



Research article

Determinants of stillbirth in hospitals of North Shoa Zone, Oromia region, Central Ethiopia: A case control study

Workineh Gizaw^a, Mulugeta Feyisa^a, Dejene Hailu^b, Tadesse Nigussie^{c,*}^a Department of Midwifery, College of Health Sciences, Salale University, Fitcha, Ethiopia^b Department of Nursing, College of Health Sciences, Salale University, Fitcha, Ethiopia^c Department of Public Health, College of Health Sciences, Mizan Tepi University, Mizan Aman, Ethiopia

ARTICLE INFO

Keywords:

Determinants of stillbirth
Stillbirth
North Shoa Hospitals

ABSTRACT

Background: World Health Organization defined stillbirth as birth of fetus at 28 weeks or above gestation with a birth weight of ≥ 1000 g or body length of ≥ 35 cm. Majority of stillbirths occur in low and middle income nations. Efforts made in Ethiopia to improve maternal and child health are showing encouraging results, even though the magnitude didn't reach the expected level. Identification of determinants of stillbirth is quite substantial to apply further meaningful actions.

Objective: To assess the determinants of stillbirth in hospitals of North Shoa Zone, Oromia region, Central Ethiopia.

Method: Institution based unmatched Case control study was conducted from March 01 to May 30/2019 among 342 women who gave birth in Fitcha, Kuyu, Gundomeskel, and Muketurihospitals. Sample size was calculated by using Epi-info version 7.1.1 software package. Statistical Package for Social Sciences version 25 was used to analyze the data. Descriptive statistics, bivariate and multivariate logistic regression analysis were conducted. Variables having P-value ≤ 0.05 in multivariable logistic regression were considered as statistically significant.

Result: Type of labor (AOR = 3.79, 95%CI = 1.53, 9.38), duration of labor (AOR = 3.59, 95% CI = 1.53, 8.33), mal-presentation (AOR = 3.45, 95%CI = 1.99, 9.8), preeclampsia/eclampsia (AOR = 4.58, 95%CI = 1.45, 14.48) and birth defect (AOR = 3.05, 95%CI = 1.31, 7.1) were found to be the determinants of stillbirth.

Conclusion and recommendation: Causes of still birth in more than two third of the cases were identified. Type of labor, duration of labor, mal presentation, preeclampsia/eclampsia were identified as determinants of stillbirth from mothers' side while birth defect was found to be determinant of stillbirth from fetal side. Health care providers, policy makers, and other stakeholders, should focus on identified factors to combat problems associated with still birth.

1. Introduction

Stillbirth (fetal death) is defined as the death of baby in uterus before or during delivery. World Health Organization (WHO) defined it as birth of fetus at 28 weeks or above gestation with a birth weight of ≥ 1000 g or body length of ≥ 35 cm [1]. Stillbirth is a common cause of prenatal mortality. Data from 157 countries showed that the rate of this event was 18.4 per 1000 births in 2015. Majority of stillbirths occurred in low and middle income countries; seventy eight percent in south Asia and sub-Saharan Africa [2]. A study from Ethiopia showed the rate of stillbirth among women of child bearing age to be 25.5 per 1000 deliveries [3]. Ethiopian demographic and health survey (EDHS) also revealed that

the perinatal mortality rate was 33 deaths per 1000 pregnancies in 2016 [4].

Still birth has many negative consequences on bereaved parents [5] and siblings [6]. When the baby is born dead, the extraordinary journey through months of pregnancy comes to a devastating and painful end. The impact does not remain to the loss of the newborn; it also encompasses psychological, social and economic consequences on parents, families, caregivers, and countries at large. Perinatal death touches family dynamics and the social atmosphere of the parents of the affected family [7]. Study also showed that stillbirth affects marital relationships. Women who had a history of stillbirth regularly reported higher rates of mental health and relationship difficulties [8].

* Corresponding author.

E-mail address: tadessenigussie21@gmail.com (T. Nigussie).<https://doi.org/10.1016/j.heliyon.2021.e07070>

Received 7 February 2021; Received in revised form 4 April 2021; Accepted 11 May 2021

2405-8440/© 2021 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The occurrence of still birth is decreasing globally even if it is not satisfactory yet. Between 2010 and 2016, stillbirth rate decreased from 31.7 per 1000 births to 26.4 per 1000 births showing the annual decline of 3.0% per year [9].

Studies revealed that stillbirth is influenced by multiple factors including maternal risk factors (maternal age, parity, prenatal care, placental disorders, maternal hypertensive disorders, infections, cord problems, and ruptured uterus due to obstructed labor [9, 10, 11], maternal exposure to pesticide, and lack of appetite for vegetables [12]) and cultural practices and beliefs (mainly in Africa. [13]).

Oromia regional state had higher magnitude of stillbirths when compared to other regions of Ethiopia. EDHS 2016 showed that Oromia was the second highest in number of stillbirths next only to Amhara regional state [4].

Efforts made in Ethiopia to improve maternal and child health are showing encouraging results, even though the magnitude didn't reach the expected level. Stillbirth rate have decreased from 52 deaths per 1000 live births in 2000 [14] to 33 deaths per 1000 pregnancies in 2016 [4]. Studies conducted in the country on determinants stillbirth are limited in number; they also focused on single setting [15, 16] and therefore couldn't address the issue comprehensively. The current study aimed to identify determinants of stillbirth in hospitals of North Shoa Zone, Oromia region, Central Ethiopia.

2. Methods

2.1. Study area, design and period

Facility based Case-control study was undertaken from March 01 to May 30/2019 among women who gave birth in four hospitals (Fitche, Kuyu, Gundomeskel, and Muketuri) in North Shoa Zone, Oromia regional state. The capital city of the Zone, Fitche, is located at about 114 km away from Addis Ababa, the capital city of Ethiopia. The Zone had a total of 14 woredas and 291 kebeles. There were 1,639,587 population (362,841 women of reproductive age group) and 78,700 households in the zone in 2019. Number of pregnancies in 2019 in the Zone was 56,894. There were 4 hospitals, 63 Health centers and 267 Health posts in the Zone when the current study was undertaken.

2.2. Populations

Mothers who gave birth in hospitals of North Shoa zone during the study period were the source population while mothers randomly selected from the same hospitals were the study population.

2.3. Eligibility criteria

Inclusion criteria for cases: All pregnant women greater than 28 weeks of gestation who gave birth to dead fetus were included in the study.

Inclusion criteria for controls: All pregnant women greater than 28 weeks of gestation who gave a live birth.

2.4. Case definition

Cases were mothers who newly gave stillbirth in the study facilities during the study period. Controls include mothers who gave a normal birth in the study facilities during the study period.

2.5. Sample size determination

The sample size was calculated using Epi-info version 7.2.0.1. The following assumptions were considered in sample size calculation; 95% confidence level, ratio of control to Case = 4, power of 80%, the proportion of controls with exposure 58.2% (taken from study conducted in Bonga General and Mizan Tepi University Teaching Hospitals) [15] and odds ratio of 2.4. The selected exposure was duration of labor ≥ 24 hrs. The sample size was then calculated to be 342 (69 case and 273 controls).

2.6. Sampling technique

The study sample was proportionally allocated to all study hospitals based on their six months' delivery report prior to the study. Cases were taken consecutively while the controls were selected using systematic random sampling. Controls were selected from mothers who gave live births at the study hospitals. The detail of the sampling procedure is described in Figure 1 below.

2.7. Data collection tools and procedures

Questionnaire was prepared based studies conducted in Ethiopia previously [15, 17, 18, 19]. It was prepared in English and then translated to Afan Oromo (*Attached as supplementary material separately*). Back translation to English was also done to ensure message consistency. The Afan Oromo version was used to collect the data. Pretest was conducted to check consistency of the tool and modification was made to the tool accordingly. Data collectors and supervisors were trained on the tool, how to interview mothers and reassure grieving mothers (cases). Besides,

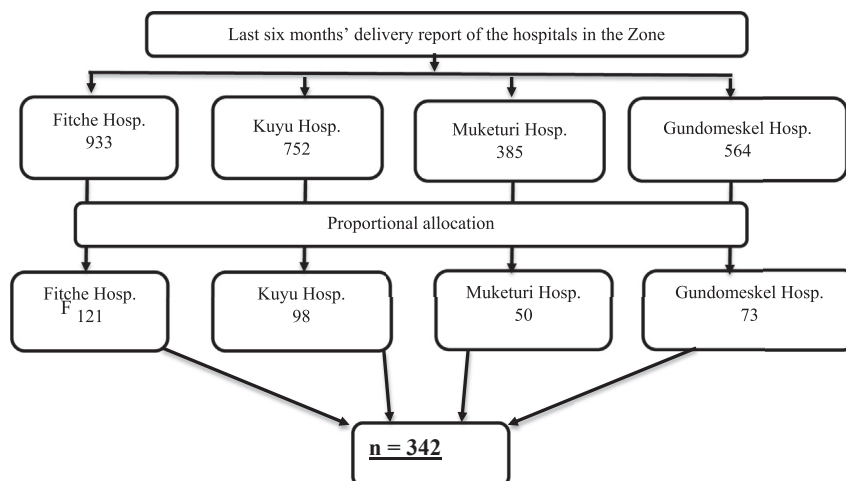


Figure 1. Sampling procedure for determinants of stillbirth in Hospitals of North Shoa zone, Oromia region, Ethiopia, August 2019.

principles of confidentiality were seriously discussed with the data collectors and supervisors.

2.8. Data processing and analysis

The Collected data were checked by the principal investigators for completeness and consistency. The completed questionnaires were coded by numbers and entered into computer software Epi data version 3.1 statistical package. Data cleaning was made by sorting and running frequencies to see the distribution of data and to check assumptions. Statistical analysis was then performed using SPSS version 25. Bivariate logistic regression analysis was performed to identify variables that fit for multivariable logistic regression. Variables with p-value < 0.25 in bivariate analysis and were clinically important were entered into multivariable logistic regression model to identify the determinant factors. Model fitness was checked by Hosmer and Lemeshow giving a p-value = 0.16.

2.9. Study variables

Dependent variable was still birth while the independents variables were socio demographic characteristics (age of mothers, marital status, educational status, occupation and residence), past and present obstetric factors (gravidity, stillbirth history, abortion history, antenatal care, birth interval, gestational age at birth, type of labor, duration of labor, antepartum hemorrhage, amniotic fluid volume, obstructed labor, malpresentation, preterm labor, identified causes of stillbirth, birth defect and birth weight) and maternal medical conditions (hemoglobin level,

preeclampsia/eclampsia, RH incompatibility, sexual transmitted infections, history of congenital abnormalities and urinary tract infections).

2.10. Ethics approval and consent to participate

Ethical approval was obtained from ethical review committee of college of health sciences, Salale University and permission letter was secured from all hospitals. Informed written consent was obtained from respondents after providing information about the study. Confidentiality/anonymity of all the responses was kept and used for research purpose only.

3. Results

3.1. Socio-demographic characteristics

A total of 342 mothers (69 cases and 273 controls) were included in the study. The mean age of the participants was 27.52 years (SD = 6.55 years). Majority, 230 (67.25%) mothers (i.e. 42(18.3%) cases and 188 (81.7%) controls) were in the age group of 20–35 years. One hundred seventy two (50.3%) of the study subjects were rural dwellers, of which 39 (22.7%) were cases and 133 (77.3%) were controls. [Table 1](#).

3.2. Obstetric factors

Majority, 198 (57.89%) of study participants (39 (19.7%) cases and 159 (80.3%) controls) didn't experience more than two pregnancies.

Table 1. Socio-demographic characteristics of women who gave birth in North Shewa public hospitals, August 30/2019.

Variables	Stillbirth		Total (n = 342)	P value
	Yes (cases) n = 69 (%)	No (controls) n = 273 (%)		
Age of Mothers				
<20 years	11 (17.2)	53 (82.8)	64	0.049
20–35	42 (18.3)	188 (81.7)	230	
>35	16 (33.3)	32 (66.7)	48	
Residence				
Urban	30 (17.6)	140 (82.4)	170	0.153
Rural	39 (22.7)	133 (77.3)	172	
Educational status				
Can't read and write	31 (27.4)	82 (72.6)	113	0.063
Primary and secondary	32 (16.8)	159 (83.2)	191	
College and above	6 (15.8)	32 (84.2)	38	
Referral status				
Self	30 (17.6)	140 (82.4)	170	0.018
Referred	39 (22.7)	133 (77.3)	172	
Occupational status				
House wife	31 (22.6)	106 (77.4)	137	
Government employee	17 (17.5)	80 (82.5)	97	0.218
Merchant	9 (25.0)	27 (75.0)	36	
Farmer	9 (28.1)	23 (71.9)	32	
Student	1 (4.3)	22 (95.7%)	23	
Private/NGO employee	2 (11.8)	15 (88.2%)	17	
Marital status				
Single	4 (11.8)	30 (88.2)	34	0.325
Married	63 (21.3)	233 (78.7)	296	
Widowed	1 (50.0)	1 (50.0)	2	
Divorced	1 (10.0)	9 (90.0)	10	
Pregnancy status/type				
Planned and supported	57 (22.9)	192 (77.1)	249	0.067
Unplanned and supported	8 (10.7)	67 (89.3)	75	
Unplanned and unsupported	4 (22.2)	14 (77.8)	18	

NGO: non-governmental organization.

Table 2. Distribution of Obstetric factors of women who gave birth in North Shewa public hospitals August, 2019.

Variables	Categories	Stillbirth		Total (n = 342)	P value
		Yes (cases) n = 69 (%)	No (controls) n = 273 (%)		
Gravidity	<2	39 (19.7)	159 (80.3)	198	0.662
	3–4	15 (18.3)	67 (81.7)	82	
	≥5	15 (24.2)	47 (75.8)	62	
Stillbirth history	Yes	6 (20.7)	23 (79.3)	29	0.551
	No	63 (20.1)	250 (79.9)	313	
Abortion history	Yes	7 (14.3)	42 (85.7)	49	0.181
	No	62 (21.2)	231 (78.8)	293	
Antenatal care	Yes	56 (19.7)	228 (80.3)	284	0.207
	No	13 (22.4)	45 (77.6)	58	
Birth interval	<18 months	18 (32.7)	37 (67.3)	55	0.014
	18–36 month	24 (16.0)	126 (84.0)	150	
	> 36 months	3 (11.1)	24 (88.9)	27	
Gestational age at birth	<37 weeks	19 (73.1)	7 (26.9)	26	<0.001
	37–42 weeks	48 (15.5)	262 (84.5)	310	
	> 42 weeks	2 (33.3)	4 (66.7)	6	
Onset of labor	Spontaneous	57 (18.0)	260 (82.0)	317	0.001
	Induced	12 (48.0)	13 (52.0)	25	
Duration of labor	≤18 h	55 (17.6)	257 (82.4)	312	0.001
	> 18 h	14 (46.7)	16 (53.3)	30	
Antepartum hemorrhage	Yes	3 (42.9)	4 (57.1)	7	0.149
	No	66 (19.7)	269 (80.3)	335	
Amniotic fluid volume	Normal	47 (15.9)	249 (84.1)	296	<0.001
	Oligohydramnios	14 (53.8)	12 (46.2)	26	
	Polyhydramnios	8 (40.0)	12 (60.0)	20	
Obstructed labor	Yes	6 (66.7)	3 (33.3)	9	0.003
	No	63 (18.9)	270 (81.1)	333	
Mal-presentation	Yes	5 (55.6)	4 (44.4)	9	0.019
	No	64 (19.2)	269 (80.8)	333	
Preterm labor	Yes	10 (38.5)	16 (61.5)	26	0.020
	No	59 (18.7)	257 (81.3)	316	
Identifies cause of stillbirth	Yes	47 (68.1)	-	47	
	No	22 (31.9)	-	22	
Birth defect	Yes	13 (41.9)	18 (58.1)	31	0.321
	No	56 (18.0)	255 (82.0)	311	
Birth weight	<2500 gm	24 (61.5)	15 (38.5)	39	0.061
	2500–4000 gm	44 (14.6)	257 (85.4)	301	
	> 4000 gm	1 (50.0)	1 (50.0)	2	

More than 80% of the participants (56 (19.7%) of cases and 228 (80.3%) controls) had at least one Antenatal Care (ANC) follow up. A total of 55 study participants (18 (32.7%) cases and 37 (67.3%) controls) had interpregnancy interval less than 18 months. About 69% of the stillbirths occurred at term pregnancy. Preterm labor among the cases was 10 (38.5%) compared to controls, 16 (61.5%). Twenty five (7.3%) of all deliveries were induced, which accounted for 17% of the cases and 4.76% of controls. Mal-presentations were more common among the cases, 5 (7.24%) compared to controls, 4 (1.46%). Forty seven (68.1%) of the total cases had identified/known causes of stillbirth. Majority of the study participants, 301 (88%) (i.e. 44(14.6%) cases and 257 (85.4%) controls) had normal birth weight [Table 2](#).

Majority of the study participants, 279 (81.58%) (i.e. 57(20.4%) cases and 222 (79.6%) controls) had no anemia while only 6 (4 cases and 2 controls) had preeclampsia. RH incompatibility was minimal among cases, 4 (22.2%) compared to controls, 14 (77.8%). Congenital anomalies were not common in both cases and controls whereas 13 (3.8%) of the study participants (9 (69.2%) cases and 4 (30.8%) controls) were diagnosed with urinary tract infection. Among cases about 57 (82.6%) occurred during antepartum period [Table 3](#).

3.3. Determinants of stillbirth

The bivariate analysis result showed that, referral status, type of labor, duration of labor, mal-presentation, preterm labor, preeclampsia/eclampsia and birth defect had p-value<0.25 and hence included in multivariable logistic regression. The multivariable logistic regression analysis result revealed that the type of labor, duration of labor, mal-presentation, Preeclampsia/Eclampsia and birth defect were determinants of stillbirth.

Mothers who had induced labor were 3.79 more likely to have stillbirth than those who had spontaneous onset labor (AOR = 3.79, 95%CI = 1.53, 9.38). Mothers with duration of labor greater than 18 h were 3.59 times more likely to experience stillbirth than their counterparts (AOR = 3.59, 95%CI = 1.53, 8.33). Mothers who had mal-presentation during labor were 3.45 times more likely to have stillbirth than their counterparts (AOR = 3.45, 95%CI = 1.99, 9.8). Mothers who had preeclampsia/eclampsia were 4.5 times more likely to have stillbirth (AOR = 4.58, 95%CI = 1.45, 14.48) compared to those who had no preeclampsia/eclampsia. Fetuses with birth defect are at a 3.05 times odd of getting still birth compared to normal fetuses (AOR = 3.05, 95% CI 1.31, 7.1) [Table 4](#).

Table 3. Distribution of maternal medical disorders of women who gave birth in North Shewa public hospitals August, 2019.

Variables	Stillbirth		Total (n = 342)	P value
	Yes (cases) n = 69 (%)	No (controls) n = 273 (%)		
Hemoglobin level				
<11 mg/dl	12 (19.0)	51 (81.0)	63	0.480
≥11 mg/dl	57 (20.4)	222 (79.6)	279	
Preeclampsia/Eclampsia				
Yes	6 (35.29)	11 (64.7)	17	0.017
No	63 (19.38)	262 (80.61)	325	
RH incompatibility				
Yes	4 (22.2)	14 (77.8)	18	0.509
No	65 (20.1)	259 (79.9)	324	
Sexual transmitted infections				
Yes	1 (16.7)	5 (83.3)	6	0.651
No	68 (20.2)	268 (79.8)	336	
History of congenital abnormalities				
Yes	1 (50.0)	1 (50.0)	2	0.363
No	68 (20.0)	272 (80.0)	340	
Urinary tract infections (UTI)				
Yes	9 (69.2)	4 (30.8)	13	0.202
No	60 (18.2)	269 (81.8)	329	
Time of death				
During antepartum	57 (82.6)	-		
During intra-partum	12 (17.4)	-		

4. Discussion

This study revealed that type of labor, duration of labor, malpresentation, preeclampsia/eclampsia and birth defect were the determinants of stillbirth. Type of labor was found to be significantly associated with stillbirth experiencing. Women who had induced labor were more likely to experience stillbirth than those who had spontaneous

onset labor. This might be associated with lack of care from the attendants during labor induction and poor clinical decision making skill.

Mothers who had labor duration greater than 18 h were more vulnerable to stillbirth than those whose labor stays less than 18 h. This result agrees with the finding of studies done in Bangladesh, Nepal and Southwestern Ethiopia [15, 20, 21]. The current finding might result from the fact that prolonged labor causes fetal distress which further causes intra partum fetal death.

Table 4. Factors associated with stillbirth among women who gave birth in North Shewa public hospitals August, 2019.

Variable	Stillbirth		COR, 95% CI	AOR, 95% CI
	Yes (%)	No (%)		
Referral status				
Self	30 (17.6)	140 (82.4)	1	1
Referred	39 (22.7)	133 (77.3)	1.36 (1.08, 3.16)	1.7 (0.95, 3.06)
Onset of labor				
Spontaneous	57 (18.0)	260 (82.0)	1	1
Induced	12 (48.0)	13 (52.0)	4.21 (1.82, 9.71)	3.79(1.53, 9.38)
Duration of labor				
≤18 h	55 (17.6)	257 (82.4)	1	1
> 18 h	14 (46.7)	16 (53.3)	4.08 (1.88, 8.86)	3.59(1.53, 8.33)
Malpresentation				
Yes	5 (55.6)	4 (44.4)	5.25 (1.37,20.12)	3.45(1.99, 9.8)
No	64 (19.2)	269 (80.8)	1	1
Preterm labor				
Yes	10 (38.5)	16 (61.5)	2.72 (1.17, 6.3)	2.38 (0.95, 5.95)
No	59 (18.7)	257 (81.3)	1	1
Preeclampsia/Eclampsia				
Yes	6 (35.29)	11 (64.7)	2.26 (1.49,8.51)	2.35(1.45, 6.4)
No	63 (19.38)	262 (80.61)	1	1
Birth defect				
Yes	13 (41.9)	18 (58.1)	3.29 (1.52, 7.1)	3.05(1.31, 7.1)
No	56 (18.0)	255 (82.0)	1	1

Bold in Odds ration with confidence interval shows the significantly associated variables.

Mothers who had mal-presentation during labor were more likely to have stillbirth than those who did not have the same. This result was congruent with the findings of a study done in Uganda and Northern Tanzania [22, 23]. Such findings might result from the fact that mal presentation is a risk factor for obstetric complications like prolonged labor, premature rupture of membrane and cord prolapse.

Mothers who had preeclampsia/eclampsia were more likely to have stillbirth compared to those who had no such Case similar to a study from Norway, Iran, Ghana and Tanzania [22, 24, 25, 26]. Hypertensive disorder during pregnancy can cause utero-placental hypo perfusion and therefore leads to fetal death.

The current study also revealed that fetal birth defect increases the risk of getting still birth. This result agrees with the finding from Europe and Felege-Hiwot comprehensive specialized referral hospital, Ethiopia [16, 27]. Lack of vital organs to for the fetus's survival and fetus's proneness to fatal complications and infections could be the reason for such finding.

4.1. Limitation of the study

Since it is institution based study, its generalizability is not strong enough (mothers who didn't come to health institutions were missed).

5. Conclusions

This study identified the causes of still birth in more than two third of the cases. Type of labor, duration of labor, mal presentation, pre-eclampsia/eclampsia were identified as determinants of stillbirth from mothers' side while birth defect was found to be determinant of stillbirth from fetal side. Early detection of the problem and referral should be strengthened during pregnancy and childbirth to avoid delay and fetal death.

Declarations

Author contribution statement

Workneh Gizaw: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data.

Mulugeta Feyisa: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data.

Dejene Hailu: Performed the experiments; Contributed reagents, materials, analysis tools or data.

Tadesse Nigusie: Analyzed and interpreted the data; Wrote the paper.

Funding statement

This work was supported by Salale University.

Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

Supplementary content related to this article has been published online at <https://doi.org/10.1016/j.heliyon.2021.e07070>.

Acknowledgements

We would like to thank Selale University for providing us all the support needed. We would also like to extend our greatest appreciation and respect to our colleagues. The data collector, respective hospitals staffs and the study participants are also paid our heartedly respect.

References

- [1] Who, *International Statistical Classification of Diseases and Related Health Problems*, 2014.
- [2] H. Blencowe, S. Cousens, F.B. Jassir, et al., National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: a systematic analysis, *Lancet Glob. Heal.* 4 (2) (2015) e98–e108.
- [3] K.A. Berhie, H.G. Gebresilassie, Logistic regression analysis on the determinants of stillbirth in Ethiopia, *Matern. Heal. Neonatol. Perinatol.* (2016) 1–10.
- [4] Central Statistical Agency, *Ethiopia Demographic and Health Survey*, 2016.
- [5] D. Nuzum, S. Meaney, K.O. Donoghue, The impact of stillbirth on bereaved parents: a qualitative study, *PLoS One* 13 (1) (2018) 1–13.
- [6] J. Cacciatore, Psychological effects of stillbirth, *Semin. Fetal Neonatal Med.* (2019).
- [7] C. Fern, M.C.-A. M. Hern, I. Mar, Impact of perinatal death on the social and family context of the parents, *Int. J. Environ. Res. Publ. Health* 17 (2020) 1–18.
- [8] M. Redshaw, J.M. Hennegan, J. Henderson, Impact of holding the baby following stillbirth on maternal mental health and well-being: findings from a national survey, *BMJ Open* 6 (2016) 15–17.
- [9] S. Saleem, S.S. Tikmani, E.M. McClure, et al., Trends and determinants of stillbirth in developing countries: results from the global network's population-based birth registry, *Reprod. Health* 15 (Suppl 1) (2018).
- [10] M. Aminu, S. Bar-Zeev, S. White, M. Mathai, N. Van Den Broek, Understanding cause of stillbirth: a prospective observational multi-country study from sub-Saharan Africa, *BMC Pregnancy Childbirth* 19 (1) (2019) 1–10.
- [11] E.M. McClure, R.L. Goldenberg, Factors and prevention strategies, *Matern Fetal Neonatal Med.* 22 (3) (2014) 183–190.
- [12] Y. Qu, S. Chen, H. Pan, et al., Risk factors of stillbirth in rural China: a national cohort study, *Sci. Rep.* (2019) 1–8.
- [13] J. Kiguli, I.G. Munabi, E. Ssegujja, et al., Stillbirths in sub-saharan Africa: unspoken grief, *Lancet* 387 (10018) (2016) e16–e18.
- [14] Central Statistical Agency, *Ethiopian Demographic and Health Survey*, 2001. <http://www.dhsprogram.com/pubs/pdf/FR118/FR118.pdf>.
- [15] T.K. Welegebriel, T.L. Dadi, K.M. Mihrete, Determinants of stillbirth in Bonga general and mizan Tepi university teaching hospitals southwestern Ethiopia, 2016: a Case-control study, *BMC Res. Notes* 10 (1) (2017) 1–5.
- [16] D.T. Worede, G.W. Dagnaw, Determinants of stillbirth in Felege - hiwot comprehensive specialized referral hospital, *BMC Res. Notes* (2019) 1–6.
- [17] K.M. Nyarko, E. Afari, S.O. Sackey, Supplement Article Determinants of Stillbirths in Northern Ghana: a Case Control Study, 2016, pp. 3–7. April 2017.
- [18] T. Hagos, M. Zemichael, G. Teklay, T. Mariye, Risk factors of stillbirth among mothers delivered in public hospitals of Central Zone, Tigray, Ethiopia, *Afr. Health Sci.* 19 (2) (2019) 1930–1937.
- [19] A. Mengistie, Prevalence of Stillbirth and Associated Factors Among Immediate post-partum Mothers at Felegehiwot Comprehensive Specialized Hospital, Northwest Ethiopia: an Institution Based Cross-Sectional Study, 2019, pp. 1–16.
- [20] A. Kc, J. Wrammert, U. Ewald, R.B. Clark, J. Gautam, G. Baral, Incidence of intrapartum stillbirth and associated risk factors in tertiary care setting of Nepal: a Case-control study, *Reprod. Health* 13 (103) (2016) 1–11.
- [21] S. Nahar, A. Rahman, H.E. Nasreen, Factors influencing stillbirth in Bangladesh: a Case-control study, *Paediatr. Perinat. Epidemiol.* 27 (2) (2013) 158–164.
- [22] F.S. Chuwa, A.H. Mwanamsangu, B.G. Brown, J. Mahande, Maternal and fetal risk factors for stillbirth in Northern Tanzania: a registry-based retrospective cohort study, *PLoS One* 12 (8) (2017) 1–10.
- [23] E. Agaba, J.M. J.N., Factors associated with stillbirths at mbarara regional referral hospital, *J. Heal. Med. Nurs.* (2016).
- [24] Q. Harmon, L. Huang, D. Umbach, K. Klungsoyr, S. Engel, P. Magnus, Risk of fetal death with preeclampsia, *Obstet. Gynecol.* 125 (3) (2015).
- [25] K. Hajian-Tilaki, S. Esmailzadeh, G. Sadeghian, Trend of stillbirth rates and the associated risk factors in babol, northern Iran, *Oman Med. J.* 29 (1) (2014) 18–23.
- [26] J. Owusu, F. Anderson, J. Coleman, S. Oppong, J. Seffah, A. Aikins, Association of maternal sleep practices with pre-eclampsia, low birth weight, and stillbirth among Ghanaian women, *Int. J. Gynecol. Obstet.* 121 (3) (2013) 261–265.
- [27] H. Groen, K. Bouman, A. Pierini, J. Rankin, A. Rissmann, M. Haeusler, Stillbirth and neonatal mortality in pregnancies complicated by major congenital anomalies: findings from a large European cohort, *Prenat. Diagn.* 24 (10) (2017).