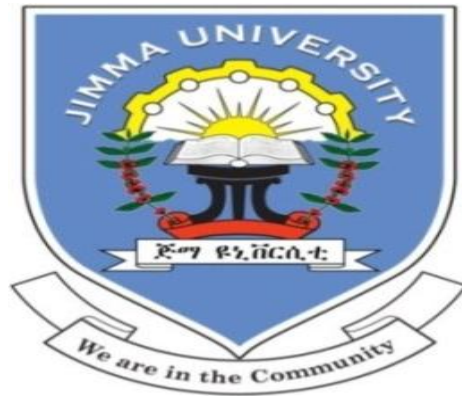


DETERMINANTS OF NEONATAL OUTCOME IN ALL MODES OF DELIVERY IN ATTAT HOSPITAL, GURAGE ZONE, SNNP, ETHIOPIA, RETROSPECTIVE STUDY.



**BY:
MEMUNA KEMAL**

A THESIS SUBMITTED TO THE HEALTH RESEARCH AND GRADUATING STUDIES COORDINATING OFFICE, COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCE, JIMMA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT DEGREE OF MASTERS IN INTEGRATED EMERGENCY SURGERY (OBSTETRICS, GYNECOLOGY AND GENERAL SURGERY).

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JIMMA, ETHIOPIA

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By:

MEMUNA KEMAL

ADVISERS:

Dr. ELIAS ALI YESUF (MD, MPH)

Mr. KALKIDAN HASSEN (Asst. Professor)

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ABSTRACT

Background: *The quality of obstetric care is reflected on the level of perinatal and maternal mortality rates of a certain country, which is considered as one of the vital indicators of the health status. The current WHO initiative is to reduce maternal mortality rate by 75% by 2015 and under five mortality rate at least by 75%. There is a gap in knowledge over determinants of mode of delivery and its outcome in the Ethiopian setting.*

Objective: *The objective of this study is to assess determinants of mode of delivery and neonatal outcome in Attat Primary Hospital*

Method: *A retrospective study design review of obstetric and neonatology records were obtained over a period of one year (January 1 to December 2013 G.C). The study was conducted from May 1 –June 30, 2014 G.C. All records women admitted to Attat Primary Hospital labor ward with recorded diagnosis of true labor and pregnancy with indication of termination and gave birth were included in this study. The data is collected with pre-prepared structured format by the principal investigator and data collectors. Results were analyzed using Statistical Package for Social Sciences (SPSS) version 20. For all statistical significance tests the cutoff value set or p value is 0.05 and 95% confidence interval.*

Results: *Out of 904 included women, 14 (1.5%) had caesarean section before labor started and 890 (98.5%) were on labor at admission. From women in labor, main modes of delivery were spontaneous vaginal delivery, 452 (50.8%) followed by emergency caesarean section, 224(25.17) and operative vaginal delivery, 185 (20.8%). Of all mothers who gave birth in Attat Primary Hospital 25 (2.8%) of them develop post-partum hemorrhage, hysterectomy was done in 6 (0.7%) mothers, transfusion was done in 14 (1.5%) and 2 (0.2%) maternal deaths were recorded. Regarding fetal outcome, 888(98.2%) live births and 16 (1.8%) of still births were recorded. From live birth babies 71(7.99%) of them had neonatal complications and 27(38%) of them early neonatal deaths. The most common neonatal complications were birth asphyxia, meconium aspiration syndrome and sepsis in 39.4%, 22.5%, and 21.1% and 15.5% for other. Age of the mother, ANC follow up, weight of the neonate and neonatal admission are associated with neonatal death (AOR= 1.157, 95%CI=1.026, 1.304)*

Conclusion: *- Residence and maternal waiting area are significantly associated with mode of delivery whereas, Age of mother, ANC follow up, weight of the neonate and neonatal admission are associated with neonatal outcome. Special attention should be given to mothers in waiting area in deciding mode of delivery and factors related to neonatal death.*

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ACRONYMS

ANC	Antenatal Care
AP/IPC	Antepartum/ Intrapartum Caesarean section
APGAR	Appearance, Pulse rate, Grimace, Activity and Respiration
APH	Antepartum Haemorrhage
CS/CD	Caesarean Section/ Caesarean Delivery
EDHS	Ethiopian Demographic and Health Survey
EmCS /EmCD	Emergency Caesarean Section/ Delivery
ENND	Early Neonatal Death
FD/FAVD	Forceps Delivery/ Forceps Assisted Vaginal Delivery
GA	Gestational Age
HDP	Hypertensive Disorder of pregnancy
HEELP	Haemolysis Elevated liver enzyme, Low platelets
LBW	Low Birth Weight
MDG	Millennium Development Goal
NICU	Neonatal Intensive Care Unit
NRFHRP	Non Reassuring Fetal Heart Rate Pattern.
NVD/SVD	Normal Vaginal Delivery/ Spontaneous Vaginal Delivery
OVD	Operative Vaginal Delivery
PPH	Post-Partum Haemorrhage
PROM	Premature Rupture of Membrane

UNFPA United Nation Population Fund

VAD/ VAVD Vacuum Assisted Delivery/ Vacuum Assisted Vaginal Delivery

VBD Vaginal Breech Delivery

WHO World Health Organization

Table of contents

Content	page
ABSTRACT.....	I
ACKNOWLEDGMENTS	II
ACRONYMS.....	III
Table of contents	V
LIST OF TABLES	VII
LIST OF FIGURES.....	VIII
CHAPTER ONE: INTRODUCTION	1
1.1 Background:.....	1
1.2 Statement of the problem	2
1.3 SIGNIFICANCE OF THE STUDY.....	5
CHAPTER TWO: LITRATURE REVIEW	5
2.1 Conceptual frame work.....	8
CHAPTER THREE: OBJECTIVES	9
3.1 General objective	9
3.1 Specific objectives	9
CHAPTER FOUR: METHODS AND MATERIALS	10
4.1 Study Area	10
4.2 Study Period	11
4.3 Study Design	11
4.4 Population.....	11
4.4.1 Source population	11
4.4.2 Study population	11
4.4.3 Inclusion criteria	11
4.4.4 Exclusion criteria	11
4.5 Sample size and sampling technique	12
4.6 Variables	12
4.6.1 Dependent variables.....	12
4.6.2 Independent variables.....	12
4.7 Operational definition.....	12

4.8	Data collection process.....	13
4.8.1	Data collection method and instruments.....	13
4.8.1	Data quality assurance.....	14
4.9	Data processing and analysis	14
4.10	Ethical consideration	14
4.11	Dissemination of the finding.....	14
CHAPTER FIVE: RESULT		15
5.1	Socio-demography of study participants	15
5.2	Obstetric profile of study participants	15
5.3	Prevalence of mode of delivery in Attat Hospital.....	16
5.4	Determinants of mode of delivery.....	17
5.5	Maternal outcome	18
5.6	Early neonatal outcome.....	19
5.7	Factors affecting neonatal outcome.....	21
CHAPTER SIX: DISCUSSION.....		24
CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION.....		27
7.1	CONCLUSION	27
7.2	RECOMMENDATION.....	28
Annex 1		29
References.....		29
Annex 2		32
QUESTIONNAIRE.....		32

LIST OF TABLES

page

Table 1: Socio-demographic characteristic of mothers who gave birth in Attat Hospital during the study period.....	15
Table 2: Obstetric profile of mothers who gave birth during the study period in Attat Hospital.....	16
Table 3: Determinant factors mode of delivery during the study period in Attat Hospital.....	18
Table 4: Maternal complications in each mode of delivery in Attat Hospital during the study period.....	19
Table 5: Neonatal condition by mode of delivery in Attat Primary Hospital during the study period.....	20
Table 6: Factors associated with neonatal death in Attat Primary Hospital during the study period (2013 G.C).....	21
Table 7: Independent t-table showing association of fetal death with continuous variables during the study period.....	22
Table 8: Chi-square table showing association between neonatal death and risk factors.....	23

LIST OF FIGURES

Figure 1: Trend of mode of delivery in Attat Hospital during in 2013 G.C.....	17
Figure 2: Neonatal complications during the study period in Attat Hospital.....	20

CHAPTER ONE: INTRODUCTION

1.1 Background:

Pregnancy and delivery have been and continue to be a high risk venture for females. This assertion explains the continuous efforts of healthcare workers to maintain pregnancy and delivery course safer. Labour is a sequence of uterine contractions that results in effacement and dilatation of the cervix and voluntary bearing-down efforts leading to the expulsion per vagina of the products of conception(1). Delivery is the mode of expulsion of the fetus and placenta after 28weeks of gestational age. The World Health Organization (WHO) defines normal birth as: “spontaneous in onset, low-risk at the start of labour and remaining so throughout labour and delivery. Moreover, the infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy and after birth, mother and infant are in good condition” (2).

Inevitably, delivery might follow abnormal discourse which may need assisted or operative approaches to decrease maternal and neonatal complications related to child birth. An operative delivery refers to an obstetric procedure in which active measures are taken to accomplish delivery (1). Ventose delivery mode is executed by traction of fetal scalp with a suction cup. Forceps cradle the parietal and malar bones of the fetal skull and apply traction, as well as laterally displace maternal tissues. There exist variations in the incidence of operative vaginal delivery in different countries between 10-15% (3).

Caesarean section refers to the delivery of a fetus, placenta and membrane through the abdominal and uterine incision after 28 weeks of gestation (1). Caesarean delivery has played a major role in lowering both maternal and per natal morbidity and mortality rates during the past century. To perform caesarean section safely the indications, risks, operative technique, and potential complications of the procedure must be known (1). The initial purpose of the surgery was to preserve the life of the mother with obstructed labour, but indications have expanded over the years to include delivery for a variety of more subtle dangers to the mother or fetus (4).

The outcome both the neonate and mother is affected by the quality of care provided to the mother and the fetus during antepartum, intra-partum and post-partum.

1.2 Statement of the problem

Neonatal mortality, accounting for an estimated 4 million deaths worldwide each year, constitutes 40% of under-5 mortality and approximately 57% of infant mortality (7). Most neonatal deaths (99%) arise in low income and middle income countries, and approximately half occur at home (8). Approximately 42% of the under-5 mortality in Ethiopia is attributable to neonatal deaths (9). According to the 2011 Ethiopia Demographic and Health Surveys (DHS), the country is experiencing a high neonatal mortality rate at 37 per 1000 live births, comparable to the average rate of 35.9 per 1000 live births for the African region overall (10).

Globally, there were an estimated 287,000 maternal deaths in 2010, yielding a MMR of 210 maternal deaths per 100,000 live births. Of these 99% of global maternal death accounted for developing countries. More importantly, slightly more than half of maternal deaths 56% occurred in sub-Saharan Africa region alone, followed by South Asia 29%. Hence sub-Saharan Africa and South Asia accounted for 86% of global maternal deaths. Of these, 11 countries including Ethiopia comprised 65% of global maternal death. Maternal mortality ratio in developing regions highest which is 240 maternal deaths per 100,000 live births are as compared to developed countries which have 16 maternal per 100,000 live births (5). Ethiopia is one of the countries with highest maternal, perinatal and neonatal mortality which is estimated at 676 deaths per 100,000 live births, 46 death per 1000 pregnancies and 37 deaths per 1000 live births respectively (6). Majority of maternal deaths take place during child birth and immediate post-partum period.

Most causes of maternal and neonatal mortality and suffering are due to direct obstetric complications which require modest setting specific health care services which are related to delay in seeking skilled emergency obstetric care, delay in reaching health facility and delay in receiving timely and appropriate management after reaching health facility (Ethiopia MDG report 2012).

Mode of delivery has its own risk and benefit for both the mother and the neonate especially assisted and operative deliveries. Among operative delivery techniques some of them may result contrary outcome for maternal and neonatal health.

Forceps and vacuum deliveries are associated with increased risk of maternal and neonatal injury when compared to normal spontaneous vaginal deliveries (11). Poor maternal and new-born outcome has also been reported after the sequential use of Vacuum and forceps delivery for assisting vaginal delivery (12). Furthermore, it has been repeatedly shown that maternal injury is less frequent and less extensive with the use of vacuum (13). Many studies suggest higher rates of cephalhematomas, retinal haemorrhages and intracranial haemorrhages (14), others point the risks of vacuum but consider it as a safe alternative to forceps (15). There exist variations in the incidence of operative vaginal delivery in different countries between 10-15% (3). Although the incidence remains unchanged ventouse has become more popular than forceps over the past two decades (16). Even though ventouse delivery is associated with a significant reduction in maternal morbidity compared to the use of forceps (17), it has a higher failure rates (18, 19) which is a concern in the light of the risks of sequential use of instruments for delivery (20)

Few studies have assessed the intrinsic risk related to the different modes of delivery in low income countries, where the deleterious effects of CS may be even higher due to delays in accessing referral health facilities (21), low safety of the procedure (22), and lack of human and material resources at the institutional level for managing emergency cases (23). In the context of rapid changes regarding practices related to the mode of delivery in those countries many of them reporting recent increases in CS rates (24) and rates of caesarean section are of concern both in developed and developing countries. The global caesarean section rate is distributed very unevenly and results 15% of abdominal delivery. Latin America and Caribbean shows the highest rate (29.2%) and Africa shows the lowest (3.5%). In Ethiopia the caesarean section rate of the country based on 2010 report is only 1% (25), and 1.5% based on EDHS 2011(6).

1.3 SIGNIFICANCE OF THE STUDY

To address millennium development the health workers and the community should be hand in hand to decrease the burden of maternal and neonatal morbidity and mortality in Ethiopia especially in rural settings where there is no access to health facility. The finding of this study is important to know the existing mode of delivery, factors that affect mode of delivery and determinants of neonatal mortality in the study area. The findings of this study will be expected to provide the hospital, and other concerned institutions with relevant information about mode of delivery, factors that affect mode of delivery, and associated factors of neonatal outcomes for future planning of appropriate strategies and also used by program implementers as an input towards improving the quality obstetric care to reduce unnecessary action and with their ultimate goal of reducing maternal and neonatal morbidity and mortality.

CHAPTER TWO: LITRATURE REVIEW

Globally, the total number of maternal deaths decreased by from 543,000 in 1990 to 287,000 in 2010 likewise, global MMR declined from 400 maternal deaths per 1000 live births in 1990 to 210 in 2010 (5). Neonatal mortality, accounting for an estimated 4 million deaths worldwide each year constitutes 40% of under-5 mortality and approximately 57% of infant mortality (7).

A global survey on maternal and perinatal health by WHO from 2004-2008 shows a total of 286,565 analysed the overall CS rate was 25.7% with 1.0% of all deliveries were CSs without medical indications. Compared to SVD (71.7%) all other modes of delivery presented an association with increased risk death (maternal 0.1% SVD, in 0.47% of OVD and 0% in antepartum CS), fetal death was seen lowest in 0.17% in AP CS without indication and 0.96% SVD the highest fetal deaths were seen in OVD 3.99%), blood transfusion for maternal (0.94% of SVD, 2.72% of OVD, 0.52% of AP and 1.89% of IP CS without indication and 3.31% of AP and 3.36% of IP CS with indication) and hysterectomy (0.04% in SVD, 0.15% in OVD, and 0.42% in IP CS without indication) (26).

A retrospective study done in teaching and referral hospitals between in Kenya 2004 and 2011 shows, the overall maternal mortality ratio was 426 per 100,000 live births and the early neonatal mortality rate (<7 days) was 68 per 1000 live births. The Hospital record audit showed that half (51%) of the neonatal mortalities were for young mothers (15–24 years) and 64% of maternal deaths were in women between 25 and 45 years. Most maternal and early neonatal deaths occurred in multiparous women, in referred admissions, when the gestational age was under 37 weeks and in latent stage of labor. Indirect complications accounted for the majority of deaths. Where there were direct obstetric complications associated with the delivery, the leading cause of maternal death was eclampsia and the leading cause of early neonatal death was pre-mature rupture of membranes. Pre-term birth and asphyxia were leading causes of early neonatal deaths. In both sets of records the majorities of deliveries were vaginal and performed by midwives (27). A cross-sectional epidemiological survey done on maternal and perinatal outcome by mode of delivery from October 2007 to October 2008 in referral hospitals of Mali and Senegal shows that among 78,166 included women 1,738 (2.2%) had pre-labour CS and 76,428 (97.8%) had a trial of labour. Of them 85.2% were SVD, 2.3% were OVD, 12.5% had intra-partum CS. Maternal

and fetal indications accounted for, 77.6% and 19.6% of all CSs (no indication reported in 2.8% of cases) respectively. The most common intra-partum indications were prolonged/obstructed labour which were 44.6% followed by fetal distress in 18.7%, and previous CS in 12.3%. Previous CS (39.9%) and suspected CPD (17.2%) were most common indications for pre-labour CS. Overall the proportion of LBW was 15.5%. Women who had pre-labour CS were more likely to have LBW babies, while the proportion of LBW was lower in operative vaginal delivery. Maternal outcomes by mode of delivery: blood was transfused in 1.4% of SVD, in 1.6% of OVD, in 4.7% in intra-partum CS; hysterectomy was done 0% of OVD which was lowest and in 0.7% of intra-partum CS; Maternal death in 0.3% of SVD, in 1.2% of OVD, in 1.6% of intra-partum CS and in 0.1% of pre-labour CS. Neonatal outcomes by mode of delivery was: immediate neonatal death was highest OVD (15.6%), and lowest in 1.5% of pre-labour CS and neonatal death after 1 day was in 0.4% of SVD, in 0.7% of OVD, in 1% of intra-partum CS and in 0.6% of pre-labor CS (28).

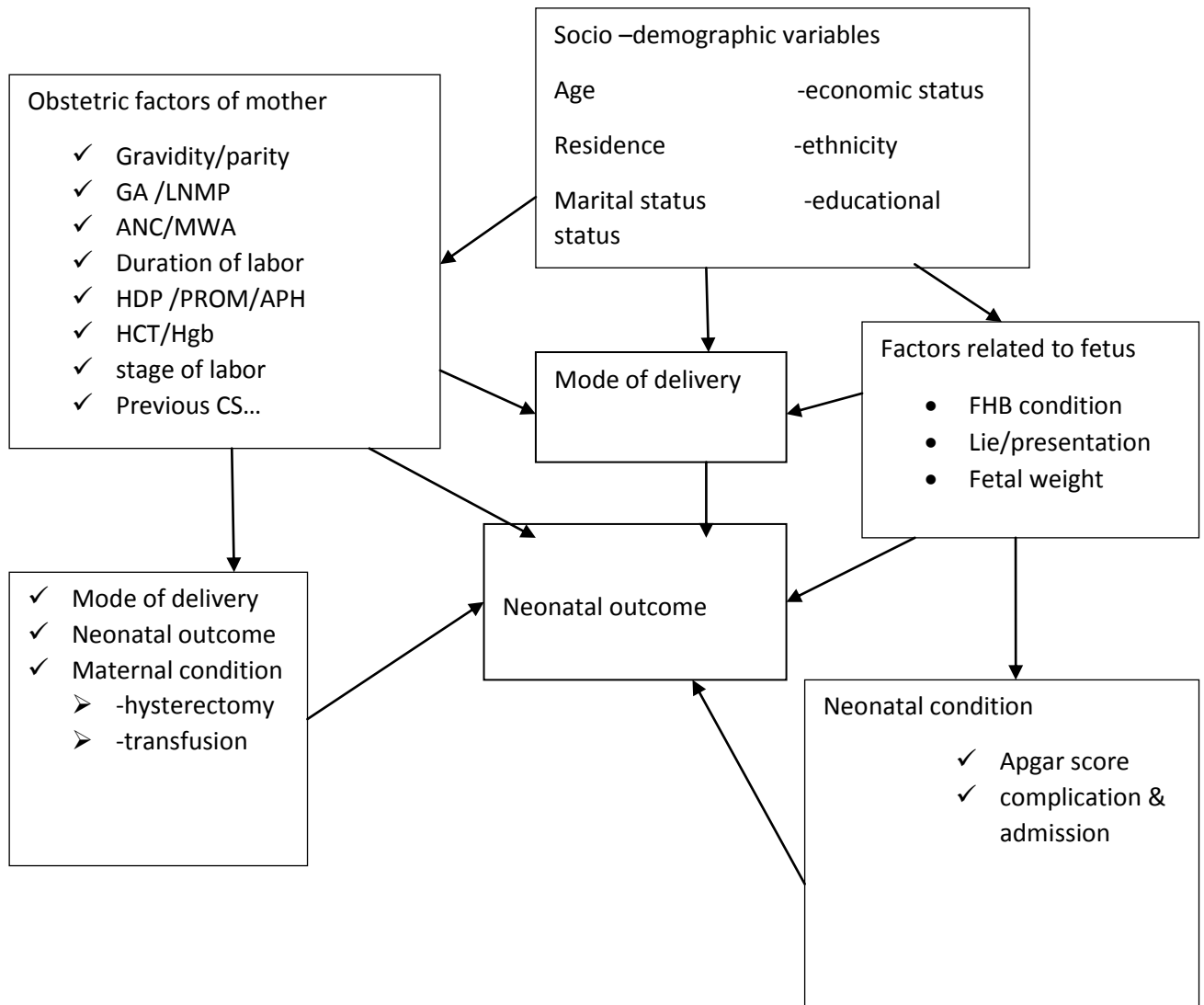
A population based surveillance system covering all births in New South Wales Australia public and private hospitals, as well as home births to compare the influence of mode of delivery on selected neonatal and maternal morbidities and outcomes over a period of 1998-2008 shows that of all 981,178 births during the study period 62.9% NVD, 10.4% OVD (3.8% forceps and 6.6% VAD) and 25.9% were by CS. There was a 0.7% rate of vaginal breech delivery. Maternal outcomes; 3rd-4th tear highest in forceps delivery which was 4.6% and very low in vaginal breech delivery (0.4%); PPH requiring blood transfusion in 2.8% of forceps delivery and in 1.6% of NVD; Maternal death in 41.67% of VBD and 0.9% of NVD. Neonatal outcomes: weight in grams: wt. < 2500g was seen in 4.6% of SVD and in 54.2% of vaginal breech delivery; wt. 1 min Apgar score < 5 in 3.2% of neonates of NVD and in 43.5% of VBD; 5 min Apgar score < 7 was seen in 1.7% of NVD and in 34.3% of VBD; NICU admission was seen in 1.6% of NVD and VAD, and in 13.4% of VBD; Neonatal death was seen in 1.9% of NVD, in 1.5% of FD, in 0.37% of VAD, and in 75.5% of VBD (29).

A retrospective cross-sectional study done on mothers who delivered in the inner-city tertiary maternity hospital in Lagos, Nigeria from May 2005 to December 2007 shows that of 4615 enrolled mothers 2584(56.0%) deliveries were vaginal, 1590(34.4%) emergency CS and 441(9.6%) elective CS. Maternal age, parity, social class, all obstetric factors including lack of

ANC, maternal HIV, multiple gestations were associated with increased risk of emergency CD when compared with vaginal delivery. EmCD rate was 54.2% in primiparous and in 34.9% of mothers who have no ANC, Only parity, lack of ANC and prolonged/OL were associated with increased risk of emergency compared with elective caesarean delivery. EmCD was also associated with male gender, low five minute Apgar scores when compared with vaginal or elective CD (30).

A prospective observational study done in Queen Elizabeth Central Hospital Blantyre-Malawi on still birth and early neonatal death shows of all 10,700 deliveries conducted 7.9% were stillbirths and early neonatal deaths. Stillbirths comprised 3.4% of all deliveries; 20.2% of the antepartum deaths occurred before the mother was admitted to the labor ward while a slightly higher proportion (22.7%) of fetal loss occurred during the process of labor and delivery. Fifty-six percent of the perinatal deaths (PD) were EHND. The mean gestational age for the perinatal deaths was 34.7 weeks and mean birth weight was 2,155 g (standard deviation = 938 g). The majority, 468 (57.8%) of the perinatal deaths were males and 350 (43.2%) were females. Many of the perinatal deaths (57.9%) were deliveries between gestational ages of 20 and 37 weeks. Most (62.7%) of the mothers with a perinatal death had experienced a previous similar incident. (31)

2.1 Conceptual frame work



CHAPTER THREE: OBJECTIVES

3.1 General objective

- To assess factors that neonatal outcome in the existing mode of delivery in Attat Hospital from January 1, 2013 to December 30, 2014 G.C.

3.1 Specific objectives

1. To identify early neonatal outcome in Attat Hospital.
2. To identify factors associated with early neonatal mortality in Attat Hospital.
3. To assess factors that affect mode of delivery in Attat Hospital.

CHAPTER FOUR: METHODS AND MATERIALS

4.1 Study Area

The study was conducted in Attat Hospital which is located 187km from a capital city Addis Ababa to the south west in Gurage Zone, Cheha woreda along the Jimma road. It is located 17km from Wolkite town on the road to Hossana. The service has been functional since 1969 G.C. The owner of the Hospital is Ethiopian Catholic Church and managed by Medical Missions Sisters an international religious congregation. Gurage zone is a densely populated rural area with approximately 359-400 populations per square kilometre. The main aim of this Hospital is to care for those in rural areas having poor access to health care services.

The total number of population in catchment area is 800,000. Out of this women in the reproductive age group (15-45 year) are 192,000 and the expected deliveries per year is 29,600. On the preventive the object is responsible for 10 peasant Associations with a target population of about 32,000. There are 35 Health centres and 5 clinics in nine woredas including Wolkite town using this hospital as a referral centre. The nearest hospitals are St. Luke's Hospital in Wolliso, 60km away, and Hossana Hospital in Hossana, 120km away and found in between.

Currently the Hospital has a total of 65 beds for inpatient services. In addition, there are 48 beds in the Maternity Waiting Area, 13 beds in Nutrition Rehabilitation Unit, 5 beds in delivery ward, 1 bed for examination, 4 beds for follow up of mothers in active first stage of labour and 3 delivery coaches. Normal deliveries return home within 6-24 hrs. The obstetric and gynecology post-operative cases go to surgical ward which is not isolated for male and female. Obstetric and gynaecologic cases are the main operative procedures done in this hospital.

As to the human resource 1 gynaecologist, 1 surgeon, 3 GPs, 3 Health officers, 1 health coordinator, 2 pharmacists, 4 druggists, 44 nurses, 7 lab technicians, 14 other health professionals and 87 supportive staff members.

4.2 Study Period

The study was conducted from May 1- June30, 2014 based on mothers who gave birth in Attat primary Hospital from January 1, 2013 G.C to December 30, 2013 G.C.

4.3 Study Design

A retrospective cross sectional study was employed to assess determinants of mode of delivery and neonatal outcome.

4.4 Population

4.4.1 Source population

All records of mothers who were admitted to delivery ward with true labor and pregnancy after 28 weeks of gestation with indication of termination and gave birth in Attat primary Hospital

4.4.2 Study population

All records of mothers who gave birth after 28 weeks gestation in Attat Hospital in all types of mode of delivery from January 1, 2013 to December 30, 2013 G.C.

4.4.3 Inclusion criteria

All records of mothers with diagnosis of true labour admitted to delivery and pregnancy after 28 weeks of gestation with indication of termination and who gave birth in all types of mode of delivery with or without complication in Attat Hospital from January 1, 2013 to December 30, 2013 G.C.

4.4.4 Exclusion criteria

Mothers and Neonates admitted to Attat Hospital following immediate post-partum referral from other health institution, missed cards, destructive deliveries, uterine ruptures and multiple pregnancies in the same period.

4.5 Sample size and sampling technique

All records of eligible mothers who were attended in Attat Hospital from January 1, 2013 to December 30, 2013 G.C were included consecutively. No sampling was employed.

4.6 Variables

4.6.1 Dependent variables

- Neonatal outcome
- Mode of delivery

4.6.2 Independent variables

- Age
- Residence
- Marital status
- ANC follow-up
- MWA
- Gravidity
- Parity
- LNMP
- GA
- Duration of labour
- Apgar score

4.7 Operational definition

Gravidity: the total number of pregnancy a women experience irrespective of site and duration of pregnancy.

Parity: the state of having given birth after 28 week of gestational age or weighing 1000gm or more, alive or dead.

Forceps delivery: delivery of the fetus by using obstetric forceps (pair of instruments) used to effect delivery of the fetus.

Vacuum delivery: delivery of the fetus by ventouse (vacuum extractor either metallic or elastic cup)

Post-partum hemorrhage: denotes excessive bleeding (>500ml in vaginal delivery) and (> 1000ml in caesarean section) following delivery.

Caesarean delivery: is the delivery of the fetus, placenta and membrane through an incision on the abdominal wall at or after 28 weeks of gestational age

Maternal mortality: death of a women while pregnant or within 42 days of termination of the pregnancy regardless of the site or duration of the pregnancy, from any cause related to pregnancy or aggravated by its management but not from accidental or incidental causes. For this study we use only institutional deaths.

Maternal Waiting Area: a special place in the compound of hospital to keep pregnant mothers who have other risk factors such as previous uterine scar, young prim ladies, grand multiparas, mothers with APH and HDP (preeclampsia, eclamsia)

Neonatal mortality: death of the neonate within the first 28 days of life

Early neonatal death: death of a live born baby within the first seven days of life (time of delivery to hospital discharge for this study)

Still birth: the expulsion of a fetus after 28 completed weeks and/or weighing at least 1kg with absence of breathing, heart beats, pulsation of the umbilical cord, or definite movements of voluntary muscles.

4.8 Data collection process

4.8.1 Data collection method and instruments.

Data was collected from patient records of past one year (January 1, to December 31, 2013) by reviewing delivery registration book, maternity and paediatric (neonatology) ward records and major operation registration book, patient charts, discharge and death report registration books, by using pre-prepared structured format check list (questionnaires).

4.8.1 Data quality assurance

Before main data collection started pre-test was conducted in this hospital to check the completeness of patient information and the collected data were checked by principal investigator every day.

4.9 Data processing and analysis

The collected data entered, cleaned and analyzed using SPSS version 20. Descriptive statistical analysis were used to describe the percentages and number distributions of socio- demographic and obstetric profile of mothers and summarized and presented by frequency tables and graphs. The main statistical methods applied were chi-square test, independent t-test and bivariate and multivariate logistic regression. For all statistical test, the cut-off value set is significant at $p < 0.05$ with 95% CI and was considered statistically reliable for the analysis of the study. Independent variables which showed association with dependent variable in bivariate analysis at $< 5\%$ entered in to multiple logistic regression model. Chi-square test and independent t-test values, and adjusted odds ratios together with corresponding 95% confidence intervals were used to interpret the findings.

4.10 Ethical consideration

Ethical clearance was obtained from ethical review committee of Jimma University, college of public health and medical sciences and letter of permission was obtained from Attat primary Hospital. Charts and medical records revised only for the purpose of the study. All concerned body in Attat hospital has been informed to get necessary information and materials needed from departments.

4.11 Dissemination of the finding

The result of this study will be submitted to college of public health and medical sciences of Jimma University and other responsible bodies. The result will be presented during thesis defense in the college of public health of Jimma. The study area stake holders will be communicated. Efforts will be made to publish on scientific journal.

CHAPTER FIVE: RESULT

5.1 Socio-demography of study participants

Among 904 included mothers who gave birth in Attat primary Hospital during the study period, 756(83.6%) of them were from rural areas. Almost all were married 891(98.6%). The minimum age of this participants were 15 years and the maximum age of 45 years with the mean age of 27.18 and 0.18 SEM. As a neonate 52% of them were male and 48% females. See table 1 for detail on socio-demographic characteristics of the respondents.

Table1. Socio-demographic characteristics of study participants

Variables	Number	Percent
Residence (n=904)		
Urban	148	16.4
Rural	756	83.6
Marital Status (n=904)		
Single	13	1.4
Married	891	98.6
Fetal Sex (n=904)		
Male	470	52
Female	434	48

5.2 Obstetric profile of study participants

As table 2 below shows 87.9% of the respondents in this study had ANC follow up and from those who had ANC follow up 290(32.1%) of them were in maternal waiting area for prior caesarean section (CS scar), grand multiparas, young primigravida ladies and mothers who have other risk factors till termination of pregnancy. 578(63.9%) of mothers were multigravidas and half of them were party 1-4. And of them 107(11.8%) were grand multiparas. Majority of mothers 782(86.5%) who gave birth at this hospital were delivered at term and stayed in labor 12-24hours. The incidence of premature rupture of the membrane, hypertensive disorder of pregnancy (pre-eclampsia, eclampsia), antepartum hemorrhage, and gestational diabetic mellitus in this study population were 7.1%, 3.6%, 2.1% and 1% respectively. Only 314(34.7%) of mothers had recorded hemoglobin before delivery. The minimum and maximum recorded pre-labor hemoglobin level was 8.4gm/dl and 15gm/dl with the mean of 11.83gm/dl and 0.06 SEM. (See table 2 below for detail).

Table 2 Obstetric profile of mothers who gave birth during the study period in Attat Hospital

Variables	Category	No	(%)
Age of mother in years	<18	34	3.8
	18-35	830	91.8
	>35	40	4.4
Gravidity	Primigravida	326	36.1
	Multigravida	578	63.9
Parity	0	340	37.6
	1-4	457	50.6
	>4	107	11.8
Gestational age (FH) in wks.	<37	103	11.4
	37-42	782	86.5
	>42	19	2.1
ANC follow up	Yes	795	87.9
	No	109	12.1
Maternal waiting area	Yes	290	32.1
	No	614	67.9
Duration of labor in hours	<12	42	4.8
	12-24	809	91.6
	>24	32	3.6
Associated presentations (co-morbidities)	APH	19	2.1
	PROM	64	7.1
	HDP	36	3.98
	Previous CS scar	73	8.1
	GDM	9	1

5.3 Prevalence of mode of delivery in Attat Hospital

Of all 904 included women who gave birth in Attat Hospital during the study period, 14 (1.5%) had caesarean section before labor started and 890 (98.5%) were on labor. From mothers who were on labor given 452 (50.8%) had spontaneous vaginal delivery, 224(25.17%) had emergency caesarean section, 185 (20.8%) had operative vaginal delivery (174 (19.6%) were vacuum assisted delivery and 11 (1.24%) forceps delivery), and vaginal breech delivery 29(3.3%), The most commonly reported indication for CS were Cephalopelvic disproportion/ suspected CPD 44.3%, followed by NRFHRP (suspected fetal distress) 14.5% and pervious caesarean section 12.8% and other(placenta previa, mal-presentation, obstructed labor, cord prolapse, failed induction, maternal request). (See figure 1)

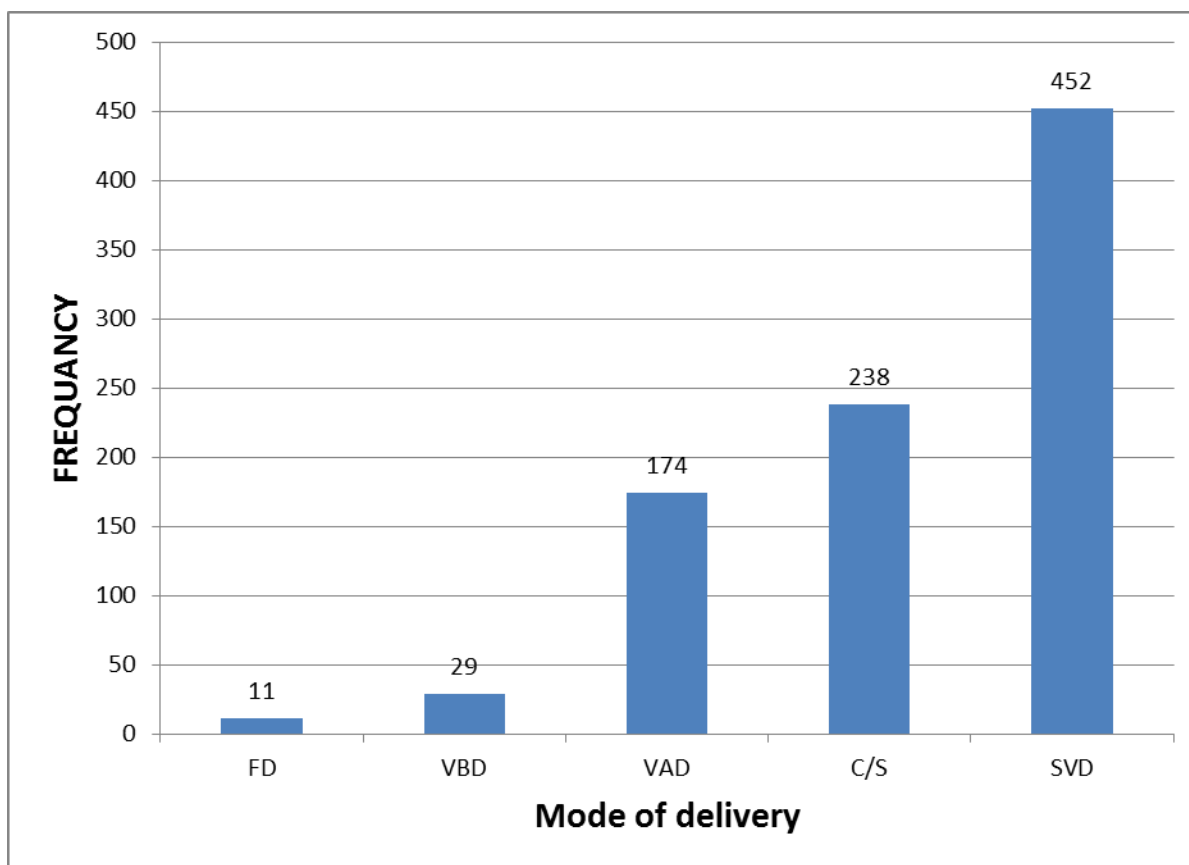


Figure1: Mode of delivery in Attat Hospital during in 2013 G.C

5.4 Determinants of mode of delivery

Statistical analysis was done to assess determinants of mode of delivery in Attat Hospital during the study period. The rate of caesarean section was higher in mothers who came from rural areas and mothers who were in maternal waiting areas by 7% and 18.5% with 1.86 chi-square and p-value 0.173(2-sided) and 20.92 X² and p-value <0.0001 when compared to urban area and non-maternal waiting area mothers respectively. An association was done with binary regression and mothers who were in maternal waiting area were delivered by CS with 2.14 COR and CI (1.539, 2.967) when compared to spontaneous vaginal delivery.

Table 3 Determinant factors of mode of delivery during the study period in Attat Hospital

	Number	Rate of CS	X2	p-value (2-sided)
Residence (n=690)				
Urban	114	28.90	1.86	0.173
Rural	576	35.60		
Sex(n=690)				
Male	347	34.3	0.12	0.912
Female	343	34.7		
Waiting area(690)				
Yes	232	46.1	20.92	<0.0001
No	458	28.6		

An independent t-test also done to assess determinants of mode delivery and fetal weight had effect on mode of delivery with mean difference \pm SEM (difference) 253.22 \pm 43.63 and p-value 0.001 when caesarean delivery compared to SVD. The mean fetal weight in caesarean section and spontaneous vaginal delivery were 3346.37g and 3093.14g.

5.5 Maternal outcome

Maternal complications observed among included women who gave birth in Attat Hospital during the study were postpartum hemorrhage 25(2.8%) due to genital tract laceration 14(56%) followed by Uterine tony 7(28%), Retained placenta 1(4%) and others 3(12%), two of them from others had APH and one bleeding disorder due low platelet (HEELP syndrome. Puerperal infection 7(0.8%), two complete wound dehiscence and one intra-abdominal abscess collection and one bladder rupture recorded during caesarean section.

Operative vaginal delivery had higher risk of 3rd -4th degree perineal tear and cervical tear 12 (6.5%) when compared to spontaneous vaginal delivery 2 (0.4%) and vaginal breech delivery 0%. Only 25(2.8%) of mothers had recorded postpartum/operative hemoglobin level with the minimum and maximum 5.2gm/dl and 12.6g/dl respectively with the mean of 8.19g/dl and 0.38 SEM.

Hysterectomy were done for six mothers for PPH 1(0.2%) in SVD and 1(0.5%) in OVD and 4(1.7%) delivered by CS. 14 mothers were transfused during the study period, ten of them delivered by CS, two by SVD and two by OVD. Two maternal deaths` were recorded during the study period which accounts 0.22%, one due to puerperal sepsis after CS and one delivered by vacuum and were complicated by HDP (eclampsia). Maternal mortality rate in 2013G.C were 221/100,000 live births in Attat Hospital during the study period which is very low when compared to national level based on EDHS 2011. (See table 4 below)

Even though maternal morbidity and mortality were observed during this study period has no significant association with mode of delivery.

Table 4 Maternal complications in each mode of delivery in Attat Hospital during the study period

	All deliveries(n=904)	SVD(n=452)	VBD(n=29)	OVD(n=185)	CS(n=238)
PPH	25(2.8)	3(0.7)	0(0)	14(7.6)	8(3.4)
3 rd -4 th Degree of tear and cervical tear	14(1.6)	2(0.4)	0(0)	12(6.5)	-
Bladder rupture	1(0.1)	-	-	-	1(0.42)
Transfusion	14(1.6)	2(0.4)	0(0)	2(1.1)	10(4.2)
Hysterectomy	6(0.7)	1(0.2)	0(0)	1(0.5)	4(1.7)
Puerperal infection	6(0.7)	1(0.2)	0(0)	1(0.5)	5(2.1)
Maternal death	2(0.22)	0(0)	0(0)	1(0.5)	1(0.42)

5.6 Early neonatal outcome

A total 904 included neonates, 888(98.2%) live births and 16 (1.8%) of still births were recorded. From live birth babies 71(7.99%) of them had neonatal complications and 27(38%) of them early neonatal deaths and giving early neonatal mortality rate (ENMR) of \sim 30 per 1000 live births and perinatal mortality rate (PMR) of \sim 48 per 1000 births. The most common neonatal complications were birth asphyxia, meconium aspiration syndrome and sepsis in 39.4%, 22.5%, and 21.1% and 15.5% for others (Low birth weight, very preterm babies, congenital anomaly). From neonates who developed birth asphyxia half of them were died followed by sepsis.

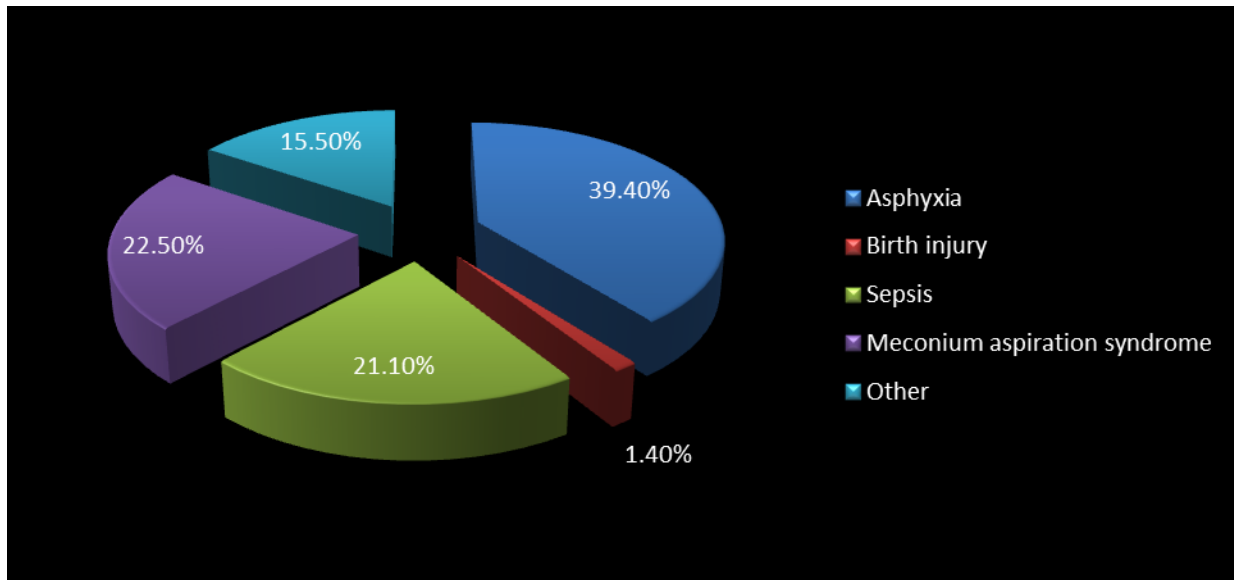


Figure 2: Neonatal complications during the study period in Attat Hospital

The prevalence of low birth weight in this study ($\leq 2500\text{gm}$) was 10.7% and birth weight greater than 4 was seen in 38(4.2%) of neonates. The minimum and maximum recorded fetal weight was 1200gm and 5700gm respectively with the mean weight of 3189.75 and 0.18 SEM. 94(10.4%) of the neonates had <5 one minute APGAR score and 44.83% of vaginal breech delivery births were in this Apgar score group. The minimum and maximum recorded Apgar score at 1 minute was 0 and 9 with the mean 1' Apgar score of 6.57 and 0.06 SEM. Five min Apgar score < 7 were seen in 89(9.8%) of neonates minimum 0 and maximum 10 with the mean Apgar score of 7.94 and 0.06 SEM.

Table 5: showing neonatal condition by mode of delivery in Attat Primary Hospital during the study period.

Variables	All deliveries (904)	SVD(n=452)	VBD(29)	VAD(174)	FD(11)	CS(238)
Still birth	16(1.8)	12(2.7)	1(3.5)	0(0)	1(9.1)	2(0.84)
Neonatal Admission	53(5.9)	14(3.1)	5(17.24)	11(6.3)	3(27.3)	20(8.4)
Early Neonatal Death	27(3)	10(2.2)	6(20.7)	1(9.1)	0(0)	10(4.2)

5.7 Factors affecting neonatal outcome

As table below shows first bivariate logistic regression analysis done with all variables and then multivariate logistic regression applied for those significant, there was an association between age of the mother, maternal ANC follow up, FHR pattern, weight of the neonate, and admission with neonatal outcome(death).

Increased maternal age is associated with perinatal death. (AOR=1.157, 95%CI=1.026, 1.304)

Fetal/neonatal weight has a positive association with early neonatal death, as fetal /neonatal weight increased the risk of decreased of AOR=0.998, 95%CI= (0.997, 0.999) and p-value <0.002.

Table 6 Factors associated with neonatal death in Attat Primary Hospital during the study period (2013 G.C)

Variable	Category	COR	AOR	p-value
Age of mother		1.085(1.026,1.148)*	1.157(1.026,1.304)	0.017
ANC	Yes	0.26(0.13,0.50)**	2.218(0.446,11.03)	0.330
	No	1	1	
1'APGAR		0.23(0.16,0.337)**	0.342(0.28,1.556)	0.342
Fetal weight		0.998(0.997,0.998)**	0.998(0.997,0.999)	0.002
FHR pattern	Abnormal	33.124(16.574,66.201)**	2.826(0.669,11.932)	0.157
	Normal	1	1	
Neonatal admission	Yes	6.703(3.16,14.218)	0.061(0.011,0.358)	0.002
	No	1	1	

* P-value <0.05 ** p-value <0.0001

Low 1st minute Apgar score were associated with neonatal death in bivariate analysis but no significant association when adjusted. Neonatal admission had less odds of death when compared to non-admitted neonates after complication.

As shown on table below independent t-test also done on fetal outcome with fetal weight, the risk of neonatal death is higher in low birth weight babies with the mean difference \pm SEM (difference) 737.99 ± 81.45 and p-value <0.0001 and the mean birth weight of perinatal deaths was 2486.86gm .

Table 7: Independent t-test table showing association of fetal death with continuous variables during the study period.

Variables	Fetal outcome		Mean difference \pm SEM (difference)	p-value (2-sided)
	Alive	Dead		
Age of mother (n=904)	27.06	29.49	-2.43 ± 0.836	0.004
Fetal weight (n=904)	3224.85	2486.86	737.99 ± 81.45	<0.0001
1'APGAR score (n=904)	6.98	2.14	4.85 ± 0.21	<0.0001
5'APGAR score (n=904)	8.24	2.02	6.22 ± 0.18	<0.0001

Another chi-square test done to determine association between fetal death and ANC follow up, FHR pattern, neonatal complication and admission. Neonates which had complication has risk of death with $188.28 \chi^2$ and p-value <0.0001 . Neonates delivered from mothers who had ANC follow up had chance of survival by 9% when compared to mothers who had no ANC follow up with $17.89 \chi^2$ and p-value <0.0001 . (see table below)

Table 8: showing association between neonatal death and risk factors during the study period.

Variables	category	Number	Neonatal death	X2	p-value
ANC(904)	Yes	795	3.6	17.89	<0.0001
	No	109	12.8		
Neonatal complication(904)	Yes	71	38	188.28	<0.0001
	No	833	1.9		
Neonatal admission(904)	Yes	53	20.8	59.99	<0.0001
	No	835	1.9		
FHR pattern(904)	Abnormal	63	25	187.41	<0.0001
	Normal	840	17		

CHAPTER SIX: DISCUSSION

In this study 904 deliveries were reviewed to assess determinants of mode of delivery and neonatal outcome during this study period. The existing mode of delivery observed were Spontaneous vaginal delivery 50%, followed by caesarean section 26.3%, operative vaginal delivery 20.2% and vaginal breech delivery 3.3%. The rate of caesarean section in this study accounted 26.3% of hospital delivery which is almost similar to a study done on global health survey on maternal and perinatal health 2004-08 by WHO which was 25.7% of CS rate (26).

The main indications to perform CS in this study was CPD 44.3%, followed by NRFHRP (fetal distress) 14.5 % and previous CS 12.8%. These findings also go in line with a study done in referral hospitals of Mali and Senegal 2007-08(28). Some of other indications for CS during the study period were antepartum hemorrhage secondary to placenta previa, Footling breech, cord prolapse, transverse lie, previous fistula repair, failed instrumental delivery and bad obstetric history. The incidence of elective CS and SVD in Attat Hospital during the study period was low when compared to a study done in inner city tertiary maternity hospital in Logos, Nigeria (30).

There is no significant association with mode of delivery and maternal and neonatal outcome this study which differed from other similar studies done. But there are factors which affect mode of delivery such as residence, maternal waiting area and fetal weight. The incidence of caesarean section was high in mothers who came from rural areas, and maternal waiting area when compared to mothers came from urban and mothers who came from home respectively. Mothers who came from home spent more time in labor before they reach Attat hospital and mothers in maternal waiting area had other risk factor such as prior CS scar (uterine scar), APH, malpresentations, post term and others. And as fetal weight increased risk of CS increased the mean fetal weight in SVD and CS was 3093.14gm and 3346.37gm with mean difference \pm SEM (difference) of 253.22 \pm 0.836. More than half of mothers presented with antepartum hemorrhage (2.1%) and gestational diabetic mellitus (1%) gave birth by caesarean section when compared to SVD.

Antenatal care coverage in mothers who delivered this hospital during the study period was high 87.9% and the national ANC coverage according to EDHS 2011 is 33.9 % (10). Hemoglobin before and after delivery done in this hospital in special circumstances. The recorded Hemoglobin level in this hospital found were only from records of mothers in maternal waiting area and who had ANC follow up at this hospital. Hemoglobin after delivery was done only for mothers that develop PPH and who were suspected for anemia.

Majority of post-partum hemorrhage were found in 3.4% mothers delivered by caesarean section and 3rd - 4th degree tear and cervical tear were found in 6.7% of OVD which is high when compared to mothers delivered by SVD 0.4%. This finding is consistent with a research done in New South Wales Australia 1998-2008(29). Hysterectomy was done for postpartum hemorrhage in 0.2% of SVD, in 0.5% OVD and in 1.7% of CS. Transfusion was done in 0.2% of SVD, in 1.1% of OVD and in 4.2% of mothers delivered by CS. Maternal death was seen in 0.5% of OVD and in 0.42% of mothers delivered by CS. This finding is almost similar with a research done in Mali and Senegal (28).

Maternal mortality rate in Attat Hospital in 2013 G.C based on this study was 221 per 100,000 live births which is indicative to attain Millennium Development goal of 2015.

Even though no significant association between mode of delivery and fetal outcome vaginal breech delivery had in increased risk of neonatal complications and death, 20.7% and 34.5% of vaginal breech delivery respectively when compared to SVD (4.43%, 2.2%) and OVD (9.2%, 0.54%). Higher rate neonatal asphyxia was seen in VBD (11.3%) followed by OVD and CS (9.9%) for each and SVD (8.5%). This finding also go in line with a research done in New South Wales Australia 1998-2008 which shows high rate of neonatal death seen in VBD (29). The leading cause of early neonatal death in this study was birth asphyxia 50.8% followed by neonatal and others (low birth weight babies, preterm babies, congenital anomaly) 29.6% and sepsis 14.8%. A research done in Kenya referral hospitals 2004-2011, shows preterm birth and birth asphyxia were leading cause of death (27).

Perinatal death has statistically significant association with age of mother, as age of mother increase risk of perinatal death increases, advanced maternal age (adolescents) receive less perinatal care which is risk for poor outcome and congenital anomalies. And risk of death was high in low birth weight babies since low birth weight babies are at increased risk of thermal instability given their grater body surface to weight ratio, thinner skin, and relative paucity of

subcutaneous fat compared to term babies. Hypothermia can occur rapidly in preterm babies and may cause complications such as hypoglycemia and acidosis (1) and respiratory problems due to prematurity. This finding is consistent with a research done in Malawi QECH which shows low birth weight increases the risk of neonatal death but differed in mean birth weight (31).

Neonates who had complication had high risk of death when compared to non-complicated neonates and neonates who were admitted after complication had less odds of death when compared with non-admitted neonates after since.

Early Neonatal and perinatal death in this hospital during the study period was 30 per 1000 live births and 48 per 1000 pregnancies. This finding differed from research done in Kenya referral hospitals in which early neonatal death was 68 per 1000 live births (27). This may be due to early neonatal death in this study till hospital discharge a maximum of 5 days stay for Caesarean section. This still needs more effort to attain millennium development goal. The national neonatal and perinatal mortality was 37 per 1000 live births and 46 death per 1000 pregnancies) based on 2011 EDHS respectively.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

- In this study area the rate of caesarean section is high during the study period and the rate of spontaneous vaginal delivery is low.
- Vaginal breech delivery has high risk neonatal morbidity and mortality.
- Residence of mother, maternal waiting area and weight of the neonate affect mode of delivery.
- Age the mother, fetal weight and neonatal admission after complication has significant association with early neonatal death.
- Long-term maternal neonatal complications cannot be determined since there is no recorded post-natal follow up.

7.2 RECOMMENDATION

Since incompleteness of the data was seen during the study period, Attat Hospital should improve recoding system by training health professionals.

Since high risk mothers kept in maternal waiting area, maternal mortality rate in Attat Hospital is low, and the service should be continued but still need attention of gynecologists and other responsible bodies to be selective in deciding mode of delivery.

Pregnant mothers with malpresentation need special attention in intrapartum care.

The hospital should have neonatology unit and professionals who experienced in neonatal resuscitation to give special care for newborn.

The hospital should arrange favorable condition for post-natal follow-up of mother and neonate.

Annex 1

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Annex 2

QUESTIONNAIRE

Jimma University, Collage of Public Health, faculty of medical science coordinating office of integrated emergency obstetric and surgery, questionnaire format on mode of delivery and associated maternal and neonatal outcome in Attat Primary Hospital, Gurage Zone, SNNP, Ethiopia. A retrospective one year study from January, 2013 to December, 2013 G.C.

Instruction for Data Collectors

You are kindly requested to fill all questionnaires genuinely. Circle the options that corresponding to the response of checklist or fill the response on the space provided.

Part 1: socio-demographic characteristics

1. Residence: 1) Rural 2) Urban
2. Card number: _____
3. Age of mother: _____
4. Marital status: 1) Single 2) Married 3) Divorced 4) Widowed
5. Ethnicity: 1) Amhara 2) Oromo 3) Tigre 4) Gurage 5) Other specify _____

6. Religion: 1) Muslim 2) Orthodox 3) Catholic 4) Protestant
i. 5) Other
7. Educational status: 1) Illiterate 2) Primary school 3) Secondary school
4) Higher education
8. Occupation: 1) House wife 2) Daily worker 3) Student 4) Employer 5)
Other specify _____
9. Monthly Income: 1) <500birr 2) 500-1000birr 3) >1000birr

Part 2: Obstetric history of the respondents

- 2.1. Gravidity: 1) Primigravida 2) Multigravida
- 2.2. Parity: 1) 0 2) 1-4 3) ≥ 5
- 2.3. ANC follow-up 1) Yes 2) No

2.4. Known LNMP? 1) Yes 2) No

2.5. If yes for ques. No 2.4 Gestational Age in weeks: _____

2.6. If no for ques.no 2.4 GA by fundal height_____

2.7. Was the mother in maternal waiting area? 1) Yes 2) no

Part 3: Clinical condition to management process

3.1. Was the mother in true labor when she admitted to Attat Hospital labor ward: 1) Yes 2) No

3.2. If yes for question no 3.1 was she in: 1) latent phase of labor 2) Active 1st stage of labor
3) 2nd stage of labor

3.3. Total duration of labour: 1) <12hr 2) 12-24hr 3) >24hr

3.4. Was FHR positive at time of Admission: 1) Yes 2) No?

3.5. If yes for Ques. No 3.4 was it 1) Bradycardic 2) In normal range 3) Tachycardic

3.6. Presentation of the fetus? 1) Cephalic 2) Brow 3) Face 4) Shoulder 5) breech 6) Other
specify_____

3.7. Any Malposition? 1) Yes 2) No 3) unknown

3.8. If yes for ques. 3.7 specify

3.9. Any associated presentation: 1) APH 2) HDP, Pre-eclampsia/Eclampsia 3) PROM 4)
Chorioamnionitis 5) GDM 6) Previous CS 7) RVI 8) Other specify_____

3.10. Any intrapartum complication? 1) Yes 2) No

3.11. If yes for ques.no 3.10 specify_____

3.12. Mode of delivery: 1) SVD 2) VBD 3) VAD 4) FD 5) CS

3.13. If mode of delivery was CS was it? 1) Elective 2) Emergency

3.15. Indication to perform Caesarean delivery 1) CPD 2) NRFHRP 3) Failed instrumental
delivery 4) Failed induction 5) OL 6) Cord Prolapse 7) Previous CS 8) Previous Fistula

repair 9) Placenta Previa 10) Footling breach 11) Bad Obstetric history 12) Abruptio Placenta 13) Transverse lie 14) Maternal Request 15) other specify _____

3.15. If laparotomy specify the reason _____

3.16. Did the mother develop PPH? 1) Yes 2) No

3.17. If yes for question no.3.16 what was the cause? 1) Genital tract Laceration 2) Retained placental tissue 3) Uterine atony 4) Other specify _____

3.18. If the cause of PPH is tear what was the degree 1) 1st degree 2) 2nd degree 3) 3rd-4th degree 4) Cervical tear

3.19. Did the mother transfused? 1) Yes 2) No

3.20. Hemoglobin before delivery _____

3.21. Hemoglobin after delivery _____

3.20. Any Other intervention for PPH 1) Yes 2) No if yes specify

3.21. Any other postpartum/operative complication? 1) Endometritis 2) wound site infection 3) sepsis 4) Wound dehiscence 5) Fistula (VVF, RVF) 6) Episiotomy site infection 7) Intra-abdominal abscess collection 8) Other Specify _____

3.21. Maternal outcome: 1) Alive 2) Dead

PART IV) Fetal outcome

4.1. Fetal outcome: A) Alive B) Still birth C) Early Neonatal Death

4.2. Fetal Weight: _____

4.3. Sex of the fetus: 1) Male 2) Female

4.4. 1min Apgar score _____

4.5. 5 min Apgar score _____

4.6. Any neonatal complication? 1) Asphyxia 2) Birth injury 3) Sepsis 4) Meconium Aspiration Syndrome 5) Other specify _____

4.7. Did the neonate admitted? 1) Yes 2) No

Name of data collector: _____

1. Date: _____ Signature: _____

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name of student: **Memuna Kemal Siraj**

Signature: _____

Name of institution: **JIMMA UNIVERSITY**

The thesis has been submitted for examination with my approval as university advisor:

1 . Dr. Elias Ali Yesuf (MD, MPH)

Signature _____

Date _____

2 Mr. Kalkidan Hassen (Asst. Professor)

Signature _____

Date _____