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Determinants of preterm birth in neonatal intensive care units at public hospitals in Sidama zone, South East Ethiopia; case control study

Abstract

Background: Preterm birth is defined by the World Health Organization as babies born before 37 completed weeks of gestation or fewer than 259 days since the first day of woman's last menstrual period. Preterm birth is the first leading cause of neonatal mortality and the second leading cause for under-five mortality.

Method: Facility-based case control study was conducted from 1st Mar to 1st May, 2018 in Sidama zone public hospitals. A total of 280 samples (70 cases & 210 controls) were determined using a double population proportion formula and participants were selected using consecutive sampling for the cases and systematic random sampling for the controls. Data were entered into Epi info version 7 and analyzed using SPSS version 23. Both bivariate and multivariable logistic regression model was used to identify determinants of preterm birth and variables which have p-value of <0.05 at final model were declared as statistically significant.

Result: History of preterm birth (AOR: 4.19; 95%CI: 1.69-10.4), history of still birth (AOR:3.66; 95% CI:1.389-9.65), pregnancy induced hypertension (AOR:6.73;95%CI:2.69-16.85), premature rupture of membrane (AOR:6.92;95%CI:3.07-15.64, antepartum hemorrhage(AOR:5.52;95% CI:2.05-14.8), maternal nutrition (AOR:6.26;95%CI:2.32-16.87], sexually transmitted infection (AOR:2.42;95%CI:1.01-5.79) and standing for a long period of time (AOR:2.53;95% CI:1.2-5.35) were independent determinants of preterm birth.

Conclusion: The multivariable analysis indicate that antepartum hemorrhage, pregnancy induced hypertension, history of preterm birth, history of still birth, premature rupture of membrane, sexually transmitted infection, nutritional status and standing for long time were identified as determinants of preterm birth.

Keywords: preterm birth, determinants, case control, sidama zone, hospital

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Abbreviations: ANC, antenatal care; AOR, adjusted odd ratio; APH, antepartum hemorrhage; COR, crude odd ratio; EDHS, Ethiopian demographic health surveillance system; IPV, intimate partner violence; MUAC, mid upper arm circumference; NICU, neonatal intensive care unit; STIs, sexually transmitted infections; VDRL, venereal disease research laboratory

Background

Preterm birth is defined by world health organization (WHO) as all a live births before 37 completed weeks of gestation or fewer than 259 days since the first day of a woman's last menstrual period. Here are division of preterm birth based on gestational age as extremely preterm (<28weeks), very preterm (28 to <32 weeks), and moderate to late preterm (32 to <37weeks).[1] Preterm birth continues to be the leading cause of perinatal and postnatal mortality and morbidity especially in developing countries where health facilities are not only limited but are not functioning properly. Preterm birth occurs in 7% to 11% of pregnancies but is responsible for 85% of neonatal deaths in normally formed infants who do not have any congenital anomalies.[2,3] Preterm birth has a significant cost implication due to the initial hospital stay, neonatal intensive care and ongoing long-term complex health needs induced by the resultant disabilities.[3] Of the estimated 130 Million babies born each year globally, approximately 15 million are born preterm. Compared with term neonates, mortality rates for preterm (less than 37weeks) and very preterm infants (less than 32weeks) are 15-fold and 75-fold higher respectively.[4]

In Ethiopia preterm birth is a direct contributing factor in 28% percent of newborn deaths. Around 3 million babies are born every year in Ethiopia and 10% of them are born preterm. Over two-thirds of childhood deaths in Ethiopia are caused by few and easily preventable conditions; mainly, neonatal conditions and malnutrition. The health challenges faced by premature infants often necessitate that they spend the first few weeks or months in neonatal intensive care units. There are different interventions to help to prevent preterm birth, such as counseling on healthy diet and optimal nutrition, tobacco and substance use, fetal measurements including use of ultrasound to help to determine gestational age and detect multiple gestations.[3] Ethiopian government also made commitment to prevent prematurity and improve care for newborns through the focusing on lifesaving interventions in its health sector transformation plan and new born and child survival strategy.[5] In addition; there are limited studies in the study area and the whole Ethiopia which assess the prevalence but

no studies conducted which assesses the determinants. Therefore; this study was designed to develop a comprehensive list of evidence based risk factors for preterm birth.

Methods and materials

Study Design, setting and period

Unmatched case control study was conducted at Sidama zone public hospitals specifically at Bona and Yirgalem general hospital. Bona District Hospital serves for more than 400,000 catchment populations and Yirgalem Hospital is general hospital and which serves for populations more than the Bona District hospital. The study was conducted in selected hospitals from 1st March to 1st May 2018.

Population

All mothers who gave birth in public hospitals in Sidama Zone were the source populations and the study populations were selected from the source populations.

Sample size determination and procedures

The Sample size was calculated using the double population proportion approach and it was calculated using Epi info version 7 statistical software package with cases to control ratio of 1:4 and considering 10% non-response rate, the maximum sample size was 280(70 cases and 210 controls). Proportional allocation to sample was employed across the two hospitals in the zone using their average previous last two months delivery flow. Eligible cases were selected consecutively and for each case, controls were selected by using systematic random sampling method during data collection period until the required sample was achieved.

Operational definitions

a) Case: Mothers who gave birth after 28 completed weeks and before 37 completed weeks of gestation.[6]

b) Control: Mothers who gave birth after37 completed weeks of gestation.[6]

c) Undernourished mother: Mother who have MUAC less than 23cm.[7]

d) Standing for long period of time: Standing for more than 3hours per day.[8]

e) Spontaneous preterm birth: Preterm birth related to spontaneous onset of labor with intact membranes or preterm PROM.

f) Induced preterm birth: initiation of labor or elective Caesarian section before 37 completed weeks of gestation.

g) Intimate partner violence: any act which can affect(harm) women physical , sexual , stalking and psychological aggression (including coercive acts) by a current or former intimate partner(husband).[1]

Data collection tool and procedures

A structured pretested interviewer administered questionnaire was developed in English and then translated to a local language for simplicity and then retranslated to English language for its consistency by two different language experts. Data were collected by trained data collectors from medical records, directly from the clients through face to face interview and actual measurement using standard scale for height to measure height and inelastic tape to measure mid upper arm circumference (MUAC). The data collection tool was adopted from Ethiopian demographic and health survey (EDHS), global physical activity questionnaire and some other literature review.[9–11] Pretest was conducted on small sample (5%).

Data processing, management and analysis

The collected data were coded, cleaned and entered into Epi info version 7 and exported to SPSS version 23 for analysis. Multicolinearity among independent variables was checked and missing variables were managed accordingly. Bivariate and multivariate logistic regression was performed to see the association between the dependent and independent variables. Variables which have P-value less than 0.25 were entered into multivariable logistic regression model. Model fitness was checked by hosmer and lemshow with P-value greater than 0.05. Crude odd ratio, adjusted odd ratios and 95% confidence interval were used to assess the strength of association and statistical significance. Variables that had a p-value of <0.05 in the multivariable analysis were considered as independent determinants of preterm birth.

Ethical consideration

The ethical clearance was obtained from ethical review board of Arba Minch University, college of medicine and health sciences Institutional review board. Support letter was obtained from Sidama zone health Bureau. After explaining the purpose of the study, permission was obtained from the Hospital administrators and the medical Director. Written informed consent was obtained from all study participants. Privacy and Confidentiality were maintained throughout the whole period.

Results

Socio-demographic characteristics of respondents

From a total of 280 eligible participants (70 cases and 210 controls) 70 cases and 210 controls were participated making a response rate of 100%. The mean maternal age of the cases and controls were 25.84(±7.1) and 25.08(±4.94) respectively. Concerning marital status of the respondent's, 97.1% of cases and 94.8% of controls were married. Majority of the respondents 75.7% of case groups and 66.7% of control group were protestant. Pertaining to educational level, 60% of the cases and 35.2% of the control were not attended formal education. Most of the respondents (71.4%) among case and (57.6%) among controls were housewives. Regarding to maternal residence, 55.7% of the case and 40.5% of the controls were rural residents (Table1).

Maternal Obstetrics and Medical characteristics

Spontaneous labour of the current pregnancy was occurred with 47(67.1%) of the cases and 154(73.3%) of the controls. Among mothers in the governmental hospitals in Sidama zone, 23(32.9%) cases and 56(26.7%) controls had induced labor in their current pregnancy. Previous history of preterm birth was occurred in 25(35.7%) of the cases and 20(9.5%) of the controls. Among mothers in case group 20(28.6%) had had history of still birth, while it was 24(11.4%) among mothers in the control group. More than half of Cases 58(82.9%) had ANC visit in their current pregnancy, while it was 186(88.6%) among mothers in the control group. Pregnancy induced hypertension was occurred on 29(41.4%] of the cases and 26(12.4%) of the controls. Premature rupture of membrane for the current pregnancy was occurred on 43(61.1%) and 59(28.1%) of the

cases and controls respectively. Nearly one fifth of the cases which was 19(27.1%) and 26(12.4) of the controls had APH in their pregnancy. Sexually transmitted infection (STI) (VDRL test result reactive) was diagnosed on 24(34.3%) of the cases and 26(12.4%) of the controls (Table 2).

Fetal characteristics

Majority of new born in the current study area were free from congenital malformation. Among new born in the case group 69(98.6%) had no congenital malformation, while it was 207(98.6%) among neonates in the control group. In this study males accounted 33(47.1%) of the cases and 9(43.8%) of the controls.

Determinants of preterm birth

Bivariable logistic regression was performed for each independent variables and variables which have p-value <0.25 were entered to multivariable logistic regression. Mothers who had history of preterm birth were 4.196 times more likely to deliver preterm babies as compared with the counterparts on mothers who had no history of preterm birth(AOR: 4.196; 95%CI:1.693-10.400). The odd of mothers having history of still birth was 3.661 times more likely to deliver preterm babies than mothers who had no history of still birth(AOR: 3.661; 95%CI: 1.388-9.653). Similarly mothers who have pregnancy induced hypertension were 6.728 times more likely to deliver preterm babies as compared with mothers who haven't pregnancy induced hypertension(AOR: 6.728; 95%CI: 2.687-16.850). In addition mothers who have experienced ante partum hemorrhage during their pregnancy were 5.521 times more likely to deliver preterm babies as compared with mothers who haven't experienced ante partum hemorrhage during their pregnancy(AOR: 5.521; 95%CI: 2.054-14.840).

Mothers who have experienced premature rupture of membrane during their pregnancy were 6.924 times more likely to deliver preterm babies than mothers who haven't experienced premature rupture of membrane during pregnancy(AOR: 6.924; 95%CI: 3.066-15.637). Mothers who have STI infection during their pregnancy were 2.420 times more likely to deliver preterm babies than their counterpart (AOR: 2.42; 95%CI: 1.010-5.797). Maternal nutritional and occupational physical activity characteristics significantly associated in this study. Mothers with low nutritional status (MUAC<23cm) were 6.257 times more likely to deliver preterm babies than mothers well nourished (MUAC≥26cm) during their pregnancy (AOR: 6.257; 95%CI: 2.320-16.869). Mothers who have standing for a long period of time during their pregnancy after second trimester were 2.533 times more likely to deliver preterm babies than their counterpart (AOR: 2.533; 95%CI: 1.200-5.347) (Table 3).

Table 1 Socio-demographic characteristics of study participant in Sidama zone, South East Ethiopia, 2018

Variables	Category	Case[n=70)		Control (n=210)	
		n	%	n	%
Maternal age(Year)	15-19	14	20	21	10)
	20-34	41	58.6)	176	83.8
	≥35	15	21.4	13	6.2
Religion	Protestants	53	75.7	141	67.1
	Muslims	3	4.3	13	6.2
	Orthodox	11	15.7	44	21
	Catholic	3	4.3	12	5.7
Occupational status of the women	Housewife	50	71.4	121	57.6
	Farmer	0	0.0	3	1.4
	Self-employed	11	15.7	45	21.4
	Others	1	1.4	2	1
Educational level	Government employed	8	11.4	39	18.6
	No formal education	42	60.0	74	35.2
	Formal education	28	40.0	136	64.8
Maternal residence	Rural	39	55.7	85	40.5
	Urban	31	44.3	125	59.5
Marital status	Currently married	68	97.1	199	94.8
	Currently unmarried	2	2.9	11	5.2

Table 2 Maternal related characteristics among mothers who gave birth in Sidama Zone, South East Ethiopia, 2018

Variables	Category	Cases [n=70(%)]	Controls [n=210(%)]
History of preterm	Yes	25(35.7%)	20(9.5%)
	No	45(64.3%)	190(90.5%)
History of still birth	Yes	20(28.6%)	24(11.4%)
	No	50(71.4%)	186(88.6%)
ANC received	Yes	58(82.9%)	186(88.6%)
	No	12(17.1%)	24(11.4%)
Parity	Nulliparous	17(24.3%)	61(29.0%)
	Multiparous	53(75.7%)	149(71.0%)
Pregnancy induced hypertension	Yes	29(41.4%)	26(12.4%)
	No	41(58.6%)	184(87.6%)
Antepartum hemorrhage	Yes	19(27.1%)	20(9.5%)
	No	51(72.9%)	190(90.5%)
Polyhydraminos	Yes	6(8.6%)	12(5.7%)
	No	64(91.4%)	198(94.3%)
Spontaneous labor	Yes	47(67.1%)	154(73.3%)
	No	23(32.9%)	56(26.7%)
Oligohydramnios	Yes	8(11.4%)	10(4.8%)
	No	62(88.6%)	200(95.2%)
Induced labor	Yes	23(32.9%)	56(26.7%)
	No	47(67.1%)	154(73.3%)
Premature rupture of membrane	Yes	43(61.4%)	59(28.1%)
	No	27(38.6%)	151(71.9%)
Anemic status	Yes	25(42.4%)	77(38.7%)
	No	34(57.6%)	122(61.3%)
STI	Reactive	24(34.3%)	26(12.4%)
	Non-reactive	46(65.7%)	184(87.6%)

Table 3 Multivariable logistic regression analysis of factors associated with preterm birth among mothers who gave birth in public hospitals Sidama Zone, 2018

Variables	Category	Preterm birth		COR(95%C.I)	AOR(95%C.I)
		Case n=70(%)	Control n=210(%)		
STI(VDRL)	Reactive	24(34.3%)	26(12.4%)	3.692(1.94-7.02)	2.420(1.01-5.79)**
	No reactive	46(65.7%)	184(87.6%)	1	1
History of preterm	Yes	25(35.7%)	20(9.5%)	5.278(2.69-10.33)	4.196(1.69-10.4)**
	No	45(64.3%)	190(90.5%)	1	1
Pregnancy induced hypertension	Yes	29(41.4%)	26(12.4%)	5.006(2.67-9.38)	6.728(2.69-16.85)**
	No	41(58.6%)	184(87.6%)	1	1
Antepartum hemorrhage	Yes	19(27.1%)	20(9.5%)	3.539(1.76-7.13)	5.521(2.05-14.84)**
	No	51(72.9%)	190(90.5%)	1	1
Premature rupture of membrane	Yes	43(61.4%)	59(28.1%)	4.076(2.31-7.19)	6.924(3.07-15.64)**
	No	27(38.6%)	151(71.9%)	1	1
History of still birth	Yes	20(28.6%)	24(11.4%)	3.100(1.59-6.06)	3.661(1.39-9.65)**
	No	50(71.4%)	186(88.6%)	1	1
MUAC	<23cm	33(47.1%)	40(19.0%)	5.569(2.6-11.9)	6.257(2.32-16.87)**
	23-25cm	25(35.7%)	89(42.4%)	1.896(1.89-4.02)	2.210(1.87-5.62)
	≥26cm	12(17.1%)	81(38.6%)	1	1
Standing for a long period of time	Yes	51(72.9%)	19(27.1%)	5.145(2.83-9.36)	2.533(1.2-5.35)**
	No	19(27.1%)	138(65.7%)	1	1

*Candidate variables for multivariable analysis at p-value ≤0.25
**statistically significant at p ≤0.05 in multivariable logistic regression

Discussion

This study was conducted with the objective of examining the factors that determine preterm birth at NICU in public hospitals at Sidama zone. It revealed that STI, history of preterm birth, pregnancy induced hypertension during pregnancy, ante partum hemorrhage during pregnancy, history of still birth, premature rupture of membrane during pregnancy, maternal nutrition and standing for a long period of time during pregnancy were identified as factors determining the likelihood of preterm delivery. Mothers who had history of preterm birth were 4 times more likely to deliver preterm babies than mothers who hadn't history of preterm birth. This finding contradicts with a study conducted in Ethiopia, Jimma University teaching Hospital; which indicate that mothers who had history of preterm delivery were 99.5% less likely to deliver preterm birth as compared to their counterparts. This discrepancy might be due to the difference in socio-demographic status and geographical difference.[12] In line with a study conducted in Malaysia, where mothers who had history of preterm delivery were 5.43 times more likely to deliver spontaneous preterm babies as compared to their counterparts.[13] Similarly a study conducted in Jawaharlal Nehru Medical College(Belgravia) in India, Pakistan, China and Thailand revealed that having history of prior preterm birth was risk factor for late preterm birth.[14–17] This might be due to the fact that persistence of unidentified factors in some women precipitating the risk of preterm delivery.

Pregnancy induced hypertension was significantly associated with preterm birth, where mothers who have pregnancy induced hypertension during pregnancy were 6.73 times more likely to deliver preterm babies as compared with mothers who haven't pregnancy induced hypertension during pregnancy. This finding is similar with study conducted in Debramarkos town health institutions, Gonder

town health institutions and Malaysia.[10,13,18] This might be due to the fact that complications of pregnancy induced hypertension can affect vascular damage to placenta; this in turn brings the oxytocin receptors, which yields in preterm delivery. This study indicate that history of still birth is significantly associated with preterm birth, where mothers who had history of still birth were 3.66 times more likely to deliver preterm babies as compared with mothers who had no history of still birth. Similarly this result is in line with case study conducted at referral hospital in northern-eastern Tanzania and Rural Tanzania at Mkomaindo hospital.[19,20] This might be due to the persistence of unidentified factors in some women advancing still birth, which in turn might be initiate preterm labor in preceding pregnancy.

Ante partum hemorrhage has independently associated with preterm birth, where mothers who have experienced ante partum hemorrhage during pregnancy were 5.52 times more likely to deliver preterm babies as compared with mothers who haven't experienced ante partum hemorrhage during their pregnancy. This finding is similar with a study conducted in Debramarkos town health institutions and Kenyatta national hospital.[10,21] This might be due to the fact that ante partum hemorrhage often leads to delivery due to the risk it poses to the pregnant mother as well as the fetus.

This study revealed that premature rupture of membrane is significantly associated with preterm birth, where mothers who have experienced premature rupture of membrane during pregnancy were 6.92 times more likely to deliver preterm babies as compared with the mothers who haven't experienced premature rupture of membrane during pregnancy. This finding is similar with a study conducted at Dabremarkos town health institutions, Jawaharlal Nehru medical college in India, West of Iran and rural China.[14,22–24] This might be due to the fact that premature rupture of membrane raised up fetal plasma interleukin-6 representing that this fetal response may activate preterm labor of spontaneous delivery within 72hours.

The finding of this study has shown that, STI significantly associated with preterm birth, where mothers with VDRL test reactive during pregnancy and delivery were 2.42 times more likely to deliver preterm babies as compared with the counterparts from mothers who are non-reactive for VDRL test during pregnancy and during delivery. This result is similar with a case control study done in Malaysia and rural Tanzania at Mkomaindo Hospital which revealed that mothers with vaginal tract infection were 1.76 times more likely to deliver spontaneous preterm birth compared to their counterpart and maternal syphilis was associated with preterm birth respectively.[13,21] This might be due to the fact that ascending infection ultimately infects the amniotic sac and fluid and this in turn rupture the sac membrane leak amniotic fluid which results in preterm labor and delivery.

In line with a study conducted at Brazil, this study revealed that maternal occupational physical activity (standing for a long period of time) after second trimester of pregnancy found to be significantly associated with preterm birth, where mothers standing for a long period of time during their pregnancy were 2.5 times more likely to deliver preterm babies.[8] This might be due to the fact that standing for a long time increases the pressure on the blood vessels because the weight of the uterus and the baby is resting on pelvis, this in turn compresses blood vessels and become hard for the blood from the lower part of maternal body to return to heart. As a result this congestion of blood in lower body can cause the uterus to contract regularly resulted in opening of cervix and preterm labor. The finding of this study found that maternal nutritional status is significantly associated with preterm birth, where mothers with low nutritional status (MUAC <23cm) were 6.26 times more likely to deliver preterm babies as compared with well-nourished mothers (MUAC>26cm) during their pregnancy period. This finding is similar with a study conducted in two central hospital Zimbabwe and Bangladesh.[25,26] This might be due to the fact that when mother's nutritional status is affected, they will be prone to chronic infection which leads to activation of maternal fetal innate immune system which in turn initiates preterm labor.

Conclusion

The multivariable analysis found that history of preterm birth, history of still birth, premature rupture of membrane, ante partum hemorrhage, pregnancy induced hypertension, STI during pregnancy, standing for a long period of time during pregnancy and maternal malnutrition were factors which had associations with preterm birth. Therefore, providing appropriate information on maternal nutrition encountered during pre-pregnancy and pregnancy is very crucial.

Data availability

The data used to support the finding of this study is available from the corresponding author upon request.

Disclosure

The university has no role in the design of the study, collection, analysis, and interpretation of the data and in writing the manuscript.

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None.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. WHO. International statistical classification of diseases and related health problems. Geneva: Switzerland; 2015.
2. UNICEF. Level and Trends in Child Mortality. 2014.
3. BA. Preterm Birth Causes, Consequences, and Prevention. Washington DC: National Academy of Sciences; 2007.
4. Marlow N, Wolke D, Samara M. Neurologic and developmental disability at six years of age after extremely preterm birth. *N Engl J Med*. 2005;352(1):9–19.
5. FMOH. Health Sector Transformation Plan Addis Ababa; 2015.
6. Betamarium M. Ethiopia profile of preterm and low birth weight prevention and care. 2015.
7. Guidelines S. Anthropometric indicators to identify a pregnant woman as acutely malnourished and predict adverse birth outcomes. 2014.
8. Domingues MR, Matijasevich A, Barros AJ. Physical Activity and Preterm Birth A Literature Review. *Sports Med*. 2009;39(11):961–75.
9. BelaYnew W, Teumay Abraha, Getachew G. Effects of inter pregnancy interval on preterm birth and associated factors among postpartum mothers who give birth at Felegehiowt referral hospital. *World journal of pharmacy and pharmaceutical science*. 2015;4(04):12–25.
10. Bekele GK. Preterm Birth and Associated Factors among Mothers Who gave Birth in Debremarkos Town Health Institutions. Gynecol Obstet (Sunnyvale). 2013;5:92.

11. Ayman S. Abdelhady, Alaa Abdelwahid. Rate and risk factors of preterm births in a secondary health care facility in Cairo. *World journal of medical science*. 2015;12(1):09–16.

12. Bekele I, Demeke T, Dugna K. Prevalence of Preterm Birth and its Associated Factors among Mothers Delivered in Jimma University Specialized Teaching and Referral Hospital, Jimma Zone, Oromia Regional State, South West Ethiopia. *J Women's Health care*. 2017;6 (1).

13. Niu J Tan, Thilakavathy Karuppiah, Mohtarrudin N et al. Risk Factors for Spontaneous Preterm Labour with Intact Membrane: A Case Control Study of Malay Ethnic Group in Hospital Serdang, Malaysia. *J Gynec Obstet*. 2017;1(3).

14. Soumya Patil, Kamal P Patil. Analysis of risk factors of late preterm birth: A case-control study. *IJHBR*. 2017;10(3):283–7.

15. Shoukat Ali Baig, Najla Khan, Tooba Baqai. Preterm birth and its associated risk factors. A study at tertiary care hospitals of Karachi, Pakistan. *J Pak Med Assoc*. 2013;63(3).

16. Zhang YP, Liu XH, Gao SH, et al. Risk Factors for Preterm Birth in Five Maternal and Child Health Hospitals in Beijing. *PLoS One*. 2012;7(12):e52780.

17. Marisa I, Elmera P, Vitool L. A Case-Control Study of Preterm Delivery Risk Factors According to Clinical Subtypes and Severity Thaqiland Bankok. *J Obstet Gynaecol Res*. 2010;36(1):34–44.

18. Kahsay Gebreslasie. Preterm birth and associated factors among mothers who gave birth in Gonder town health institution. 2016.

19. Mahande JM. Maternal and obstetricrisk factors associ ated with preterm delivery at a referral hospital in northern-eastern Tanzania case control. *Asian Pacific Journal of Reproduction*. 2016;5(5):365–70.

20. Ahamad Kh, Abed Y, Abu Hamad B. risk factors associated with preterm birth in Gaza strip,Hospital based case-control study. *East Mediterr Health J*. 2007;13(5):1132–41.

21. Wagura P, Wasunna A, Laving A. Prevalence and factors associated with preterm birth at Kenyatta national hospital. *BMC Pregnancy Childbirth*. 2018;18(1):107.

22. Bekele T, Amanon A, Gebreslasie KZ. Preterm Birth and Associated Factors among Mothers Who gave Birth in Debremarkos Town Health Institutions, Institutional Based Cross Sectional Study. J Gynecol Obstet. 2013;5(5).

23. Derakhshi B, Esmailnasaba, Ghaderi E, et al. Risk Factor of Preterm Labor in the West of Iran: A Case-Control Study. *Iran J Public Health*. 2014;43(4):499–506.

24. Xiaosong Z, Min Z, Lijun C. Risk factors for preterm birth: a case-control study in rural area of western China. 2014.

25. Chimhini G. Determinants of premature births in two central hospital Harare,Zimbabwe, 2011. *Cen Afr J Med*. 2013;59(9–12):49-57.

26. Reshad S, Luke CM. Incidence and risk factors of preterm birth in rural Bangladshi cohort. *Bio Medical Central Peadiatrics*. 2013;14:112.

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