Socio Demographic and Maternal Determinants of Low Birth Weight at Mekelle Hospital, Northern Ethiopia: A Cross Sectional Study

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ABSTRACT

The objective of the study was to assess the determinant factors of low birth weight among newborns delivered at Mekelle Hospital, northern Ethiopia. A cross-sectional study was employed and cards of 180 mothers who gave birth to low birth weight babies were assessed. Data was collected using pre prepared structured checklist and analyzed using SPSS version 16.00. The association between dependent and independent variables was assessed and presented using descriptive statistics, student t-test, and ANOVA test. Out of the180 mothers, 45% of them fall into the age category of 15-19 years. The study finding showed maternal age, fetal sex, parity, number of antenatal care, gestational age, birth order, and history of abortion had significant association with low birth weight (P-value < 0.05). This study depicted that low birth weight is a public health problem in the study area. Hence, attention should be given to increase community awareness of antenatal care service, access to family planning and male involvement, prevention of abortion, and community mobilization to prevent early pregnancy.

Keywords: Low birth weight, Reproductive histories, cross-sectional, Mekelle.

INTRODUCTION

Low birth weight (LBW) has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams including 2,499 grams irrespective of gestational age[1,2]. LBW is a sensitive indicator for predicting the chance of infant healthy growth and development and a primary determinant of infant mortality risk[3,4]. LBW is either the result of preterm birth or due to restricted fetal growth. It is

closely associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life[1]. Worldwide, about 16% of live births or some 20 million infants per year are born with less than 2500g of weight and 90% of them are born in developing countries[5].

LBW is a leading cause of neonatal mortality[6]. It is now also incriminated in the occurrence of many chronic diseases in adult life time; these include adult-onset diabetes, coronary heart disease, and high blood pressure, intellectual, physical and sensory disabilities. However, little attention is paid to birth weight improvement as a means of reducing child mortality[7]. In most developing countries, it was approximated that every ten seconds an infant dies from a disease or infection that can be attributed to LBW [5]. Those who had a history of very low birth weight (VLBW) are 2.6 times at risk of respiratory failure requiring mechanical ventilation[8]. Although about one-half of all LBW infants in industrialized countries are born preterm (<37 weeks of gestation), most LBW infants in developing countries are born at term and are affected by intrauterine growth restriction that may begin early during pregnancy[9]. As children, LBW infants are more likely to have disabilities, hospitalizations, brain damage, and poorer language development, be placed in special education classes, and display more intellectual impairments[10]. Across the world neonatal mortality is 20 times more likely for LBW babies compared to heavier babies ($\geq$2500g) and it increases sharply as birth weight (BW) decreases[11]. WHO shows that factors contributing to LBW in developing countries include, in order of importance; inadequate weight gain during pregnancy, low pre pregnancy weight, short stature, malaria and female sex of the fetus[12]. Other factors which are associated with LBW include hard physical work during pregnancy, and illness, especially infections, social factors such as lower status of women, malnutrition, lack of antenatal care (ANC) etc[3,5]. Mothers who had multiple gestations had a higher risk of delivering LBW babies[13].

In Ethiopia, studies showed that the prevalence of LBW varies from 6-10 % [10]. Another retrospective study conducted to establish BW changes at Tikur Anbessa Hospital showed that LBW has increased trend between 1976 and 1996. According to the 2005/06 annual activity report of the Addis Ababa City Administration, Health Bureau, the rate of LBW among all deliveries attended from health institutions reporting to the city health bureau is 11%[5]. In another paper, more than 60% of all LBW are preterm. Some are both premature and growth retarded while others may be full term, but underweight (small for gestational age) [14]. Hence, LBW is still a challenging problem for the child's health and affecting the health cost of the government and the society. Therefore, the overall work of this study assessed the determinant factors of low birth weight among newborns delivered at Mekelle Hospital, Tigray, northern Ethiopia. Thus, it will provide valuable information to the health professionals, researchers, regional health bureau and other stakeholders act upon it.

MATERIALS AND METHODS

Study design, area and period

A cross sectional retrospective study was implemented to review 180 birth cards of mothers who had live births within one year just before the study period in Mekelle Hospital, Mekelle, Northern Ethiopia. The study was conducted from April 1, 2012 in August 10, 2012.

Inclusion criteria

All birth cards with low birth weight with no missing the most important information were included.

Exclusion criteria

The cards having incomplete information, multiple pregnancies and babies with congenital anomalies were excluded from the study.

Sample size and Sampling technique

The sample size was calculated using single population proportion formula with the estimated proportion of LBW to be 14% from reports of Ethiopian Demographic Health Survey (EDHS) [15] and with the assumption of a marginal error of 5% at 95% CI, the estimated sample size was 180. Convenience sampling was used with the following steps. Birth cards of one year ahead the study period were identified; cards with LBW were separated, and checked for completeness of the necessary information. Incomplete birth cards, multiple pregnancies, cards, revealing any congenital anomalies were excluded. The data were collected using Pre prepared structured checklist.

Data analysis

SPSS software version 16.00 was used. The collected data were cleared and checked again and analyzed using descriptive statistics, t-test, ANOVA. This test was used in order to compare the mean birth weight.

Variables

Independent variables: socio-demographic characteristics, reproductive characteristics and fetal sex.
Dependent variable: Low birth weight.

Quality control measures

Pre prepared Structured checklist was used. Training was given to the data collectors to prevent any confusion and have a common understanding about the study. Each birth card was checked for its consistency, provision of full information and appropriate documentation.

Ethical consideration

Ethical clearance was obtained from the Addis Ababa University Faculty of Medicine, Research and publication Committee (RPC) to conduct the study. Further permission was obtained from the Regional Health Bureau of Tigray, Medical Director of Mekelle Hospital and the department head of the obstetric ward for the utilization of the cards. Since the cards include the name of the mothers, confidentiality was maintained by making the data collectors aware not to disseminate any information found on the card.

RESULTS

Socio-demographic characteristics

The study showed that 81 (45.0 %) of the study population fall into the age category of 15-19 years. Most (44.4%) of the mothers were married. The majority (90%) of the study population belonged to the ethnic group of Tigray and higher proportion (75.6%) of the mothers were followers of Orthodox. Of the study population, 135 (75%) mothers gave birth to LBW and 45 (25%) gave birth to VLBW babies whereby the mean BW was 1.8$\pm$ 0.46kg within a range of 0.7-2.4 kg. The result indicated that 128 (71.1%) of newborn babies with LBW were females (Table 1).

Reproductive characteristics

The finding indicated that 80 (44.4%) of the mothers were primi-parous, and higher proportion (51.1%) of the mothers had never attended ANC during

their pregnancy time. Most (61.1%) of the mothers had given birth before they became a term. Seventy seven (42.8%) of the index baby belongs to the first birth order. Forty one (22.8%) of the mothers had a history of abortion and out of the mother who had abortions, 39.0 % of them had a history of repeated abortion (Table 2).

Socio demographic characteristics associated with low birth weight

There was statistically significant association between the age of the mothers and mean BW   (F= 122.08, p=0.0001). Mothers who belong to the age category of 15-19 years had babies weighing 1.41$\pm$0.47 kg. Whereas mothers in the range of 20-34 years old gave birth to babies weighing 2.14$\pm$0.15 kg. The result of this study indicated that there was statistically significant association between baby sex and BW that is; female newborn babies had a lower BW (1.74$\pm$0.44) than male babies (1.95$\pm$0.48). Although there was a mean BW difference among mothers of different marital status, ethnicity and religion, BW was not found to be statistically significant with the variables as supported by Turkey's test (Table 3).

Reproductive characteristics in relation to low birth weight

A Significant association was found between parity and BW; thus primi-para mothers had babies with mean BW of 1.41$\pm$ 0.41 as compared to grand multi-parous which is 2.17$\pm$ 0.18 (130.12, P=0.0001). Mothers who had ever attended ANC follow up gave birth to babies with higher mean BW (2.16$\pm$0.14) than the mothers who had never attended (1.45$\pm$0.42) and this was statistically significant at a P value of 0.001. Significant association was also found between gestational age and BW (t=7.76, P=0.0001). The mean BW of preterm babies

was (1.62$\pm$0.47kg), however, the BW for term babies was (2.09$\pm$0.27kg) (Table 4).

As it is shown in Table 4, BW was directly proportional to birth order and the association was found to be statistically significant (F=89.24, P= 0.0001). Mothers who had not history of abortion gave birth to babies with higher BW (2.11$\pm$0.16 kg) than mothers who had a history of abortion (1.70$\pm$0.48). This was also found to be significant at a P value of 0.0001. However, the number of abortion and BW was not found to be statistically significant (P=0. 67).

DISCUSSION

This study assessed determinants of LBW among mothers who gave birth at Mekelle Hospital, northern Ethiopia. Accordingly, the lowest mean BW was found in mothers belonging to age category of 15-19 years, which is similar to the findings of studies in Bangladesh, India and Gondar[2,16,17]. This finding also goes in agreement with the studies done in Pakisatn[11]. Female babies had a lower mean BW than male babies who are similar to studies conducted in Gondar, Jimma and Metu[3,17,18]. A Significant association was found between parity and LBW which is in line with findings from elsewhere[2,10,16,17].

It is well known that the ANC is essential for early identification of pregnancy induced complications and managing before complicated problems have emerged that could lead LBW and preterm delivery. Finding of statistically significant relation of LBW with ANC are consistent with the findings reported by different studies in Jimma and Metu[3,18]. Findings from Tanzania also reported similar results[5]. Besides, it was indicated that the number of ANC follows up had a positive impact on BW (F= 7.16, P=0. 001) as similar studies from Bangladesh and Tanzania reported[5, 16]. Although the time of the first visit is not

assessed in this study, another finding made in Jimma indicated that early starting with ANC visit had improved BW[18].

The significant effect of gestational age on LBW was found in this study like the studies in Tanzania, Gondar and Jimma[5,13,17]. This could be most probably as a result of intrauterine growth retardation which is the most common cause of LBW in developing countries[9]. There was also a strong significant association between birth order and LBW (F= 89.24, P= 0.0001). This finding is similar to the reports of EDHS[15]. This study also revealed that mothers with previous history of abortion had increased risk of giving birth to LBW and this is similar to other studies conducted elsewhere[11].

Limitation of the study

As we utilized secondary data, cards lack some variables. Hence, these variables were excluded from the study, which could have yielded better results.

CONCLUSION AND RECOMMENDATIONS

This finding of this study depicted that LBW is still a public health problem in the study area. It also revealed that LBW is statistically associated with maternal reproductive and socio demographic characteristics. Hence, attention should be given to increase community awareness of antenatal care service, including early initiation of ANC follow up, access to family planning and male involvement, prevention of abortion, community mobilization to prevent early pregnancy. Thus, the issue of LBW should not be concern of health sectors only, but should also be concerned of other social sectors.

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Conflict of interest

We declare that we have no conflict of interest.

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Table 1. Socio-demographic characteristics of study subjects of Mekelle Hospital, Tigrai, northern Ethiopia, 2012

Variable	Frequency	Percent (%)
Maternal age		
15-19	81	45.0
20-34	56	31.1
35-49	34	23.9
Marital status		
Married	80	44.4
Never married	43	23.9
Divorced	42	23.3
Widowed	15	8.3
Ethnicity		
Tigrai	162	90.0
Amhara	10	5.6
Afar	8	4.4
Religion		
Orthodox	136	75.6
Muslim	31	17.2
Protestant	13	7.2
Fetal sex		
Female	128	71.1
Male	52	28.9
Fetal birth weight		
Low birth weight	135	75.0
Very low birth weight	45	25.0

LBW: low birth weight, VLBW: very low birth weight

Table 2. Reproductive characteristics of study subjects of Mekelle Hospital, Tigrai, northern Ethiopia, 2012

Variable	Frequency	Percent (%)
Parity		
Primi- para	80	44.4
Multi- parous	60	33.3
Grand multi-parous	40	22.2
ANC follow up		
Not attended	92	51.1
Ever attended	88	48.9
Number of ANC follow up (N=88)		
1 times	8	9.1
2-3 times	34	38.6
Greater than 4 times	46	52.3
Gestational age at birth		
<37 wk	110	61.1
>=37 wk	70	38.9
Birth order		
First	77	42.8
second & third	39	21.7
forth & fifth	35	19.4
6 and above	29	16.1
History of abortion		
No	139	77.2
Yes	41	22.8
Number of abortion (N=41)		
One	25	61.0
Two	16	39.0

Number, wk: week

Table 3. ANOVA test of Socio-demographic characteristics in relation to low birth weight of study subjects of Mekelle Hospital, Tigrai, northern Ethiopia, 2012

Variable	N	Mean	SD	F/T-tests	P-value
Maternal age					
15-19	81	1.41	0.47	F=122.08	0.0001
20-34	56	2.14	0.15		
35-49	43	2.10	0.15		
Marital status					
Married	80	1.79	0.52	F=0.60	0.62
Never married	43	1.87	0.43		
Divorced	42	1.75	0.45		
Widowed	15	1.88	0.31		
Ethnicity					
Tigrai	162	1.81	0.47	F=0.10	0.90
Amhara	10	1.75	0.29		
Others	8	1.77	0.56		
Religion					
Orthodox	136	1.84	0.45	F=1.72	0.18
Muslim	31	1.68	0.50		
Protestant	13	1.72	0.47		
Baby Sex					
Female	128	1.74	0.44	t=2.78	P=0.006
Male	52	1.95	0.48		

N: number, SD: standard deviation

Table 4. ANOVA test of reproductive characteristics of study subjects in relation to low birth weight in Mekelle Hospital, Tigrai, northern Ethiopia, 2012

Variable	No	Mean	SD	Tests		P-value
				t	F	
Parity						
Primi-para	80	1.41	0.41		130.12	0.0001
Multi-parous	60	2.09	0.12			
Grand multi-parous	40	2.17	0.18			
ANC follow up						
Ever attended	88	2.16	0.14	13.83		0.0001
Not attended	92	1.45	0.42			
Number of ANC follow up						
1	8	2.06	0.12		7.16	0.001
2-3	34	2.09	0.09			
4+	46	2.19	0.16			
Gestational age						
< 37	110	1.62	0.47	7.76		0.0001
$\geq$ 37	70	2.09	0.27			
Birth order						
1st	77	1.39	0.41		89.24	0.0001
2nd -3rd	39	2.10	0.13			
4th 5th	3 5	2.16	0.16			
6th and above	29	2.12	0.17			
History of abortion						
Yes	41	2.11	0.16	5.07		0.0001
No	139	1.70	0.48			
Number of abortion						
One	25	2.12	0.16	0.43		0.67
Two	16	2.09	0.17			

ANC: Ante natal care, No: Number