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Magnitude and Factors Associated with Low Birth Weight among New Born in Selected Public Hospitals of Addis Ababa, Ethiopia, 2016

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Result: The magnitude of low birth weight was 8.8%. Low birth weight was more likely associated with timing of ANC visit (adjusted odds ratio [AOR] = 7.41, 95% confidence interval [CI] :1.15, 47.79), taking extra meal during pregnancy (AOR=0.25, 95% CI: 0.06, 0.96), type of pregnancy (AOR=0.30, 95% CI:0.09, 0.97) and iron/folic acid supplementation (AOR=0.30 , 95% CI: 0.09, 0.99).

Conclusion and Recommendation: Low birth weight was substantial and strengthening the public health intervention that put into consideration the factors identified here are essential.

Keywords: low birth weight, maternal risk factors, public health problem.

I. Introduction

Low birth weight (LBW) has been, and continues to be, very important public health problem. LBW is not only the major cause of negative health outcome in infancy and childhood, but it also affects the health outcome in later life. The nutritional status of mother may have a great influence on birth weight of the newborn and its early development. LBW imposes a considerable burden to health sector and on society as a whole. Although, the global prevalence of LBW is sluggishlyreducing, yet, it remains high in many developing countries of Asian and African. Hence, birth weight is an essential element in the success of national and global efforts to improve child health, and a major target for public health intervention[1,2]. Studies have indicated that the mean birth weight of African babies is significantly lower than those of developed countries. Analyzed data from east Africa showed that about 52% of neonatal death happened due to Preterm and small for gestations births [3,4].

World health organization defines LBW as weight less than 2,500gram (5.5pounds) in the first hour of delivery. Various epidemiological observationsshow that LBW contributes to a range of poor health outcomes which is more common in developing than developed countries, LBW infants are about 20 times more likely to die than normal weight, those who survive likely to remain under nourished, have impaired immune function and increased risk of morbidity, and may suffer a higher incidence of chronic diseases in later life and lower intellectual ability that in turn affect their future school performance and job opportunities[3]. These can be overcome by applying preventive measures on the risk factors through lifespan approach (before, during, and after child birth) to the health of women that takes full account of socioeconomic and environmental as well as medical issues and by applying important Preventive interventions on maternal nutrition, antenatal care (ANC), Provision of all the necessaryservices during ANC based on the working guide line and educating mother about reproductive health[5].

The global magnitude of LBW is 15.5 %. In Ethiopia, the prevalence of under-five mortality ranges from 53 to 169 per 1000 live births out of this neonatal mortality which is mainly attributed by LBW accounts the largest portion[6]. Extent of LBW is one of thekey vital statistics used as an indicator of the quality of ANC, medical service, and general health service to the mother However, recent evidence regards to the magnitude and factors associated with LBW are insufficient in the country, in addition Some of the determining factor for LBW in the literature are inconclusive and questionable [2,3]. Answering such question and taking positive action on the results is often more important than knowing the precise magnitude of neonatal mortality.

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The empirical literature provides mixed results on the relationship between many of these factors and LBW. Some of the variables that are found to be predicator of LBW in one study may not necessarily be factor in another study. Supporting the argument on possible determinants of LBW vary across the geographical location. Besides, the DHS findings based on the mother's subjective assessment of the baby's weight rather than active weighting. In addition, DHS use the five years data preceding the survey. In most cases recalling such information is difficult. Therefore, it is helpful to conduct such study in urban settings like Addis Ababa where around 83% of births delivered in the health facilities and have their babies weighted at birth as it presumed to obtain more reliable information than we get on the average [6]. Thus, this study was designed to assess the magnitude of low birth weight and associated factors among newborns in selected public hospitals of Addis Ababa Ethiopia. The finding expected to provide working base for all concerned stakeholdersinsuch fields for planning programs and interventions to effectively address the problems, thereby, decreasing neonatal mortality.

II. Methods

a) Study area and period

The study was conducted in Addis Ababa, the capital city of Ethiopia from April to May 2015. The city has 10 sub city administration and 116 Woreda administrations. According to population projection value for 2014 the city has an estimated population of 3,195,000T the proportion of male counts 1,515,000 and female counts 1,680,000. The city has 11 public hospitals of which 5 are owned by Addis Ababa health beuro(AAHB), 4 by federal ministry of health, one (TikurAnbesa referral hospital) which is under the ministry of Education(AAU) [28].

b) Study design and study population

Institution based cross sectional study was conducted in selected public hospitals of Addis Ababa Ethiopia. Source populations for this study were all newbornsin three public hospitals of Addis Ababa. All consecutively selected alive newborns with a clearly defined gestational age were considered as study participants. Yet, multiple births, Preterm andpost termnew bornand new bornwith congenital anomalies were excluded.

c) Sample size determination

The sample size was determined using a formula for estimating sample size for single population proportion assuming a confidence level of 95%, margin of error 3%, magnitude of LBW 17.1 % [8] and 10 % non-response rate. Accordingly 457 new born were included as study participants.

d) Sampling procedure

Health institutions that provide delivery services were stratified into Federal Ministry of health and Addis Ababa City Administration Health Bureau. One hospital from the Federal Ministry of Health and two from Addis Ababa City Administration were selected using lottery method. The allocation of the study subjects to each hospital was based on the number of deliveries the same period last year (from hospital records) in each health facilities. Consecutive sampling was employed to select the study participants in each health facility. Participants were recruited immediately after delivery, and recruitment was continued until the sample size allocated fulfilled/met.

e) Operational definitions

A new born with weight less than 2500 grams is considered as low birth weight. A birth weight < 1500 grams irrespective of gestational age is statedas Very low birth weight (VLBW). An infant is considered as premature if it born before 37 weeks of gestation. While, an infant born between 37 and 42 weeks of gestation is considered as term. Intrauterine growth restriction (IUGR) refer to a fetus that has not reached its growth potential due to various reasons, while Small for gestational age (SGA) refers to an infant whose birth weight is below the 10^{th} percentile for the appropriate gestational age. A baby born dead after 28 completed week of pregnancy is Stillbirth. While, A fetus born before 28 week of gestation considered as abortion.

f) Data collection tools and procedure

A pretested structured questionnaire was used to gatherdata. The questionnaire was taken from different literatures and modified. Before the data gathering the questionnaire was translated to Amharic and then back translated to English to confirm consistency. The questionnaire was designed to measure Socio-demographic characteristic, obstetric history, dietary counseling, extra diet and iron supplementation, burden of low birth weight, and various factors affectingit.

The data gathering was undertaken by three midwives who were hired from other health facilities and supervised by one health professional in each selected health facility (not from the same hospital) after giving a 2- day training to discuss the purpose of the study, data gathering method and procedure,moralissue, technique of approaching the participants during interview, and about the inclusion and exclusion criteria. This was complemented with practical role plays. After securing an oral consent, interview was carried out on the first postnatal day. Astandardbaby weighing scale graded in grams was used to take babies nude weight within one hour after delivery by data collectors. Weighing scales were checked daily by the principal investigator and between measurements checked by the data collectors and adjusted at zero level.

g) Data analysis procedures

The data were first checked manually for completeness and coded using a template prepared for this purpose. Data were entered in to Epi-info version 3.5.4 statistical software, cleaned and exported to SPSS version 21 for analysis. Descriptive analysis was done and presented using frequency tables and percentage. Bivariate analysis was made to determine the association between LBW and such variables as socio demographic, types of pregnancy, timing of ANC booking, taking extra meal during pregnancy and iron /folic acid supplementation using odds ratio. These factors with significant associations were further tested using multivariate logistic regression analysis at $p \leq 0.05$ and 95% confidence interval (CI).

To ensure quality of the data different steps were followed. Data collectors and supervisors were equipped with all relevant informationregarding the data collection method and procedure, and complimented with role play on how to do interviews and record. The study tools were pretested on 5% of the total sample size in one of the hospitals out of the selected to assess for its completeness, clarity, length and skip patterns. Then, appropriate amendments were done on the questionnaire based on thecomments from the pretest. These comments were further discussed with data collectors and supervisor for better understanding. During data collection principal investigator and supervisors checked the daily data collection processes proceed as intended and took timely action for any gap identified. At data entry,Epi-info statistical software was used to enter and clean data before exported to SPSS for analysis.

h) Ethical approval

Ethical clearance was obtained from the Research Ethical Clearance Committee (REC) of the School of Public Health Addis Ababa University and permission was obtained from the head of study facilities. Before enrolling,the purpose of the study was described and discussed and verbal consent was obtained from each respondent.

III. Results

a) Socio demographic characteristics of the participants

A total of 457 mothers who gave birthin the selected hospitals, participated, with a response rate of 100%. About two hundred eighty eight (63.0%) were between 20-29 years with mean age of 28 years $\pm$10. Majority (97.4%) of the respondent's height was above 150 centimeter. Three hundred twenty seven (71.6%) were married and close to half (42.0%) had attained secondary level education. About one-third (30.4%) were house wives while 132 (28.9%) of the respondent's husbands were government employee. Out of the total respondents, 322 (70.5%) had family size of less than four and more than half (57.2%) of the babies were female sex (Table 1).

b) Obstetric characteristics of the respondents

Three hundred forty three (75.1%) of the respondent's recent pregnancies were planned. Two-hundred sixty five (58%) of participants were multi-porous, of which 42 (15.8%) of them had history of small baby in their previous birth. Two hundred eighteen (47.7%) of participants had greater than four ANC visit and only 158 (42.9%) of participant started ANC during the first trimester.More than three fourth (81.8%) of participants reported to have Tetanus toxoid(TT) vaccination during or before the recent pregnancy. More than half (55.4%) of respondents reported that they were provided with dietary counseling during the current pregnancy and 216 (47.3%) reported to have extra meal during the recent pregnancy. Two hundred seventy five (60.2%) were supplemented with iron/folic acid during their recent pregnancy.

Table 1: Selected Socio demographic characteristics of mother who gave birth at the selected public hospitals of Addis Ababa, Ethiopia, May 2015(n=457)

Variables	Frequencies(no)	Percentage (%)
Age(in years)		
<19	11	2.4
20-29	288	63.0
30-34	67	14.7
5+	61	13.3
Unknown	30	6.6
Height		
<150 cm	12	2.6
≥150 cm	445	97.4
Marital status		
Married	327	71.6
Cohabitation	106	23.2
Separated	19	4.2
0thers	5	1.1
Level of education		
Illiterate	26	5.7

Primary school	71	15.5
Secondary school	192	42.0
Collage and above	168	36.8
Occupation of the mother		
Government employee	112	24.5
Private employee	95	20.8
Merchant	73	16.0
House wife	139	30.4
Others	38	8.3
Occupation of the husband		
Government employee	132	28.9
Private employee	103	22.5
Merchant	111	24.3
Daily laborer	88	19.3
No husband	23	5.0
Family size		
1-3	322	70.5
4-5	132	28.9
>5	3	0.7
Sex of the baby		
Female	262	57.3
Male	195	42.7

Out of the total respondents, 80 (17.5%) had history of abortion, while 46 (10.1%) and 56 (12.6%) had history of still birth and APH respectively. Ninety seven (21.5%) of respondents were used alcohol like, tella, beer, wine, areke during the recent pregnancy. Of the total 25 (5.5%) of the respondents were used substances like, chat, cigarette and shisha and 21(4.6%) of the respondents had chronic diseases like, Diabetic mellitus, hypertension (Table 2).

Table 2a: Obstetric and baby characteristics of mothers who gave birth at the selected public Hospitals of Addis Ababa, Ethiopia May 2015 (n=457)

Variables	Frequencies(no)	Percentages (%)
History of previous small baby		
Yes	42	15.8
No	223	84.2
Current pregnancy type		
Planned	343	75.1
Unplanned	114	24.9
No of parity		
1	192	42.0
2-4	210	46.0
≥5	55	12.0
No of ANC visit for the last pregnancy		
No ANC	38	8.3
1-3	199	43.5
≥4	218	47.7
Trimester at 1st visit for the last pregnancy		
1st	158	42.9
2nd	126	34.2
3rd	84	22.8
TT vaccine before or during pregnancy		
Yes	374	81.8
No	83	18.2
Iron supplementation for current pregnancy		
Yes	275	60.2
No	182	39.8
dietary counseling during the current pregnancy		
Yes	254	55.6

No	203	44.4
Extra meal during current pregnancy		
Yes	216	47.3
No	241	52.7
History of abortion		
Yes	80	17.5
No	377	82.5
History of still birth		
Yes	46	10.1
No	419	89.9

Table 2b: Obstetric and baby characteristics of mother who gave birth at the selected public Hospitals of Addis Ababa, May 2015 (n=457)

Variables	Frequencies(no)	Percentages (%)
APH during the current pregnancy		
Yes	56	12.3
No	401	87.7
Substance use during the current pregnancy		
Yes	25	5.5
No	432	94.5
Alcohol use during the current pregnancy		
Yes	97	21.5
No	360	78.5
Chronic medical illness		
Yes	21	4.6
No	436	95.4

c) Magnitude of low birth weight

In this study birth Weight ranged from 1200 to 4500 gram with mean of 3041 ± 479.9 gram. It was found that 8.8 % of the new born were low birth weight.

d) Factors associated with low birth weight

Bivariate analysis shows that sex of the new born, type of pregnancy, parity, trimester at which ANC started, number of ANC visit, iron/folic acid supplementation, TT vaccination, extra meal during pregnancy, history of small baby and anti-partum hemorrhage (APH) during the current pregnancy were significantly associated with low birth weight .The finding shows that mothers with; history of previous small baby, parity ≥ 5, who started first ANC at third trimester and mothers with history of APHduring current pregnancy were more likely to give birth to low birth weight infant. It was also found that mothers with; planned pregnancy, pregnant of male baby, ≥ 4 ANC visit, history of tetanus toxoid vaccination, mothers who supplemented with iron/folic acid and mothers who took additional diet during the current pregnancy were less probable to give birth to low birth weight infant (Table 3). Despite such evidences in bivariate analysis, multiple logistic regressionshave shown that onlytype of pregnancy, trimester at which ANC started, iron/folic acid supplementation and extra meal during pregnancy were significantly associated with LBW.

Accordingly, Mothers who booked first ANC at third trimester were seven times more probable to give birth to LBW infant than those mother who booked first ANC at first trimester (adjusted odds ratio [AOR]= 7.41,95% confidence interval [CI] :1.15, 47.79). Mothers with planned pregnancy were three times less probable to give birth to LBW infants (AOR=0.30, 95% CI: 0.09, 0.97). Similarly those mothers who took additional diet during the current pregnancy two times (AOR=0.25, 95% CI: 0.06, 0.96) and respondents who supplemented with iron/folic acid three times (AOR=0.30, 95% CI: 0.09, 0.99) less probable to give birth to LBW infantthan who did not take additional diet during the current pregnancy and respondents who were not supplemented with iron/folic acid respectively (Table 3).

Table 3: Multiple logisticregressions of selected variables in relation to low birth weight among public Hospitals of Addis Ababa, Ethiopia, May 2015(n=457)

Variables		LBW	COR(95% CI)	AOR (95% CI%)
Yes(%)	No(%)			
History of previous small baby				
Yes	33(80.4%)	9(19.6%)	3.36(1.36, 8.32)	3.57(0.75, 17.02)
No	205(91.9%)	18(8.1%)	1	1
Current pregnancy type				
Planned	336(94.6%)	19(5.4%)	0.22(0.11, 0.42)	0.30(0.09, 0.97)*
UnPlanned	81(79.4%)	21(20.6%)	1	1
No of parity				
1	179(93.2%)	13(6.8%)	1	1
2-4	192(96%)	18(4%)	1.27(0.62, 2.71)	1.39(0.09, 22.12)
>5	46(83.6%)	9(16.4%)	2.69(1,08, 6.69)	1.31(0.06, 28.83)
No of ANC visit for the last pregnancy				
No ANC	38(82.6%)	8(17.4%)	1	1
1-3	178(89.4%)	21(10.6%)	0.65(0.24, 1.72)	0.00
>4	202(94.8%)	11(5.2%)	0.27(0.09, 0.79)	0.00
Trimester at 1st visit for the current pregnancy				
1st	151(95.6%)	7(4.4%)	1	1
2nd	114(98.3%)	12(1.7%)	2.27(0.867, 5.95)	5.85(0.96, 35.61)
3rd	73 (86.9%)	11(13.1%)	3.25(1.21, 8.73)	7.41(1.15, 47.79)*
TT vaccine before or during pregnancy				
Yes	345(92.7%)	27(7.3%)	0.43(0.21,0.88)	1.15(0.26, 5.10)
No	72(84.7%)	13(5.3%)	1	1
Iron supplementation for current pregnancy				
Yes	258(93.8%)	17(6.2%)	0.46(0.24, 0.88)	0.30(0.09,0.99)*
No	159(87.4%)	23(12.6%)	1	1
Extra meal during current pregnancy				
Yes	206(95.4%)	10(4.65%)	0.34(0.16,0.72)	0.25(0.06,0.96)*
No	211(87.5%)	30(22.5%)	1	1
APH during the current pregnancy				
Yes	46(82.1%)	10(17.9%)	2.69(1.23, 5.86)	3.11(0.98, 14.8)
Sex of the baby				
Female	230(87.8%)	32(12.2%)	3.252(1.46,7.23)	2.53(0.73,8.85)
Male	187(95.9%)	8(4.1%)	1	1

Note: * statistically significant

Abbreviations: AOR, adjusted odds ratio; COR, crudeodds ratio; CI, confidence interval.

IV. Discussion

In the present study the prevalence of LBW is 8.8 %. This is consistent with Ethiopian demographic and health survey 2011(9.1%)[6]. and Axum and Laelay Maichew district (9.9%)[23]. But it is a little bit higher than the study conducted in Addis Ababa Ethiopia (5.6%) [17], Jakarta Indonesia (4. 5%) [9]. This inconsistency may be due to difference in the skills of data collectors, study area and methodology. And it is lower than study finding in Gambia (22.5%) [13], Gonder referral hospital north Ethiopia (17.1%) [18] and Jimma west Ethiopia (11.2%) [20]. This discrepancy between these findingsmay be due tovarious intervention undertaken between these study time.

Likewise this finding is not in line with the finding in Nepal, Abha city Saudi Arabia, Northeast Nigeria and Olkalou District Hospital, Kenya (11.7%, 18.8%, 16.9%, 12.3%) respectively[7,10,26,27]. This discrepancy might be explained by different study area and time gap b/n these studies. The finding from present study is far lower from a community based survey of Kersa, West Ethiopia (28.3 %)[25]. This might be permissible due to urban rural difference.

Timing for first ANC booking was found to have significant association with LBW. Mothers who booked

first ANC in the first three months of gestation have lower risk of LBW as compared to those mothers registered for ANC visit during second and third trimester. This finding suggested that early ANC visit might help to ensure early interventions, thus those mothers at risk of LBW can be identified early enough if quality prenatal care is made available to them. This may have valuable impact on intrauterine fetal development and early identification and management of pregnancy related problems, eliminating or decreasing modifiable risk factors and is time to intervene activities like nutritional education, pregnancy related complications and other adverse outcome of pregnancy. This finding was consistent with various other studies done in different areas[11,20,23].

Similarly, a type of pregnancy was significantly associated with LBW. Mothers who did not plan the current pregnancy were more probable to give birth to LBW baby compare to those mothers who have plan. This might be attributed to the beneficial impact of early ANC booking on pregnancy outcome, either through the treatment of complications or by contributing to the reduction of modifiable maternal risk factors as mother with planned pregnancy envisioned to reduce the risk of LBW and other negative pregnancy outcomes. This finding was in line with the finding from other study[23]. Iron supplementation during pregnancy was also significantly associated with LBW. Women who supplemented with iron were less probable to deliver LBW baby. It is due to the fact that, the growing fetus shares not only iron but also other nutrient from mother for its intrauterine development. This finding was in line with a study done in west Bengal[11].

The current study also showed a significant association between taking additional diet during pregnancy and low birth weight. Respondents who didn't take additional diet during pregnancy were more probable to give birth to LBW baby. It is due to the fact that, healthy and optimal intra uterine fetal growths rely heavily on maternal nutrient status. This finding was consistent with the study on the same theme from Gondar Ethiopia[18].

Strength

Direct measurement of newborn's weight was done in contrast to history based estimation as it eliminates recall bias.

Limitations

Sincethis study is cross-sectional, it may not provide strong evidence on the direct cause and effect relationship between dependent and independent variables. As this study was done at public hospitals found in Addis Ababa those receives referred pregnant mother from periphery health facility, the result may not be generalizable to mothers in Addis Ababa.

V. Conclusion and Recommendations

The magnitude of low birth weight in this study issubstantial (8.8 %). Trimester at first ANC visit, unplanned pregnancy, iron/folic acid supplementation and taking extra meal during pregnancy were supposed to have played imperative role. In a country like Ethiopia where neonatal mortality isforemost issue, investing on strengthening strategies like awareness creation on benefit of early pregnancy identification and ANC booking, birth planning, additional diet for pregnant mother and iron/folic acid supplementation is vital. All stake holders should apply their effort in strengthening the already established strategy on maternal and neonatal health care services.

VI. Acknowledgements

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Author's contributions

All authors were responsible for data analysis, interpretation, preparing the manuscript and approved for submission and reach agreement to be responsible in all aspects of the work.

Competing interests

Authors declare that no financial and non-financial conflicts of interest regard to this work.

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