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Prevalence and Factors Associated with Low Birth Weight among Teenage Mothers in New Mulago Hospital: A Cross Sectional Study

Bayo Louis[1], Buyungo Steven[1], Nakiwala Margret[1], Nabimba Ronald[4], Luyinda Emmanuel[4], Nsubuga Tadeo[1], Imelda Namagembe[3], Arabat Kasangaki[5] and Banura Cecily[2]

1. Department of Internal Medicine, School of Medicine, Makerere University College of Health Sciences, P. O Box 7072, Kampala, Uganda

2. Child Health and Development Centre, School of Medicine, Makerere University College of Health Sciences, P. O Box 6717, Kampala, Uganda

3. Department of Obstetrics and Gynecology, School of Medicine, Makerere University College of Health Sciences, P. O Box 7072, Kampala, Uganda

4. Department of Nursing, School of Health Sciences, Makerere University College of Health Sciences, P. O Box 7072, Kampala, Uganda

5. Department of Dentistry, School of Health Sciences, Makerere University College of Health Sciences, P. O Box 7072, Kampala, Uganda

Abstract: The World Health Organization defines low birth weight (LBW) as a new born having a weight of less than 2,500 g at birth. Low birth weight is one of the major determinants of perinatal survival, infant morbidity and mortality as well as the risk of developmental disabilities and illnesses in future lives. WHO estimates that about 30 million low birth weight babies are born annually (23.4% of all births) and they often face short and long term health consequences. Whereas the global prevalence of LBW has slightly declined, the rate in many developing countries is still quite high. In Uganda, low birth weight among teenage mothers is a problem. Our study aimed to estimate the prevalence of and identify the factors associated with low birth weight among teenage mothers in New Mulago hospital. We conducted an analytical cross sectional study among teenage mothers who delivered from new Mulago Hospital Complex labour suite from August 2013 to August 2014. Trained interviewers, administered pre-tested questionnaires to consecutive mothers to obtain information on their socio-demographic characteristics, obstetric history and child factors. Odds ratios and *P*-values were calculated to determine the relationship between independent and dependent variables. We also used descriptive statistics for the quantitative data. A total of 357 teenage mothers were enrolled on the study. Their mean age was 18 years (Range 13-19), majority, 98.4% aged 15-19 years. The prevalence of LBW was 25.5%. Pre-term delivery (OR = 3.3032 *P* = 0.0001) and multiple pregnancies (OR = 0.165 *P* = 0.039) were associated with LBW. Malaria, young maternal age and ANC attendance were not associated with LBW. Child factors such as birth order, congenital anomalies and sex of the baby were also not associated with LBW. The prevalence of LBW is high among teenage mothers, pre-term delivery and multiple pregnancies were associated factors with LBW. Health professional's need to address teenage maternal health. Health workers should encourage teenage mothers to attend focused antenatal care as recommended by the Uganda ministry of Health. A specialized maternal facility centre that is friendly for adolescent/teenage mothers is advisable so as to improve on completion rates and capture high risk teenage mothers early.

Key words: Prevalence, low birth weight, teenage mothers, Mulago, Uganda.

1. Introduction

The World Health Organization (WHO) defines low birth (LBW) weight as a new born having a weight of less than 2,500 g at birth. Low birth weight is one of the major determinants of perinatal survival, infant morbidity and mortality as well as the risk of developmental disabilities and illnesses in future lives [1].

Corresponding author: Bayo Louis, doctor, research field: general practitioner.

WHO estimates that about 30 million LBW babies are born annually (23.4% of all births) and they often face short and long term health consequences. While the global prevalence of LBW has slightly declined, the rate in many developing countries is still quite high (30%) [2]. Weight at birth is a good indicator of the newborn's chances for survival, growth, long-term health and psychosocial development. LBW babies are significantly at risk of death, contributing to the high perinatal morbidity and mortality in developing countries.

1.1 Prevalence of LBW

According to the Uganda Demographic Health Survey 2011, 13.5% of 452 recorded births were low weight among mothers less than 20 years of age, 9.7% of 1,414 among mothers ranging from 20-34 and 7.9% of 203 among those ranging from 35-49.This clearly shows that the prevalence of low birth weights is quite high [3]. In Ethiopia, the incidence rate of LBW was 17.1% among mothers in the age group 18-35 years [4]. In Kenya, the prevalence of low birth weight was 11.2% [5].

1.2 Factors Associated with LBW

Most literature supports the notion that teenage childbearing is generally associated with higher risk of adverse reproductive outcomes. There is however continued debate on whether this association is mainly a factor of unfavorable socio-demographic conditions of adolescent mothers or due solely to their biological immaturity. Hospital-based studies employing less-rigorous analytic methods mostly reveal that maternal age alone is causally associated with poor obstetric outcome indicators such as antenatal care attendance, delivery by skilled personnel, and perinatal death. The independent effect of maternal age on the frequency of preterm delivery, LBW and neonatal mortality could nevertheless be significant as age at first childbirth falls below 16 years of age [6].

Besides, there are other factors that affect low birth weights. For example, in Botswana, the risk factors for LBW were low or no education for the mother, being unmarried, and late or less frequent attendance of ANC services and place of birth [7]. However, in Egypt, LBW was associated with only low maternal education [8].

A study conducted in Nigeria revealed that maternal predictors of preterm delivery and/or low birth weight were marital status, occupation, residential accommodation with shared sanitation facilities, and lack of antenatal care, absence of previous cesarean section, hypertensive disorders and antepartum hemorrhage. Gender and intrauterine growth restriction (IUGR) were also predictive of low birth weight [4].

LBW was associated with first delivery (prima gravida), lack of ANC follow up or infrequent visits and being HIV- positive. More female than male newborn babies had LBW [9]. In a related study it was found that women who had delivered before were less likely to have a LBW baby implying the risk was with prima gravidas [10]. Further, in rural Kenya, a prospective study showed that socio-economic factors are the best predictors of LBW. Other associated factors were BMI, Hb level and MUAC of the mother [5].

Previous studies in Uganda have shown that teenage pregnancy, rural residence and lack of knowledge about any risk factors for LBW as some of the major factors influencing low birth weight [11]. Further, Kiggundu in 1995 found that the risk of LBW babies was 22.4% among unbooked mothers compared to 9.6% who were booked. In this study, prematurity alone contributed to 66% of LBW, maternal febrile illnesses such as malaria and urinary tract infections (UTIs) contributed to 35.3% [12].

In a related study, it was also found out that of the babies delivered in Mulago hospital 12.3% were low birth weight though the relationship with malaria and maternal anemia were not assessed [2].

2. Methods

2.1 Study Setting

The study was carried out in new Mulago Hospital Complex, which is a national referral and teaching hospital. Mulago has a capacity of over 1,500 beds and offers specialized services in various disciplines. Although Mulago hospital is in Kawempe division, which is located about 2 km from the Kampala city centre, the capital of Uganda, it serves referred patients from all over the country and other patients who use it as their primary health care provider. It offers both free and private services. The study was conducted in labor suite (5C) and the special care unit (5B). The labour suite conducts about 1,800-2,000 deliveries a month and almost up to one fifths (360-400) of these mothers are below 20 years of age.

2.2 Study Design, Population, Sample Size Estimation and Sampling Procedure

We conducted an analytical cross sectional study from August 2013-August 2014. The study population was teenage mothers delivering within the hospital, we targeted those within the study period. Those considered accessible met our eligibility criteria. Mothers below 20 years who consented and delivered from ward 5A were considered, and those in the private wing or developed complications after delivery were excluded.

A total of 357 mothers were sampled using the non-probability method of consecutive sampling. This was achieved in a 3 months data collection period from Oct. 2013-Jan. 2014. Our sample size was calculated based on the kish leslie formula.

Data concerning age, education status, antenatal care, maternal infections, Co-morbidities and information on the baby were collected.

The diseases were confirmed by checking medical forms and antenatal card for the mothers who had them in their possession or based on self-reported presenting symptoms from the mothers.

2.3 Variables

The dependent variable in this study was low birth weight in newborns defined as a new born having a weight of less than 2,500 g at birth. The independent variables were Socio-demographic factors, past obstetric history of the mother and Social habits, constitutional factors and child factors.

2.4 Study Procedures, Measurements and Data Collection

Mothers were enrolled into the study on a daily basis in reference to the delivery book in labour suite, questionnaires were administered in the morning between 7.00 am-9.00 am after taking the mothers through the process of informed consent. We reweighed the babies to confirm the Birth weights in the delivery book.

2.5 Data Analysis

Data was entered and cleaned in EPI-DATA version and exported to STATA (Texas, USA 1985-2011 copyright) software version 12 for the analysis.

Prevalence was calculated by expressing the total number of LBW out of the total of recorded births as a percentage.

On univariate analysis, categorical data was analyzed using descriptive statistics i.e. frequencies, proportions and percentages. Continuous data was analyzed using mean, range, median and standard deviation.

Odds ratios and *P*-values were used to determine the association between the dependent and independent variables at bivariate level.

Logistic regression analyses were conducted to determine the effect of factor(s) on the outcome variable and to control possible confounders. Factors with a P-value < 0.05 were taken as statistically significant.

2.6 Ethical Considerations

The research protocol was approved by the School of

Medicine Research and Ethics Committee SOMREC with clearance from the Uganda National Council for Science & Technology (UNCST), Mulago Research and ethics committee (REC) and the department OBS & GYN Mulago hospital. We took our study participants through the process of informed consent and they signed consent forms thereafter before participation.

3. Results

A total of 91/357 babies weighed below 2.5 kg, giving a prevalence of 25.5%. 266/357 (74.5%) of babies weighed between 2.5-5.0 kg (Table 1). The overall mean birth weight was 2.9 (range 1.0-5.0 kg). Among low birth weight babies (< 2.5 kg), the mean was 2.1 (Range 1-2.4 kg). Among babies with birth weight 2.5-5.0 kg, the mean birth weight was 3.1 (Range 2.5-5.0).

The age distribution of mothers, residence, marital status and tribe are shown in table 1.

Table 1 Socio-demographic characteristics of mothers.

Characteristics	N = 357 (%)
Age	
Mean	18
Median	
IQR (Q1 = 17, Q3 = 19)	2
Age groups	
< 15	5 (1.4)
15-19	352 (98.6)
Marital status	
Married	222 (62.2)
Single	135 (37.8)
Tribe	
Muganda	237 (66.39)
Musoga	15 (4.20)
Munyankole	24 (6.72)
Mutooro	10 (2.80)
Munyoro	13 (3.64)
Munyarwanda	25 (7.00)
Others*	33 (9.25)
Residence	
Kampala	282 (78.99)
Mukono	11 (3.08)
Wakiso	49 (13.78)
Others**	15 (4.15)

The mean age of mothers was 18 (Range 13-19) with majority of mothers aged 15-19 years.

Majority (62.2%) of mothers were married.

Most (95.85%) mothers were from the central region with 78.99% residing in Kampala.

Mothers were from various tribes within and outside Uganda. Majority (93%) were Ugandans mainly from the Ganda tribe (66.39%).

Majority of the mothers (99%) attended antenatal care. However, only (42%) completed the recommended 4 visits in focused antenatal.

Malaria was the most frequent condition reported at 39.2%.

All the teenage mothers reported that they did not smoke any cigarettes. However 17.9% lived with other persons smoking within their households.

18.8% of the mothers reported consuming alcohol during pregnancy.

Majority (67.2%) of mothers, reported to have eaten at least 3 meals during the pregnancy and most reported they fed on a balanced diet.

1.7% were multiple pregnancies.

They were slightly more female than male babies, (51.3%) and (48.7%) respectively as shown in the table 2 below;

Table 2 Characteristics of children.

	N = 357 (%)
Characteristics	
Weight	
< 2.5	91 (25.5)
2.5-5.0	266 (74.5)
Sex of the baby	
Male	174 (48.7)
Female	183 (51.3)
Birth order	
First	278 (77.9)
Second +	79 (22.1)
Completed weeks	
< 37	57 (16.0)
37-40	300 (84.0)
Congenital anomalies	
Absent	340 (95.2)
Present	17 (4.8)

Majority (77.9%) of the babies born were the first borns and most of the babies were delivered at term (84%).

(4.8%) of the babies had congenital anomalies as shown in table 2.

3.1 Maternal Factors Associated with LBW (Table 3)

Multiple pregnancy was significantly associated with LBW OR 0.165, $P = 0.039$.

Age of the mother was not associated with LBW, OR 4.5, $P = 0.102$.

Marital status was not associated with LBW, OR 0.666, $P = 0.100$.

ANC attendance was not associated with LBW, OR 2.966, $P = 0.280$.

The number of times of ANC attendance was also not significantly associated with LBW, OR 1.296, $P = 0.298$.

Malaria was not associated with birth weight. OR 0.900, $P = 0.675$.

Cigarette smoking within households and alcohol consumption were not associated with LBW, OR 1.423, $P = 0.296$ and OR 0.899, $P = 0.737$ respectively.

The number of meals was not associated with LBW OR 0.946, $P = 0.831$.

3.2 Child Factors Associated with LBW (Table 4)

The gestational age assessed as completed weeks of pregnancy was significantly associated with LBW [OR 3.302; $P = 0.00001$].

Table 3 Maternal factors associated with LBW.

Characteristic	LBW N (%)	Normal N (%)	Crude OR (95% CI)	*P*-value
Marital status				
Married	50 (54.9)	172 (64.7)	0.666 (0.41, 1.08)	0.100
Not married	41 (45.1)	94 (33.3)		
Age of the mother				
< 15 years	3 (3.3)	2 (0.75)	4.5 (0.740, 27.37)	0.102
15-19 years	88 (96.7)	264 (99.25)		
ANC attendance				
Not attended	2 (2.2)	2 (0.75)	2.966 (0.411, 21.36)	0.280
Attended	89 (97.8)	264 (99.25)		
Freq. ANC				
< 4	57 (57.6)	150 (56.4)	1.296 (0.795, 2.114)	0.298
4 Plus	34 (42.4)	116 (43.6)		
Condition suffered				
Malaria	34 (37.4)	106 (39.8)	0.900 (0.551, 1.470)	0.675
Others ***	57 (62.6)	160 (60.2)		
Smokers(Household)				
No smokers	78 (85.7)	215 (80.8)	1.423 (0.734, 2.759)	0.296
Smokers	13 (14.3)	51 (19.2)		
Alcohol use				
Alcohol	16 (17.6)	51 (19.2)	0.899 (0.484, 1.671)	0.737
None	75 (82.4)	215 (80.8)		
Pregnancy				
Singleton	87 (95.6)	264 (99.2)	0.165 (0.030, 0.915)	0.039
Multiple	4 (4.4)	2 (0.8)		
No. of meals				
< 3	29 (31.8)	88 (33.1)	0.946 (0.568, 1.575)	0.831
3 or more	62 (68.2)	178 (66.9)		

Table 4 Baby factors associated with LBW.

Characteristic	LBW N (%)	Normal N (%)	Crude OR (95% CI)	*P*-value
Sex of the baby			**0.979 (0.608, 1.577)**	**0.932**
Male	44 (48.4)	130 (48.9)		
Female	47 (51.6)	136 (51.1)		
Birth order			**1.322 (0.727, 2.408)**	**0.360**
First	74 (81.3)	204 (76.7)		
Second +	17 (18.7)	62 (13.3)		
Gestational age			**3.032 (1.682, 5.466)**	**0.0001**
< 37 weeks	26 (28.6)	31 (11.7)		
Term.	65 (71.4)	235 (88.3)		
Congenital anomaly			**0.813 (0.278, 2.373)**	**0.704**
Absent	86 (94.5)	254 (95.5)		
Present	5 (5.5)	12 (4.5)		

Others*; Japadhola = 1, Mugisu = 6, Acholi = 1, Itesot = 6, Alur = 4, Langi = 1, Lugbara = 2, Mufumbira = 3, Murundi = 5, Mukiga = 3, Munubi = 1.

Others**; Nakasongola = 2, Mpigi = 7, Luwero = 3, Masaka = 3.

Others***; includes Diabetes = 1, Epilepsy = 2, Rubella = 2, sexually transmitted infections = 3, Asthma = 9, hypertension = 23, urinary tract infections = 68, none = 109.

The sex of the baby [OR 0.979; $P = 0.932$], birth order [OR 1.322; $P = 0.360$] and congenital anomalies [OR 0.813; $P = 0.704$] were not associated with LBW.

4. Discussion

Our study set out to establish the prevalence and risk factors for LBW among teenage mothers who delivered in a tertiary health institution. We found a LBW prevalence rate of 25.5%, which is much higher than the prevalence rate of 13.5% reported in the recent Uganda Demographic and Health Survey (2011) [3]. Compared to our study that abstracted birth weight from written records, the birth weight reported by the 2011 UDHS was obtained from multiple sources including written records, and subjective mother's estimate of birth weight for babies who were delivered outside the health unit. The LBW prevalence rate in our study is also much higher than average estimate of 16.5% rate for many sub Saharan countries [1] and the region [9]. Previous studies conducted in Uganda also found much lower LBW prevalence rates than in our study [13]. The observed differences could be a reflection of probable variations in study populations and seasons when these studies were conducted [17].

Pre-term delivery and multiple pregnancies were significantly associated with LBW consistent with other studies [18, 19]. However, self-reported malaria infection during pregnancy was not associated with LBW unlike findings reported by other studies [20]. Febrile illnesses such as malaria cause retarded intra-uterine growth and subsequently lower the birth weight [20].

Sex of the baby was not associated with LBW in our study. In a cross-sectional study conducted among 540 mothers at Gondar University Hospital in Northern Ethiopia, being female was associated with LBW [21]. Unlike our study that focused only on teenage mothers, the Ethiopian study population included not only teenagers but also adult mothers, which could explain the differences.

Birth order was not associated with LBW in our study. According to UDHS 2011, first births are more likely to result in LBW and the likelihood of birth weight decreases as birth order increases.

Cigarette smoking, alcohol consumption, numbers of meals per day taken by the mother during pregnancy and maternal complications after delivery were not associated with LBW in our study.

Our study has limitations. The prevalence rate of LBW we found in this study may be an overestimate given that the study was conducted in a tertiary referral health institution. The cross-sectional study design does not show seasonal variations of LBW. This study does not also consider potential risk factors including HIV infection, placental factors and intra-uterine infections. Nevertheless, our study highlights some of the important maternal factors of LBW.

5. Conclusions

The prevalence of LBW among our study population was high, 25.5%. Pre-term delivery and multiple pregnancies were associated with LBW.

Health workers should encourage teenage mothers to attend focused antenatal care as recommended by Ministry of Health, Uganda. A specialized maternal facility centre that is friendly for adolescent/teenage mothers is advisable so as to improve on completion rates and handle high risk pregnancies.

More research is needed in this area to assess the likely association of potential risk factors such as HIV infection, placental factors and other intra-uterine factors plus seasonal variations.

Acronyms

ANC—Antenatal Care

BMI—Body mass Index

IUGR—Intrauterine Growth Restriction

LBW—Low Birth Weight

MUAC—Mid upper arm circumference

OBS & GYN—Obstetrics & Gynecology

REC—Research & Ethics Committee

SOMREC—School of Medicine Research & Ethics Committee

UNCST—Uganda National Council for Science and Technology

UTI—Urinary tract Infection

WHO—World Health Organization

Conflict of Interest

The authors declare that there is no conflict of interest.

Author's contribution

BC, BL & BS wrote the proposal, were involved in data collection, data analysis and manuscript writing. NM & NR were involved in data collection and analysis. NT & LE participated in data collection. KA, NI approved the proposal with some revisions. BC, KA & NI edited the draft manuscript. All authors read and approved the final manuscript.

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