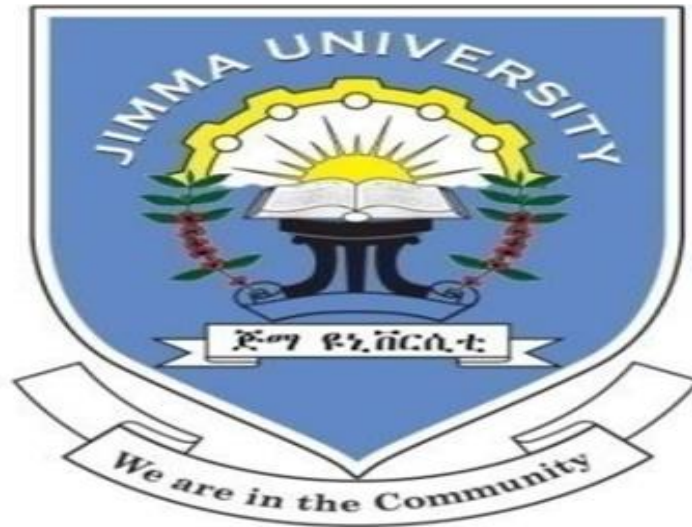


Determinants Of Adverse Pregnancy Outcomes Among Mothers Who Gave Birth From Jan 1-Dec 31/2015 In Jimma University Specialized Hospital, Case Control Study, 2016.



COLLEGE OF HEALTH SCIENCES

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BY: EYOSIYAS YESHIALEM

**JUNE, 2016
JIMMA, ETHIOPIA**

Determinants of adverse pregnancy outcomes among mothers who gave birth from Jan 1-Dec 31/2015 in Jimma University specialized hospital, case control study, 2016.

Name of the investigator: EYOSIYAS YESHIALEM

Name of Advisors:

MULUMEBET ABERA (PhD)

AMANUEL TESHAY (MPH)

JUNE, 2016

JIMMA, ETHIOPIA

ABSTRACT

Background: Adverse pregnancy outcomes lead to serious health consequences to the mother and/or the baby. These Adverse birth outcomes; prematurity, low birth weight and still birth represent significant problems in both developing and developed countries. Adverse pregnancy outcomes are still major public health problems in developing countries including Ethiopia where most pregnancies are unplanned, complications are many and outcomes are generally Unfavorable for both mother and infant.

Objective: To identify determinants of adverse pregnancy outcomes among deliveries takes place in Jimma University specialized hospital from January1 – December 31 / 2015.

Methods: The study was a facility based unmatched case-control study design conducted by reviewing mothers and newborn cards and registration log book who delivered in Jimma university specialized hospital from January 1 /2015 to December 31/2015, southwest Ethiopia. The study was done on randomly selected 86 cases and 258 controls using structured data collection checklist. Data analysis was done by SPSS version 20 and multiple logistic regression statistical methods were used to identify the predictors.

Result: In this study 344 mothers and newborns cards were included yielding 100 % response rate. From this 86 mothers and newborn cards were selected for case group and 258 mothers and newborn cards were selected for control group. Out of 344 mothers in both case and control groups, most of them were between the age group of 20-34 years, which is 80.2 % and 82.9 % for case group and control group, respectively. Stillbirth comprises majority of adverse birth outcomes contributing 62.7 % of cases while low birth weight (48.8 %) and Preterm birth (24.4 %) take second and third respectively. Mothers who are referred for delivery service from other area are more than five times to have adverse pregnancy outcomes than mothers who are not referred, **AOR=5.49 95% CI [2.80-10.76]**. And mothers who had illness during current pregnancy are seven times to be case than controls, **AOR=7.22, 95% CI = 1.65-31.58**. Mothers who attend ANC were less likely to have adverse pregnancy outcome, than mothers who didn't attended ANC follow up, **AOR = 0.17 95% CI [0.06-0.49]**. Pregnant mothers who are anemic or had hemoglobin level of less than 11 gram/dl are more than seven times to have adverse pregnancy outcomes than non-anemic pregnant mothers, **AOR=7.29 95% CI=[2.85-18.67]**. Additionally, women who had obstetric emergencies during current pregnancy, complications during current delivery, and multiple pregnancy are more than 18 times **AOR =18.40[6.12-55.37]**, 2 times **AOR=2.65[1.38-5.11]** and 7 times **AOR=7.59[1.49-38.65]** to have adverse pregnancy outcomes than their counterparts respectively.

Conclusion: According to the findings of this study; referral, illness during current pregnancy, having ANC attendance, anemia during current pregnancy, complication during delivery, multiple pregnancy and having obstetric emergencies are statistically significant predictors of adverse pregnancy outcomes.

Recommendation: providing quality FANC and quality care for laboring mother and facilitation of early referral in case of complications is recommended.

Keywords: pregnancy outcomes, determinant factors

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List of acronyms and abbreviations

AOR: ADJUSTED ODDS RATIO

ANC: ANTENATAL CARE

APH: ANTEPARTUM HEMORRHAGE

APOS: ADVERSE PREGNANCY OUTCOMES

ART: ANTI RETRO VIRAL THERAPY

BW: BIRTH WEIGH

CI: CONFIDENCE INTERVAL

CS: CESAREAN SECTION

DM: DIABETES MELLITUS

EDHS: ETHIOPIA DEMOGRAPHIC AND HEALTH SURVEY

FANC: FOCUSED ANTE NATAL CARE

HIV: HUMAN IMMUNODEFICIENCY VIRUS

HTN: HYPERTENSION

IUGR: INTRAUTERINE GROWTH RETARDATION

JUSH: JIMMA UNIVERSITY SPECIALIZED HOSPITAL

LBW: LOW BIRTH WEIGHT

NBW: NORMAL BIRTH WEIGHT

OR: ODDS RATIO

PIH: PREGNANCY INDUCED HYPERTENSION

PROM: PREMATURE RUPTURE OF MEMBRANE

PPH: POSTPARTUM HEMORRHAGE

UNICEF: UNITED NATIONS CHILDREN'S FUND

UTI: URINARY TRACT INFECTION

WHO: WORLD HEALTH ORGANIZATION

1. INTRODUCTION

1.1. Background of the study

Pregnancy outcomes refers to life events that occur to the newborn infant from the age of viability (28 weeks) to the first week of life. The transition of fetus immersed in the amniotic fluid to life outside the womb is not always smooth and can result in adverse events to the mother or/and the baby. pregnancy outcomes varies from pregnancy to pregnancy which includes; normal live birth, low birth weight, prematurity in the baby, stillbirth, intrauterine fetal death, early neonatal death and late neonatal death. Adverse pregnancy outcomes are those pregnancy outcomes other than normal live birth which majorly includes preterm birth, stillbirth and low birth weight which are the major cause of neonatal morbidity, mortality and long term physical and psychological problems [1].

The World Health Organization (WHO) defines Preterm (PT) delivery as delivery before the end of 37 weeks of gestation (less than 259 days). Low birth weight (LBW) is a birth weight of less than 2500 grams. And stillbirth as a baby born without sign of breathing or dead at 28 weeks of gestation or more, with a birth weight of ≥ 1000 g, or a body length of ≥ 35 cm [2].

These Adverse birth outcomes; prematurity, low birth weight and still birth represent significant problems in both developing and developed countries. Each year, about 15 million babies in the world, more than one in 10 births, are born too prematurely. More than one million of those babies die shortly after birth; countless others suffer from lifelong physical, neurological, or educational disabilities, often at great cost to families and societies [3].

Among 136 million babies born every year, approximately 4 million are stillborn, and the other 4 million die in the first month of life. In 2006 Worldwide, 12% of babies are born prematurely, 8% with low birth weight, and 3% have major birth defects. Adverse pregnancy outcomes lead to serious health consequences to the mother and/or the baby [4].

Adverse pregnancy outcomes are influenced by a myriad of biologic, social, economic and environmental factors. Many of the 3 million deaths of babies each year in the first week of life and 2.7 million stillbirths are related to poor health of the mother and to inadequate care during pregnancy, childbirth and the period immediately after birth [5]. It is estimated that nearly two-thirds of the 8 million infant deaths that occur each year result largely from poor maternal health

and hygiene, inadequate care, inefficient management of delivery, and lack of essential care of the newborn [6].

A baby's death whenever or however it occurs is a profound loss. The stillbirth rate is a reflection of health status and policies, socioeconomic indicators relate to health and access and adequacy of health care [7].

Raising awareness of the need for women to reach emergency care without delay if complications arise during delivery is particularly critical. To address the problems of maternal and neonatal health in developing countries, a standard of care is required to define level of performance, improve quality of services provided and ultimately reduce maternal and newborn deaths [8].

1.2. Statement of the problem

The burden of adverse pregnancy outcomes (APOs) is substantial in both developed and developing countries. More than 60% of preterm births take place in south Asia and sub-Saharan Africa [9]. Preterm birth and low birth weight are critical determinants of child survival, disabilities, stunting, and long-term adverse consequences for the onset of non-communicable diseases in the life course and demand appropriate public health interventions [10].

These Adverse pregnancy outcomes (still births, preterm births, and low birth weight) account for a large proportion of perinatal losses [11]. Each year, an estimated 904,000 intrapartum related neonatal deaths occur, accounting for approximately one-third of the early neonatal deaths [12]. Early neonatal deaths occur during the perinatal period and have obstetric origins and are largely avoidable [13]. Preterm birth and low birth weight are leading causes of neonatal and infant mortality as well as short and long-term morbidity [14]. Maternal demographic characteristics such as age, parity, birth order and pregnancy interval may directly influence perinatal mortality [15]. High stillbirth and early neonatal mortality rate have been associated with unattended deliveries compared with hospital based deliveries [16].

Worldwide 303,000 mothers died in 2015 from pregnancy-related causes and millions more suffered from complications related to pregnancy or childbirth, including hemorrhage, infection, hypertensive disorders and obstructed labour. Total of 830 women died due to preventable causes related to pregnancy and childbirth each day and 5.9 million Children under the age of five died

in 2015, largely from preventable or treatable causes. More than any other region, sub-Saharan Africa is home to the highest number of child deaths – roughly 3 million in 2015. Despite some countries making improvements – and in some cases, dramatic gains – in child health in recent years, sub-Saharan Africa’s average child mortality rate is still almost 12 times the average of high-income countries. Many of these deaths are from entirely preventable and treatable causes, such as pneumonia, diarrhea, malnutrition and malaria [17].

Other study in Kenya showed that magnitude of adverse pregnancy outcomes of recent pregnancies were found in 27.6% respondents [18].

Ethiopian demographic and health survey of 2011 showed that national perinatal mortality rate is 46 per 1,000 pregnancies of seven or more months of gestation. The perinatal mortality rate is higher among births to young mothers (less than 20 years of age) as well as among births that occur less than 15 months after the previous birth. High rate of neonatal mortality (37 deaths per 1,000 live births) is reported and preterm birth is believe to be a major and direct cause of neonatal mortality where about 12% of under- five deaths is attributed to preterm birth in Ethiopia. [19].

According to the study done in Gondar university hospital, northwest Ethiopia, in February 2013, 23% of women had adverse birth outcomes in their last pregnancy [20].

In Ethiopia, adverse outcome of pregnancy are still major public health problems. The achievement of decreasing child mortality is strongly influenced by progress in reducing neonatal deaths where Preterm birth and low birth weight are the leading causes of neonatal mortality.

To the investigator’s knowledge in Jimma zone, no study has yet been done to identify determinant factors of adverse pregnancy outcomes (preterm, low birth weight and stillbirth). So that this study aims to identify major determinant factors that contribute for adverse pregnancy outcomes in Jimma university specialized hospital.

2. LITERATURE REVIEW

2.1. Introduction

While most pregnancies and births are uneventful, all pregnancies hold some risk. Pregnancy is a time of joy and excitement; however, it can also be full of anxiety and concern. The successful transition from life in utero to life outside the womb is based on a complex balance between the health of the mother, the course of the pregnancy, and the process of delivery and immediate postnatal care [12].

Intrapartum-related neonatal deaths (birth asphyxia) are a leading cause of child mortality globally, outnumbering deaths from malaria [11]. Between 60 and 90 percent of newborn deaths globally are low birth weight babies. Previous fetal and neonatal deaths are strongly associated with preterm, low birth weight (LBW) and small for gestational age (SGA). Preterm labour and delivery remains the pre-eminent problem in modern obstetric practice. Around 6% of babies are delivered preterm in the UK and other developed countries [13]. Preterm birth has serious short and long-term health, psychological, and economic consequences and it has now overtaken congenital anomaly as the single biggest cause of perinatal mortality and morbidity [21]. Although stillbirth is infrequent, it occurs 10 times more often than sudden infant death. In the United States, stillbirth accounts for a large proportion of all perinatal losses, although its causes remain incompletely understood [22]. In developing nations, preterm births and stillbirths are grossly underreported, thus making international comparisons difficult.

A recent study estimated that 12.8 million babies were born small for gestational age in India alone in the year 2010, a prevalence of 47% of all births. Preterm birth and low birth weight are critical determinants of child survival, disabilities, stunting, and long-term adverse consequences for the onset of non-communicable diseases in the life course and demand appropriate public health interventions [23].

2.2. Magnitude of adverse pregnancy outcomes

Perinatal care reflects the quality and utilization of prenatal, delivery and immediate post-delivery care available to women and their newborn infants. Each year at least 1.16 million newborns die

in Sub-Saharan Africa within the first 28 days of life, making the region the world's most dangerous to be born in [12].

The study done in Kenya shows that adverse pregnancy outcomes of recent pregnancies were found in 106 (27.6%) respondents, of which 15 (14.2%) had terminations or miss-carriages, 29 (27.3%) had stillbirths, 48 (45.2%) pre-term babies, 14 (13.2%) had neonatal mortalities [18].

Other study in Gondar university hospital shows that about 23% of women had adverse birth outcomes (14.3% preterm, 11.2% low birth weight and 7.1% still births) [20].

According to cohort study in Dabat, northwest Ethiopia, on contribution of maternity care to reduce adverse pregnancy outcomes showed that 2.8 % women pregnancies end up with stillbirths, another 2.8 % of the women lost their baby in the first month of the postnatal period where most (80 %) of the deaths occurred in the first week of life [24].

2.3. Determinants of adverse pregnancy outcomes

2.3.1. Socio-demographic and economic factors

Study done in Kenya showed that para 3/4 women were less likely to have poor pregnancy outcomes (OR=0.376) compared with lower parity women. Low education level was also associated with poor pregnancy out-comes; women who did not receive schooling (OR=5.63) and primary schooling (OR 2.09). Self-employment among the partners of the respondents was associated with poor pregnancy outcomes (unadjusted OR 2.885) compared with employed partners [18].

A case control study done in mekele showed that, women who lived in urban areas were (AOR = 0.27) less likely to get neonates with adverse outcome compared to women who lived in rural areas [25].

The survey in Wollo, northeast Ethiopia indicates that Monthly family income, marital status, and HIV status were the predictors to delivering low birth weight baby than their counterparts, AOR = 19.6), AOR = 10.5), AOR = 34.2) respectively. Mothers who were illiterate and who were at primary education level were 4 times more likely to have poor birth outcome than those who had secondary education level and more, AOR = 4.3&4.0 respectively. Mothers who lived in rural area

encountered poor birth outcomes more than two times than mothers who lived in urban area, AOR = 2.6 [26].

2.3.2. Antenatal care and delivery factors influencing pregnancy outcomes

Timely and adequate antenatal care is generally acknowledged to be an effective method of preventing adverse outcomes in pregnant women and their babies [27].

Survey in Kenya showed that Respondents who never received antenatal care during their pregnancy were associated with poor pregnancy outcomes. Gestational age during delivery is also significantly associated with adverse pregnancy outcomes; where 28-37 weeks gestations had higher risk with AOR=6.9 than term births [18].

From study in Tanzania, Maternal weight gain during the second and third trimesters, hemoglobin level and maternal height had strong association with infant birth weight ($p=0.024$, $p=0.003$ and $p=0.001$) respectively [28].

Study done in Wollo showed that, Mothers who didn't attend ANC were more than 3 times to have adverse birth outcome, than mothers who attended ANC follow up, AOR = 3.4 [26].

The same study done in Gondar showed that lack of antenatal care follow up (AOR: 9.7) is significantly associated with still birth [20].

2.3.3. Pre-existing conditions and illnesses

Some conditions may already exist before a woman gets pregnant. These may include hypertension, diabetes, renal disorders, respiratory conditions like asthma, Tuberculosis (TB) and cardiac conditions. Other conditions may occur during pregnancy such as malaria, urinary tract infections or pregnancy induced hypertension. Hypertension and diabetes are two of the most common medical conditions to complicate pregnancy, 7% -10% and 3%-5%, respectively [29].

Survey in Kenya showed that Preexisting medical conditions were significantly associated with adverse pregnancy outcomes. The illnesses which significantly affected pregnancy outcome included malaria (OR =4,026) and pregnancy induced hypertension (AOR=6.1) [18].

According to result of a Systematic review done in 2013, among untreated pregnant women with syphilis, fetal loss and stillbirth were 21% more frequent, neonatal deaths were 9.3% more frequent

and prematurity or low birth weight were 5.8% more frequent than among women without syphilis [30].

Study done in Atlanta shows that, HIV infected women with concomitant STIs had a higher risk of spontaneous preterm birth (OR = 2.11) and a low CD4 count (<200) at entry to prenatal care had increased risk for spontaneous preterm birth (AOR=1.96) [31].

Other study done public hospitals of northwest Ethiopia showed that WHO clinical stage III&IV is significantly associated with LBW and preterm delivery while mothers who had CD4 count less than 200 cells/MM³ had 4.2 times higher risk of having LBW compared to those with CD4 >350 mm³ [32].

Study done in Wollo indicates that Mothers who had no history of UTI and/or any documentation for bacteriuria during the current pregnancy were 90% less likely to deliver low birth weight baby than mothers who had urinary tract infection AOR = 0.1) [26].

While Survey conducted in Jimma hospital showed that 20.4% of mothers with LBW had clinical diagnosis of malaria as compared to 12.4% among those with NBW [33].

Another study in Gondar shows that Malaria during pregnancy was also a risk factor for low birth weight. Those women attacked by malaria during pregnancy were 5 times (AOR=4.9) more likely to deliver low birth weight baby than their counterparts [34].

2.3.4. Obstetric emergencies and previous obstetric history

At the time of an obstetric emergency, every moment of delay in seeking and receiving skilled obstetric care increases the risk of stillbirth, neonatal or maternal death, or disability [35]. For some emergencies such as antepartum hemorrhage, even minutes can be the difference between life and death for mother and fetus [36]. According to study done in Gondar university hospital, Obstetric emergencies such as postpartum hemorrhage (PPH), antepartum hemorrhage, cord prolapse and cord presentation, uterine rupture were also significantly associated with poor pregnancy outcomes [20].

The risk of antepartum stillbirth increased 1.3-fold for a history of cesarean delivery and 1.6-fold for history of preterm birth [37].

The study done in Pakistan showed non-booked hospital cases (OR = 1.95, history of still birth (OR = 3.9), miscarriages (OR = 1.94) and preterm delivery (OR = 6.01) were significantly associated with developing adverse birth outcomes as compared to control [38].

In the Institution based cross-sectional study conducted in February 2013 at Gondar University Hospital, Women having history of either preterm delivery or small baby (AOR: 3.1) were more likely to have preterm births. Similarly, history of delivering preterm or small baby (AOR: 8.4), preterm birth (AOR: 5.5) and hypertension (AOR: 5.8) were associated factors with low birth weight. Ante partum hemorrhage (AOR: 8.43), hypertension (AOR: 9.5) and history of perinatal death (AOR: 13.9) were significantly associated with still birth [20].

The case control study done at mekele in 2013 showed that, adverse pregnancy outcomes are associated with presence of complication of last pregnancy and labor complication of last birth with AOR=4.85 and AOR=9.94 respectively [25].

According to case control study done in Kenya, mothers who had obstetric emergency during current pregnancy are significantly associated with developing poor pregnancy outcomes (AOR=13.8 CI [3.14-60.1]) than controls [18].

Mothers who had current pregnancy complication were also found to be significantly associated with preterm birth. Mothers with one or more of current pregnancy complication (PIH, APH, multiple pregnancies, polyhydraminous and cervical incompetence) are 2.9 times more likely of develop preterm birth than mothers without any of the mentioned problems and Mothers who developed PROM and anemia in this pregnancy had about 6.2 times and 7.2 times increased risk of developing preterm birth respectively than mothers who didn't had the problems [39].

2.4. Significance of the Study

Even if the government of Ethiopia declared the achievement of maternal and child mortality reduction, the current figure is still high and needs different interventions. And currently neonatal death is still continuing to be high and remains untouched. So this is identified area of intervention by the government to avert neonatal mortality which accounts the majority of under-five mortality rate in the country.

Prevalence of Adverse pregnancy outcomes like stillbirth, low birth weight and preterm birth which are highly related to neonatal death were studied in different parts of the country. But there are limited studies that identify the possible factors associated with adverse pregnancy outcomes in the country including Jimma zone.

So, studying the determinant factors of adverse pregnancy outcomes in JUSH will

- Address the knowledge gap regarding factors associated with APOs contributing to neonatal and infant morbidity and mortality in the zone.
- Provide valuable evidences for health professionals so as to improve their care basing the identified factors.
- For zonal, regional health bureau and other stakeholders this study will help them to plan health interventions focusing on the specific identified factors to improve the wellbeing of children and women in Jimma zone.
- For researchers the study results will be used as a reference for future studies.

2.5. Conceptual Framework

Several factors play a role in determining the pregnancy outcomes among women. These factors may be inter-related and may contribute to adverse pregnancy outcomes. This relationship between the factors is illustrated by conceptual frame work adapted by referring different literatures on figure 1 below.

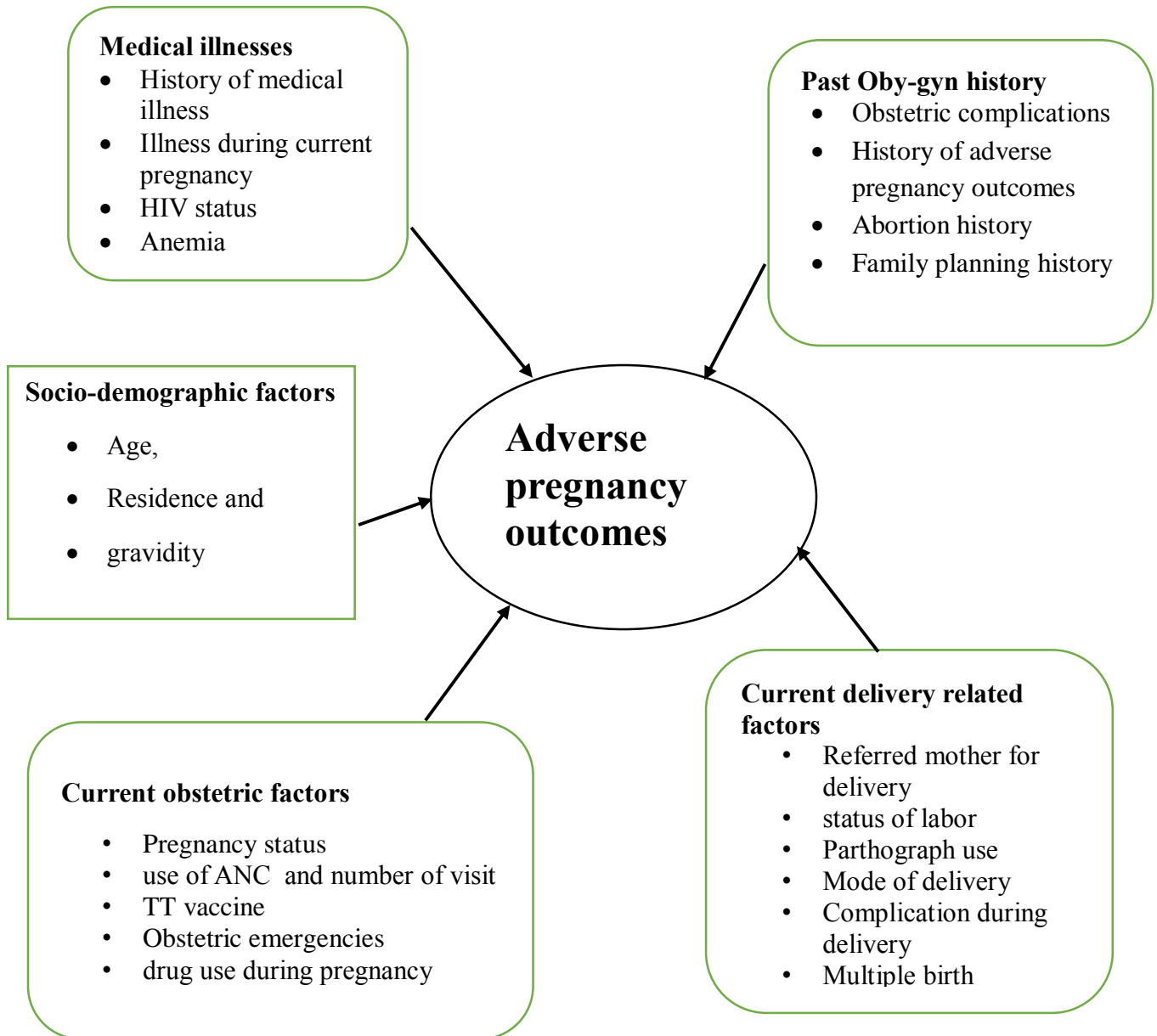


Figure 1: conceptual frame work developed after literature review

3. OBJECTIVES

3.1. General objective

To identify determinant of adverse pregnancy outcomes among women who gave birth in JUSH from Jan 1/2015 to Dec 31/2015, Jimma, Ethiopia.

3.2. Specific objectives

- To identify the maternal socio-demographic factors associated with adverse pregnancy outcomes among mothers who gave birth at JUSH in 2015.
- To assess medical factors associated with adverse pregnancy outcomes among mothers who gave birth at JUSH in 2015.
- To identify obstetric and gynecologic factors associated with adverse pregnancy outcomes among mothers who gave birth at JUSH in 2015.

4. METHODOLOGY

4.1. Study area and period

The study was conducted in Jimma university specialized hospital. The hospital is one of the oldest public hospitals in the country located in Jimma town of Oromia Regional State, Ethiopia. The town is Located 357 km from Addis Ababa and JUSH is the only specialized teaching and referral hospital in the South Western region of Ethiopia.

The hospital has a predominantly rural catchment population of 15 million people for tertiary level care. According to 2006 fiscal year annual report, the hospital provided services for about 15,000 inpatient, 160,000 outpatient attendants, 11,000 emergency cases and around 5000 deliveries takes placed. The hospital has about 21 units and 503 beds where around 65 beds are found in Maternity ward. The ward has around 119 health professional and supportive staffs, namely: Seven (7) Senior Obstetricians and Gynecologists, 6 BSc Nurses, 6 BSc Midwives, 5 Diploma Nurses, 32 Diploma midwives, 38 Residents, 16 Cleaners, 6 Porters and 3 Runners [40]. The study was conducted from March 15- 30/ 2016.

4.2. Study design

Institution based case control study was conducted at JUSH in Jimma town, Oromia regional state.

4.3. Population

4.3.1. Source population

All women who gave birth in JUSH from January 1, 2015 to December 31, 2015.

4.3.2. Study population

- **For controls:** selected women who gave normal live birth in JUSH from January 1, 2015 to December 31, 2015.
- **For cases:** selected women who gave birth with at least one adverse pregnancy outcome (preterm birth, stillbirth or low birth weight) in JUSH from January 1, 2015 to December 31, 2015.

4.3.3. Sampling unit

Mothers who gave normal birth for controls and mothers with at least one adverse pregnancy outcome (preterm, stillbirth, low birth weight) for cases were sampling units.

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

All mothers who gave births from January 01/2015 December 30/2015 in JUSH were included.

4.4.2. Exclusion criteria

Mothers whose cards are missed and incomplete with outcome variable were excluded from the study.

4.5. Sample size determination

All recorded deliveries in the study period were included and Sample size was determined using the formula for two population proportion as follows.

Labor complication of last birth, complications during last pregnancy, residence (urban), Gravida (primi Gravida) and having ANC visit were considered in order to calculate required sample size by revising different literatures. To calculate sample size all the above exposure variables were considered and complication during current pregnancy was chosen as an independent variable since it gives maximum sample size as compared to other exposure variables.

Table 1: sample size calculation based on significant independent variables identified on literatures

Variables	Control % exposed/ AOR	Calculated sample size		
		Cases	Controls	Total
Complication during last labor-delivery	3.5(9.94)	26	78	104
Complications during last pregnancy	2.7(4.85)	86	258	344
Residence(urban)	67.5(0.27)	29	87	116
Gravida (I)	49(0.35)	49	145	194
Have ANC visit	67.8(0.44)	71	211	282

The sample size was calculated by (statistical EPI info 7.1.1) software package by considering that the percent of controls exposed among the controls is 2.7 % (main exposure variable), with 4.85 odds ratio which is taken from similar study done in mekele town public hospitals, Ethiopia, 95% CI, 80% power of the study and case to control ratio of 1:3 [25].

$$n1 = \left[z\alpha/2 \sqrt{\left(1 + \frac{1}{r}\right) p(1-p)} + z\beta \sqrt{p1(1-p1) + \frac{p2(1-p2)}{r}} \right]^2 / (p1 - p2)^2$$

WHERE

n1 = sample size

Z α = standard normal variate for level of significance

r = ratio of control subject per case subject

Z β = standard normal variate for power or type two error

P1 = probability of events in control group

P2 = probability of events in case group

Accordingly, the final sample size was 86 cases and 258 controls (a total sample size of 344) was involved in the study.

4.6. Sampling technique

Simple random sampling technique was used with the following steps. A total of 1740 Births from 1st Jan to 31st Dec 2015 were identified using registration log book and 387 births were with at least one adverse pregnancy outcomes (LBW, preterm, stillbirth). Card number of identified births were coded for cases and controls. After the codes of cases and controls are entered in to Epi info software separately, 86 cases and 258 controls were selected randomly. Cards were traced and checked for completeness of the necessary information. Incomplete birth cards were excluded and replaced with another card.

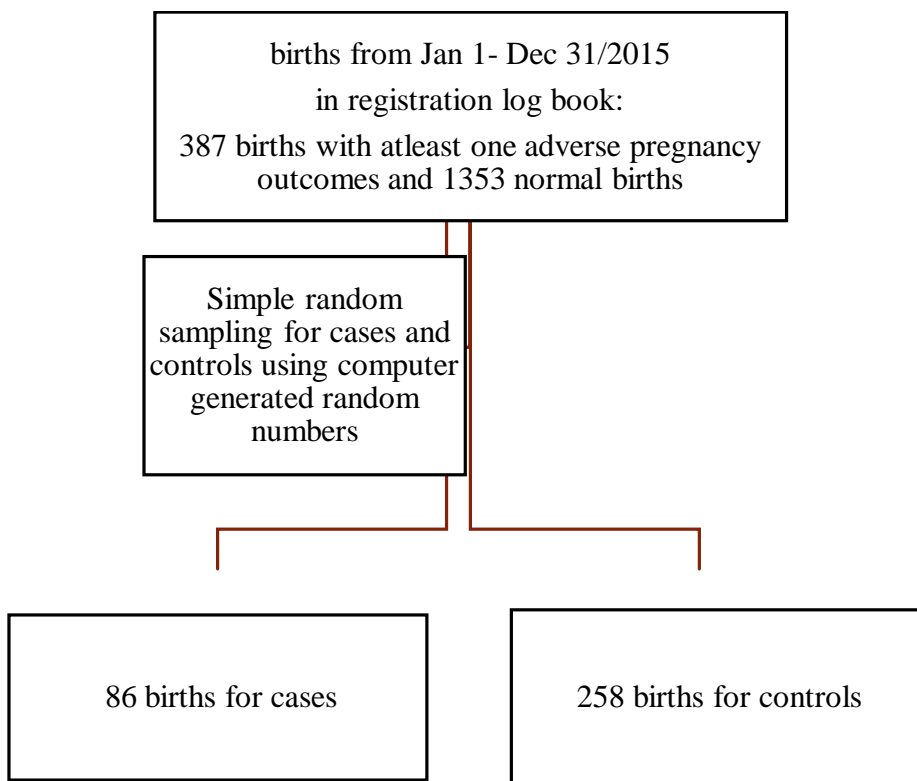


Figure 2: schematic presentation of sampling procedure

4.7. Study variables

4.7.1. Independent variables

Socio-Demographic factors: (Age, Residence and gravidity)

Medical factors :(Previous medical illness, Illness during current pregnancy, HIV status and Anemia)

Past Obstetric and gynecologic factors: (Obstetric complications, History of adverse pregnancy outcomes, Abortion history and Family Planning history)

Current obstetric factors: (Pregnancy status, use of ANC and number of visit, TT vaccine, Obstetric emergencies and drug use during pregnancy)

Current delivery related factors: (Referred mother for delivery, status of labor, Parthograph use, Mode of delivery, Complication during delivery and multiple birth)

4.7.2. Dependent variables:

Adverse pregnancy outcomes: (stillbirth, preterm birth and low birth weight).

4.8. Operational Definition and Definition of Terms

Normal birth: alive term birth with birth weight of 2500 to 4000 grams.

Obstetric emergencies: obstetric complications like (APH, cord prolapse, eclampsia, fetal distress, shoulder dystocia)

Medical illness: chronic disease like DM, hypertension, cardiac disease, HIV/AIDS...

Adverse pregnancy outcomes: refers to a pregnancy results with at least one of the following birth outcomes (preterm birth, low birth weight and stillbirth).

Preterm birth is any birth occurring between 28 – 37 weeks gestation.

Still birth is any fetus born at 28 weeks gestational age or more with no heartbeat or respiratory effort.

Birth weight: is the first weight of the fetus or newborn obtained after birth. Measured within the first hour of life before significant postnatal weight loss has been occurred by using a standard weight scale.

Low birth weight: neonate birth weight less than 2,500 gm (up to and including 2,499 gm).

Gravida: number of pregnancy

Para: number of live births

4.9. Data extraction tools and procedures

The data was extracted from clinical records of mother's and newborn's (registration log books and individual cards) using a structured data collecting checklist. Selected mother's cards on registration log book were traced through the hospital's registry book. Structured checklist was prepared in English. Some of the data included in the checklist were maternal age, residence, pregnancy and delivery history (Gravida, antenatal care, mode of delivery, and condition of the new born at birth), obstetric and medical complications of the mother. The data was extracted by 2 diploma midwives & 2 diploma nurses and two degree Midwives as supervisor. Training was given for reviewers and supervisor before actual data collection.

4.10. Data quality control and management

Data quality was ensured during collection, coding, entry and analysis. Structured checklist was used. Training was given to the reviewers and supervisors to avoid any confusion and have a common understanding about the study. Each card was checked for its consistency, provision of full information and appropriate documentation. Supervision of reviewers included observation of how the reviewers were collecting data was done by supervisors. The reviewers were instructed to write cards number on the check list during the data collection so that any identified errors will be traced back using the cards number. The filled checklist was checked for completeness by reviewers, supervisors and PI on a daily basis. Consequently, any problem encountered was discussed among the team and solve immediately. Two days Training on method of reviewing, how to use the checklist and objective of the study was given for four data collectors and two supervisors.

4.11. Situational analysis

Situational analysis was conducted on 16 mother's cards (taken as 5% of the total sample size) 4 cases and 12 controls in Shenen Gibie hospital found in Jimma town before the actual data collection to control the quality of the tool.

4.12. Data processing and analysis

Collected Data was entered in to Epi Data version 3.1 and exported SPSS-version 20 for analysis. Data was checked for consistency and completeness by exploratory data analysis before running the actual statistical analysis. Frequencies were used to see the overall distribution of the study subjects with regard to the variables under the study. Bivariate logistic regressions was used to select important variables candidate for the multiple logistic regression. Independent variables with p value less than 0.2 were selected as a candidate for multiple logistic regression. Finally, multiple logistic regression was used to assess the relative effect of independent variables on dependent variable and to control the possible confounders and finally to select important predictors of adverse pregnancy outcomes included in the model. Odds Ratio (OR) and their 95% Confidence Interval (CI) was used to measure the association. A significance level of 0.05 was used to decide the significance of statistical tests. Finally the results is presented in text, table and graphs.

4.13. Ethical considerations

Ethical clearance was obtained from Ethical review committee of college of health sciences, Jimma University to conduct the study. Further permission was obtained from Medical Director of JUSH, department head of the obstetric ward and card room head for the utilization of logbooks and cards. Since the cards include the name of the mothers, confidentiality will be maintained by making the data collectors aware not to record any identification information found on the card.

4.14. Dissemination of the study result

The final result of this study will be presented to Jimma University, college of health sciences; school of graduate studies, department of population and family health, Jimma University specialized hospital and other concerned governmental and non-governmental organizations and there will be possible efforts to publish on different scientific journal.

5. RESULTS

5.1. Socio-demographic characteristics of cases and controls

A total of 86 women (cases) and 258 controls yielding 100% response rate were included in the study. The mean age among the cases was 26.01 (\pm SD 5.49) years (range 18 to 40), and among the controls 25.34 (\pm SD 5.00) years (range 16 to 40). Additionally, 214(82.9%) of controls and 69 (80.2 %) of cases are within the age group of 20-34 years. In addition, 134 (51.9 %) of the controls and 32 (37.2 %) of the cases are Gravida one. With regards to the participants residence, majority of cases 58(67.4 %) and only 84 (32.6%) controls are rural in residents. (see **Table 2**)

Table 2: Socio-demographic characteristics of the cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

		Controls /n=258 N (%)	Cases n=86 N (%)	Total N=344 N/ (%)
Age	15-19 years	21(8.1)	6(7.0)	27(7.8)
	20-34 years	214(82.9)	69(80.2)	283(82.3)
	35 and above	23(8.9)	11(12.8)	34(9.9)
Gravidity	One	134(51.9)	32(37.2)	166(48.3)
	2-4	111(43.0)	43(50.0)	154(44.8)
	Five and more	13(5.0)	11(12.8)	24(7.0)
Residence of mothers	Urban	174(67.4)	28(32.6)	202(58.7)
	Rural	84(32.6)	58(67.4)	142(41.3)

5.2. Past Obstetric and gynecologic characteristics of cases and controls

This study shows that 1(0.4 %) of the controls and 3(3.5 %) of the cases had a recorded complication in their previous pregnancies. Additionally 15(5.8 %) controls and 14 (16.3 %) cases had history of abortion while 11(4.3 %) of controls and 12(14.0 %) cases had previous adverse pregnancy outcomes.

The study also indicates that 162(62.8 %) of controls and 51(59.3 %) of the cases ever used modern family planning methods where majority of controls 145(56.2 %) and cases 42(48.9%) used pills & injectable family planning methods. (see **Table 3**)

Table 3: Past obstetric and gynecologic characteristics of the cases and controls, at JUSH, Jimma, Ethiopia, 2015.

		Controls/ n=258		Cases / n=86		Total / N=344	
		N	(%)	N	(%)	N	(%)
Any obstetric complications in previous pregnancy?	No	257	(99.6)	83	(96.5)	340	(98.8)
	Yes	1	(0.4)	3	(3.5)	4	(1.2)
Any history of abortion?	No	243	(94.2)	72	(83.7)	315	(91.6)
	Yes	15	(5.8)	14	(16.3)	29	(8.4)
Previous History of Adverse pregnancy outcomes	No	247	(95.7)	74	(86.0)	321	(93.3)
	Yes	11	(4.3)	12	(14.0)	23	(6.7)
Ever used family planning methods?	No	96	(37.2)	35	(40.7)	131	(38.1)
	Yes	162	(62.8)	51	(59.3)	213	(61.9)
Type of modern family planning methods used	Pills & injectable	145	(56.2)	42	(48.9)	187	(54.4)
	Implants	15	(5.8)	4	(4.7)	19	(5.5)

The study also indicates that, Six (2.33 %) of controls had previous history of early neonatal death while five (5.81%) of cases had previous history of stillbirth and low birth weight each. (see **Figure 3**)

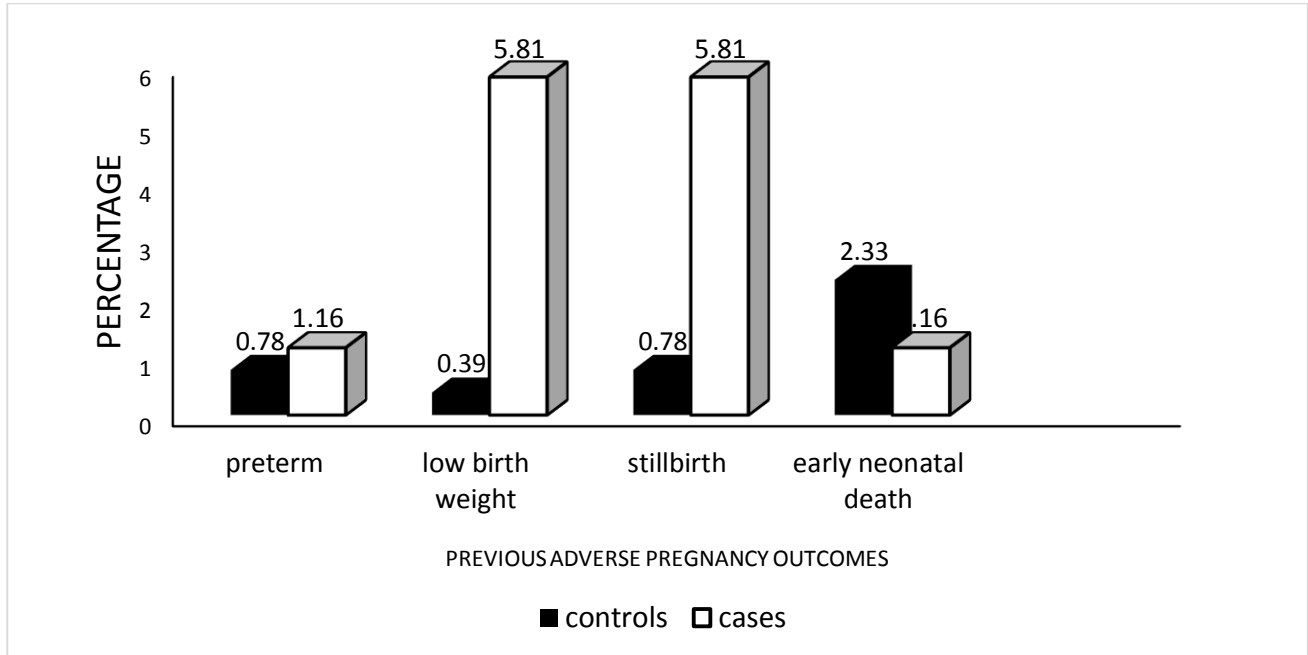


Figure 3: distribution of previous history of APOs among cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

5.3. Previous and current medical characteristics of cases and controls

The result of this study shows that 4(1.6 %) of the controls and 8(9.3 %) of cases had record of pre-existing medical illness where 5(5.81) of cases experience hypertension. Four (1.6 %) of controls and 12(14.0 %) of cases had medical illness during their current pregnancy. Concerning HIV/AIDS, 253(98.1%) of controls and 86 (100%) of cases are tested for HIV/AIDS where 251(99.2%) of controls and 85 (98.8%) of cases are non-reactive and all the reactive mothers among both group are on ART. Additionally, Nine (3.5 %) of control and 27 (31.4%) of cases had been diagnosed as having anemia during their current pregnancy. (See **Table 4**)

Table 4: distribution of previous and current medical illnesses among cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

Characteristics		Controls/ n=258 Count (%)	Cases/ n=86 Count (%)	Total/ N =344 Count (%)
pre-existing medical illness	No	254(98.4)	78(90.7)	332(96.5)
	Yes	4(1.6)	8(9.3)	12(3.5)
Illnesses during current pregnancy	No	254(98.4)	74(86.0)	328(95.3)
	Yes	4(1.6)	12(14.0)	16(4.7)
HIV test status	Tested	253(98.1)	86 (100.0)	339 (98.5)
HIV test result	Non- reactive	251(99.2)	85 (98.8)	336 (99.1)
	Reactive	2(.8)	1(1.2)	3 (0.9)
Anemia status	Non anemic	249 (96.5)	59 (68.6)	308 (89.5)
	Anemic	9 (3.5)	27 (31.4)	36 (10.5)

5.4. Current Obstetric characteristics of cases and controls

Majority of the controls, 243(94.2 %) and 75(87.2 %) cases had planned pregnancy. The proportion of women who received at least one ANC service was higher among controls 246(95.3 %) than cases 68 (79.1 %) where 173(67.1 %) and 31 (36.0 %) of controls and cases had ANC visit of four and above respectively.

Having at least one Tetanus toxoid vaccination was slightly lower among cases (50.0 %) compared to (59.7 %) controls that have got tetanus vaccination during current pregnancy. Higher proportions of cases 19(22.1 %) than controls 6 (2.3 %) had at least one obstetric emergencies during their current pregnancy. (See **Table 5**)

Table 5: Current Obstetric characteristics of cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

characteristics		Controls/N=258		Cases N=86		Total/N=344	
		count	%	Count	%	count	%
pregnancy status	planned	243	94.2	75	87.2	318	92.4
	unplanned	14	5.4	11	12.8	25	7.3
ANC follow-up	no	11	4.3	17	19.8	28	8.1
	yes	247	95.7	69	80.2	316	98.9
Frequency of ANC visits	1 visit	2	0.8	3	3.5	5	1.5
	2 -3 visits	72	27.9	35	40.7	107	31.1
	4 and more visits	173	67.1	31	36	204	59.3
TT vaccination status	no	12	4.7	21	24.4	33	9.6
	yes	154	59.7	43	50	197	57.3
	not recorded	92	35.7	22	25.6	114	33.1
Any Medication taken during current pregnancy	no	256	99.2	83	96.5	339	98.5
	yes	2	0.8	3	3.5	5	1.5
Obstetric emergencies at current pregnancy	no	252	97.7	67	77.9	319	92.7
	yes	6	2.3	19	22.1	25	7.3

5.5. Current Delivery characteristics of cases and controls

According to the result of this study, 71 (27.5%) of controls and 62 (72.1%) of cases were referred from different health institutions to JUSH for delivery service.

Higher proportion of cases 35(40.7 %) than controls 65 (25.2 %) were delivered with caesarean section. Parthograph utilization in JUSH during the study period is lower among cases 1(1.2 %) than controls 14 (5.4%). Smaller amount of controls 3(1.2 %) than cases 5(5.8 %) had multiple births. This study also demonstrated that 81 (31.4%) of the controls and 48(55.8%) cases were experienced at least one complication during index child labor-delivery. (See **Table 6**)

Table 6: Delivery characteristics of the cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

characteristics		Controls n=258		Cases N=86		Total N=344	
		count	%	count	%	count	%
labor Status	spontaneous	246	(95.30)	81	(94.20)	327	(95.10)
	induced	12	(4.70)	5	(5.80)	17	(4.90)
mode of current delivery	Spontaneous vaginal delivery	183	(70.90)	49	(57.00)	232	(67.40)
	instrumental	10	(3.90)	2	(2.30)	12	(3.50)
	caesarean section	65	(25.20)	35	(40.70)	100	(29.10)
Complications during delivery?	no	177	(68.60)	38	(44.20)	215	(62.50)
	yes	81	(31.40)	48	(55.80)	129	(37.50)
Referred from other facility	no	187	(72.5)	24	(27.9)	211	(61.30)
	yes	71	(27.5)	62	(72.1)	133	(38.70)
multiple birth during current pregnancy	no	255	(98.8)	81	(94.2)	336	(97.7)
	yes	3	(1.2)	5	(5.8)	8	(2.3)

This includes 48(55.8 %) of cases had complications during labor delivery which includes prolonged labor 17(19.8%), Fetal distress 12(14%), obstructed labor 8(9.3%), others (Uterine rupture, bleeding & pre eclampsia/eclampsia) 6(7%) and abnormal presentations 5(5.8%). And 81 (31.4 %) of controls had at least one complication that includes prolonged labor 27(10.5%), fetal distress 25(9.7%), abnormal presentations 18(7%) and obstructed labor 11(4.3%) (See **Figure 4**).

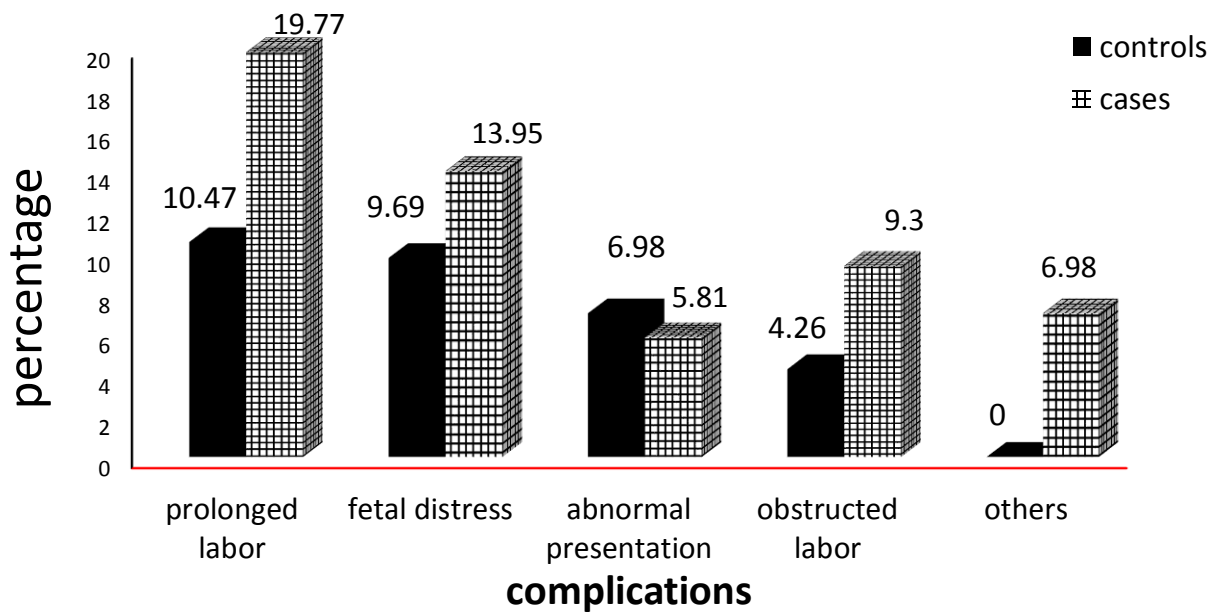


Figure 4: Distributions of current obstetric complication during labor delivery among cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

This study investigated that, Stillbirth comprises majority of adverse birth outcomes contributing 62.7 % of cases while low birth weight and Preterm birth take second and third respectively. (See **Figure 5**)

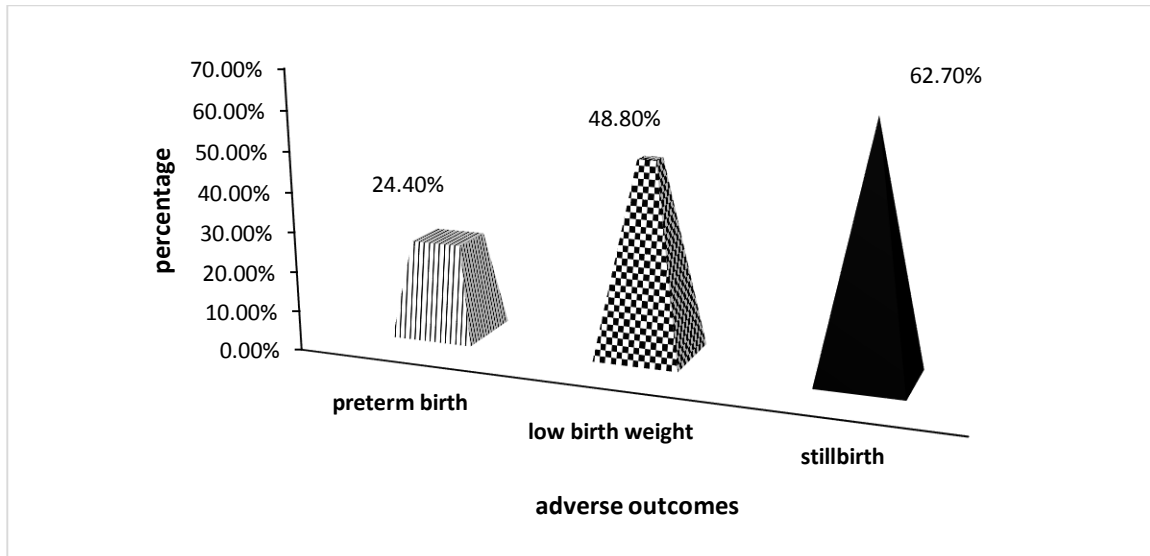


Figure 5 : distribution of various birth outcomes to the general adverse birth out comes, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

5.6. Results from bivariate and multi-variable logistic regression Analysis

Variables considered for multiple logistic regression were those with a p-value <0.2 at bivariate analysis and these included Gravida, residence, referral status, complications during previous pregnancy, abortion history, adverse pregnancy outcomes history, medical complications, illness during current pregnancy, ANC utilization, number of ANC, TT vaccine, medication received, anemia status, delivery mode, delivery complications, partograph used, multiple pregnancy, obstetric emergencies.

Accordingly; mothers who are referred for delivery service from other area are more than five times to have adverse pregnancy outcomes than mothers who are not referred, **AOR=5.49 95% CI [2.80-10.76]**(see **Table 9**). Additionally, mothers who had illness during current pregnancy are seven times to be case than controls, **AOR=7.22, 95% CI = 1.65-31.58]** (see **Table 7**). Mothers who attend ANC were 83% less likely to have adverse pregnancy outcome, than mothers who didn't attended ANC follow up, **AOR = 0.17 95% CI [0.06-0.49]**. Pregnant mothers who are anemic or had hemoglobin level of less than 11 gram/dl are more than seven times to have adverse pregnancy outcomes than non-anemic pregnant mothers, **AOR=7.29 95% CI=[2.85-18.67]** (see **Table 8**). Additionally, women who had obstetric emergencies during current pregnancy, complications during current delivery, and multiple pregnancy are more than 18 times **AOR =18.40[6.12-55.37]**, 2 times **AOR=2.65[1.38-5.11]** and 7 times **AOR=7.59[1.49-38.65]** to have adverse pregnancy outcomes than their counterparts respectively. (See **Table 7- Table 9**)

Table 7: Multiple logistic regression output for socio demographic factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015

		Controls n=258(%)	Cases n=86(%)	COR 95 %(CI)	AOR 95 %(CI)
gravidity	One	134(51.9)	32(37.2)	1.0	1.0
	2-4	111(43.0)	43(50.0)	0.28(0.12-0.69)	0.92(0.255-3.32)
	≥five	13(5.0)	11(12.8)	0.46(0.19-1.1)	0.74(0.21-2.61)
Mothers residence	Urban	174(67.4)	28(32.6)	1.0	1.0
	Rural	84(32.6)	58(67.4)	4.29(2.55-7.22)	0.48(0.12-1.88)
Illnesses during current pregnancy	No	254(98.4)	74(86.0)	1.0	1.0
	Yes	4(1.6)	12(14.0)	10.29(3.23-32.88)	7.22(1.65-31.58)
Medical illness before pregnancy	No	254(98.4)	78(90.7)	1.0	1.0
	Yes	4(1.6)	8(9.3)	6.51(1.91-22.21)	2.55(0.45-14.36)

Table 8: Multiple logistic regression output for obstetric and gynecologic factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

characteristics		Controls n=258(%)	Cases n=86(%)	COR 95 % (CI)	AOR 95 % (CI)
Any history of abortion?	No	243(94.2)	72(83.7)	1.0	1.0
	Yes	15(5.8)	14(16.3)	3.15(1.45-6.83)	2.18(0.67-7.06)
APOs history	No	247(95.7)	74(86.0)	1.0	1.0
	Yes	11(4.3)	12(14.0)	3.64(1.54-8.59)	1.85(0.45-7.59)
ANC follow-up	No	11(4.3)	17(19.8)	1.0	1.0
	Yes	246(95.3)	68(79.1)	0.179(0.08-0.40)	0.17(0.06-0.49)
Received TT injection?	No	12(4.7)	21(24.4)	1.0	1.0
	Yes	154(59.7)	43(50.0)	0.93(0.87-0.99)	0.94(0.86-1.02)
Medication taken during this pregnancy	No	256(99.2)	83(96.5)	1.0	1.0
	Yes	2(.8)	3(3.5)	4.63(0.76-28.16)	0.45(0.04-5.4)
Anemia status	non anemic	249(96.5)	59(68.6)	1.0	1.0
	anemic	9(3.5)	27(31.4)	12.66(5.66-28.35)	7.29(2.85-18.67)
Obstetric Emergency at current pregnancy	No	252(97.7)	67(77.9)	1.0	1.0
	Yes	6(2.3)	19(22.1)	11.9(4.58-31.0)	18.40(6.12-55.37)

Table 9: Multiple logistic regression output for delivery related factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015

characteristics		Controls n=258(%)	Cases n=86(%)	COR(CI)	AOR(CI)
Referred from other facility for delivery service	No	187(72.5)	24(27.9)	1.0	1.0
	Yes	71(27.5)	62(72.1)	6.80(3.95-11.73)	5.49(2.80-10.76)
mode of current delivery	SVD	183(70.9)	49(57.0)	1.0	1.0
	instrumental	10(3.9)	2(2.3)	0.497(0.30-0.84)	2.06(0.81-5.23)
	C/S	65(25.2)	35(40.7)	0.37(0.08-1.79)	0.40(0.04-3.60)
Complications during delivery?	No	177(68.6)	38(44.2)	1.0	1.0
	Yes	81(31.4)	48(55.8)	2.76(1.67-4.55)	2.65(1.38-5.11)
parthograph use	No	244(94.6)	85(98.8)	1.0	1.0
	Yes	14(5.4)	1(1.2)	0.21(0.03-1.58)	0.15(0.01-1.73)
multiple birth	No	255(98.8)	81(94.2)	1.0	1.0
	Yes	3(1.2)	5(5.8)	5.25(1.23-22.44)	7.59(1.49-38.65)
Gender of the new born	female	100(38.8)	42(48.8)	1.0	1.0
	male	158(61.2)	44(51.2)	0.66(0.41-1.08)	0.61(0.31-1.20)

6. DISCUSSION

This study was aimed to assess determinants of adverse pregnancy outcomes in Jimma university specialized hospital, Jimma Town, Oromia regional state. The finding of this study indicated the impact of referral from other facility for delivery service, illness during current pregnancy, having ANC visit, anemia (hemoglobin level below 11 gm/dl), having delivery complications, multiple pregnancies and obstetric emergency during current pregnancy on pregnancy outcomes. There were differences among the cases and controls in relation to the above variables. In this study the mean age of the study subjects were 26.01 for cases and 25.34 for the controls.

In this study stillbirth takes majority of adverse pregnancy outcomes accounting 62.7% of cases and this is in line with similar study done in mekele where it accounts 61.2 % of adverse birth outcomes [25]. This is probably because most of the mothers of the cases (72.1%) in this study are referred with serious obstetric complications to this hospital arrived late.

Multiple logistic regression output of this study showed that late referral of mother with complication from other facility for delivery service is significantly associated with adverse pregnancy outcomes. According to findings of this study, 96% of urban mothers are not referred while 88% of referred mothers are from rural residence. This is consistent with the study done in mekele public hospitals which indicates that mothers who lived in urban are 76 % less likely to develop adverse birth out come as compared to those mothers who lived in rural area [25]. This might be due to distance naturally prevents mothers from doing so even if they are knowledgeable of the benefits of antenatal care services but deprives them the opportunity for early identification and management of pregnancy related problems and may further influence their choice of place of deliver and also lack some health services on time. Additionally, 35(72.9%) of cases who are referred for delivery had obstetric complications during labor delivery time. so referring mother with obstetric complication lately will increase risk of developing APOs by delaying appropriate service.

Illness during current pregnancy were significantly associated with poor pregnancy outcomes [AOR 7.22 CI (1.65-31.58)]. This finding is consistent with similar study done in Kenya [18] and this may be medical illness present during pregnancy time affect maternal health as well as fetal growth and development.

Results of this study showed that, mothers who had ANC attendance are less likely to develop adverse pregnancy outcomes than those who didn't. During ANC follow up women will have access to information related to nutrition, danger signs of pregnancy, birth preparedness and complication readiness. Regular ANC follow up will also help a pregnant woman seek early treatment for her potential pregnancy related problems but if failed to showed up for ANC, she will be disadvantaged. This finding is in agreement with study done in Wollo [26] and Gondar university hospital [20] where mothers who didn't attend ANC are more than 3 and 9 times at risk to develop adverse pregnancy outcomes.

Anemia is significant predictor of adverse pregnancy outcome in this study where anemic mothers are more than 7 times at high risk to develop than those who are not anemic. This is similar with

study done in Tanzania which indicates that low hemoglobin level is associated with the occurrence of low birth weight [28]. This might be low Hb levels during pregnancy leads to intra-uterine oxygen inadequacy and reduced iron stores, causing infantile anemia before the age of six months [40].

This study shows that those mothers who developed obstetric emergencies during pregnancy are more than 18 times at risk to develop adverse birth outcomes as compared to mothers who don't develop obstetric emergencies during current pregnancy. This finding is in line with the study done in Kenya where mothers who develop obstetric emergencies are about 14 times at high risk of developing poor pregnancy outcomes compared to the controls [18]. This is because, obstetric emergencies like APH, pre eclampsia/eclampsia, cord prolapse, and fetal distress affect both maternal and fetal conditions and usually leads to occurrence of adverse pregnancy outcomes if they are not addressed timely.

The result also shows that mothers who develop complication during labour & delivery are 7.59 times more likely to develop adverse pregnancy outcome as compared to those mothers who don't develop complication during labour and delivery. According to the cross tabulation result 35(72.9 %) of mothers who develop complication during labor and delivery among cases are referred from other facilities for delivery service. So those mothers who are referred with complications maybe delayed to get the right care on time leading to development of adverse pregnancy outcomes. This finding is consistent with similar study done in mekele public hospitals which shows that mothers who had complications during pregnancy and labor delivery are 4.85 and 9.94 times more likely to develop adverse birth outcomes than mothers who did not have complications during pregnancy and labor-delivery respectively [25]. This is also similar with study done in Gondar university hospital which showed that Obstetric emergencies such as postpartum hemorrhage (PPH), antepartum hemorrhage, cord prolapse and cord presentation, uterine rupture are significantly associated with poor pregnancy outcomes [20].

Multiple birth affects the occurrence of adverse pregnancy outcomes by 7.59 folds compared to singleton pregnancies. This finding is supported by study done in Gondar university hospital which showed that, which showed that, mothers with multiple pregnancy are 2.26 times more at risk to give low birth weight baby. And stillbirth is significantly associated with preterm and low birth weight with AOR= 4.47 CI (1.39–14.32) and AOR = 18.21 CI (6.06 - 55.34) respectively [20]. This might be, multiple fetuses growing in the uterus will share the same supply from the mother and are at risk to be low birth weight. Additionally multiple pregnancy is usually leads to preterm birth which is also associated with development of stillbirth.

In Contrary to the above birth outcome predictors; gravidity, residence, complication during previous pregnancy, history of abortion, history of adverse pregnancy outcomes, pre-existing medical conditions, having tetanus injection, medication taken during current pregnancy, modes of delivery and partograph use were significant predictors by the bivariate analysis which are not significant during the multiple logistic regression analysis. This finding is different from findings of studies conducted on adverse pregnancy outcomes in other areas where these independent factors were identified to be predictors of adverse pregnancy outcomes (18, 20, 25, 29, and 30).

This deviation may be due to differences in study settings which includes, time, place and study design.

LIMITATION OF THE STUDY

- Unavailability of some independent variables on records which may have impact on the dependent variable (educational status, occupation, income, religion...).
- Exclusion of participants who do not have complete information could have resulted in selection bias and thus impacted on the results. Selection bias could have affected the accuracy of the data collected as the participants were sampled from hospitals.

7. CONCLUSION

In conclusion, this study has found that stillbirth was the highest among adverse pregnancy outcomes and On the other hand, low birth weight was the second most adverse birth outcome followed by preterm birth from births takes place in Jimma university hospital in 2015.

This study also indicates that; late referral of mother with complication, illness during current pregnancy, having ANC attendance, anemia during current pregnancy, complication during labor-delivery, multiple pregnancy and having obstetric emergencies were found to be statistically significant and these factors were possible predictors of adverse pregnancy outcomes. Having ANC attendance is determinant factor identified as preventive factor to adverse pregnancy outcomes.

On the other hand; gravidity, residence, complication during previous pregnancy, history of abortion, history of adverse pregnancy outcomes, pre-existing medical illnesses, having tetanus injection, medication taken during current pregnancy, modes of delivery and parthograph use were not found to be associated with adverse pregnancy outcomes.

8. RECOMMENDATIONS

- To Jimma zone health department;
 - To monitor provision of quality focused ANC within the health facilities found in the zone.
 - Monitor early referral in case of complications.
- For Jimma university specialized hospital;
 - Creating good referral linkage with health facilities within its catchment areas including feedbacks provisions.
 - Providing the most quality service for mothers coming for delivery service to decrease delay
- To researchers ;
 - To do similar research using primary data supported with qualitative findings by addressing health facility related factors contributing to adverse pregnancy outcomes.

REFERENCE

1. B. vibal chaiba, *determinants of adverse pregnancy outcomes in Mutare district clinics*, 15 October 2014.
2. World Health Organization, *The incidence of low birth weight: an update*, Wkly Epidemiol Rec [Weekly Report] 1984.
3. Althabe F, Bhutta Z, Blencowe H, Chandra-Mouli V, Chou D, Costello A, Cousens S, Davidge R, Johnson JG: In *Born too soon: The global action report on preterm birth*, Edited by Christopher Howson MK, Joy L. Geneva, Switzerland: WHO; 2012
4. Kent, H., Johnson, K., Curtis, M., Hood, J.R. and Atrash, H. (2006) Atlanta, GA: National center on birth defects & developmental disabilities. Proceedings of the Preconception Health and Health Care Clinical, Public Health, and Consumer Workgroup Meetings, Atlanta, 27-28 June 2006.
5. World Health Organization, *Progress in Reproductive Health Research*, No. 62. Geneva , 2003
6. World Health Organization (WHO), *Infant and Child Mortality*, 2001.
7. Rayamajhi RT, Shreshtha N, Karki C, Padhye SM, *Evaluation of Clinico-social Factors Associated with Antepartum and Intrapartum Stillbirths at Kathmandu Medical College Teaching Hospital*, South Asian Federation of Obstetrics and Gynecology, 2009 .
8. Republic of Kenya (ROK), *National Reproductive Health Policy*, Ministry of Health, Central Bureau of Statistics, Macro International; Nairobi, Kenya, (2007).
9. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller A- B, Narwal R, et al. *National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications*. Lancet. 2012
10. Lawn JE, Wilczynska-Ketende K, Cousens SN. *Estimating the causes of 4 million neonatal deaths in the year 2000*. International Journal of Epidemiology. 2006.
11. Ziyu FY, Matly FA, Mehemd GM, Dofany, EM *Relation between Prenatal care and Pregnancy Outcome at Benghazi*, Sudanese Journal of Public Health, Vol. 4, No. 4, (2009)
12. Lawn JE, Lee AC, Kinney M, Sibley L, Carlo WA, Paul VK, et al. *Two million intrapartum stillbirths and neonatal deaths: where, why, and what can we do? Intrapartum related neonatal deaths*. Bull WHO, 2005.

13. World Health Organization (WHO), *Neonatal and Perinatal mortality. Country, Regional and Global estimates* accessed at, (2006).
14. Miranda ML and Edwards S, *Strategic Opportunities for improving intrapartum-related neonatal deaths.* (2009).
15. Cheptum j, *factors contributing to adverse pregnancy outcomes in Public health facilities in keiyo district, Kenya,* 2012
16. Archibong EI, Sobande AA, Al-Bar HM and Asindi AA. *Unattended delivery and Perinatal Outcome: A tertiary Hospital Experience.* Nig J Paediatr 2002
17. World health organization (2015) Maternal and child health, [http://www.google.com/maternal and child death_eng/pdf](http://www.google.com/maternal%20and%20child%20death_eng/pdf) accessed on 23/06/2016.
18. Joyce Jebet C. *Poor pregnancy outcomes in public health facilities in Kenya,* AFRICAN journal of midwifery and women's health, October–December, 2012.
19. Statistical Agency (CSA) and Ethiopia Demographic and Health Survey. Addis Ababa, Ethiopia, 2011.
20. Adane A. *adverse birth outcomes among deliveries in Gondar university hospital,* 2014,14:90 <http://www.biomedcentral.com/1471-2393/14/90>
21. Shah PS, Zao J; *Knowledge Synthesis Group of Determinants of preterm/LBW births,* BJOG.; 116:1425-1442, (2009).
22. Stanton C, Lawn JE, Rahman H, Wilczynska-Ketende K, Hill K. *Stillbirth rates: delivering systematic review.* Reproductive Health, 1:1742-4755, (2006)
23. Lee AC, Katz J, Blencowe H, Cousens S, Kozuki N, Vogel JP, et al. *National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010.* Lancet Glob Heal. 2013.
24. Abebaw G. *contribution of maternity care to reduce adverse pregnancy outcomes,* Matern Child Health J 18:1336–1344, (2014).
25. Hailemariam B. *factors associated with patterns of birth outcomes at public hospitals in mekele town, Ethiopia,* International Journal of Therapeutic Applications, Volume 12, 39-46 (2013).
26. A. Eshete, *Birth outcomes among laboring mothers in selected health facilities of North Wollo Zone A.* Eshete et al./ Health 5:1141-1150, (2013).

27. Alderliesten ME, Vrijkotte TGM, Van Der Wal MF, Bonsel GJ, *Late start of antenatal care among ethnic minorities in a large cohort of pregnant women*, RCOG BJOG An International Journal of Obstetrics and Gynaecology, (2007)
28. THEOBALD C. *Factors Influencing Pregnancy Outcomes in Morogoro Municipality, Tanzania*, Tanzania Journal of Health Research Volume 12, Number 4, October 2010
29. Nybo Andersen AM, Wohlfahrt J, Christens P, Olsen J, Melbye M), *maternal age and fetal loss: population based register linkage study*. BMJ 2000;320:1708-12, (2000)
30. Gabriela B Gomez, *Untreated maternal syphilis and adverse outcomes of pregnancy*, Bull World Health Organ; 91:217–226, 2013.
31. Erin Burnett, *Perinatal Outcomes in HIV Positive Pregnant Women with Concomitant Sexually Transmitted Infections*, Infectious Diseases in Obstetrics and Gynecology, Article ID 508482,5 pages, 2015
32. B. kebede, *Birth outcome and correlates of low birth weight and preterm delivery among infants born to HIV-infected women*, Health (5) 25-34, 2013.
33. Gebremariam. A, *Factors predisposing to low birth weight in Jimma hospital south western Ethiopia*, East African Medical Journal Vol 82 No. 11 November 2005.
34. Kahsay Z, Tadese A, Nigusie B , *Low Birth Weight & Associated Factors Among Newborns in Gondar Town, North West Ethiopia: Institutional Based Cross Sectional Study*, Indo Global,2012.
35. Nwobodo EI. *Obstetric emergencies as seen in a tertiary health institution in North-Western Nigeria: maternal and fetal outcome*. Nigerian Medical Practitioner 49(3):54-55, (2006).
36. Mills S, Bos E, Lule E, GNV Ramana, Bulatao R, *Obstetric Care in Poor Settings in Ghana, India, and Kenya*, The International Bank for Reconstruction and Development / The World Bank 1818 H Street, NW Washington, DC 20433 (2007).
37. America Reddy , *Antepartum Stillbirth Risk Factors*, VOL. 116, NO. 5, NOVEMBER 2010
38. Pakistan Shafquat R. *Factors associated with adverse pregnancy outcomes and obstetric complications*, European Journal of Public Health, Vol. 25, Supplement 3, 2015
39. Bekele T, Amanon A, Gebreslasie KZ (2015) *Preterm Birth and Associated Factors among Mothers Who gave Birth in Debremarkos Town Health Institutions*, Institutional Based Cross Sectional Study. Gynecol Obstet (Sunnyvale)5: 292, 2013

40. Annual report of delivery ward, Jimma university specialized hospital, Jimma, Ethiopia, 2014
41. Allen, L.H. Anemia and iron deficiency: effects on pregnancy outcome. American Journal of Clinical Nutrition 71 (Suppl), 1280 – 1284, (2000)

ANNEX-I CHECKLIST FOR DATA COLLECTION

JIMMA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF GRADUATE STUDIES

Department of population and family health

Reviewer's Name: _____ **Code:** _____ **Signature:** _____

Supervisor's Name: _____ **Code:** _____ **Signature:** _____

Date: _____

Code no. _____

Codes		_____		
S. No	Coding categories	Questions and filter	Skip	Code
Section I. demographic and Socio - economic data				
101	Age (completed years)	_____ years		
102	gravidity	_____	If she was Gravida- I skip to 104	
103	Residence	_____		
Section II. Past obstetrics history				
201	Any obstetric complications recorded during previous pregnancy?	1. Yes 2. no	If no skip to 203	
202	If yes what type?	1. APH 2. PPH 3. Eclampsia 4. Cord prolapse 5. Fetal distress 6. Other(specify)		
203	Any history of abortion?	1. Yes 2. No	If no skip to 205	
204	If yes, how many times?	Put exact number_____		
205	Any history of adverse pregnancy outcomes in her previous pregnancies?	1. Yes 2. No	If no skip to 207	

206	If yes, which one?	<ol style="list-style-type: none"> 1. Preterm birth 2. low birth weight 3. stillbirth 4. other (specify)_____ 		
Section III. Pre – existing conditions				
301	Any recorded pre-existing medical illnesses before pregnancy?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to 303	
302	If yes, which ones?	<ol style="list-style-type: none"> 1. Diabetes mellitus 2. hypertension 3. cardiac disease 4. HIV/AIDS 5. others (specify)____ 		
303	Medical Illnesses during the current pregnancy recorded on the card?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to 305	
304	If yes, which ones?	<ol style="list-style-type: none"> 1. malaria 2. Anemia 3. PIH 4. others (specify) 		
305	She Ever used family planning methods?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to 401	
306	If yes, which type?	<ol style="list-style-type: none"> 1. Pills 2. Injectable 3. implants 4. IUCDs 5. permanent method 		
Section IV. Pre delivery factors				

401	Pregnancy status	1. planned and wanted 2. unplanned but wanted 3. unplanned and unwanted 4. not recorded		
402	ANC for current pregnancy recorded?	1. Yes 2. No 3. Not recorded	If no skip to 404	
403	Number of ANC visits for current pregnancy?	Put exact number of ANC _____		
404	Did she received tetanus toxoid injection?	1. Yes 2. No 3. Not recorded	If no skip to 406	
405	How many times did she received tetanus toxoid?	Put exact number _____		
406	What was her hemoglobin level on her current pregnancy, if available?	Put exact value _____ gm/dl.	Skip if not available	
407	Did she received any medication during this pregnancy?	1. Yes 2. No	If no skip to 501	
408	If yes for what disease she took?	Write specific disease _____		
409	HIV test status	1. Tested 2. Not tested 3. Not recorded		
410	HIV test result	1. Reactive 2. Non-reactive		
4.11	If reactive , ART status	1. On ART 2. No started ART		

Section V: delivery factors				
501	labor Status	1. Spontaneous 2. induced		
502	What was the mode Of current delivery?	1. Normal vaginal delivery 2. instrumental 3. caesarean section		
504	Do she had any obstetric Complications during delivery?	1. Yes 2. No	If no Skip to 506	
505	What were the complications? (look for card)	1. Abnormal presentation 2. prolonged labor 3. fetal distress 4. obstructed labor 5. others(specify) _____ —		
506	Was she referred from other Facility for delivery service?	1. Yes 2. No		
507	Is parthograph been used?	1. Yes 2. No		
Section VI: Neonatal factors				
601	Number of newborns delivered	1. 1 2. 2 3. More than two		
602	Sex of new born	1. Male 2. Female		
603	1 st and 5 th minute APGAR score	_____ and _____		

604	Weight of the new born in grams? (Record for all if multiple birth)	Record exact value _____ , _____ grams		
605	What is the gestational age at delivery, in weeks?	Calculate and put exact gestational age _____ weeks		
Section VII: obstetric emergencies and complications				
701	Any obstetric emergencies during current pregnancy recorded?	1. Yes 2. No	If no skip	
702	If yes, which one?	a. APH b. pre-eclampsia/ eclampsia c. Cord prolapse d. fetal distress e. Other (specify)		