia contributed to a significant maternal disease burden among pregnant and recently delivered women seeking care at the facilities. Approximately 1% of all deliveries and 5% of all women with complications were documented as having severe preeclampsia/eclampsia. However, nearly 16% of direct maternal deaths were due to pre-eclampsia/eclampsia. Overall, 10% of maternal deaths (direct and indirect) occurred among women whose pregnancies were complicated by pre-eclampsia/eclampsia. A relatively high case fatality rate of 3.6% was noted among all preeclamptic/eclamptics who received care at the facilities. The survey found that only 1%–3.8% (n = 2095) of the total number of potential preeclamptic women received care at health facilities during the year for which the EmONC survey collected data. It is likely that the number of cases at facilities was under-recorded. However, even if the number reported were doubled, a large proportion of pre-eclamptics/eclamptics still did not access the formal health system. The implication for resultant

morbidity and mortality is obvious. The survey found that only 2% of the hospitals had facilities for intensive care for women with severe pre-eclampsia/eclampsia[21]

2.2. Maternal and child outcome

Pre-eclampsia is a major obstetric problem leading to substantial maternal and perinatal morbidity and mortality worldwide, especially in developing countries. Maternal and perinatal outcomes in pre-eclampsia depend on one or more of the following: gestational age at time of disease onset, severity of disease, quality of management, and presence or absence of pre-existing medical disorders. In general, maternal and perinatal outcomes are usually favorable in women with mild pre-eclampsia developing beyond 36 weeks' gestation [22, 23]. In the developing countries over 50% pregnant women in high- risk pregnancies lived in rural area [24].

Preeclampsia is associated with substantial both acute and long-term maternal complications[25]. The deaths occur secondary to preeclampsia mainly result from eclampsia, uncontrolled hypertension, or systemic inflammation. Approximately 20% of women with preeclampsia develop hypertension within seven years of a preeclamptic pregnancy, as compared with only 2% among women with uncomplicated pregnancies. [26, 27].

A meta-analysis study by Bellamy et al., showed that after a pregnancy complicated by preeclampsia, women had an increased risk for hypertension, ischemic heart disease, stroke, and venous thromboembolism. The risk of death from cardiovascular and other causes is also increased in these women. Women with early-onset severe preeclampsia appear to be at highest risk. Therefore, preeclampsia raises a red flag concerning the risk of cardiovascular and neurologic disease in later life [28, 29].

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 placentae, liver hemorrhage or failure, adult respiratory distress syndrome, sepsis, and stroke[30] . The development of HELLP syndrome in the postpartum period also increases the risk of renal failure and pulmonary edema[23].

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 [31]. In the fetus preterm delivery, asphyxia and intrauterine growth restrictions commonly associated with the disease increase the perinatal mortality. Pregnancy related complications like abruption placentae, HELLP syndrome are frequently associated and pose a risk to the mother as well as for the fetus[32]. Pre-eclampsia and eclampsia are also an independent risk factors for cerebral palsy [33].

Study done by Tukur A Jido in Nigeria, an eclampsia incidence was 1.2%. Sixty-nine percentage gave no account of antenatal care in this pregnancy. Convulsions were controlled with diazepam in 93(77.5%) patients while the remaining 22.5% had magnesium sulphate. Sixty-seven (55.8%) patients were delivered by caesarean section, and 18 (15%) had assisted vaginal delivery. The death account 11.7% and the leading causes of death were cerebrovascular accident and pulmonary edema. There was no mortality in the 22.5% patients treated with magnesium sulphate compared to diazepam. Stillbirth rate was 22.5% with significant association with diazepam use (RR 7.55, 95% CI= 1.07-53.09, $p=0.04$). Birth asphyxia was recorded in 39.1% and low birth weight in 25.8%. (14.2%) were admitted to the special care baby unit, mostly for asphyxia and prematurity[34].

The provision of parenteral anticonvulsants to pre-eclampsia/ eclampsia women is one of the nine emergency obstetric care (EmOC) signal functions vital to the reduction of maternal mortality[5]. Large multicenter trials have shown that magnesium sulfate is superior to other anticonvulsants in the prevention and control of eclampsia seizures [8– 11]. Prompt administration of magnesium sulfate reduces the risk of seizure recurrence by half and significantly reduces the risk of maternal deaths. Control of severe hypertension is also important in reducing maternal mortality and morbidity due to cerebrovascular accidents. This is often achieved through the administration of effective parenteral antihypertensive agents such as hydralazine or labetalol. Termination of pregnancy leads to rapid regression of pre-eclampsia disease, often without residual effects[35].

2.3 The trend of preeclampsia /ecclampsia

A secular trend study done in USA [36] shows that, the trend of preeclampsia has been increasing with age-adjusted rates rising from 2.4% (between 1987 and 1988) to 2.9% of deliveries (between 2003 and 2004). In contrast with this, the trend of ecclampsia shown decrement with age-adjusted rate of ecclampsia decreased by 22.0% from an average annual rate of 1.04 during 1987–1995, to 0.82 during 1996–2004[36]. In the same study it was indicated that improved access to antenatal care, early delivery of women with severe pre-ecclampsia, and use of magnesium sulphate were believed to be responsible for the reductions [36]. Similarly, the Norwegian data also showed that increasing rates of preeclampsia, from 3.7% between 1988 and 1992 to 4.4% between 1998 and 2002 [37].

Study done in United states by Zhang et al. in their survey of approximately 300,000 deliveries, obtained from the National Hospital Discharge Survey from 1988 to 1997, reported that severe maternal morbidity was associated with hypertensive disorders of pregnancy. Based on the study, the overall incidence of hypertensive disorders in pregnancy was 5.9%. Women with preeclampsia and ecclampsia had a 3- to 25-fold increased risk of severe complications such as abruptio placentae, thrombocytopenia, disseminated intravascular coagulation, pulmonary edema, and aspiration pneumonia African American women not only had higher incidence of hypertensive disorders in pregnancy, but also tended to have a greater risk for most severe complications [38]. In the same note, in the United States, the number of delivery hospitalizations with pregnancy induced hypertensive disorders is increasing, and these hospitalizations are associated with a substantial burden of severe obstetric morbidity [39].

A study done on maternal mortality trend in Ethiopia by Ahmed A. showed that, the proportion of deaths due to ecclampsia/ preeclampsia is on the increase. In 2007 and 2008, there were 15 deaths due to ecclampsia/ preeclampsia accounting for 35.7% of the maternal deaths at Black Lion Hospital and Ghandi Memorial Hospital. In the same two hospitals, in 1981-1983, there were nine deaths due to ecclampsia which account for 6.5% of the total maternal death. The prevalence of ecclampsia (number of women with ecclampsia/ total deliveries) in Addis Ababa hospitals doesn't show a marked increment; it varies from 1.2% to 7.1% with most of the studies indicating a prevalence rate of about 3.3%[40].

3. OBJECTIVE

General objective

To determine the magnitude and trends of preeclampsia /ecclampsia, maternal and neonatal complications among women delivering in government hospital from 2009-2013, Addis Ababa, Ethiopia

Specific objective

- To determine the proportion of preeclampsia/ecclampsia among the total deliveries
- To assess the trends of preeclampsia/ ecclampsia over the five years period
- To describe the trend of maternal complication among preeclampsia/ecclampsia women
- To describe the trend of early neonatal complication among preeclampsia/ecclampsia women.

4. METHODOLOGY

Study area and period

Addis Ababa is a capital city of Federal democratic republic of Ethiopia. According to the 2007 national census, the total population of Addis Ababa, the capital of Ethiopia was above 2.7 million; of which 47.6% were males and 52% were females. The total fertility rate of the city is below replacement level (1.5) and crude death rate is 9/1000. Infant mortality rate is 40/1000 live births and maternal mortality rate is 0.01 per 100000 live birth [41].

In Addis Ababa, totally there are 43 (21% of the total hospitals in the country); 12 public and, 31 private registered hospitals, respectively. In addition, there are 41 health centers (24 governmental and 7 private) with 141 beds and 551 private clinics (109 special, 169 higher, 146 medium and 127 lower). Nearly 43% of the total medical doctors in the country are serving in these health facilities. The hospitals provide health care services for not only Addis Ababa residents but also serve as referral facilities for the nation[42].

Study period: January 1, 2009 to December 30, 2013.

Study design

A five years retrospective hospital based study design from January 1, 2009 to December 30, 2013 conducted at selected governmental hospital in Addis Ababa.

Population

Source population: All pregnant women who had antenatal care (ANC) follow up and gave birth at government hospitals in Addis Ababa.

Study population: All women who gave birth at selected government hospital during the study period.

Eligibility

Inclusion criteria

- Those mothers who gave birth and have complete record included in the study.

Exclusion criteria

- Mothers who diagnosed as chronic hypertension before pregnancy

Sample size and sampling

Three governmental hospital that offer maternal and delivery service were selected purposively based on the case load (case of preeclampsia and eclampsia) and the presence of fully registered data. Those hospitals are Black Lion Specialized hospital, Zewuditu memorial hospital and St Paul's Hospital. One of the well-known maternity hospital in Addis Ababa, Ghandi Memorial Hospital was at the end excluded because of difficulty in identifying the exact case of preeclampsia/ eclampsia cases from the registry book. All case of preeclampsia and eclampsia found in the study hospitals were included during the data collection. In order to avoid double counting of referred mothers, only mother whom give birth in the specific hospital were included in the study.

Study variables

Information on demographic, clinical, laboratory and management of all mother among pre-eclamptic/eclamptic and their outcomes and their babies who were delivered at selected hospitals during the study period retrieved from the maternity admission registers, delivery books and operation registers.

Information on the following was collected:

1. Maternal Variables: Age, parity, gestational age, ANC attendance, interventions during antenatal and perinatal period, and mode of deliver were extracted.
2. Neonatal variables: birth weight, and admission to ICU, status of baby
3. Laboratory and management data which is urine protein. In addition, the management, diagnosis on admission, commencement of anti-hypertension or anti-convulsion drugs
4. Both maternal and neonatal outcome variables were also included.

Measurement tool and data collection

The principal investigator developed a structured data-extracting tool (checklist) by reviewing literatures, hospital registrations and based on the available information in the registration book (Annex 1). The data abstraction tool was pretested before the actual data collection. Information related with maternal age, ANC follow up, severity of proteinuria, and the frequency of antenatal and intrapartum complications gravidity/parity, gestational age at presentation and delivery, intervention, mode of delivery and health outcome of both maternal and neonatal were extracted. There were three data collector (2 BSc Nurses with principal investigator) assigned within each hospital. The data collectors and coordinators had prior relevant experience and extensive training on how to review hospital based records and registration books. To capture preeclampsia/eclampsia in all selected hospitals, medical records and delivery registry books for the study period were reviewed (January 1, 2009 to December 30, 2013).

Data processing and analysis

The completed questionnaire was checked for completeness and consistency and coded. The extracted data was cleaned, checked for accuracy, consistencies, entered using Epi Info version 3.5.1 software and analyzed using SPSS version 22 and Open Epi version 2.2. Both descriptive and analytical statistical procedures were employed.

The analysis was presented in the epidemiological trends followed the following steps:

- Proportions were computed by dividing those preeclampsia/eclampsia values with the respective total delivery/denominator for each specific year.
- Proportions were computed for maternal and neonatal outcome among preeclampsia/eclampsia for each year
- Trends of maternal and neonatal outcome among preeclampsia/eclampsia for each year
- When appropriate numeric summaries were used to describe the nature of the trend in the specific trend variable (X^2), stratification were done by year (Mantel Hansel chi square was used) to assess significant linear trend over time.

Operational definition

Preeclampsia is defined as blood pressure of at least 140 mm Hg (systolic) or at least 90 mm Hg (diastolic) on at least 2 occasions and at least 4–6 hr apart after the 20th week of gestation in women known to be normotensive beforehand plus proteinuria.

Eclampsia is neurologic involvement in the form of generalized tonic–clonic convulsions in women with preeclampsia. If the seizures cannot be attributed to any other cause (such as epilepsy, cerebral infection, tumors or ruptured aneurysm)

Proteinuria is defined as the urinary excretion of >300 mg of protein or +2 and above urine dipstick in 24 hours.

Early Neonate is a newborn baby less than one week old.

Maternal complication: the mother who have at least one of the following complication; Eclampsia, acute renal failure, stroke, intracranial hemorrhage, disseminated intravascular coagulation, HELLP syndrome, cardiac failure, abruption placenta, aspiration pneumonia, pulmonary edema, maternal death .

Neonatal complication: the neonate who have at least one of the following complication; preterm delivery, small-for-gestational-age infants, respiratory distress syndrome, low birth weight, Large-for-gestational-age infants, macrosomia (defined as delivery of an infant weighing >4000 g), admission to the neonatal intensive care unit (NICU), respiratory distress syndrome, and prenatal death.

Ethical Considerations

Ethical clearance was obtained from the school of public health, College of Health Science, Addis Ababa University. An official letter of cooperation was taken from the School of Public Health to the respected departments and medical director of the hospital where the study was undertake and another ethical clearance gained from the IRB of each three hospitals to conduct this study. Consent was obtained from each hospital to retrieve the five years data. Anonymity and confidentiality was ensured for information obtained from the charts reviewing.

5. RESULT

5.1. Characteristics of the 2009 to 2013 data of Governmental Hospitals

As presented in table 1, the analysis included a total delivery of 42,963 in five years from 2009 (7,282 deliveries) to 2013(9445 deliveries) among three government hospital named Black lion specialized hospital, St Paul hospital and Zewuditu memorial hospital, of those 79% of cases were from the central city Addis Ababa by residence.

Among the total deliveries (42,963), in the five years 2059 case of preeclampsia/ eclampsia were registered, but from the archive, 1809 chart was retrieved and it gives a chart retrieval rate of 87.9%. In the five years 1809 case of preeclampsia/ eclampsia were registered, with a five year average proportion rate of 4.2% [95%CI (4.02%, 4.4%)]. Of these, 1424(78.1%) were severe preeclampsia, 313(17.3%) eclampsia and 84 (4.6%) were diagnosed as mild preeclampsia.

The mean maternal age was 26.75 ($\pm$ 5.08), with 663 (36.6%) in the age range 25 to 29 years. With regard to parity 959 (53%) were nulliparous and 39 (2.15%) were parity five and above. The mean gestational age at presentation was 35.83($\pm$ 3.7) and half of the mother 897 (49.6%) gestational age at presentation were between 37-41 weeks.

Based on the five year data of mothers who had a case of preeclampsia / eclampsia, 79(4.4%) had chronic medical history, mainly HIV/AIDS positive mothers 43(54.4%), and diabetes 16(20.3%). With regard to the history of past pregnancy, 492 (27.2%) had at least one complication in their previous pregnancy. The major complication were abortion 285 (57.9%), severe preeclampsia 140 (28.5%), C/S delivery 96 (19.5%), still birth 60 (12.2%), neonatal death 24(4.9%) and 14 (2.8%) eclampsia as depicted in table1.

Table 1: Characteristics of preeclampsia/ eclampsia women from 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable	Response	Frequency (Percent)	Mean($\pm$ SD)
Hospital address (n=1809)	Black lion specialized hospital	844(46.7)	26.75 ($\pm$ 5.08)
	St Paul hospital	550 (30.4)	
	Zewuditu Memorial Hospital	415(22.9)	
Year of the data	2009	160(8.8)	
	2010	317(17.5)	
	2011	359(19.8)	
	2012	446(24.7)	
	2013	527(29.1)	
Maternal age	<20	104(5.7)	
	20-24	499(27.5)	
	25-29	663(36.6)	
	30-34	356(19.7)	
	35 ⁺	187(10.5)	
Region	AA	1424(78.7)	
	Oromia	360(19.9)	
	Others (Amhara, SNNP, Afar)	25(1.4)	
Parity	Primipara	959(53.0)	
	Multipara	850(47)	
Medical History	Yes	79(4.4%)	
	No	1730(95.6)	
Type of Medical condition (n=79)	Chronic renal disease	4 (5.1)	
	Diabetes	16 (20.3)	
	Heart disease class I	3(3.8)	
	Heart disease class II-IV	8 (10.1)	
	HIV Patient	43 (54.4)	
	Others (Neurological disorder	6(7.8)	
	Asthmatic patient, Hematological Disorder, Anxiety disorder)		
Past pregnancy history	Yes	492(27.2)	
	No	1317(72.8)	
Type of complication (n=492)	Severe preeclampsia	140(28.45)	
	Ecclampsia	14 (2.8)	
	Abortion	285 (57.9)	
	Multiple pregnancy	10 (2.0)	
	C/S delivery	96 (19.5)	
	Still birth	60 (12.2)	
	Neonatal death	24 (4.9)	
Gestational age	20-28	112(6.2)	
	29-36	737(40.7)	
	37-41	897(49.6)	
	>42	63(3.5)	

Condition of the mother's at the time of admission

With regard to hypertension, 101(5.6%) had a family history and only 0.7% had family history of preeclampsia. Meanwhile the mean SBP of the mothers were 157.04mmHg (± 16.1) ranges from 120-230 mmHg and mean of DBP was 103 ± 10.85 mmHg with range from 80 to 160 mmHg. The majority of mothers had proteinuria 1725 (95.4%) in urine analysis.

Furthermore, mother who had preeclampsia and eclapmsia mothers present at admission one or more than one chief compliant of the following sign and symptom, headache 1607 (88.8%), blurring of vision 896 (49.5%), epigastric pain 605 (35.9%) and 308 (17%) had abnormal body movement.

Table 2: Condition of the mother at the time of admission from 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable	Response	Frequency (%)	Mean $\pm$ (SD)
Proteinurea(++dipstick or 3gm/24hr)	Yes	1725(95.4%)	
	No	84(4.6%)	
Family history hypertension	Yes	101 (5.6%)	
	No	1708 (94.4%)	
Family history of preeclampsia	Yes	13 (0.7%)	
	No	1796 (99.3%)	
SBP(mmHg)			157.04 (± 16.1)
DBP(mmHg)			103 ± 10.85
Chief compliant	Headache	1607(88.8%)	
	Epigastric pain	650(35.9%)	
	Nausea and vomiting	72(4.0%)	
	Blurred vision	896(49.5%)	
	Generalized body swelling	139(7.7%)	
	Abnormal body movement	308(17.0%)	
	Vaginal bleeding	24(1.2%)	
	Decrease fetal movement	16(1%)	

Characteristics of the mothers during the time of delivery

There were 387 (21.4%) mother who didn't have antenatal follow up. Based on the diagnosis of the mother the majorities were severe preeclampsia 1412 (78.1%). With regard to labor, 423(23.4%) were induced/terminated and the main indication was sever preeclampsia/term pregnancy 279 (66%). The data showed in the mode of delivery, half of the delivery took place by spontaneous vaginal delivery 905(50%) and C/S delivery rate was 800(44.3%). Instrumental (forceps+ vacuum) and breech extraction delivery takes the rest of the delivery rate. Fetal distress and failed induction was the commonest indication for C/S delivery.

Table 3: Characteristics of the mothers during delivery from the total case of preeclampsia /ecclampsia in 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable	Response	Frequency n (%)
ANC follow up	Yes	1422 (78.6)
	No	387 (21.4)
Diagnosis	Mild preeclampsia	84(4.6)
	Severe preeclampsia	1412(78.1)
	Ecclampsia	313(17.3)
Presentation	Cephalic	1661(91.8)
	Breech	134(7.4)
	Transverse	14(0.8)
Labor induced or terminated	Yes	423(23.4)
	No	1386(76.6)
Indication for induction/termination	severe preeclampsia and GA>34	7(1.7)
	severe preeclampsia/term pregnancy	279 (66.0)
	Abruptio placenta	11(2.6)
	HELLP syndrome	10(2.4)
	fetal distress	79(18.7)
	Ecclampsia	18(4.3)
	IUFD	19(4.5)
	SVD	905(50.0)
	C/S delivery	800(44.3)
	Instrumental delivery(vacuum, forceps delivery)	82(5%)
Indication for C/S	(breech extraction, fetal distress	12(0.6), 172(21.5)
	Abrabtio placental	39(4.8)
	Intrauterine fetal death	39(4.8)
	severe preeclampsia	148(18.5)
	Ecclampsia	93(11.6)
	previous c/s delivery	70(8.8)
	failed induction	169(21.1)
	severe oligohydraminous	35(4.4)
	Cephalo-pelvic disproportion due to malpresentation	31(3.8)

Management of the preeclampsia/ecclampsia mother

Among 1809 mother who had preeclampsia/ecclampsia cases, 1340 (74.1%) of the mother received MgSo4 as a means of management and the majority (96.3%) of the mothers Blood Pressure (BP) become less than 160/100 during discharge. In addition to these, many of mothers kept in hospital and took anti-hypertensive treatment.

Table 4: Management of mothers in 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable	Response	Frequency (%)
MgSo4 administration	Yes	1340(74.1%)
	No	469(25.9%)
Mother kept for 24hr and more	Yes	1805(99.8%)
	No	4(0.2%)
BP during discharge <160/100 mmHg	Yes	1742(96.3%)
	No	67(3.7%)
Appointment after 2weeks given	Yes	1772(98.0%)
	No	36(2.0%)

The five year (2009-2013) pattern of maternal complications

Among the 1809 cases, 652(36%) had maternal complication. HELLP Syndrome 257 (39.5%) was the most frequent complication observed of the mother. The case of Aspiration pneumonia, pulmonary edema, and Abrabtio placenta were also the second most frequent case for maternal complication.

Table 5: Pattern of maternal complication from the total cases of preeclampsia/eclampsia in 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=652)

Variable	Response	Frequency (%)
Maternal complication(n= 652)	Yes	652(36.04%)
	No	1157(63.96%)
Type of complications	HELLP syndrome	257(39.5%)
	Aspiration pneumonia	114 (17.5%)
	Pulmonary edema	114(17.5%)
	Abrabtio placenta	100(15.3%)
	Post-partum hemorrhage	56(8.6%)
	Acute Renal failure	44(6.8%)
	Disseminated intravascular coagulopathy (DIC)	43(6.6%)
	Congestive heart failure (CHF)	41(6.3%)
	Intracranial hemorrhage	33(5.1%)
	Severe anemia	30(4.6%)
	Postpartum Ecclampsia	17(2.6%)
	Puerperal sepsis	15(2.3%)
	Institutional Maternal death	6(0.9%)
	Others(Severe uterine atony, Thyrotoxin, Uterine rupture, Postpartum psychosis)	6 (0.9%)

The five year (2009-2013) pattern of Neonatal complication

From all delivery, **1202 (66.4%) [95%CI (64.24%, 68.59%)]** had at least one neonatal complication in the five years (2009-2013). The rate of birth weight <1500, 1500-2500 among the total delivery were 301 (16.6%) and 743 (41.1%), respectively. There were 363 (30.2%) still births. Among still birth cases, 243(66.9%) and 115(31.7%) were among the mother who had severe preeclampsia and eclampsia, respectively. Prematurity 395(32.8%), respiratory distress syndrome 456 (37.9%), and low birth weight 363(30.2%) were the commonest cause of neonatal complication. There were also 756 (41.8%) of the neonatal intensive care unit admission and from the total delivery, early neonatal death rate was 150 (8.29%)

Table 6: pattern of the birth outcome and their complication after delivery from 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable	Response	Frequency (%)
Birth weight	<1500	301(16.6)
	1500-2500	743(41.1)
	>2500	765(42.3)
APGAR IN 1st min	0-3	392(21.7)
	4-6	513(28.4)
	>7	904(50.0)
APGAR in 5th min	0-3	375(20.7)
	4-6	179(9.9)
	>7	1255(69.4)
Neonatal complication	Yes	1202(66.4)
	No	607(33.6)
Type of Neonatal complications (n=1202)	Low birth weight	532 (44.2%)
	Respiratory distress syndrome	456 (37.9%)
	Premature	395 (32.8%)
	Still birth	363 (30.2%)
	Asphyxia	102 (8.5%)
	Sepsis	67 (5.6%)
	Small for gestational age	59 (4.9%)
	Jaundice	38 (3.2%)
	Post term baby	18 (1.5%)
	Others (anencephaly, congenital malformation, exposed infant ,hydropsfetalis, macrosomia)	10 (0.8%)
Neonatal ICU admission	Yes	756 (41.8%)
	No	1053 (58.2%)
Early Neonatal outcome (n=1446)	Alive	1296 (91.71%)
	Dead	150 (8.29%)

5.2. Trend of Preeclampsia/ecclampsia among the total deliveries

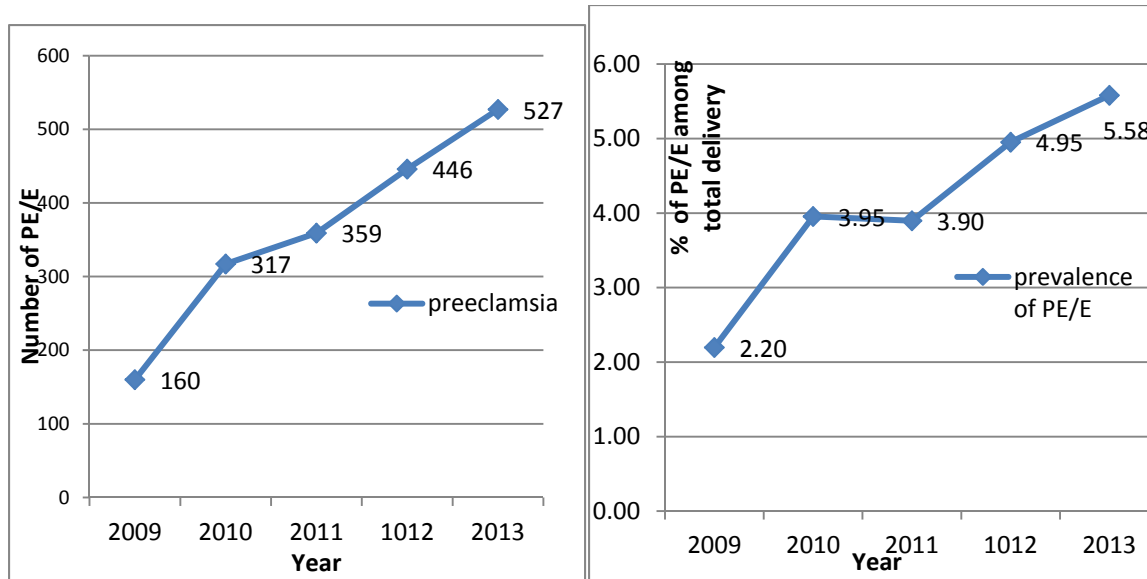


Fig 1a: The Number of preeclampsia/ecclampsia from 2009 to 2013

Fig 1b: The proportion of PE/E from 2009 to 2013

As shown in Fig 1a, the number of preeclampsia /ecclampsia increased as a year from 2009 to 2013. The proportion of preeclampsia was 2.2% in 2009 and increased to a proportion of 5.58 % in 2013($p < 0.001$). The percentage increase over the five years was 154%.

Table 7: Five years trends of Preeclampsia/ ecclampsia case from 2009-2013 in three government Hospitals Addis Ababa, Ethiopia (n=1809)

Variable		Total delivery		Proportion of MH		Test
		PE/E	No PE/E	PE/E	OR	
Year	2009**	160	7122	2.20%	1	$X^2_{MH}=121.43$ $P < 0.001^*$
	2010	317	7699	3.95%	1.833	
	2011	359	8854	3.90%	1.805	
	2012	446	8561	4.95%	2.319	
	2013	527	8918	5.58%	2.63	

* *P value for linear trend*

** *the reference for the test*

As shown in both the figure 1a and 1b, and the test of Mantel-Haenszel odds ratios, there is an increase trend of preeclampsia/ eclampsia as year passed from 2009 to 2013 by 2.63 times and the test of linearity showed significant change of linearity ($P<0.001$). The trend of cases was true also by the severity of the preeclampsia/ecclampsia (fig 2)

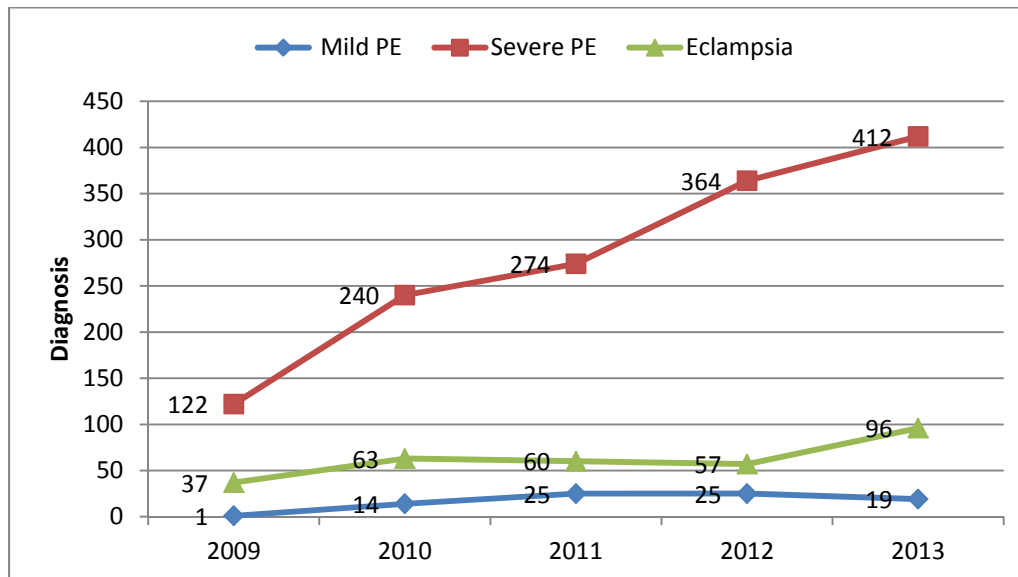


Fig 2. Diagnosis of Preeclampsia/ Ecclampsia severity from 2009-2013 in three governments Hospital Addis Ababa, Ethiopia (n=1809)

As shown in the graph 2, Sever preeclampsia dominates in all the five year and had higher change throughout the five year trend, while mild preeclampsia had the lowest level in the five year and the change was minimal.

5.3. Trend of Maternal complication

Of the total 1809, mothers who had preeclampsia/ecclampsia, **652 (36.04%) [95%CI (33.85%, 38.28%)]** had at least one maternal complication. Of mothers who had at least one, the different maternal complication over five year depicted below in the bar graph.

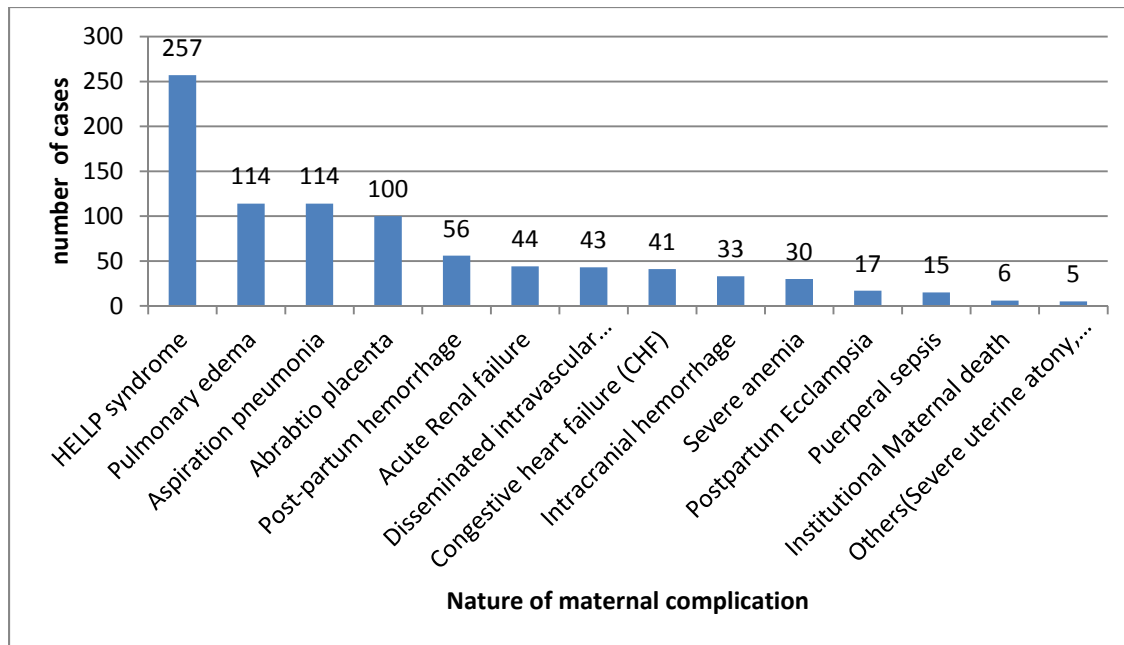


Fig 3: the pattern of maternal complication among the preeclampsia/ecclampsia cases in 2009-2013 in three governments Hospital Addis Ababa

As the figure 4a, shown the number of at least one type of the above maternal complication increase from the 2009 (54) to 2013 (224). Though those number increase looks like related with an increase in the number preeclampsia/ecclampsia. This clearly manifested as in the proportion of maternal complication has ups and downs and was lowest by the 2010 and 2012, but there was a sharp increase of complication cases from 33 % in 2012 to 43% in 2013. The percentage change of maternal complication over the time was 26.5%. The trend of this graphs has a global significance of linearity ($p < 0.006$).

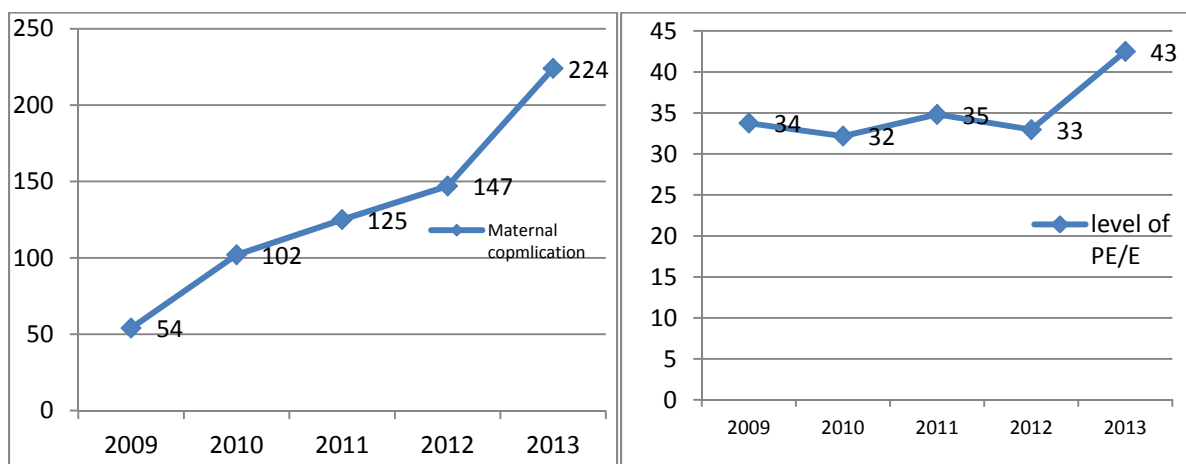


Fig 4a the number of maternal complication from 2009to 2013

Fig 4b: the proportion of maternal complication among PE/E from 2009 to 2013

Table 8: Five years trend of maternal complication by total number of preeclampsia / eclampsia case from 2009-2013 in three government Hospitals, Addis Ababa , Ethiopia

		Maternal complication		Proportion of maternal complication	MH OR	Test
		Number with at least one complication	No complication			
Year	2009**	54	106	33.75%	1	$X^2_{MH}=7.55$ P =0.006006*
	2010	102	215	32.17%	0.931	
	2011	125	234	34.81%	1.049	
	2012	147	299	32.95%	0.965	
	2013	224	303	42.5%	1.451	
* P value for linear trend						
** reference value						

5.4. Trend of neonatal complication

The bar graph showed that the major cause of neonatal complication were low birth weight , respiratory syndrome, premature, and still birth among preeclampsia/ eclampsia women.

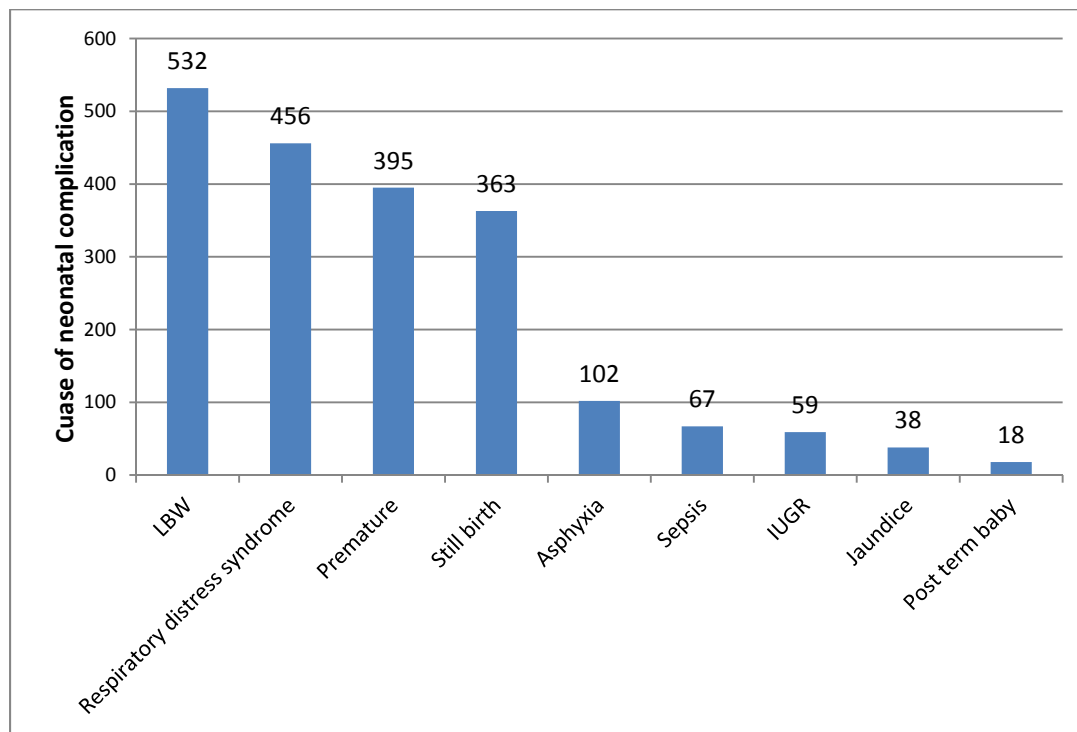


Fig 5.Type of neonatal complication in 2009-2013 in three governments Hospital Addis Ababa (n=1202)

As shown in the Fig.6, the numbers of neonatal complication looked increase. When the analysis considered cases of preeclampsia/ecclampsia as denominator (proportion), the evidence showed in the next graph. The neonatal complication decrease 76% in 2009 to 66% in 2013. This showed the percentage of change of neonatal complication over time was -13.2%.

This change of neonatal complication reduction was significant and have a decreasing linearity ($P=0.04028^*$).

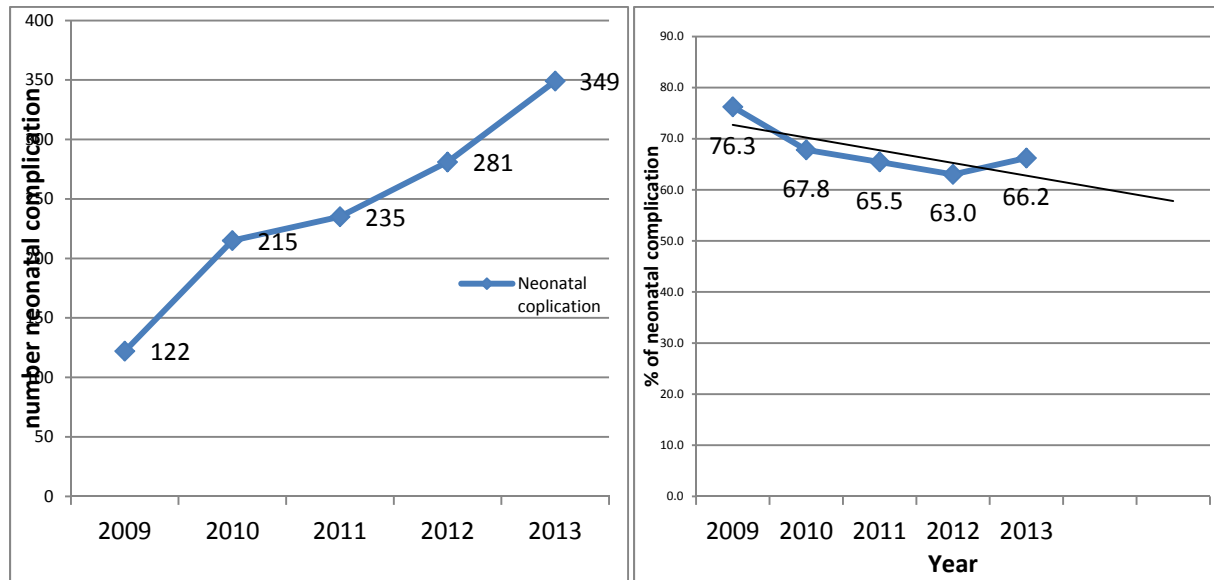


Fig.6. Trend of neonatal complication in 2009-2013 in three governments Hospital, Addis Ababa

Table 9: Neonatal complication by total number of preeclampsia / eclampsia case from 2009-2013 in three government Hospitals, Addis Ababa, Ethiopia

		Neonatal complication		Proportion of neonatal complication	MH OR	Test
		Number with at least one complication	No complication			
Year	2009**	122	38	76.25%	1	$X^2_{MH}=4.21$ $P < 0.04028$
	2010	215	102	67.82%	0.657	
	2011	235	124	65.45%	0.59	
	2012	281	165	63%	0.53	
	2013	349	178	66.22%	0.611	

* P value for linear trend

** reference value

The crude odds ratio and stratum specific odds ratio were equal and indicates there is no confounding but within stratum odds ratio are different indicates

6. DISCUSSION

Preeclampsia has remained a major obstetric problem which has significant public health threat in both developed and developing countries contributing to maternal and perinatal morbidity and mortality worldwide. The problem became more in developing countries[43, 44].

Studies done in Ethiopia and elsewhere indicate that the prevalence, maternal and neonatal morbidity and mortality of preeclampsia/ecclampsia show increment from year to year especially in developing countries [21, 45].

Trend of preeclampsia/ecclampsia

In this study the magnitude of preeclampsia /ecclampsia was found 4.2%, which is consistent with study done in Ethiopia, at Tikur Ambesa Hospital (5%)[46].The trend of preeclampsia /ecclampsia shows an increment with percentage of change was 154% from 2009 to 2013 and statistically significant ($P<0.01$). This finding is consistent with a study conducted in Ethiopia [21, 45]. This increment might be related with the improvement of the case detection rate due to special emphasis in the country as compared in the previous years, or might be the actual increment in the number of preeclampsia/ecclampsia cases and it needs a further analysis.

As other many studies including in Ethiopia[18], severe preeclampsia were the dominates (78%) as compared to mild and ecclampsia over five years.

Trend and Pattern of Maternal complication:

In this study, maternal complication rate from the total cases of preeclampsia / ecclampsia was 36%. This is consistent with a study conducted among the same study group with our study in Nigeria (39%) [34]. The proportion of maternal complication shows a decrement in year 2010 and 2011. This might be due to the introduction of MgSo₄ drug to treat preeclamptic /ecclamptic mothers in those hospitals can reduce its prevalence as compared to the previous years. But in general, the percentage change of maternal complication over the time was 26.5%. According to the study on maternal complication [40] (especially on maternal mortality) done in Ethiopia, the proportion of complication due preeclampsia/ ecclampsia show increment and it consistent with our study. This might be related with the three delayed (delay in the decision to seek care, delay in reaching the health facility and delays in health service provision) will result in high burden of

complication. But, this is difficult to justify and needs further verification on the intervention of the programs.

Women with preeclampsia and eclampsia had three- to 25-fold increased risk of severe complications such as abruptio placentae, HELLP Syndrome, disseminated intravascular coagulation, pulmonary edema, and aspiration pneumonia. Consistent with this, our study also identified that those complication was the commonest complication among mothers with preeclampsia /eclampsia[38].

Preeclampsia is generally considered as a disorder of primigravida women and Based on our finding, more than half of the cases were primigravida (53%).

The mean gestational age during delivery was $35.83(\pm 3.7)$ weeks and this was consistent with the result from the finding in the Eastern Cape (35.16 ± 3.80 weeks)[47]. This might increase the percentage of premature neonate and percentage of respiratory distress syndrome. So that preterm delivery become dominates and more common and this finding were supported by the study done in Pakistan.

Trend and patter of Neonatal complication:

The neonatal complication has shown a statically significant decrement from year 2009 to 2013 continuously from 76% to 66%, respectively. The percentage of change of neonatal complication over time was -13.2%. This might be due to special attention given to the newborn care to decrease a neonatal mortality and morbidity and achieving the Millennium Developmental Goals (MDGs) at national level and worldwide. To mention some, establishing and strengthen of Neonatal Intensive Care Unit (NICU), introduction of MgSo₄ drug to reduce and control maternal as well as neonatal morbidity and mortality, and other possible factor may contribute for this reduction in neonatal complication.

Based on our finding, 66.4% of the neonates have at least one complication and majority of the complication were low birth weight, respiratory distress syndrome, premature birth and still birth. In women with preeclampsia/ eclampsia, the neonatal complication become higher

7. STRENGTHS AND LIMITATIONS OF THE STUDY

Strengths:

- Our study includes large number of cases in addition to this the time variability is controlled in the study.
- The data extraction tool developed based on the health management information system log sheet and patient card.

Limitations:

- The study is descriptive in nature which does not analyze more analytic nature of the existing situation (factors related with our interest variable)
- The trend limited to five year due to unavailability of registration in hospitals
- The study is conducted on facility based which doesn't see the real situation on the community.

8. CONCLUSION

From this study the researcher concludes the following points:

- Maternal preeclampsia and eclampsia are important public health issues with proportion rates as high as 4.2%. Even though interventions were introduced at a country level in the past five years, the proportion of preeclampsia/eclampsia cases significantly increased over time. .
- The rate of maternal complication remained relatively stable ever since the introduction of the MgSO₄ preeclampsia/eclampsia management drug, however, lately, the rate of complications among preeclampsia/eclampsia cases has experienced a significant increase, for unjustified reasons.
- Regarding neonatal health, neonatal complications arising from deliveries by preeclamptic/eclamptic mothers have significantly declined overtime.

9. RECOMMENDATION

Overall, the findings of this study have important policy implications for health interventions on problems of preeclampsia/ eclampsia, maternal complications, and neonatal complications. Because those problems have an important public health significance regarding maternal and neonatal health, special attention should be given to mothers and neonates, in order to halt the progress of the illness and its consequences. In the long run, these problems may be alleviated by integrating efforts from different sectors. However, short term efforts can be performed before long-term solutions are obtained. Taking this into consideration, the following recommendations are brought forward.

- *At community level:* Raise awareness among mothers in the community regarding early sign and symptoms of preeclampsia / eclampsia and inform them of the referral system by Health Extension Workers (HEW) to help tackle the “Three Delays” issues. This would also help identify mothers during their ANC and give them the appropriate care.
- *Health Facility level:* in this study ANC coverage is encouraging but still special focus should be given since ANC is a useful setting to diagnose and manage preeclampsia/eclampsia, it is essential to design a better tracking system for ANC. . Similarly, providing health facilities with the MgSo₄ drug could prevent and reduce convulsions and severe outcomes in mothers and neonates. In addition, strengthening and establishing neonatal intensive care units (NICU) in health facilities could be an important input in reducing maternal complications. In addition to this, the health facility has to be strengthen the data keeping system.
- Finally, the conduct of further studies is widely encouraged, in order to identify the causes behind this increase in preeclampsia/ eclampsia cases and maternal complications.

10.REFERENCE

1. Nicholas J Kassebaum, et.al., *Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013*. The lancet, 2014.
2. WHO, *Trend In Maternal Mortality: 1990 to 2010: WHO, UNICEF, UNFPA, and The World Bank estimates*. 2012: Geneva, Switzerland.
3. Federal Ministry of Health, et al., *National Baseline Assessment for Emergency Obstetric and Newborn Care Final Report 2008*. 2010: Addis Ababa.
4. Sibai BM, *Diagnosis, prevention, and management of eclampsia*. Obstet Gynecol, 2005. **105**: p. 402-410.
5. WHO, et al., *Monitoring Emergency Obstet ric Care: a Handbook*. 2009, Geneva: WHO.
6. Teklu S and Gaym A, *Prevalence and clinical correlates of the hypertensive disorders of pregnancy at Tikur Anbessa Hospital Addis Ababa, Ethiopia*. Ethiop Med J, 2006,Jan. **44**(1): p. 17-26.
7. Mekbebe T and Ketsela K, *Pre-eclampsia/ eclampsia at Yekatit 12 Hospital, Addis Ababa, Ethiopia (1987-1989)*. East Afr Med J, 1991. **68**(11): p. 893-9.
8. Abate M and Lakew Z, *Eclampsia a 5 years retrospective review of 216 cases managed in two teaching hospitals in Addis Ababa*. Ethiop Med J, 2006. **44**(1): p. 27-31
9. WHO, *Coverage of Maternity Care : A Listing of Available Information*. 2004: Geneva, Switzerland.
10. WHO, *Make every mother and child count*, in *The world health report 2005*. 2005.
11. Myers JE, B.P., *Hypertensive diseases and eclampsia*. Curr Opin Obstet Gynecol, 2002. **14**(2): p. 119-25.
12. Zhang J, M.S., Trumble A, , *Severe maternal morbidity associated with hypertensive disorders in pregnancy in the United States*. Hypertens Pregnancy, 2003. **22**: p. 203-212.
13. Minassian C, et al., *Acute Maternal Infection and Risk of Pre-Eclampsia: A Population-Based Case-Control Study*. PLoS ONE 2013. **8**(9).
14. Kuklina EV, A.C., Callaghan WM, *Hypertensive disorders and severe obstetric morbidity in the United States*. Obstet Gynecol, 2009(113): p. 1299-1306.

15. Martin JN Jr, T.B., Moore RC, et al., *Stroke and severe pre-eclampsia and eclampsia: A paradigm shift focusing on systolic blood pressure*. *Obstet Gynecol*, 2005(105): p. 246-254.
16. Cunningham FG, L.K., Bloom SL et al, *Williams obstetrics*. 23rd[chapter 34] ed. 2010, Toronto: McGraw Hill Medical,.
17. ANDREA P. MACKAY, CYNTHIA J. BERG, and HANI K. ATRASH, *Pregnancy-Related Mortality From Preeclampsia and Eclampsia*. *American Obstetricians and Gynecologists*, 2001. **97**(4).
18. Zenebe Wolde , Hailemariam Segni , and Mirkuzie Woldie, *Hypertensive disorders of pregnancy in jimma University specialized hospital*. *Ethiop J Health Sci* November 2011. **21**(3).
19. Central Statistical Agency, *Ethiopia Demographic and Health Survey 2011*. March 2012, ICF International ,Calverton, Maryland, USA: Addis Ababa, Ethiopia.
20. *Federal Democratic Republic of Ethiopia Ministry of Health, Health and Health Related Indicators 2000 E.C. (200 8/ 09 G.C.)*.
21. Asheber Gaym et al, *Ethiopian National EmONC Assessment Team, Disease burden due to pre-eclampsia/eclampsia and the Ethiopian health system's response*, 2011. International Federation of Gynecology and Obstetrics.
22. *Report of the National High Blood Pressure Education Program, Working group report on high blood pressure in pregnancy*. *Am J Obstet Gynecol* 2000. **183**: p. 21-22.
23. Sibai BM, *Diagnosis, controversies, and management of the syndrome of hemolysis, elevated liver enzymes, and low platelet count*. *Obstet Gynecol*, 2004. **103**: p. 981-999.
24. Tital pent v et al, *Risk factors for birth before arrival of siriray Hospital*. *J Med Asso* Dec 2002. **85** (12): p. 1251-55.
25. Khan KS, Wojdyla D, and Say L, *WHO analysis of causes of maternal death: A systematic review*. *Lancet*, 2006. **367**(1066-1074).
26. Urassa DP, Carlstedt A, and Nyström L, *Eclampsia in Dar es Salaam, Tanzania- Incidence, outcome, and the role of antenatal care*. *Acta Obstet Gynecol Scand* 2006. **85**: p. 571-578.
27. Moodley J, *Maternal deaths associated with hypertensive disorders of pregnancy: A population-based study*. *Hypertens Pregnancy* 2004. **23**: p. 247-256.

28. Bellamy L, Casas JP, and Hingorani AD, *Preeclampsia and risk of cardiovascular disease and cancer in later life: Systematic review and meta-analysis*. . BMJ 2007 **335**: p. 974.
29. Yerdelen D and Karatas M, *Neurological complications without eclampsia during pregnancy in Turkey*. J Obstet Gynaecol Res, 2011. **37**: p. 202-208.
30. Tuffnell DJ, Jankowicz D, and Lindow SW, *Outcomes of severe pre-eclampsia/eclampsia in Yorkshire 1999/2003*. Br J Obstet Gynaecol 2005. **112**: p. 875-880.
31. Miquil M, et al., *Acute renal failure requiring dialysis in Obstetrics*. Neprol Theor, 2011. **7**(3): p. 178-81.
32. Agida ET, Adika BI, and Jibril KA, *Pregnancy outcome in eclamptics: a 3-year review*. Nig J Clin Pract, 2010. **13** (4): p. 394-8.
33. Kulak W, et al., *Risk factors for cerebral palsy in term infants*. Adv Med Sci. , 2010. **55**(2): p. 216-21.
34. Tukur A Jido, *Ecalmpsia: maternal and fetal outcome*. African Health Sciences 2012. **12**(2): p. 148 - 152.
35. Cunningham G, et al., *Williams Obstetrics*. 21st ed. 2001, New York: McGraw-Hill.
36. Wallis AB, et al., *Secular trends in the rates of pre-ecclampsia, ecclampsia, and gestational hypertension, United States, 1987-2004*. Am J Hypertens, 2008. **21**: p. 521-526.
37. Dahlstrom BL, et al., *Changes in the prevalence of preeclampsia in Akershus County and the rest of Norway during the past 35 years*. Acta Obstet Gynecol Scand, 2006. **85**: p. 916-921.
38. Zhang J, Meikle S, and Trumble A, *Severe maternal morbidity associated with hypertensive disorders in pregnancy in the United States*. Hyper-tens Pregnancy, 2003. **22**: p. 203-212.
39. Kuklina EV, Ayala C, and C. WM, *Hypertensive disorders and severe obstetric morbidity in the United States*. Obstet Gynecol 2009. **113**: p. 1299-1306.
40. Ahmed Abdella, *Maternal Mortality Trend in Ethiopia*. Ethiop. J. Health Dev, 2010. **24** (1): p. 115-122.

41. Population Census Commission, *The Population and Housing Census of Ethiopia*. . Statistical Report for Ethiopia, 2007.
42. Misganaw A, et al., *Ethiopian Ministry of Health: Health and Health Related Indicators. Validity of Verbal Autopsy Method to determine causes of death among adults in the urban setting of Ethiopia*. BMC Med Res Methodol ,2012, 2008. **12**: p. 130.
43. WHO, *Global Program to Conquer Preeclampsia/Eclampsia*. 2002.
44. E.M.McClurk e, et al., *Stillbirth in developing countries: a review of causes, risk factors and prevention strategies*. *Journal of Maternal-Fetal and Neonatal Medicine*, 2009. **22**(3): p. 183-190.
45. Khalid S Khan, et al., *WHO analysis of causes of maternal death: a systematic Review* Lancet 2006. **367**: p. 1066-74.
46. Eyob Berihun and Asheber Gaym, *Risk factors for mortality among eclamptics admitted to the surgical intensive care unit at Tikur Anbessa Hospital, Addis Ababa, Ethiopia*. *Ethiopian Journal of Reproductive Health*, May, 2007. **1**(1).
47. Olumide Ojodun, *The prevalence of hypertensive complications of pregnancy in Dora Nginza Hospital, Port Elizabeth, Eastern Cape*. . unpublished research, 2007-2008.

11.ANNEXES

Annex 1: Data abstraction tool

The following were recorded in the subject medical record, delivery register, theatre register or related records pertaining to the selected delivery.

A. SOCIO-DEMOGRAPHIC DATA

1. Address Hospital	1. Black Lion Specialized hospital 2. Zeweditu memorial hospital 3. St. Paul Hospital	
2. Year of the data	_____	
3. Age of mothers	_____(in years)	
4. Residence of the mother	_____	

B. MEDICAL & PREGNANCY HISTORY

5. Number of pregnancy	_____	
6. Gestational age (current pregnancy)	_____(in weeks)	
7. Medical History –	Check all that apply 1. Chronic Renal Disease (glomerulonephritis, Chronic pyelonephritis) 2. Diabetes (circle class) 3. Heart Disease, Class I (No limitation of activity)	4. Heart Disease, Class II-IV (any limitation in activity) 5. Haematological Disorder (Chronic anaemia) 6. Hepatitis: (Type) 7. Neurological Disorder (Seizure or epilepsy) 36 8. HIV/AIDS positive 9. Other , specify _____

8. Past Pregnancy History (for mothers who have more than one parity)	Check all that apply 1. Gestational Diabetes (Class A) 2. Severe preeclampsia 3. elevation & proteinuria 1-2+ & or persistent edem PIH- with Eclampsia (CNS involvement & seizures) 4. Large for Gestation (LGA) infant (> 4000Gms or 9 lbs) 5. Small for Gestation (SGA) infant (<10th percentile for GA) 6. Multiple Gestation	7. Pre-term delivery (<37 weeks gestation) 8. Post- term delivery (>42 Weeks gestation) 9. Instrument Delivery (Forceps, Vacuum extraction) 10. Caesarea section delivery 11. Postpartum haemorrhage (Blood loss more than 500ml) 12. Still birth 13. Neonatal Death (First 28 days of life) 14. Abortion 15. Other, specify _____
9. Spacing between the two pregnancy	_____	
10. Family history of hypertension?	1. Yes 2. No	
11. Family history of preeclampsia?	1. Yes 2. No	
C. ADMISSION TO HOSPITAL		
12. Chief complaints (other than pregnancy/ labour)	1. Headache 2. Epigastric pain 3. Nausea and or vomiting	4. Blurred vision 5. Edema 6. Abnormal body movement 7. Other, Specify _____
13. Blood pressure on admission	SBP(mmHg) _____ DBP(mmHg) _____	

14. Oedema	1. Yes	2. No 3. Unknown
15. Proteinuria (++)dipstick or 3gm/24hr)	1. Yes	2. No
16. Attended Antenatal Care follow up	1. Yes 2. No	
17. Diagnosis:	1. Mild Pre-eclampsia - BP >140/90 and <160/110 2. Severe pre-eclampsia - BP 160/110 or greater 3. Eclampsia -experiencing convulsions	
18. Presentation:	1. Cephalic 2. Breech	3. Transverse 4. Other, Specify _____
19. Was MgSo4 administed to the mother with preeclampsia/ ecclampsia?	1. Yes 2. No	
D. DELIVERY		
20. Was labour induced/pregnancy terminated	1. Yes 2.. No	
21. If yes what was the indication?	1. Severe pre-eclampsia and gestational age >34 weeks 2. Severe pre-eclampsia / term pregnancy 3. Intra uterine fetal death?	4. Abruptio placenta 5. HELLP syndrome 6. Fetal distress 7. Ecclampsia 8. Other
22. What was mode of delivery?	1. Spontaneous vaginal delivery (SVD) 2. Breech extraction	3. Vacuum extraction 4. Forceps delivery 5. Caesarean section

23. If caesarean section? What was the indication?	1. Foetal distress, 2. Abruption placenta 3. Still birth	4. Severe Pre-eclampsia 5. Eclampsia 6. Failed induction 7. Severe oligohydraminous 8. Previous C/S scar 9. CPD due to malpresentation 10. Other _____, _____ specify _____ —
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E. POST-PARTUM CARE

24. Was the mother kept at least for 24 hours in the hospital after delivery?	1. Yes 2. No
25. Was the blood pressure on discharge less than 160/ 100 mmHg?	1. Yes 2. No
26. Was appointment given to the mother to come back after 2 weeks for checkup?	1. Yes 2. No

F. Maternal Complications

27. Was there maternal complication?	1. Yes 2. No
28. If yes what?	1. Abruption placenta, 2. postpartum eclampsia 3. Pulmonary oedema, 4. Post-partum haemorrhage 5. maternal Death 6. intracranial haemorrhage 7. Cardiac failure (CHF) 8. acute Renal failure 9. Disseminated intravascular coagulopathy (DIC) 10. HELLP syndrome 11. stroke 12. Other specify

G. Neonate complication

29. Weight (KG)---		
30. APGAR score within 1 st and 5 th min		
31 Was there Neonatal complication?	1. Yes 2. No	
32. If yes neonatal complication, what?	1. Premature, 2. Post term baby 3. IUGR 4. Respiratory distress syndrome,	5. Jaundice, 6. Sepsis 7. Still birth 8. asphyxia 9. Low birth weight 10. other, specify_____
34. Was the neonate admitted to ICU	1. Yes 2. No	
35. What was the outcome for the neonate?	1. Alive 2. Dead	