

# PREVALENCE OF LOW BIRTH WEIGHT AND NUTRITIONAL RISK FACTORS AMONG NEWBORNS IN FAFAN AND LIBAN ZONE, SOMALI REGION, ETHIOPIA.

## **Abstract**

**Background:** Birth weight is an important predictor of an infant's future health, and growth, It serves as a key indicator of various public health issues, including long-term maternal malnutrition and inadequate healthcare during pregnancy. In developing countries, a birth weight below 2,500 grams is a leading cause of infant and child mortality. While the determinants of low birth weight are not yet fully understood, this research aims to assess the prevalence of low birth weight and the nutritional risk factors affecting newborns in the Fafan and Liban Zones of the Somali region in Ethiopia

**Methodology:** Institution-based cross section study design was conducted among 191 newborns delivered from March to May,2020 in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital, Consecutively, simple random sampling was employed to select study participants. Data were collected by interview using semi-structured and pretested questionnaire. Descriptive statistics were used for data description, and binary logistic regression was performed to explore the associations between independent and dependent variables.

**Result:** In this study, the prevalence of low birth weight was 25.1% percent. Iron folic acid supplementation during pregnancy[(AOR=0.23(0.11,0.50)], under-nutrition (MUAC <23cm) [(AOR=3.17(1.22,8.25)] and Family Size  $\geq 5$  person[(AOR=2.74(1.13,6.62)] were found to be independent predictor of low birth weight.

**Conclusion:** Low birth weight is a significant public health concern that is linked to multiple factors. According to the findings, iron folic acid supplementation during pregnancy, maternal under-nutrition and Family Size  $\geq 5$  people were significantly associated with low birth weight.. Targeted efforts should prioritize family planning services, coverage antenatal care, and improving household food security and dietary diversity.

**Keywords:** Birth weight, Fafan and liban Zone,Newborn, Low birth weight, Somali region

## **1.1. Introduction**

According WHO, Low birthweight is a term used to describe babies who are born weighing less than 2,500 grams. Birth weight is an important indicator of health status of an infant and is a principal factor that determines the infant's, physical, survival and mental growth. It also indicates past and present health status of the mother. LBW is considered as the single most important predictor of infant mortality, especially of deaths within the first months of life <sup>[4]</sup>. It is also a significant determinant of infant and childhood morbidity, particularly of neurodevelopment impairment such as mental retardation and learning disability <sup>[5]</sup>.

Low birth weight (LBW) imposes a significant burden on political, social, economic, and healthcare systems in both developing and developed countries. In response, the World Health Assembly has set a policy target to reduce LBW by 30% by the end of 2025. Various strategies have been implemented to address the issue of newborns with below-normal birth weight, focusing on the care packages provided during the prenatal, antenatal, and postnatal periods. In

Ethiopia, globally recommended approaches are being applied; however, a meta-analysis showed that the prevalence of LBW is 17.3%. This finding lacks national representativeness, as no data are available from the Benishangul Gumuz, Afar, Somali, and Gambella regions, Harari region and Dire Dawa city administration. [6] Therefore, it is important to identify low birth weight and nutritional risk factors among newborns in the Fafan and Liban Zones of the Somali region. This will help to develop feasible intervention strategies aimed at minimizing adverse reproductive outcomes.

## **2. Materials and Method**

### **Study design, area and period**

An institutional-based cross-sectional study was conducted from March to May, 2021 among Newborns in Fafan and Liban Zone, Somali region, eastern Ethiopia.

**Eligibility criteria:** Birth weight of all selected sample were included. Newborns with multiple births, visible deformity, and preterm were excluded from the study because those conditions are known as risk factors for low birth weight.

### **Sample Size determination**

The sample size was determined using a single population proportion formula. By the following assumptions: The level of confidence ( $\alpha$ ) is taken to be 95% ( $Z_{1-\alpha/2}=1.96$ ); the margin of error (d) is taken to be 5% [0.05]. The proportion (p) of low birth weight was 13%, according Ethiopian demography health survey performed in Ethiopia (EDH, (2016). The final sample size was 191.

### **Sampling procedure**

A Simple Random Sampling technique was employed to select study participants. According to delivery reports from Sheikh Hassan Yabare Referral Hospital and Dolo Ado Hospital, a total of 900 women deliver each month. Consequently, 191 study participants were chosen through simple random sampling and lottery method was used to select the initial participants. If a selected participant did not meet the inclusion criteria, the next participant on the list was included.

### **Variables of the Study**

Dependent variables: Birth weight

### **Independent Variables**

**Socio-demographic variables:** (Infant's sex, marital status, maternal age, the weight of the mother, maternal education, religion, ethnicity, maternal occupation..

**Obstetric factors:** (gestational age, parity, Antenatal Care (ANC) visit, anemia, history of abortion, gravidity.

**Nutritional factors:** maternal MUAC, nutrition counselling during pregnancy, and prenatal iron supplementation

### **Data collection Procedure**

The data were collected by interviewing the mothers, observing medical records and measuring the anthropometry of the mothers and the newborns using Semi-structured and pretested questionnaires. The interview and anthropometric measurements were conducted by 8 trained midwives working in delivery rooms of the two public hospitals and 2 supervisors.

The socio-demographic, obstetric, and nutritional factors of the questionnaire were obtained from the maternal interviews, and document review. Newborn's birth weight was measured within 1–2 hours after birth by using balanced seca scale. The scale measures starting from 50 grams (g) (lowest) to 20 kilograms (highest) and rounded to the nearest 50 g. The scale interval was 50 g. Mothers who fulfill the inclusion criteria were interviewed face to face within a day after delivery. MUAC of mothers was measured by MUAC tape and rounded to the nearest 0.1cm. We considered a MUAC of 23cm as the cut-off point.

### **Data analysis**

Data was entered and analyzed SPSS (version 25). Multivariable logistic regression was used to measure the association between birth weight and independent variables with 95% confidence interval. Finally, Statistical significance was declared at p-value < 0.05.

### **Ethical consideration**

Ethical clearance for the research was obtained from the research, publication and technology transfer directorate director of Jigjig University. A written letter of permission was obtained from Somali region health office. The aim, purpose, benefits and method of the study was clearly explained to the respondents. All of the study groups were informed that their response will be kept secret.

## **2. Result**

### **Socio-demographic characteristic of the respondent**

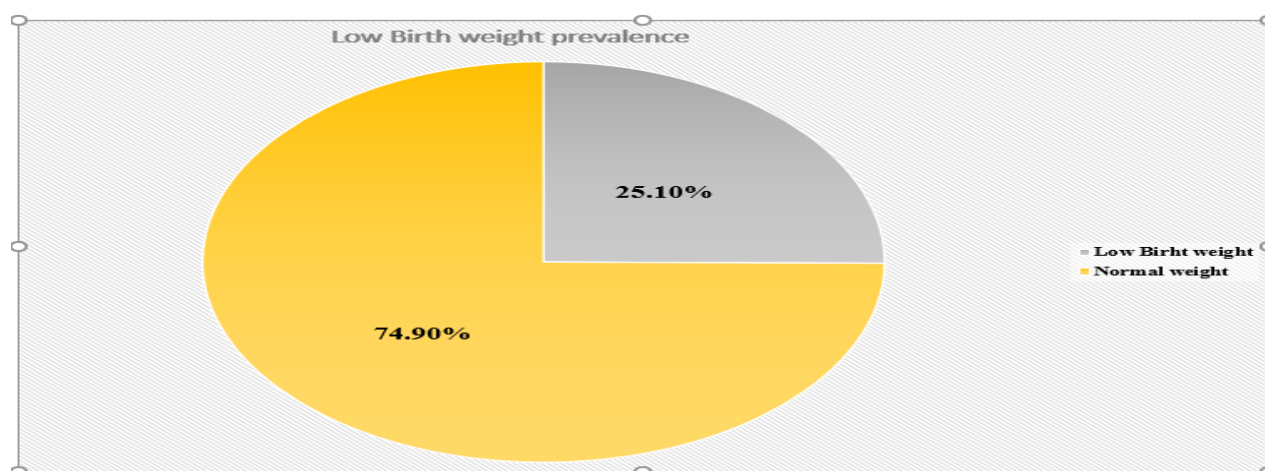
In this study 191 of new baby/mother pairs were included yielding 100% response rate. The mean age of the mother was 27.91(±4.6) and more than two third of the respondents 158(82.7%) were found within the age 20-34. The majority of the participants 156(81.7%) were Somali followed by Oromo 22(11.7%). Ninety nine percent of the mothers were married and sixty percent of the respondents were urban residence. Regarding maternal educational status, 61(31.9%) of the respondents were unable to read and write and closed-two third of the participants were housewives(65.4%). A summary of Socio-demographic characteristics of the present study participants is indicated in table 1

**Table:1:** Socio-demographic characteristics of women delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital,

Variable	Categories	Frequency	Percentage
<b>Age of the Mother</b>	<19	8	4.2%
	20-34	158	82.7%
	34-39	25	13.1%
<b>Religion</b>	Muslim	169	88.5 %
	Orthodox	20	10.5%
	Protestant	2	1%
<b>Ethnicity</b>	Somali	156	81.7%
	Oromo	22	11.5%
	Amhara	6	3.1%
	Tigray	2	1%
	Others	5	2.6%
<b>Residence</b>	Urban	115	60.2%
	Rural	76	39.8%
<b>Marital Status</b>	Married	190	99.5%
	Single	1	0.5%
<b>Maternal educational status</b>	Illiterate	61	31.9%
	Primary-Secondary Education	3	1.6%
	Diploma	101	52.9%
	Degree	25	13.1%
	Master	1	0.5%
<b>Maternal occupation</b>	House- wife	125	65.4%
	Trade	30	15.7%
	Professional	20	10%
	Private-worker	5	2.6%
	Students	3	1.6%
	Un-employed	3	1.6%
<b>Family Size</b>	≤ 5 people	128	67%
	≥ 6 people	63	33%

**Prevalence of low birth weight among new born babies in Sheikh Hassan Yabare Referral hospital and Dolo Ado Primary hospital,**

The study assess the prevalence of low birth weight among newborns at Sheikh Hassan Yabare Referral Hospital and Dolo Ado Primary Hospital, as illustrated in Figure 1. Out of the 191 participants, 48 (25.1%) were classified as having low birth weight ( $\leq 2500$  grams). This indicates that approximately one-fourth of the



participants experienced adverse pregnancy outcomes, highlighting the need for immediate intervention.

**Figure. 1 Birth weight of newborns delivered in Sheikh HassanYabare Referral hospital and Dolo Ado primary hospital.**

### Maternal nutrition

Thirty-eight (19.9%) of the women were undernourished (MUAC<23cm) and approximately, one third (30.4%) of women were anemic (Hb<11g/dl). Only 32(16.7%) reported taking additional food during pregnancy. Close to two-thirds of the women (125(65.4%) had received nutritional counselling, while 120(62.8%) had received iron and folic acid supplements. A summary of maternal nutritional status of the present study participants is indicated in table 2.

**Table:2. Maternal Nutrition**

Variable	Categories	Frequency	Percentage
Maternal MUAC	Under-nourished	38	19.9%
Maternal Hemoglobin	Anaemic	58	30.4%
Additional food during pregnancy	Yes	32	16.7%
Nutritional Counseling	Yes	125	65.4%
Iron and Folic Acid Supplementation	Yes	120	62.8%
Nutritional problem during pregnancy	Nausea and Vomit	90	47.1%
	Poor Appetite	48	25.1%
	Heartburn	41	21.5%
	Constipation	12	6.3%

### Food type consumed during current pregnancy

Twenty-five percent (n=49) of the respondents reported having consumed animal proteins daily and close two third of the respondent consumed plant protein daily(125(65.4%). Slightly more than half of the participants 117(61.3%) consumed fruits thrice weekly, while 120(62.8%) % consumed dark green vegetables daily. Ninety-one percent (n=174%) ate cereal daily, while one-third of the respondent 66(34.6%) consume milk and milk product.

**Table: 3. Food type consumed during current pregnancy**

Variable	Categories	Frequency	Percentage
Animal Protein	Daily	49	25.7%
	Theric week	106	55.5%
	Twice a week	9	4.7%
	Once a week	15	7.9%
	Once a month	12	6.3%
Plant Protein	Daily	125	65.4%
	Theric week	38	19.9%

	Twice a week	12	6.3%
	Once a week	12	6.3%
	Once a month	4	2.1%
<b>Fruit</b>	Daily	51	26.7%
	Theric week	117	61.3%
	Twice a week	9	4.7%
	Once a week	7	3.7%
	Once a month	7	7.7%
<b>Vegetable</b>	Daily	120	62.8%
	Theric week	51	26.7%
	Twice a week	8	4.2%
	Once a week	7	3.7%
	Once a month	5	2.6%
<b>Cereals</b>	Daily	174	91.1%
	Theric week	17	8.9%
<b>Milk and milk product</b>	Daily	66	34.6%
	Theric week	120	62.8%
	Twice a week	3	1.6%
	Once a week	2	1%
<b>Oil</b>	Daily	179	100%

#### **Obstetrical characteristics of women delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital**

Out of 191 mothers 34 (17.8%) were primigravid and forty-five (23.6%) of the respondents were primiparous. Thirty (15.7%) of the respondent reported having had a previous abortion and more than two-third (86.9%) mothers have ANC follow up during the course of pregnancy. Approximately one-hundred per cent (91.6%) of the respondent never used family planning A summary of maternal obstetric characteristic of the present study participants is indicated in table 4.

**Table 4: Obstetrical characteristics of women delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital**

<b>Variable</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Gravidity</b>	Prime-gravida	34	17.8%
	2-5 pregnant	131	68.8%
	six times become pregnant and more	23	13.6%
<b>Parity</b>	Prime-parity	45	23.6%
	Multi-parity	125	65.4%
	Grand-Multiparity	21	11%
<b>Gestational age</b>	<36 week	30	15.7%
	37-40week	158	82.7%
	>40week	3	1.6%
<b>Previous pregnancy interval</b>	<2year	173	90.6%
	≥2 year	18	9.4%

<b>History of abortion</b>	Yes	30	15.7%
<b>ANC Follow-up</b>	Yes	166	86.9%
<b>Time of 1<sup>st</sup> ANC visit</b>	1st trimester	102	53.4%
	2 <sup>nd</sup> trimester	86	45%
	3 <sup>rd</sup> trimester	3	1.6%
<b>Family planning practice</b>	Never used	175	91.6%
	Traditional method	3	1.6%
	Modern Method	13	6.8%

### **Factors associated with low birth weight among women delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital.**

Binary logistic regression was done to identify the effect of independent variable on dependent variable (birth weight). During binary logistic regression analysis sex of the neonate, age of the mothers, residence, family size, nutritional counseling service during pregnancy, iron folic acid supplementation, anti-nontonal care visit, under-nutrition, and anemia(hemoglobin) were included. Iron folic acid supplementation during pregnancy [(COR=4.23(1.99, 9.02)], under-nutrition [(COR)0.31(0.12,0.81)], and Family Size  $\geq 5$  person [(COR=0.36(0.15,0.87))] had statistically significant association with lower birth weight.

Multivariate logistic regression analysis iron folic acid supplementation during pregnancy[(AOR=0.23(0.11,0.50)], maternal under-nutrition[(AOR=3.17(1.22,8.25)] and Family Size  $\geq 5$  people [(AOR=2.74(1.13,6.62)] were found to be independent predictor of low birth weight.

Iron folic acid supplementation during pregnancy was significantly associated with low birth weight: mothers who took iron folic supplementation were 23 times less likely to delivery low birth weight neonate when we compare to their counterpart[(AOR=0.23(0.11,0.50)].

Under-nutrition was significantly associated with low birth weight: under-nutrition mothers were 3.17 times more likely to have low birth weight neonate when we compare to their counterpart[(AOR=3.17(1.22,8.25)].

Family size was significant associated with low birth weight: mother from family size  $\geq 5$  people was approximately three time more likely to have low birth weight neonate when we compare to those come from family size less than five people [(AOR=2.74(1.13,6.62)].

### **Table:5: Factors associated with low birth weight among women delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital.**

<b>Variables</b>	<b>Responses</b>	<b>COR(95% CI)</b>	<b>AOR(95% CI)</b>
<b>Sex of the neonate</b>	<b>Male</b>	<b>1.40(0.67,2.94)</b>	<b>0.69(0.33,1.46)</b>
	<b>Female</b>	<b>I</b>	<b>I</b>
<b>Age</b>	<b>&lt;19</b>	<b>1.44(0.24,8.33)</b>	<b>0.69(0.12,4.01)</b>
	<b>20-49</b>	<b>I</b>	<b>1.87(0.53,6.56)</b>
<b>Residence</b>	<b>Urban</b>	<b>1.0(0.48,2.09)</b>	<b>0.99(0.47,2.06)</b>

	<b>Rural</b>	<b>1</b>	<b>I</b>
<b>Nutritional counselling</b>	<b>Yes</b>	<b>0.54(0.23,1.26)</b>	<b>1.82(0.79,4.19)</b>
	<b>No</b>	<b>I</b>	<b>I</b>
<b>Iron folic acid supplementation provision</b>	<b>Yes</b>	<b>4.23(1.99, 9.02)</b>	<b>0.23(0.11,0.50) *</b>
	<b>NO</b>	<b>I</b>	<b>I</b>
<b>Under-nutrition (MUAC)</b>	<b>Yes</b>	<b>0.31(0.12,0.81)</b>	<b>3.17(1.22,8.25) *</b>
	<b>No</b>	<b>I</b>	<b>I</b>
<b>Anemia</b>	<b>Yes</b>	<b>0.98(0.46,2.10)</b>	<b>1.01(0.47,2.17)</b>
	<b>No</b>	<b>I</b>	<b>I</b>
<b>Family Size</b>	<b>≤ 5 people</b>	<b>0.36(0.15,0.87)</b>	<b>2.74(1.13,6.62) *</b>
	<b>≥ people</b>	<b>I</b>	<b>I</b>
<b>ANC visit</b>	<b>Yes</b>	<b>0.67(0.21,2.12)</b>	<b>1.47(0.47,4.62)</b>
	<b>No</b>	<b>I</b>	<b>I</b>

### 3. Discussion

Somali region, Ethiopia low birth weight is still remaining significant cause of morbidity and mortality among neonates and neonatal mortality rate increased from 27 deaths per 1,000 births in 2005 to 41 deaths per 1,000 births in 2016(7). Our study set out to establish the prevalence and risk factor for low birth weight among mothers delivered in Sheikh Hassan Yabare Referral hospital and Dolo Ado primary hospital.

The prevalence of low birth weight was 25.1% percent. Iron folic 205 acid supplementation during pregnancy[(AOR=0.23(0.11,0.50)], under-nutrition (MUAC <23cm)[(AOR=3.17(1.22,8.25)] and Family Size ≥5 person[(AOR=2.74(1.13,6.62))] were found to be independent predictor of low birth weight.

We found a low-birth-weight prevalence rate of 25.1%, which is higher than the prevalence rate of 13%, national average Ethiopian demographic health survey (2016), 17.4% report from Gondar[8], and 14.6% report from mixed study in Tigray [9]. LBW prevalence rate in our study was also higher than the prevalence rate of 6.3% and 12.3% study in conducted Nigeria in Benin city and Olkalou District Hospital, Central Region, Kenya respectively.[10,11].The possible explanation of the variations might be the difference in study design, population and geographic which might have difference in health service utilization and nutritional status of mothers during pregnancy. However, the prevalence of low birth weight was lower than 32% documented facility-based study conducted at Negest Elene Mohammed Memorial General Hospital in Hosanna Town, SNNPR, Ethiopia (2016).This difference might be due to sample size and socio-economic.

Low birth weight observed in this study was approximately consistent with studies conducted in Bahir Dar Felege Hiwote Referral which was 25.5% [12] and 25.5% from a cross sectional Study done on the prevalence and factors associated with low birth weight among Teenage Mothers in New Mulago Hospital in Uganda[13]

Increased family size may adversely affect the nutritional status of every member of the household, including mother, because it may be associated with decreased per capita human inputs. In other words, the allocation of food per house hold is likely to decrease with the increase in the number of family size, which, in turn, may adversely affect the nutritional status of the mother. In line with this, the current study revealed that respondents from family



size  $\geq 5$  people were approximately three times more likely to have low birth weight neonate when we compare to those come from family size less than five people [(AOR=2.74(1.13,6.62)].

Maternal nutritional status prior to and during pregnancy is an important factor, especially as demand for macronutrients and micronutrients increase. Iron requirements, e.g., increase by about 8-fold by the third trimester to support the development of the maternal-placental-fetal unit during pregnancy[14]. necessitating supplementation during pregnancy. In line with this, our study reveals mothers who took iron folic supplementation were 77% times more likely to delivery normal birth weight neonate when we compare to their counterpart[(AOR=0.23(0.11,0.50)].

Poor nutrition is a known cause of low birth weight, especially in developing countries. According to Kramer reported that maternal nutritional factors both before and during pregnancy account for 50% of cases of LBW in many developing countries [15]. In line with this, our study reveals maternal under-nutrition was significantly associated with low birth weight: under-nourished mothers were three times more likely to have low birth weight neonate when we compare to their counterpart[(AOR=3.17(1.22,8.25)].

### **Limitation**

This study was Institutional based, and therefore it may not be as good as population-based studies to generalize the results in the population

### **Conclusion**

Low birth weight is a significant public health concern that is linked to multiple factors. According to the findings, iron folic acid supplementation during pregnancy, maternal under-nutrition and Family Size  $\geq 5$  people were significantly associated with low birth weight. Targeted efforts should prioritize family planning services, coverage antenatal care, and improving household food security and dietary diversity

### **What this study adds**

In this study, Iron folic acid supplementation during pregnancy[(AOR=0.23(0.11,0.50)] and Family Size  $\geq 5$  person[(AOR=2.74(1.13,6.62)] was significantly associated with the low birth weight among newborns; this was not much revealed by other studies.

### **Research standard**

All methods were carried out in accordance with relevant guidelines and regulations.

### **Availability of data and materials**

All data generated or analyzed during this study are included in this published article.

### **Declarations**

### **Ethical consideration**

Ethical clearance for the research was obtained from the research, publication and technology transfer directorate director of Jigjig University. Written informed consent and or assent were obtained from each study participant after they were included in this study. The assent was taken from the mother and signed on the consent form after detail explanation of the procedure and the research. The purpose of the study was explained to study participants before giving consent. Confidentiality was maintained at all levels of the study. Participants were informed about the weight status of the neonate. All mothers who deliver low birth weight neonate were given appropriate nutrition counselling

### **Consent for publication**

Not Applicable.

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