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Maternal Factors Affecting Birth Weight of New Born Babies in Maiduguri

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Abstract
Data collected from the Medical Records Department of the University of Maiduguri Teaching Hospital (UMTH) from October to December 2009 were used to assess the effects of some maternal factors (age, parity, duration of pregnancy, ethnic groups, maternal health conditions and antenatal care attendance) on the birth weight of babies. The study showed that in Maiduguri, the incidence of low birth weight (LBW) was 28.5% and about 3.5% of the babies were macrosomic. The mean birth weight (MBW) was 2.86kg and this was found to be significantly affected by the mother's age, parity, duration of pregnancy and by antenatal care utilization. The influence of maternal ethic group and maternal health condition during pregnancy were also obtained.
Keywords: Birth weight, Mean birth weight (MBW), Low birth weight (LBW), Maternal factors, Macrosomic, Parity

1.0. Introduction

There is a close inter-relationship between the maternal conditions during pregnancy and the birth weight of their offspring. Because of the close relationship between the mother and her baby, their health problems are interrelated. Hence, perinatal factors have very important influence on the weight and general health of the child. Mothers and children form the majority of the public, thus effective health services for them means effective health services for the whole community. Therefore the care of pregnant women, mothers, and their children deserve to be given the highest priority in every community (Lucas and Gilles, 1984).

The birth of an infant is strongly influenced by the health and nutritional status of the mother. This is in turn closely associated with the economic, social and environmental conditions surrounding the mother. So for a community, birth weight can be used as an index for maternal health services as well as indication of the viability of the new born baby since perinatal mortality and morbidity are directly influenced by birth weight.

The World Health Organization (WHO) has recommended 2,500g as the lower limit of normal for birth weight, such that any baby that weighs less than 2,500g are termed as "Low Birth weight" baby (WHO, 1961).

This can be used for international and local comparison and for assessing the rate of development of some nations (WHO, 1961).

This research was carried out to determine the relationship between the birth weight of the new born babies and some maternal factors that could affect the birth weight of new born babies in Maiduguri. The maternal factors that are considered in this study are maternal age, parity, race and ethnicity, maternal health condition, duration of pregnancy and maternal utilization of antenatal care (ANC). Observations have shown that various factors viewed under biological, social and environmental status which operate in both the mother and child have some relationship.

The factors considered in this study do not differ much from those conducted somewhere else on the birth weight of the new born babies, but the purpose is to note the peculiarities and pattern of birth weight and perinatal outcome in Maiduguri.

The optimum age for child bearing is between 20 and 30 years because the mother is physically and psychologically prepared for the task at this period. Very young (below 16years) and older women (above 35years) tend to have smaller babies (Hugh *et al.,* 1986). There is increasing birth weight and placental weight with increasing maternal age at pregnancy which is correlated with increasing height (Lao and Ho, 2000). Multinomial regression analysis shows maternal age to have sufficient association with new born low birth weight (Jaydip *et al.,* 2009).

The relationship between parity, birth order and mean birth weight is well established. It was found that the risk is greatest for the first baby, lowest for the second baby and thereafter rises sharply with increasing parity. This means it was found that the mean birth weight of first born children is relatively lower than those of second, third and fourth born, after which the weight starts to decline. If it were possible to choose the optimum circumstances for birth, the baby should be born the second child of a healthy married 23 year old girl with no adverse family history of illness (Hugh *et al.,* 1986).

Parity is a term used to indicate the number of pregnancies a woman has had that have each resulted in birth of an infant capable of survival. The new born health is affected by the timing and frequency of pregnancy. Women who give birth when they are too young or too old, or have baby too closely spaced, place themselves and their new-borns at increased risk of complications (Tinker and Ransom, 2009).

A new born who is less than 24 months younger than the next oldest sibling is 2.2 times more likely to die than a new born who arrives after 36 months (Rutstein, 2000). Women who have born many children are at higher risk of low birth weight babies and death as well (Tinker and Ransom, 2009).

Association between maternal body mass index (BMI) and birth weight showed that as BMI increases, the outcome of variable birth weight also increases (Gourangie and Ahmed, 2007).

Early studies in Nigeria showed that the mean birth weight among Yoruba children was 3.1kg as reported by Effiong in (1976) at Ibadan. Mean birth weight was reported as 3.08kg at Katsina by Reham *et al.,* (1979) and in Malumfashi as 2.85kg by Osuhor (1976). These show that mean birth weight among the Yoruba people is more than that of the Hausas, though the difference is not much.

One measurable indicator of nutritional status is that of pregnancy outcome in birth weight (Gourangie and Ahmed, 2007). Micronutrient deficiencies may also influence both maternal and neonatal health. For example, iron deficiency afflicts more than half of all pregnant women in developing countries. Mothers with severe anaemia are at increased risk of maternal death, still birth and early neonatal death; and their infants are at increased risk of low birth weight, premature and/or cognitive impairments (Lindsay, 2000).

Up to one-third of untreated HIV-positive mothers transmit the virus to their infants during the prenatal period resulting in nearly a half million child death in 1999 (Piwoz, 2001).

Malaria is associated with spontaneous abortion and stillbirth, and women who develop severe anaemia from malaria are at increased risk of maternal death (Rush, 2000).

Various factors come in to play which influence the antenatal care services utilization. Some of these factors included occupation, literacy level, religion, the environment and socio-cultural practices.

A single scoring system designed by the world health organization for the purpose of statistical analysis on the regularity of antenatal care services attendance is as follows:-

Total number of antenatal care visits/10

Where 10 is the total number of visits expected from each woman beginning from 12 weeks to 37 weeks, in uncomplicated pregnancy (WHO, 1961).

The attitude of the mother to her pregnancy contributes to the low antenatal care service utilization. Thus, they have a baby with low birth weight compared with those that attend and utilize antenatal care services (Yusuf and Mustafa, 2007).

1.1. Aim and Objectives

The aim of this study is to determine some maternal factors influencing the birth weight of the new born babies in Maiduguri and the specific effect each of these factors have on the birth weight.

The objectives include:-

- To determine the pattern of birth weight in Maiduguri
- To determine the effect of maternal age on birth weight of new born babies
- To determine the effect of parity on birth weight of new born babies
- To evaluate the influence of maternal duration of pregnancy on the birth weight of the new born babies
- To evaluate the relationship between maternal illness and the baby's birth weight.
- To know the effect of utilization of antenatal care services on birth weight of new born babies
- To know the relationship between maternal ethnic group and the birth weight of new born babies.

2.0. Materials and Methods

Maternal factors like age, parity, duration of pregnancy, maternal health conditions, ethnic groups and utilizations of antenatal care services of pregnant mothers and birth weight of new born babies were considered in this study. Thus, the study utilized pregnant mothers and/or mothers who had just delivered and the newly born babies in Maiduguri. Two hundred data was drawn from the population of study and this is called the sample. This sample was drawn from the population for the purpose of generalization for the entire population. The research work was carried out in the University of Maiduguri Teaching Hospital (UMTH). This hospital was used for carrying out the research work to ensure that both the lower social class and the higher social class individuals are reached since UMTH is standard hospital with affordable prices for their services.

Data were collected from the medical records department of the hospital. The medical records of three (3) months ranging from October to December, 2009 were only considered in this study. Any other record(s) that did not fall under this period were exempted. Also, data collected was majorly restricted to the three major ethnic groups in Nigeria (Yoruba, Hausa and Igbo) and the major ethnic group in Maiduguri (Kanuri). All other ethnic groups are considered as others.

The parameters recorded excluded those from the stillborn and those of babies with congenital malformations. Furthermore, the maternal factors such as maternal age, parity, duration of pregnancy, maternal

health condition, maternal ethnic group and maternal attitude towards utilization of antenatal care services were also recorded. Women who have delivered at home before rushing to the hospital for one reason or the other were not considered in this study. Likewise, the data of mothers with prenatal and maternal mortality were exempted.

The statistical procedure for processing the collected data was by statistical package for social service (SSPS) software which consists of simple percentage, correlations and pair sample t-test analysis.

3.0 RESULTS

3.1. Distribution of Birth Weight among the Surveyed Babies

In this study, a sample of 200 babies was observed and the results obtained are represented in table and figure 3.1. The result shows that the mean birth weight (MBW) of babies surveyed was 2.86kg. The low birth weight (LBW) group of babies constituted 28.5%. There were also 3.5% of macrosomic babies. (Table 3.1 and figure 3.1)

3.2. Birth Weight in Relation to Mother's Age

The mean birth weight tends to increase with maternal age until after about 35 years when the birth weight tends to decrease with increase in maternal age. The result shows that the mean birth weight of the babies increase with maternal age but starts declining after 35 years. The mean birth weight of babies born to mothers of age between 10 – 14 years was 1.82kg and the mean birth weight of babies born to mothers of age between 40 – 44 years was 2.15kg, which were both termed as "Low Birth Weight" babies. Babies born to mothers of ages between 20 – 30 years increased and were termed as normal. There was strong positive relationship between the birth weight and age of mothers. (Table 3.2 and figure 3.2)

3.3. Birth Weight in Relation to Parity of Mother

The mean birth weight (MBW) has been shown to increase with increase in parity until the fifth child when the birth weight starts declining. The mean birth weight (MBW) has been shown to increase with increase in parity until the fifth child when the birth weight starts declining. The MBW increases with parity up to parity of 5 after which it begins to decline. The maximum MBW is attained by those mothers with parity of 4 and 5. The results indicated that there is a statistical significantly perfect positive relationship between birth weight of the babies and the parity of mothers. (Table 3.3 and Figure 3.3).

3.4. Birth Weight and Duration of Pregnancy

Preterm and post-term babies have greater risk of being small weight babies. The result shows that the MBW increases with each completed weeks of pregnancy up to week 39 after which it starts declining, post-term. The MBW of mothers that delivers at <36 weeks of pregnancy is the lowest. Table 3.4 and figure 3.4 results indicate that there was a statistical significant strong positive relationship between birth rate and pregnancy duration (Table 3.4 and Figure 3.4).

3.5. Birth Weight and Mothers Ethnic Group

The mean birth weight (MBW) of Kanuri tends to be more than that of Hausa children. The results shows that MBW of babies born to Hausa mothers was 2.48g which was low birth weight. Babies born to Yoruba families have 2.91kg as their MBW while those from Igbo families had the highest MBW of 3.20kg. Other members of the community have babies with MBW of 3.01kg (Table 3.5 and Figure 3.5).

3.6. Birth Weight and Maternal Health Condition

Maternal illness during pregnancy tends to cause decrease in the mean birth weight (MBW) of the baby. This was more pronounced in chronic debilitating illness. For instance mothers with history of Sickle Cell Disease (SCD) had the lowest MBW. The result shows that the MBW of babies born to mothers who had no health problems during pregnancy was 3.20kg which was more than those babies born to mothers with sickle cell disease and malaria which was 2.20kg and was the lowest. The MBW of babies born to diabetic mothers was 4.20kg which was termed as macrosomic for the babies (Table 3.6 and Figure 3.6).

3.7. Birth Weight and Maternal Health Condition

With good attendance of antenatal care (ANC), the MBW tend to increase because of adequate and appropriate care. But mothers with poor attendance stand the risk of giving birth to low weight babies. The MBW of babies born to unbooked mothers was lower than those that were booked and the MBW of the babies tended to increase with increase in frequency of attendance.

The result indicated that there was a significant difference between the mean birth weight of babies of unbooked mothers and those of mothers who had received good antenatal care (Table 3.7 and Figure 3.7).

4.0. Discussion

The results of this study showed some significant association between some maternal factors and the birth weight of their new born babies.

The mean birth weight (MBW) of babies in this study was 2.86g. This is in comformity with that reported by Osuhor (1976) in a similar study in Malumfashi.

The incidence of low birth weight of babies in this study was 28.5%. There were also 3.5% of macrosomic babies. The 3.5% macrosomic babies could be accounted for by the diabetic mothers. High incidence of low birth weight in developing countries is not surprising because of poor nutrition, poor environment and various socio-cultural practices which affect child bearing. There was a significant positive relation between the age of mother and birth weight of their babies. This was in line with the result of the study by Jaydip et al (2009).

Parity was related to maternal age as well as birth weight of the new born. Results obtained from this conforms to the findings of Hugh et al (1986) which stated that the risk of birth was greatest for the firstborn children compared to those born at parity 4 or 5. The falling of MBW after parity 5 could be due to the fact that repeated pregnancy depletes mother's storage ability coupled with poor nutrition which is common in this environment. Women who have borne many children at higher of LBW babies and death. This conforms to the results reported by Tinker and Ransom (2009).

The mean birth weight (MBW) of babies born to Kanuri mothers was higher than those of babies born to the Hausa families. The Igbo families had the children with highest MBW. The new-borns of other ethnic groups had MBW of 3.01kg. The MBW of babies born to Yoruba families was 2.91kg. This was in contrast with the result given by Effiong (1996) in Ibadan. This might be due to general low economic situation of the attendant mothers.

There was increase in birth weight with increase in frequency of attendance. The MBW of babies born to unbooked mothers was lower than those that were booked. However, there was a significant difference between MBW of babies of unbooked mothers and those of mothers who have received good antenatal care. In line with the result reported by Yusuf and Mustapha (2007), utilization of antenatal care services was a significant determinant of birth weight.

There was a significant relationship between duration of pregnancy and the birth weight. The result revealed by this study showed that the MBW increased steadily up to 39 weeks after which there was a fall. This could be explained by the fact that babies were not at peak of development until about 38 weeks and 40 weeks, since thereafter, there tend to be reduction in amniotic fluid nutritional supply. In this present study, mothers that were free of any serious illness during pregnancy had relatively high MBW babies, unlike those babies of mothers with one or two MBW problems. Rush (2000), found that women with malaria were more likely to had low birth weight infants.

5.0. Conclusion

This study has been able to show the mean birth weight (MBW) of babies in Maiduguri and how this has been affected by maternal age, parity, duration of pregnancy and maternal utilization of antenatal care services. These maternal factors are seen to have marked influence on the mean birth weight of this babies. The incidence of low birth weight still exist in Maiduguri hence, possible appropriate measures should be instituted to improve on it.

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Tables and Figures

Table 3.1: Distribution of Birth Weight among the Surveyed Babies

Birth weight (kg)	Frequency	% percent	Cumulative freq.	Cumulative %
0.5-0.9	3	1.5	3	1.5
1.0-1.4	7	3.5	10	5.0
1.5-1.9	16	8.0	26	13.0
2.0-2.4	31	15.5	57	28.5
2.5-2.9	43	21.5	100	50.0
3.0-3.4	50	25.0	150	75.0
3.5-3.9	43	21.5	193	96.0
4.0-4.4	5	2.5	198	99.0
4.5-4.9	2	1.0	200	100.0
Total	200	100	-	-

The table 3.1 above and figure 3.1 below shows that the mean birth weight (MBW) of babies surveyed was 2.86kg. The low birth weight (LBW) group of babies constituted 28.5%. There were also 3.5% of macrosomic babies.

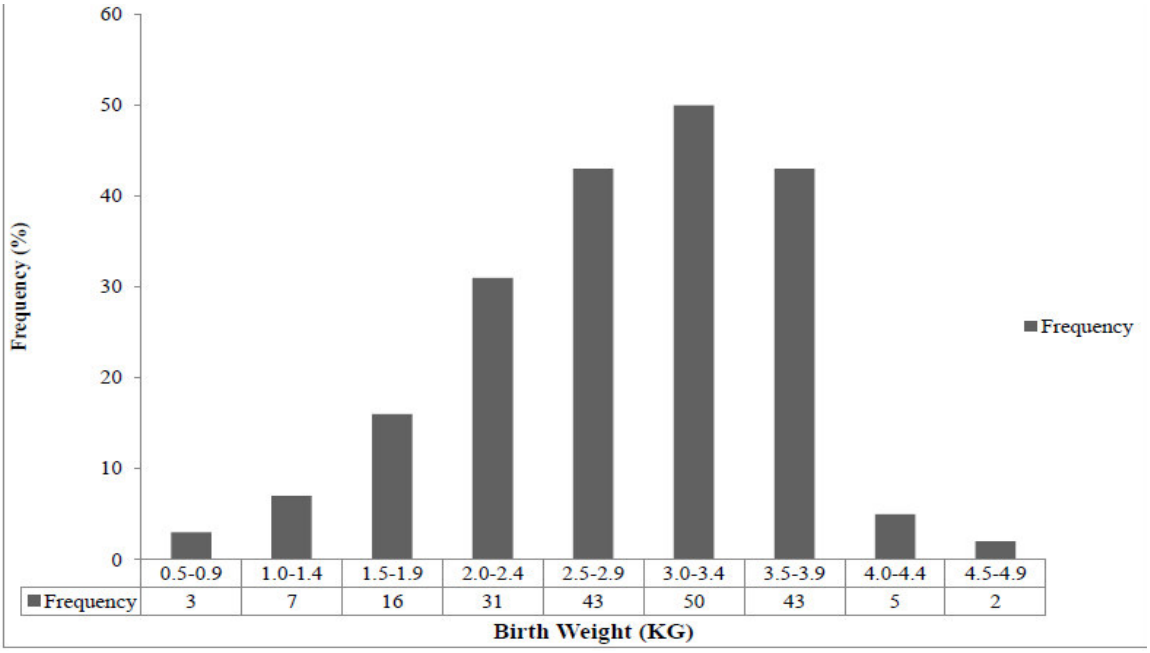


Figure 3.1. Showing distribution of birth weight among the surveyed babies.

Table 3.2: Distribution of Birth Weight in Relation to Mother's Age

MOTHERS AGE (YRS)	BIRTHWEIGHT (KG) 0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
10-14	1	1	2	1	-	1	-	-	-	6	1.82
15-19	1	2	6	10	10	12	8	1	-	50	2.69
20-24	-	1	1	8	18	19	70	2	1	57	2.96
25-29	-	1	1	3	7	8	12	1	1	34	2.98
30-34	-	-	1	4	4	5	8	-	-	22	3.04
35-39	-	1	3	3	2	4	7	1	-	21	2.91
40-44	1	1	2	3	1	1	1	-	-	10	2.15
Total	3	7	16	31	43	50	43	5	2	200	2.265

Table 3.2 shows that the mean birth weight of the babies increase with maternal age but starts declining after 35 years. The mean birth weight of babies born to mothers of age between 10 – 14 years was 1.82kg and the mean birth weight of babies born to mothers of age between 40 – 44 years was 2.15kg, which were both termed as "Low Birth Weight" babies. Babies born to mothers of ages between 20 – 30 years increased and were termed as normal. There was strong positive relationship between the birth weight and age of mothers ($r = 0.949$, $p < 0.01$).

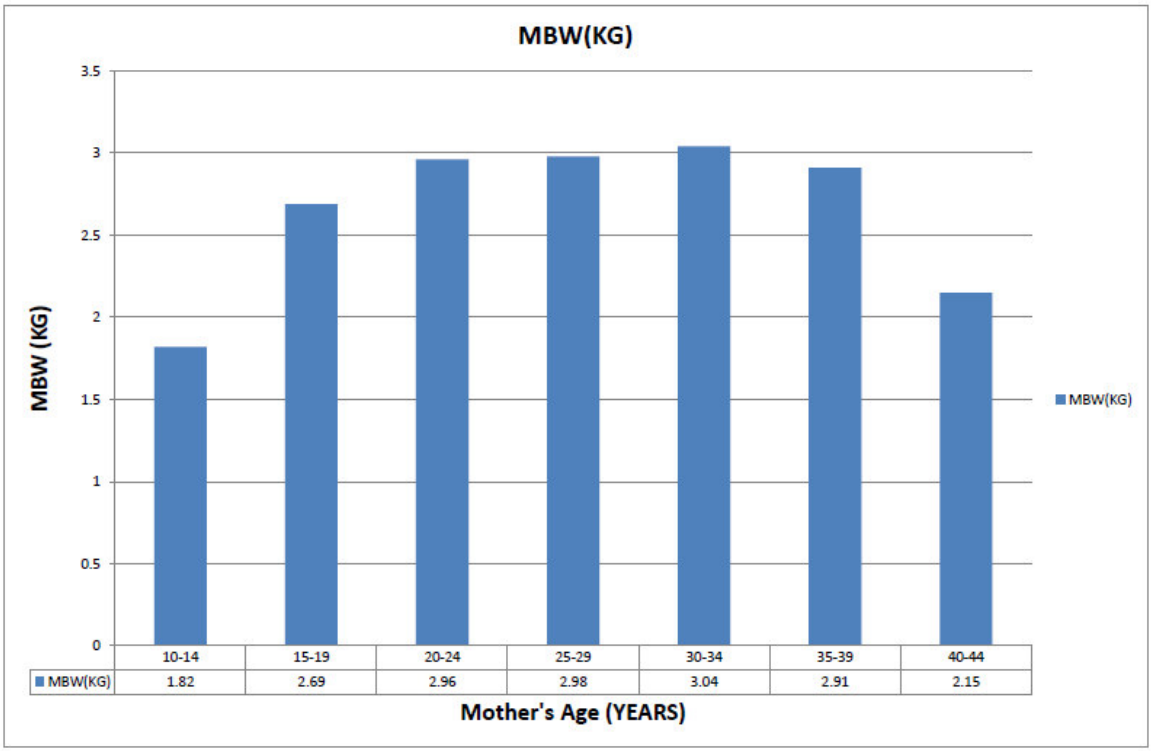


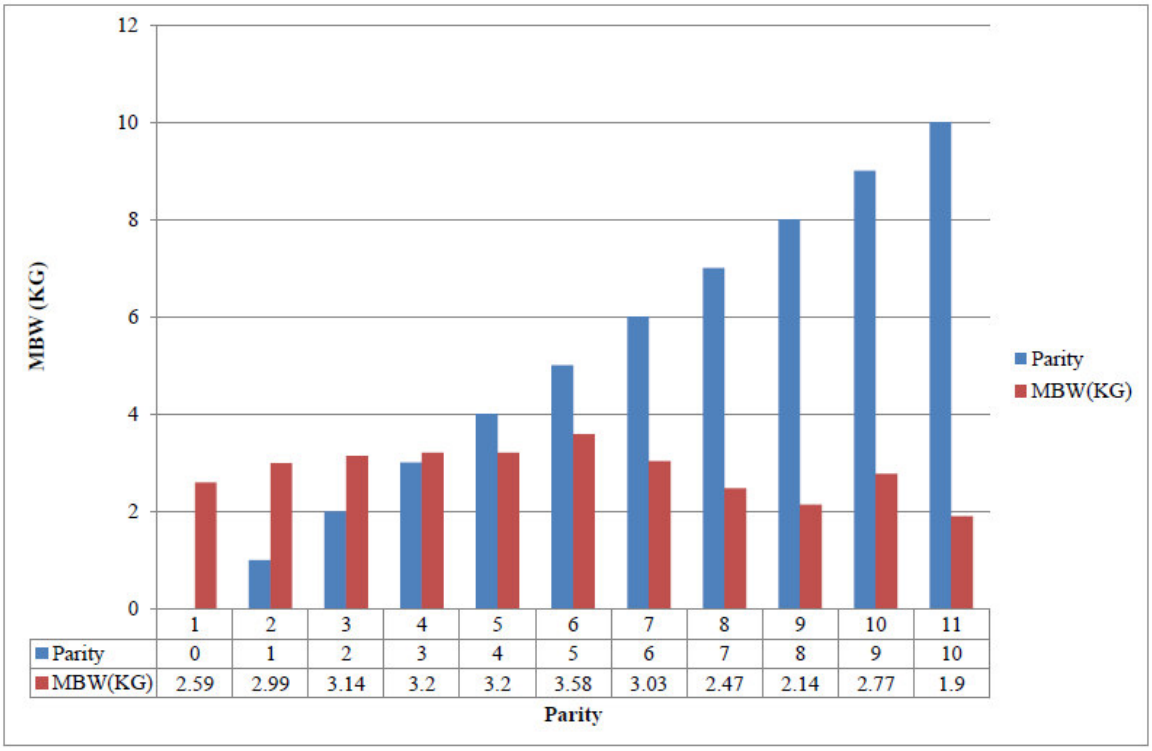
Figure 3.2. Showing distribution of birth weight in relation to mother's age.

Table 3.3. Distribution of Birth Weight in Relation to Parity

Parity	BIRTHWEIGHT (KG) 0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
0	1	2	5	11	13	9	6	-	-	47	2.59
1	-	-	3	6	11	11	10	2	-	43	2.99
2	-	1	-	-	6	12	7	-	-	26	3.14
3	-	-	-	1	3	7	5	-	-	16	3.20
4	-	1	-	-	2	4	5	1	-	13	3.20
5	-	-	-	-	2	2	6	1	1	12	3.58
6	-	-	1	1	1	1	1	1	-	6	3.03
7	-	1	3	2	2	1	-	-	-	11	2.47
8	-	1	3	2	2	1	-	-	-	9	2.14
9	-	-	1	2	1	1	2	-	-	7	2.77
10	1	1	2	5	1	-	-	-	-	10	1.90
Total	3	7	16	31	43	50	43	5	2	200	2.82

The MBW increases with parity up to parity of 5 after which it begins to decline. The maximum MBW

is attained by those mothers with parity of 4 and 5. Table 3.3 results indicated that there is a statistical significantly perfect positive relationship between birth weight of the babies and the parity of mothers ($r = 1.00$, $p < 0.01$).



	1	2	3	4	5	6	7	8	9	10	11
Parity	0	1	2	3	4	5	6	7	8	9	10
MBW(KG)	2.59	2.99	3.14	3.2	3.2	3.58	3.03	2.47	2.14	2.77	1.9

Figure 3.3. Showing distribution of birth weight in relation to Parity.

Table 3.4: DISTRIBUTION OF BIRTH WEIGHT IN RELATION TO DURATION OF PREGNANCY

	BIRTHWEIGHT (KG)										
Duration (weeks)	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
36	1	1	3	3	7	5	3	1	-	24	2.53
37	1	2	2	5	11	7	7	-	-	35	2.73
38	-	3	1	5	10	11	10	1	1	42	2.96
39	-	-	3	8	7	12	12	1	-	43	2.99
40	1	-	6	8	5	14	9	2	-	45	2.86
41	-	1	1	2	3	1	2	-	1	11	2.99
Total	3	7	16	31	43	50	43	5	2	200	2.81

Table 3.4: shows that the MBW increases with each completed weeks of pregnancy up to week 39 after which it starts declining, post-term. The MBW of mothers that delivers at <36 weeks of pregnancy is the lowest. The result indicated that there was a statistical significant strong positive relationship between birth rate and pregnancy duration ($r = 0.988$, $p < 0.01$).

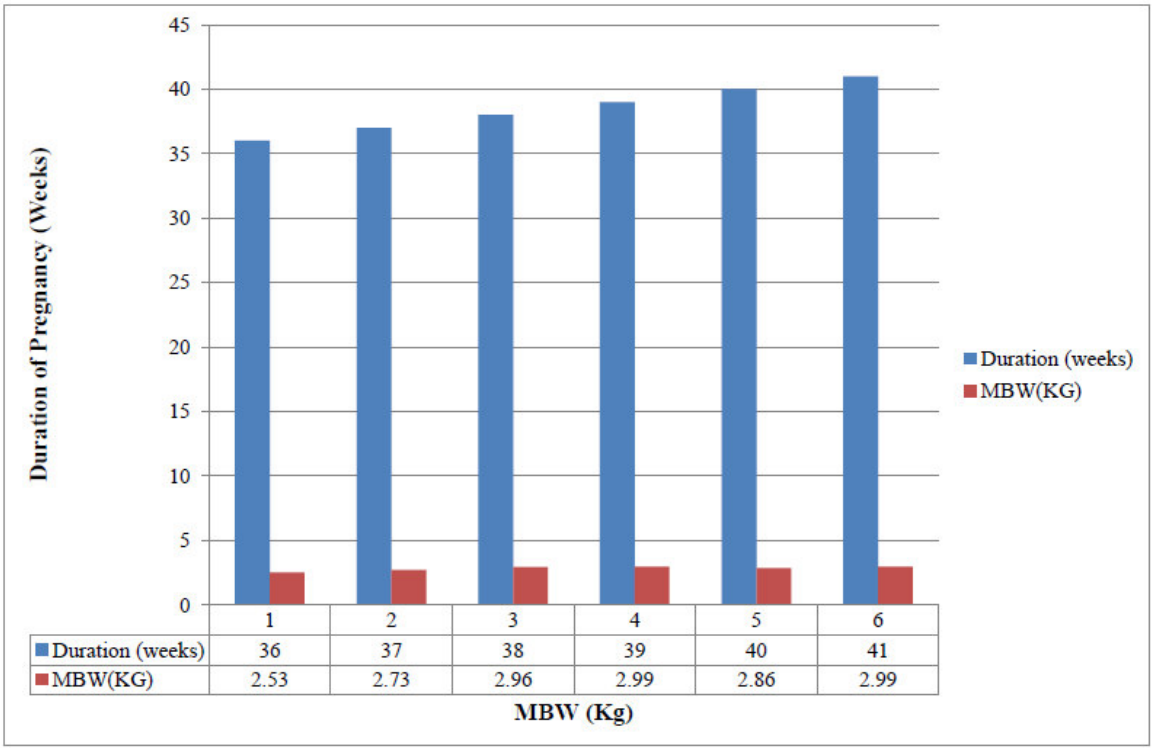


Figure 3.4. Showing distribution of birth weight in relation to duration of pregnancy.

TABLE 3.5 DISTRIBUTION OF BIRTH WEIGHT IN RELATION TO ETHNIC GROUPS

	BIRTHWEIGHT (KG)										
Ethnic group	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
Kanuri	2	3	7	15	24	18	12	2	1	841	2.74
Hausa	-	2	5	3	5	3	2	1	-	21	2.48
Yoruba	-	1	1	2	4	5	3	1	-	17	2.91
Igbo	-	-	1	3	4	9	8	1	1	27	3.20
Others	1	1	2	8	6	15	18	-	-	51	3.01
Total	3	7	16	31	43	50	43	5	2	200	2.87

Table 3.5 shows that MBW of babies born to Hausa mothers was 2.48g which was low birth weight. Babies born to Yoruba families have 2.91kg as their MBW while those from Igbo families had the highest MBW of 3.20kg. Other members of the community have babies with MBW of 3.01kg.

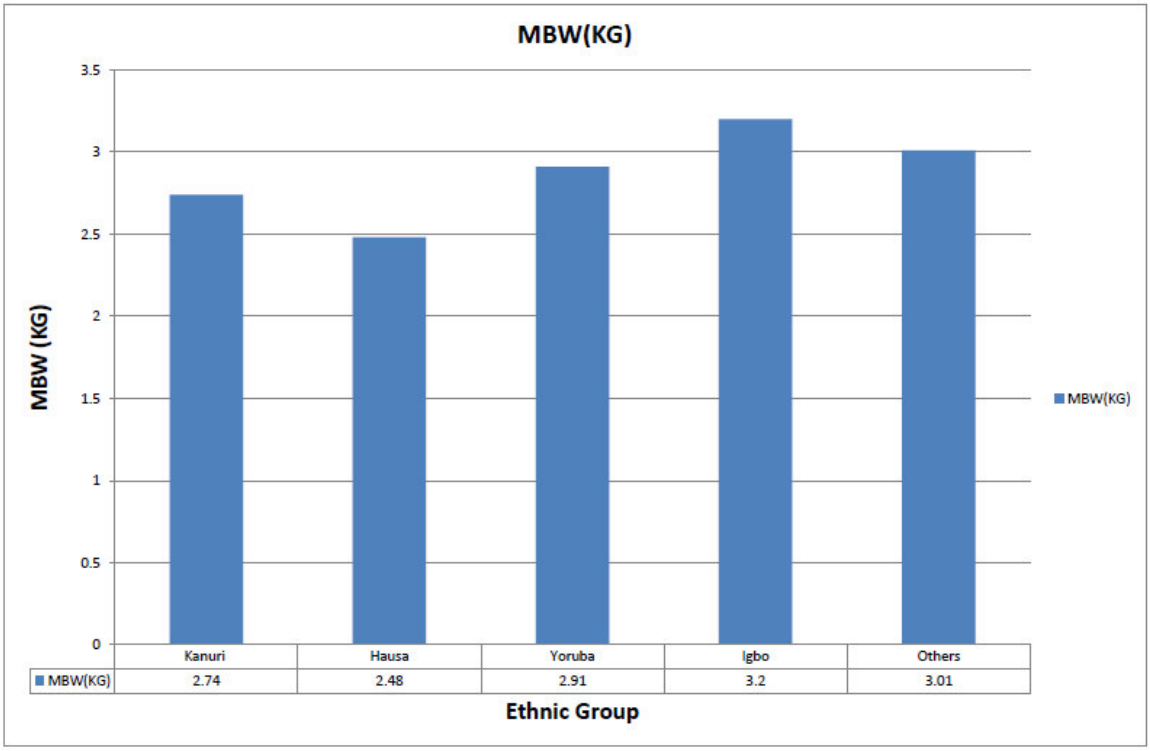


Figure 3.5. Showing distribution of birth weight in relation to Ethnic Group.

TABLE 3.6 DISTRIBUTION OF BIRTH WEIGHT IN RELATION TO MATERNAL HEALTH CONDITION DURING PREGNANCY

	BIRTHWEIGHT (KG)										
Health condition	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
Well	-	-	2	13	24	33	27	2	-	107	3.20
Anaemia	1	2	6	9	11	8	6	-	-	43	2.57
TOP	-	-	1	2	5	5	4	-	-	17	2.96
SCD	1	2	3	2	-	2	2	-	-	12	2.20
Diabetes	-	-	-	-	-	-	2	3	2	7	4.20
Malaria	1	3	4	5	3	2	2	-	-	20	2.20
Total	3	7	16	31	43	50	43	5	2	200	2.89

TOP: Toxaemia of pregnancy
SCD: Sickle cell disease

Table 3.6 shows that the MBW of babies born to mothers who had no health problems during pregnancy was 3.20kg which was more than those babies born to mothers with sickle cell disease and malaria which was 2.20kg and was the lowest. The MBW of babies born to diabetic mothers was 4.20kg which was termed as macrosomic for the babies.

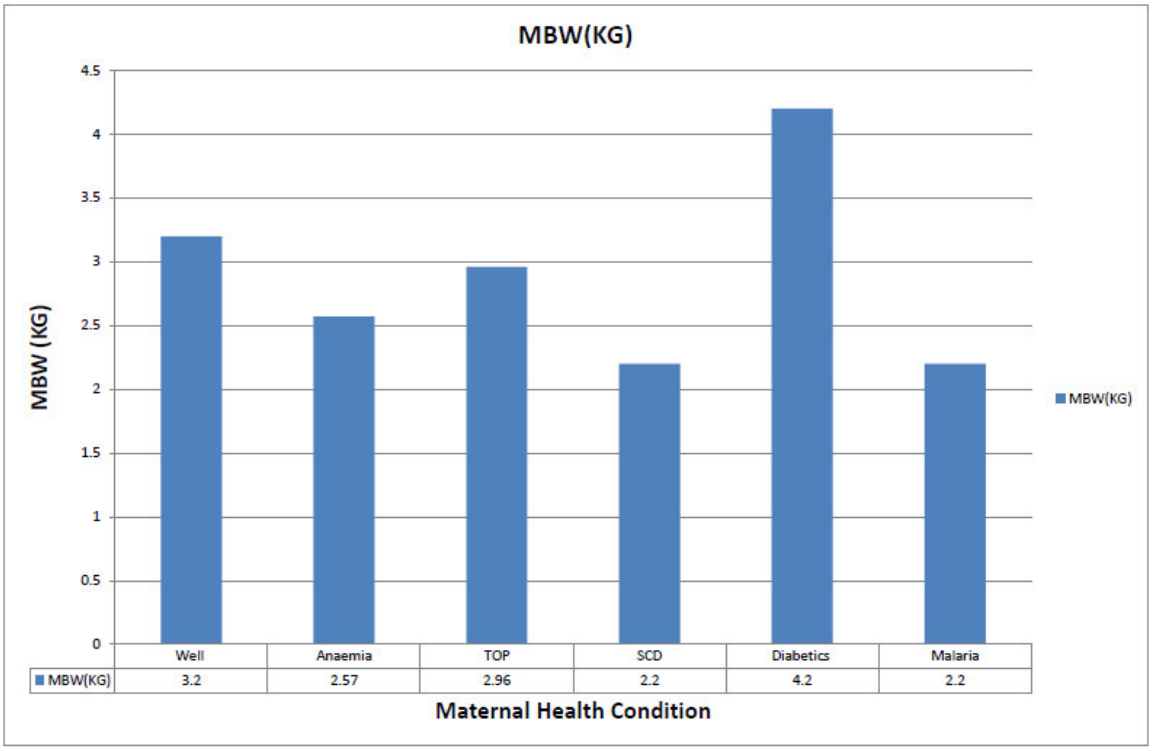


Figure 3.6. Showing distribution of birth weight in relation to maternal health condition.

3.7 BIRTH WEIGHT AND ANTENATAL CARE UTILIZATION

With good attendance of antenatal care (ANC), the MBW tend to increase because of adequate and appropriate care. But mothers with poor attendance stand the risk of giving birth to low weight babies.

TABLE 3.7 DISTRIBUTION OF BIRTH WEIGHT IN RELATION TO UTILIZATION OF ANTENATAL CARE (ANC)

	BIRTHWEIGHT (KG)										
ANC attendance frequency	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	F	MBW(KG)
Not booked	2	4	6	9	6	6	3	-	-	36	2.30
Poor (1-3)	1	1	4	8	11	9	7	-	-	41	2.70
Average (4-6)	-	1	2	6	13	15	14	2	-	53	3.04
Good (7-9)	-	1	3	5	10	18	18	1	1	57	3.11
Excellent (10)	-	-	1	3	3	2	1	2	1	13	3.05
Total	3	7	16	31	43	50	43	5	2	200	2.84

The MBW of babies born to unbooked mothers was lower than those that were booked and the MBW of the babies tended to increase with increase in frequency of attendance.

Table 3.7 result indicated that there was a significant difference between the mean birth weight of babies of unbooked mothers and those of mothers who had received good antenatal care ($P<0.01$).

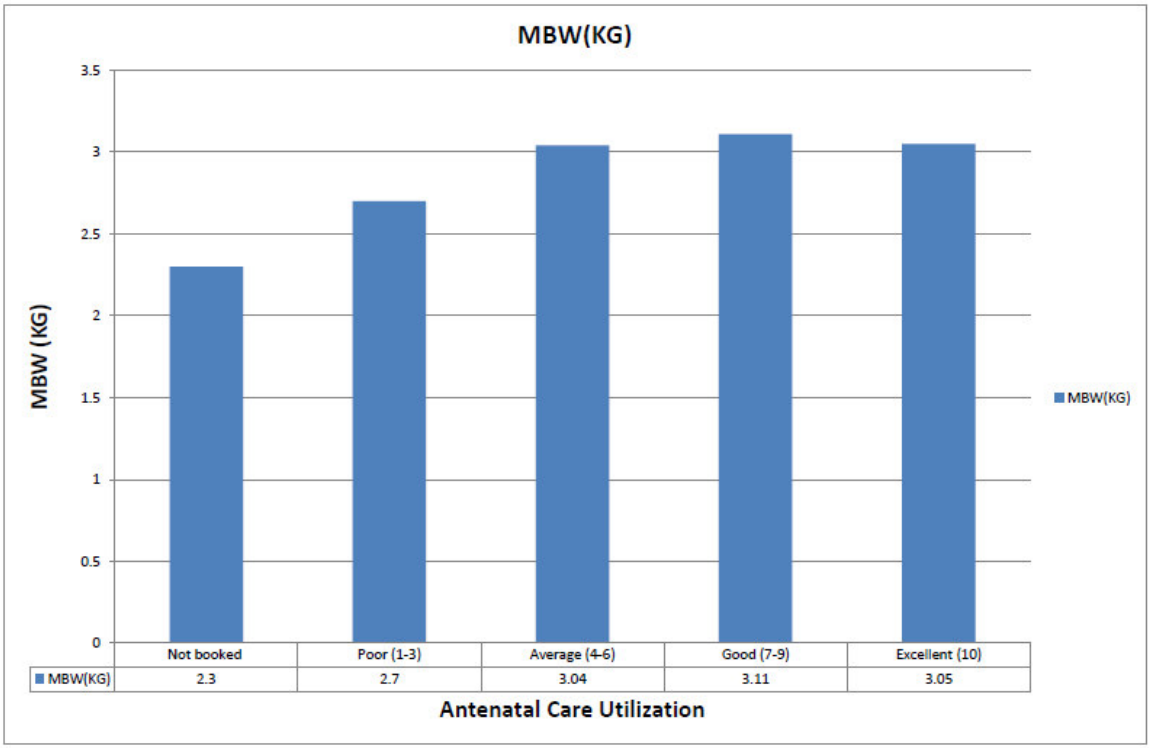


Figure 3.7. Showing distribution of birth weight in relation to antenatal care utilization.