

**RISK FACTORS OF PUERPERAL SEPSIS AMONG MOTHERS
WHO GAVE BIRTH IN JIMMA UNIVERSITY SPECIALIZED
HOSPITAL, SOUTH WEST ETHIOPIA.**

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RESEARCH THESIS SUBMITTED TO THE DEPARTMENT OF NURSING AND
MIDWIFERY COLLEGE OF HEALTH SCIENECES, JIMMA UNIVERSITY IN PARTIAL
FULFILLMENTS OF THE REQUIREMENTS FOR THE MASRTERS OF SCIENCE
DEGREE IN MATERNITY NURSING.

JIMMA, ETHIOPIA

June, 2016.

JIMMA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
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Abstract

Background: Puerperal sepsis is the second cause of maternal morbidity and mortality in the resource poor countries. One's susceptibility to developing an infection is related to such factors as cesarean section, prolonged labor, obesity, anemia and poor prenatal nutrition, socio economic status, geographical factors amongst others. Though these risk factors are assumed to be high in Ethiopia it is not well studied in Ethiopia in general and in Jimma University Specialized Hospital in particular. Thus, this study aimed to fill this gap.

Objective: - To identify risk factors for puerperal sepsis and determine their association among mothers who gave birth in Jimma university specialized hospital.

Method: This research had been conducted in JUSH from March 1-30, 2016. A case control study was conducted to identify risk factors for puerperal sepsis and to determine their association with puerperal sepsis. A sample of 54 cases has been selected by simple random sampling from all cases of puerperal sepsis registered on the log book for the year 2015. By using 2:1 ratio, 108 controls has been selected randomly among all deliveries not encountering puerperal sepsis in the year period by taking sampling frame from the log book. Card numbers has been used to assess the delivery record cards of mothers for both cases and controls and data has been collected by reviewing the record cards using prepared check-list, data collection has been collected by two Bsc nurses who have been recruited from the hospital staffs. Data was entered into SPSS V 20, bivariate and multivariable binary logistic regression model was used to identify factors associated with puerperal sepsis. Odds ratio along with 95%CI was used to declare the level of significance and the strength of the associations.

Result:-A total of 54(33.3%) cases and 108(67.7%) controls were included in the study, variables identified as significantly associated with puerperal sepsis were, ANC follow-up (AOR=8.47, 95% CI(2.292, 31.314), prolonged PROM(AOR=8.27 95% CI(1.772, 38.625), anemia (AOR=10.14 95% CI(1.772, 58.061) and the use of prophylaxis antibiotic before delivery(AOR=10.28 95% CI (3.693, 28.638).

Conclusion and recommendation:-In this study variables significantly associated with puerperal sepsis were ANC follow-up, prolonged PROM, anemia, and the use of prophylaxis antibiotic before delivery, so it is mandatory to prevent these risk factors of puerperal sepsis.

Acknowledgment

I would like to give my deepest gratitude to Dr. Gurmesa Tura and Mr.Desta Workneh for their assistance and supportive comments for the accomplishment of this thesis. Also my thanks goes to JUSH maternity ward heads Sr. Tsige and Sr. Frehiwot for their cooperation during my data collection time, plus record room workers who helped me a lot during my data collection time. Last but not least I would like to thank Jimma University, department of nursing and midwifery for giving me the chance to conduct this study.

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Acronymes

ANC	Antenatal Care
AOR	Adjusted odds ratio
CS	Cesarean Section
COR	Crudes odds ratio
JUSH	Jimma University Specialized Hospital
MD	Maternal Death
MSAF	Meconium Stained Amniotic Fluid
PROM	Premature Rupture Of Membrane
PR/ANT	Prophylaxis Antibiotic
PS	Puerperal Sepsis
RR	Relative Risk
SVD	Spontaneous Vaginal Delivery
SPSS	Statistical Package for Social Science
WHO	World Health Organization

Chapter one: Introduction

1.1 Background

According to World Health Organization, puerperal sepsis is a genital tract infection occurring at a time between the rupture of extra placental membranes or labour and the 42nd day postpartum in which 2 or more of the following symptoms are present: pelvic pain, fever that is, oral temperature 38.5°C or higher on any occasion, abnormal vaginal discharge, for example, presence of pus, abnormal smell/foul odour of discharge, and delay in the size of the uterus. Puerperal sepsis has been a common pregnancy-related condition, which could eventually lead to obstetric shock or even death. It has been indicated that puerperal sepsis is the second most cause of maternal mortality in the developing world. (1)

It's also scientifically defined as a polymicrobial infection presenting as a combination of endometritis, endomyometritis and endoparametritis. It is an important public health problem contributing to Maternal, morbidity and mortality. Anaerobic organisms are encountered in most infections associated with puerperal sepsis. This condition was first known as a child fever by the Hippocrates. The association with a clear and well documented history spans over two hundred years since its first recognition as a separate disease entity in early 18th century. Challenges in identification led to inaccurate recording and reporting of the information and this problem has existed to date (1, 2).

The first recorded epidemic of puerperal fever occurred at the Hotel-Dieu Paris in 1646. Hospitals throughout Europe and America consistently reported death rates of 20% to 25%. During 18th and 19th centuries, puerperal fever was the single most common cause of maternal mortality, accounting for about half of all deaths related to child birth. In 1843, a scientist by the name, Oliver Holmes in Boston, USA, became the first to establish that puerperal fever was contagious and was transmitted by the unwashed hands of the physician from bed to bed. Another scholar in the year 1847, Semmelweis in Vienna, Austria also concluded that examiners might transmit infection from live patients as well as from the dead and ordered his students to scrub with the chlorine solution before every physical examination. This led to a striking decrease of mortality due to puerperal sepsis from 11% in 1846 to 3% in 1847. (1, 2)

A study reported that puerperal pyrexia and sepsis are highly preventable problems occurring among the leading causes of maternal morbidity and mortality not only in the developing countries but also in developed countries as well.(3) Common predisposing factors leading to puerperal sepsis are anemia, prolonged labour, frequent vaginal examinations in labour under unsterilized circumstances, premature rupture of membranes for prolonged period.(4)puerperal sepsis results from infection contacted during child birth and this is one of the commonest causes of maternal mortality in the developing countries. Despite the discovery of antibiotics over eighty years ago, there is still a strong need for their proper and prophylactic utilization. Some developing countries have experienced increased use of health facilities for labour and delivery care but there is a lack of proper monitoring or checks and balances and there is possibility that this trend could lead to rising rates of puerperal sepsis. Drug and technological developments need to be combined with effective health system intervention to reduce infection including puerperal sepsis. (5)

In addition to trauma sustained during the birth process or cesarean procedure, physiologic changes during pregnancy contribute to the development of puerperal sepsis. It has been identified that the major causative microorganisms to be poly microbial with group A b-hemolytic streptococcus, often being the cause of severe cases of puerperal fever. (6)

Though these risk factors are assumed to be high in Ethiopia it is not well studied in Ethiopia in general and in Jimma University Specialized Hospital in particular. Thus, this study aimed to fill this gap.

1.2. Statement of the problem

Maternal and child health are high priorities for international development .Sepsis was the most frequent underlying cause of maternal mortality in the 19th century, responsible for 50% of all cases (WHO, 2002). In industrialized countries, puerperal sepsis is rare, causing 2.1% of maternal deaths. In Africa and Asia, it is the second commonest cause of maternal mortality after hemorrhage, causing 9.7% and 11.6% of deaths respectively. During the 19th century, it took on epidemic proportions, particularly when home delivery practice changed to delivery lying-in hospital, as there still was a total ignorance of asepsis.(6)

Puerperal fever secondary to postpartum infection is among the leading causes of preventable maternal morbidity and mortality worldwide (7). Along with pre-eclampsia and obstetrical hemorrhage puerperal infection has formed the lethal triad of causes of maternal death for many decades, accounting for as much as 16% of the 287,000 maternal lives lost annually. (8, 9)

However, postpartum patients are frequently discharged within hours to few days following deliver. The short period of observation may not afford enough time to exclude evidence of infection prior to discharge from the hospital. In the absence of postnatal follow-up, as is the case in many developing countries, many cases of puerperal infections can go undiagnosed and unreported. (10) In one study, 94% of postpartum infection cases were diagnosed after discharge from the hospital. In low and middle income countries, infections occurring in the pueriperium are reportedly the sixth leading cause of disease burden for women in their reproductive years. Complication in the mother such as secondary postpartum haemorrhage and infertility can result, and there is association with early onset neonatal sepsis. (11)

It has been found to be the second most common cause of maternal morbidity and mortality in the developing world (12). Studies from high-income countries report incidence of maternal morbidity due to sepsis having increased from 0.65 per 1000 deliveries in 2002 to 1.13 per 100,000 maternities in 2008. It has been reported that for each woman that dies another sixteen suffer various forms of morbidity, puerperal sepsis among them (13).

Eighty percent of maternal deaths resulting from pregnancy complications are brought about by preventable causes as they depend strongly on quality of care provided. The most significant

long-term complication is infertility resulting from tubal occlusion, estimated to affect some 450,000 women each year. (14).

In 2010 the research done in Ethiopia on maternal mortality trend showed that No grossly notable reduction in the proportions of MD after ruptured uterus/ obstructed labor and sepsis are indicated. Infection was one of the major contributors for the high maternal mortality in Ethiopia in the 1980s–1990s and early 2000s. Particularly, the reports from Jimma and Ambo hospitals showed that more than a quarter of maternal deaths were due to infection. (15).Also in a research done in Addis Ababa in one tertiary hospital in 2014 the prevalence of puerperal sepsis becomes 8.4%, with rates of 10.78% following cesarean section and 4.12% following vaginal delivery. The independent risk factors identified in this study were peripartum anemia, operative deliveries, rupture of membrane of greater than 12 hours and post-term pregnancy. (16)

Therefore the rationale of this study is to identify the risk factors of puerperal sepsis and to determine their association among mothers who gave birth in JUSH.

1.3. Significance of the study

The purpose of this study is to provide detailed representative information on puerperal sepsis in JUSH, and determine the association between the risk factors for puerperal sepsis, establish the knowledge on puerperal sepsis and determine the preventive measures in order to form a basis for decision making, policy formulation and planning towards the management of morbidities resulting from puerperal sepsis in JUSH. For researchers it will help to do further studies. Results from the study will highlight gaps in infection control strategies, informing subsequent interventions to reduce the levels of infections and associated maternal morbidity.

CHAPTER TWO: LITERATURE REVIEW

2.1 Risk factors of Puerperal Sepsis.

The epidemiology of puerperal febrile morbidities has not been well characterized. Precise figures are difficult to find because of the variety of definitions used and the difficulty of obtaining data from the community as many postpartum febrile morbidities occur after discharge from hospital. Different researchers used variety of methods for post discharge surveillance of postpartum fever. One research used physician questionnaires for post discharge surveillance of patients undergoing cesarean section. During the five months before post discharge surveillance the overall infection rate was 1.6%; afterward the rate increased to 6.3% which is fourfold higher than the previous rate. Approximately 59% of infectious complications would have gone undetected with only inpatient surveillance. (17)

Another research used patient self administered questionnaires to conduct large-scale, routine post discharge surveillance following vaginal delivery or cesarean section. Despite a modest return of questionnaires (36%), self-reported questionnaire results identified twice as many apparent postpartum infections (4% infection rate) as did concurrent prospective in-hospital surveillance. The most common maternal infections were mastitis (406 cases), urinary tract infections (185 cases), and endometritis (58 cases). (18)

It is generally considered that pelvic infections are more common among women of poor socioeconomic status compared with middle- or upper-class patients, but the precise reason for that is unclear. Some other factors have been considered also to predispose to puerperal infections: anaemia, poor nutrition and prolonged labour particularly occurring in young primipara are the most frequently cited (19). In a study at the Ife State Hospital in Nigeria the predisposing factors associated with sepsis were: anaemia in 69.2% of cases, prolonged labour (labour lasting more than 12h) in 65.7%, frequent vaginal examinations in labour (more than five) in 50.7%, and premature ruptured membranes in 31.5%.(20).

A study comparing the rate of endometritis after cesarean section in patients who were 17 years old or younger (teenage group) versus patients who were 35 years of age or older (advanced maternal age group) showed that the teenage group, 18 of 41 (43.9%) developed endometritis compared with 6 of 41 (14.6%) in the advanced maternal age group ($P < 0.003$) (21). The same result was found in another article (22) that maternal age less than 17 years was

associated with increased risk of puerperal infection (OR 3.3, 95% CI 1.5-7.2). A 12 year retrospective review of patients with puerperal infection also reported that maternal age <24 years was associated with puerperal infection (OR of 1.32) (23). In contrary, one study stated that advanced maternal age to be associated with puerperal pyrexia/sepsis. In this study, majority of the women admitted with puerperal pyrexia/sepsis were above thirty years of age 84(65.11%) (24).

The route of delivery is the single most significant risk factor for the development of uterine infection (25, 26). An examination of five years of Obstetric Medical Database showed that 1.6% of postpartum mothers had endometritis. Even without trial of labor, women after primary cesarean delivery were 10.3 times more likely to develop endometritis (95% CI 5.9, 17.9) than after spontaneous vaginal delivery. In another study re-hospitalization rates for wound complications (6.6 in 1,000) (P<.001) and endometritis(3.3 in 1,000) were increased significantly in women undergoing a planned primary cesarean delivery compared with those having a planned vaginal birth (27).

From the USA study by Yokoe and others the rate of puerperal infections following CS deliveries was 5.3% (relative risk 2.1). (28) A Cochrane review of antibiotic prophylaxis for CS demonstrated a RR of 0.29 for prophylaxis compared to no prophylaxis (29). As no information was given on the use of antibiotic prophylaxis in the Yokoe study, it was assumed the regional coverage of 80%. Back-calculating antibiotic prophylaxis results in an incidence of sepsis of 10.1% following caesarean section with no antibiotic prophylaxis. This figure is similar to the rates found in the Cochrane review , where the average rate of endometritis in the control groups in those women undergoing elective CS of 9.2% (0-24%), and for the women undergoing non-elective CS the average incidence of endometritis in the control groups was 28.6% (3-61%).(30)

Meconium stained amniotic fluid (MSAF) is common in term births and especially in post-date deliveries and occurs in up to 30% of deliveries. (31) Others have demonstrated that women with preterm labor and MSAF have a higher rate of microbial invasion of the amniotic cavity, and others had confirmed their findings (32, 33). A retrospective cohort study of 43,200 deliveries reported, compared with deliveries with clear amniotic fluid, those with meconium-stained amniotic fluid had higher rate of endomyometritis (1.0% vs 1.7%, P<.001). Further, the severity of meconium staining was associated with increased rates of infection (34). This

conclusion was also made in another retrospective cohort study of 678 pregnant women (35) which showed puerperal infection rate of 7.1% and 3% in the meconium and no-meconium group, respectively. However, in another retrospective study involving 4872 deliveries, MSAF was not found to be an independent risk factor for puerperal morbidity (36).

According to a study done in Maidunguri University Teaching Hospital in Nigeria, it was found that the major risk factors for developing puerperal sepsis were un-booked status, home delivery, perineal trauma, caesarean section (C/S) and maternal age <24 years.(37)

A study done in Tanzania to determine factors influencing puerperal sepsis where a sample size of 3,262 women were selected, only 27% (877) reported that the birth attendant inserted his or her hands into the vagina, and 25% (830) reported that the attendant washed his or her hands before doing so. Of those 830 women, 98% reported that the attendant had used soap and water while 1.5% were attended by birth assistants who washed their hands developed puerperal sepsis, compared to two (8.0%) of the 25 women who reported that the birth attendant did not wash their hands before inserting their into the vagina.(38).

Another study done in India also showed that Puerperal sepsis was 1.7% of all obstetrical admissions and 34.4% of postnatal complications. It was seen common among young patients of 15–25 years age, 66.3%, of lower parity, 63.0%, low socioeconomic status, 65.20, uneducated patients, 78.2%, home deliveries, 73.9%, prolonged labour, 58.6, prolonged rupture of membranes from 48–72 hours in 73.8% and deliveries conducted by untrained birth attendants, 60.5%. (39).

A study in New Zealand reported rate of 10.9% but this could be attributed to the relatively fewer numbers of study subjects as was the case with the study in Sierra Leone. Interestingly, a higher incidence rate is reported in one study in the United States where the study population may be considered to be of a similar background to those in developing countries. This study looked at women from low socioeconomic backgrounds and reported an incidence rate of 6.18 %.(40)

Studies done in Liaquat University Hospital, Hyderabad, Sindh it was found that Over the study period 230 patients presented with puerperal sepsis representing 6.28% of 3658 admissions. All patients were anemic, in 228 translating to 99% patients no aseptic measures were taken, 209 equivalent to 90.86% patients were un-booked, 56.08% patients had frequent

vaginal examination, 126 equivalent to 54.78% patients had home delivery, 48.26% patients had prolonged rupture of membrane, and 46.52% patients had prolonged labor (41). A study on 'Maternal Intensive Care and Near-miss Mortality' in Canada, showed sepsis to be the third main reason for transfer to intensive care unit and accounted for 15% of cases. This was also observed in Brazil where sepsis was among the leading causes of transfer to intensive care unit (42).

Other risk factors for puerperal febrile morbidities have been also identified like twin pregnancy, assisted vaginal delivery, and post-term gestation and co-morbidities such as DM, hypertension disorders, HIV infection (43).

2.2 Conceptual frame work

The concepts in this conceptual framework was developed after review of different literatures

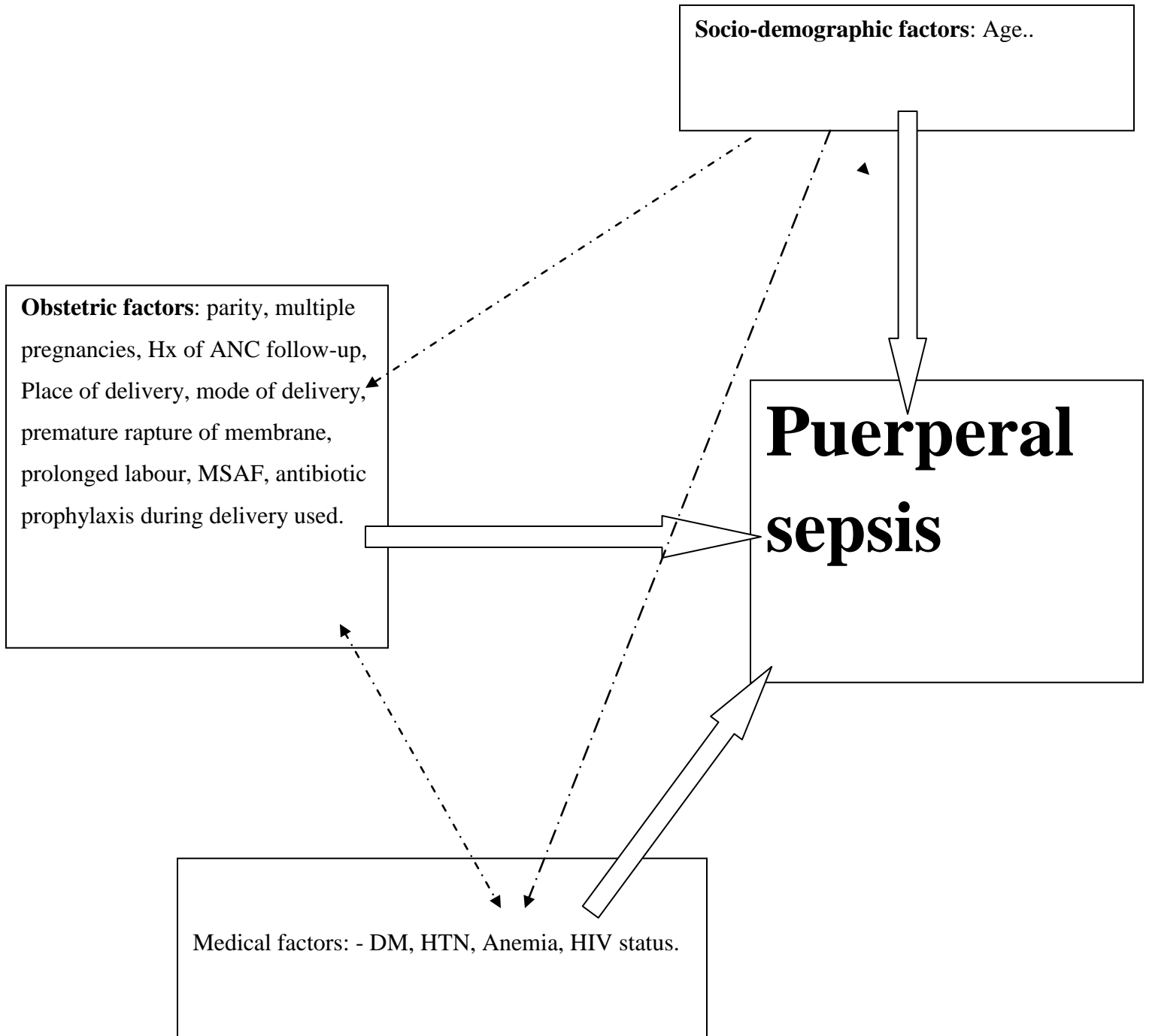


Figure 1 conceptual framework

Chapter three: objectives

3.1 General objective

To identify the risk factors of puerperal sepsis and determine their association among mothers who gave birth in Jimma university specialized hospital, south west Ethiopia.

3.2 Specific objectives

1. To identify the risk factors of puerperal sepsis among mothers who gave birth in JUSH.
2. To determine the association of the identified risk factors with puerperal sepsis.

Chapter four: methods and materials

4.1 Study area and period

This study was conducted from March 09 to April 13, 2016 in Jimma University Specialized and Teaching Hospital (JUSTH) maternity ward. The hospital is located at 352 km Southwest of Addis Ababa, capital of Ethiopia. The hospital has catchment population of around 15 million from Oromia, Southern Nations Nationalities of Ethiopia, Gambella and Benishangul. It is teaching and referral hospital, providing services for approximately 15,000 inpatient, 160,000 outpatient attendants, 11,000 emergency cases and 4500 deliveries in a year coming to the hospital from the catchment population of about 15 million people. It is also the training center for undergraduate and postgraduate medical students, dentists, nurses, pharmacists, and others. It has approximately 1500 clinical and non-clinical staffs. The hospital has a total of around 500 beds and total of 21 units.

4.2 Study design

A Case control study design had been conducted.

4.3 Source population

For cases: all mothers who gave birth in JUSH and developed Puerperal sepsis.

For controls: all mothers who gave birth in JUSH and didn't develop puerperal sepsis.

4.4 Study population

Cases: all mothers who gave birth in JUSH and developed puerperal sepsis from January 01 to December 31, 2015 have been selected and included in the study.

Controls: all mothers who gave birth in JUSH and didn't develop puerperal sepsis from January 01 to December 31, 2015 have been selected and included in the study.

4.5 Inclusion and Exclusion criteria

Inclusion criteria

Cases: all mothers who gave birth in JUSH and developed puerperal sepsis from January 01 – December 31, 2015 had been included in the study whose diagnosis clearly recognized in the record card.

Controls: all mothers who gave birth in JUSH and didn't develop puerperal sepsis from January 01- December 31, 2015 had been included in the study whose diagnosis clearly recognized in the record card.

Exclusion criteria

The record cards of mothers in which the diagnosis of puerperal sepsis was not clearly recognized had been excluded, for both cases and controls.

4.6 Sample size determination

For the case control study, exposed variable: mode of delivery, C/S is taken. From previous study done in a tertiary hospital (16) Percentage of cases exposed=69.2%, Percentage of controls exposed=44.5%, Odds ratio =2.8, Ratio of controls to cases 2:1, Power of test 80%, Non-response rate=10, using Epi info V7.1, it has calculated as the following,

Cases=54 and Control=108 Therefore a total of 162 samples have been used for the case control study.

4.7 Sampling technique

Cases: simple random sampling technique had been used to select the sampled cases from the total cases of puerperal sepsis registered in the log book in the year 2015 by using mother's card number and preparing sampling frame.

Controls: - sampled controls had been selected from log book in the same manner as cases.

4.8. Study variable

4.8.2. Dependent variable _ Puerperal sepsis

4.8.2 Independent variables

- ✓ Socio-demographic characteristics(Age, Residence)
- ✓ Obstetrics factors(Parity, Mode of delivery, Prolonged labour, Premature rupture of membrane Previous obstetrics Hx, Hx of ANC follow-up)
- ✓ Medical factors(DM, HTN, Anemia, HIV status)

4.9 Operational and term definition

For this study puerperal sepsis is mothers whose diagnosis is clearly recognized as puerperal sepsis in their record card.

1. **Puerperal sepsis:** This is serious form of septicemia contracted by women during or soon after child birth, miscarriage or unsafe abortion. This condition is normally characterized by two or more of the following symptoms; pelvic pain, fever, abnormal vaginal discharge, abnormal smell/foul odor of discharge, and delay in the size of the uterus.

2. **Un-booked patients:** These are patients who did not seek antenatal services during their pregnancy period.

4.10. Data collection tool

Check list had been used to collect data from selected cards of the mothers for both the controls and the cases.

The check had included include the following information:-

- ✓ Socio-demographic characteristics
- ✓ Individual factors in the mother
- ✓ Medical factors
- ✓ Obstetric factors

Data collectors: - for the record review- two Bsc nurses had been used for data collection; they had been recruited from the hospital staffs.

4.11. Data quality assurance

The check-list has been pre-tested to check what information is available in the record cards of mothers before the actual data collection, to check words, adequacy of variable. Based on the result possible amendments had done. One day's intensive training had given for data collectors by principal investigators on how to fill the check-list and review the documents. The completed

check list had checked every day for completeness by principal investigator and correction had given for data collectors before the next day data collection.

4.12. Data analysis procedure

The data had been edited, cleaned, coded and entered into SPSS version 20.0 for analysis. Frequency distributions had been used to organize the data and present the responses obtained. Bi-variate and multivariate binary logistic regression analysis had been used to identify variables having significant association with puerperal sepsis .All variables having $p < 0.25$ during bi variate analysis had been considered as candidates for multivariate binary logistic regression analysis to see the effect of the independent variable on the outcomes variables and significance had been declared at $p < 0.05$. Odds ratio along with 95%CI was used to express the strength of association. Results were presented by using tables and graphs and texts.

4.13 Ethical considerations

The ethical clearance had been obtained from the Ethical Review Committee of the College of health sciences of Jimma University. A written letter had been taken from the JUSH medical director to revise the selected cards. All the information collected from the study subjects had been handled confidentially.

4.14. Plan of dissemination

The result had been submitted to department of nursing and midwifery, Jimma University post graduate studies, JUSH and will be presented. Further effort will be made for publication on local or international peer reviewed journal.

CHAPTER FIVE: RESULT AND DISCUSSION

5.1 Results

5.1.1 Socio-demographic characteristics

During the study period there were 162 record cards of mothers included in the study, who gave birth and attended postpartum care in JUSH in the year 2015. Among them 54(33.3%) were taken as cases, which were diagnosed with puerperal sepsis and it was clearly indicated on their record cards, the other 108(66.7%) also gave birth and attended postpartum care in JUSH in the year 2015 and taken as control groups and they were not diagnosed for puerperal sepsis.

The ages of the mothers included in this study ranges from 18-42, majority of the mothers 85(52.5%) were between the age group, with the mean age is 26.56 with a standard deviation of 5.68

Table 1:- Socio-demographic characteristics of mothers who gave birth in JUSH in the ear 2015.

Variables		Puerperal sepsis		Total=162
		Cases/PS=yes	Controls/PS= no	
Address	Jimma town	21(43.8%)	27(56.2%)	48(29.6%)
	Outside Jimma	33(28.9%)	81(71.1%)	114(70.4%)
Age of mother	18-25	33(38.8%)	52(61.2%)	85(52.5%)
	26-35	21(31.3%)	46(68.7%)	67(41.4%)
	36-42	0(0%)	10(9.3%)	10(6.2%)

5.1.2 Obstetric characteristics

Majority of the mothers 140(86.4%) of them had at least one ANC follow-up and the other 22(13.6) had no ANC follow-up. 72(44.4%) of the mother were primi, that is on their first delivery, the mean delivery is 2.45 with standard deviation of 1.83.

Among the mothers 82(50.6%) delivered via caesarean section, 70(43.2%) of them delivered via spontaneous vaginal delivery and the rest 10(6.2%) of them attended instrumental delivery. The gestational age during their delivery 150(92.6%) were term delivery, 4(2.5%) of them were preterm and the rest 8(4.9%) of them are post term deliveries.

46(28.4%) had premature rupture of membrane before the onset of labour , for 107(66.0%) labour follow-up chart used to follow the labour progress. 20(12.3%) had meconium stained amniotic fluid during labour and the rest 140(87.7%) didn't have meconium stained amniotic fluid. Among the mothers 7(4.3%) of them had multiple pregnancy.

Table 2:- obstetric characteristics of mothers who gave birth in JUSH in the year 2015.

Variables	Responses	Cases /PS/Yes=54(33.3%)	Controls /PS/No=108(66.7%)	Total=162(100%)
ANC follow-up	Yes	36(66.7%)	104(96.3%)	140(86.4%)
	No	18(33.3%)	4(3.7%)	22(13.6%)
No. of ANC follow-up	None	18(33.3%)	4(3.7%)	22(13.6%)
	1-3	22(40.7%)	63(58.3%)	85(52.5%)
	4 and above	13(25.9%)	41(38%)	55(34%)
Parity(No.of delivery)	Primi	29(53.7%)	43(39.8%)	72(44.4%)
	2-4	18(33.3%)	47(43.5%)	65(40.1%)
	5 and above	7(13%)	18(16.6%)	25(15.4%)
multiple	Yes	5(9.3%)	2(1.9%)	7(4.3%)

pregnancy	No	49(90.7%)	106(98.1%)	155(95.7%)
previous bad obstetric Hx	Yes	9(16.7%)	22(20.4%)	31(19.1%)
	No	45(83.3%)	86(79.6%)	131(80.9%)
type of previous bad obstetric Hx	operative delvery	3(5.6%)	11(10.2%)	14(8.6%)
	still birth	3(5.6%)	1(0.9%)	4(2.5%)
	early.neonatal.death	3(5.6%)	10(9.3%)	13(8%)
gestational age	term(37-42Wks)	49(90.7%)	101(93.5%)	150(92.6%)
	preterm(<37Wks)		4(3.7%)	4(2.5%)
	post-tem(>42Wk)	5(9.3%)	3(2.8%)	8(4.9%)
labour follow-up chart used	yes	29(53.7%)	78(72.2%)	107(66%)
	no	25(46.3%)	30(27.8%)	55(34%)
Duration of Premature rupture of membrane	<=12hrs	41(75.9%)	89(82.4%)	130(80.2%)
	>12hrs	13(24.1%)	19(17.6%)	32(19.8%)
Premature rupture of membrane	Yes	21(38.9%)	25(23.1%)	46(28.4%)
	No	33(22.2%)	83(76.9%)	46(28.4%)
Meconium staining	Yes	10(18.5%)	10(9.3%)	20(12.3%)
	No	44(81.5%)	98(90.7%)	142(87.7%)
Episiotomy don	Yes	12(2.2%)	23(2.1%)	35(21.6%)
	No	42(77.8%)	85(78.7%)	48(29.9%)

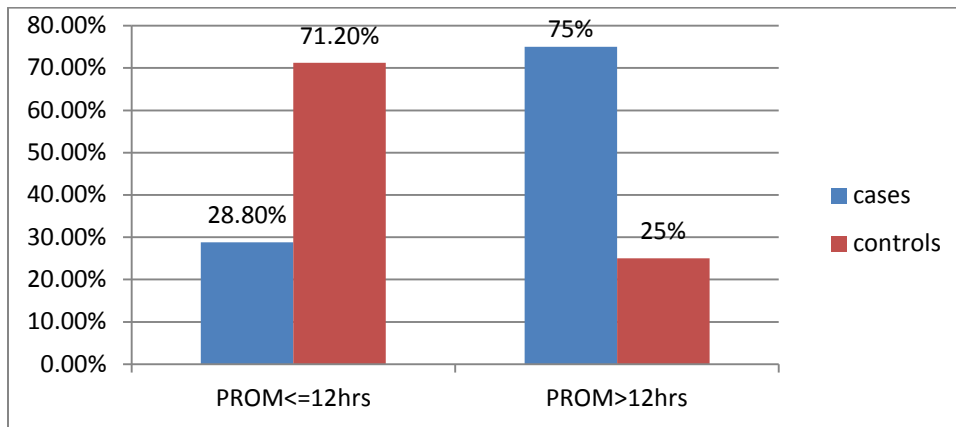


Figure 2:- Duration of PROM among mothers who gave birth in JUSH in the year 2015.

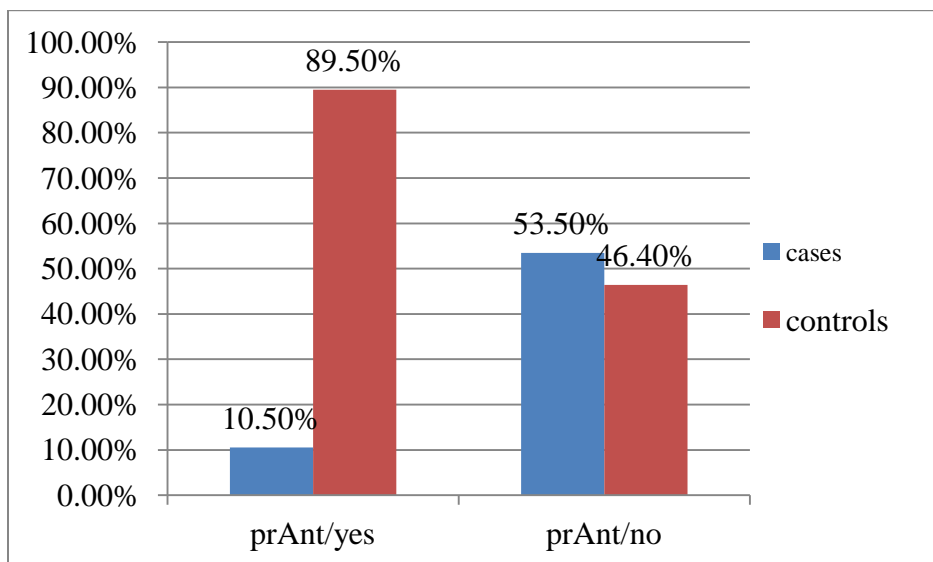


Figure 3:- Prophylaxis antibiotic used before delivery among mothers who gave birth in JUSH in the year 2015.

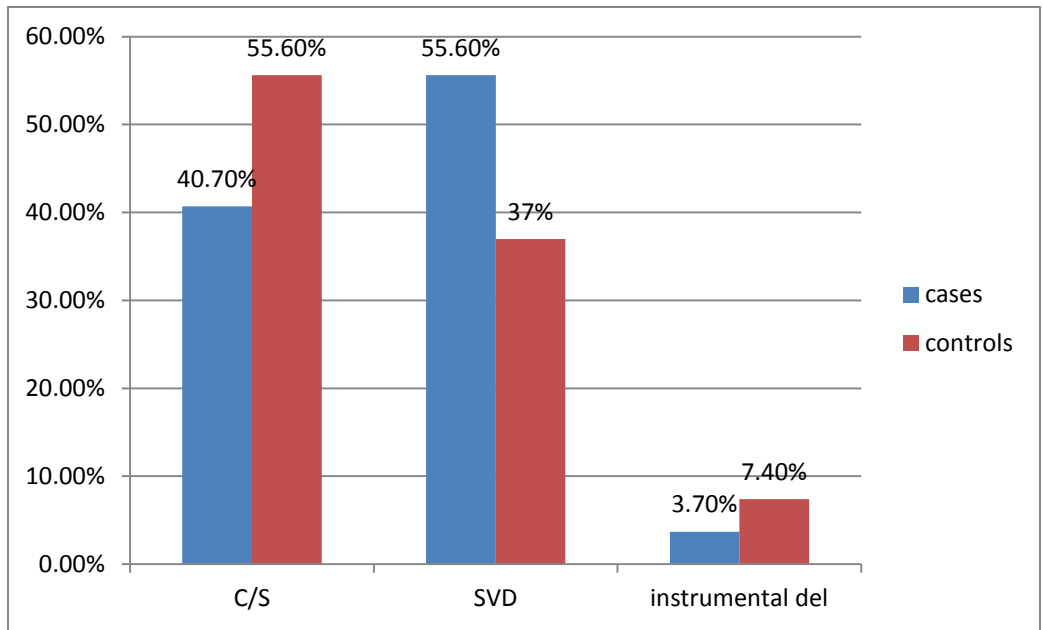


Figure 4:- Mode of delivery of mothers who gave birth in JUSH in the year 2015.

5.1.3 Medical co-morbidities of mothers

Among the 162 mothers, 24(14.8%) had medical problem, 10(6.2%) of them were hypertensive and the other 14(8.6%) were anemic.

Table 3 Medical problems among mothers who gave birth in JUSH in the year 2015.

Variables	Responses	Cases /PS/Yes=54(33.3%)	Controls /PS/No=108(66.7%)	Total=162(100%)
Medical co-morbidities	Yes	14(25.9%)	10(9.3%)	24(14.8%)
	No	40(74.1%)	98(90.7%)	138(85.2%)
Type of medical problem	HTN	2(3.7%)	8(7.4%)	10(6.2%)
	Anemia	12(22.2%)	2(2%)	14(8.6%)

5.2 Analytic part

5.2.1 Bivariate and multivariate binary logistic regression

Variables were entered one by one for bivariate analysis and those variables with p-value less than 0.25 are selected and become candidates for multivariate binary logistic regression; variables with p-value <0.05 included in the final model, during multivariate binary logistic regression analysis.

Variables selected during bivariate analysis with p-value <0.25 were ANC follow-up, medical problem, presence of anemia, meconium stained amniotic fluid, premature rupture of membrane, prolonged premature rupture of membrane, labour follow-up chart, used or not and prophylaxis antibiotic used before C/S delivery.

Variables selected during multivariate analysis with p-value <0.05 and included in the final model were ANC follow-up, prolonged PROM, anemia and prophylaxis antibiotic used before delivery. As it is summarized below in the table, variables included in the final model were highlighted in bold. Accordingly, mothers who had no ANC follow-up were 8 times more likely to develop puerperal sepsis than mothers who had attended ANC follow-up with 95% confidence interval (AOR=8.47(2.292, 31.314).

Mothers with anemia were 10 times more likely to develop puerperal sepsis than mothers without anemia with 95% confidence interval (AOR=10.14(1.772, 58.061).

With respect to PROM (premature rupture of membrane) duration, mothers with PROM duration >12hours were 8 times more likely to develop puerperal sepsis than mothers with PROM duration <=12hours duration with 95% confidence interval (AOR=8.27(1.772, 38.625).

finally the variable included in the final model was prophylaxis antibiotic used or not before delivery, mothers who had not used prophylaxis were 10 times more likely to develop puerperal sepsis than who had used prophylaxis antibiotic with 95% confidence interval (AOR=10.28(3.693,28.638).

Table 4:- The bivariate and multivariate binary logistic regressions.

Variables	Responses	Cases PS/yes=54(%)	Controls PS/no=108(%)	p-value <0.25	95% confidence interval	
					COR	AOR
ANC follow-up	No	18(33.3%)	4(3.7%)	0.000	13(4.125,40.966)	8.47(2.292, 31.314)
	Yes	36(66.7%)	104(96.3%)		1.00	1.00
Medical problem	No	40(74.1%)	98(90.7%)		1.00	1.00
	Yes	14(25.9%)	10(9.3%)	0.007	3.43(1.407,8.360)	1.03(0.197,5.417))
Anemia of mother	No	42(77.8%)	106(98%)		1.00	1.00
	Yes	12(22.2%)	2(2%)	0.001	15.14(3.250,70.565)	10.14(1.772, 58.061)
Meconium stained amniotic fluid	No	10(18.5%)	10(9.3%)		1.00	1.00
	Yes	44(81.5%)	98(90.7%)	0.097	2.23(0.865,5.736)	2.92(0.588,14.488)
PROM	No	33(61.1%)	83(76.9%)		1.00	1.00
	Yes	21(38.9%)	25(23.1%)	0.038	2.11(1.042,4.283)	1.83(0.544.6.175)
PROM duration	PROM<=12hr	9(16.7%)	21(1.4%)		1.00	1.00
	PROM>12	12(38.9%)	4(3.7%)	0.001	7.43(2.267,24.344)	8.27(1.772, 38.625)
Labour follow up chart used	No	25(46.3%)	30(27.8%)		2.241(1.135,4.428)	0.79(0.295,2.147)
	Yes	29(53.7%)	78(72.2%)	0.020	1.00	1.00
Prophylaxis antibiotic used	No	46(85.2%)	40(46.9%)		9.78(4.193,22.786)	10.28(3.693, 28.638).
	Yes	8(14.8%)	68(63.1%)	0.000	1.00	1.00

5.3 Discussion

The aim of this study was to identify the risk of puerperal sepsis and to determine their association with puerperal sepsis accordingly, mothers who had no ANC follow-up were 13 times more likely exposed to puerperal sepsis, this can be because during ANC follow-up most maternal condition that predisposes to puerperal sepsis like anemia and so on are identified and managed, unless the mother had ANC follow-up as in the case of the finding of this study mothers will be exposed to puerperal sepsis, this is also supported by a study done in Maidunguri University Teaching Hospital in Nigeria, it was found that the major risk factors for developing puerperal sepsis were un-booked status(not having ANC follow-up).(37)

Prolonged premature rupture of membrane had been also the other associated factors identified in this study, mothers who had prolonged PROM were 8 times more likely to develop puerperal sepsis. This can be because Prolonged PROM may facilitate the entrance of bacteria towards the pelvic and indirectly facilitate the development of puerperal sepsis, this finding is also supported by a study done in Liaquat University Hospital, Hyderabad, Sindh it was found that among 230 mothers admitted with puerperal sepsis 48.26% patients had prolonged rupture of membrane, another study done in rural India also supports this finding(39), also a study done in a tertiary hospital in Addis Ababa also suggested prolonged PROM as one factor for puerperal sepsis.(16)

The use of prophylactic antibiotic before delivery was also one factor significantly associated in this study, it was found that mothers who didn't use prophylaxis antibiotic were 10 times more likely to develop puerperal sepsis, and this can be because prophylaxis antibiotic decreased the chance of developing puerperal sepsis by inhibiting the growth of bacteria. Other study findings also support this finding; a cochrane review of antibiotic prophylaxis for C/S demonstrated a RR of 0.29 for prophylaxis compared to no prophylaxis (26). As no information was given on the use of antibiotic prophylaxis in the Yokoe study, it was assumed the regional coverage of 80%. Back-calculating antibiotic prophylaxis results in an incidence of sepsis of 10.1% following caesarean section with no antibiotic prophylaxis. (26)

Presence of anemia is also the other significant risk factor identified in this study mothers who were anemic were 10 times more likely to be exposed for puerperal sepsis, this may be because anemia exposes for the development of different types of infections and this finding is

also supported by a study done at the Ife State Hospital in Nigeria as one predisposing factor associated with puerperal sepsis, in this study 69.2% were found to be anemic..

Limitation of the study

Since the research was done by record review, during revision of cards there was problem of incompleteness of data, because some variables that could be included in the study were missed.

CHAPTER SIX:-CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In this study variables identified in the bivariate analysis as they have association with puerperal sepsis were ANC follow-up, medical problem, presence of anemia, meconium stained amniotic fluid, PROM, duration of PROM, labour follow-up chart used or not used and prophylaxis antibiotic used or not used. Variables significantly associated with puerperal sepsis and included in the final model were ANC follow-up, PROM duration, anemia and prophylaxis antibiotic used before delivery or not used.

6.2 Recommendation

As the result of this study showed, puerperal sepsis highly occurred on mothers who had prolonged PROM, mothers who didn't get prophylaxis antibiotic before delivery, and mothers who had no ANC follow-up, and anemia accordingly the recommendations of the study are:-

- ✓ For the JUSH and also other health institutions to strength the promotion of appropriate and adequate ANC follow-up for all pregnant mothers.
- ✓ For JUSH health professionals to assure the administration of prophylaxis antibiotic for all mothers in need.
- ✓ For JUSH and other health institution health professionals to announce mothers to come quickly to nearby health institutions whenever there is sign of premature rupture of membrane and also to strength its early identification and management.

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Annex

QUESTIONNAIRE

JIMMA UNIVERSITY COLLEGE HEALTH SCIENCES, DEPARTMENT OF NURSING AND MIDWIFERY, QUESTIONNAIRE FORMAT FOR RECORD REVIEW ON PUERPERAL SEPSIS AND ASSOCIATED FACTORS AMONG MOTHERS WHO GAVE BIRTH IN THE YEAR 2015 AT JIMMA UNIVERSITY SPECIALIZED HOSPITAL, JIMMA, SOUTH WEST ETHIOPIA, FEBRUARY 2016.

PART I – SOCIODEMOGRAPHIC

1. Age of the mother in years _____
2. Address 1/ Jimma town 2/outside of Jimma

PART II-OBSTETRIC CHARACTERISTICS

1. Was the diagnosis of puerperal sepsis indicated on the record card of the mother?
1/Yes 2/No
2. Parity (number of delivery of the mother) _____
3. Gravidity (number of pregnancy of the mother) _____
4. Was the pregnancy multiple?
1/Yes 2/No
5. Had the mother had ANC follow-up?
1/yes 2/no
6. If yes for the above question for how many times she had the ANC follow-up?
1/once 2/twice 3/Three times 4/four times or more
7. Where was her ANC follow-up?
1/ health center 2/hospital 3/ health post 4/private clinics

8. Does the mother had any medical problem?

1/Yes

2/No

9. If yes for the above question, what was the medical problem present?(multiple answers possible)

1/DM

2/HTN

3Anemia

4/HIV/AIDS

10. Had she any previous bad obstetric history?

1/Yes

2/No

11. If yes for the previous question, what form of bad previous obstetric history she has encountered with?

1/operative delivery

2/still birth

3/ early neonatal death

4/none

12. Was there premature rupture of membrane in the mother (before the onset of labour)?

1/ Yes

2/ No

13. If yes for the above question, how long the premature rupture of membrane stayed for?

14. What was the gestational age during the onset of labour?

1/term (37-42wks)

2/Preterm (37wks)

3/post-term (>42wks)

15. What was the duration of labour in hours? _____

16. Was labour follow up chart used (partograph)?

1/Yes

2/No

17. Was there meconium staining during assessment?

1/Yes

2/No

18. What was her mode of delivery?

1/C/S

2/SVD

3/instrumental delivery (specify)_____

19. Does episiotomy done for her during vaginal delivery?

1/Yes

2/No

20. Prophylactic antibiotic used before delivery?

1/ Yes

2/No

21. If yes for the above question what was the prophylactic antibiotic uses specify? _____

22. Does the mother gave birth in this hospital or referred?

1/Yes

2/No

23. If yes for the above question from where she has referred from?

1/Hospital

2/Health center

3/Health post