Proportion of Preterm birth and associated factors among mothers who gave birth in Debretabor town health institutions, northwest, Ethiopia

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Abstract

Objective: Each year, about 15 million babies in the world are born too prematurely. Complication of preterm birth is the single largest direct cause of neonatal deaths and the second most common cause of under-5 deaths after infection. Therefore, assessing the proportion of preterm birth and associated factors among Mothers who gave Birth in Debretabor town health institutions have a paramount importance in designing an effective strategy to intervene.

Result: In this study preterm birth was 12.8%. Obstetric complication [AOR = 6.6, 95% CI (3.4–12.6)], maternal Mid Upper Arm Circumference less than 24 cm [AOR = 2.6, 95% CI (1.1–6.1)], antenatal care follow up < 4 visits [AOR = 3.0, 95% CI (1.6–5.9)], being HIV positive [AOR = 5.1, 95% CI (1.7–15.4)], Premature Rupture Of membrane [AOR = 3.0, 95% CI (1.3–6.6)], and being Anemic [AOR = 2.9, 95% CI (1.3–6.6)] were found to be statistically significant. Proportion of preterm birth was high in Debretabor town. Timely identification of obstetric complications and health education to improve antenatal care utilization will minimize the proportion of preterm birth.

Keywords: Preterm birth, Proportion, Debretabor Town

Introduction

Preterm birth is defined by WHO as all viable births before 37 completed weeks of gestation or fewer than 259 days since the first day of woman’s last menstrual period [1]. Each year, more than one in 10 births, are born too prematurely in the world. Preterm birth is the single largest direct cause of neonatal deaths responsible for 35% and the second most common cause of under-5 deaths a year [2]. About 28% of early neonatal deaths are due to preterm birth [3].

Globally preterm neonates take the first place for neonatal intensive care unit (NICU) admission and longer hospital stay [4]. Complication of the preterm result in significant cost to the health sector, parents and the society. Therefore, the prediction and prevention of preterm birth is a major health care priority [5, 6].

Over 60% of preterm births occur in low- and middle-income countries (LMICs) and consistently risen in most countries [7]. Study on preterm birth highly recommends the need for focused and continuous studies across those nations in order to fill this information gap [8].

Ethiopia had reduced under-5 mortality by 67%, however, the reduction in neonatal mortality is not as impressive and premature birth is the leading cause accounts 37% [9].

Studies estimated preterm birth rates ranged from 5% in developed countries to 26% in developing countries [5]. In 2010 WHO estimated the global rates was 11.1%. From this majority (85%) occurred in sub-Saharan Africa and South Asia [5]. Another retrospective study estimated as 10.2% [10]. One cohort study estimated to be 15.8% [11], in Jeddah, Saudi Arabia, 13.7% [12], in
Reliance Region (West of Algeria), 9.26% [13], in Brazilian young parturient women 21.7% and Multicenter Study in Brazil preterm births was 12.3%, ranging from 14.7% in the northeast region to 11.1% in the southeast [14, 15].

A cross-sectional study in the University of Ilorin teaching hospital, Ilorin, Nigeria, reported 11.8% [16], in Cameroon and Malawi was 26.5% and 16.3% respectively [17, 18], and in the eastern part of Africa the largest prevalence of preterm was in Kenya 18.3% [19].

Studies conducted in different areas reported risk factors for preterm birth: low socio-economic status, malnutrition, pregnancy-related complications and history of preterm birth [20], age less than 20, PROM, UTI, multiple pregnancy, preeclampsia [15, 24], cervical insufficiency, fetal malformation, polyhydramnios, antepartum hemorrhage, previous abortion, high BMI, suffered from domestic violence [21], history of child death [22], residence, lack of antenatal care and maternal disease [23], null parity and being unmarried [25, 26]. Presence of chronic illness, the absence of antenatal follow up, and hematocrit (HCT) level < 33 were found to be significantly associated with preterm birth [27, 28].

Therefore determining factors has a great role in guiding health professionals and health policy makers to design the intervention strategy and applying necessary preventive and appropriate measures to decrease preterm birth.

Main text

Methods

Institutional based cross-sectional study design was conducted among mothers who gave birth in Debretabor town health institutions from June 1 to September 30, 2016

The source population was mothers who gave birth in Debretabor town health institutions and the study population was those mothers who gave birth during the study period.

By considering single population proportion formula the final sample sizes were 575. Health institutions providing labor and delivery service in the town were systematically selected. Then the sample for each health institution was proportionally allocated based on their patient flow prior to the data collection period. Systematic sampling technique was employed to select the study participants from each health institution. Neonates born at less than 37 completed weeks of gestation but after viability (28 weeks of gestation) were taken as preterm, gestational age was calculated based on LNMP or first-trimester ultrasound result. Maternal nutritional status was assessed by measuring the left middle upper arm circumference (MUAC) using non-stretchable world food program MUAC tapes. Most screening programs have used a cut off of 21–23 cm. Given that there is no international consensus on the cut off to use, a MUAC of < 24 cm was chosen for this study.

Data were collected by face to face interview and chart review using a structured and pre-tested questionnaire. Data were checked, coded and entered into EPI Info 7 and exported to SPSS 20 for analysis. Binary logistic regression was used to identify the associations between the dependent and independent variables. Those variables with a p-value of<0.2 on binary logistic regression analysis were transferred to multivariable logistic regression. The degree of association was assessed using odds ratio with a 95% confidence interval and variables with a p-value < 0.05 were taken as statically significant.

Results

Socio-demographic characteristics of respondents

A total of 548 participants were completed the interview making 95.3% of response rate. The mean age of the study participants was 27.7 with SD of 5.8. Sixteen years old was the minimum and 41 years old was the maximum ages of clients participated in this study. Majority of the participants were 517 (94.2%) Orthodox Christians in religion. Majority 538 (98.2%) of the respondents were married and one-third 184 (33.4%) of the mothers were secondary and above on their educational status (Table 1).

Obstetric and medical related characteristics

Majority of the respondents 511 (93.3%) had ANC follow up and three-fifth of them had at least 4 visits 326 (59.5%). Nearly all of the respondents had used modern contraceptive 488 (89%) prior to their pregnancy and majority of them had their pregnancy wanted and planned 496 (90.4%). More than two-fifth of the respondents had birth to pregnancy interval greater than or equal to 36 months 231 (42.2%). One in ten mothers had Mid Upper Arm Circumference (MUAC) less than 24 cm (10%). Labour spontaneously started in 91.6% of the respondents. One-sixth of participants had one or more obstetric complications 92 (16.8%) (Table 2).

Proportion of preterm birth

The proportion of preterm birth in this study was 12.8% [95% CI (9.9%, 15.7%)] and 11.5% was post term.

Factors associated with preterm birth

After multivariable logistic regression, number of ANC visits less than 4 times, MUAC less than 24 cm, having PROM, being anemic, the complication in current pregnancy and being HIV positive were found to be statistically significant at a p-value of < 0.05.
Mothers who had ANC visits < 4 times in the index pregnancy were 3.3 times more likely to have a preterm birth than mothers who had ANC visits ≥ 4 times [AOR = 3.0, 95% CI (1.6–5.9)]. Mothers who had MUAC < 24 CM were 2.6 times more likely to develop preterm birth than their counterparts [AOR = 2.6, 95% CI (1.1–6.1)]. Obstetric complications during the index pregnancy were:

- PROM Yes 68 12.4
pregnancy were 6.6 times more likely to develop preterm birth than mothers without any of the mentioned problems [AOR = 6.6, 95% CI (3.4–12.6)]. Being HIV positive had 5.1 times increased the risk of giving preterm birth than their counterparts [AOR = 5.1, 95% CI (1.7–15.4)]. Having anemia in the index pregnancy increased the risk of preterm birth by 2.9 times [AOR = 2.9, 95% CI (1.3–6.6)] (Table 3).

### Discussion

In this study the proportion of preterm birth was found to be 12.8% with 95% CI (9.9%–15.7%). This finding was in line with findings in Africa (11.9%) and North America (10.9%) [5], the prevalence of preterm birth in Ethiopia 10.1% [29], a study conducted in Debremarkos town health institutions 11.6% [27], and Gondar university hospital 14.3% [28].

The current finding was higher than the findings conducted in Sweden 5.03% [31], in Gondar town health institutions 4.4% [30]. This might be due to the difference in study time, setting, and design used. However, this finding was lower than findings reported in Malawi 16.3% [18], Brazil 21.7% [14], Nigeria 23.7% [24]. This variation might be because of the difference in a study area, design, time, population and sociocultural variations.

Having pregnancy complications during index pregnancy were 6.6 times more likely to have a preterm birth than mothers without these problems [AOR = 6.6, 95% CI (3.4–12.6)]. This finding was parallel with findings in

### Table 2 (continued)

| Variables          | Frequency | Percent (%) |
|--------------------|-----------|-------------|
| No                 | 480       | 87.6        |
| HGB (mg/dl)        |           |             |
| < 11               | 52        | 9.5         |
| ≥ 11               | 496       | 90.5        |
| GA at delivery     |           |             |
| Preterm            | 70        | 12.8        |
| Term               | 415       | 75.7        |
| Post term          | 63        | 11.5        |
| Obstetric complication |     |             |
| Yes                | 92        | 16.8        |
| No                 | 456       | 83.2        |
| Type of obstetric complication | |     |
| APH                | 42        | 7.7         |
| PIH                | 27        | 4.9         |
| Multiple pregnancy | 15        | 2.7         |
| Polyhydraminosus   | 8         | 1.5         |
| History of medical illness | |     |
| Yes                | 60        | 10.9        |
| No                 | 488       | 89.1        |
| Type of medical illness |     |             |
| CHTN               | 13        | 2.4         |
| DM                 | 8         | 1.5         |
| Heart failure      | 9         | 1.6         |
| Asthma             | 5         | 0.9         |
| UTI                | 19        | 3.5         |
| Malaria            | 6         | 1.0         |

### Table 3 Factors associated with preterm birth among the women delivered in Debretabor town health institution northwest, Ethiopia, from June to September 2016 (N = 548)

| Variables          | Preterm | COR (95% CI) | AOR (95% CI) | p-value |
|--------------------|---------|--------------|--------------|---------|
| Residence          |         |              |              |         |
| Rural              | 42      | 195          | 2.17 (1.3–3.6)* |         |
| Urban              | 28      | 283          | 1            |         |
| ANC follow up      |         |              |              |         |
| No                 | 15      | 22           | 5.65 (2.8–11.5)* |         |
| Yes                | 55      | 456          | 1            |         |
| Number of ANC visits |       |              |              |         |
| < 4                | 50      | 172          | 4.4 (2.5–7.7)* | 3.0 (1.6–5.9)* | 0.001  |
| ≥ 4                | 20      | 306          | 1            | 1       |
| History of preterm delivery | |     |             |         |
| Yes                | 6       | 8            | 5.5 (1.8–16.4)* |         |
| No                 | 64      | 470          | 1            |         |
| History of abortion |       |              |              |         |
| Yes                | 21      | 80           | 2.1 (1.2–3.7)* |         |
| No                 | 49      | 398          | 1            |         |
| Anemia             |         |              |              |         |
| Yes                | 17      | 35           | 4.06 (2.1–7.7)* | 2.9 (1.3–6.6)* | 0.01   |
| No                 | 53      | 443          | 1            |         |
| Prom               |         |              |              |         |
| Yes                | 22      | 46           | 4.3 (2.3–7.7)* | 3.0 (1.5–6.2)* | 0.002  |
| No                 | 48      | 432          | 1            | 1       |
| MUAC (cm)          |         |              |              |         |
| < 24               | 12      | 43           | 2.09 (1.04–4.2)* | 2.6 (1.1–6.1)* | 0.022  |
| ≥ 24               | 58      | 435          | 1            | 1       |
| Complication in current pregnancy | |     |              |         |
| Yes                | 37      | 55           | 8.6 (4.99–14.9)* | 6.6 (3.4–12.6)** | < 0.001 |
| No                 | 33      | 423          | 1            |         |
| Status of HIV      |         |              |              |         |
| Positive           | 12      | 15           | 6.4 (2.8–14.5)* | 5.1 (1.7–15.4)* | 0.003  |
| Un known           | 3       | 22           | 1.0 (0.3–3.7) |         |
| Negative           | 55      | 441          | 1            |         |
| History of medical illness | |     |              |         |
| Yes                | 17      | 43           | 3.2 (1.7–6.1)* |         |
| No                 | 53      | 435          | 1            |         |

*p value < 0.05, **p value < 0.001
Ethiopia [30], Nigeria [24] Bangladesh [22], Brazil [14] and Kenya [19]. This might be due to that obstetric complications result in medical induced or spontaneous preterm delivery.

The current study showed that having PROM were 3 times more likely to have a preterm birth than their counterparts [AOR = 3.0, 95% CI (1.5–6.2)]. This finding was similar with findings in Tehran, Iran, [32], in Kenya [19] and in Debremarkos town, Ethiopia [27]. This might be due to that labor will spontaneously initiate within hours after term PROM and within a week after preterm PROM in the majority of the cases.

In this finding being anemic were 2.9 times more likely to have a preterm birth than their counterparts [AOR = 2.9, 95% CI (1.3–6.6)]. This finding was agreed with findings in Saudi Arabia [12], in Ethiopia [27] and in Malawi [18]. This might be due to anemia predisposes to decreased blood flow to the placenta causing placental insufficiency and result in preterm delivery.

In this study, mothers with less than four times ANC visit were 3 times at risk to give preterm birth than those with four and more visits [AOR = 3.0, 95% CI (1.6–5.9)]. This finding is in line with a study in Cameron [17]. This might be frequent ANC visit maximizes the opportunity of health promotion, early detection, and treatment of obstetric complications.

The current finding showed that maternal MUAC less than 24 cm were 2.6 times increased risk of developing preterm birth than mothers with MUAC greater than or equal to 24 cm with [AOR 2.6, 95% CI (1.1–6.1)]. This finding was agreed with a study in Bangladesh [22]. This might be maternal nutritional status had a direct effect on placental size, fetus and strength of the membrane resulted in preterm delivery.

This study showed that HIV positive mothers were 5.1 times at increased risk of having a preterm birth than their counterparts [AOR = 5.1, 95% CI (1.7–15.4)]. This finding is in line with a study in Ethiopia [30]. This might be due to the drug effect and immunity of the mother at risk for preterm birth.

Conclusion
The proportion of preterm birth was high. Problem with current pregnancy, being anemic, being HIV positive, MUAC less than 24 cm and ANC visit less than four times were found to be statistically significant for preterm birth in the current pregnancy. So that, Ministry of health need to engage on educating the community to improve ANC service utilization through different methods and Upgrade capacity of health institutions to identify treat obstetric complications and nutritional counseling for mothers during their ANC follow up.

Limitation
This study was conducted through a cross-sectional study and may not show the cause and effect relationship.

Abbreviations
ANC: Ante Natal Care; AOR: adjusted odds ratio; APH: ante-partum hemorrhage; CHT: chronic hypertension; CI: confidence interval; COR: crude odds ratio; CS: cesarean section; DM: diabetes mellitus; DTH: Debretabor Hospital; EDHS: Ethiopian Demographic and Health Survey; GA: gestational age; HC: Health Center; HCT: hematocrit; HGB: hemoglobin; HIV: human immune deficiency virus; LMICs: lower and middle income countries; MDG: millennium development goal; MUAC: mid upper arm circumference; NICU: Neonatal Intensive Care Unit; PIH: pregnancy induced hypertension; PROM: premature rupture of membrane; SD: standard deviation; SVD: spontaneous vaginal delivery; SPSS: Statistical Package for Social Sciences; UTI: urinary tract infection; WHO: World Health Organization.

Authors’ contributions
DGM and AEY conceived and design the idea, participated in the data collection process, analyze data and wrote the paper. TSN and WMA participated in data analysis and wrote the paper. All authors read and approved the final manuscript.

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Competing interests
The authors declare that they have no competing interests.

Availability of data and materials
Data will be shared up on request and will be obtained by email to the author using ‘davegeby@gmail.com’.

Consent for publication
Not applicable.

Ethics approval and consent to participate
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