ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DETERMINANTS OF STILL BIRTH AMONG MOTHER WHO GAVE BIRTH IN SELECTED HOSPITAL OF SOUTH WEST, ETHIOPIA, 2019

BY: MELESE TEBEKA (BSc.)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL REQUIREMENTS OF FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH IN REPRODUCTIVE AND FAMILY HEALTH.

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APPROVED BY THE BOARD OF EXAMINERS

Approved by the examining board	Signature	Date
Chairperson, Department Graduate Committee	_____	_____
Advisors:		
Meselech Assegid **(**MPH, Ph.D. Fellow)	_____	_____
Nigussie Assefa (BSc,MPH)	_____	_____
Internal examiner:		
Gudina Egata(Ph.D)	_____	_____
External examiner		
	_____	_____

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Abbreviations and Acronyms

AOR	Adjusted Odds Ratio
APO	Adverse Pregnancy Outcome
ACOG	American College of Obstetricians and Gynaecologist
ANC	Antenatal Care
APH	Ante Partum Haemorrhage
CHTN	Chronic Hypertension
CI	Confidence Interval
EMONC	Emergency Obstetric and Newborn Care
ENAP	Every Newborn Action Plan
HD	Hypertensive Disorder
HDP	Hypertensive Disorder of pregnancy
ICD	International Disease Classification
LFD	Late Fetal Death
LMIC	Low- and Middle Income Countries
MDG	Millennium Development Goal
PPH	Postpartum Haemorrhage
PROM	Premature Rupture of Membrane
SNNPRS	South Nation Nationality People Regional State
SSA	Sub Sahara Africa
SDG	Sustainable Development Goal
WHO	World Health Organization

Abstract

Background: The cause of stillbirth is often unknown, but can be attributable to various causes; hypertensive disorders and obstetric factors supposed to complicate pregnancy and may cost the life of the fetus. Increased risk of stillbirth in most conditions is not precisely known and available few research findings are inconsistent & its effect is not well established.

Objectives: To identify the determinants of still birth among mother who gave birth in Mizan Tepi University Teaching Hospital South West Ethiopia.

Methods: Facility based unmatched case-control study design was employed from January2018 to June2019, (287 cases and 574 controls) was selected using systematically random sampling methods. Double population proportions formula with a 1:2 case to control ratio was used to calculate sample size with 95% confidence interval and 80% power. The data was collected from clinical records of mother's a using data collecting checklist. Epi data version 4.4.2.1 was used for data entry, and analysis was done by SPSS version 21 statistical software. Descriptive analysis such as frequency, percentage and chi-square test were done. For the inferential analysis, a multivariable analysis was done. Statically significant was used at a p-value $\leq$0.05both for the univarible and multivariable analysis.

Result: women who had hypertensive disorder were 1.76 times at risk to have stillbirth than women who had no hypertensive disorder (AOR: 1.76: 95%CI :(1.06, 2.9). In addition, women who had first antenatal care at third trimester were 4 times at higher risk to have still birth than women who had first antenatal care at first trimesters (AOR: 4, 95%CI: (1.54, 11). Women who had more than four children were 2.6 times at higher risk of having still birth compared to with women one child (AOR: 2.6, 95%CI: (1.2, 5.7). And also, the odds of having still birth was found to be higher in women who had blood group O than women who had blood group A (AOR: 1.7, 95%CI: (1.057, 2.8). Women who received iron for less than three months were 1.8 times at risk of having stillbirth than women who received iron for more than three months (AOR: 1.8, 95%CI: (1.031, 3.15).

Conclusion: According to the findings of this study, we conclude that a hypertensive disorders and obstetric factors were risk factors for stillbirth. Therefore, it is very important to give special attention to women with hypertensive disorder, multipara women, timing of antenatal care initiation and iron supplementation.

1. INTRODUCTION

1.1. Background

The American College of Obstetricians and Gynaecologists (ACOG) defines stillbirth as delivery of fetus which shows no signs of life e.g. absence of breathing, heart beats, pulsations in umbilical cord and no voluntary movement of muscle. International classification of diseases (ICD) classifies late fetal deaths (greater than 1000 g or after 28 weeks) and early fetal death 500 to 1000 g or 22–28 weeks(1). However, definition of stillbirth varied between countries and even between studies conducted in the same country .World health organization (WHO) also recommended stillbirth greater than or equal to 28weeks of gestation or ≥1000g for international comparison(2). Ethiopia has also considered a still birth if fetal loss is >28 weeks of gestation.

Stillbirth is the main agenda of sustainable development goal (SDG) although was not incorporated in the millennium development goals (MDG) for women's and children's health. Stillbirth is included as one of the core indicators in the every women and every child health, by 2030 there should no more than 12 stillbirth's per1000 total live births.

Globally stillbirth rate was 18 per1000 live births in 2015 though the rate varied significantly between countries and across country depending on their income categories. However, large proportion (98%) of the stillbirth rate concentrated among low- and middle-income countries (LMICs). Even from the LMICs, about 77% of the burden was in Sub-Saharan Africa (SSA) and South East Asian countries. In comparison, national still birth rates in Western Europe was about less than 2 per 1000 total live birth while the SSA rate was about more than 30 per 1000 total live birth, in 2015.Though we found that the magnitude of stillbirth rate was very high in SSA, the reduction remains the slowest compared with other regions (2-4).

A study in 2016 reported that Ethiopia had a national still birth rate of 33 per thousand births with regional rate variations, such as South Nation Nationality and People Regional State (SNNPRS) had more than two folds of the national still birth rate of 85 per thousand births(5). The cause of stillbirth is often unknown, but can be attributable to various causes.

Factors associated with stillbirth are multidimensional and complex and the most common factor identified so far in most studies in developing countries were HD, obstetric conditions, placental abnormalities, fetal genetic abnormalities, infection ,umbilical cord abnormalities, other maternal medical conditions and stillbirth of unknown cause is also one that cannot be explained by any identifiable cause(1, 2, 5, 6).

Focusing on prevention of stillbirth is very important unless the global Newborn action plan will not be achieved, that aimed to reduce stillbirth rate of less than10/1000 births by 2035. In order to achieve this target researching of stillbirth is essential.

1.2. Statements of the problem

Different studies identify common factors associated with stillbirth in developing countries these includes HDP ,maternal age, parity, inadequate antenatal care, multiple gestation, preterm birth ,infection ,obstructed lab our, history of stillbirth and anaemia(2, 6, 9, 10).

According to research done in South Africa there is no significant effect of the gestational age at first ANC visit on stillbirth in contrast research conducted in Southern Nigeria show that the later the gestational age at first ANC the higher the fetal mortality(20,22).

Study done in Pakistan demonstrate that woman with hypertensive disorder(HD) are at much higher risk of developing stillbirth than non-hypertensive woman(8, 11-13).Women who had previously suffered from stillbirth were more likely to have had stillbirth even though evidence regarding the recurrence risk of stillbirth remains controversial (13, 14).

Obstetric and Medical factors are complicating pregnancy and endanger the life of the fetus during pregnancy. Among Medical risk factors Hypertensive disorder of pregnancy was the most common risk factor which has been associated with still birth. And it was found in 8% of pregnancies and may affect as many as 20% of pregnancies. Hypertensive disorder of pregnancy include preeclampsia, gestational hypertension and chronic hypertension (7, 8).

The women who had previously suffered from stillbirth were more likely to have had a stillbirth (4.6% versus 1.4%). Stillbirths in the first two pregnancies may therefore have common biological causes beyond any known risk factors for stillbirth that may develop during the second pregnancy. Evidence surrounding the recurrence risk of unexplained stillbirth remains Controversial (13, 14)

Factors associated with stillbirth are complex and multidimensional. Finding of research done SNNPRS showed that stillbirth birth rate 85 per thousand total births which is more than national stillbirth rate of Ethiopia(5, 8). Increased risk of stillbirth in most conditions is not precisely known and available few research findings are inconsistent & its effect is not well established

1.3. Significance of the study

The study will give information on the association of stillbirths and hypertensive disorder and obstetric factors in the Bench Maji Zone, South West Ethiopia .Enabling the family for having healthy baby should be considered significantly at a public level. From this health view there is a limited information or evidence on stillbirth and at the same time prevention of stillbirth benefits newborn health and avoid experiencing the mother another risk of pregnancy or stillbirth. The findings of this study will help to build awareness and the knowledge of health professionals, aid policy decision on stillbirth prevention and will be used to develop new strategies. Also, the study will contribute to increase knowledge of a very few available literature on association of stillbirth and hypertensive disorder and obstetric factors. In addition, the finding of the study could also be a baseline for future studies, the fact that stillbirth is complex and its etiology unexplained

2. LITERATURE REVIEW

2.1. Determinants of stillbirth

Determinants of stillbirth are multidimensional and complex and the most common factor identified in studies in developing countries were hypertensive disorders, placental abnormality, fetal genetic abnormalities ,infection, previous stillbirth, placenta abruption, maternal age, parity, inadequate antenatal care ,placenta abruption ,obstructed labour, pre mature rupture of membrane PROM, cord accidents, being grand multi-Para ,and anaemia(1, 4, 12, 16, 17, 21).

2.1.1. Medical Risk factors associated with stillbirths

2.1.1.1. Hypertensive disorder of pregnancy

Preeclampsia is a common obstetric disorder, occurring in 2-7% of pregnancies and is the main factor causing stillbirth, increasing the odds by 2-fold. The rate of stillbirth in women with preeclampsia in high-income countries is estimated at 0.3–1.9% and fetal risk with preeclampsia was 86-fold higher in week 26, even in week 34, fetal risk was increased more than 7-fold. This elevated fetal risk is plausibly due to the disorders of placental function that cause preeclampsia or to systemic maternal responses to inadequate placental attachment (18, 19).

Study done in Pakistan identifies that woman with hypertensive disorder are 12 times much higher probability of developing stillbirth than non-hypertensive woman and risk of stillbirth was 3.6/1000 overall and 5.2/1000 among pregnancies with preeclampsia. Relative risk of stillbirth was markedly elevated with preeclampsia in early pregnancy. Although study done in Ethiopia shows wide-ranging prevalence of HDP was observed across the different studies in Ethiopia, a prevalence of 1.2% in nation-based study to 18.25% in SNNPR was observed. Another study done in Jima assesses that 42 among 146 delivery stillbirths yielding stillbirth rate of 27.5%. Of these still births, 38% and 36% were among mothers who had severe preeclampsia and eclampsia (8, 11-13).

The proportion of stillbirths was more than 4-fold higher than early neonatal deaths: (81%) stillbirths versus (18.9%) early neonatal deaths. The distribution of pre-natal mortality by type of HDP was preeclampsia (49.4%), eclampsia (44.4), the majority of pre-natal deaths (81%) occurred among women with ante partum onset of HDP(8, 20).

Placental insufficiency is often implicated in stillbirth, particularly in setting of in hypertensive disorder of pregnancy placental insufficiency is when a maladaptive placenta fails to provide adequate oxygen and nutrients to the growing fetus, leading to both adverse obstetric sequelae and fetal programming(18)

2.1.1.2. Anaemia

The risk of stillbirth decreased linearly per unit increase in haemoglobin concentration at first visit and increased at 28 weeks. Compared with women with haemoglobin≥110 g/l, the risk of stillbirth was fivefold higher in women with moderate- severe anaemia (haemoglobin <100 g/l) at first visit. Number of studies has demonstrated that low maternal haemoglobin or maternal anaemia to be a risk factor for stillbirth. Therefore, there is a need to delineating the pathways through which maternal haemoglobin could affect stillbirth. In addition, to testing known pathways, study showed that several mechanisms are still unknown and need further investigation. However, it is important to acknowledge that path-models are not causal models and therefore, the findings of study are hypothesis-generating rather than confirmed causal pathways (22)

2.1.2. Obstetric determinants of stillbirth

2.1.2.1. Antenatal care

Stillbirths were more likely where the woman had no care during the pregnancy. However, pregnancy care was not associated with intra-partum stillbirths. Women in the poorest quintile were more likely to have no care in the current pregnancy than women in the richest quintile. Women in the poorest quintile were also more likely to have received poor quality pregnancy care. The duration of ANC attended also impacted pregnancy outcome. Women without adverse outcomes attended ANC for a longer period than women with adverse outcomes. Attending <4

ANC visits was significantly associated with still birth. According research done in Cape Town indicates no significant effect of the gestational age at first ANC visit on the odds of having a stillbirth, unlike research conducted in Southern Nigeria which show that the later the gestational age at ANC the higher the fetal mortality rate(12, 23, 24).

2.1.2.2. Parity

Parity significantly influenced stillbirth. Study done in Ethiopia states significant association of primi-gravida with HDP, higher risk of HDP among primigravida women than multi-gravida ,also another study showed a lower risk of HDP among primigravida women while few studies showed non-significant difference between the two groups(25-27). However, the odds of experiencing a stillbirth outcome increased with increasing order of parity. Women with >5 children were 4 times more likely to experience a stillbirth outcome compared with women with one child, 60% increase in risk for mothers with a parity of 3 or higher. There was a progressive increase in the risk for stillbirth for nullipara, in comparison, low risk of stillbirth in primiparous mothers has been reported from developed countries. However the causes and mechanisms of stillbirth among null Para is not established it needs further investigations (15, 23, 24).

2.1.2.3. Previous stillbirth

The risk of stillbirth in the second pregnancy was increased if the first pregnancy ended in stillbirth, the evidence was less clear cut, also unexplained stillbirth after any stillbirth (explained or unexplained) reported a greatly increased risk of recurrence. The women who had previously suffered from stillbirth were more likely to have had a stillbirth (4.6% versus 1.4%). Stillbirths in the first two pregnancies may therefore have common biological causes beyond any known risk factors for stillbirth that may develop during the second pregnancy. Evidence surrounding the recurrence risk of unexplained stillbirth remains controversial (13, 14).

2.1.3. Socio-demographics determinants of stillbirths

2.1.3.1. Maternal age

Advanced women age was associated with stillbirths. Stillbirths were more frequent at either very young or very old age. Aged over 40 at delivery were at increased risk of stillbirth. The exact age at which stillbirth outcome for older mothers becomes significant is unclear. Extensive assessment using age as continuous variable is limited. The risk of stillbirth birth outcome was highest at ages of 14 years, and then steadily increased to ages of over 44.Where as another study done in Cameroon states maternal age ≥35 years increasingly associated with still birth .The age of women who had fresh stillbirths was significantly lower than those of women who had macerated stillbirths(30-33).

2.1.3.2. Referral

A significant association was found between referral and still birth. Women who were referred from anther hospital were at increased risk of having still birth. This increases the risk of stillbirths especially if the woman is unable to access care immediately. A study in Nigeria found that late referral was a contributor to delivery of stillbirths(34, 35,43)

2.1.4. Conceptual framework

Conceptual frame work prepared from available reviewed literature. Factors which affects stillbirth are classified in to four main categories; Socio-demographic factors, maternal medical factors, Obstetrics factors and factors which associate with stillbirth listed below under each category (Figure 1).

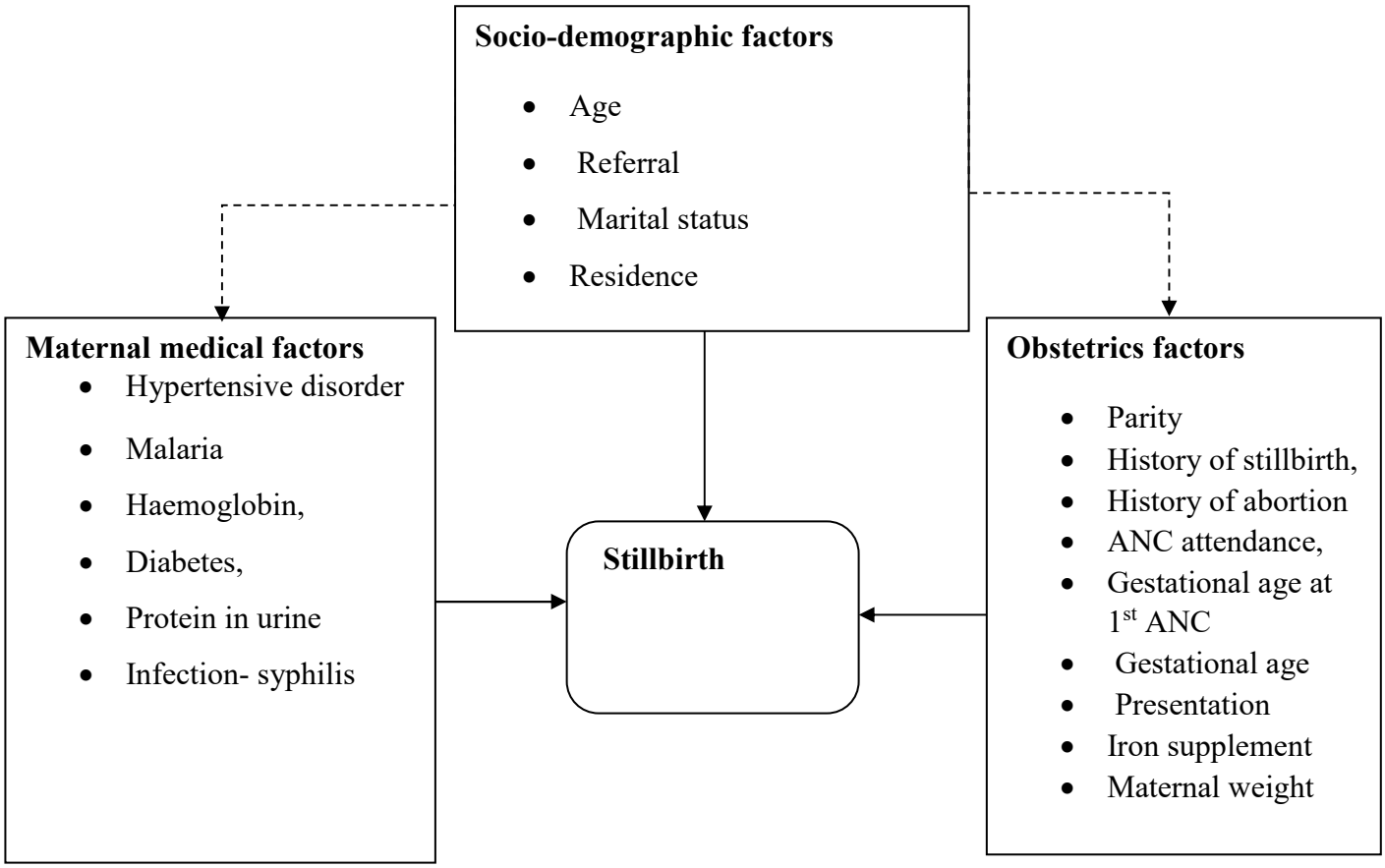

Figure 1: Conceptual framework which shows the relation between stillbirth, medical and obstetric factors which is adapted after reviewing the available literature

3. OBJECTIVE

3.1. General objective

3.1. To identify the determinants of still birth among mother who gave birth in Mizan Tepi University Teaching Hospital South West Ethiopia,2019

Specific objective

1. To examine the determinants of still birth among mother who gave birth in Mizan Tepi University Teaching Hospital South West Ethiopia,2019

4. METHODS AND MATERIALS

4.1. Study area

The study was conducted in Bench Maji Zone. Bench Maji Zoneis one of the 16 zones in SNNPRS located 561 km away from Addis Ababa, the capital city of Ethiopia. It is found in Southwest direction and Ethiopian population census 2007 estimated the populations of the Zone 829,493 of which 418,213 are women, 129,500 are under five year and 26,462 are under 1 year. The expected number of households in the zone is about169,284 and the primary health service coverage of the zone is 92.6% covering in the catchment area of 19965.8 Km with majority 86% of the population living in the rural areas. The zone includes a city administration (MizanTeferi), 10 Woreda (districts), 246 rebels (229 rural and 17 urban). There are two functional Hospitals (MizanTepi Teaching University Hospital and Bachuma Primary Hospital) Mizan-Tepi Teaching University Hospital was General Hospital it is upgraded to Mizan Tepi-University Teaching Hospital since 2016. The zone has 44 health centres and 182 functional health posts; in addition, there exist one Health Sciences College and one Vocational College. Mizan-Tepi University Teaching Hospital is a secondary level service point with labour and Maternity Wards. The facilities provide Comprehensive Emergency Obstetric and Neonatal Care (EmONC) and other nongovernmental health facilities exist in the zone.

4.2. Study period

The study was conducted from January2018 to June2019

4.3. Study design

A facility based unmatched case control study design was used

4.4. Population

4.4.1. Source population

Records of all mothers who found in the Zone and gave birth in Mizan–Tepi University Teaching Hospital between 2014 and 2018

4.4.2. Study population

Cases: mothers whose birth outcome was stillbirth in Mizan–Tepi university Teaching Hospital from January 2014 to December2018

Controls: mothers whose birth outcome was live birth in Mizan–Tepi University Teaching Hospital from January 2014 to December 2018

4.5. Inclusion and exclusion criteria:

4.5.1. Inclusion criteria

Records of all mothers who gave birth in Mizan–Tepi university Teaching hospital from January2014-December 2018 and meets the following criteria were included in the study

A mother who gave single a live birth

A mother whose age was between 15–49 years

Documentation of intra-partum care available in the facility

Known status of birth outcome

And if a mothers had history of one ANC prior to admission for intra-partum care

4.5.2. Exclusion criteria

Those mothers who had delivered in Mizan–Tepi University Teaching Hospital between January2014 to December 2018

Whose records missed during data collection and

Whose records contain incomplete information were excluded from the study

4.6. **Sample size determination**

Sample size was determined using two population formula as described below.

$$n = (\frac{r+1}{r}) \frac{(p)(1-p)(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

Where

n= the number of cases

r = ratio of control to cases

p= average proportion of exposure among cases and controls,

p1=the proportion of exposure among cases,

p2=the proportion of exposure among controls,

ZB= is power for which 0.84 for 80 % power and

Zα/2 level of significance 95% confidence interval or 1.96,P1-p2, Minimum meaningful difference in proportions between case and control groups.

To increase the power of the study, sample size was calculated for eight variables that where considered to be significantly associated with stillbirth from previous studies.

Caesarean section, HD, obstructed labor, residence, parity, antenatal care visit, maternal age and ante partum haemorrhage were considered to calculate required final sample size by revising different literatures. In order to calculate sample size all, the above exposure variables were considered and parity was chosen as an independent variable because it gives maximum sample size as compared to other exposure variables

The sample size was calculated by (EPI info 7.2.2.2) software package by considering the percent of controls exposed among the controls is 11.5%, with 1.8 odds. The following assumption was used to calculate the sample size 95% CI, 80% power of the study and control to case ratio of 2:1(Table1)

Table1: Sample size determination to study the determinants of stillbirth in Mizan Tepi University Teaching Hospital, South West Ethiopia, 2019.

S no	Variables	Proportion of cases	Proportion of controls	Sample size	Minimum odds ratio	References
1.	Caesarean section	11.9%	25.2%	341	0.4	
2.	HD	6.4%	18%	302	3.2	
3.	Obstructed labor	19%	8.9%	440	2.4	
4.	Residence	18.4%	32%	399	0.48	
5.	Parity	19%	11.5%	863	1.8	*Bayou G & Berhan Y.,2012*
6.	ANC	66.7%	80%	411	0.5	
7.	Maternal age	57.5%	42%	393	1.87	
8.	Ante partum haemorrhage	12.7%	6.2%	750	2.2	

4.7. **Sampling procedures**

Mizan -Tepi University Teaching Hospital was purposively selected since it is the only health care settings which provide comprehensive Emergency Obstetric and Neonatal Care including referred clients in the zone. Within the facility, mothers (cases) were identified from the labor and delivery registers. There were15814 live birth and 1032 still birth in the study facilities during study period then,1032 /287=4 every still birth was selected using systematic sampling methods after that one control before case and one control after case selected until 861 maternal charts was reviewed, 287cases and 574 controls.

4.8. Variables

Dependent variable

Stillbirth

Independent variables

Socio-demographic factors

Age, referral, marital status, residence

Maternal medical factors

Hypertensive disorder, malaria, haemoglobin, diabetes, protein in urine, infection- syphilis

From medical factors only Hypertensive disorder was considered

Obstetrics factors

Parity, history of stillbirth, history of abortion, ANC, gestational age at 1st ANC, Gestational age presentation, Iron supplement an women weight

4.1. Operational definitions

Stillbirth: is defined as a baby born after 28 weeks of gestation who did not any time after delivery, breath or show any other sins of life(1)

Hypertensive disorders in pregnancy is multisystem disease and which includes

Preeclampsia:-Rising of blood pressure with significant protein-urea was enough to diagnose preeclampsia:- Pre-existing hypertension: this is defined as hypertension that was present either pre-pregnancy or that develops at before 20 weeks gestation,The development of an elevated blood pressure during the second half of pregnancy without protein urea was used to diagnose gestational hypertension(8, 20).

4.2. Data collection tools and procedures

Data collection tool was developed by reviewing available related literatures. The data was extracted from clinical records of mother a using a structured data collecting checklist in line with the research objectives. Important variable which is considered to be exposure to stillbirth was extracted. The checklist had three parts. The first section was about socio-demographic characteristics and the second section was used to assess obstetric factors where as the last

section of the checklist was on maternal medical health problem of the mother. Important information was retrieved from charts of mother who gave birth in Mizan–Tepi University Teaching hospital from January2014 to December2018.The data was extracted by two midwives nurse (diploma) for one month and supervised by one midwives (BSc). Training was given for two days for reviewer and supervisor before actual data collection focused on objectives of the study and techniques of data collections and data quality was also assured by strict supervision and data cleaning.

4.3. Data management

During data extraction (5%) of the completed check list containing the raw data was randomly selected and checked to identify errors or omissions and corrective measure was taken and the process was throughout data coding, entry and analysis. Training was given to the reviewers and supervisors to have a mutual understanding about the research objectives. Every chart was checked for its completeness and proper documentation. Reviewers were oriented to write charts number on the data collection check list so any errors were easily traced back using the cards number. The data was collected for one month from March to April 2019. The collected data were cheeked for consistency immediately after collection by reviewers, supervisors & principal investigators on a daily basis.

4.4. Data analysis

Data were entered into Epi data 4.4.2.1and the data analysis was done on spss 21 software. Frequency was used to see the overall distribution of cases and control of reviewed chart with variables under the study. Descriptive statistical analysis was done such as proportion, table & graph

Bivarible logistic regressions followed by multiple logistic regressions were done. Those variables whose p value were 0.05 or below were recruited for the multivariable logistic regression, the multivariable analysis was done to assess the effect of independent variables on dependent variable and to control the confounders. Odds Ratio and 95% Confidence Interval (CI) were used to measure the association between independent and outcome variable. Variables with

P-value <0.05significance level were considered statistical significance. The Hosmer -Lemeshow goodness of fit test was used to check the model fitness. Finally, the results are presented in table, text and graphs narration.

4.5. Ethical considerations

Before the data collection ethical clearance and supportive latter was obtained from the Research Ethics Committee of the School of Public Health, College of Health Sciences in Addis Ababa University. Since it was secondary data taken retrospectively I was not gotten any informed consent for study subjects instead of them I was gotten informed written consent from Mizan–Tepi University Teaching hospital and the concerned respective management bodies.

Procedure: all maternal charts of birth registration who attended delivery service from January2014 to December 2018 in Mizan–Tepi university Teaching hospital were selected and a review of the required information from the maternal records was made using checklist.

Confidentiality: to ensure confidentiality, maternal delivery records was coded and accessed only by nurse data collectors working in the hospital. No other party will access the data and the extracted data would lock by password.

4.6. Dissemination of results

The findings of this research will be submitted to Addis Ababa University Department of Reproductive Health and Health Service Management for partial fulfilment of the requirements of degree of Master in Family and Reproductive Health Science. The finding will be also disseminated to concerned stock holders (national and international conference, publication on peer-reviewed journals, Bench Maji Zone health office and minister of health.

5. RESULT

5.1. Socio-demographic characteristics

A total 861 respondents were included in the study with cases to control ratio of 1:2(287 cases and 574 controls). The median age of the mother among cases was 28 years while the median age of the mother among control was 26 respectively. The majority (52.6%) of the participants was aged 25-34 years; 35.3% were aged 15-24years, and 12% were aged at least 35years. The proportion Still birth was more than one third 116(40%) among mother's whose age was below 24 years in case and 188(32%) among control. Likewise, 79(27.5%) of still birth occurred in mother's age greater than 35 years in case and 25(4.4%) among control. Concerning residence 361(41.9%) of participant were rural resident of mother who were rural resident 173(48%) of their birth outcome were stillbirth while 500(58%) participant urban resident of which mother who were rural resident 114(39.7%) of their birth outcome were stillbirth.

Regarding referral status168 (19.5%) of participant mother were referred to study hospital from which 116(69%) of their birth outcome were stillbirth and 52(31%) were live birth while 693(80.5) of participant were directly admitted to study hospital of which171 (20.7%) of their birth outcome were stillbirth. Marital status 278(96.9%) mother with stillbirth were married however 9(3.1%) were single and as well 566 (98.6%) of control mother were married the rest 8 (1.4%) were single (Table2).

Table 2: Socio-demographic characteristics of the respondents who attended delivery service in Mizan–Tepi university Teaching hospital, Bench Maji Zone, 2019(N=861)

Variables	Cases (%), N=287	Controls (%), N=574	Chi- square(X^2)	PV
Women age(years)			122	.001
Median	28	26		
15-24years	116 (40.40)	188 (32.80)		
25-34 years	92 (32.00)	361 (62.90)		
≥35 years	79 (27.50)	25 (4.40)		
Residence			59	.001
Urban	114 (39.7)	386 (67.20)		
Rural	173 (60.30)	188 (32.80)		
Referral			119	.001
Yes	116 (40.40)	52 (9.10)		
No	171 (59.6)	522 (90.9)		
Marital status			5.2	
Married	278 (96.90)	566 (98.60)		.07
Single	9 (3.10)	8 (1.40)		

COR crudes odds ratio, **SD** standard deviations **, Percentage is calculated from column total

5.2. Obstetrics characteristics of respondents

Table3 showed obstetrics characteristics of respondents. The mean weight of mother at antenatal care one was 57.5kg for cases and 61kg for control while the mean weight was 63.6kg at antenatal care two for cases and 68.5 kg for control, respectively. There was significant difference in weight among cases and controls, about 97(33.8%) cases had weight less than 53kg and 92(16%) control had weight less than 53 kg.

About (20%) of the mother had ANC one the majority (70%) of the mother had ANC two and more whereas, (10%) of mother had at least ANC four. Approximately 17% of the mother had their first ANC in the first trimesters of which 12% of birth outcome were stillbirth. Similarly 20% of mother had their first ANC at third trimesters from which 66% of their birth outcome was stillbirth. Forty-nine (6%) of mother had mal-presentation, of which, 12 (24.5%) of their birth outcome were still birth.From those who had stillbirth history, 29(72.5%) of the mother had stillbirth, while11 (27.5) of stillbirth were from mother who had no stillbirth history. Proportion of still birth from those whose gestation less than 37 weeks of gestation were 358(41.8%), of which, 155 (43.3%) of their birth outcome were still birth whereas,132(26%) of stillbirth were found in gestational age of greater than37weeks.

Forty-nine (53%) still births were directly related to obstetric complication, whereas, 238(31%) of still birth were occurred from those mother who had no obstetric complication. About 246 (46%) of cases were supplemented iron for fewer than three months and around 290(44%) of control mother were supplemented iron for three or more months and from those who were supplemented iron for fewer than three months, (46%) of them had still birth, while, (44%) of still birth were found from those who had supplemented iron for three or more months (Table3).

Table 3:Obstetric characteristics of the respondents who attended delivery service in MizanTepi University Teaching Hospital, Bench Maji Zone, 2019(N=861)

Variables	Cases (%)	Controls (%)	Chi-square(X^2)	PV
Women weight during 1st ANC			35	.001
<53kg	97(33.80)	92(16.00)		
≥53kg	188(65.50)	480(83.60)		
Women weight during delivery			8	.005
<53kg	12(4.20)	7(1.20)		
≥53kg	274(95.80)	567(98.8)		
Number of ANC			.38	.001
1	116(40.41)	53(9.20)		
2-3	161(56.09)	443(77.20)		
≥4	10(3.5)	78(13.60)		
GA at first ANC			.46	.001
8-12weeks	19(6.62)	132(22.1)		
13-24weeks	96(33.50)	354(61.70)		
≥25weeks	17 (59.6)	87(15.20)		
Presentation			.046	.17
Cephalic	275(95.82)	537(93.56)		
Non-cephalic	12(4.18)	37(6.44)		
History of stillbirth			28	.001
Yes	29(72.50)	11(27.50)		
No	258(31.40)	563(68.60)		
GA age			27	.001
≤37weeks	155 (43.30)	203 (56.70)		
>37weeks	132 (26.20)	371 (73.80)		
Obstetric complication			17.6	.001
Yes	49(52.70)	44(47.30)		
No	238(31.00)	530(69.00)		

ANC: antenatal care, **GA:** gestational age, **kg**: kilogram

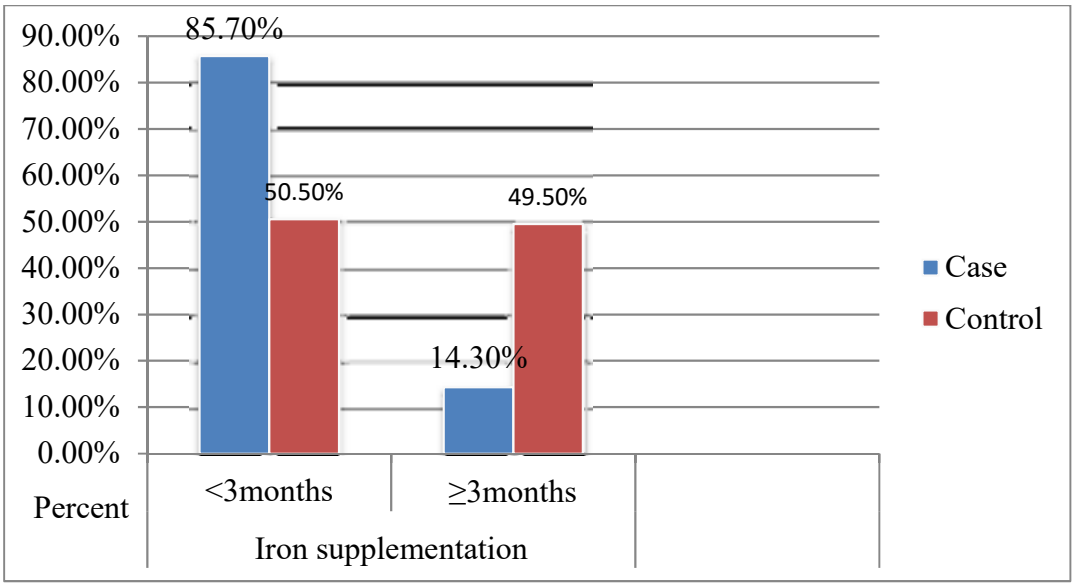

Figure 2: Iron supplementation for mother who attended delivery service in MizanTepi University Teaching Hospital, BenchMajiZone2019

There was significant variation among cases and controls with regard to iron supplementation. Eighty-six (86%) cases and fifty (50%) controls were supplemented iron for less than three months. On the other manner fourteen (14%) cases and forty-nine (49%) controls were supplemented iron for more than three months, and from those who were supplemented iron for fewer than three months, (46%) of them had still birth, while, (44%) of still birth were found from those who had supplemented iron for three or more months.

5.3. Bivarible analysis of risk factors on stillbirths

In bivarible analysis, mother weight, mother age, number of ANC, blood group, gestational age, mal-presentation, gestational age at first antenatal care, number of antenatal cares, number of births, history of abortion, history of stillbirth, obstetric complication, iron supplementations were significantly associated with stillbirth.

Mother whose age at least 35 years were at 4 times higher risk for stillbirth than those mother who aged between15-24years (COR = 5, 95% CI :(3, 8.4). And those who were rural resident were 3 times more at risk to have stillbirth than those who were urban resident (COR = 3.16, 95% CI: (2.30, 4.10). The risk of stillbirth among mother were referred to study hospital was 6.8 times as high as than mother directly admitted (COR =6.8, 95% CI (4.70,9.80). Single mother were 2.3times more at risk to have still birth than married women (COR =2.3, 95% CI: (.87, 6.01).

Number of children a mother had significantly associated with having of stillbirth, as parity increases the risk of having stillbirth also increased (COR= 2.48 ,95%CI:(1.5,4), however, mother who had two children were less likely to have still birth than mother who had one child (COR= .27, 95% CI:(.19, .38). In the other manner women who had more than four children were also at increased risk of having of still birth. Mother who had more than four children was 2.5 times at higher risk of having still birth compared to with mother one child (COR= 2.5, 95%CI: (1.5, 4).

And those mother who had gestational age less or equal to 37 weeks were 2 times more at risk to have still birth than those who had gestational age greater than 37 weeks (COR: 2.14, 95% CI: (1.6, 2.8). Mother who had history of still birth was strongly associated with stillbirth. Mother who had history of still Birth had higher risk of having still birth than who had no history of stillbirth (COR: 5.7, 95%CI: (2, 11). In the same manner mother who had obstetric complication had higher risk of still birth compared to who had no obstetric complication (COR: 2.48, 95%CI :(1.6, 3.8) however, the association vanish in multiple logistic regression. In addition, iron supplementation was significantly associated with having still birth. Mother who were received iron for less than three months were 2.9 times at risk of having stillbirth than mother who

received iron for more than three months (COR: 2.9, 95%CI: (1.9,4.5). The risk of stillbirth was also significantly higher among mother whose weight was less than 53kg, mother whose weight less than 53kg was twice as high as than mother who weight more than 53kg (COR: 2.7, 95%CI:(1.93, 3.74) .Mothers who had one ANC were 17 times more likely to have still birth than mother who have four ANC (COR: 17, 95% CI:(8, 35). Mother who had first antenatal care at third trimester were at higher risk to had still birth. The risk of stillbirth among mother who had first antenatal care at third trimester were13times higher risk to have stillbirth compared to who had first antenatal care at first trimesters (COR 13.6, 95% CI (7.9, 23.5) . Mother whose labour progress not monitored by intra-partum parto-graph were 4.6 times more likely to have still birth than women whose labour was monitored (COR 4.6, 95% CI: (3.2, 6.6,) (Table4).

Table 4: Bivarible analysis of Risk factors on stillbirth among women who gave birth, in MizanTepi University Teaching Hospital, 2019(n=861).

Variables	Cases (%)	Controls (%)	COR (95%CI)	P value
Mother age(years)				.001
Median	28	26		
15-24	116 (40.40)	188 (32.80)	1	
25-34	92 (32.00)	361 (62.90)	.41(.29,.57)	
≥35	79 (27.50)	25 (4.40)	5(3,8.40)	
Residence				.001
Urban	114 (39.7)	386 (67.20)	1	
Rural	173 (60.30)	188 (32.80)	3.10(2.30,4.10)	
Referral				.001
Yes	116 (40.40)	52 (9.10)	6.80(4.70,9.80)	
No	171 (59.6)	522 (90.9)	1	
Marital status				
Married	278 (96.90)	566 (98.60)	1	.09
Single	9 (3.10)	8 (1.40)	2.3(.87,6.01)	
Parity				.001
1	104 (36.20)	115 (20.00)	1	
1-2	106 (36.90)	425 (74.00)	.27 (.19,.38)	
≥4	77 (26.80)	34 (6.00)	2.48 (1.50,4)	
GA at delivery				.001
≤37 weeks	155 (54)	203 (35.40)	2.14(1.60,2.80)	
>37 weeks	132 (46)	371 (64.60)	1	

History of abortion				.005
Yes	17 (5.92)	28 (4.90)	1.20 (.66,2.20)	
No	270 (94.07)	546 (95.10)	1	
History of stillbirth				
Yes	29 (10.10)	11 (1.90)	5.70 (2,11)	.001
No	258 (89.90)	563 (98.10)	1	
Obstetric complication				.001
Yes	49 (17.07)	44 (7.70)	2.48(1.60,3.80)	
No	238 (82.93)	530 (92.30)	1	
Mother weight during 1st ANC				
<53kg	97(33.80)	92(16.00)	2.7(1.93,3.74)	.001
≥53kg	188(65.50)	480(83.60)	1	
Number of ANC				
1	116(40.41)	53(9.20)	17(8.07,35.60	.001
2-3	161(56.09)	443(77.20)	2.8(1.43,5.61)	.003
≥4	10(3.5)	78(13.60)	1	
GA at first ANC				
8-12weeks	19(6.62)	132(22.1)	1	.001
13-24weeks	96(33.50)	354(61.70)	1.8(1.10,3.20)	
≥25weeks	171(59.6)	87(15.20)	13.6(7.9,23.5)	
Intra-partum parto-graph				.001
Yes	188(65.5)	515(89.70)	1	
No	99(34.5)	59(10.30)	4.6(3.2,6.6)	

ANC: antenatal care, **CI**: confidence interval, **GA**: gestational age, **H/P**: health Professional, **kg**: kilo gram, ** Percentage is calculated from column total

5.4. Multivariable logistic regression analysis on association between stillbirth and hypertensive disorder and obstetric and factors

Table5 showed about analysis which was done on hypertensive disorder, obstetric and socio-demographic factors within cases and controls. The variation among cases and controls were analyzed in binary logistic regression. After that a variable which were statistically significant within binary logistic regression was entered in to multivariable logistic regression analysis to establish the determinants of stillbirth.

In multiple logistic regression analysis hypertensive disorder, mother age, residence, referral status, blood group, gestational age at first antenatal care, number of births, iron supplementation and parity were significantly associated with still birth as clearly depicted in (Table5)

The multivariable analysis showed that mother with hypertensive disorder were1.76 times at risk to have stillbirth than mother who had no hypertensive disorder (AOR: 1.8, 95%CI: (1.06, 2.90). Mother who were in age group of 25-34 were 56.5% less likely at risk for stillbirth than being in age group15-24 (AOR: 0.435, 95%CI :(.30,0.62) in contrary mother whose age above 35 year were 4 times at risk to develop still birth than15-24 mother age group (AOR:3.9,95%CI:(2.2, 6.7).

Living in rural was statistically significant risk factor for stillbirth. Multivariable analysis shows that mother who live in rural were 2.4 times more likely to have still birth than mother who live in urban (AOR: 2.4, 95%CI :(1.7, 3.65). And mother who referred to study hospital were found to be at higher risk to have stillbirth compared to mother directly admitted to study hospital. The odds of having stillbirth was 6 times higher for mother who referred than mother directly admitted to study hospital (AOR: 5.9, 95%CI :(3.9, 9).

Blood group of the mother was also found to be independently associated still birth in multiple logistic regressions. The odds of having still birth was found to be higher in mother who had blood group O than mother who had blood group A (AOR: 1.7, 95%CI: (1.057, 2.8). Likewise, multiple logistic regressions showed that the risk of having still birth was impacted by

gestational age at first antenatal care. Mother who had first antenatal care at third trimester were at higher risk to had still birth. Mother who had first antenatal care at third trimester were 4 times at higher risk to have stillbirth compared to mother who had first antenatal care at first trimesters (AOR:4.11,95%CI:(1.54, 11).

Mother who had two and three children were 72% less likely to have still birth than mother who had one child (AOR: .28 95%CI: .16, .49). In the other manner mother who had more than four children were also at increased risk of having of still birth. Mother who had more than four children were 2.6 times at higher risk of having still birth compared to with mother one child (AOR: 2.60 95%CI: 1.20, 5.75). Lastly iron supplementation was significantly associated with having stillbirth. Mother who were received iron for less than three months were 1.8 times at risk of having stillbirth than mother who received iron for more than three months (AOR: 1.8,95% CI :(1.031, 3.15) (Table5)

Table 5: Multivariable logistic regression analysis on association of stillbirth and hypertensive disorder, socio-demographic and obstetric factors among women attended delivery service, Bench Maji Zone, 2019

Variables	Cases (%) n (%)	Controls (%) n (%)	COR (95%CI)	AOR (95%CI)
Hypertensive disorder				
Yes	31 (10.80)	37(6.50)	1.80(1.07,2.90)	1.76(1.06,2.90)**
No	256(89.2)	537(93.5)	1	1
Mother age				
15-24	116 (40.40)	188(32.80)	1	1
25-34	92(32.10)	361(62.90)	.41(.29,.57)	.43(.30,.62)**
≥35	79(27.5)	25(4.40)	5(3-8.40)	3.90(2.20-6.70)
Residence				
Urban	114(39.70)	368(67.20)	1	1
Rural	173(60.30)	188(32.80)	3.10(2.30,4.10)	2.40(1.70,3.65)**
Referral				
Yes	116(40.40)	52(9.050)	6.80(4.70,9.80)	5.90(3.9,90)**
No	171(59.60)	522(90.94)	1	
Blood group				
A	50(17.40)	137(28.90)	1	1
B	54(18.80)	138(24)	1.07(.68,1.68)	1.18(.69,20
AB	46(16)	141(24.60)	.89(.56,1.40)	1.04(.60,1.8)
O	137(47.40)	158(27.50)	2.37(1.60,3.50)	1.70(1.05,2.80)**
GA at first ANC				

8-12	19(6.62)	132(22.1)	1	1
13-24	96(33.50)	354(61.70)	1.8(1.10,3.20)	1.27(.64,2.49)
≥25	171(59.6)	87(15.20)	13.6(7.9,23.5)	4.11(1.54,11)**
Parity				
1	104(36.20)	115(20)	1	1
2-3	106(36.90)	425(74)	.27(.19,.38)	.28(.16,.49)
≥4	77(26.80)	34(6)	2.48(1.5,4)	2.60(1.20,5.75)**
Duration of iron supplement				
<3months	246(85.70)	290(50.50)	2.90(1.90,4.50)	1.80(1.03,3.15)**
≥3months	41(14.30)	284(49.50)	1	1

ANC: ante natal care, **GA**: gestational age, **HD:** hypertensive disorder, **Percentage is calculated from column total

6. DISCUSSION

In this study we assessed the determinants of stillbirth among women who gave birth in Mizan–Tepi university Teaching hospital. The study found that hypertensive disorder, age of the women, residence, being referred from other facility, mother of O blood group, starting first ANC after 25 weeks of gestation, parity, iron supplementation during pregnancy were identified risk factors for stillbirth.

In multivariable analysis showed that mother who had hypertensive disorder were 1.76 times at risk to have stillbirth than mother who hadn't hypertensive disorder. This finding is in line with research conducted before in Ghana and Pakistan (28, 36) however, it was lower than study done in Ethiopia. The disagreement be due to study setting, that former study were done in tertiary and specialized health care centre in spite of this more of complicated case might happen in tertiary and specialized health care centre. In addition, improvement in health care service delivery health facilities and health care utilization behaviour of the mothers may have also contribution for observation of lower of stillbirth.

Age was found to be a risk factor for having of stillbirth. Mothers who were in age group25-34 years were 56%less likely at risk of stillbirth compared to mothers in age group of 15-24years. However, there was increased risk of stillbirth among advanced mother age, Mother whose age greater than 35 years were 4 times higher risk of stillbirth than being in age group15-24, this research finding is in agreement with study done in Taiwan (38). In this extrem of age uterine vasculature change , less antenatal care contact , hypertensive disorder might be the possible reson(28).

Place of residence was found to be a risk factor for having stillbirth .Multivariable analysis shows that Mother who live in rural were 2.4 times more likely to have still birth than Mother who live in urban .This finding is in agreement with study done in Jimma(8) that might be due to health care system or health seeking behaviour and life style of the Mothers who live in rural area.

Likewise, Mother who were referred to study hospital from another facility were found to be at higher risk to have stillbirth compared to directly admitted to study hospital. The odds of delivering stillbirth were 6 times higher for mothers who referred than directly admitted to study hospital. This odd of still birth was higher than study done in Kampala (43). Variation may be due to the quality of health care service, the condition of road and cultural variation.

Blood group of the mothers was found to be risk factor for having of still birth in this research. The odds of having still birth were found to be higher among mothers who had blood group O than mothers who had blood group A. This finding is supported by studies done before (40, 41). This might be related with incompatibility of maternal and foetal blood that happened by is the transfusion of embryo red blood cells to the mother circulation could stimulate the antibodies against embryo cells and could cause mild to severe haemolytic anaemia. The foetus contains B antigen inherited from a father that is not present in the mother and the mother carry naturally occurring antibodies in her serum, anti-A or anti-B, Leak through the placental membrane of an O type mothers may be destroyed by anti-A or anti-B antibodies.

Having of still birth was also impacted by gestational age at first antenatal care. Mothers who had first antenatal care at third trimester were at higher risk to have of still birth. Mothers who had first antenatal care at third trimester were 4 times at higher risk to have of stillbirth compared to mothers who had first antenatal care at first trimesters .This findings was not consistent with the study done in south Africa(12) that indicated there was no effect of gestational age at first ante natal care visit on stillbirth outcomes .May be because of the quality of ANC care matter rather than the timing of antenatal care initiation.

Number of children a mother had was found to be risk factor for a woman to have stillbirth. Mothers who had two and three children were 72% less likely to have still birth than who had one child. In the other manner mothers who had more than four children were also at increased risk of having of still birth. Mothers who had more than four children were 2.6 times at higher risk of having still birth compared to with mother one child. This result was inline research findings of Pakistan and Ethiopia(28, 42).

This research finding also showed that iron supplementation has significant factor with stillbirth. Mothers who were supplemented iron for less than three months were 1.8 times at risk of having of stillbirth than mothers who received iron for more than three months. The possible association between iron supplementation and reduced risk of stillbirth specifically in the first trimesters may be due to increase in hemoglobin concentration.

7. LIMITATIONS AND STRENGTH OF THE STUDY

7.1. Limitations

Because of retrospective nature of the study design, some data on types of hypertensive disorder and socio-demographic characteristics of the mothers were not complete. In addition, one of the exclusion criteria for the study was not having any antenatal care contact therefore those mothers who had antenatal care may not be the same with those who had no antenatal care. Because of study setting the study may not necessarily be generalized to the general population.

7.2. Strengths.

The design was stronger than cross sectional study design to establish cause and effect relationship. Large sample size was used in the study. The effect of multiple risk factors on stillbirth were examined, and cases and controls were recruited at the same facility to control for the context variation in the study participants

8. CONCLUSION AND RECOMMENDATIONS

8.1. Conclusion.

According to the findings of this study we conclude that hypertensive disorder and obstetric factors were risk factors for stillbirth. In this study age of ≥35 years, rural residence, being referred from other facility, mother of O blood group, starting ANC after 25 weeks of gestation, parity and iron supplementation were risk factors for stillbirth.

8.2. Recommendation.

Factors associated with still birth in this research may be used to prevent stillbirth specifically among pregnant women with HD and obstetric problems.

For health care providers: It is very important to give special attention to women with HD, multi-Para women, timing of ANC initiation and iron supplementation

For public: women shall be encouraged to have regular followed up of ANC

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Addis Ababa University

College of Health Sciences

School of Public Health

ANNEXES I

Research Title**:** Determinants of still birth among mother who gave birth in selected hospital of South West, Ethiopia, retrospective unmatched case control study, 2019

Name of principal investigator: Melese Tebeka

Name of the sponsor: Addis Ababa University

5.1. Information sheet

Introduction**:** This information sheet and is prepared for Mizan-Tepi University Teaching Hospital. The aim of the form is to make the institution clear about the purpose of the research, data collection procedures and finally to get permission to conduct the research.

Purpose of the research project: Primarily, the result of the study will be submitted to Addis Ababa University School of Public Health for the requirements to get Masters of Public Health in reproductive and family health.

Due to the fact that there are a very few studies conducted on the area of stillbirth in South West Ethiopia, every woman and every child Global Strategy Monitoring Framework, had mentioned improving research capacity on stillbirth as one strategy to reduce the burden. Thus, the finding of this study will contribute its part in filing the information and knowledge gap on stillbirth area and it helps also to identify primarily the association between stillbirth with hypertensive disorder and obstetric factors that affect stillbirth so this research will guide specific interventions on those factors. Therefore, it will contribute its part for policies that focus on stillbirth prevention.

Procedure**:** All maternal cards of birth registration that are under follow up from January2014 to December 2018 in Mizan-Tepi University Teaching Hospital. Was selected and a review of the required information from the maternal records will be made using checklist. Two nurses from the hospital will be trained and collect the data.

Benefit**s:** The result of the study will use to improve the knowledge of health care provider and to fill information gap on stillbirth and also to improve strategies on stillbirth prevention.

Confidentiality**:** any information or data obtained from facility will be kept confidentially so no other parties can obtain except the principal investigators and also will not be utilized for other purpose it will be locked with password

Person to contact**:** This research project was reviewed and approved by the institutional review board of College of Medicine and Health Sciences, Addis Ababa University. In case, if you want to know more information about the research and its undertakings, you can contact the committee through the following address.

Advisor Address

1. MeselechAsseged; meseleua@yahoo.com
2. NigussieAssefa: nigussie19@gmail.com

   Principal Investigator
3. MeleseTebeka (MPH students) : meleseaddis123@gmail.com

   Tele phone: 0921239826/0904116015

Permission**:** Therefore, you are kindly requested to permit and forward your permission to concern.

ANNEX II

The checklist result (to be confirmed by the supervisor)

Completely filled---------- Partially filled----------

Name of data collector----------signature----------date ----------

Supervisor----------signature----------date----------

Checklist

Question No	Question	response	Skip to Q number
01	Name of town	1. ---------- 2. ----------	
02	Name of hospital	1. ---------- 2. ----------	
03	Status of the chart	1. Case 0. Control	
04	Identification code of the charts	Id----------	

i. Section one checklist to abstract socio-demographic characteristics

S no	Questions	Response	Skip
101	Women age in (years) at delivery	——————years	
102	Residence	1. Urban 2. Rural	

104	Weight (kg) of the mother at registration	_____ Kg	
105	Weight (kg) of the women at 36 weeks	_____	
106	Marital status of the woman.	1. Married 2. unmarried 3. Living together 4. Divorce 5. Widowed 6. Separated	

ii. Section two checklists to abstract obstetric care characteristics of the mother

S no	Questions	Response	Skip
201	Admission record for current labour management	1. Available 2. Not available	
202	Intra-partum care record or partograph	1. Available 2. Not available	
203	Qualification of the person attended the delivery	1. Doctor 2. Midwife 3. Emergency surgeon Other_____	

204	Number of visits to antenatal care.	1. Once 2. Twice 3. Three times 4 Four times and more	
205	Did the women take iron supplements during this pregnancy	1. Yes 2. No 3. Don't know	Skip to 207
206	If yes for how many months or visit	----------	
207	Antenatal folic acid taken	1. Yes 2. No →	If no skip209
208	If yes for how many months	----------	
209	Parity of the woman	1. Zero 2. One 3. Two 4. Three 5. Four and above	
210	History of previous stillbirth?	1 Yes 2No	
211	If history of stillbirth in which gestation	----------	
212	History of previous abortion?	1Yes 2No	
213	Birth interval of last delivery and pregnancy in review pregnancy.	——————————months	
214	Gestation of pregnancy (relative to LMP as recorded in Maternal Health Record book).	————————	
215	Date or gestation of the first ANC visit for the pregnancy in review	----------	

216	Date or gestation of the last ANC visit for the pregnancy in review	----------	
217	expected date of delivery (EDD) for the pregnancy in review	————————dd/mm/yyyy	
218	Excessive bleeding per vagina before onset of labor	1. Yes 2. No ——————————→	If no Skip To 220
219	If excessive bleeding per vagina before onset of labor(in which trimester)	----------weeks of gestation	
220	Foetal presentation (as recorded in maternity notes)	1. Cephalic 2. Breech 3. Transverse 4. Other	
221	Mode of delivery.	1. NVD 2. C/S 3. Vacuum assisted delivery 4. forceps assisted delivery 5. Destructive delivery	
222	Admission status to facility for delivery.	1. Referred to facility 2. Direct admission to facility	
223	Use partograph to monitor progress of laour	1. Yes 2. No	

iii. Section three checklistson general medical condition of the mother

S no	Questions	Response	Skip
301	VDRL status.	1. Reactive 2. Non-reactive 3. Not done ——→	If not done skip To 303
302	If reactive, treatment given or not	1. Yes 2. No	
303	Sero-status for HIV infection	1. HIV positive 2. HIV negative ——→	If negative skip To 305
304	Treatment given for HIV infection	2. Yes 3. No	
305	Haemoglobin level (g/dl) on ANC	1. At registration ---------- 2. At 36 weeks ----------	
306	Protein in urine in gram	_____	
307	Urinalysis.	1. Sugar 2. Protein 3. record other ———	
308	Family history of chronic hypertension	1. Yes 2. No	
309	Systolic blood pressure (mm/Hg)	1. at registration for ANC ---------- 2. At 36 weeks. ----------	

		3. Not recorded	
310	Diastolic blood pressure (mm/Hg	1. At first registration for ANC---------- 2. At 36 weeks ---------- 3. Not recorded	
311	Did the women diagnosed for? Hypertensive disorder?	1. Yes 2. No	If no skip to 313
312	Did hypertensive women get treatment for hypertension?	1. Yes 2. No	
313	Did the women had malaria during this pregnancy	1. Yes 2. No	If no skip To 314
314	If yes the treatment given for malaria	1. Yes 2. No	
315	History of admission in early pregnancy?	1. Yes 2. No	316
316	If yes write diagnosis	----------	
317	RH factors of women	1. Negative 2. Positive	