

Factors Affecting Birth Weight at Kenyatta Hospital in Nairobi County

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Abstract: *This cross-sectional study sought to identify the various factors responsible for low birth weight in Nairobi County. Three hundred and one pregnant mothers, who had booked for antenatal care in Kenyatta hospital which is Nairobi County, were studied for age, residence, occupation, medical condition, folic intake, iron, delivery mode, age of the spouse and other characteristics. Data was collected by use of questionnaires and was later analyzed using descriptive and inferential statistical analysis tools. The mean maternal age was 26.45 years (range 16-46 years). 15.0% of women were married at the time of delivery and 85% were separated/divorced. 23.6% of the women had attained primary level of education, 40.2% secondary and 35.9% tertiary. 49.2% booked antenatal care (anbooking) at <16 weeks gestation period and 50.8% booked the same at >28 weeks of their gestation period. Most women came from urban i.e. 90.7% and only 6.3% came from rural area. 71.5% of the mothers were unemployed and only 28.5% were employed, 72.6% had taken folic and 72.6% had taken iron. Most mothers (59.9%) had used family planning methods and only 39.9% were never users. 10% had diabetes, 30% hypertension, epilepsy 50%, anemia 30% and 20% had asthma. According to the study findings medical condition was found to be the most influencing factor on birth weight with a strong positive spearman correlation of 0.769; p value < 0.01. marital status had a positive spearman correlation of 0.191; p value < 0.01, neonatal outcome had a positive spearman correlation of 0.328 p : value < 0.01 and family planning methods had a negative spearman correlation : p value < 0.05. The other variables were found to be insignificant. Multinomial logistic was used since birth weight was polytomous (categorical with more than two categories). Women who were married were more likely to get children of birth weight between 1501-2500g compared to separated \divorced, that is their odds ratio > 1 with p value less than 0.001 ($p = .000$), (they were 1.478 times more likely) .*

Keywords: birth weight, gestation period, odds ratio (OR), family planning methods, medical condition.

1. Introduction

Birth weight is a strong indicator of health of the mother and her nutritional status .It also indicates the chances of newborns survival, growth, long-term health and psychosocial development, Shmuel .A (2004) .The proportion of newborns born weighing less than 2500 grams is an internationally accepted measure of population health status ,since, according to the World Health Organization (WHO) definition, infants with birth weights of less than 2,500 g are classified as low birth weight (LBW). Low birth weight (LBW) has been acknowledged as the single most important determinant of neonatal mortality. Berkowitz G.S (1993), Alberta health(1996),Kramer ms(1985), Mccornick M.C (1985) Low birth weight infants contribute to about 75% of the deaths that occur in the first week of life.

According to Shmuel .A (2004) a low birth weight raises grave health risks for children. Babies who are undernourished in the womb face a greatly increased risk of dying during their early months and years. This is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies. More common in developing than developed countries, a birth weight below 2,500 g contributes to a range of poor health outcomes. Those who survive have impaired immune function and increased risk of disease; they are likely to remain undernourished, with reduced muscle strength, throughout their lives, and to suffer a higher incidence of diabetes and heart disease Shmuel .A (2004). Children born underweight also tend to have cognitive disabilities and a lower IQ, affecting their performance in school and their job opportunities as adults. Previous studies have also linked infant mortality with mother's education, age at childbirth, delivery status, health status, parity and

marital union; father's education and employment; household income and consumer goods, household safe source of drinking water and sanitation; and slum and rural residence Hennekens CH et al (1987).

Kramer et al (1998) in an analysis of births between 1978-1996 in Montreal, Canada reported an increased risk of preterm birth for unmarried women compared to married women (adjusted OR 1.51, 95%CI 1.36, 1.68). Shiono et al (1995) in a population based study of ethnic differences in birth weight found a significant difference in the birth weight of offspring from married women compared to unmarried women. Marriage offers protective effects that may lie in social, psychological, emotional and financial support of partners.

The age of the mother is a major factor in birth weight. When a woman is between the ages of 18 and 35, she is in the prime of her childbearing years and is more likely to conceive a healthy child. Table 3.1 shows that the more number of LBW babies (36%) were born to mothers who were greater than 35 years of age. The relationship between maternal age and LBW was not found to be statistically significant ($p > .05$). These complications arise because the human organism is just not organized for women to bear children. Menopause usually happens around the ages of 45-55 and it changes the hormone levels required for maintaining the uterine environment. For these reason, older women have a higher chance of giving birth to low birth weight babies. This cross-sectional study was designed to identify these various etiological factors responsible for different birth weights deliveries that is <1500g, 1501-2500g and >2500g.

2. Literature Survey

An adequate supply of nutrients and oxygen are essential for the normal progression of healthy fetal growth and development. Any alteration in this can change its normal growth. Maternal infection transmitted through the placenta can also affect the growth. Beside this medical conditions affecting oxygen carrying capacity, utero placental blood flow and the size of uterus can also affect the gestational period and the growth of the fetus. Maternal diabetes causes long term changes in placenta and may cause fetal growth restriction. (Kliogman, R.M.2001) (Bernstein,P.S.1997) Maternal hypertension can reduce fetal growth due to a reduction in blood flow or an increased risk of preeclampsia . (Halterman et.al.1997) Other factors that can help identify nutritional risk in a pregnancy include: adolescence, anemia, abnormal pre-pregnancy weight, multiple gestation, medical illness or medication that interferes with absorption of vitamins and minerals, cigarette smoking, alcohol abuse, and low socioeconomic status (Kolasa & Weismiller 205). Other chronic conditions which can affect fetal growth are cystic fibrosis, asthma, pancreatitis, malabsorption syndrome, starvation, short bowel, collagen vascular disorder, sickle cell anaemia. Therefore, health of a mother and her general medical conditions affects the health fetal growth.

There is a very large literature from around the world that demonstrates the significance of mother's schooling to lower mortality (whose major cause is low birth weight) outcome among children. The chances of having a low-birth weight baby are substantially higher for women who do not receive prenatal care. Studies have found that even after adjusting for other differences like socioeconomic status and maternal age, infants born to mothers who received no prenatal care weighed considerably less, on average, than those whose mothers received prenatal care (Henderson 28).

The age of the mother is a major factor in birth weight and maternal outcome. When a woman is between the ages of 18 and 35, she is in the prime of her childbearing years and is more likely to conceive a healthy child and have a good maternal outcome. Woman's ability to choose if and when to become pregnant has a direct impact on her health and well-being.

Promotion of family planning and ensuring access to preferred contraceptive methods for women and couples is essential to securing the well-being and autonomy of women, while supporting the health and development of communities

Family planning allows spacing of pregnancies and can delay pregnancies in young women at increased risk of health problems and death from early childbearing, and can prevent pregnancies among older women who also face increased risks. Family planning enables women who wish to limit the size of their families to do so. Evidence suggests that women who have more than four children are at increased risk of maternal mortality.

Family planning enables people to make informed choices about their sexual and reproductive health. Family planning represents an opportunity for women for enhanced education

and participation in public life, including paid employment in non-family organizations.

3. Research Methodology

The study adopted a cross sectional study design to determine factors affecting birth weight of a child in Nairobi County. This study design allows us to compare many different variables at the same time.

Data was collected by use of questionnaires from 301 pregnant women who had booked for ante natal care in Kenyatta hospital during the period October 2014 to November 2014. Most respondents were in the age group of 18–35 years as described in Table 3.1. The dependent variable was: birth weight coded as "<1500g"; "1501-2500g" and ">2500g", and independent variables included: marital coded as Married =1 ,Separate/divorced=2 and Widowed=3 , residence coded as rural=1 and urban=2 , age of the mother, age of the spouse, ante natal care booking, family planning methods ,delivery mode ,neonatal outcome coded as Good=1 and Poor=2,medical conditions coded as Diabetes mellitus=1,Hypertension=2,Epilepsy=3,Sick cell disease=4,Anemia=5 , Asthma=6 and others=7. Multinomial logistic regression model was used. Stratification was done to determine the confounding factors. Age was stratified in decades to determine the effect of maternal age on birth weight of a child as described in Table 3.1.

Table 3.1: Distribution of birth weight according to age

Birth weight	age			total
	16-25years	26-35 years	36- 46 years	
<1500	7	14	1	22
1501-2500	30	27	3	60
>2500	109	93	14	216
Total	146	134	18	298

4. Results and Analysis

First, we calculated descriptive statistics to establish the determinants of birth weight of a child. Continuous variables were presented as mean and standard deviations (SD), and categorical data were presented based on frequency and percentage. To explore the determinants of birth weight, mothers with <1500g, 1501-2500g and >2500g babies were compared for different related factors. Multinomial logistic was used since the dependent variable (birth weight) was polytomous. Multinomial logistic regression allows for more than two categories of the dependent or outcome variable and it uses maximum likelihood estimation to evaluate the probability of categorical membership. The combined effect of marital, family planning method, medical conditions and neonatal outcome to the birth weight was examined by multiple Regression analysis. The results show the logistic coefficient (B) for each predictor variable (family planning methods, neonatal outcome, medical condition and marital) for each alternative category (birth weight <1500g and 1501-2500g) of the outcome variable. Multinomial logistic model was applied to estimate odds ratios (ORs) and 95% confidence intervals (CIs) as a measure of the associations between birth weight and related factors. A P value of <0.05 was considered significant. Data were analyzed using SPSS version 21.0 for Windows.

The mean maternal age was 26.45 years (range 16-46 years). 15.0% of women were married at the time of delivery and 85% were separated/divorced. 23.6% of the women had attained primary level of education, 40.2% secondary and 35.9% tertiary. 49.2% booked antenatal care (anbooking) at <16 weeks gestation period and 50.8% booked the same at >28 weeks of their gestation period. Most women came from urban i.e. 90.7% and only 6.3% came from rural area. 59.5% of the mothers had used fp methods, 28.5% were employed, 72.6% had taken folic and 72.6% had taken iron. Most mothers (59.9%) had used family planning methods and only 39.9% were never users. 10% had diabetes, 30% hypertension, epilepsy 50%, anaemia 30% and 20% had asthma.

The incidence of birth weight < 1500g was 22.0%, while the mean birth weight of all 299 newborns was 2.65 Kg (with SD ± 0.613 kg). It is to be noted that the number of new born with birth weight greater than 2.5 Kg was the highest with 72.6 % and only 20.1% of the new born had the birth weight between 1501-2500Kg (Table 4.1).

Table.4.1: Distribution of new born according to birth weight

Birth weight in (Kgs)	No .of new born	Percent (%)
< 1.5	22	7.4
1.501-2.5	60	20.1
> 2.5	217	72.6
Total	299	

Table 4.2 reveals that mothers who were married were 1.485 times more likely to get children of birth weight between 1501-2500g compared to Separated/divorced mothers (odds ratio>1 with p value less than 0.005(p=.000).

Table.4.2: Distribution of birth weight according to marital status

Marital status	Birth weight in Kgs			Total
	<1.5	1.501-2.5	>2.5	
Marital married	3	19	22	44
Separated/divorced	19	41	195	255
Total	22	60	217	299

According to the study findings medical condition was found to be the most influencing factor on birth weight with a strong positive spearman correlation of 0.769: p value<0.01. marital status had a positive spearman correlation of 0.191: p value<0.01, neonatal outcome had a positive spearman correlation of 0.328: p value<0.01 and family planning methods had a negative spearman correlation :p value<0.05. Women with diabetes mellitus compared to those with sick cell disease were less likely (exp (B)) <1) to deliver children with birth weight between 1501-2500g than birth weight>2500g.

Women with hypertension compared to those with sick cell disease were more likely (exp (B))>1) to deliver children with birth weight between 1501-2500g than birth weight >2500g.

Women with epilepsy compared to those with sick cell disease were equally likely to deliver children with birth weight between 1501-2500g than 2500g.

Women with anemia, compared to those with sick cell disease were more likely (exp (B))>1) to deliver children with birth weight between 1501-2500g than birth weight>2500.

Women with asthma, compared to those with sick cell disease were equally likely to deliver children with birth weight between 1501-2500g than birth weight>2500.

Table.4.3: distribution of birth weight according to neonatal outcome

Neonatal outcome	Good	Birth weight in Kgs			Total
		< 1.5	1.501-2.500	> 2.5	
		3	42	195	240
	Poor	17	18	22	57
Total		20	60	217	297

Table 4.3 reveals that mother who had good maternal outcome had the highest number of new born weighing > 2.5kg. 81.25% of new born weighing >2.5kg had good neonatal outcome.

Mothers who were users of family planning method were more likely to get new born with birth weight >2.5kg. 76.4% of new born with >2.5kg came from mothers who were users of family planning methods in contrast with 67.5% who were never users (Table 4.4).

Table.4.4: distribution of birth weight according to family planning methods

Family planning methods	Yes	Birth weight			Total
		< 1500	1501-2500	> 2500	
	No	8	34	136	178
		14	25	81	120
Total		22	60	217	299

Women who were users of family planning methods were 0.23 times less likely to deliver children with birth weight less than 1500g, than those who were never users (p<0.0001), the exp(B)<1.

5. Conclusion

As our conclusion, it is important to be attentive of the limitations of the findings due to the source of the data. The data for this study were obtained from a form that is part of the patient record within hospital and is primarily used to direct patient care and follow-up. In particular, some of the data collected is highly sensitive and depends on both Interaction and trust between health professionals and the mother.

In this study married women had low incidence of birth weight <1500g (6.8%) compared to Separate/divorced who had (7.5%) of the same. This supports previous studies that indicated an increased risk of low birth weight for unmarried women. The basis for protective effects of marriage may lie in social, psychological, emotional and financial support of partners. Kramer et al(1998) in an analysis of births between 1978-1996 in Montreal, Canada reported an increased risk of preterm birth for unmarried women compared to married women (adjusted OR 1.51, 95%CI 1.36, 1.68). Shiono et al(1995) in a population based study of

ethnic differences in birth weight found a significant difference in the birth weight of offspring from married women compared to unmarried women.

This study has confirmed that health of mother and her general medical conditions can affect the fetus in many ways. This is consistent with previous studies which indicated that maternal diabetes causes long term changes in placenta and may cause fetal growth restriction (Kliogman,R.M.2001) (Bernstein,P.S.1997) and maternal hypertension reduces fetal growth due to a reduction in blood flow or an increased risk of preeclampsia.(Haelterman et.al.1997)

In consistent with previous studies that confirmed that mother's education has strong negative effect on birth weight, independent of other factors ,that is mother's schooling lowers mortality (whose major cause is low birth weight) outcome among children, this study found education of a mothers being insignificant.

Studies have found that even after adjusting for other differences like socioeconomic status and maternal age, infants born to mothers who received no prenatal care weighed considerably less, on average, than those whose mothers received prenatal care (Henderson 28). This study is inconsistent with above and indicates that ante natal booking is not significant and hence does not influence birth weight of a child in Nairobi County.

The study confirms that neonatal outcome influences the birth weight of a child; mothers who had good neonatal outcome were more likely to deliver children with birth weight between 1501-2500g compared to those with poor neonatal outcome. In our study mothers between 16-25yrs had low incidence(4.7%) birth weight (<2500g) followed by those between 26-35yrs while above 36yrs had high incidence ,despite the previous study indicating that the age of the mother is a factor in birth weight of a child. Our findings excluded age as a factor on birth weight.

The result showed that there is a strong relationship between medical condition and birth weight with a strong positive spearman correlation of 0.769: p value<0.01 ,marital status which had a positive spearman correlation of 0.191: p value<0.01,nn-outcome which had a positive spearman correlation of 0.328 :p value<0.01 and family planning methods which had a negative spearman correlation :p value<0.05.

6. Recommendations

In this study mothers who had booked for ante natal care in Kenyatta hospital were studied, further study should be done to include both private and public hospital to get a good representative of Nairobi county.

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