INCIDENCE OF LOW BIRTH WEIGHT AND ITS ASSOCIATED FACTORS IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL

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JIMMA, ETHIOPIA

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ABSTRACT

Background: Weight at birth is a good indicator of the newborn's chance for survival, growth and development, as well as long term health and psychosocial development. Low birth weight newborns are at a significantly higher risk of morbidity and mortality contributing a lot to the higher perinatal, neonatal, infant and childhood morbidity and mortality rates specially in the developing countries like Ethiopia. They are also at a higher risk of adulthood illnesses once they survive the early complications. Even if many studies have been done on low birth weight, its associated factors and the short as well as long term outcomes of low birth weight infants in the developed world, little has been done in developing countries like Ethiopia where the burden of the problem is huge. In Ethiopia, few studies have been done on the incidence of low birth weight and associated factors but most of these studies didn't consider many of the factors thought to be associated with low birth weight.

Objectives: To determine the incidence of low birth weight and its associated factors in Jimma University Specialized Hospital.

Methods and materials: A cross sectional study was conducted on 931 newborns who were born in Jimma University Specialized Hospital from March 1 to May 30, 2014 GC. Data were collected by using structured questionnaire. Maternal and neonatal anthropometric measurements were done by using standard beam balance, tape meter and measuring board. Consecutive sampling technique was used to include all eligible newborns and their mothers until the required sample size is obtained. p value of <0.05 was used to consider significance.

Results: The mean (± SD) of birth weights were 3017 ± 612gm. The incidence of low birth weight (birth weight <2500) was 24.4%. The factors found to be associated with low birth weight in this study are female gender, maternal urinary tract infections, preterm delivery, maternal antepartal hemorrhage, and multiple gestations.

Conclusion and recommendations: The incidence of low birth weight is found to be high in this study. An attempt to increase the rate of ANC attendance and identifying the medical illnesses as

well as obstetric complications and addressing them timely is recommended so that the rate and complications of low birth weight could be minimized.

Key words: *Birth weight, low birth weight, intrauterine growth restriction*

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ABREVATIONS

AIDS: Acquired Immunodeficiency Syndrome

ANC: Antenatal Care

BMI: Body Mass Index

EDHS: Ethiopian Demographic and Health Survey

EVLBW: Extremely Very Low Birth Weight

HIV: Human Immunodeficiency Virus

IUGR: Intrauterine Growth Restriction

JUSH: Jimma University Specialized Hospital

LBW: Low Birth Weight

MUAC: Mid-Upper Arm Circumference

SNNNPR: Southern Nation, Nationalities and peoples' Region

TORCHs: Toxoplasmosis, Others(Syphilis, HIV, Hepatitis), Rubella, Cytomegallo Virus, Herpes Simplex Virus

UNICEF: United Nations' Children's Fund

VLBW: Very Low Birth Weight

WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

Birth weight is an important determinant of prenatal, neonatal as well as post neonatal outcomes as poor intrauterine growth increases the risk of prenatal, neonatal, infant and childhood morbidity and mortality as well as long term morbidity during adulthood(1). Low birth weight refers to a newborn with birth weight of less than 2500gm and it includes those who are born premature as well as those who are born fully mature but with intrauterine growth restriction.

Multiple factors play a role in determining the birth weight of a newborn which could relate to the mother; such as mother's own fetal growth, her diet from birth through pregnancy, her body composition at conception, illnesses which may be infectious or non-infectious, her life-styles like consumption of alcohol, cigarette smoking and physically demanding activities. The fetal factors include gender, genetic makeup, and the number of fetuses. Environmental factors (like altitude, toxin exposure, air pollutants, and war) also contribute in determining birth weight of a newborn(1,2).

Low birth weight is associated with multiple acute and long term complications which contribute a lot for neonatal, infant and childhood morbidity and mortality as well as adulthood chronic illnesses. Among the acute complications of LBW which could occur in the neonatal period are respiratory distress syndrome, intra-ventricular hemorrhages, necrotizing enter colitis, neonatal infections, patent dactus arteriosus and metabolic complications like hypothermia and hypoglycemia, thus directly or indirectly increasing the neonatal morbidity and mortality(1,6,7).

Additionally, the LBW infant is in an immune deficient state at any time, and thus at a significantly higher risk of common childhood illnesses like infectious diarrhea and lower respiratory infections as well as frequent hospitalizations from these illnesses.

Majority of the newborns who survive these acute complications are again at higher risk of additional complications during their childhood and adulthood life. Some of these complications are neurologic and developmental abnormalities (like cognitive dysfunction, poor school performance, cerebral palsy, hydrocephalous, hearing and visual impairments),

chronic obstructive lung diseases, renal damage and chronic kidney disease, cardiovascular disorders (like stroke, hypertension, coronary heart disease), metabolic abnormalities (like diabetes mellitus, hypercholesterolemia, and metabolic syndrome)(2,3,4,6).

All the above mentioned complications will add up and increase the health cost of the LBW infant both at an individual household level and at the national level first because of the prolonged and frequent hospital admissions and second because of the prolonged treatment and follow up cares as well as special cares for the victims of the disabilities like

the need for special classes. In fact, some studies have found that the health cost of a LBW infant is six times higher than that of a normal birth weight infant. For all these reasons, LBW has been a good public health indicator and target has been made by the WHO, UNICEF, and the global countries to reduce the prevalence and associated complications(1,2,8).

1.2 Statement of the problem

The period of intrauterine growth and development is one of the most vulnerable in human life cycle. The weight of an infant at birth is an important indicator of maternal health and nutrition prior to and during pregnancy, and powerful predictor of infant growth and survival (4). In some studies done in developing countries, it has been found that every ten seconds a newborn dies of problems related to LBW (1,7).In developing countries, there are only very few publications on short as well as medium term development of the newborns with low birth weight. Majority of these available data show that there is significant deficit in cognitive, motor and intellectual aspect of the VLBW when compared with the normal birth weight babies (8).

Globally, more than 20million (i.e. more than 15.5% of all deliveries) LBW infants are born annually. Of this more than 95% occur in developing countries. There is a significant variation in the incidence of LBW between geographic regions, the highest incidence occurring in South East Asian sub-regions (27%) (1).

In many developing countries like Sub-Saharan African countries, majority of the deliveries occur at home and thus birth weight is not measured and even in those who are born at health institution, birth weight is not either measured at all or is not accurately measured. Based on some reports available, the incidence of LBW in Sub-Saharan sub-region is estimated at around 10-20% which is higher than most other sub regions of the world, presenting a major challenge in the sub-region (1,7).

Ethiopia, being one of the countries with higher neonatal and infant mortality rates in the world, has a limited data on LBW since most of the deliveries occur at home and the birth weight is not measured. According to a data obtained from Ethiopian Demographic and Health Survey_(EDHS) 2011, which didn't use objective measurement of birth weight, rather used maternal estimate of birth weight as giving birth to very small baby, over a period of the preceding five years, the incidence of LBW is found to be among the highest in the world (9). In an institutional based study done in a referral hospital in North Western Ethiopia, the incidence was found to be 17.1% which is highly significant (10). In a study done in South West Ethiopia in 2002/03 in four health centers and JUSH, the prevalence of LBW was found to be 22.5% which is again higher (11). These all indicate that LBW is highly prevalent in the country. Thus

an attempt to make an accurate measurement of birth weight and estimating the incidence is necessary at all health institutes as much as possible and identifying the factors which play a role locally is very vital.

CHAPTER TWO: OBJECTIVES

General objective

To determine the incidence of low birth weight and associated factors in JUSH, Jimma, Ethiopia

Specific objectives

- To determine the incidence of low birth weight in JUSH, Jimma, Ethiopia
- To determine the factors associated with low birth weight in JUSH, Jimma, Ethiopia

CHAPTER THREE: METHODS

3.1 Study design

A cross sectional study was conducted on newborns born in JUSH.

3.2 Setting

The study was conducted on newborns born in JUSH, Jimma Zone, Jimma town, Oromia Region, South West Ethiopia which is located about 350Km from Addis Ababa, the capital of the country. The study period was from March 1 to May 30, 2014 GC. The hospital is the only referral hospital for over 15million people in the Southwest Ethiopia (JUSH archive, 2000). At the same time it is a teaching hospital with various other public health services.

The labor ward is one of the busiest wards of the hospital where both normal & complicated cases are served. Laboring mothers could come having follow up in the hospital or being referred from the nearby health centers as well as hospitals. There are six first stage and three second stage beds in the labor ward of the hospital. There is also one functional operating room adjacent to the labor ward where laboring mothers in need of operative deliveries are operated. The neonatal ward of the hospital is in close proximity to the labor ward so newborns that need further care and treatment will be referred to the ward. More than 3,830 mothers deliver in the ward per year.

3.3 Participants

3.3.1 Source population

All newborns who were born in JUSH.

3.3.2 Study population

All newborns who were born in JUSH over a period of three months (i.e. from March 1 to May 30, 2014G.C).

3.4 Eligibility criteria

3.4.1 Inclusion criteria

All newborns delivered in the study period whose mothers or care takers are willing to participate in the study.

3.4.2 Exclusion criteria

Newborns whose mothers or care takers are not willing to participate in the study.

3.4.3 Sampling technique

A consecutive sampling technique - including all eligible participants was used until the required sample size was obtained (after checking willingness of the mother or care takers).

3.5 Variables

3.5.1 Dependent variable

- Low birth weight

3.5.2 Independent variables

Maternal Socio demographic factors

- Age
- Religion
- Ethnicity
- Marital status
- Level of education
- Income
- Occupation

Maternal anthropometric characteristics

- Maternal height
- Maternal MUAC

Maternal medical conditions

- Asthma
- Hypertension
- Renal diseases
- Diabetes mellitus
- Cardiac illnesses
- HIV / AIDS
- UTIs
- Syphilis
- Malaria
- Anemia

Maternal obstetric factors

- Parity
- Birth interval
- Pregnancy planned or not
- Gestational age
- Antenatal hemorrhages
- Preeclampsia / eclampsia
- ANC follow up

Maternal behavioral factors

- Alcohol consumption
- Exposure to cigarette smoking
- Chat
- Coffee consumption

Fetal factors

- Sex
- Multiple gestations

3.6 Data sources

Data on maternal socio-demographic characters, maternal medical conditions, and maternal obstetric factors, were obtained by interviewing the mother as well as revising her medical record. The data on maternal behavioral factors were obtained by interviewing the mother. The data on maternal and neonatal anthropometric characters was obtained by measuring the anthropometric parameter (by using standard beam balance for maternal and neonatal weight, measuring board for maternal height and measuring tape for maternal MUAC, neonatal length and head circumference). Maternal and neonatal anthropometric characters were measured only once.

3.7 Sample size

The estimated number of deliveries in the labor ward of JUSH hospital was around 320 per month. The study was conducted over a period of three months. So the total population for this study was 960.

The minimum sample size needed for the study was calculated by using the single population proportion formula of calculating the minimum sample size. 95% confidence interval assumption was also used. So according to this formula:-

$\mathbf{n = Z^2 p (1\text{-}p) / d^2}$ where:

n= the minimum sample size required

Z=the normal standard score corresponding to 95%CI=1.96

P=prevalence of low birth weight=22.5% from previous study in the Area (11)

d=degree of accuracy required

So, $n = (1.96)(1.96)(0.225)(0.775)/(0.05)(0.05) = 268$

But the total population (N) was assumed to be 960 which is < 10,000. Thus the final sample size was obtained by:

nf= (n)/1+(n/N) plus 10% contingency = 268/(1+(268/960)) plus 10% contingency = 230

So, the final sample size was reduced to 230 (this is the expected number of LBW newborns).

3.8 Quantitative variables

The birth weight of the newborns was recorded in grams and the descriptive statistics was done. Then re-categorization was done at different stages (into EVLBW, VLBW, LBW, NBW, and macrosomia at first stage and into LBW and no LBW at the second stage).

The maternal age was recorded in years and re-categorized into three groups (<18 years, 18-35 years and >35 years) for further analysis, the basis for this classification is the fact that pregnancy at extremes of ages (<18 & >35years) is usually complicated with different conditions. Maternal height was measured in centimeter and recoded into two categories for further analysis (<150cm and ≥150cm), the basis for this classification was the fact that 150cm is the cut off value to define short stature. Maternal MUAC was measured in cm and re-categorized into three categories (<16cm, 16-23cm & ≥24cm), this was because the classification of nutritional status of adults is based on this cut off values.

CHAPTER FOUR: RESULTS

4.1 Participants

There were a total of 938 mothers who gave birth in the hospital during the study period and of these 910 of the mothers were willing to participate in the study making a response rate of 97%. The total number of newborns included in the study were 931 (19 of the mothers had twin deliveries and one of the mothers had triplets).

4.2 Descriptive

4.2.1 Socio-demographic characteristics of the mothers

Majority of the mothers(95.5%) were aged between 18-35years. The predominant religion of the mothers was Muslim accounting for about 63.2% of the cases. More than two third (76.3%) of the mothers were Oromo and 35.6% of the mothers didn't have any education. Most (72.8%) of the mothers were housewives. More than half of the mothers(57.3%) reside in the rural area. Among the mothers included in the study, 97.5% were married. (Table 1)

Table 1: socio-demographic characteristics of the mothers involved in the study

Variable (n=910)		Frequency	Percent (%)
Age(Years)	<18	8	0.9
	18-35	869	95.5
	>35	33	3.6
Religion	Protestant	120	13.2
	Orthodox	212	23.6
	Muslim	578	63.2
	Oromo	694	76.3

Ethnicity	Amhara	136	14.9
	Kefa	28	3.0
	Gurage	26	2.9
	Others*	26	2.9
Marital status	Single	6	0.6
	Divorced	8	0.8
	Widowed	10	1.1
	Married	886	97.5
Education	No education	324	35.6
	Primary	308	33.8
	Secondary	158	17.4
	College & above	120	13.2
Occupation	Student	25	2.7
	Daily labor	90	9.9
	Employed	133	14.6
	House wife	662	72.8
Residence	Rural	521	57.3
	Urban	389	42.7

*=Tigre, Dawuro, Yem, Wolaita, Siltie

4.2.2 Maternal obstetric factors

Half of the mothers were Para II to V whereas 46.04% and 3.96% of the mothers were Para I and Para VI and above respectively. Of the multiparous mothers, the birth interval was >2years in majority of the cases (74.7%), 1-2 years in 24.8% and <1year in 0.5% of the cases. Majority of the pregnancies (90%) were planned.

With regard to gestational age, in 41.8% of the mothers the gestational age could not be obtained whereas 7.1%, 49.8% and 1.3 % of the cases were preterm, term and post term deliveries respectively. APH was identified in 30 of the mothers , of which 23 had placenta previa and 7 had placental abruption. Of all the mothers included in the study, 77 of the mothers had pregnancy induced hypertension, of which 13 had ecclampsia and 64 had preeclampsia. With regard to ANC attendance, 3.8% of the mothers had no ANC follow up at all, whereas 42.6% had less than 4 visits and 53.6% had 4 or more visits.

4.2.3 Maternal medical disorders

With regard to maternal medical conditions, anemia is the most common identified medical illness whereas hypertension and renal diseases were the second and third frequent illnesses identified(see table 2). Only less than half of all the mothers (45.4%) were screened for syphilis and none of them had a positive test result. Almost one third of the mothers (32.1%) were not tested for HIV.

Table 2: Maternal medical disorders identified during the study

Medical disorder	Frequency	Percent(%)	P value (for association with LBW)
Asthma	5	0.5	1.00
Cardiac diseases	7	0.8	.06
Diabetes Mellitus	8	0.9	.21
UTIs	13	1.4	.02

HIV/AIDS	14	1.5	.76
Malaria	36	3.9	.14
Hypertension	52	5.7	.000
Renal diseases	55	6.0	.36
Anemia	249	27.4	.01

4.3 Outcome data

Majority (58.3%) of the newborns were males and 41.7% were females. Out of the 931 newborns included in this study, 24.4% had LBW, whereas 70.6% and 5% of the newborns had normal birth weight and macrosomia respectively. From the 24.4% LBW newborns, 0.8% were VLBW, whereas 23.6% were just LBW; there is no newborn found to be ELBW.

Of all the 931 newborns included in the study, 99% were live births and 1% were still births. Majority (77.8%) of the still births had LBW whereas the rest 22.2% had NBW. The mean ± SD of birth weights were 3017 ± 612gm.

4.4 Main results

4.4.1 Incidence of LBW

The incidence of LBW in this study was 24.4%.

4.4.2 Factors associated with low birth weight

On the binary logistic regression, factors found to have statistically significant association with low birth weight are rural residence (COR=1.56,95%CI 1.14,2.13), maternal hypertension (COR=2.88 95%CI 1.65,5.03), UTIs(COR=3.70 95%CI 1.23, 11.13), hemoglobin of less than 11gm/dl(COR=1.56 95%CI 1.12, 2.17), MUAC of less than 23cm(COR=2.09,95%CI 1.46,3.00), prematurity(COR=22.96 95%CI 11.74, 44.92), maternal APH (COR=3.74 95%CI 1.79, 7.78),

maternal pregnancy induced hypertension(COR=3.09 95%CI 1.94, 4.92), lack of ANC followup or infrequent (<4) visits (COR=1.74 95%CI 1.29, 2.36), female sex(COR=1.62 95%CI .46, .83) and multiple gestation(COR=4.78, 95%CI 2.52, 9.07).

On the multiple logistic regression analysis, all the variables having p value <.25 on binary logistic regression analysis were considered for analysis. The variables found to have statistically significant associations with LBW include maternal UTIs(AOR=9.13 95%CI 1.26, 66.46),prematurity (AOR=16.03 95%CI 7.60, 33.83), maternal APH (AOR=4.74, 95%CI 1.49, 15.07), female sex (AOR=2.02 95%CI 1.22,3.36), and multiple gestation (AOR=8.6 95%CI 1.88, 34.16). All the other factors have no statistically significant associations.

4.5 Other analysis

4.5.1 Mean birth weights of the different categories of newborns

On one sample t test analysis, statistically significant difference in mean birth weight was seen with gender of the fetus (males heavier than females), number of the fetus (singleton deliveries having higher birth weight than multiple gestation deliveries), parity (newborns of multiparous mothers weighing more than those of primiparous mothers), gestational age(preterm weighing lower than term & post term babies) and also residence (newborns of urban mothers heavier than those of rural mothers)(see table 3).

Table 3: Comparison of the mean birth weights of the different categories of the newborns

Variable		Mean	SD	P	95%CI of the difference	
					lower	upper
Gender	M	3.073	.5947	.001	.0542	.2146
	F	2.939	.6382			
No. of fetus	singleton	3.038	.6121	.000	.3378	.6067
	Multiple	2.566	.4078			
Parity	Multipara	3.090	.6438	.000	.0795	.2346
	Primipara	2.933	.5620			
Gestational age	>37weeks	3.099	.5499	.000	.7332	1.0189
	<37weeks	2.223	.5465			
Residence	Urban	3.084	.5807	.004	.0373	.1941
	Rural	2.968	.6033			

To the contrary, statistically significant difference was not seen in the mean birth weight of newborns with regard to maternal age, religions, ethnicities, marital status, educational status and occupation when analyzed by one way Annova.

CHAPTER FIVE: DISCUSSIONS

The incidence of LBW in this study is 24.4% which is one of the highest figures in the world, and is consistent with different studies done in different parts of the world. In India, K.S Negi did a longitudinal study, which showed incidence of 23.8%(12). In a cross sectional descriptive study done in Jimma zone (in one hospital & four health centers),22.5% of the births were LBW(11). It is also comparable with the EDHS-2011 report of LBW rate of 21% which was based on maternal report of giving birth to a small or very small baby.

But the 24.4% incidence of LBW found in this study is lower than some community based studies. For example, in a community based study done in India by J.S. Deshmukh, 30.3% of the deliveries were found to have LBW(13). In Kersa , Eastern part of Ethiopia, a community based observational cohort study was done, and the incidence of LBW was 28.3% (21). This difference may be explained by the fact that these two studies were done in the community which might be the real reflection of the problem whereas our study was a hospital based study.

When compared with other studies , the incidence of LBW found in this study is much higher than the previous ones. Some of these studies are prospective cross sectional study done in Turkey, Istanbul which showed incidence of 9.1%(16), a cross sectional study done in Yazd, Iran, where the incidence of LBW was 8.8%(17), a study conducted in Zahdan Hospital in Iran, where the incidence was 11.8%(18), a study done in Tanzania, which showed 13.6 of the births to be LBW(7), a cross sectional study done on 305 newborns in Gondar University Hospital, North West Ethiopia, with the overall incidence of LBW of 17.1%(10). The difference in the socio-demographic background of the participant mothers and also the time at which these studies were conducted may explain this difference in the incidence of LBW between these studies and our study.

Maternal residence in a rural area was found to have statistically significant association with low birth weight which is similar with study done in Peshawar, Pakistan in public hospitals, which has demonstrated area of residence (i.e. rural) to have a negative association with birth weight(15). It is also consistent with the EDHS-2011 report which showed place of residence as one of the factors associated with LBW(9). But in a study done in Gondar University, maternal residence in rural area was not found to be associated with LBW(10), the reason behind may be

the difference in the distribution of the mothers in the two studies (75% of the mothers in the Gondar University study were urban dwellers whereas only 42.7% of the mothers were urban dwellers in our study).

Maternal MUAC of less than 23 was found to be associated with LBW, a finding similar to a study done in Eastern Ethiopia(11).

Female sex, multiple gestations, prematurity, maternal UTIs and APH are the factors found to have statistically significant association with LBW on the multiple logistic regression analysis during this study. This is also consistent with some of the studies done so far like a study done in Istanbul, Turkey which has demonstrated multiple gestation and prematurity to be associated with LBW(16), in Iranian study which also showed prematurity & multiple gestations to be associated with LBW(17), the study done in Gondar (female sex), and the Jimma study which has also shown preterm and multiple gestations to be associated with LBW(10,11). Some other studies didn't find significant association between sex of the newborn and LBW(16,17) which might be explained by the difference in sex distribution seen during those studies.

Maternal demographic factors like age, religion, ethnicity, marital status, and educational status were not found to have statistically significant associations with LBW which was also demonstrated on other similar studies done in the other parts of the country as well as the study done in Jimma zone in 2002-2003(10,11,21). The reason for this might be because of similar nature of the mothers in the study, majority being in a similar age group, not educated, married , and belonging to one religion or ethnic group.

Many of the maternal medical illnesses were not found to have a significant association with LBW like other studies done in the past (10,21) and in contrary to other studies done elsewhere (7,17,18). The possible explanation for this might be the fact that the number of mothers identified to have these medical disorders in the current study was minimal (which was actually the case in the previous studies done in Ethiopia as well). The other reason may be the fact that significant number of the mothers were not tested for some of the medical illnesses (54.6%, 32.1% and 9.1% of the mothers were not screened for Syphilis, HIV, and anemia respectively) during the current study.

Generalisability

The study is a hospital based cross sectional study, so the findings of the study could be generalized for hospitals or other health institutions found at the same level, but may not represent the situation in the community as the situation at the community level may be entirely different.

Limitations

It was difficult to get the monthly or annual income of the family in majority of the cases as the mothers or care takers either don't know their exact income or are afraid to tell. So it was difficult to assess the effect of income on birth weight in this study. The study did not also address some of the risk factors of LBW like fetal congenital malformation, genetic abnormalities and placental abnormalities. As the study was conducted over a period of three months, it was not possible to assess the association between LBW and season.

Source of funding

The source of funding for the study was Jimma University College of Public health and Medical sciences.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The incidence of LBW found in this study is higher than many of the hospital based studies done so far and also the national estimate of LBW. It is even higher than the regional average estimate for the Sub-Saharan African sub-region. The factors found to be associated with LBW in this study are rural residence, female gender, UTIs, hypertension, anemia, maternal MUAC of less than 23cm, preterm delivery, lack of or infrequent ANC follow up, pregnancy induced hypertension and APH.

6.2 Recommendations

An attempt to increase the rate of ANC attendance as part of the zonal and regional program should be strengthened. In those having ANC follow up health workers providing these services should try to identify the medical illnesses as well as obstetric complications and address them timely so that the rate and complications of LBW could be minimized. Additionally, routine screening of some of the medical illnesses such as HIV and Syphilis at ANC visits should be strengthened.

Further study should also be carried out to address the other factors associated with LBW and also to determine the outcomes of these LBW infants using follow up study.

REFERENCES

1. WHO / UNICEF, low birth weight: country, regional and global estimates. Geneva, Switzerland, 2004
2. Arne O, Prakeshkumar S. Determinants and prevention of low birth weight: synopsis of evidences. Institute of Health Economics, Alberta, Canada.
3. David P, Lois J, Low birth as a risk factor for gestational diabetes, diabetes mellitus impaired glucose tolerance test during pregnancy. Diabetes care; 2007;30(2):147-149.
4. Unite Nations administrative committee on coordination subcommittee on nutrition (ACC/SCN)(2000)) low birth weight: report of a meeting in Dhaka, Bangladesh on 14-17 June 1999. Eds. Pojda J and Kelly L. Nutrition Policy No.18. Geneva: ACC/SCN in collaboration with ICDDR,B.
5. Usha R. Nutrition and low birth. American Journal of Clinical Nutrition;2004;79:17-21.
6. Leonardo R, Reynaldo M. Long term consequences of low birth weight. Kidney International; 2005;68(97):107-111.
7. Siza JE. Risk factors associated with low birth weight of neonates among pregnant mothers attending a referral hospital in Northern Tanzania. Tanzanian Journal of Health Research;2008;10(1):1-8
8. Konstantyner T, Leite HP, Taddei AC. Effects of low birth weight on family. Nutricion Hospitalaria;2007;22(2):138-145.
9. Central Statistical Agency of Ethiopia and ICF International. Ethiopian Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International 2012.
10. Megabiaw B, Zelalem M, Mohammed N. Incidence and correlates of low birth weight at a referral hospital in North West Ethiopia. Panafrican Medical Journal;2012;12(4):1-7.
11. Tema T. Prevalence and determinants of low birth weight in Jimma Zone South West Ethiopia. East African Medical Journal;2006;83(7):366-371.
12. Negi KS, Kandpal SD, Kukreti M. Epidemiologic factors affecting low birth weight. JK Science;2006;8(1):31-34.

13. Deshmukh JS, Motghare DD, Zodpey SP, Wadhva SK. Low birth weight and associated risk factors in urban area. Indian Pediatrics;1998;35:33-36.
14. Sareer B, Linda M, Kenneth M, Roger P, Pauo GJ. Risk factors for low birth weight in the public hospitals at Peshawar NWFP Pakistan. BMC public health;2008;8:197.
15. Rizvi SA, Hatcher J, Jehan I, Qureshi R. Maternal risk factors associated with low birth weight in Karachi. Eastern Mediterranean health Journal;2007;13(6):1343-1352.
16. Emel A, Sultan K, Pinar O, Zeynel A, Ayfer A. The incidence of low birth weight in 5000 live born and the etiology of fetal risk factors. Marmara Medical Journal;2006;19(2):46-51.
17. Golestan M, Akhavan K, Fallah R. Prevalence and risk factors of low birth weight in Yazd Iran. Singapore Medical Journal;2011;52(10):730-733.
18. Roudbari M, Yaghmaei M, Soheili M. Prevalence and risk factors of Low birth weight infants in Zahedan, Islamic Republic of Iran. Eastern Mediterranean Health Journal;2007;13(4):838-845.
19. Murphy CC, Berit S, Terri L, Janice D. Abuse: a risk factor for low birth weight? A systematic review and met analysis. Canadian Medical Association Journal;2001;164(11):1567-1572.
20. Bayou G, Berhan Y. Perinatal Mortality and associated risk factors: a case control study. Ethiopian Journal of Health Sciences;2012;22(3):153-162.
21. Assefa N, Berhane Y, Worku A. Determinants for low birth weight in Kersa, Ethiopia. PlOs ONE;2012;7(6):1-5.
22. John O. The newborn. In: Behrman RE, Kliegman RM, Jenson HB, eds. Nelson textbook of pediatrics. 17th rev edn. Pennsylvania, USA: Saunders,2007

ANNEXES

ANNEX I: QUESTIONAIRE

I-Maternal Socio demographic factors

1. Age _____ years
2. Religion a. orthodox b. protestant c. Muslim d. others
3. Ethnicity a. Oromo b. Amhara c. Kefa d. Gurage e. others
4. Marital status a. single b. married c. widowed d. divorced
5. Level of education

a. No education at all
b. Primary education
c. Secondary education
d. College and above

6. Occupation

a. House wife
b. Daily laborer
c. Governmental employee
d. Student

7. Family income (per month)_____Birr
8. Place of residence a. rural b. urban

II- Maternal anthropometric characteristics

9. Maternal height _____ cm
10. Maternal MUAC _____cm

III- maternal medical conditions

11. Bronchial asthma a. yes b. no
12. Hypertension a. yes b. no
13. Renal diseases a. yes b. no
14. Diabetes mellitus a. yes b. no
15. Cardiac illness a. yes b. no
16. HIV/AIDS a. positive b. negative c. not tested
17. VDRL a. reactive b. nonreactive c. not done
18. UTIs a. yes b. no
19. Malaria a. yes b. no
20. Hemoglobin_____gm/dl

21. Iron supplementation during pregnancy a. yes b. no

IV-Maternal obstetric factors

22. Parity a. 1 b. 2-5 c. ≥6
23. Birth interval a. <1 year b. 1-2 year c. ≥2 years
24. Pregnancy planned a. yes b. no
25. Gestational age(weeks/months) a.LNMP_____ weeks b.US_____ weeks
26. APH a. placenta previa b. placental abraption
27. Hypertensive disorders of pregnancy a. eclampsia b. preeclampsia c. none
28. ANC follow up a. no b.< 4 visits c. ≥4 visits

V-Maternal behavioral factors during pregnancy

29. Alcohol consumption a. never b. sometimes c. often (daily)

30. Exposure to Cigarette smoke

30.1. Direct exposure a. never b. sometimes c. often (daily)

30.2. Second hand a. never b. sometimes c. often (daily)

31. Chat consumption a. never b. sometimes c. often (daily)

32. Coffee consumption a. never b. sometimes c. often (daily)

VI- Fetal characteristics

33. Sex a. M b. F

34. outcome a. alive b. still birth

35. Multiple gestations a. yes b. no

36. Weight_____grams

37. Head circumference_____cm

38. Length_____cm

THANK YOU!!!

Name of data collector_____

Signature of data collector_____