DETERMINANTS AND MANAGEMENT OUT COME OF POST PARTUM HEMORRHAGE AMONG MOTHERS DELIVERED IN ATTAT PRIMARY HOSPITAL, GURAGIE ZONE, SOUTHERN ETHIOPIA, 2019

BY: YENENESH DEBASH (BSc)

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

DECEMBER, 2019

JIMMA, ETHIOPIA

DETERMINANTS AND MANAGEMENT OUT COME OF POST PARTUM HEMORRHAGE AMONG MOTHERS DELIVERED IN ATTAT PRIMARY HOSPITAL, GURAGIE ZONE, SOUTHERN ETHIOPIA, 2019

BY: YENENESH DEBASH (BSc)

ADVISOR: DR. DEJENE ASSEFA [MD, ASSISTANT PROFESSOR, AND CONSULTANT OF OBESTATRICS AND GYNACOLOGY]

DECEMBER, 2019

JIMMA, ETHIOPIA

Abstract

***Background**: Postpartum haemorrhage refers loss of more than 500 and/or 1000 ml of blood within 24 hour following vaginal, caesarean delivery respectively. It is significant public health problem both in developed and developing countries, causing considerable maternal mortality and morbidity. In Ethiopia, the government launches different strategies to prevent postpartum haemorrhage. But still more than half of the maternal mortalities occurred after delivery due to haemorrhage. Even though postpartum haemorrhage is one of the major direct causes of maternal death in Ethiopia, there are only few studies done in the country. Therefore, determining risk factors that predispose womens to postpartum haemorrhage is important to make different interventions.*

***Objective**: To assess determinant factors and management outcome of Postpartum Hemorrhage among mothers delivered at Attat primary Hospital, Gurage Zone, Southern Ethiopia,from january 2016 up to december2018.*

***Method**: Hospital based case control study design was used to include 200 mothers who gave birth during the study period. Data was collected using data collection checklists from logbook and patient folder by trained data collectors after they were trained for three days. The collected data was cleaned and entered and analyzed using SPSS Version 22 computer software. Bivariate and multivariable analysis was used to identify an independent predictors of PPH. The results are presented by tables, graphs, charts and text as appropriate.*

***Result**: All the 200 cards were found to be complete and used for data retrieval resulting in 100% completeness rate. The mean age of the respondents was 31.4 years. The finding of this study showed that mothers with prolonged labor, whose labor was induced or augmented, with retained placenta and mothers with previous history of c/s, were about 3 times (AOR=2.8[1.2, 14.5]), 2 times (AOR=1.8[1.2, 4.8], 23 times (AOR=23[3.2, 28.5] and 15 times (AOR=15[2.5, 38] more likely to develop PPH when compared with their counterparts respectively. Finally, mothers with hypertensive disorders of pregnancy and those with macrosomia were about 18 and 6 times more likely to develop PPH when compared to their counterparts (AOR=17.6[1.8,34.2] and 5.8[2.3,9.2]) respectively.*

***Conclusion**: Based on the finding of this study, most of Management Outcome of the mothers encountered with post-partum hemorrhage was good 43 (86%). It was found that having history of retained placenta, mothers whose labour was prolonged, Induced /augmented labour, mothers with previous history of c/s, mothers with hypertensive disorders and mothers who had macrosomia were found to be an important determinants or risk factors for postpartum hemorrhage in the study population.*

***Recommendations:** Emphasis should be given on prevention and early detection of risks factors for PPH, in order to reduce the burden of postpartum hemorrhage.*

***Keywords:** Postpartum Hemorrhage, risk factors, Maternal Mortality, Management Outcome*

ACKNOWLEDGMENTS

First, I would like to express my gratitude to wards Jimma University, Collage of Public Health and Medical Science, Department of Emergency Surgery and Obstetrics for allowing me to conduct this study in the hospital.

I am very grateful to my advisor Dr. Dejene Assefa (MD, Assistant professor of obstetrics and gynecology] for his constructive suggestion and comment in accomplishing this research.

I would like to extent my heart full thanks to Attat Primary Hospital, department of Obstetrics and Gynecology for allowing me to do this research in the Hospital and as well as midwives and third year IEOS students for their support in the data collection process.

Table of Contents

List of Tables and Figures

LIST OF ABBREVIATION AND ACRONYM

AMTSL	Active Management of the Third Stage of Labour
APH	Ante partum Hemorrhage
C/S	Caesarean Section
CCT	Controlled Cord Traction
IESO	Integrated Emergency Surgery and Obstetrics
MDG	Millennium Development Goal
MOH	Ministry of Health
PPH	Postpartum Hemorrhage
SNNPR	Southern Nation Nationality & Peoples Region
SVD	Spontaneous Vaginal Delivery
DIC	Disseminated intravascular coagulation
WHO	World Health Organization
SPSS	Statistical package for social science

CHAPTER ONE: INTRODUCTION

1.1 Background

Post-partum hemorrhage (PPH) is defined as blood loss of more than 500 ml following vaginal delivery or more than 1000 ml following caesarian delivery (1). Another definition of PPH is that blood loss sufficient to cause hypovolemia, or a 10% drop in the hematocrit or requiring transfusion of blood products (regardless of route of delivery) (2). The diagnosis of PPH remains a subjective clinical assessment, which includes any degree of blood loss that threatens the woman's hemodynamic stability. Blood loss can occur during the first 24 hours (primary PPH) or from 24 hours up to 6 weeks after delivery (secondary PPH) (3).

PPH remains a major cause of both maternal mortality and morbidity worldwide more so in developing countries with an estimated mortality rate of 140,000 per year or one maternal death every four minutes (25-43) (4). In industrialized countries, PPH usually ranks in the top 3 causes of maternal mortality, along with embolism and hypertension. PPH is frequent complication of deliveries and its incidence is 2-4%, after vaginal deliveries and 6% after caesarean sections. PPH occur in 5% of all deliveries, majorities of death occur within four hours of delivery indicating that it is a consequence of third stage of labour (4, 5).

WHO estimates that of the 529,000 maternal death occurring every year, 136,000 or 25.7% of death takes place in India and two third of these maternal death occur after delivery, PPH being the most commonly reported complication In Sub-Saharan Africa the probability of dying during child birth is 175 times more than that of developed country. In China, PPH is the most common serious obstetric complication and the leading cause of maternal mortality, accounting for 49.9% of maternal death (6). Improvement in women's health and reduction of reproductive mortality and morbidity is one of the set targets of the Millennium Development Goals (MDGs). MDG five has set the goal of reducing maternal mortality by 75% in 2015; compared to the 1990 levels. Achievement of this key target requires implementation of cost-effective strategies that address the major causes of maternal morbidity and mortality (7).

Rapid recognition of PPH and identification of hemorrhage etiology is essential to reduce mortality and morbidity. Treatment is etiology-specific and comprises a range of medical, mechanical, temporizing and surgical procedures. Important developments from trauma and emergency medicine around massive hemorrhage protocols are newly implemented for PPH. The

incidence of PPH in a low-resource tertiary hospital in Nigeria was found to be 4.5%, in Uganda, (an African country) it was 9%, and it was 6.4% in the high-resource country of the Netherlands in Europe (8).

A community-based survey in India has estimated that of the 560/100,000 live births PPH accounted for 35–56% of the deaths (9).

Recent study conducted in Karachi, Pakistan reported, hemorrhage accounts 51%of, causes of maternal mortality followed by anemia (21.2%), and dystocia (14.8%) (10). Despite global efforts to ensure that women deliver with skilled birth attendants and have access to conventional utero-tonics for PPH prevention, 60% births in low resource countries occur outside health facilities without a skilled attendant. In Pakistan, 65% of births occur at home and 27% of maternal deaths are attributed to PPH. (11).

The leading cause of PPH is uterine atony (failure of the uterus to contract adequately after child birth) accounting for 60-80% of cases, followed by retained placenta and injury to genital tract. Despite the global burden of PPH, little is known about factors that contribute to PPH, especially in less developed areas where 99% maternal death occur. PPH may develop in patients with no risk factors; however, reported Antenatal risk factors for PPH include Asian ethnicity, obesity, previous PPH, multiple pregnancy, anemia, large baby, placenta Previa, polyhydramnios, uterine myoma, pre-eclamsia and age over 40 years. Intra-partum risk factors include induction of labour, prolonged labour, intra-partum pyrexia, placental abruption, episiotomy, operative vaginal delivery, retained placenta, premature birth and delivery by caesarean section. One preventive approach is to identify patients at high-risk for PPH prior to delivery, so that blood components and equipment can be mobilized before bleeding onset (9,10). This study will investigate the determinants and management outcome of PPH at Attat Primary Hospital.

1.2 Statement of the Problem

Postpartum hemorrhage (PPH) is a major cause of maternal mortality and severe morbidity, particularly in low-income countries (12). Recently, however, several industrialized countries, including Australia, Canada, the United Kingdom, and the United States, have reported an increasing incidence of PPH. Reasons speculated for the temporal increase include the rises in maternal obesity, previous Caesarean section, multiple pregnancy, and differences in the management of labour (including induction and augmentation of labour and epidural anesthesia) (13).

It is well recognized that appropriate obstetric management (in particular, active management of the third stage of labour) and access to blood transfusion and, if necessary, hysterectomy, can prevent mortality and severe morbidity once PPH occurs. Active management of third stage of labour is a feasible, low cost measure to prevent 60-70% of atonic PPH (14). However, these definitive therapies are often not accessible in developing countries. Long transports from home or primary health care facilities, lack of skilled providers, and lack of intravenous fluids and/or a safe blood supply often create long delays in instituting appropriate treatment (14, 15). The lack of skilled attendants at delivery who can provide even the minimum of care, long transport times to facilities that can manage uterine atony or severe lacerations of the genital tract and unattended obstructed labor leading to a ruptured uterus conspire to elevate PPH to its position as the number one killer of women during child birth (10).

An increase in the prevalence of known maternal and obstetric risk factors for PPH could play a role, but the supporting evidence from the published studies is limited(16).

Risk factor identification in the antenatal and intra-partum periods may provide an opportunity for timely interventions to prevent PPH. But PPH can also occur in women with no identifiable risk factors and it is not predictable. Ability to reduce the risk of PPH needs ongoing investigations of previously unaccounted for causes and risk factors (17).

Prenatal evaluation of anemia is important globally; however, diagnosis and treatment of nutritional factors, hemoglobinopathy, malaria and helminthes infection is even more important in low-resource countries due to the higher burden of anemia among this population. Reducing maternal mortality is one of the hot agendas, globally and nationally. The government of Ethiopia provides free maternal and pre delivery waiting services regardless of social and economic status of the women. But with this effort, still maternal mortality ratio is high at the

national level (27). Despite the severe burden of PPH, few studies have examined risk factors, incidence, management and outcome predicting PPH in Ethiopia. The primary objective of this study is to determine risk factors and management outcome of PPH at Attat primary hospital.

1.3 Significance of the Study

Identification of risk factors will help the prevention and control program and also will have a paramount implication in identifying target group. The rational of this study is to provide evidence about existing constraints with PPH to policy makers and other stake holders for further improvement of service provision in future.

The result of this study can also help as base line data or source of information for further study.

CHAPTER TWO

2.1 LITRATURE REVIEW

Globally, postpartum hemorrhage (PPH) is a leading cause of maternal mortality. The global prevalence of PPH is 6 % and the highest burden is experienced in low-income countries. The magnitude of PPH in sub-Saharan Africa is high at 10.5 %. In Uganda, PPH causes 25 % of all maternal deaths. However, there is little information about predictor factors of PPH (21).

Despite reduction in maternal death amongst transitional and developed countries, maternal mortality (MM) remains a significant cause of death for women of reproductive age in developing world. This fact is exemplified by statistics collected by the WHO, which show that 99% of the world's half-million annual maternal deaths occur in developing countries. Life time risk of maternal death is as high as one in six for women living in the world's poorest nations, a figure in sharp contrast to a risk of one in 30,000 for women in Northern Europe (10, 12).

Direct causes account for the great majority of maternal deaths in developing world. A systematic review conducted by the WHO found that PPH is the leading cause of MM in Africa and Asia, accounting for up to half of the total number of deaths in these regions. Overall, PPH accounts for an estimated 25% of MM worldwide. (13). A retrospective descriptive cohort study carried out at Mpilo Central Hospital, a tertiary referral government hospital in a low-resource setting in Bulawayo, Zimbabwe shows The incidence of PPH was 1.6%. The most identifiable risk factor for primary PPH was pregnancy-induced hypertension (33.3%) followed by prolonged labor (17.5%) and large for gestational age (15.8%). Nearly 1 in 4 had no identifiable risk factor for PPH in this study. Uterine atony was the most common cause of postpartum hemorrhage (82.4%) followed by perinatal trauma (18). A population-based research study conducted in Bangladesh reported PPH as 6% of total maternal morbidities (9). In a two-year longitudinal census in West Africa, the estimated postpartum morbidities through PPH were 28%. A study conducted in Pakistan revealed prevalence of PPH as 34 % (10).

Findings from WHO Multicounty Survey on Maternal and Newborn Health shows that reported rate of PPH among all women was 1.2%, and factors significantly associated with PPH diagnosis include age, parity, gestational age, induction of labour, caesarean section, and geographic region. Among those diagnosed with PPH, 92.7% received utero-tonics for the treatment of PPH, one-third received blood products, and about one-quarter received therapeutic intravenous antibiotics (19).

A cross sectional study conducted at Liquate National Hospital; well-known tertiary care hospital of Karachi, founds that PPH occurs in (1.7%) of cases. Common mode of delivery in patients with PPH were Spontaneous vaginal delivery (61.5%) followed by C-section (38.5%) and (23.1%) had episiotomy with spontaneous vaginal delivery (69.2%) had primary Postpartum Hemorrhage while (30.8%) were suffered from secondary Post-Partum Hemorrhage. cause of Primary Post-Partum Hemorrhage was Uterine atony followed by cervical and vaginal tear, uterine inversion in, Morbidity adherent placenta and placenta Previa. Cause of Secondary post-partum hemorrhage was remaining products of Placenta. Most reported method for the management of Primary Post-Partum Hemorrhage was Hysterectomy followed by Repair of cervical and vaginal tear, internal iliac artery ligation and replacement of uterine inversion. Commonest management methods used for the treatment of Secondary Post-partum Hemorrhage is Evacuation of remaining products of conception (20).

A prospective cohort study conducted in Uganda indicates incidence of PPH was 9.0 % and of severe PPH (EBL>1500ml) was 1.2 %. The risk factors for PPH were being HIV positive, multiple pregnancy, delivery by cesarean section and delivering a macrocosmic baby >=4000gm (21).

Another Retrospective descriptive study conducted in Maiduguri, Nigeria shows incidence of primary post-partum hemorrhage as 1.9%. and Uterine atony was found as a causative factor (37.7%) followed by retained placenta (22.5%), abruption- placenta (14.0%), lower genital tract laceration(13.6%) , Uterine rupture and placenta Previa(5.6%) . (47.0%) received Blood transfusion, Utero-tonics (52.3%) Manual removal of placenta (14.6%), lower genital tract repair (10.6%) and Laparotomy (for uterine repair and hysterectomy) (5.6%). Fetal macrosomia (21.2%) and ante-partum hemorrhage (18.9%) were identified as major risk factors and PPH was responsible for 4.2% of maternal deaths in this study (1). Another retrospective study in US shows Previous cesarean delivery, prolonged labor, oxytocin augmentation and emergency cesarean delivery are strongest predictors of severe blood loss in women with PPH. Uterine atony and abnormal placentation are the etiologies significantly associated with severe PPH.(22).

A study conducted in Sudan shows Grand multiparty, multiparty, emergency admission and prolonged labor was significantly associated with PPH (3).

a retrospective case-control study done in California indicates that a second stage duration of ≥ 3 hr was the only independent risk factor for PPH and second line utero-tonic use was relatively high, but surgical intervention or postpartum transfusion rate was low(23).

Recent study conducted in Japan also shows incidence of PPH was (13%) and factors significantly associated with PPH in this study are, null parity, increased birth weight, instrumental deliveries and low fibrinogen level (24).

Another retrospective Hospital based study done in Dare selam shows the prevalence of PPH was 11.9% and the risk factors for PPH found in this study are low hemoglobin (HB), pregnancy induced hypertension (PIH), trauma after delivery, history of birth before arrival, advanced age group (>32years old) and multiparty (> 3 parity) (25).

Prospective observational study conducted at UK shows the incidences of PPH ≥500, ≥1500 and ≥2500 ml were 33.7%, 3.9% and 0.8% respectively. Independent risk factors predicting PPH ≥ 500 ml included Black African ethnicity, assisted conception, caesarean section, retained placenta, multi-parity without caesarean section and administration of steroids for fetal reasons (26).

Institutional based cross-sectional study conducted in Dessie Referral Hospital from 5th January 2017 to 10th January 2017 shows magnitude of PPH 5.8% and factors associated with PPH include, age, parity, cesarean delivery and prolonged duration of labour. But blood loss is not estimated by standard blood loss measurements in this study (27).

Case–control study conducted at JUSH founds leading cause of maternal death was hemorrhage (54%), followed by pregnancy-induced hypertension and anemia (12%) (28).

2.2 Conceptual Frameworks

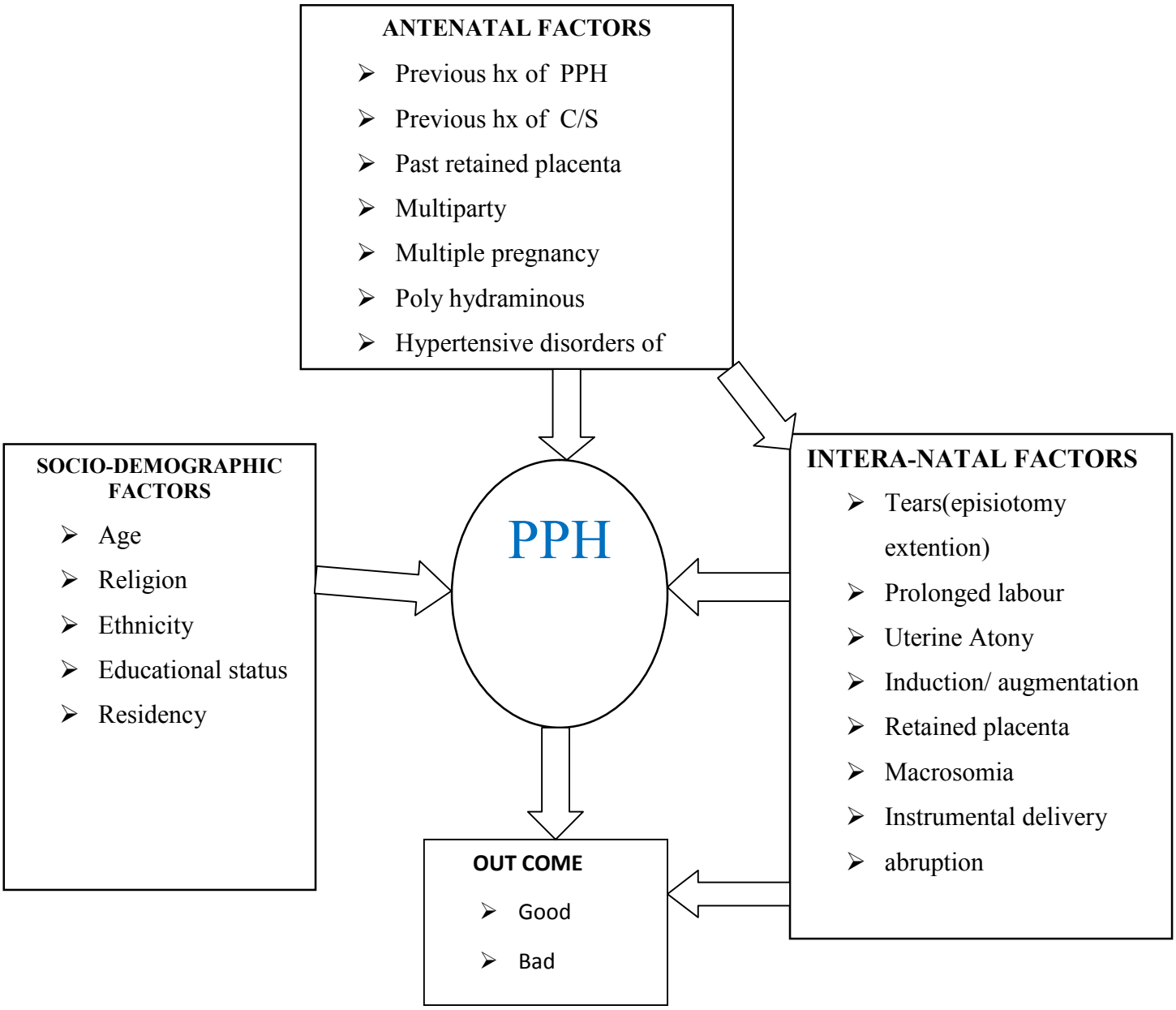

Figure 1: Conceptual framework developed showing factors associated with PPH

CHAPTER THREE: OBJECTIVES

3.1 General Objective

- To assess determinant factors and management outcome of postpartum hemorrhage among mothers delivered in Attat primary hospital Gurage Zone, Southern Ethiopia from January 1, 2016 to December 30 ,2018.

3.2 Specific Objectives

1. To identify determinant factors of postpartum hemorrhage among mothers delivered in Attat primary hospital, Gurage Zone, Southern Ethiopia from January1 2016 to December 30, 2018.
2. To describe management outcome of postpartum hemorrhage among mothers delivered in Attat primary hospital Gurage Zone, Southern Ethiopia, from January 1 2016 to December 30, 2018.

CHAPTER FOUR: METHODOLOGY

4.1 Study area and period

The study was conducted at Attat catholic primary Hospital, Gurage Zone, SNNPR Ethiopia; which is 175 kilometers from Addis Ababa and 254 kilometers from regional city Hawassa. The climate is woinadega; Teff and inset are the main agricultural product. They also reared domestic animals like cow and got.

The Hospital was established in 1961E.C by Catholic Missionary and still now governed by them. The catchment population is 800,000, of which 51.2% females and 48.8 % males. The Zone has 40 Health Centers and 2 newly established primary Hospitals which are government owned, and all referred to this Hospital. It is one of affiliated hospital for training of IEOS students in conjunctions with Jimma University. This Hospital has 100 beds including delivery room, which give services for parturient mothers and other patients. The hospital has multidisciplinary staffs (Gynecologist, General Surgeon, General practitioner, emergency surgeon, Pharmacist, Radiographer, Lab Technologist, midwives and clinical nurses).Through all the days of week the services are provided free of charge for all laboring mothers. The study was conducted from June 15 to July 30, 2019.

4.2 Study design

A Hospital based case control study design was conducted.

4.3 Source population

All mothers who gave birth in the catchment area of Attat Primary Hospital were the source population of the study.

4.4 Study population

For Cases: -All women who had been diagnosed as PPH and recorded in patient folder in the department of Gynecology and obstetrics of Atat hospital were study populations for cases.

For Controls: study populations for Controls were sampled mothers who gave birth and managed at Attat Primary Hospital during the study period.

4.5 Eligibility criteria

4.5.1 Inclusion criteria

For cases: - women who had been diagnosed as PPH in the inpatient department of gynecology and obstetrics of Attat hospital and recorded in the patients folder.

- ✓ All mothers diagnosed and managed as PPH during the study period and recorded on their chart
- ✓ All mothers who delivered at Hospital, home, referred in and diagnosed and managed as PPH at attat hospital

For controls: -Controls were sampled post-partum women who gave birth in department of gynecology and obstetrics of Atat hospital.

Exclusion criteria

- ✓ For both cases and controls
    - o Referred out patients were excluded from the study.
    - o Women with incomplete documentation of their chart

Case Definition /ascertainment of cases

Case: A women diagnosed as PPH and registered in patient folder and managed in Attat Hospital.

Control: A women who gave birth in department of obstetrics of Atat hospital.

4.6 Sample size determination

The required sample size was determined by using Epi-info version 7 statistical software for case-control study design based on the assumption that previous history of prolonged labour is significant risk factor for PPH by using the assumptions of retrospective case control study in Ghana,(21).

- ➢ $\mathbf{P_1}$ proportion among cases = 14.8% and $\mathbf{p_2}$ proportion of among controls= 2.0%
- ➢ **AOR**=13.1 was used to calculate the sample size
- ➢ Proportion among controls and proportion among cases is also considered in the calculation
- ➢ At 95% ($\mathbf{Z\alpha/2}$ = 1.96) level of confidence, Power of study=80%
- ➢ Ratio of cases to controls = **1:3**

- ❖ All above assumptions were considered in Epi-info version 7. The final sample size calculated by using the above assumption gives **50 cases** and **150 controls** with a total of **200** study subjects. And assuming 5% incomplete patient cards was considered with the total sample size of 200 (cases 50 and controls 150).

Table 1: Sample size determination by Epi-info version 7 statistical software, Southern Ethiopia, 2019.

Exposure variables	Proportion ion among cases	Proportion on among controls	AOR	Sample size		Final Sample size
				Cases	Controls	
Pervious History of prolonged labour	14.8	2.0	8.5	50	150	200 Cases=50 Controls=150
Retained placenta	22.6	3.1	9.127	32	96	128 Cases=32 Controls= 96
Pervious history of augmentation of labour	26	3	11.36	25	75	100 Cases=25 Controls=75

From the above three significant risk factors of PPH, Pervious History of prolonged labour gives large sample size so that 50 cases and 150 controls with total of 200 subjects were considered for the study.

4.7 Sampling technique and procedures

4.7.1 Sampling Technique

A total of 2 years (**Jan1, 2016 to December 30, 2018 G.C**) data were reviewed from **June 15 – July 30** to get the minimum required sample size (50 cases) since the cases are rare. Data were collected from patient record cards, registration books and anesthesia charts available in the

hospital by check list questionnaires using trained data collectors. According to the 2 years (**Jan1, 2016 to December 30,2018 G.C**) HMIS report of Atat Hospital reviles a total of pregnant women visiting hospital during their pregnancy were report as 3600. Around 3860 women gave birth in this two years.

150 Controls were randomly selected from the mothers who were managed for their birth in this hospital.

First card number of study subjects were identified from registration books (logbooks), and then their charts have been retrieved from card office.

Finally documents from patient cards were entered in to a structured format by two pre trained third year IEOS students and four midwives.

4.8. Data collection tool and procedure

A semi-structured questionnaire was adopted from different literatures and necessary adjustment were made to fit the local condition. The main content of the questionnaire were socio-demographic characteristics, Antenatal and intra-partum risk factors and management outcomes. Data were collected from record cards, registration books and anesthesia charts available in the hospital using check list questionnaires by trained data collectors. The health providers in the delivery rooms in the Hospital were trained on the data collection procedure. During enrolment, data collector asses patients folder on the risk factors including: previous history of PPH, previous history of caesarean delivery, woman's age in completed years and parity obtained from patient records. The research team were noted whether labour was induced or augmented with oxytocin, the mode of delivery, performance of episiotomy, perennial tear requiring suture, single or multiple deliveries, polyhydramnios, use of oxytocin at birth to prevent PPH (injectable oxytocin 10 IU or oral misoprostol) within 1 min of delivery. Postpartum blood loss also noted if it is wroten at patient folder. First patient folder was assessed for weather the card includes all the above information's or not then finally documents from patient cards were entered in to a structured format by pre trained third year IEOS students and midwives working in the labor ward.

.

4.9 Study Variables

4.9.1 Independent variables

Socio-demographic variables: - age, parity, educational status, residency

Antenatal and intra-partum risk factors: - polyhydramnios, chorioamnionitis, past pph, previous c/s,Previous history of retained placenta, multiple pregnancy, APH, fibroids, multiparty, Hypertensive disorder, Induction/augmentation of labour, , prolonged labour.

4.9.2 Dependent variable

- PPH

4.10 Operational definitions

- **Residence:**

  -rural: mothers who will come from outside Wolkite town

  -urban: mothers who will come from Wolkite town

- **Cases: mothers who develop PPH were recruited as cases**
- Controls: mothers who did not develop PPH after delivery were recruited as controls
- Post-partum hemorrhage: Blood loss in excess of
  - 500ml following vaginal delivery
  - 1000ml following cesarean section
  - Change in vital signs, pallor and/ or the need for blood transfusion and for this particular study it will be obtained from patient record.
- Uterine atony-lack of effective contraction of the uterus after delivery
- Maternal mortality-Death of mother related to PPH and its complication
- **Maternal management outcome**-Maternal condition after PPH which can be improved and discharged without complication were considered as **good** and those who developed complication and those who were died were considered as **bad** outcome according to this study.
- Primary PPH : PPH that occur during the first 24 hours of delivery
- Secondary PPH: PPH from 24 hours up to 6 weeks of delivery
- Macrosomia :birth weight>=4000gm
- Prolonged lebour :duration of lebour >12 hrs

4.12 Data processing and analysis

The collected data were reviewed, checked for completeness before data entry. Complete data were entered in to computer and Statistical Package for Social Sciences (SPSS for windows version 22). Descriptive statistics was used to describe the main features of the data. Bivariate analysis was done to determine association between independent variables and outcome variable. Multivariate Logistic regression was used to control the effect of confounding variables. Variables having $P<0.25$ from bivariate analysis were included in multivariable logistic regression analysis. Finally, statistical significance was declared at $P<0.05$. Results were presented by using tables, graphs and written paragraph forms. Final interpretation, discussion and recommendation were made based on the findings of this research.

4.13 Data quality assurance

To assure the quality of the data, data collectors and supervisors were trained and a regular supervision and follow up was made by Supervisors. In addition, regular checkup for completeness and consistency of the data was also made on daily basis and entered to SPSS software. Pretest was done at wolkite health centere for two consecutive weeks before the actual data collection started and based on the result adjustment was made on the instrument. The pretest data were not included in the analysis of the actual study.

All women who had been diagnosed with PPH in patient folder or card in the department of gynecology and obstetrics of Attat hospital were recruited in the case group (PPH) and women who gave birth and managed in the same hospital who did not develop PPH were recruited in the control group. Data quality was ensured during collection, coding, entry and analysis. During data collection adequate training and follow up was provided to data collectors and supervisors. Incomplete checklists were returned back to the data collector for completion. Codes was given to the questionnaires and during the data collection so that any identified errors was traced back using the codes.

4.14 Ethical consideration

Ethical approval or clearance letter was obtained from institutional review board (IRB) of Institute of Health, of Jimma University. Permission letter (Formal letter of cooperation) was written to respective Hospital administration office, and the study was commencing after receiving formal permission from them. Name and personal identifiers are not to be written on

the questionnaire and official permission to undertake the study was obtained from Attat Primary hospital.

4.15 Dissemination plan

The findings of this study will be presented during thesis defense and submitted to Jimma university department of INTEGRATED EMERGENCY OBS/GNY AND SURGERY. Then it will be disseminated to Jimma university research unit and it will be communicated to the local Health planners and other relevant stakeholders such as administration of each Hospitals and ministry of Health. Beside to this, the findings of the study will be disseminated through publications and may be presented in scientific conferences and workshops.

CHAPTER FIVE: RESULTS

5.1. Socio-Demographic Characteristics

All the 200 cards were found to be complete and used for data retrieval resulting in 100% completeness rate. The mean age of the respondents was 31.4 years and seventy one (35.5%) of the mothers were between the age group 30-34 years. The majority of the subjects were rural (56%). (Table 2)

Table 2: Socio-demographic characteristics of cases and controls in Attat hospital in Gurage Zone, Southern Ethiopia,Jan 2016-December 2018(N=200).

No	variables	Categories	Frequency	Percent
1	**Age.**	<20	9	4.5
		20-24	31	15.5
		25-29	61	30.5
		30-34	71	35.5
		>=35	28	14
		Total	200	100.0
2	**Address**	urban	88	44
		rural	112	56
		Total	200	100

5.2. Antenatal characteristics of mothers (**Cases and Controls**)

Eight percent of the mothers had previous history of post-partum hemorrhage and about 6% of them had previous history of retained placenta. Majority of the mothers (53%) were multipara and about 8% of them had multiple pregnancy. About 18 % of the mothers had previous history of cesarean section and about 21% of them had hypertensive disorders of pregnancy (Table 3).

Table 3: Antenatal factors of cases and controls in Attat hospital in Gurage Zone, Southern Ethiopia,Jan 2016 –December 2018(N=200).

No	variables	Categories	Frequency	Percent
1	Previous history of PPH	Yes	16	8
		No	184	92
		Total	200	100.0
2	History of previous retained placenta	Yes	11	5.5
		No	189	94.5
		Total	200	100
3	Multi-parity	Yes	106	52.6
		No	94	57.4
		Total	200	100
4	Multiple pregnancy	Yes	15	7.5
		No	185	92.5
		Total	200	100
5	Previous hx of C/S	Yes	36	18
		No	164	82
		Total	200	100
6	Hypertensive disorders of pregnancy	Yes	41	20.5
		No	159	79.5
		Total	200	100

5.3. Intra-natal characteristics of mothers (Cases and Controls)

About 3% of the mothers encountered tear during the intra-natal period and about 24% of them had prolonged labor. Fourteen percent of the mothers had uterine atony while 24% of them were

augmented and/or induced. The prevalence of retained placenta, instrumental delivery, and macrosomia were 18%, 19%, and 14% respectively. (Table

Table 4:Intra-natal factors of cases and controls in Attat hospital in Gurage Zone, Southern Ethiopia,Jan 2016-December 2018(N=200).

No	Variables	Categories	Frequency	Percent
1	Tear	Yes	6	3
		No	194	97
		Total	200	100.0
2	Prolonged labor	Yes	48	24
		No	152	76
		Total	200	100
3	Uterine atony	Yes	28	14
		No	172	86
		Total	200	100
4	Induction/augmentation	Yes	48	24
		No	152	76
		Total	200	100
5	Retained placenta	Yes	35	17.5
		No	165	82.5
		Total	200	100
6	Instrumental delivery	Yes	37	18.5
		No	163	81.5
		Total	200	100
7	Macrosomia	Yes	27	13.5
		No	173	86.5
		Total	200	100

5.4. Management Outcome of Post-Partum Hemorrhage among mothers (Cases)

More than three-fourth (86%) of the mothers had good management outcome for postpartum hemorrhage whereas only 14% of them had bad outcome (Figure 2).

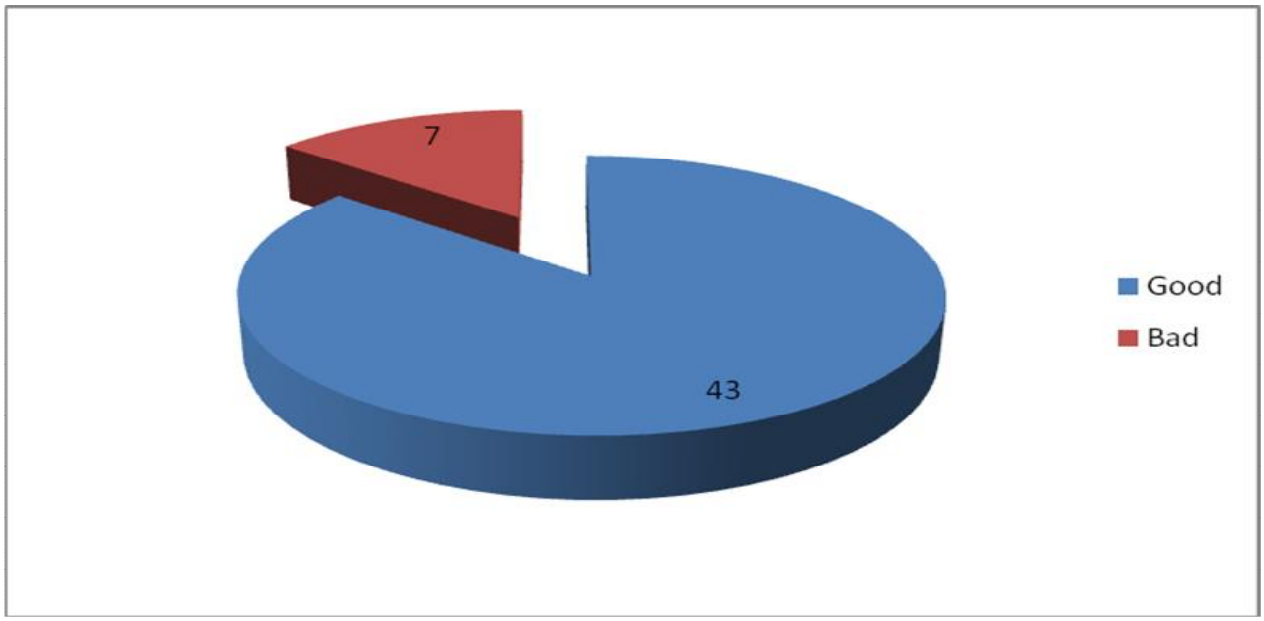

Figure 2 : Status for management outcome of mothers with PPH in Attat hospital in Gurage Zone, Southern Ethiopia,Jan 2016-December 2018(N=200)

5.5. Determinant factors of Postpartum Hemorrhage among mothers (Cases and Controls)

A bivariate logistic regression analysis was done for a total of 24 variables comprised from socio-demographic, antenatal, and intranatal factors. Among twenty-four variables in bivariate logistic regression analysis nine of them had a p-value of less than 0.25.At the final multivariable logistic regression mode, 6 variables were found to be significant determinants/risk factors of postpartum hemorrhage (Table 5).

Upon multivariable logistic regression prolonged labor, induced/augmented labor, retained placenta, previous history of cesarean section, hypertensive disorders of pregnancy and macrosomia were found to be important determinants of postpartum hemorrhage (Table 5).

The finding of this study showed that mothers with prolonged labor were about 3 times more likely to develop postpartum hemorrhage than those whose labor was not prolonged (AOR=2.8[1.2, 14.5]). The finding of this study also showed that mothers whose labor was

induced or augmented were 2 times more likely to end up in postpartum hemorrhage compared to those whose labor was not induced/augmented (AOD=1.8[1.2, 4.8].

This study also revealed that mothers with retained placenta were 23 times more likely to develop postpartum hemorrhage when compared with their counterparts (AOR=23[3.2, 28.5]. Moreover, mothers with previous history of cesarean section were 15 times more likely to experience postpartum hemorrhage when compared to those with no history of previous cesarean section (AOR=15[2.5, 38].

Finally, mothers with hypertensive disorders of pregnancy and those with macrosomia were about 18 and 6 times more likely to develop postpartum hemorrhage when compared to their counterparts (AOR=17.6[1.8,34.2] and 5.8[2.3,9.2]) respectively.

Table 5: Bivariate and multivariable logistic regression of factors associated with PPH in Attat hospital in Gurage Zone, Southern Ethiopia,Jan 2016-December 2018(N=200).

Variables		Cases (N=50	Controls (N=150)	COR (95% C.I)	AOR (95% C.I)	p-value
Age	<20	1	8	1		
	20-24	3	28	6(0.66,54.6)		
	25-29	13	48	**7(1.7,28.5)**		
	30-35	21	50	2.8(1.0,7.3)		
	>=35	12	16	1.8(0.7,4.4)		
Previous history of PPH	Yes	11	5	3.7(0.04,1.25)		
	No	39	145	1		
Prior history of retained placenta	Yes	6	5	**3.95(1.15,13.5)**		
	No	44	145	1		
Multi-parity	Yes	35	70	**2.6(1.3,5.2)**		
	No	15	79	1		
Multiple pregnancy	Yes	7	8	0.34(0.1,1)		

	No	43	142	1		
Tear	Yes	5	1	**16.5(1.8,24)**		
	No	45	149	1		
Prolonged labor	Yes	39	9	**55(20,94)**	**2.8(1.2,14.5)**	**0.01***
	No	11	141	1	1	
Uterine atony	Yes	28	1	1.4(0.36,2.48)		
	No	22	149	1		
Induction/augmentation	Yes	31	14	**15.8(7.1,35.0)**	**1.8(1.2,4.8)**	**0.001***
	No	19	136	1	1	
Retained placenta	Yes	31	14	**59(18,88)**	**23(3.2,28.5)**	**0.002***
	No	19	136	1	1	
Previous hx of C/S	Yes	29	7	**28.2(10.9,72.5)**	**15(2.5,38)**	**0.008***
	No	21	143	1		
Hypertensive disorders of pregnancy	Yes	34	7	**43.4(16.5,82.4)**	**17.6(1.8,34.2)**	**0.01***
	No	16	143	1	1	
Instrumental delivery	Yes	27	10	**16.4(7.0,38.4)**		
	No	23	140	1		
Macrosomia	Yes	26	20	**7.0(4,12)**	**5.8(2.3,9.2)**	**0.004***
	No	24	130	1		

Chapter 6- Discussion

This was hospital-based Case- control study which was aimed to assess determinant factors and management outcome of postpartum hemorrhage among mothers delivered in Attat primary hospital in Gurage Zone, Southern Ethiopia 2019. It was found that retained placenta, prolonged labour, Induction /augmentation of labour, previous history of c/s, hypertensive disorders and macrosomia were found to be an important determinants or risk factors for postpartum hemorrhage.

According to the finding of this study, mothers who had history of retained placenta were 23 times more likely to have postpartum hemorrhage than those without history of retained placenta [**AOR=23 :95%CI:3.2-28.5**)]. These results are consistent with those studies done in Uganda [AOR: =3.4] (21). But it is higher than study done in Dessie Referral Hospital [AOR=2.09] (27). This effect might partly have explained by accessibility variation of health facilities in different countries lacks adequate health infrastructure and even individuals living far from health facilities were less likely to utilize health care, especially developing country like Ethiopia the availability of health facility is low and early prevention, diagnose and management of postpartum hemorrhage is also low which leads to increase even the death of the mothers.

Having the history of prolonged labour is about three times more likely to develop postpartum hemorrhage compared with the mothers who have no history of prolonged labour **[AOR=2.8 95% CI:1.2-14.5].** This finding was supported by retrospective descriptive cohort study done in Mpilo Central Hospital in Zimbabwe and Sudan (18,3). Prolonged labour was found statistically significant relation with postpartum hemorrhage. The association might be most postpartum hemorrhage was resulted with the mothers whose labour was prolonged meanwhile this can be resulted in uterine atony which is the risk factor for postpartum hemorrhage.

Mothers who had **induction/augmentation of labor** were nearly 2 times more likely to have postpartum hemorrhage compared with their counterpart. [**AOR=1.8: 95% CI: 1.2-4.8]**. This finding was similar to study done in Pakistan and India (AOR=2) (9, 11). These association

might be due to the fact that induction makes uterus to contract more and more which become lax and unable to return to its place after delivery and resulted to bleeding.

Odds of having a previous history of **caesarean section** for previous pregnancy were 15 times more likely to have postpartum hemorrhage when compared to pregnant women who didn't experience with caesarean section previously [**AOR=15 :95%CI:2.5-38**)].This findings was supported by the findings of multicountries (Uganda, Dessie, Turk and Pakistan)(8,9,11). These association or similarity might be due to the previously scared uterus is sub optimal for normal implantation of placenta that lead to abnormal adherence of placenta to the uterine endometrium which is difficult to separate immediately after delivery of fetus and makes uterus to lax that causes to bleed a lot as well, scared uterus is prone to rupture during or before labor due to dehiscence of the scar which in turn causes bleeding.

Women who had **hypertensive disorder** were at risk of developing postpartum hemorrhage about **17.6** times more likely when compared with those mothers who had no hypertensive disorder [**AOR=17.6:95%CI:1.8-34.2**)]**.** This finding is in line with study done by WHO (world health report) which shows about 58% of mothers with hypertensive disorders were at risk of postpartum hemorrhage (12). This might be due to the hypertensive women doesn't gain equal blood volume that normotensive women gain physiologically during pregnancy and these women cannot tolerate even with loss of small amount of blood. As well women with hypertension are prone to coagulative disorders like DIC which makes them to bleed more.

Mothers who had **macrosomia**/big baby were about six times more likely to have postpartum hemorrhage when compared with the mothers who have no macrosomia/big baby. [**AOR=5.8:95%CI: 2.3-9.2**)]**.** This finding is supported by the study done in Bangladesh and Pakistan that reported that mothers who have a big baby were about 45% at risk of developing postpartum hemorrhage (11).This association might be related because macrosomia makes the uterus over distended and laxed which is unable to contract immediately after delivery to its place (atonic) that causes bleeding.

Strength of the study

- Cases and controls of postpartum women were from the same source population which makes comparison valid.
- Inferring casual association is possible due to case control study by nature.
- Confounders were controlled by the use of multivariate analysis.

Limitation of the study

- Hospital based case control study was conducted. Hence, it did not allow generalization for the general population.
- Since this study assesses history of exposure retrospectively, it may be prone to recall and selection bias by nature during data collection time.
- Effect of confounding factors may still present

CHAPTER 7. Conclusion and recommendations

7.1. Conclusion

Based on the finding of this study, most of Management Outcome of the mothers encountered with post-partum hemorrhage was good 43 (86%). It was found that having history of retained placenta, mothers whose labour was prolonged, Induced /augmented labour, mothers with previous history of c/s, mothers with hypertensive disorders and mothers who had macrosomia were found to be an important determinants or risk factors for postpartum hemorrhage in the study population.

7.2 Recommendations

1. For Hospitals (Attat)

- Women with history of previous retained placenta, prolonged labour, previous caesarean section and mothers with hypertensive disorders should be followed up carefully, even in the absence of symptoms should always be counselled about the possibility of postpartum hemorrhage and the associated risks.
- Even if PPH is not predictable, emphasis should be on prevention and early detection so pregnant women should counseled to stay at the maternal waiting area available at the hospital.
- Screening and fetal weight estimation by ultrasound or clinically to detect macrosomia should be practiced at the hospital.

  Treatment for hypertensive disorders should be done by involving medical staffs to prevent the risk factors of postpartum hemorrhage.
- Mobilize health professionals to give health education to mothers about risk factors of postpartum hemorrhage.
- Women with active and second stage of lebour should followed strictly to avoid prolonged lebour which is risk factor for pph
- Counsel the women to not be exposed for C/S unless indicated and recommended by physicians.

2. For FMOH, Zonal and woreda health office

- Strengthening quality of ANC for early screening and interventions of risk factors for postpartum hemorrhage so that decrease the cesarean section and treat hypertensive disorders.

3. For researchers

- It is needed to explore the determinants of postpartum hemorrhage in country based by using multicenter hospital-based studies that might bring the compressive risk factors for postpartum hemorrhage as early as possible.
- The researchers should consider also to explore determinants of the management outcome.

Reference

1. Baskett TF. Complications of the third stage of Essential Management of Obstetrical Emergencies. 3rd ed.Bristol, England: Clinical Press; 1999:196-201.

2 .Weisbrod AB, Sheppard FR, Chernofsky MR, Blankenship CL, Gage F, Wind G, Elster EA, Liston WA: Emergent management of postpartum hemorrhage for the general and acute care surgeon. World J EmergSurg 2009, 4:43.

3. Hazem El-Refaey and Charles Rodeck. Pos-t-partumhemorrhage: definitions, medical and surgical management.A time for change. Oxford Journals Medicine British MedicalBulletin Vol. 67, No 1 Pg. 205-217.

4. Abouzahr C. Global burden of maternal death and disability. Br. Med Bull. 2003;67(1):1-11.

5. Reyders FC, Seuten L, Tjalma W, Jacquemyn Y. Postpartum hemorrhage practical approach to a life threatening complication. ClinExpObstet Gynecol. 2006;33:81-84.

6. Lynn P, Freedman RJ, Waldman H de Pinho, Wirth ME. Who's got the power? Transforming health systems for women and children. UN Millenium Project Task Force Child Health Maternal Health. 2005;77–95.

7 Mahler H. The Safe Motherhood Initiative: a call to action. Lancet 1987; 365:668-70.

8. van Stralen G, von Schmidt Auf Altenstadt JF, Bloemenkamp KW, van Roosmalen J, Hukkelhoven CW. Increasing incidence of postpartum hemorrhage: the Dutch piece of the puzzle. ActaObstetGynaecol Scand. 2016;95(10):1104–1110. doi:10.101111/aogs.12950.

9. Bibi S, Danish N, Fawad A, Jamil M. An audit of primary post partum hemorrhage. J Ayub Med Coll Abbottabad 2007;19:102–6.

10. Hoestermann CF, Ogbaselassie G, Wacker J, Bastert G. Maternalmortality in the main referral hospital in The Gambia, WestAfrica. Trop Med Int Health 1996;1(5):710–7.

11. Ramakrishna J, Ganapathy S, Mahendra S. After Birth:Bananthana in rural Karnataka. Proceedings of ReproductiveHealth in India: New Evidence and Issues Ministry of Health andPopulation. 2000

12. World Health Organization. The world health report: 2005: make every

mother and child count. Geneva: WHO; 2005.

13. Miniño AM, Heron MP, Murphy SL, Kochanek KD; Centers for Disease Control and Prevention National Center for Health Statistics National Vital Statistics System. Deaths: final data for 2004. Natl Vital Stat Rep 2007;55:1–119.

14. CaberoRoura L, Keith LG. Post-partum hemorrhage: diagnosis, prevention and management. J Matern Fetal Neonat Med 2009;22:38–45.

15. Umashankar KM et al. Effect of a primary postpartum hemorrhage on the 'Near-Miss' morbidity and mortality at a tertiary care hospital in rural Bangalore, India. JCDR, 2013; 7(6).

16. Kramer MS, Dahhou M, Vallerand D, Liston R, Joseph KS. Risk factors for Postpartum hemorrhage: can we explain the recent temporal increase?J ObstetGynaec Can. 2011;33:810–9.

17. Begley CM, Gyte GML, Devane D, et al. Active versus expectant management for women in the third stage of labour. Cochrane Database Syst Rev 2011; 11:CD007412.

18. Postpartum hemorrhage: incidence, risk factors, and outcomes in a low-resource settingInternational Journal of Women's Health 2016:8 647–65010.

19. Post-partum hemorrhage management, risks and maternal outcomes: findings from the WHO multi-country survey on maternal and new born health, 2013.

20.Edhi et al.: "Post-partum hemorrhage: causes andmanagement". BMC Research Notes 2013 6:236.

21. Ononge et al. Incidence and risk factors for PPH in Uganda: Reproductive Health (2016) 13:38

22 .Ekin A1, Gezer C2, Solmaz U2, Taner CE2, Dogan A2, Ozeren M2. Predictors of severity in primary post partum Hemorrhage 2015 Dec;292(6):1247-54.

23. J Perinatol, Post partum hemorrhage following vaginal delivery: risk factors and mathernal out comes. 2017 March ; 37(3): 243–248.

24. Nakagawa K, Yamada T, Cho K, et al. Independent risk factors for postpartum hemorrhage. Crit Care Obst&Gyne.2016, 2:10.

25. John Stanford. PPH among women delivered at Mbeya Referral Hospital in 2008-Dareselam medical student journal, September 2010.

26.Briley A, Seed PT, Tydeman G, Ballard H, Waterstone M, Sandall J, Poston L,Tribe RM, Bewley S. Reporting errors, incidence and risk factors for postpartum haemorrhage (PPH) and progression to severe PPH: a prospective observational study. BJOG 2014;121: 876–888.
27. Temesgen MA (2017) Magnitude of Postpartum Hemorrhage among Women Delivered at Dessie Referral Hospital, South Woll, AmharaRegion, Ethiopia. J Women's Health Care 6: 391.
28. Tegene legesse1Misra abdulahi2 anteneh Dirar, Trends and causes of maternal mortality in Jimma University specialized Hospital, southwest
Ethiopia: a matched case–control study: International Journal of Women's Health 2017

ANNEXES I: CHECKLIST

Jimma University, College Of Public Health And Medical Science , Department Of Integrated Emergency Surgery And Obstetrics , Questionnaire Format For Evaluation Of Magnitude, risk factors And management Outcomes Of Postpartum Hemorrhage In Attat Hospital.

Case code number--------Control Code number_____ Card number----------

I. Socio-demographic Characteristics

1 Socio-Demographic characteristics		
s/n	Questions	Coding categories
1	Age	A.<20 B. 20-24 C. 25-29 D .30-34 E.>=35
2	Address	A.urban B Rural
3	Ethnicity	A .Oromo B.Amhara C.Debub E.other
4	Religion	A.Othodox B.muslim C.protestant D.catholic E.others
5	Educational status	A.Not educated B.Read & write C.Up to grade 8 D.8-12 E.Diploma and above
2 Obstetric history		
6	Parity	A.primipara B.Multipara C.Grand multipara
7	Route of delivery	A.SVD B.C/S

8	Birth wt in gm	A,<2500 B,2500-3999 C ,>=4000
9	Place of delivery	A. Hospital B. Health centre C. Home D.Others (specify
10	Expected blood loss	A.<500ml B.500-1000ml C.1000-1500ml D>=.1500ml
11	PR	A,<60bpm B,60-80bpm C,80-90bpm D,90-100bpm E,>100bpm
12	BP	A<80/40mmhg B,85/50mmhg C,90/60mmhg D,100-140/70-90mmhg

3.ANTENATAL RISK FACTORS

PUT X" MARK ON THE BOX PROVIDED

S/N	Questions	Alternatives	
		yes	no
13	Poly hydraminious		
14	Multiple pregnancy		
15	Fibroids		
16	Past PPH		
17	Previous retained placenta		
18	Previous C/S		
19	Other uterine surgery		
20	Ante partum haemorrhage		
21	Multy parity		
22	Hypertensive disorder		
23	Pre-existing coagulation disorder		
24	anemia		

4. INTRANATAL RISK FACTORS

PUT X'MARK ON THE BOX PROVIDED

S/N	Question	Alternative

		Yes	No
25	Fetal demse in utero		
26	Abruption		
27	Induction/ augmentation of labour		
28	Prolonged labour		
29	chorioamnionitis		
30	Instrumental delivery		
31	Retained placenta / membrane		
32	Drugs (E.g inhaled anaesthetics)		
33	Therapeutic anticoagulants		
34	Precipitated lebour		
35	macrosomia		
36	Atony		
37	Tear/episiotomy extention		
38	Morbidly adherent placenta		
39	Uterine inversion		

5. MANAGEMENT PROCDURE AND ITS OUTCOME
Please circle letter of your choice

40.What was the management of the case?

A.Recesitation with crystallooides

B . Medications (oxytocin, misoprostol,ergometrine)

C.Blood transfusion

D. Compression techniques (external uterine massage, bimanual aortic compression

E. Procedure (manual removal of placenta, manual evacuation of clot, uterine tamponed, uterine artery embolization and laceration repair)

F. Surgeries (curettage, uterine artery ligation, uterine haemostatic compression suturing, hysterectomy)

G. Anti-shock garment

41, Complications due to pph or related to its management

A,hypotention B,severe anemia C,sepsis D, ARF E,others

42**. Status of mother after management**

A, Good B. Bad

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:Yenenesh Debash (BSc)

signature:_____ Date:_____

Name of institution: Jimma university college of health science

Date of submission:----------

Confirmed by advisor

Name: Dr. Dejene Assefa (MD, assistant professor and consultant of obstetrics and gynecology)

Signature:_____ Date:_____