# DETERMINANTS OF MATERNAL NEAR-MISS AMONG WOMEN ADMITTED TO MATERNITY WARDS OF PUBLIC HOSPITALS IN HADIYA ZONE, SOUTHERN ETHIOPIA

**BY**

**SAMUEL KUSHETA KATAMA (BSc/PH)**

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**SAMUEL KUSHETA KATAMA (BSc/PH)**

**ADVISORS:**

1. **Dr. GURMESA TURA (PhD)**
2. **Mr. AFEWORK TADELE (MPH/RH)**

## ABSTRACT

BACKGROUND: Reducing maternal mortality ratio below 70 per 100,000 live births for all countries by the year 2030 is one of the targets of the UN sustainable development goals. Hence, identifying the determinants of maternal near-miss would contribute to accelerating the achievement of this target. However, studies on these issues are limited in Ethiopia in general and in Hadiya Zone in particular.

OBJECTIVE: To identify determinant factors of maternal near-miss among women admitted to maternity wards of public hospitals in Hadiya Zone, South Ethiopia.

METHODS: Facility based unmatched case-control study was conducted from February 17 to May 9, 2019. A total of 279 women (70 cases and 209 controls) were included in the study. Cases were mothers with near-miss and controls were mothers who didn't experience near-miss. The data were analyzed by using SPSS version 24 and statistical significance was assessed using multivariable binary logistic regression model by determining odds ratios and 95% CIs.

RESULTS: The most common near-miss event in this study was severe pre-eclampsia (41.4%) followed by sepsis (31.4%), severe PPH (25.7%), eclampsia (8.6%) and uterine rupture (1.4%). Being in rural residence (AOR = 3.16; 95%CI: 1.62, 6.16), no birth preparedness (AOR = 3.50; 95%CI: 1.66, 7.41), previous cesarean section (AOR = 3.68; 95%CI: 1.63, 8.31), previous history of hypertension (AOR = 3.69; 95%CI: 1.52, 8.96), and poor knowledge of pregnancy danger signs (AOR = 3.15; 95%CI: 1.32, 7.52) were all determinants of maternal near-miss.

CONCLUSION: Severe pre-eclampsia is the leading maternal near-miss event in Hadiya zone. Rural residence; reproductive and obstetric factors such as no birth preparedness, previous cesarean section, and poor knowledge of pregnancy danger signs; and previous history of hypertension were significant determinant factors of maternal near-miss. Thus strengthened public health and clinical interventions on these arenas need to give priority for rural women and women with preexisting hypertension.



**Key words:** Maternal near-miss, Determinant factors, Southern Ethiopia

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## Abbreviations and acronyms

| | |
|---|---|
| AIDS | Acquired Immune Deficiency Syndrome |
| ANC | Antenatal Care |
| CPD | Cephalo-Pelvic Disproportion |
| C/S | Cesarean Section |
| DM | Diabetes Mellitus |
| EDHS | Ethiopian Demographic and Health Survey |
| FGM | Female Genital Mutilation |
| GA | Gestational Age |
| HCHS | Hossana College of Health Sciences |
| HELLP | Hemolysis, Low liver enzymes, and Low platelet count |
| HIV | Human Immunodeficiency Virus |
| ICU | Intensive Care Unit |
| IRB | Institutional Review Board |
| JU | Jimma University |
| MDG | Millennium Development Goal |
| MM | Maternal Mortality |
| MMR | Maternal Mortality Ratio |
| MNM | Maternal Near-Miss |
| PPH | Post-Partum Hemorrhage |
| PROM | Premature Rupture Of Membrane |
| SMO | Severe Maternal Outcome |
| SRS | Simple Random Sampling |
| SSA | Sub-Saharan Africa |
| TBAs | Traditional Birth Attendants |
| UN | United Nations |
| USA | United States of America |
| WUNEMMH | Wachamo University Nigist Eleni Mohammed Memorial Hospital |
| WHO | World Health Organization |

# 1. INTRODUCTION

## 1.1. Background:

Reducing maternal mortality ratio below 70 per 100,000 live births for all member countries by the year 2030 is one of the targets of the UN sustainable development goals (1). Hence, identifying the determinants of maternal near-miss would contribute to accelerating the achievement of this target (2).

The World Health Organization (WHO) has defined a Maternal Near-Miss (MNM) as "a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy". World Health Organization proposes a "MNM approach" to monitor and improve quality of obstetric care using a tool that classifies women according to severe (potentially) life-threatening conditions. The classification is based on three different types of criteria: disease-, intervention- and organ dysfunction-based (3). However, a study conducted to validate the WHO maternal near-miss tool indicated that applying solely organ dysfunction-based criteria may lead to underreporting of severe maternal outcome (SMO) especially in low resource settings and recommend refined disease-based criteria (4).

Maternal Near-Miss is more valuable indicator for analysis of obstetric care than Maternal Mortality (MM) (5). It has higher incidence rate than MM. Hence MM is frequently described as "Just the Tip of the Iceberg" with a vast base of maternal morbidity that still remains largely undescribed (6). The study in low resource setting showed that maternal near miss occurred 26 times more frequent than maternal death (2, 5). In Ethiopia, 20,000 women die each year from complications related to pregnancy, childbirth and post-partum. For every woman that dies, 20 more experience injury, infection, disease, or disability (7). Thus, Maternal Near-Miss study allows rigorous quantitative analysis of factors leading to severe maternal morbidity and maternal mortality (2). Moreover, it offers a good opportunity for data collection as a woman herself can be a source of information (8). Furthermore, identification of delays at various levels and modifiable socio-demographic and other determinant factors responsible for maternal morbidity and mortality can be done (6).

Recognizing these facts, World Health Organization called for increased study of Maternal Near-Miss (2, 3). Hence this study would identify potentially modifiable determinant factors for policy making and/or program designing to reduce the magnitude of maternal near-miss.

## 1.2. Statement of the Problem

Ending preventable maternal mortality remains one of the world's most critical challenges despite reduction of MMR by 44% since 1990. While this is a significant improvement, showing what can be achieved given sustained commitment, the world failed to meet the 75% reduction target set by MDG 5 (9). Despite the high maternal mortality ratios in many of the resource-poor settings, maternal deaths are rare in absolute numbers per centre. This leads to a reduced level of statistical power to allow studies to investigate the potential risk factors and determinants that are locally important (10). Thus, in this situation, maternal near-miss could serve as a stand-in for maternal death to evaluate the quality of obstetric care in particular health institutions as the number of near-miss cases occur more often than the maternal deaths (11, 12).

Essentially, three different methods have been used for identifying near-miss cases. Criteria for identification of cases vary widely across studies. Prevalence vary between 0.80% – 8.23% in studies that use disease-specific criteria while the range is 0.38% – 1.09% in the group that use organ-system based criteria and rates are within the range of 0.01% and 2.99% in studies using management-based criteria. It is not possible to pool data together to provide summary estimates or comparisons between different settings due to variations in case-identification criteria (11).

According to WHO disease specific criteria women who have considered near-miss are those women survived from one or more life-threatening conditions (i.e. severe postpartum hemorrhage, severe pre-eclampsia, eclampsia, sepsis or ruptured uterus) (3). Nevertheless, there seems to be an inverse trend in prevalence with development status of a country. Based on disease specific criteria 4-8% of pregnant women who deliver in the hospitals in resource-poor settings experienced MNM compared to 1% in developed country settings (11). Particularly in sub-Saharan Africa, the incidence/prevalence ratio for maternal near misses ranged from 1.1%-10.1% and the commonest causes were ruptured uterus, sepsis and hemorrhage (13).

In Ethiopia 20,000 women die each year from pregnancy complications (majorly near-miss causes) during pregnancy, child birth and post partum period (14). The overall near-miss rate in Ethiopia was 9079 per 100,000 live births, whereas the overall case fatality rate was 8%. Regarding causes of MNM in Ethiopia, a facility based review of ten hospitals revealed that uterine rupture is the major cause which accounted 29.7% followed by hypertensive disorders of pregnancy (27.5%) and obstetric hemorrhage (14.5%). Sepsis is the least cause (2.1%) (15).

Harmful consequences of MNM are numerous, including separating mothers and newborns, interfering with bonding, lengthy hospital stays and healthcare costs, and emotional distress (7, 16). Recognizing the high burden of MNM, the government of the federal democratic republic of Ethiopia attempts to reduce severe maternal outcome (MNM and MM) using different strategies. Training of health professionals, construction of health institutions, procuring ambulance vehicles for transporting mothers to health institutions, and making maternity services free of charge are some of the interventions the government in collaboration with development partners is doing (17, 18). Despite all of these efforts, the magnitude of MNM and the MM rate of the country remain high, where only 27.7% of women gave birth by skilled attendant (19). Therefore, there is a need to further identify potential risk factors of maternal near-miss.

Although the concept of maternal near miss has been explored in maternal health as an adjunct to maternal-death in the last 20 years (20), few studies have examined maternal near miss in Ethiopia. These studies revealed factors such as prior history of cesarean section, women with no formal education, women who had induced labor, lack of ANC, history of still birth and difficult labor, rural residence, being less than 16 years of age at first pregnancy, chronic medical disorders (history of anemia and chronic hypertension), first delay, distance from the hospital and referral from other health facility were significant determinants of maternal near-miss (2, 7, 17, 21, 22).

Despite the identified factors, there are also problems with those previous studies in Ethiopia. For instance, many of those studies did not use the currently recommended standardized and validated WHO criteria to identify MNM cases to minimize biases related to measurement. Some other studies were prone to subjective misclassification of cases and controls as verification of cases were done by different physicians not trained. Moreover many of them commonly used hospital records which hardly capture complete socioeconomic and other factors responsible for maternal near-miss from primary source.

The present study tried to fill the prevailing gap as it was not relied on the available hospital secondary data and it used standardized WHO criteria to identify cases. Concurrently, the outcome of the study would equip administrative authority in designing evidence-based maternal healthcare interventions. So this study was aimed to identify determinants of MNM among women admitted to maternity wards of public hospitals in Hadiya zone.

## Significance of the Study

The near-miss approach yields results that inform policy decisions for improving the quality of maternal health care. Hence, investigating MNM cases would aid in taking measures for further amendment of service delivery and programs. When properly investigated, it help in recognizing the contributory factors of maternal deaths so that appropriate actions can be adopted at community and health systems level.

Thus this study would supply evidence based information concerning the determinant factors of MNM which in turn help in reducing maternal mortality and morbidity. The final result would help decision makers, program planners and policy makers in making decisions and taking actions that in turn lead to controlling the determinants of MNM. Evidence based intervention to control determinants of MNM would subsequently, lead to reduced maternal morbidity and mortality, and better and efficient provision of obstetric services. This would contribute its part on reduction of maternal mortality in study area and even broadly nationally.

# 2. LITERATURE REVIEW

## 2.1. Maternal Near-Miss events

Maternal near-miss has emerged as an adjunct and proxy measure to identify gaps in maternal health services and act as complementary to maternal mortality (6). In the current WHO MNM approach, five potentially life-threatening conditions are used as part of the inclusion criteria set: severe PPH, severe pre-eclampsia, eclampsia, sepsis, and ruptured uterus. The prevalence of severe maternal outcomes (MNM and MM) may vary depending on several factors, but it is generally expected to be around 7.5 cases/1000 deliveries (3). However, the rate of detection of severe maternal outcomes (SMO) depends on the type of approach used. For instance, a study conducted in Netherlands, Tanzania and Malawi for validating the WHO maternal near miss tool: comparing high- and low-resource settings revealed that total SMO detection was 87.2% for disease-based criteria, 78.9% for intervention-based criteria and 38.2% for organ dysfunction-based criteria (4). Applying solely organ dysfunction-based criteria may lead to underreporting of severe maternal outcome (SMO) especially in low resource settings and disease-based or intervention based criteria may lead to overestimation of maternal near-miss (4).

According to studies conducted in Nigeria at one teaching hospital over a period of one year and in Morocco at three referral hospitals over a period of six months; the incidence of near miss was 12% of births (23, 24). Studies conducted in Syria, Sudan, London, and Brazil indicated the maternal near miss ratio (MNMR) of 32.9 per 1000 live births in Syria, 22.1 per 1000 live births in Sudan, 12 per 1000 live births in London, and 5.8 per 1000 live births in Brazil (10, 25-27). Whereas a cross sectional study conducted in Amhara region of Ethiopia at three referral hospitals over a period of six months revealed that the overall proportion of maternal near miss was 23.3% (21).

Regarding MNM events, a study conducted in Gurage zone of southern Ethiopia found that dystocia was the leading MNM event which accounted for 57.1% of all maternal near misses followed by obstetric hemorrhage (26%), hypertensive disorders (16.9%), anemia (9.1%), and 3.9% of maternal infections (2). Similarly study from Amhara region of Ethiopia found that ruptured uterus was the most common MNM event followed by severe pre-eclampsia and sever PPH (21). Whereas severe obstetric hemorrhage was found common MNM event in Tigray, Ethiopia and Hypertensive disorders here was 2$^{nd}$ cause of MNM (7). Hypertensive disorders

during pregnancy (45%) and severe hemorrhage (39%) were the most frequent direct causes of near miss in Morocco (24). Severe hemorrhage is the leading cause of MNM in Nigeria, Sudan, London, and Nepal (23, 25, 26, 28); whereas severe pre-eclampsia is the most common cause in Syria, India, South Africa, and Egypt (10, 29-31).

Regarding time of occurrence of near miss, 40% of cases occurred in postnatal/post-op phase, 34.4% of cases occurred in antenatal phase and 25.6% of cases in intra-partum/intra-op phase according to study conducted in Kerala, India whereas 9.6% cases were diagnosed prenatally in Amhara region of Ethiopia (21, 29).

## 2.2. Determinant factors of maternal near-miss

### 2.2.1. Socio-demographic factors

A significant association between MNM and age of study population was found as per the study conducted in India. There was also a significant association between state of residence and development of potentially life threatening conditions (32). According to studies conducted in Tigray and Amhara regions of Ethiopia, women with no formal education had higher odds of experiencing MNM and in India low socio-economic status had association with MNM (7, 21, 29). Similarly low maternal education was a significant factor in Egypt (31). Being older than 35 years was found associated with MNM in London, Brazil, and USA (26, 33, 34); whereas rural residence in Addis Ababa and illiteracy in Morocco were found determinant factors of MNM (22, 24). Older age group, low education, and rural dwellers were the significant determinants of MNM in a study conducted in southwestern Nigeria (35).

### 2.2.2. Obstetric and Reproductive Health factors

Having had previous history of Cesarean Section (C/S) was found to be a significant determinant factor of maternal near miss among studies conducted in Gurage zone in south Ethiopia, Tigray region in north Ethiopia, Erbil city Iraq, Brazil, USA, and another study on incidence of maternal near miss in Brazil (2, 7, 27, 34, 36, 37). In addition to this, C/S in current pregnancy was the risk factor in India and Brazil (29, 33); whereas studies conducted in Nigeria and London identified delivery by emergency C/S as a determinant factor for MNM (23, 26). A case control study to identify determinant factors of MNM in northern Ethiopian public hospitals found that women who had induced labor had higher odds of experiencing MNM (7). Lack of ANC or having no ANC attendance had association with MNM among studies conducted in

DebreMarkos in NW Ethiopia, Addis Ababa, Morocco, and Brazil (17, 22, 24, 27). On the other hand, inadequate ANC was a factor in Egypt (31) and having attended fewer than six prenatal visits was a predictor of MNM as per the two studies conducted in Brazil (33, 38).

Additionally according to study conducted in Nigeria and London, presence of complications at booking ANC visits and having had antenatal admission to hospital respectively were determinant factors and similarly a case control study in Nigeria identified having had ANC attendance at tertiary facility is a protective factor for MNM (23, 26, 39). Two case control studies conducted in Brazil identified history of abortion as a predictor of MNM (33, 38), whereas history of still birth is the determinant factor in Addis Ababa, history of difficult labor in DebreMarkos, and low birth weight and severe birth asphyxia were associated factors with MNM in Nigeria (17, 22, 39). A Brazil study identified patient status whether pregnant; puerperium or post-op was found associated with MNM (27). Another study conducted in London found that previous PPH and multiple pregnancies were predictors of MNM and according to study conducted in Nigeria, assisted vaginal delivery is the determinant factor of MNM (23, 26). Being less than 16 years of age at first pregnancy was found to be a determinant factor for MNM according to study conducted in northern Ethiopia (7).

### 2.2.3. Pre-existing medical illnesses

Generally having had chronic medical disorder was a significant determinant factor of MNM as per studies conducted in Tigray region of northern Ethiopia and USA (7, 34). But specifically women with history of anemia had higher odds of experiencing MNM in Addis Ababa and India (22, 29). History of chronic hypertension was found a determinant factor for MNM as this was identified by studies conducted in Addis Ababa, Nigeria, Brazil, and London (22, 23, 26, 33).

### 2.2.4. Three Delays and Referral status

Distance from the hospital in general was identified as a significant factor for MNM by a study conducted in DebreMarkos, whereas women who travelled more than 60 minutes before reaching their final place of care had higher odds of experiencing MNM in Tigray (7, 17). A study conducted in India revealed that referral status was a risk factor and similarly a study conducted in Gurage zone, southern Ethiopia indicated that referral from other health facilities was a determinant factor for MNM (2, 29). Additionally late referral of women was found to be a determinant factor as per study conducted in Nigeria (39). First delay was documented as a

predictor of MNM in a studies conducted in Gurage zone, Nigeria, and Morocco (2, 23, 24). On the other hand third delay was found a determinant factor in Morocco and Brazil (24, 38). Study conducted in Iraq indicated that arrival as an emergency condition by ambulance had associated with MNM (36).

Previous maternal near-miss studies in Ethiopia faced challenges expected in a study of this nature. For instance, many of those studies were used criteria for MNM classification proposed by Fillipi which included anemia as a near-miss event; but the condition was chronic and excluded from the currently recommended WHO criteria to identify MNM cases.

**Conceptual framework:**

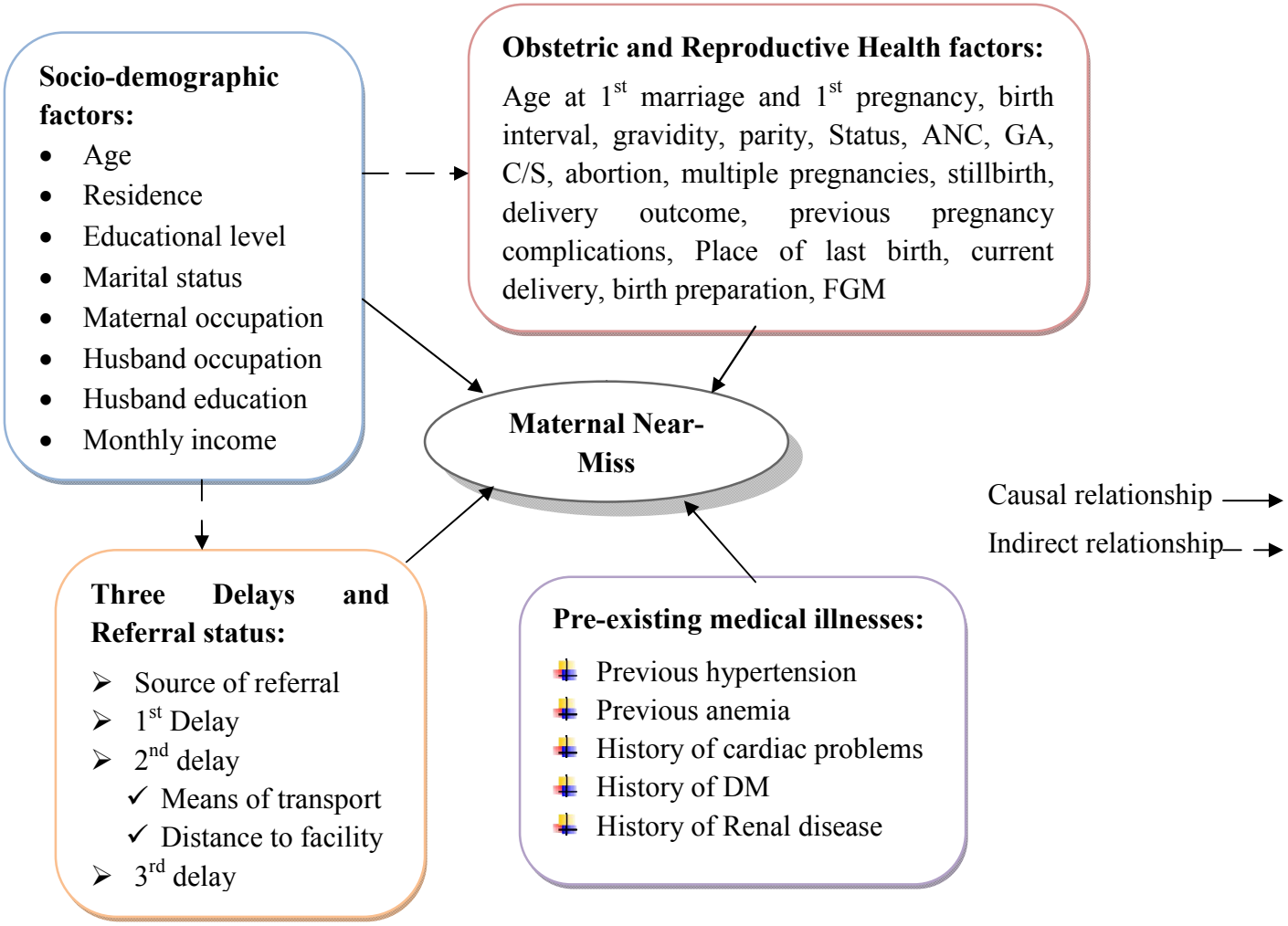


Figure 1:- Conceptual framework of the study developed after review of literatures (2, 7, 17, 21-24, 26, 27, 29, 31-39).

## 3. OBJECTIVE:

- To identify determinant factors of maternal near-miss occurrence among women admitted to maternity wards of public hospitals in Hadiya Zone, South Ethiopia.

# 4. METHODS AND MATERIALS

## 4.1. Study area and period

The study was conducted in Hadiya zone, which is one of the 16 administrative zones in SNNPRS, Ethiopia. Hadiya zone with 3542.66 sq. km area has a population of 1,650,104 (820,102 males and 830,002 females; and 384,474 Child bearing age women in 2018. The zone has 10 districts and two town administrations. Hossana is the capital town of Hadiya zone which is located 230 kilometers Southwest of Addis Ababa, the capital of Ethiopia. There are four hospitals in the zone (one referral and three district hospitals). All hospitals provide comprehensive emergency obstetric care services. The total live births in Hadiya zone in 2018 were 57,094. Among them skilled delivery attendance was 44,581 (78%) and 1,592 (3.6%) women had cesarean delivery in hospitals and there were six maternal deaths in four hospitals. The zonal coverage for ANC $_4$ was 93%, PNC (87%) and FP was 70% (40). The study was conducted from February 17 to May 09, 2019.

## 4.2. Study design and population:

### 4.2.1. Study design

Facility-based unmatched case-control study was conducted.

### 4.2.2. Source population

All pregnant, intrapartum and postpartum mothers who are attending public hospitals in Hadiya Zone, southern Ethiopia.

### 4.2.3. Study population

#### *4.2.3.1. Study population for cases*

Women who are pregnant, in labor, or who delivered or aborted up to 42 days ago and admitted to obstetric wards and/or obstetric intensive care units of the study hospitals and fulfilled at least one of the conditions indicated in the WHO disease specific criteria set such as severe postpartum hemorrhage, severe pre-eclamsia, eclampsia, sepsis/severe systemic infection, and ruptured uterus.

#### *4.2.3.2. Study population for controls*

Selected pregnant, intrapartum and postpartum mothers up to 42 days ago who are admitted to obstetric wards of the study hospitals with normal obstetric outcomes (normal vaginal delivery or women with mild to moderate obstetric complications).

## 4.3. Eligibility criteria

### 4.3.1. Inclusion criteria

The standardized and validated World Health Organization's disease-specific criteria set were used in this study for inclusion of cases. Accordingly women who were admitted to the study hospitals and survived at least one diagnosed severe PPH, severe pre-eclampsia, eclampsia, sepsis, or ruptured uterus were included as cases.

Women admitted to the same hospital and the same ward where cases were identified with normal obstetric outcomes (normal vaginal delivery or women with mild to moderate obstetric complications) were included as controls.

### 4.3.2. Exclusion criteria

The exclusion criteria considered were having had records that missed pertinent information to declare as a case and permanent difficulty in communication. However, no mother was fulfilled exclusion criteria.

## 4.4. Sample size and Sampling Procedure:

Sample size was determined using Epi-Info version 7.2.2.6 software using sample size estimation for unmatched case control studies and using the assumptions: power of 80%, confidence level of 95% and control to case ratio of three (3:1) that was used to increase the power to detect any differences in predictive factors between cases and controls.

Exposure status of controls and odds ratio for significant determinant factors were taken from a facility based case-control study conducted in selected public hospitals in Tigray region, northern Ethiopia and the estimated sample size was presented in the following table to take the maximum sample size (7).

Table 1:- Sample size estimation using exposure variables of maternal near-miss from study conducted in Tigray.

| Variables | Exposure category | % of control exposed | Odds ratio | Sample size | | |
|---|---|---|---|---|---|---|
| | | | | Cases | Controls | Total |
| Maternal education | No formal education | 17.6% | 3.2 | 44 | 130 | 174 |
| | More than secondary | 41% | 1 | | | |
| Age at 1st pregnancy | <16 years | 18.5% | 2.5 | **70** | **209** | **279** |
| | ≥ 20 years | 48.3% | 1 | | | |
| Induced labor | Yes | 20% | 3.0 | 46 | 138 | 184 |
| | No | 80% | 1 | | | |
| Delay in reaching final place of care | < 30 minutes | 30.2% | 1 | | | |
| | ≥ 60 minutes | 40.5% | 2.8 | 46 | 137 | 183 |

Therefore, Age at first pregnancy yields a maximum sample size of 70 cases and 209 controls. So the final minimum sample size included in the study was 279 women.

**Sampling procedure**

All public hospitals in Hadiya zone were included in the study. The last 6 months' obstetric case management report for total deliveries from each public hospital was used to determine average monthly obstetric client flow rate of respective hospitals for delivery. Then sample size was proportionally allocated to each selected hospitals (See figure 2).

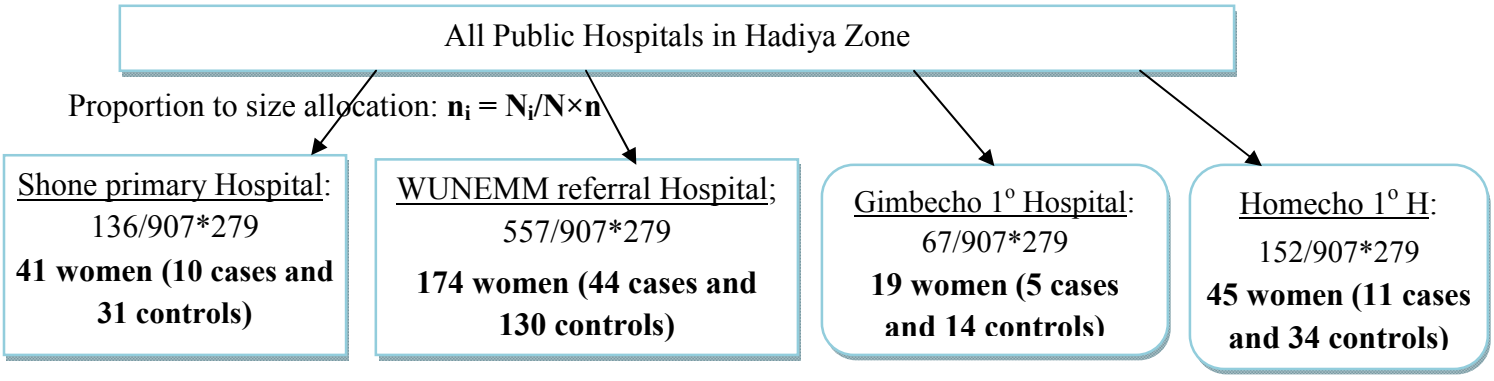


Figure 2:- Schematic diagram showing sampling procedure; i.e. proportional allocation of sample size to public hospitals in Hadiya zone, 2019.

All maternal near-miss cases during the study period were consecutively included and for each near miss case, three controls were selected using systematic random sampling and accordingly the interval of every three women was taken (k = 907/279 = 3). Cases were identified using patient cards, admission log books and operation theatre log books.

## 4.5. Study Variables and Measurement

### 4.5.1. Dependent variable

Maternal near miss

### 4.5.2. Independent variables

- Socio-demographic factors: Age, residence, educational level, marital status, maternal occupation, husband occupation, husband education, monthly income;
- Obstetric and Reproductive health factors: Age at 1st marriage, Age at 1st pregnancy, birth interval, gravidity, parity, GA at delivery, Status, ANC, knowledge of danger signs, previous C/S, previous abortion, multiple pregnancies, history of stillbirth, previous pregnancy complications, delivery outcome, place of last birth, place and attendant of current delivery, birth preparedness, FGM, contraception, and maternity waiting home utilization;
- Pre-existing medical illnesses: Previous hypertension, previous anemia, history of cardiac problems, history of DM, and history of renal disease;
- Delays and Referral status: Mode of referral, 1st delay, 2nd delay (Distance to facility, Means of transport), 3rd delay.

### 4.5.3. Measurement:

In this study factors responsible for the occurrence of maternal near-miss events were assessed. Women survived at least one of the WHO disease–specific criteria for MNM was labeled as "Yes" and otherwise "No". The diagnosis of these life threatening conditions were declared from the client records by one physician from each hospital who was recruited as supervisor each day to identify eligible cases and then trained midwives were conducted the interviews with the patients and reviewed medical records using pre-coded questionnaire.

Second delay (delay to reach at health facility) was measured in travel time it took to walk to the facility on foot and it was categorized to $\leq 2$ and $> 2$ hours according to Ethiopian travel time standard (41). First and third delays were measured in hours and/or minutes and first delay (delay to seek health care) was categorized into $\leq 24$ hours and $> 24$ hours, however due to zero cells, it

was treated as continuous variable; whereas third delay (delay to receive care) was categorized as < 1 hour and ≥ 1 hour (24). Means of transport was measured as multiple response questions and included all locally available means of transport.

### 4.6. Operational definitions:

- Maternal near-miss: - any women admitted to public hospitals in Hadiya zone and survived from at least one of the diagnoses such as severe postpartum hemorrhage, severe pre-eclampsia, eclampsia, sepsis/severe systemic infection, or ruptured uterus.
- Severe postpartum hemorrhage: - if a woman experience genital bleeding after delivery with at least hypotension or result in blood transfusion and/or diagnosed as having severe postpartum hemorrhage by a physician.
- Severe pre-eclampsia: - Persistent systolic blood pressure of 160 mmHg or more or a diastolic blood pressure of 110 mmHg; and either proteinuria of 5 g or more in 24 hours; or oliguria of <400 ml in 24 hours; or HELLP syndrome or pulmonary edema without seizure of eclampsia and/or diagnosed as severe pre-eclampsia case by a physician.
- Eclampsia: - Generalized fits in a patient without previous history of epilepsy includes coma in pre-eclampsia and other causes of seizure were ruled out by a physician.
- Severe systemic infection or sepsis: - Presence of fever (body temperature >38°C), a confirmed or suspected infection (e.g. chorioamnionitis, septic abortion, endometritis), and at least one of the following: heart rate >90, respiratory rate >20, leucopenia (white blood cells < 4,000), leukocytosis (white blood cells >12,000).
- Uterine rupture: - Rupture of uterus during labor confirmed by laparotomy.
- Knowledge of pregnancy danger signs**:** Respondents when answered more than half of the knowledge questions were considered having good knowledge and otherwise poor knowledge.
- Mild to moderate obstetric complications: if a woman present with obstetric conditions other than near-miss events such as hyper-emesis gravid arum, placenta previa and abruption placenta with minimal blood loss, PROM, retained placenta, and others.
- Birth preparedness: respondents when had at least one of the components of birth preparedness plan in their current pregnancy were considered having birth preparedness and otherwise no birth preparedness.

### 4.7. Data Collection Procedure and Instrument:

Data were collected using structured interviewer administered questionnaire which was developed after a thorough review of literatures based on WHO maternal near-miss tool adapted for SSA with major modifications (3). Face-to-face interview and clients record review techniques were employed to gather data by the same data collector. Clients record review was used to identify near-miss diagnosis for cases selection, data regarding gestational age and attendant of the current delivery, and delivery outcome; otherwise other variables were assessed directly by interviewing the cases and controls by well-trained midwives. The interview was held in a private area at admission or some time latter during their stay at hospital near to discharge depending on the patient/client's clinical condition. Overall data collection process was supervised by trained general practitioner working in the respective hospitals. Obstetrics and Gynecology Ward, and obstetric ICU of each hospital were visited for data collection.

### 4.8. Data Processing and Analysis:

Each questionnaire was checked for completeness, coded and entered into Epi-data Version 4.4 and was exported to SPSS for windows version 24 for analysis. The analysis was done after data cleaning was done. Frequencies, proportions and measures of variation were used to describe the study population in relation to socio-demographic and other relevant variables for cases and controls. Binary logistic regression model was constructed. Bivariate logistic regression was used to see the association between each independent variable and the outcome variable and a p-value of < 0.25 was used to recruit variables for the final multivariable logistic regression model. Model fitness was checked using Hosmer and Lemeshow goodness of fit test ($x^2$ = 1.86, p-value = 0.868). There was no multicollinearity among independent variables included in the model with maximum variance inflation factor of 1.77. Statistical significance was assessed using odds ratios and 95% confidence intervals.

### 4.9. Data Quality Management:

The questions prepared in English were translated into Amharic and back translated to English by different expert translators to check for consistency. Pre-test was carried out at Worabe comprehensive hospital on 5% of the sample size for two days. Internal consistency reliability analysis was carried out and Cronbach's alpha showed the questionnaire reached acceptable reliability, $\alpha = 0.74$. Data collectors were trained for two days on objectives of the study, data

collection techniques and tool and the data consistency and completeness were checked on daily basis by trained supervisors and the principal investigator and spot corrections were taken. After data were collected each questionnaire was coded and data cleaning was done before actual data analysis.

### 4.10. Ethical Considerations:

Ethical clearance was obtained from Jimma University, Faculty of Public Health Institution Review Board (IRB). Permission was granted from Hadiya zone health department and the participating hospitals. The respondents were informed about the objective and purpose of the study, their right of not to participate in the study or with-draw at the middle and an informed verbal consent was obtained from each respondent. Confidentiality of the information was assured and data de-identified and de-linked was stored in a secure location.

### 4.11. Dissemination of Results

The findings of the study will be presented for JU community and submitted to Jimma University, institute of health, faculty of public health, population and family health department, to Hadiya Zone Health Department and respective study hospitals. It would also be disseminated through publication on peer reviewed reputable journal, and presented on national and/or international scientific conferences.

# 5. RESULT

## 5.1. Socio-demographic characteristics

A total of 279 participants (70 cases and 209 controls) were included in the study with response rate of 100%. The mean age of the study participants was 27.7 (5.4 SD) years among cases and 26.9 (5.1 SD) years among controls. Currently married cases were 92.9% while controls were 94.3%. More than three fourth of cases (77.1%) and half of controls (58.9%) were housewives in their occupation. The percentage of cases who come from rural area doubles controls (72.9% VS 32.5%). Similarly percentage of cases with no formal education doubles that of controls (40% VS 19.6%). Cases whose husbands complete primary school were 36.4% and controls were 30.5%. The median average monthly income of family was 2,000 birr (IQR 1,362.5 to 3,000) among cases and 3,000 birr (IQR 1,500 to 5,000) among controls (See table 2).

Table 2:- Socio-demographic characteristics of women admitted to public hospitals in Hadiya zone for obstetric reasons, Southern Ethiopia, 2019 (n=279).

| **Variable** | **Category** | **Maternal Near-Miss Status** | | |
|---|---|---|---|---|
| | | **Yes (**n = 70**)** | **No (**n = 209**)** | **Total (**n = 279**)** |
| | | **Frequency (%)** | **Frequency (%)** | **Frequency (%)** |
| Age of participants | 18 – 29 years | 43 (61.4) | 146 (69.9) | 189 (67.7) |
| | 30 – 41 years | 27 (38.6) | 63 (30.1) | 90 (32.3) |
| Permanent residence | Rural | 51 (72.9) | 68 (32.5) | 119 (42.7) |
| | Urban | 19 (27.1) | 141 (67.5) | 160 (57.3) |
| Marital status | Currently married | 65 (92.9) | 197 (94.3) | 262 (93.9) |
| | Currently not married | 5 (7.1) | 12 (5.7) | 17 (6.1) |
| Participant occupation | Housewife | 54 (77.1) | 123 (58.9) | 177 (63.4) |
| | Civil Servant | 11 (15.7) | 46 (22.0) | 57 (20.4) |
| | Merchant | 4 (5.7) | 26 (12.4) | 30 (10.8) |
| | Other (maid, student, daily laborer) | 1 (1.4) | 14 (6.7) | 15 (5.4) |

| | | | | |
|---|---|---|---|---|
| Participant level of education | No formal education | 28 (40.0) | 41 (19.60 | 69 (24.7) |
| | Primary school (1-8) | 25 (35.7) | 81 (38.8) | 106 (38.0) |
| | Secondary school (9-12) | 5 (7.1) | 33 (15.8) | 38 (13.6) |
| | Tertiary or higher (12+) | 12 (17.1) | 54 (25.8) | 66 (23.7) |
| Monthly income | ≤ 2,500 birr | 51 (72.9) | 96 (5.9) | 147 (52.7) |
| | > 2,500 birr | 19 (27.1) | 113 (54.1) | 132 (47.3) |

### 5.2. Obstetric and Reproductive Health History of the Women

About 89% cases were circumcised compared to 58.9% controls. Higher proportion of controls (0.57) used contraceptives compared to 0.39 cases. The dominant contraceptive choice among cases was implants (37.0%) whereas injectables (42.7%) were dominant contraceptive choice among controls. About ninety percent controls compared to 57.1% cases had preparation towards current pregnancy. The major type of birth preparedness both among cases (68.4%) and controls (77.0%) was deciding place of delivery. The median number of pregnancies among cases was 3.5 (IQR 1 to 6) and 2 (IQR 1 to 3.5) among controls. The percentage of grand multigravida (≥ 5 pregnancies) among cases doubles that of controls (38.6% VS 16.2%). Regarding birth interval, the mean interval between last birth and current pregnancy in years was 1.7 (0.7 SD) for cases and 2.6 (1.1 SD) for controls. The percentage of birth interval < 2 years among cases almost quadruplicates controls (43.8% VS 11.7%). Eight cases and five controls gave their current birth at home (See table 3).

Twenty four percent cases and 3.3% controls ever experience multiple pregnancies. Nearly 26% cases compared to 7.7% controls ever gave stillbirth. Twenty six (37.1%) cases and 25 (12.0%) controls ever experience abortion and the type of abortion among all of them was spontaneous miscarriage. About 32.9% cases compared to 9.1% controls ever gave birth by cesarean section. About 41% cases and 12.4% controls had experienced previous pregnancy complications. Hypertension (37.9%) and PPH (37.9%) were the major types of complications among cases whereas PROM (26.9%) followed by APH (23.1%) were the most common types of previous pregnancy complications among controls. Only nine cases compared to 45 (21.5%) controls were utilized maternity waiting homes in their current pregnancy. With regard to their status at admission, 22.9% cases and 16.7% controls were pregnant at time of admission. Concerning birth outcome, 75.7% cases and 92.3% controls gave live birth (See table 3 and figure 3).

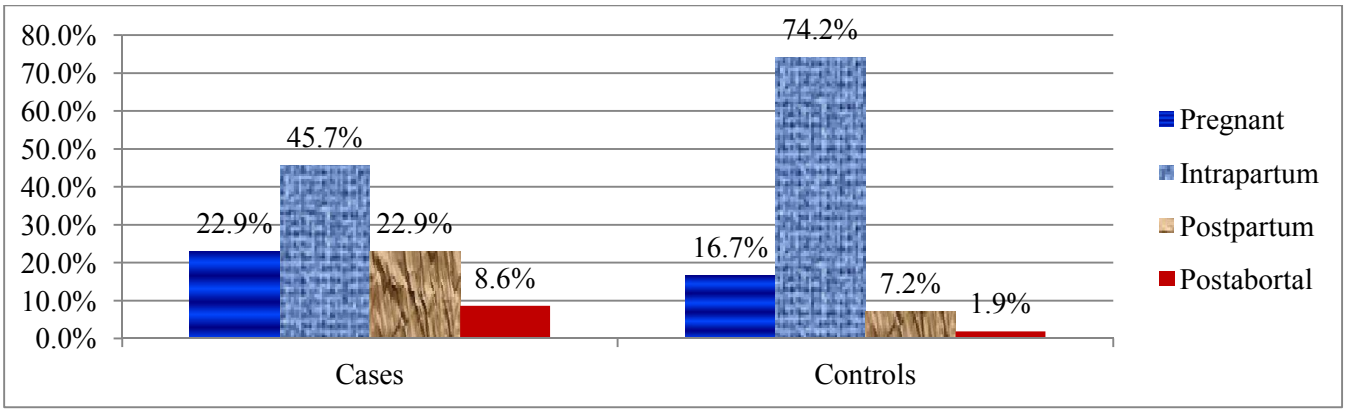


Figure 3:- Status at admission among women admitted to public hospitals in Hadiya zone for obstetric reasons, South Ethiopia, 2019 (n=279 (70:209)).

Seventy three percent cases compared to 94.3% controls received ANC in their current pregnancy. Among those who received ANC, majority of them 43.1% cases and 45.7% controls were booked at health centers. Concerning frequency of ANC contacts, 47.1% cases and 39.6% controls had had < 4 ANC contacts. Percentage of cases (41.2%) that had antenatal admission in their current pregnancy triples that of controls (13.2%). The major reason for the antenatal admission among cases was hypertension (33.3%) whereas 70.4% controls have had antenatal admission due to hyperemesis gravidarum. Nearly 22% cases and 12.7% controls were not told about danger signs of pregnancy at their booking visit. Thus 88.6% cases and 60.3% controls had poor knowledge of pregnancy danger signs. Vaginal bleeding was the most common type of danger sign known by both cases (95.7%) and controls (92.4%) whereas chest pain was the least known danger sign (8.7% cases and 15.1% controls) (See table 3).

Table 3:- Reproductive health and obstetric history of women admitted to public hospitals in Hadiya zone for obstetric reasons, Southern Ethiopia, 2019 (n=279).

| **Variable** | **Category** | **Maternal Near-Miss Status** | | |
|---|---|---|---|---|
| | | **Yes** (n = 70) | **No** (n = 209) | **Total** (n = 279) |
| | | **Frequency (%)** | **Frequency (%)** | **Frequency (%)** |
| Female Genital Mutilation | Yes | 55 (78.6) | 123 (58.9) | 185 (66.3) |
| | No | 15 (21.4) | 86 (41.1) | 94 (33.7) |
| Contraceptive use | Yes | 27 (38.6) | 110 (52.6) | 137 (49.1) |
| | No | 43 (61.4) | 99 (47.4) | 142 (50.9) |

| | | | | |
|---|---|---|---|---|
| Birth preparedness for current delivery | Yes | 40 (57.1) | 187 (89.5) | 227 (81.4) |
| | No | 30 (42.9) | 22 (10.5) | 52 (18.6) |
| Gravidity | Primigravida | 22 (31.4) | 81 (38.8) | 103 (36.9) |
| | Multigravida | 21 (30.0) | 94 (45.0) | 115 (41.2) |
| | Grand multigravida | 27 (38.6) | 34 (16.2) | 61 (21.9) |
| Birth interval n = 176 (48:128) | < 2 years | 21 (43.8) | 15 (11.7) | 36 (20.5) |
| | ≥ 2 years | 27 (56.2) | 113 (88.3) | 140 (79.5) |
| Place of current delivery n = 187 (51:136) | Health facility | 43 (84.3) | 131 (96.3) | 149 (79.7) |
| | Home | 8 (15.7) | 5 (3.7) | 38 (20.3) |
| History of multiple pregnancies | Yes | 17 (24.3) | 7 (3.3) | 24 (8.6) |
| | No | 53 (75.7) | 202 (96.7) | 255 (91.4) |
| Ever give stillbirth | Yes | 18 (25.7) | 16 (7.7) | 34 (12.2) |
| | No | 52 (74.3) | 193 (92.3) | 245 (87.8) |
| Ever experience abortion | Yes | 26 (37.1) | 25 (12.0) | 51 (18.3) |
| | No | 44 (62.9) | 184 (88.0) | 228 (81.7) |
| Ever give birth by Cesarean Section | Yes | 23 (32.9) | 19 (9.1) | 42 (15.1) |
| | No | 47 (67.1) | 190 (90.9) | 237 (84.9) |
| Previous pregnancy complications | Yes | 29 (41.4) | 26 (12.4) | 55 (19.7) |
| | No | 41 (58.6) | 183 (87.6) | 224 (80.3) |
| Receive ANC in current pregnancy | Yes | 51 (72.9) | 197 (94.3) | 248 (88.9) |
| | No | 19 (27.1) | 12 (5.7) | 31 (11.1) |
| Antenatal admissions in current pregnancy n = 248 (51:197) | Yes | 21 (41.2) | 26 (13.2) | 47 (19.0) |
| | No | 30 (58.8) | 171 (86.8) | 201 (81.0) |
| Knowledge of pregnancy danger signs | Poor knowledge | 62 (88.6) | 126 (60.3) | 188 (67.4) |
| | Good knowledge | 8 (11.4) | 83 (39.7) | 91 (32.6) |

### 5.3. Previous Medical Condition of the Women

Over four in ten cases (42.9%) and one sixth of controls (17.7%) ever experience past medical illnesses. The most common type of past medical illness was hypertension among cases (27.1%) and among controls (7.2%) (See figure 4).

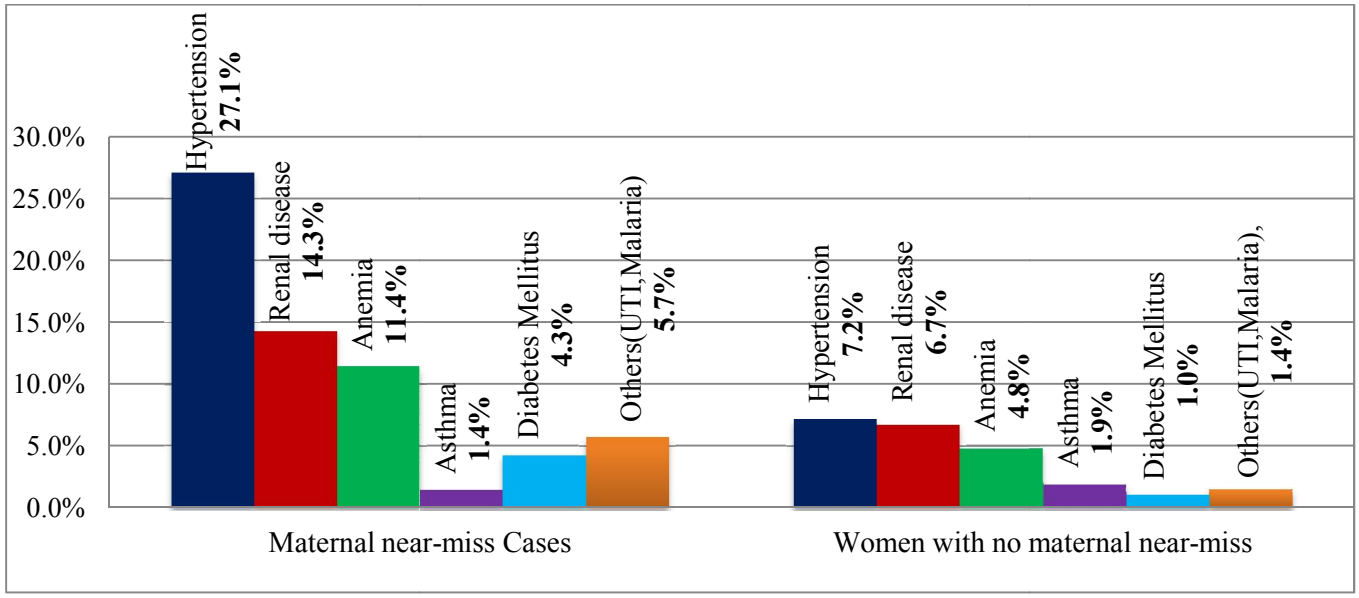


Figure 4:- Type of Past Medical Illnesses among women admitted to public hospitals in Hadiya zone for obstetric reasons, Southern Ethiopia, 2019 (n = 279 (70:209) for each category).

### 5.4. Three delays

The median time of delay to seek health care was 6 (IQR 3 to 10) hours among cases and 2.5 (IQR 1 to 6) hours among controls. The major reasons for first delay among cases were underestimating severity of condition (30.6%) followed by essential people in decision making not around (26.5%) while essential people in decision making not around (52%) and underestimated severity of condition (22%) were the dominant reasons among controls. The mean (SD) duration of second delay among cases was 2.2 hours (1.4 SD) compared to 1.6 hours (1.4 SD) among controls. Distant health facility was the most common reasons of second delay among cases (37.5%) and lack of transport among controls (35.7%). With regard to means of transport 60% cases compared to 18.7% controls used ambulance. The median duration of third delay both among cases and controls was 48 minutes with IQR of (42 to 60) for cases and (24 to 60) for controls. Nearly three fourth of cases (74.3%) and one fifth of controls (21.5%) were

referred from other health facility. Mainly both cases (75%) and controls (71.1%) were referred from health centers (See table 4).

Table 4:- Three delays among women admitted to public hospitals in Hadiya zone for obstetric reasons, Southern Ethiopia, 2019 (n=279).

| Variable | Category | Maternal Near-Miss Status | | |
|---|---|---|---|---|
| | | **Yes (n = 70)** | **No (n = 209)** | **Total (n = 279)** |
| | | **Frequency (%)** | **Frequency (%)** | **Frequency (%)** |
| First delay | Delayed < 12 hours | 54 (77.1) | 142 (67.9) | 196 (70.3) |
| | Delayed ≥ 12 hours | 16 (22.9) | 67 (32.1) | 83 (29.7) |
| Second delay | Traveled ≤ 2 hours | 51 (72.9) | 183 (87.6) | 234 (83.9) |
| | Traveled > 2 hours | 19 (27.1) | 26 (12.4) | 45 (16.1) |
| Third delay | Delayed < 1 hour | 47 (67.1) | 112 (53.6) | 237 (84.9) |
| | Delayed ≥ 1 hour | 23 (32.9) | 97 (46.4) | 42 (15.1) |

### 5.5. Maternal Near-Miss Events

The most common maternal near-miss event was severe pre-eclampsia (41.4%) followed by sepsis (31.4%) and severe PPH (25.7%) (See figure 5). The most common time of diagnosis was during postpartum/postoperative (42.9%).

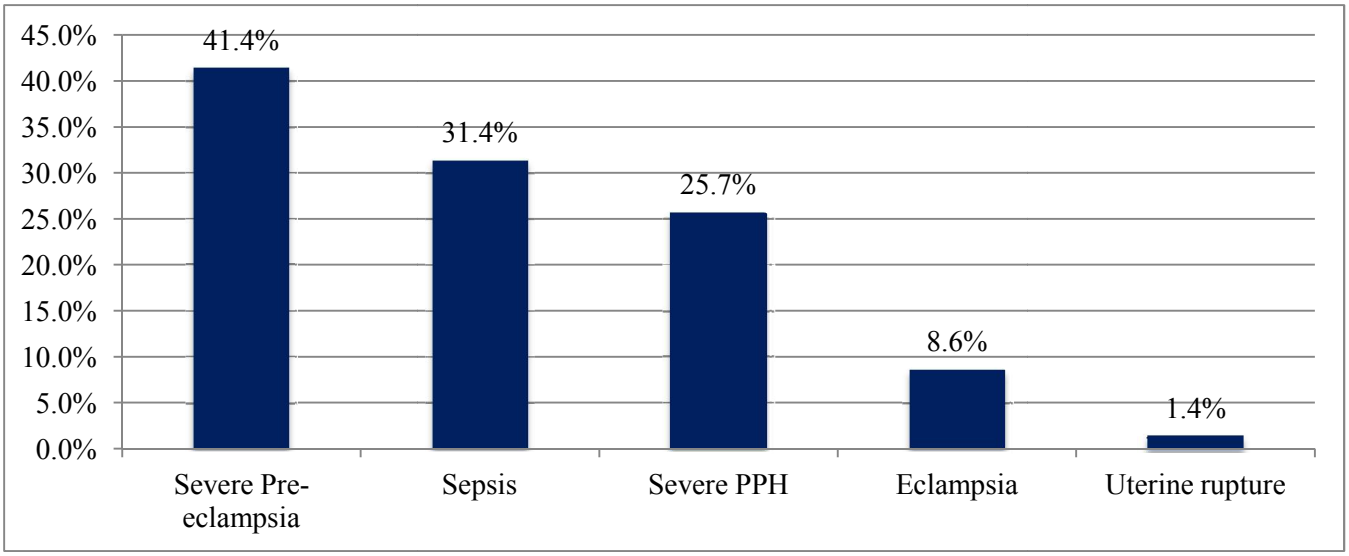


Figure 5:- Type of maternal near-miss events among women admitted to public hospitals in Hadiya Zone, South Ethiopia, 2019 (n=70).

### 5.6. Determinants of Maternal Near-Miss

Using bivariate binary logistic regression analyses, fourteen variables were recruited to be included in the final model. Thus, in the multi-variable analysis, the variables found to have an association with maternal near-miss in the final model were rural residence (AOR = 3.16; 95%CI: 1.62, 6.16), no birth preparedness (AOR = 3.50; 95%CI: 1.66, 7.41), previous cesarean section (AOR = 3.68; 95%CI: 1.63, 8.31), previous history of hypertension (AOR = 3.69; 95%CI: 1.52, 8.96), and poor knowledge of pregnancy danger signs (AOR = 3.15; 95%CI: 1.32, 7.52) (See table 5).

Table 5:- Determinant factors of maternal near-miss among women admitted to public hospitals in Hadiya zone, Southern Ethiopia, 2019 (n=279; cases=70: controls=209).

| **Variable** | **Category** | **Maternal Near-Miss Status** | | **COR (95% CI)** | **AOR (95% CI)** |
|---|---|---|---|---|---|
| | | **Yes (**n = 70**)** | **No (**n = 209**)** | | |
| | | **No (%)** | **No (%)** | | |
| Participant level of education | No formal education | 28 (40.0) | 41 (19.60 | 3.07 (1.40, 6.76) | 0.45 (0.14, 1.50) |
| | Primary school (1-8) | 25 (35.7) | 81 (38.8) | 1.39 (0.64, 3.00) | 0.59 (0.22, 1.61) |
| | Secondary school (9-12) | 5 (7.1) | 33 (15.8) | 0.68 (0.22, 2.11) | 0.63 (0.17, 2.36) |
| | Tertiary or higher (12+) | 12 (17.1) | 54 (25.8) | 1.00 | 1.00 |
| Permanent residence | Rural | 51 (72.9) | 68 (32.5) | 5.57 (3.05, 10.15) | **3.16 (1.62, 6.16)**** |
| | Urban | 19 (27.1) | 141 (67.5) | 1.00 | 1.00 |
| Monthly income | ≤ 2,500 birr | 51 (72.9) | 96 (5.9) | 3.16 (1.75, 5.72) | 1.16 (0.50, 2.72) |
| | > 2,500 birr | 19 (27.1) | 113 (54.1) | 1.00 | 1.00 |
| Female Genital Mutilation | Yes | 55 (78.6) | 123 (58.9) | 2.56 (1.36, 4.83) | 1.29 (0.58, 2.86) |
| | No | 15 (21.4) | 86 (41.1) | 1.00 | 1.00 |
| Contraceptive use | Yes | 27 (38.6) | 110 (52.6) | 0.57 (0.33, 0.98) | 0.62 (0.31, 1.26) |
| | No | 43 (61.4) | 99 (47.4) | 1.00 | 1.00 |

| | | | | | |
|---|---|---|---|---|---|
| Receive ANC in current pregnancy | Yes | 51 (72.9) | 197 (94.3) | 0.16 (0.08, 0.36) | 1.04 (0.32, 3.39) |
| | No | 19 (27.1) | 12 (5.7) | 1.00 | 1.00 |
| Ever give stillbirth | Yes | 18 (25.7) | 16 (7.7) | 4.18 (1.99, 8.75) | 1.53 (0.55, 4.27) |
| | No | 52 (74.3) | 193 (92.3) | 1.00 | 1.00 |
| Ever experience abortion | Yes | 26 (37.1) | 25 (12.0) | 4.35 (2.29, 8.25) | 1.81 (0.82, 3.99) |
| | No | 44 (62.9) | 184 (88.0) | 1.00 | 1.00 |
| Ever give birth by cesarean section | Yes | 23 (32.9) | 19 (9.1) | 4.89 (2.46, 9.72) | **3.68 (1.63, 8.31)*** |
| | No | 47 (67.1) | 190 (90.9) | 1.00 | 1.00 |
| Previous pregnancy complications | Yes | 29 (41.4) | 26 (12.4) | 4.98 (2.66, 9.33) | 1.72 (0.69, 4.31) |
| | No | 41 (58.6) | 183 (87.6) | 1.00 | 1.00 |
| Birth preparedness for current delivery | Yes | 40 (57.1) | 187 (89.5) | 1.00 | 1.00 |
| | No | 30 (42.9) | 22 (10.5) | 6.37 (3.34, 12.18) | **3.50 (1.66, 7.41)**** |
| Knowledge of pregnancy danger signs | Poor | 62 (88.6) | 126 (60.3) | 5.11 (2.33, 11.21) | **3.15 (1.32, 7.52)*** |
| | Good | 8 (11.4) | 83 (39.7) | 1.00 | 1.00 |
| Previous history of hypertension | Yes | 19 (27.1) | 15 (7.2) | 4.82 (2.29, 10.14) | **3.69 (1.52, 8.96)*** |
| | No | 51 (72.9) | 194 (92.8) | 1.00 | 1.00 |
| Second delay | Traveled ≤ 2 hours | 51 (72.9) | 183 (87.6) | 0.38 (0.20, 0.74) | 0.92 (0.37, 2.29) |
| | Traveled > 2 hours | 19 (27.1) | 26 (12.4) | 1.00 | 1.00 |

*Statistically significant variables at p-value of 0.004; **Significant at p-value of ≤ 0.001; ANC: Antenatal Care; COR: Crude Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval

# 6. DISCUSSION

This study was conducted to identify the determinant factors of maternal near-miss (MNM) in Hadiya Zone, Southern Ethiopia which could contribute to accelerate the achievement of UN's sustainable development goals (SDGs) target of reducing maternal mortality ratio (MMR) below 70 per 100,000 live births by the year 2030 (1); given sustained commitment to address all those determinant factors by clinical and public health interventions. The current study was implicative of the representativeness as it was included referral as well as district hospitals.

In this study, women who reside in rural area had three times higher odds of developing maternal near-miss compared to urban women. This finding was comparable with the study conducted in public hospitals in Addis Ababa, Ethiopia where rural residence was found determinant factor of MNM (22). Being rural dweller was also a significant determinant factor of MNM in a study conducted in Southwestern Nigeria and India (32, 35). It might be due to differences in terms of distance to hospitals, transportation, access to information and better health care as those hospitals were located on urban areas. These might indicate that despite government efforts to address rural women with basic health services, still rural women might face many difficulties to access health services compared to urban women. Also, in this study higher proportion was seen among rural women for home delivery in their current birth, did not receive antenatal care in current pregnancy and had higher travel time to reach at hospitals. All these might complicate their condition due to their late arrival at hospitals compared to urban women and in turn increase their chance of morbidity. So, improving road and transportation, and further decentralizing maternity care and public health interventions that gave priority for rural women could reduce maternal near-miss.

Similarly women who had no birth preparedness had more than three times higher odds of developing maternal near-miss compared to women with birth preparedness. This finding was supported by a systematic review and meta-analysis of randomized trials of birth preparedness and complication readiness (BPCR) interventions in populations of pregnant women living in developing countries that showed exposure to BPCR interventions was associated with a statistically significant reduction of 53% in maternal mortality risk (42). This implies that for MNM, birth preparedness is an important contributor, but it was not well addressed in ANC services. For instance, in the current study nearly three fourth of cases and more than nine in ten

controls received ANC in their current pregnancy and similarly last year's zonal ANC4 coverage was 93% (40). This signals that even though ANC services were in place, their quality were questionable.

In addition, women who ever gave birth by Cesarean Section (C/S) had nearly four times higher odds of developing maternal near-miss compared to women with no history of C/S. The finding was comparable with other studies conducted in Gurage zone, southern Ethiopia and in public hospitals in northern Ethiopia (2, 7). Study from Erbil city Iraq also documented a similar finding (36). However a study that assessed the effects of previous cesarean deliveries on severe maternal outcomes (SMOs) in Tanzania indicated that previous cesarean delivery was not a risk factor for SMOs (43). This difference might be due to differences between study subjects in terms of their timely health seeking behavior or it might be due to betterment in terms of referral mechanisms and intrapartum care in study settings. Additionally it might be due to study protocol as the Tanzania study was conducted at tertiary hospital where women with previous spontaneous vaginal delivery might only admitted for severe complications in higher proportions which in turn may result in misclassification bias. What's ever the case, Vaginal birth after cesarean section (VBAC) carries a risk of uterine rupture to a woman during her subsequent deliveries as this could obviously result from uterine scar of prior C/S which might in turn lead to MNM. The finding suggests that restriction should be made on C/S preferences and potential risks of cesarean section should be taken into account while assessing clinical indications for cesarean section. In this study the C/S rate (9.68%) was higher compared to 2018's zonal report (3.6%) and WHO's expected range for complications result in surgical operations (3-5%) (2, 40), it is increasing, though non-medical C/S need to be avoided. Efforts to reduce the rapidly rising rate of C/S would be justified by the consequent reduction of severe maternal morbidity (23).

The study also showed that women with previous history of hypertension had almost four times higher odds of developing maternal near-miss compared to women with no history of hypertension. What's more in this study was that hypertension was the major types of previous pregnancy complications among cases compared to premature rupture of membrane among controls. It also was responsible for the antenatal admission among cases in their current pregnancy compared to controls admitted with hyperemesis gravidarum. This amplifies the result of leading maternal near-miss event in Hadiya Zone is severe pre-eclampsia. Findings from other studies conducted in Addis Ababa, Nigeria, and Brazil showed history of hypertension was

determinant factor for MNM (22, 23, 33). Chronic hypertension could complicate to superimposed pre-eclampsia and consequents in MNM. Possibly encouraged screening culture of chronic medical disorders particularly for hypertension would considerably decrease in MNM incidence.

Furthermore the odds of MNM among women who had poor knowledge of pregnancy danger signs was three times higher compared to women with good knowledge. This finding was supported by one study conducted in Ethiopia that concluded timely recognition of these danger signs is central to the survival of women (44). The identification of these danger signs and its relation with complications during pregnancy would increase the capacity of women, their partners and families to seek for timely health care (45). One of the two Ethiopian national reproductive strategies is empowering women, men, families, and communities to recognize pregnancy-related risks (46); although, big emphasis is given by the national strategy to raise knowledge of obstetric danger signs, the up-to-dated strategy didn't give emphasis (47) and finding from the current study indicated poor knowledge was still problem in study area where 22% cases and 12.7% controls were not told about danger signs of pregnancy at their booking visit. So ANC should be aimed at addressing the pregnant women's information needs besides identifying symptoms and prevent appearances of life threatening complications. Therefore, women should receive health education about danger signs during pregnancy at time of visiting an ANC clinic.

The current study did not identified three delays as determinant factors of maternal near-miss, although second delay was identified as determinant factor in other studies conducted in Ethiopia (2, 7). This difference might be due to inclusiveness of the current study in terms of socio-demographic situation as it included primary hospitals. In light of the attainment of the SDG of reducing MMR below 70 per 100,000 live births by 2030; it is imperative that findings from this study be used to inform interventions. So, we need evidence based clinical and public health intervention programs particularly targeting determinant factors for reduction of maternal morbidity and mortality, whilst rural women need extra vigilance.

## Strengths and Limitations of the Study

The present study had several strengths. It was based on currently recommended standardized WHO criteria for MNM cases detection which help to minimize bias related to measurements. In addition this study was based on mothers' interviews which is important to minimize information bias and increase its validity and completeness than using record review. The nature of studying incident cases also helpful to minimize recall bias and additionally the study used hospital controls to make equivalent degree of recall among cases and controls of the antecedent exposure.

However, the study was also prone to limitations. Among the three WHO MNM criteria, this study was based on disease specific approach which has the limitation of overestimation of near-miss cases even if it was recommended for studies in low resource settings. Private health facilities were not included in this study; hence it might not represent MNM cases at private facilities. In addition, study participants were followed only until hospital discharge, but a control postpartum woman who need to be followed until 42 days postpartum might develop near-miss after discharge and missed from the study.

# 7. CONCLUSION AND RECOMMENDATION

## 7.1. Conclusion

Severe pre-eclampsia is the leading maternal near-miss event in Hadiya zone followed by sepsis, severe PPH, eclampsia and uterine rupture. Rural residence, reproductive and obstetric factors (no birth preparedness, previous cesarean section, and poor knowledge of pregnancy danger signs) and previous history of hypertension were significant determinant factors of maternal near-miss.

## 7.2. Recommendations

- Public hospitals in Hadiya zone and zonal health department:
  - ✓ In order to address having no birth preparedness, the zonal health department should design and implement birth preparedness and complication readiness (BPCR) interventions as effectiveness of the intervention to reduce maternal morbidity and mortality risks was already validated to use in low-resources settings with adequate population coverage (42); so the office should consider the application of the specific approaches such as counseling of women in antenatal clinics, home visit strategies and community mobilization activities in a combined fashion and scaling-up participatory learning cycle through available women's groups for birth preparedness.
    - Community mobilization should be conducted through stakeholders such as health extension workers, health development armies and/or through participation of established women's groups for BPCR interventions.
  - ✓ Physicians in public hospitals of Hadiya Zone should take in to account the potential complications of cesarean section while assessing women for cesarean section and there is a need to conduct C/S audit in hospitals to identify its indications and reasons behind alarmingly increasing rate.
  - ✓ Health professionals working in health facilities in the zone should get cautious while providing care to women with vaginal delivery after cesarean section (VBAC).
  - ✓ The zonal health department should schedule Zonal level high blood pressure behavioral education program and screening campaigns for hypertension by establishing rapid screening centers in health facilities and near to community gathering areas.

- ✓ Not all women in this study were told about pregnancy danger signs at their booking visit even though ANC service coverage in the Zone is promising; So ANC should be aimed at addressing the pregnant women's information needs besides identifying symptoms and prevent appearances of life threatening complications. Therefore, women should receive health education about danger signs during pregnancy at time of visiting an ANC clinic.
- ✓ All the recommended clinical and public health interventions should give priority for rural women.

➢ Researchers in higher institutions, hospitals and zonal health department:

- ✓ Antenatal care service coverage and utilization was indicated good by the current study and zonal MCH report; but its components were determinant factors such as birth preparedness and pregnancy danger signs that amplify the question of service quality. So researchers should conduct ANC service quality research on the area.

➢ Federal Ministry of Health:

- ✓ Enhancing knowledge of pregnancy danger signs among women, men, families and communities as a strategy to lower MMR didn't given emphasis in up-to-dated national reproductive health strategy (2016-2020) while it was one of the two strategies to lower MMR in outdated strategy document (2006-2015) and still poor knowledge of pregnancy danger signs is the significant determinant factor of MNM; though the MOH should give emphasis in the next strategy document.

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## Annex-I: Data Collection Questionnaire

1. INFORMATION SHEET AND CONSENT FORM

**Project title: Determinants of maternal near miss among women admitted to public hospitals in Hadiya zone, southern Ethiopia, 2019.**

**Name of the Organization:** Jimma University **Name of the Sponsor:** _HCHS___

**Instruction: Please read a copy of the full informed consent form to the respondent.**

**Introduction:**

Information sheet and Consent form prepared for women admitted to public hospitals in Hadiya zone prior to the study to participate in this Research Project. The research group includes the principal investigator, eight data collectors, and four supervisors.

**Purpose of the research**

The aim of this study is to identify determinant factors of maternal near-miss and information obtained in this survey would be useful to design effective maternal health interventions for better maternal health care and prevent maternal death. The study will be carried out for 3 months.

**Procedures**

If you are willing to participate in the study, I will proceed with the interview and administer questions that help to answer the study questions. If you do not wish to answer any of the questions included in the study, you may skip them and move to next question.

**Benefits, Risks and Discomfort**

There might be slight discomfort to share some personal information and wasting your time (a maximum of 30 minutes). However, you may refuse to answer any of the questions if you feel uncomfortable. Your participation will help us to find out more about determinant factors of maternal near miss and this will help us to better improve maternal health in this zone and other parts of the country. There is no risk or direct benefit in participating in this research project.

**Incentives**

We will not pay you for taking part in this study.

**Confidentiality**

The information that we collect in this study will be kept confidential by using codes instead of any personal identifiers and is meant only for the purpose of the study.

**Right to refuse or withdraw**

You have the full right to refuse and have the right to discontinue the interview at any time, and refusing to participate will not affect your future treatment at this health facility or elsewhere.

**Who to contact**

If you have any questions you may ask now or later. If you wish to ask questions later, you may contact: Samuel Kusheta, Phone: +251934774841, E-mail: kushetasamuel@gmail.com

**CONSENT** (Only for women age ≥ 18 years old)

Hello! My name is _____and I am working with the research group doing a study to identify the determinant factors of maternal near-miss in your community. You have scientifically been selected by chance to participate in this study. The findings of the study will be used for better planning and intervention of maternal health as you heard from the above information. Therefore, I request you kindly if you are volunteer to participate in this study and respond to the questionnaire. The study involves no risk to you and the information given is confidential. The filling of the questionnaire/interview will take about 30 minutes to fill. Would you be willing to participate? [X] 1. Yes-------- 2. No---------- Thank you!

**ASSENT** (Only for young women age less than 18 years old)

My name is ----------. I am working with a research entitled, determinants of maternal near miss among women admitted to public hospitals in Hadiya zone. Your wife/partner/child is scientifically been selected by chance to participate in this study. The findings of the study will be used for better planning and intervention of maternal health. Therefore, I request you kindly if you are volunteer that your wife/partner/child can participate in this study and respond to the questionnaire. The study involves no risk to your wife/partner/child. The information given is confidential. The filling of the questionnaire/interview by your wife/partner/child will take about 30 minutes to fill. Would you be willing for your wife/partner/child to participate? [X] 1. Yes-------- 2. No---------- Thank you!

Print name of data collector, date and signature of Data collector

_____, ____/____/____ (dd/mm/yy), Sign_____

## Data Collection Questionnaire: English version

Study Site……..……. **Code of the questionnaire**……

### Part I: Socio-Demographic Characteristics of the Women

| S. No | Questions | Responses | Skip to |
|---|---|---|---|
| 101 | How old are you? (*in completed years*) | age in years _____ | |
| 102 | Where is your permanent residence? | 1. Urban 2. Rural | |
| 103 | Your marital status | 1. Single 2. Married<br>3. Divorced 4. Widowed<br>5. Cohabiting 6. Separated | |
| 104 | What is your occupation? | 1. Housewife 4. Civil Servant<br>2. Merchant 5. Daily Laborer<br>3. Maid 99. Other_____ | |
| 105 | What is your husband's occupation? | 1. Farmer 4. Civil Servant<br>2. Merchant 5. Driver<br>3. Daily Laborer 99. Other _____ | |
| 106 | What is your education level? | 1. Illiterate 4. Secondary (9-12)<br>2. Can read and write 5. Tertiary (12+)<br>3. Elementary (1-8) | |
| 107 | What is your Husband's education level? | 1. Illiterate 4. Secondary (9-12)<br>2. Can read and write 5. Tertiary (12+)<br>3. Elementary (1-8) | |
| 108 | How much is the average family income per month? (*from salary, house rent, gift, crop, vegetables & fruits sell, etc*) | _____ **Birr** | |

### Part II: Obstetric and Reproductive History of the women

| S. No | Questions | Responses | Skip to |
|---|---|---|---|
| 201 | What was your age at your first marriage? | _____ Years | |
| 202 | What was your age at your first pregnancy? | _____ Years | |
| 203 | How many times do you experience pregnancy? | _____times | **If 1 times, go to Q205** |

| | | | |
|---|---|---|---|
| 204 | How much is the interval between your last birth & current pregnancy? | _____years / _____months | |
| 205 | Have you ever give birth? | 1. Yes 2. No | **If no, go to 209** |
| 206 | If yes to Q205, How many times? | _____times | |
| 207 | Where was you gave your last birth? | 1. Home 2. Health center<br>3. Hospital 4. Health post<br>5. Private clinic 99. Other_____ | |
| 208 | Place of current delivery? | 1. Home 2. Health center<br>3. Hospital 4. Health post<br>5. Private clinic 99. Other_____ | |
| 209 | Did you have preparations towards your current delivery? | 1. Yes<br>2. No | **If no, go to 211** |
| 210 | If yes to Q209, What preparations did you make towards the birth of your child? (***more than one answer is possible***)<br><br>***Probing is possible*** | 1. special savings<br>2. decided place of delivery<br>3. identify those that will accompany or stay with you in the hospital<br>4. identify blood donors<br>5. identify those that will look after your other children at home<br>6. make any arrangement for a means of transportation<br>7. prepare delivery equipments like towel, cord care materials, etc | |
| 211 | Did you receive antenatal care in this pregnancy? | 1. Yes<br>2. No | **If no, go to Q217** |
| 212 | If yes to Q211, where did you receive ANC?<br>***More than one answer is possible*** | 1. At hospital 3. At health post<br>2. At health center 4. Private clinic<br>99. Other specify_____ | |
| 213 | How many times did you receive ANC during this pregnancy (**Total No of visit**) | 1. One 2. Two<br>3. Three 4. Four<br>5. Five and more | |

| | | | |
|---|---|---|---|
| 214 | Did you have any antenatal admissions in current pregnancy? | 1. Yes<br>2. No | **If no, go to Q216** |
| 215 | If yes to Q214, What was the reason/s for the antenatal admission? | 1. Hyper emesis<br>2. Threatened Abortion<br>3. Bleeding during pregnancy<br>4. Diabetes 5. Malaria<br>6. Urinary Tract Infection<br>7. Hepatitis 8. PROM<br>9. Fetal problem Specify------<br>10. Anemia 11. Hypertension<br>99. Others specify_____ | |
| 216 | Were you told about the signs of pregnancy complications at Booking Visit | 1. Yes<br>2. No | |
| 217 | What are the danger signs in pregnancy? **(MENTION ALL YOU KNOW)** | 1. Bleeding<br>2. Severe headache<br>3. Offensive vaginal discharge<br>4. Blurring of vision 6. Swollen legs<br>5. Chest pain 7. Fever<br>99. Others specify……. | |
| 218 | Do you have history of multiple pregnancies? | 1. Yes<br>2. No | **If no, go to Q220** |
| 219 | If yes to Q218, how many times? | _____times | |
| 220 | Did you ever experience Ectopic pregnancy? | 1. Yes<br>2. No | **If no, go to Q222** |
| 221 | If yes to Q220, how many times? | _____times | |
| 222 | Do you ever give stillbirth? | 1. Yes 2. No | **If no, go to Q224** |
| 223 | If yes to Q222, how many times? | _____ | |
| 224 | Do you ever experience abortion? | 1. Yes 2. No | **If no, go to Q227** |
| 225 | If yes to Q224, what type of abortion? **(More than one answer is possible)** | 1. Spontaneous miscarriage<br>2. Safe Induced abortion by skilled personnel<br>3. Unsafe Induced abortion | |

| | | | |
|---|---|---|---|
| 226 | If yes to Q224, how many times? | _____times | |
| 227 | Do you ever give birth by cesarean section in your previous deliveries? | 1. Yes<br>2. No | **If no, go to Q229** |
| 228 | If yes to Q227, how many times? | _____ | |
| 229 | Did you experience any complications in your previous pregnancies? | 1. Yes<br>2. No | **If no, go to Q231** |
| 230 | If yes to Q229, What were the Complications you experienced in your previous pregnancies?<br>**(DON'T PROMPT)**<br><br>**(More than one answer is possible)** | 1. Hypertension<br>2. Ante partum bleeding<br>3. Post partum bleeding<br>4. Prolonged Labor<br>5. Premature rupture of membranes<br>6. Low birth weight<br>7. Puerperal Sepsis<br>99. Others specify …… | |
| 231 | Do you have circumcised? | 1. Yes 2. No | |
| 232 | Your status at admission? | 1. Pregnant 3. Intrapartum<br>2. Postpartum 4. Post-abortal | |
| 233 | Prior to your getting pregnant did you use any method to delay or avoid pregnancy? | 1. Yes<br>2. No | **If no, go to Q301** |
| 234 | If yes to Q233, what method do you used? | 1. IUCD 2. Implants<br>3. Injectable 4. Oral contraceptives<br>5. Condom 6. Calendar method<br>7. Emergency contraceptive<br>8. Coitus interrupts<br>9. others specify_____ | |

**Part-III: Past Medical History or Co-morbidities**

| | | | |
|---|---|---|---|
| 301 | Did you ever experience any medical conditions? | 1. Yes 2. No | |
| 302 | Previous Hypertension | 1. Yes 2. No | |
| 303 | History of Diabetes mellitus | 1. Yes 2. No | |

| | | | |
|---|---|---|---|
| 304 | Previous Anemia | 1. Yes 2. No | |
| 305 | History of Asthma | 1. Yes 2. No | |
| 306 | History of cardiac problems | 1. Yes 2. No | |
| 307 | History of Renal disease | 1. Yes 2. No | |
| 308 | Others Specify_____ | 1. Yes 2. No | |
| **Part-IV: Three delays and Referral status:** | | | |
| 401 | Referral status | 1. Self referred<br>2. Referred from other health facility | **If 2, go to Q403** |
| 402 | If the response to Q401 is 2, then From where you referred? | 1. From health post<br>2. From health center<br>3. From primary hospital<br>4. From general hospital<br>5. From other referral hospital<br>6. From private clinic<br>7. From private hospital<br>8. From TBAs<br>9. Others specify_____ | |
| 403 | How long was the delay in making a decision to go to the hospital? | …….(minutes/hours/days) | |
| 404 | What were the reasons for the delay? (*more than one answer is possible*) | 1. Underestimated severity of condition<br>2. Did not realize there was a problem<br>3. Bad experience with health system<br>4. Essential people in decision making not around<br>5. Disagreement in decision making<br>99. Others Specify …… | |
| 405 | Once the decision was made to go to the hospital, How long was the delay to reach at health facility? | …….(minutes/hours/days) | |

| | | | |
|---|---|---|---|
| 406 | What were the reasons for the delay? (*more than one answer is possible*) | 1. Lack of Money<br>2. Lack of transport<br>3. Health facility not found around / distant<br>99. Other reason (specify)_____ | |
| 407 | How far is your usual place of residence to this hospital on foot? | _____ hours/ (in minutes_____) | |
| 408 | How did you get to the hospital?<br><br>**/more than one answer is possible/** | 1. Personal car<br>2. Personal motorbike<br>3. Ambulance<br>4. Public transport<br>5. Horse / Donkey<br>6. On foot<br>7. Carried by other people<br>99. Others specify…… | |
| 409 | When you got to the hospital, how long did you wait before you were first seen by a health professional? | ……(minutes/hours/days) | |
| 410 | Did you have utilized maternity waiting home in this pregnancy? | 1. Yes<br>2. No | |

**Thank You!!**

## Part-V: Record review checklist

**Instruction:** Please look at client card or registration books (delivery/operation notes) and appropriately fill the responses for the following questions.

| S. No | Questions | Responses | Skip to |
|---|---|---|---|
| 501 | Gestational age at delivery | _____weeks | |
| 502 | Who attend the current delivery? (***can be specified from patient record or delivery summary or ask a women herself in case she gave birth out of this facility)*** | 1. Obstetrician 2. General practitioner<br>3. Midwifery nurse 4. Public health officer<br>5. Nurse 6. Medical/nursing student<br>7. Resident Gyn/Obs<br>8. Traditional birth attendant<br>9. Family member or neighbor<br>99. Other specify_____ | |
| 503 | Pregnancy outcome of the current delivery (***check client record/delivery summary/register***) | 1. Live Birth 2. Still birth<br>3. Congenital abnormality 4. Preterm<br>5. Birth asphyxia 6. Low birth weight<br>99. Other specify _____ | |
| **If the mother had the following diagnosis, tick all the findings she have to confirm the diagnosis** | | | |
| 504 | Severe postpartum hemorrhage **(multiple answer possible)** | 1. Postpartum bleeding with hypotension (BP < 90/60mmHM)<br>2. Postpartum bleeding result in blood transfusion | |
| 505 | Severe preeclampsia **(multiple answer possible)** | 1. Blood pressure ≥ 160/110 mmHg<br>2. Proteinuria ≥ 5 g over 24 hours or ≥2+<br>3. Oliguria ≤ 400 ml over 24 hours<br>4. HELLP syndrome | |
| 506 | Eclampsia (**Severe PE symptoms + seizure + Comatos**) | 1. Yes 2. No | |
| 507 | Sepsis or severe systemic infection | 1. Postpartum fever (body temperature >38°C)<br>2. Confirmed or suspected infection (chorioamnionitis, septic abortion, endometritis)<br>3. heart rate >90,<br>4. respiratory rate >20,<br>5. leucopenia (white blood cells <4,000),<br>6. leukocytosis (white blood cells >12,000) | |

| | | | |
|---|---|---|---|
| 508 | Ruptured uterus confirmed | 1. Yes 2. No | |
| 509 | When did she diagnosed with these complications?<br>**Timing of event** | 1. During ANC (pregnant) /Antepartum<br>2. Intrapartum /intra-operative<br>3. Postpartum /postoperative | |
| 510 | When exactly did the severe morbid event occur? | 1. Had occurred before arrival<br>2. After admission | |
| ***Check delivery register book to count and respond to the following every day*** **Date**_____ | | | |
| 24 hours total number of live births in the hospital | | | |
| Total deliveries over 24 hours in the hospital | | | |
| Total number of maternal deaths in the hospital | | | |
| Number of abortions | | | |

## አባሪ-I: <u>የመረጃ አሰባሰብ መጠይቅ</u>

### 1. የስምምነት ቅጽ

**የፕሮጀክቱ ርዕስ:** በደቡብ ኢትዮጵያ, ሃዲያ ዞን በሚገኙ የህዝብ ሆስፒታሎች ውስጥ በመታከም ላይ በሚገኙ እና በእርግዝና ምክንያት የሚከሰቱ ለህይወት አስጊ የሆኑ ውስብስብ የጤና ችግሮችን የተቋቋሙ እናቶች ዘንድ የጅግሩን ስፋት እና አጋላጭ ሁኔታዎች ለመለየት ያለመ ጥናት ነው።

**የድርጅቱ ስም:** <u>ጅማ ዩኒቨርሲቲ</u> **የስፖንሰር ስም:** <u>ሆሳዕና ጤና ሳይንስ ኮሌጅ</u>

**<u>መመሪያ</u>:- ለመላሾች የተሟላ የስምምነት መስጫ ቅጅን ያንብቡ**

**መግቢያ:**

በዚህ የምርምር ፕሮጀክት ላይ ለመሳተፍ ጥናቱ ከመካሄዱ በፊት በጥናቱ ለመሳተፍ የተዘጋጀ የስምምነት መስጫ ቅጽ ነው። የምርምር ቡድኑ ዋናውን ተመራማሪን, ስምንት መረጃ ሰብሳቢዎችን እና አራት ተቆጣጣሪዎችን ያካትታል።

**የጥናቱ ዓላማ**

የዚህ ጥናት አላማ ለእናቶች ሞት ምክንያት የሆኑትን መለኪያዎች ለይቶ ለማወቅ እና በዚህ ጥናት የተገኙ መረጃዎች ለተሻለ የእናቶች ጤና አጠባበቅ እና የእናቶችን ሞት ለመግታት ውጤታማ የሆነ መረጃ ተኮር የሆነ ፕሮግራም ለመቅረጽ ጠቃሚ ነው። ጥናቱ ለ 3 ወራት ይካሄዳል።

**ሂደቶች**

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ, በቃለ-መጠይቁ ሂደት እቀጥላለሁ። በጥናቱ ውስጥ ከተካተቱት ጥያቄዎች ውስጥ አንዳቸውን ለመመለስ ካልፈለጉ ይዘላሉ እና ወደሚቀጥለው ጥያቄ ይሄዳሉ።

**ጥቅማጥቅሞች, ስጋቶችና ምቾት ማጣት**

አንዳንድ የግል መረጃን ለማጋራት እና ጊዜዎን ለማባከን ትንሽ ምቾት ማጣት (ምናልባትም በ 30 ደቂቃዎች ጊዜ) ሊያሳጣ ይችላል። ይሁን እንጂ ጥሩ ስሜት የማይሰማዎት ከሆነ ለጥያቄዎችዎ ምላሽ አለመስጠት ይችላሉ። ተሳትፎዎ ለእናቶች ሞት የሚያበቁ ጉዳዮችን የበለጠ ለማወቅ ይረዳናል፤ ይህም በዚህ ዞን እና በሌሎች የሀገሪቱ ክፍሎች የእናቶችን ጤና ለማሻሻል ይረዳናል። በዚህ የምርምር ፕሮጀክት ላይ በመሳተፍዎ ምንም ዓይነት አደጋ ወይም ቀጥተኛ ጥቅም አይኖርም።

**ማትጊያዎች**

በዚህ ጥናት ተሳታፊ ስለሆኑ ክፍያ አይከፍሎትም።

**ሚስጢራዊነት**

በዚህ ጥናት ውስጥ የምንሰበስበው መረጃ ከማንኛውም ግላዊ መለያዎች ይልቅ ለጥናቱ ዓላማ ብቻ ኮዶችን በመጠቀም በሚስጥር ይያዛል።

**በጥናቱ ያለመሳተፍ ወይም ያለመቀጠል መብት**

በማንኛውም ጊዜ ቃለ መጠይቁን የማቋረጥ መብት አለዎት፤ እናም ለመሳተፍ ፈቃደኛ አለመሆን በዚህ የጤና ተቋም ወይም በሌላ ቦታ ወደፊት የሚደረገውን ሕክምና አይነካም።

**ማንን መገናኘት እንዳለብዎት**

መጠየቅ የሚፈልጉት ነገር ካለ አሁን ወይም በኋላ መጠየቅ ይችላሉ። ጥያቄዎችን በኋላ መጠየቅ ከፈለጉ, ሳሙኤል ኩሼታ ን ሊጠይቁ ይችላሉ፤ ስልክ: +251934774841, ኢሜል: kushetasamuel@gmail.com

**<u>ስምምነት</u> (ለ 18 አመት እና ከዚያ በላይ ለሆኑ ሴቶች ብቻ)**

ሰላም! ስሜ _____እባላለሁ፤ እና በማህበረሰብዎ ውስጥ ለእናቶች የተወሳሰበ ህመም ወሳኝ ምክንያቶች ለመለየት ከጥናት ቡድኑ ጋር አብሬ እሰራለሁ። በዚህ ጥናት ለመሳተፍ በሳይንሳዊ መንገድ የተመረጡ ሲሆን የጥናቱ ግኝት ከላይ ከተጠቀሰው መረጃ እንደሰሙት የእናቶችን ጤና ለማሻሻል እና እቅድ ለማውጣት ጥቅም ላይ ይውላል። ስለዚህ በዚህ ጥናት ለመሳተፍ ፈቃደኛ ከሆኑ ለጥያቄዎቹ ምላሽ እንዲሰጡ በትህትና እጠይቃለሁ። ጥናቱ ለእርስዎ ምንም አደጋ አይኖረውም እና የሚሰጡን መረጃ ሚስጢራዊ ነው። ቃለ መጠይቁን ለመጨረስ 30 ደቂቃ ያህል ይወስዳል። ለመሳተፍ ፈቃደኛ ነዎት? [X] 1. አዎ -------- 2. አይ ---------- አመሰግናለሁ!

**<u>በተጠያቂዋ ምትክ ከአሳዳሪ የሚወሰድ ስምምነት</u> (ከ 18 ዓመት በታች ለሆኑ ወጣት ሴቶች ብቻ)**

ስሜ ---------- ነው። በሃዲያ ዞን በሚገኙ የህዝብ ሆስፒታሎች ውስጥ ለእናቶች የተወሳሰበ ህመም ወሳኝ ምክንያቶች ለመለየት ከጥናት ቡድኑ ጋር አብሬ እሰራለሁ። ምስትዎ /ፍቅረኛዎ /ልጅዎ በዚህ ጥናት ለመሳተፍ በሳይንሳዊ መንገድ የተመረጠች ሲሆን የጥናቱ ግኝት ከላይ ከተጠቀሰው መረጃ እንደሰሙት የእናቶችን ጤና ለማሻሻል እና እቅድ ለማውጣት ጥቅም ላይ ይውላል። ስለዚህ ባለቤትዎ /ፍቅረኛዎ /ልጅዎ በዚህ ጥናት መሳተፍ እና ለመጠይቁ ምላሽ መስጠት እንዲችሉ በትህትና እጠይቃለሁ። ጥናቱ ለሚስትዎ / ለአጋርዎ / ለልጅዎ ምንም አደጋ የለውም። የሚሰጡን መረጃ ሚስጢራዊ ነው። ቃለ መጠይቁ 30 ደቂቃ ያህል ይወስዳል። ስለ ሚስትዎ / ለጓደኛዎ / ልጅዎ እንዲሳተፉ ፈቃደኛ ይሆናሉ? [X] 1. አዎ -------- 2. አይ ---------- አመሰግናለሁ!

**የመረጃ ሰብሳቢውን ስም, ቀን እና ፊርማ ያትሙ**

_____, _____ / _____ / _____ (ቀን/ወር/ዓ.ም),

**ፊርማ** _____

## የመረጃ መሰብሰቢያ መጠይቅ - አማሪኛ ትርጉም

የጥናቱ ቦታ ..... ..... የመጠይቁ ኮድ .....

### ክፍል 1-የሴቶች ማህበራዊ-የሥነ-ሕዝብ ባህርያት

| ተ.ቁ | ጥያቄዎች | መልሶች | ወደ... ይሂዱ |
|---|---|---|---|
| 101 | እድሜዎ ስንት ነው? (በተጠናቀቁ ዓመታት) | _____ዓመት | |
| 102 | ቋሚ መኖሪያዎ የት ነው? | 1. ከተማ 2. ገጠር | |
| 103 | የጋብቻ ሁኔታዎ | 1. ያላገባ 2. ያገባ<br>3. በፊች የተለየ<br>4. ባሏ በሞት የተለያት<br>5. ሳይጋቡ በአንድ ቤት አብሮ የሚኖሩ<br>6. ፊች ሳይፈጽሙ ተላያይተው የሚኖሩ | |
| 104 | ሥራዎ ምንድን ነው? | 1. የቤት እመቤት 2. ነጋዴ<br>3. የቤት ሰራተኛ 4. የመንግስት ሰራተኛ<br>5. የቀን ሰራተኛ 99. ሌላ _____ | |
| 105 | የባለቤትዎ ስራ ምንድነው? | 1. አርሶ አደሩ 2. የመንግስት ሰራተኛ<br>3. ነጋዴ 4. ሾፌር<br>5. የቀን ሰራተኛ 99. ሌላ _____ | |
| 106 | የትምህርት ደረጃዎ? | 1. ያልተማረ 2. ማንበብና መጻፍ<br>3. አንደኛ ደረጃ (1-8)<br>4. ሁለተኛ ደረጃ (9-12)<br>5. ከፊተኛ ትምህርት (12+) | |
| 107 | የባለቤትዎ የትምህርት ደረጃ? | 1. ያልተማረ 2. ማንበብና መጻፍ<br>3. አንደኛ ደረጃ (1-8)<br>4. ሁለተኛ ደረጃ (9-12)<br>5. ከፍተኛ ትምህርት (12+) | |
| 108 | በየወሩ አማካይ የቤተሰብ ገቢ ምን ያህል ነው? (*ከደመወዝ, የቤት ኪራይ, ሰጦታ, ሰብል, አትክልትና ፍራፍሬ ወዘተ ...*) | _____ ብር | |

## ክፍል ሁለት፡- የሴቶች የፅንስና ሥነ-ተዋልዶ ጤና ታሪክ

| ተ.ቁ | ጥያቄዎች | መልሶች | ወደ... ይሂዱ |
|---|---|---|---|
| 201 | በመጀመሪያ ጋብቻዎ ዕድሜዎ ምን ያህል ነበር? | _____ ዓመታት | |
| 202 | በመጀመሪያው የእርግዝና ወቅትዎ ዕድሜዎ ስንት ነበር? | _____ ዓመታት | |
| 203 | ምን ያህል ጊዜ እርግዝና አጋጥሙዎታል? | _____ ጊዜ | አንድ ጊዜ ከሆነ ወደ Q205 ይሂዱ |
| 204 | ከመጨረሻ ወልድሽ እና ከአሁኑ የእርግዝና ወቅት መካከል ያለው ልዩነት ምን ያህል ነው? | _____ ዓመታት ወይም _____ወራት | |
| 205 | ልጅ ወልደው ያውቃሉ? | 1. አዎ 2. አይደለም | መልሱ 2 ከሆነ ወደ 209 ይሂዱ |
| 206 | ለጥያቄ ቁ.205 አዎ ካሉ, ስንት ጊዜ? | _____ ጊዜ | |
| 207 | ለመጨረሻ ጊዜ የወለዱት የት ነው? | 1. ቤት 2. ጤና ጣቢያ<br>3. ሆስፒታል 4. ጤና ኬላ<br>5. የግል ክሊኒክ 99. ሌላ _____ | |
| 208 | ያሁኑን ልጅዎትን የት ነው የወለዱት? | 1. ቤት 2. ጤና ጣቢያ<br>3. ሆስፒታል 4. ጤና ኬላ<br>5. የግል ክሊኒክ 99. ሌላ _____ | |
| 209 | አሁን ላለው እርግዝናዎ ዝግጅቶች አሎት? | 1. አዎ 2. አይ | አይ ከሆነ ወደ 211 ይሂዱ |
| 210 | ለጥ.ቁ.209 አዎ ካሉ ለልጅዎ መወለድ ምን አይነት ዝግጅት አድርገዋል?<br><br>(ከአንድ በላይ መልስ ሊገኝ ይችላል) | 1. ልዩ ቁጠባዎች<br>2. የመውለጃ ቦታ መወሰን<br>3. በሆስፒታል ውስጥ ከእርስዎ ጋር አብረው የሚቆዩ ሰዎችን መለየት<br>4. የደም ለጋሾችን መለየት<br>5. ለሎች ልጆችዎን በቤት ውስጥ የሚንከባከቡትን መለየት<br>6. መጓጓዣን በተመለከተ ማንኛውንም ዝግጅት ማድረግ<br>7. እንደ ፎጣ, የእትብት መቁረጫ ምላጭ እና ማሰሪያ ወዘተ የመውለጃ ቁሳቁሶች ማዘጋጀት | |

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| 211 | በዚህ እርግዝና ወቅት የቅድመ ወሊድ ክትትል አድርገዋል? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 217 ይሂዱ** |
| 212 | ለጥ.ቁ.211 መልስዎ አዎ ከሆነ፤ የቅድመ ወሊድ ክትትል ያደረጉት የት ነው?<br>**(ከአንድ በላይ መልስ ሊገኝ ይችላል)** | 1. በሆስፒታል 2. በጤና ጣቢያ<br>3. በጤና ኬላ 4. በግል ክሊኒክ<br>99. ሌሎች የተገለጹ _____ | |
| 213 | በዚህ እርግዝና ወቅት ምን ያህል ጊዜ የቅድመ ወሊድ ክትትል አድርገዋል? **(አጠቃላይ ጉብኝት)** | 1. አንድ ጊዜ 2. ሁለት ጊዜ<br>3. ሦስት ጊዜ 4. አራት ጊዜ<br>5. አምስት ጊዜ እና ከዚያ በላይ | |
| 214 | በአሁኑ እርግዝና ወቅት በማናቸውም የቅድመ ወሊድ ውስብስብ የጤና ችግሮች ምክንያት ሆስፒታል ተኝተው ነበር? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 216 ይሂዱ** |
| 215 | ለጥ.ቁ. (Q214) አዎን ከሆነ, ሆስፒታል ተኝተው ለመታከምዎ ምክንያቱ ምን ነበር? | 1. ከፍተኛ ማቅለሽለሽ እና ማስመለስ<br>2. ማስወረድ (ዕንሱ በማሕፀን በህይወት እያለ) 3. በእርግዝና ጊዜ መድማት<br>4. የስኳር ህመም 5. ወባ<br>6. የሽንት ቧንቧ ኢንፌክሽን<br>7. የጉበት ቫይረስ (ሄፓቲቲስ)<br>8. የሽርት ውሃ ያለጊዜ መፍሰስ<br>9. የደም ማነስ 10. የደም ግፊት<br>99. ሌሎቹ ደግሞ _____ | |
| 216 | በመጀመሪያ የቅድሜ ወልዲ ጉብኝትዎ ስለ እርግዝና አደገኛ ምልክቶች ተነገሪዎት? | 1. አዎ 2. አይ | |
| 217 | በእርግዝና ወቅት የሚከሰቱ አደገኛ ምልክቶች ምንድን ናቸው?<br>**(ሁሉም የሚያውቁትን አደገኛ ምልክት ይጥቀሱ)** | 1. ደም መፍሰስ<br>2. ከባድ ራስ ምታት<br>3. ሽታ ያለው የብልት ፈሳሽ<br>4. የዕይታ መደብዘዝ<br>5. የእግር እብጠት<br>6. የደረት ህመም 7. ትኩሳት<br>99. ሌሎቹ ደግሞ ..... | **ምርጫ አይነበብም** |

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| 218 | የመንታ እርግዝና ታሪክ አለዎት? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 220 ይሂዱ** |
| 219 | ለጥ. ቁጥር Q218 አዎ ከሆነ ስንት ጊዜ ነው? | _____ ጊዜ | |
| 220 | ከማህፀን ውጭ እርግዝና አጋጥምዎት ያውቃል? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 222 ይሂዱ** |
| 221 | ለጥ. ቁጥር Q220 አዎ ከሆነ ስንት ጊዜ ነው? | _____ ጊዜ | |
| 222 | በማህፀን ሞቶ የተወለደ ፅንስ አጋጥምዎት ያውቃል? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 224 ይሂዱ** |
| 223 | መልሱ ለ Q222 አዎ ከሆነ, ስንት ጊዜ ነው? | _____ ጊዜ | |
| 224 | ፅንስ ማስወረድ ደርሶብዎት ያውቃል? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 227 ይሂዱ** |
| 225 | ለ Q224 አዎ ካሉ, ምን ዓይነት የፅንስ ውርጃ ነው? | 1. ድንገት በራሱ ጊዜ የፅንስ መጨንገፍ<br>2. ሆን ተብሎ ፅንስ ማስወረድ በባለሙያ<br>3. በመንደር ውስጥ ሆን ተብሎ ፅንስ ማስወረድ በልምድ የባህል ሀክም | |
| 226 | መልሱ ለ Q224 አዎ ከሆነ, ስንት ጊዜ ነው? | _____ ጊዜ | |
| 227 | በቀዶ ጥገና ወልደው ያውቃሉ? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 229 ይሂዱ** |
| 228 | መልሱ ለ Q226 አዎ ከሆነ, ስንት ጊዜ ነው? | _____ ጊዜ | |
| 229 | ባለፉት እርግዝናዎችሽ ወቅት የተወሳሰበ የጤና ችግሮች ገጥመውሽ ያውቃሉ? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 231 ይሂዱ** |
| 230 | ለ Q229 አዎ ካሉ, ምን ዓይነት የተወሳሰበ የጤና ችግሮች ናቸው ባለፉት እርግዝናዎችሽ ወቅት ያጋጠሙሽ?<br><br>**/ተረጋግተው አስበው ይመልሱ/** | 1. የደም ግፊት<br>2. በእርግዝና ወቅት መድማት<br>3. ከወሊድ በኃላ ደም መፍሰስ<br>4. የተራዘመ ምጥ<br>5. የሽርት ውሃ ያለጊዜ መፍሰስ<br>6. ዝቅተኛ ክብደት ያለው ህፃን ወለድኩ<br>7. በተፈጥሮ የጤንነት መዛባት ያለው ህፃን ወለድኩ<br>8. ከወሊድ በኋላ እንፈክሽን<br>99. ሌላ ደግሞ ይጠቀስ..... | |

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| 231 | እርስዎ ተገርዘዋል? | 1. አዎ 2. አይ | |
| 232 | በዚህ ሆሲቲታል ስተኙ የነበሩበት ሁኔታ | 1. ነፍሴ ጡር 3. ምጥ ላይ ሆኜ<br>2. ከወሊድ በኋላ 4. ከውርጃ በኋላ | |
| 233 | ከእርግዝና በፊት ማንኛውንም የእርግዝና መከላከያ ዘዴ ተጠቅመው ነበር? | 1. አዎ 2. አይ | **አይ ከሆነ ወደ 301 ይሂዱ** |
| 234 | ለ ጥ.ቁ. 233 አዎ ካሉ, ምን ዓይነት ዘዴ ተጠቅሙ? | 1. በማህጸን የሚቀመጥ (IUCD)<br>2. በግንድ የሚቀበር (Implants)<br>3. በመርፌ የሚሰጥ የወሊድ መከላከያ<br>4. የሚወጥ የወሊድ መከላከያ እንክብል<br>5. ኮንዶም 6. የካሌንደር ዘዴ<br>7. ከወሲብ በኋላ የሚወጥ (Postpill)<br>8. ውጭ ማፍሰስ<br>99. ሌላ ደግሞ ይጠቀስ..... | |

**ክፍል ሦስት፡- ያለፈ ጊዜ በሽታ ታሪክ**

| ተ.ቁ | ጥያቄዎች | መልሶች | ወደ... ይሂዱ |
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| 301 | ካሁን በፊት ታመው ያውቃሉ? | 1. አዎ 2. አይ | |
| 302 | ካሁን በፊት ደም ግፊት ታምሚያለሁ | 1. አዎ 2. አይደለም | |
| 303 | የስኳር በሽታ አለብኝ | 1. አዎ 2. አይደለም | |
| 304 | ካሁን በፊት የደም ማነስ ይዞኝ ያውቃል | 1. አዎ 2. አይደለም | |
| 305 | የአስም በሽታ አለብኝ | 1. አዎ 2. አይደለም | |
| 306 | የልብ በሽታ አለብኝ | 1. አዎ 2. አይደለም | |
| 307 | የነቀርሳ በሽታ (ካንሰር) | 1. አዎ 2. አይደለም | |
| 308 | የኩላሊት በሽታ | 1. አዎ 2. አይደለም | |
| 309 | ሌላ ካለ ይጠቀስ..... | | |

## ክፍል አራት፡- ሦስቱ መዘግየቶች እና የሪፈራል ሁኔታ

| ተ.ቁ | ጥያቄዎች | መልሶች | ወደ... ይሂዱ |
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| 401 | የሪፈራል ሁኔታ /ሪፈር ተደርገው ወይስ በራስዎት ጊዜ መጥተው ነው/? | 1. በራሴ ጊዜ መጥቼ ነው<br>2. ከለላ ተቋም ሪፈር ተደርጌ ነው | መልሱ 2 ከሆነ ወደ 403 ይሂዱ |
| 402 | ከሌላ ተቋም ሪፈር ተደርጌው ከሆነ፤ ከየት ነው ሪፈር የተደረጉት? | 1. ከጤና ክላ 2. ከጤና ጣቢያ<br>3. ከመጀመሪያ ደረጃ ሆሲፒታል<br>4. ከጠቅላላ ሆሲፒታል<br>5. ከሌላ የሪፈራል ሆሲፒታል<br>6. ከግል ኪልኒክ 7. ከግል ሆሲፒታል<br>8. በቀጥታ ከልምድ አዋላጅ<br>99. ሌላ ካለ ይጠቀስ..... | |
| 403 | ወዴ ሆሲፒታል ለመሄድ ውሳኔ ላይ ለመድረስ የነበረው መዘግየት ምን ያህል ነበር? | .....ደቂቃ ወይም .....ሰዓታት ወይም .....ቀናት | |
| 404 | ለውሳኔ ለመዘግየትዎ ምክንያቱ ምን ነበር? | 1. ለበሽታው አደገኛነት ዝቅተኛ ግምት ስለሰጠሁ<br>2. ህመም / ችግር እንደገጠመኝ ስላልተገነዘብኩ<br>3. ከጤና ተቋማት ጋር ያለኝ መጥፎ ትዝታ<br>4. ውሳኔውን ለመወሰን አስፈላጊ የሆኑ ሰዎች ባአጠገቤ ስላልነበሩ<br>5. ወደ ጤና ተቋም ለመሄድ በውሳኔ አወሳሰን ላይ አለመግባባት ስለነበር<br>99. ሌላ ካለ ይጠቀስ..... | |
| 405 | ልክ ወደ ሆሲፒታል ለመሄድ ውሳኔ ላይ ከደረሱ በሓላ ወደ ሆሲፒታል ለመድረስ ምን ያህል ዘገዩ? | .....ደቂቃ ወይም .....ሰዓታት ወይም .....ቀናት | |
| 406 | ለመዘግየትዎ ምክንያትዎ ምን ነበር? | 1. ገንዘብ ስላልነበረኝ 2. ትራኒስፖርት አጥቼ<br>3. የጤና ተቋም በቅርብ ስለሌለ / እሩቅ ስለሆነ<br>99. ሌላ ካለ ይጠቀስ..... | |
| 407 | የእርስዎ መኖሪያ ከዚህ ሆሲፒታል በእግር ምን ያህል ይርቃል? | .....ሰዓታት ወይም በደቂቃ .....ደቂቃ | |

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| 408 | ወደዚህ ሆሲፒታል እንዴት / በምን መጡ?<br><br>/ከአንድ በላይ መልስ ይቻላል/ | 1. በግል መኪና 2. በግል ሞቶር<br>3. በአምቡላንስ 4. በህዝብ ትራንስፖርት<br>5. በፊረስ / በአህያ 6. በእግር<br>7. ለሎች ሰዎች ተሸክመውኝ<br>99. ሌላ ካለ ይጠቀስ..... | |
| 409 | ሆሲፒታል ከደረሱ በኋላ በጤና ባለሙያ ለመታየት ምን ያህል ጠበቁ? | .....ደቂቃ ወይም .....ሰዓታት ወይም .....ቀናት | |
| 410 | በዚህ እርግዝና ወቅት የእናቶች ማቆያ ቤት ተጠቅመው ነበር? | 1. አዎ 2. አይ | |

አመሰግናለሁ!!

**DECLARATION**

I, the undersigned, declare that this thesis is my original work and has never been presented for a degree in any other university and that all sources of materials used for this thesis have been duly acknowledged. The advisors and examiners' comments have been duly taken in to account.

Name of the student: _____

Date of submission._____ Signature _____

This thesis has been submitted with my approval as University advisor

APPROVED BY:

| | | |
|---|---|---|
| _____ | _____ | _____ |
| First advisor | Signature | Date |
| _____ | _____ | _____ |
| Second advisor | Signature | Date |
| _____ | _____ | _____ |
| Internal examiner | Signature | Date |