Assessment of Prevalence and Associated Factors of Preterm Birth at St Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

Michael Tamene Haile
Neonatal nursing department, St Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

Abstract
Background: Preterm birth has been referring to as babies born alive before 37 weeks' births include medical conditions of the mother or completed weeks or 259 days of gestation of pregnancy are completed. Preterm birth is the leading cause of infant morbidity and mortality throughout the world.
Objective; To assess prevalence and associated factor of preterm births among mother who gave birth at St Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2018.
Methods: Institutional based quantitative cross-sectional study design was conducted in maternity ward and emergency gynecology-obstetrics outpatient department among mothers who gave birth from June 01 –June 20, 2018 at St. Paul's hospital millennium medical college. Data was entered into Epi-info version7 and export into SPSS versions 23.0 for analysis. Bivariate and multivariate logistic regressions were conducted to identify predictors of maternal satisfaction towards childbirth service by considering p-value less than 0.05.
Result: The study revealed that the prevalence of preterm birth at St. Paul's hospital was 19.8%. The highest contributing maternal factor were history of pregnancy induced hypertension(PIH) and bleeding during pregnancy (AOR= 4.13 95%CI = 0.208,7.114) (AOR=4,001 95%CI 1.014,15.795) respectively; followed by urinary tract infection (UTI) (AOR=2.31195%CI 0.147,6.58) which all showed statistically significant association.
Conclusion and recommendation: the higher prevalence of preterm birth of ~20 % was highly associated with most likely preventable or minimal complications causes with regular Antenatal follow up. Pregnant mothers should be regularly screen for PIH, bleeding, UTI & PROM as it was revealed by the study these factors increased the risk of preterm delivery. In addition, improving maternal healthcare, community health education and awareness campaigns for service utilization may decrease the rate of preterm birth and its consequence.
Keywords: Preterm, Maternal, Fetal, neonatal, prevalence
DOI: 10.7176/JHMN/79-02
Publication date: August 31st 2020

Introduction

Preterm birth is defined as a delivery which occurs at less than 37 completed weeks of gestation. It is classified as extremely preterm (<28 weeks), very preterm (28 to <32weeks), and moderate to late preterm (32 to <37 weeks). Likewise, preterm birth can be categorized on the basis of birth weight. Neonates less than 2500g are classified as low birth weight (LBW), <1500g very low birth weight (VLBW) and <1000g extremely low birth weight (ELBW). Preterm birth can also be spontaneous or provider initiated.[1]

The birth of a preterm infant results in significant health consequences to the infant and emotional and economic costs for families and communities. Although advances in prenatal and neonatal care have improved the survival for preterm infants those infants who do survive have a greater risk of developmental disabilities, health, and growth problems than infants born at full term. About 75% of prenatal deaths and 50% of neurological abnormalities are directly attributed to preterm.[2]

The majority of preterm birth remains vulnerable to long term complications that may persist all over their lives. Among the main resulting morbidities are neurosensory deficits (blindness, deafness), necrotizing enter colitis, intraventricular hemorrhage, and delay in physical and mental development. According to the report from 'white paper on preterm birth' on 2009, of all 4 million annual early neonatal deaths (deaths within the first 7 days of life) that are non-related to congenital malformations, 28% are due to preterm birth. [3] Being born too early is now the leading cause of death in children around the world. Preterm deliveries were responsible for 1 million out of the 6.3 million deaths of children. While the greatest burden is felt in developing countries, it is a problem everywhere. Its negative impacts stretch further when taking into account the health of mothers and the lives of the children who manage to survive.[4]

The complications associated with preterm births are a significant direct cause of death among neonates. Three point one million reported deaths that occur among children globally every year, 35% of such deaths are as a result of preterm babies. This continues to be the leading most important cause of mortality among children in both developed and developing countries.[5]

The World Health Organization estimates the prevalence of preterm birth to be between 5 and 18% across 184 countries. Most countries lack reliable data on the burden of preterm birth with only 65 countries having had

such data in 2010.[5] Preterm birth is the leading cause of infant morbidity and mortality throughout the world. and the second leading cause of deaths among children under the age of 5 years. Though the particular challenges and burden of preterm birth varies by setting, rates are raising both nationally and globally. It has considerable health, social, psychological and economic consequences. Of the global 135 million live births14.9 million (11.1%) babies were born preterm in 2013.[6]

In Ethiopia some studies [8, 13] showed that some risk factors for preterm birth have been identified and included Presence of chronic illness, problem with current pregnancy, PROM, being anemic, low capital wealth index and no ANC follow up were found to be associated with the occurrence of preterm birth in current pregnancy.[13] Similarly about 12% of under- five deaths is attributed to preterm birth profile. In number wise 320,000 babies are born too soon each year and 24,000 children under five die due to direct preterm complications.

The aim of this study was to identify common risk factors for preterm birth and its immediate outcome which can indicate the possible means for decreasing both preterm birth occurrence and risk of associated deaths that contributes for the larger neonatal mortality significantly. In our study area there were no previous similar studies. Therefore, the findings of this study could help policy makers, program managers, stake holders, and obstetric care providers to design appropriate interventions to reduce preterm birth and decrease newborn morbidity and mortality. It would help to fill the research gaps in the area and serves as a base line information for similar studies in the country.

Materials and Methods

Study Area, Period and Design

Institution based cross-sectional study was conducted at St Paul's Hospital Millennium Medical College (SPHMMC), Addis Ababa, Ethiopia. The study was conducted on the period between June1, 2018 to June 30, 2018 to determine magnitude and contribution factor of preterm birth among mothers who gave birth at SPHMMC.

Source Population

The source population included of all mothers who gave birth at SPHMMC.

Study population

All women who gave birth with in the time period of June1 to June 30, 2018 at SPHMMC

Sample Size and Sample Size Determination

Sample size for the study was determined by using single population proportion formula, by taking the proportion of previous study conducted at Jimma University specialized hospital [12](P= 25.9%), with CI=95%, margin of error =0.05, a correction formula used to determine the sample size and subsequent adding of 10% for non-response rate the final sample size(n_f) became 237.

Sampling Technique

The total number of study subjects was selected through systemic random sampling with $K=N/n$, 800/237 = 3.3 where N is total number of deliveries in all health institutions during the study period and n is study population. The first study participant was selected by lottery method, to estimate the total number of deliveries within a data collection time client registration book/record for a month prior to data collection was used and every third (K=3) delivered mothers involved in the study.

Operational definitions

- **Gestational age**: was calculated based on mother's last menstrual period (LMP) or early ultrasound result; when there are extra days it is counted to the near lowest gestational age.
- **Preterm birth**: being spontaneous *preterm* (for those which labor was started spontaneously) and *indicated* (for which labor was induced either for maternal or fetal cases) which is < 37 weeks of GA.
- **Extremely preterm**: is preterm birth < 28 weeks of GA, **very preterm** is 28 to <32 weeks GA and **moderate to late preterm** is 32 to <37 weeks GA as it has been recorded on date of admission.
- **Maternal factor:** Any history of medical diagnosis in the mother as it has been registered on the medical record.
- **Fetal factor:** Any recorded medical diagnosis for the preterm neonates on their medical records.

Eligibility Criteria

- **Inclusion criteria**

All women who was admitted to the maternity ward and emergency gyn/obopd and gave birth in the period of June 1 to June 30, 2018.

- **Exclusion Criteria**

A woman who delivered at home and recently admitted for retain placenta, post-partum hemorrhage or other complications

Unknown LMP and ultrasound examination was also excluded.

Data collection instrument

The data collection instrument was closed-ended questionnaire. Delivery service satisfaction related questions were adopted from the previous studies and presented using three related parts. The first draft of the English questionnaire was translated to Amharic language by independent translators then back to English language to check for consistency.

Data Quality Assurance

In order to maintain reliability and validity, the questionnaire was pre tested on 24(10%) postnatal mothers at Addis Ababa university, Tikur Anbessa teaching and referral hospital one month prior to the actual data collection. Findings were discussed among data collectors and supervisor so that, the tool was modified before actual data collection and the final interview was conducted at convenient time using the modified questionnaire. During data collection data was checked by teams and supervisor on daily basis. and corrective measures were taken accordingly.

Data processing and Analysis

Data was entered into Epi-info version7 and export into SPSS versions 23.0 after checking for completeness then analyzed and expressed using descriptive methods and logistic regression was applied to sort out relationship between variables. Using binary logistic regression variables were identified for having association ($p<0.05$) with neonatal jaundice and these significant factors were further analyzed with multivariate logistic regressions to find out a statistically significant association.

Ethical Considerations

Ethical clearance was obtained from St Paul's Hospitals Millennium Medical College Institutional Review Board to conduct the research. Informed oral consent was obtained from each study participant. Confidentiality was assured by making the questionnaire anonymous.

Results

Socio demographic characteristics of the respondent

Among 237 samples a total of 237 respondents participated in this study making a response rate of 100 %. The mean age (±SD) of mothers who gave birth at SPHMMC were 28.30 (±4.963) which ranged from 17-43 years. The distribution of participants by marital status showed majority of the respondents 225 (94.9%) were married. The distribution of the respondent by educational status indicated that 79 (33.3%) were Secondary School. level occupational status more than half of participants 126 (53.2%) were housewives. The mean (±SD) Monthly income were 2725.32 (±1611.34SD) Birr. Regarding to house ownership majority of participants 133(56.1%) live in rental houses **(Table 1).**

Table 1: Socio-demographic characteristics of mothers who gave birth at SPHMMC in Addis Ababa, Ethiopia 2018 (n=237)

Study Variable	Response	Frequency (N)	Percent (%)
Age	15-24	54	22.8
	25-34	149	62.9
	35-44	34	14.3
	>=45	0	0
	Total	237	100
Marital Status	Married	225	94.9
	Single	9	3.8
	Widowed	0	0
	Divorced	3	1.3
	Total	237	100
Educational Status	Illiterate	39	16.5
	Read and Write	27	11.4
	Elementary	49	20.7
	Secondary School	79	33.3
	College and Above	43	18.1
	Total	237	100
Ethnic Background Of Respondent	Oromo	111	46.8
	Amhara	60	25.3
	Tigray	10	4.2
	Others	56	23.6
	Total	237	100.0

Study Variable	Response	Frequency (N)	Percent (%)
Religion	Orthodox	125	52.7
	Muslim	58	24.5
	Protestant	52	21.9
	Others	2	.8
	Total	237	100.0
Occupational Status	Un Employee	7	3.0
	House Wife	126	53.2
	Daily Labour	24	10.1
	Merchant	6	2.5
	Gov't /NGO	38	16.0
	PVT Worker	36	15.2
	Total	237	100
Level of family income	500-1500	62	26.2
	1501-2500	71	30.0
	2501-3500	53	22.4
	3501-4500	20	8.4
	.>4501	31	13.1
	Total	237	100
House ownership	Rented	133	56.1
	Private	80	33.8
	Not Have	2	.8
	Kebele House	22	9.3
	Total	237	100

Prevalence of preterm

Out of 237 mothers who gave birth at SPHMMC, 47 of them pretty much 20% (19.83 % to be exact) of babies delivered before 37 weeks of gestation. **(Figure 2)**

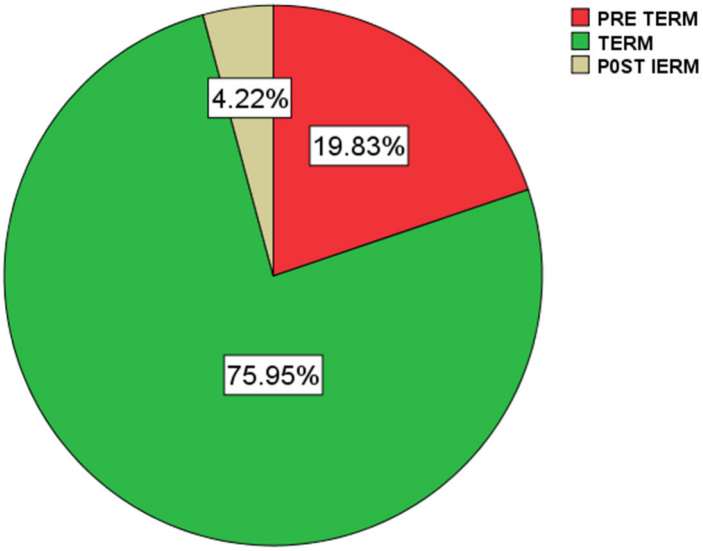

Figure2: prevalence of Preterm Birth of Mothers Who Gave Birth At SPHMMC In Addis Ababa, Ethiopia 2018 (n=237)

Description of Maternal characteristics

In descriptive analysis, the study showed that among the total of 237 women who gave birth at SPHMMC, most of the respondents 201(84.1%) had greater than four visit of ANC. More than one-third of mothers have developed pregnancy induced hypertension followed by PROM and UTI history during pregnancy (34.2%, 32.1%, 24.5% respectively). Close to half mothers were primigravida (46.4%). Additionally, 12.2% of mothers had history of preterm birth (**Table 2**) and **(figure 2).**

Table 2: Description of maternal characteristics of the respondents at SPHMMC in Addis Ababa, Ethiopia 2018

Study Variable	Response	Frequency (N)	Percent (%)
Spouse Abuse/Domestic Violence	Yes	26	11.0
	No	211	89.0
	Total	237	100.0
Medication intake during pregnancy	Yes	68	28.7
	No	169	71.3
	Total	237	100
	Yes	9	3.8
Substance Intake During Pregnancy	No	228	96.2
	Total	237	100
Mode Of Delivery	Normal	111	46.8
	C/S	126	53.2
	Total	237	100
Gravida	Primi-gravida	110	46.4
	Multi-gravida	127	53.6
	Total	237	100
Parity	0	0	0
	1	114	48.1
	2	80	33.8
	>3	43	18.1
	Total	237	100
Birth Interval	<1 year	2	.8
	1-3Years	86	36.3
	>3 years	40	16.9
	New	109	46.0
	Total	237	100
History Hyper Emesis Gravid arum	Yes	82	34.6
	No	155	65.4
	Total	237	100
	Yes	55	23.2
History Of Abortion	No	182	76.8
	Total	237	100.0
History Of The Still Birth	Yes	17	7.2
	No	220	92.8
	Total	237	100
History Of Preterm Labor	Yes	18	7.6
	No	219	92.4
	Total	237	100
	Yes	27	11.4
History Of Previous C/S	No	210	88.6
	Total	237	100
	Yes	76	32.1
Pre-Mature Rupture Of Membrane	No	161	67.9
	Total	237	100
	Yes	29	12.2
History Of Bleeding During Pregnancy	No	208	87.8
	Total	237	100
Urinary Tract Infection During Pregnancy	Yes	58	24.5
	No	179	75.5
	Total	237	100
Maternal hypertensive disorder	HTN	51	21.5
	Pre-Eclampsia	30	12.7
	No HTN	156	65.8
	Total	237	100

Study Variable	Response	Frequency (N)	Percent (%)
History Of DM During Pregnancy	Yes	14	5.9
	No	223	94.1
	Total	237	100.0
Presence Of Chronic Disease	Yes	40	16.9
	No	197	83.1
	Total	237	100
History Of Hospitalization During Pregnancy	Yes	24	10.1
	No	213	89.9
	Total	237	100
History Of ANC Follow Up	Yes	201	84.8
	No	36	15.2
	Total	237	100

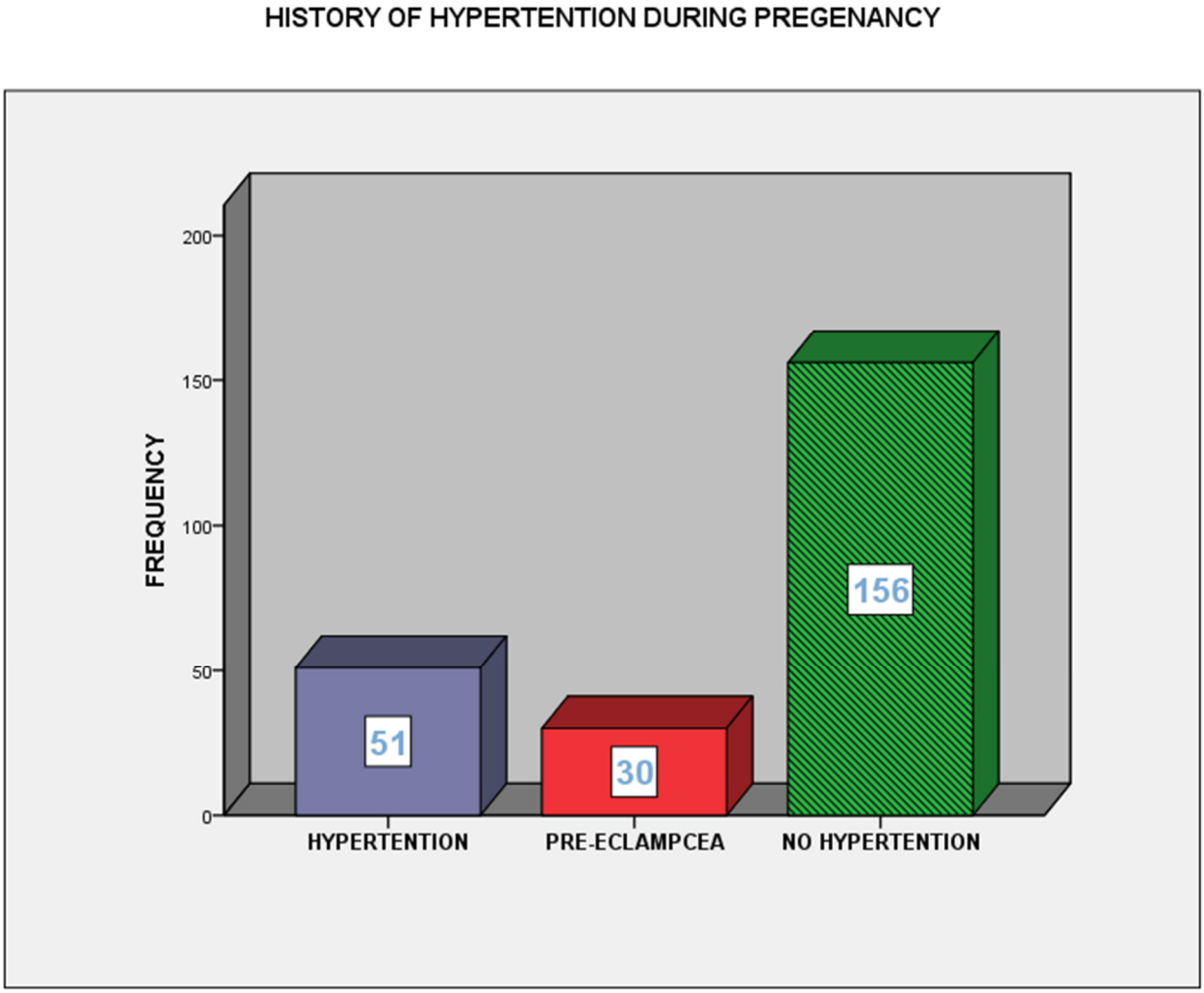

Figure 3: History of hypertension of Mothers/maternal hypertensive disorder/ who gave birth at SPHMMC in Addis Ababa, Ethiopia 2018 (n=237)

Description of Fetal characteristics

In Descriptive analysis of fetal factors, the study showed that out of 237 alive birth 5.5% of them have congenital abnormality such as clubfoot spine bifida and Esophageal atresia/tracheoesophageal fistula (EA/**TEF**) **(Table 3)**.

Table 3: Description of fetal characteristics of the respondents at SPHMMC in Addis Ababa, Ethiopia 2018

Study Variable	Response	Frequency (N)	Percent (%)
Congenital Abnormality Of The New Born	Yes	13	5.5
	No	224	94.5
	Total	237	100
History of Twins Delivery Including the Current pregnancy	Yes	8	3.4
	No	229	96.6
	Total	237	100
History Of Congenital Abnormality	Yes	3	1.3
	No	234	98.7
	Total	237	100
History Of LBW Including the Current pregnancy	Yes	66	27.8
	No	171	72.2
	Total	237	100,

Factors associated with preterm birth

Pre-mature rupture of membrane, history of bleeding, urinary tract infection and maternal hypertensive disorder were included in the final model of analysis for associated factors of preterm birth. The multivariate logistic regression reveled that maternal hypertensive disorder and history of bleeding during pregnancy were the foremost contributor of preterm birth (AOR= 4.13; 95%CI 0.208- 7.114) and (AOR=4,001 95%CI 1.014-15.795) respectively followed by urinary tract infection during pregnancy (AOR=2.311 95%CI 0.147-6.58).

TABLE 4: Factors associated with preterm birth among mothers who gave birth at SPHMMC, Addis Ababa, Ethiopia, 2018

VARIABLE	PRETERM		COR(95%CI)	AOR(95%CI)	P value
	Yes	NO			
Pre-mature rupture of membrane					
Yes	13(5.5%)	63(26.6%)	1.297(0.640,2.631)	1,261(0.358,2.818)*	0.042
No	127(53.6%)	34(14.3%)	0.0	0.0	
History of bleeding during pregnancy					
Yes	3(1.3%)	26(11 %)	2.325(0.673,8.039)*	4..001(1.014,15.795)*	0.048
No	164(69%)	44(18.6%)	0.0	0.0	
Urinary tract infection during pregnancy					
Yes	20(8.4%)	38(16%)	2.338(0.171,0.669)*	2.311(0.147,0.658)**	0.002
No	152(64.2%)	27(11.4%)	0.0	0.0	
Maternal hypertensive					
Yes	31(13.1%)	50(21%)	4.126(0.243,1.174)**	4.133(0.208,7.114)**	0,009
No	140(59.1%)	16(6.8%)	0.0	0.0	

***: Significant association at p-value < 0.05, **: Significant association at p-value < 0.01**

Discussion

In this study, prevalence of preterm birth was found to be nearly 20%. This finding was comparable to a study conducted at Jimma university teaching and referral Hospital, which stated that 25.9% prevalence [12]. This is higher than many others studies outside Ethiopia in South Asia which is 12.8% of preterm births, 11.8% in low-income countries, 11.3% in middle-income countries, 9.4% upper middle and 9.3% in high-income countries.[9,10] It was also higher than a study conducted at Debremarkos Town Health Institutions which stated 11.6%.[10] Variation of findings with the above studies could be due to the socio-economic difference of the countries and areas, methodological deference as well as the time of study.

The mean age (±SD) of mothers who gave birth at SPHMMC was 28.30 (±4.963) which ranged from 17-43 years. This was similar with other studies[9,10,11,12] at Debremarkos town (28.57), south Asia (26.7), Gonder (25) and Jimma (25). In rural South Africa and Malawi, significantly greater proportion of women with preterm births was less than 20 years old.[15] In this study high range of maternal age was seen than most of the studies mentioned, advanced maternal age was stated as one factor for higher proportion of preterm births as it was mentioned in literatures. [21]

The study indicated that one of the highest significant associations was found among those who had maternal hypertensive disorder. They were about 4 times more likely to have preterm birth than without those without maternal hypertensive disorder [AOR=4.33 95%CI (0.2087, 7.114)]. This finding was in line with a cross sectional study conducted in Gonder[11] which was stated that hypertension induced preterm of AOR =5.36, 95% CI = 1.8–15.96. This comparison might be due to fact that complication of maternal hypertensive disorder could causes preterm birth.

Another major finding of this study was the association of preterm birth and mothers with a history of bleeding during pregnancy. They are also four times more likely to have preterm birth than those who do not have a history of bleeding during pregnancy [AOR=4.00 95% CI (1.014,15.95)]. This was supported by a study in Debremarkos[10] which stated that the likelihood of having preterm birth was about three times higher than those mothers without the problem during their pregnancy [AOR= 2.9, 95% CI = 1.3-6.7].

Mothers who had urinary tract infection were about two times more likely to had preterm birth (AOR=2.311. 95 %CI 0.147,0.658) than those without UTI. In addition, mothers with premature rupture of membrane had about one-fold higher likelihood of preterm birth than without PROM. Infection may raise release of inflammatory chemokine's and cytokines such as interleukins and tumor necrosis factors. Microbial Endotoxins and pro inflammatory cytokines stimulate the production of prostaglandins (other inflammatory mediators) and matrix-degrading enzymes that finally result in stimulation of uterine contractions, preterm rupture of the membrane, and preterm birth.[12]

Conclusion and recommendation

Prevalence of Preterm birth was just about 20 %. Maternal and fetal factors that highly contributed for preterm birth were identified. Among these factors, maternal factors of maternal hypertensive disorder, history of bleeding during pregnancy, urinary tract infection and premature rupture of membrane showed as a significant association with preterm birth.

So additional efforts of regularly screening of all pregnant mothers for the potential problems, proving quality maternal healthcare, community health information and dissemination campaigns are needed as these contribute for reduction of preterm birth and its consequence in the health of neonates & mothers in Addis Ababa, Ethiopia. Ministry of Health of Ethiopia in collaboration with all stakeholders should organize efforts to confront the problems. Conducting further researches to identify other possible factors of preterm birth such as fetal causes were recommended.

Acknowledgments

First of all, I would like to thank almighty God for giving me the strength and patience throughout the study period. I would like to be grateful to my former students Huluagerish Eshete**,** Mensur Kasim**,** Kidanmariym Workie for their help during the data collection. Then I would like to express my respect to SPHMMC Administrative, who gave me the permission to proceed and NICU department, for their support in providing all the necessary information. Finally, I would like to be grateful to all who had been supporting me both with idea and logistics.

Disclosure

The author reports no conflicts of interest in this work.

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