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SCHOOL OF PUBLIC HEALTH

UNIVERSITY OF GHANA

DISSERTATION ON

THE MAJOR RISK FACTORS ASSOCIATED WITH HIGH LOW BIRTH WEIGHT (LBW) RATE IN THE BUILSA DISTRICT



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SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILLEMENT FOR THE AWARD A MASTER OF PUBLIC HEALTH DEGREE

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TOPIC:

STUDY OF THE MAJOR RISK FACTORS ASSOCIATED WITH HIGH LOW BIRTH WEIGHT (LBW) RATE IN THE BUILSA DISTRICT

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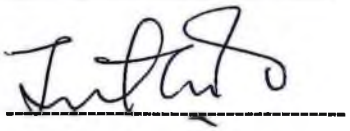
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DECLARATION

I declare that this dissertation has been the result of my own field research, except where references are cited; and that it has neither been submitted towards the award of any degree nor is it being submitted concurrently in candidature for any other degree.

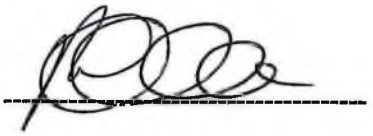
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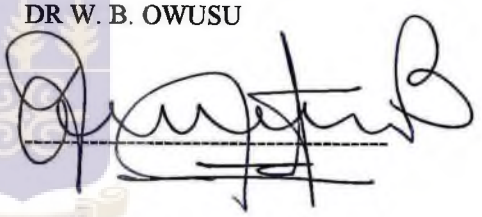


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DEDICATION

This work is dedicated to my dear mother who passed away when I was on the second draft of this report. May her soul find solace in the hands of the Almighty and Merciful Father in the name of our Lord and Saviour Jesus Christ.

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ACRONYMS

ANC	Antenatal Clinic
BMI	Body Mass Index
CBDP	Community Based Development Programme
CED	Chronic Energy Deficiency
DDHS	District Director of Health Services
DHMT	District Health Management Team
GDHS	Ghana Demographic and Health Survey
GMNS	Growth Monitoring and Nutrition Surveillance
IDD	Iodine Deficiency Disorders
IUGR	Intra Uterine Growth Retardation
LBW	Low Birth Weight
MCH	Maternal and Child Health
NBW	Normal Birth Weight
OPD	Out Patient Department
UN	United Nations
URTI	Upper Respiratory Tract Infections
WHO	World Health Organisation
WRA	Women in Reproductive Age

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SUMMARY

Low birth weight is a major contributor to perinatal and infant mortality and to problems in subsequent growth and development later in life. Three quarters of neonatal and half of all infant deaths in developing countries and over 80% of infant mortality in industrialised countries are associated with Low Birth Weight (LBW)[1]

The efforts of the Builsa District Health Administration to attain the Ministry of Health national targets of reducing LBW rate to 5% and infant mortality rate to 50%[2] seems far remote if the causes the of high LBW rate in the district are not known.

The main purpose of this study was therefore to determine the major risk factors associated with Low Birth Weight (LBW) in the Builsa district to enable appropriate interventions to be put in place to address them.

A retrospective comparative analysis of 1,077 delivery records covering the period January 1998-June 2000 was carried out in five health facilities rendering maternity services in Builsa district in the Upper East Region of Ghana.

Data on the diet history and workload of 33 mothers who delivered LBW babies and a random sample of 94 of the mothers who delivered Normal Birth Weight (NBW) babies between January and June 2000 was also obtained by questionnaire interviews.

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The main effect variables were age of mother, gestational weight gain, maternal haemoglobin (Hb) level, parity, food intake and workload during pregnancy. The outcome measure was infant birth weight. The relationship between the effect variables among women who delivered LBW babies was compared with those who delivered NBW babies.

The results confirmed high LBW rate in Builsa, the main causes of which appeared to be teenage deliveries, low Hb level (<10.0g/dl) during pregnancy, poor gestational weight gain and primiparous deliveries.

Conclusion: Improvement in the risk assessment of pregnant women and the content of nutrition education during antenatal services as well as monitoring of female adolescent and maternal nutrition are required to reduce the high LBW rate in the district.
Further studies are needed to investigate the contribution of observed high proportion of teenage deliveries and women with high workload during pregnancy to the high LBW rate in the district.

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CHAPTER 1

1.0 INTRODUCTION

Birth weight is the most important determinant of perinatal and infant mortality and morbidity and may also have an influence on health in adult life[3] Low Birth Weight (LBW), defined as birth weight <2500 grams, is therefore a major health problem in developing countries[4] Three quarters of neonatal and half of all infant deaths in developing countries and over 80% of infant mortality in industrialised countries are associated with low birth weight. A high proportion of LBW deliveries in developing countries is attributable to Intra Uterine Growth Retardation (IUGR) rather than preterm delivery[1]

IUGR demands urgent attention not only because of the significantly increased risks it poses for the infant and young child, but also because it may increase the risk of developing certain diseases later in adult life such as, cardiovascular disease, high blood pressure, obstructive lung disease, diabetes and renal diseases. Infants born with LBW have higher rates of developmental problems, subnormal growth, and health problems than other children. By school age, children born at low birth weight are more likely to have mild learning disabilities, attention disorders, developmental impairments, and breathing problems.[5]

IUGR also reinforces the inter-generational cycle of malnutrition, poverty and disease with enormous cost in terms of failed and unachieved human and socio economic development potential.[6]

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As young child deaths from infectious and parasitic diseases decline, the problem of low birth weight has become the principal barrier to child survival especially in developing countries.
In 1991, low birth weight was designated by the World Health Assembly as an indicator for monitoring progress towards the achievement of health for all by the year 2000[7]
A reduction of the incidence of Low birth weight to less than 10% of births is one of the goals that the United Nations World summit on children adopted in 1990.[8]

Many studies have been carried out comparing the characteristics of mothers whose babies have IUGR with those whose babies have appropriate weights for their gestational age and concluded that the relative importance of the various risk markers in determining birth weight varies between populations and communities with a considerable problem of confounding[9]
This study will attempt to identify the major factors associated with LBW in the Builsa district to enable effective targeting of interventions to address the problem.

Maternal and Child Health (MCH) reports for 1999, in the Builsa District showed that LBW rate of 13.6%[10] Low birth weight rate in the Builsa district in 1999 was higher than those recorded for West Africa (11.0%), Asia (12.3%), and Latin America (6.5%) in the same year.[7]
The rate in Builsa district is also higher than the World Health Organisation's cut-off of 10% for considering a place, as having a public Health problem with respect to Low Birth Weight.
Low Birth Weight rate in Ghana in general in 1999 was 8%.[11]

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Even though LBW rate in the district is high, its causes and implications for child growth and survival are not known because data collected at the health facility level on LBW is not often critically analysed and interpreted. This situation leaves the health workers themselves who collect the data less informed about the LBW problem and its causes as such no attempts are made to address this problem.

High LBW rate has severe consequences for maternal and child health and survival. The risk of a low birth weight baby dying during late pregnancy, delivery and the first week postpartum has been reported to be 30 times higher than for infants with normal birth weight.[12] Hence the need to address the problem of high LBW rate in Builsa.

Identifying and addressing the causes of the current levels of LBW in the Builsa district, will contribute to the achievement of one of the goals of the Ministry of Health's Medium Term Strategy of reducing infant and child mortality thus helping to promote the future development of the district.

The main objective of the present study was to determine the major risk factors associated with Low Birth Weight (LBW) deliveries in the Builsa district.

The specific objectives were to:

1. Determine the Prevalence of Low birth Weight Rate (LBW) at health facility level in the Builsa District
2. Assess maternal demographic and anthropometric factors influencing low birth weight.

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3. Assess obstetric factors influencing LBW rates
4. Assess the service-related factors influencing LBW
5. Determine work and diet related factors associated with LBW

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CHAPTER 2

2.0 LITERATURE REVIEW

Low birth weight is defined as "the weight at birth of less than 2,500g (up to and including 2499g) irrespective of gestational age"[13]

The LBW rate in developing countries is reported to be 11.0%. In West Africa, LBW rate of 11.4% has been reported while rates of 14.9%, 12.3 %, 6.5% and 9.8% are recorded in Middle Africa, Asia (excluding Japan), Latin America and the Caribbean and Oceania (excluding Australia and New Zealand) respectively[7]

A recent United Nation's (UN) report indicated that thirty million new borns each year are born with low birth weights. The report went further to state that current UN and national policies were not sufficient to stem the problem of malnutrition and a radical approach is needed to prevent generations of children suffering from impaired physical and mental development and chronic diseases caused by low birth weight and malnutrition.[14]

Low birth weight may result from retarded intra uterine growth or from preterm deliveries (gestation <37 weeks). Infants who have experienced Intra Uterine Growth Retardation (IUGR) may be disproportionate or wasted or thin with normal length and head circumference and appear to exhibit greater postnatal catch-up and less cognitive defects than stunted infants[15]

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IUGR infants may also be proportionate or stunted with proportional reductions in weight, length and head circumference and exhibit higher rates of neonatal morbidity and neonatal and perinatal mortality[9]. Pre-term deliveries occur either spontaneously or as a result of premature rapture of the membranes or are medically induced

The causal factors associated with LBW (Appendix 5) could be classified into the following categories:

I. Demographic factors including the age of the mother, the educational status of the mother as well as her marital status can influence the birth weight of babies.

II. The 1999 annual report of the Maternal and Child Health unit in the Builsa district shows an increase in the rate of teenage deliveries over the previous year 1998, which needs to be investigated to establish to what extent this contributes to the observed levels of LBW in the district.

III. Nutritional factors such as the pre pregnancy weight and height (which indicates level of Chronic Energy Deficiency, CED) of the mother, the weight gain during pregnancy and the food intake including micronutrients by the mother during pregnancy also contribute to the occurrence of LBW.

IV. Some obstetric and health factors are known to contribute to LBW. Such factors include the reproductive burden of women due to deliveries that are too close, too many, at too young or too old an age. The disease burden and other conditions of a

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mother during pregnancy may also lead to LBW through premature delivery or retarded intrauterine growth of the foetus. Diseases that are known to impact significantly on LBW include, malaria, TB, HIV/AIDS, rubella, diabetes and chronic hypertension. Anaemia, which may accompany some diseases, is also known to impact on low birth weight[9].

V. Socio-cultural factors such as heavy workload of women in society, age at marriage, restrictions on food intake during pregnancy and stressful situations experienced by the mother as a result of her low status in society are important as well in causing LBW. In the Builsa district like other districts in the Upper East Region, women's workload is increasingly becoming important, as most mothers have to work harder to support their husbands on the farm or cater for families they now head. In addition, they have to walk longer distances to fetch water and fire wood that are getting scarcer as a result of increased environmental degradation.[16]

VI. Health service factors such as the coverage and quality of antenatal care may have an indirect effect on LBW in a number of ways including inadequate knowledge of the mother on maternal nutrition, absence of mechanisms for prompt identification and treatment of illness in pregnant women and the identification of risk pregnancies and failure to take early interventions to improve pregnancy outcomes. Other factors may include failure to deliver prophylaxis against malaria and supplementation of pregnant women with haematinics such as iron and folic acid.[17]

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2.1 Factors related to maternal nutrition

It has been observed in both developing and developed countries that women who are heavier before pregnancy deliver heavier babies[9] Pre-pregnancy weight can be used to predict low birth weight. Studies in the USA showed that women with pre-pregnancy weight of 59kg were more than twice as likely to have low birth weight infants when compared to women with pre pregnancy weight of more than 59kg. Many researchers have found that using pre-pregnancy weight of less than 40kg is a useful cut-off point to predict women who will deliver low birth weight babies[9]

A study in the United Kingdom found that birth weight and maternal nutrient intake during the third trimester, especially for 10 micronutrients, was significantly correlated for new borns weighing under the median (3270 g)[9]

Other negative birth outcomes have been associated with inadequate intake of certain micronutrients in early pregnancy. Folic Acid deficiency in the first trimester for instance has been associated with neurological defects. Hackney Hospital in 1991 found that trace elements in foetal tissue and blood correlate with infant weight and head circumference at birth[9]

A study in the UK found that inadequate maternal micronutrient and fibre intakes early in pregnancy were more important in determining low birth weight than low protein and energy intake[9] In this study, women had intakes of fibre and ten of the micronutrients (riboflavin,

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niacin, pyridoxine, thiamine, folic acid, iron, magnesium, phosphorous, calcium, and zinc) that were more than 20 % below the reference requirements.

Hackney Hospital again found that essential fatty acids, needed for neural tissue growth, in foetal tissue and blood correlate with weight and head circumference of the infant at birth.

Two large studies in the industrial world involving over 100,000 pregnancies clearly indicate that favourable pregnancy outcomes are less frequent among anaemic mothers[9] Both studies found higher rates of foetal deaths and abnormalities, premature deaths and low birth weight newborns among anaemic mothers. These risks were evident even among mothers who had anaemia only in the first pregnancy. Significant correlation between the severity of anaemia, premature birth and low birth weight were very evident.

The causality of anaemia in these undesirable pregnancy outcomes has been established further by studies that show the positive results obtained in birth weight and perinatal deaths by the successful treatment of anaemia with iron and folic acid. For example, low birth weight (less than 2500g) was reduced from 50% to 7% and perinatal mortality dropped from 38% to 4% in a study in Nigeria. At the population level, low birth weight rate greater than 10 percent indicates a high prevalence of malnutrition among women of reproductive age[9]

2.2 Physical and Reproductive stress

Reproductive burden of women in Africa and many parts of the world may also contribute significantly to the prevalence of LBW. Between the ages of 18 and 45 years, some women in

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sub-Saharan Africa spend as much as 25% of the time pregnant and 65% lactating.[18] This phenomenon of women's problems in the developing countries are characterised by deliveries that are often too early, too closely spaced, too many or too late ("4TOOs").

Women's productive work is on the increase in the last few years compromising further their energy balance leading to Chronic Energy Deficiency (CED), which is known to be an indicator of LBW. In the Upper East region, 14.8% of women were reported to be in chronic energy deficiency with BMI < 18.5, only second to the highest rate of 15.8% in the Western region.[19]

In a study in the Bawku district in the Upper East region in 1996, Ann Whitehead's report of the following accounts given by farmers indicated that women's workload is increasing while their food intake is reducing[16]

"Now women help men a lot on their farms. Before, women were not helping the men, but now they are working harder than men in farming activities and earning their own income".
"Women are now doing serious farming. They have been doing it for 4-5 years".
"Fifteen years ago, women weren't farming and there was enough food. Now even with women farming so much, the hunger is worrying them, - because of poor yields"

Bhatt reported that among the impact of the stress related violence against women in the home, work place and health facilities, is poor obstetric performance including LBW (IUGR and Pre-term delivery), ruptured uterus, anaemia and poor lactation[20]. Coker et al, found that, 66.7% of

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women in Sierra Leone indicated they were victims of violence from a husband or a boyfriend.[21]

2.3 Demographic Factors

Demographic factors such as age of the mother at first birth have been reported to contribute to occurrence of LBW. Births to teenage mothers (15-19 years) are more likely to result in low birth weight babies. The percentage of births contributed by teenage mothers in 1998 in the Upper East region was 14.0% only second to the Eastern region which recorded 21.2%[19]

2.4 Infections

Malaria accounts for 10% of Africa's total disease burden.[22] In sub Saharan Africa, maternal malaria appears to be one of the principal causes of low birth weight among the infants produced during the first and second pregnancies.[23] Other infections such as HIV, syphilis, hookworm, Toxoplasmosis have also been known to affect birth weight. Primary Herpes infection is also known to be associated with IUGR[9,24]

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2.5 Social Factors

Mothers traditionally prefer to give birth to small babies (as they are aware that labour and delivery will be quicker and easier) and in certain communities will go on special diets in the third trimester to ensure a small baby. Social factors are thought to be important, for instance in the United kingdom, there is marked increase in LBW with decreasing social class (measured using the husband's occupation) This association is specific to LBW associated with growth retardation. There is no association between pre-term delivery and social class. There is however an association between pre-term delivery and marital status (unmarried mothers being at increased risk). In France, several studies have shown that mothers in physically taxing employment are at increased risk of preterm delivery, but housewives are also at increased risk [25]

2.6 Emotional factors: Stress, anxiety, self esteem and depression

Life stress, social support and emotional disequilibrium were found to be interrelated but each had separate effects in the life time predicted gestation difficulties, while emotional disequilibrium was associated with complications in the infants health. When life stress and social support were examined together, (that is when stress was present but social support was

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absent) complications were noted in a whole range of outcomes including gestation, labour and delivery and the infant's condition[25].

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CHAPTER 3

3.0 METHODOLOGY

3.1 Study Area

Builsa is one of the six districts in the Upper East Region and lies between longitude 10° 05' W and 10° 30'W and latitude10° 15' N and 10° 50'N. The District has a total land area of 2,205 km^2 and lies within the guinea savannah ecological zone characterised by a unimodal climate.

The district shares boundaries with the Sissala district (in the Upper West region) to the west, West Mamprusi district (in the Northern Region) to the south and the Kasena-Nankana district to the north and east (Appendices 1 & 2). Sharing boundaries with two neighbouring regions has implications for public health and health planning in the district as there is always an influx of diseases e.g. guinea worm from across the borders.

It had a total population of 103,733 people in 1999 projected from the 1984 census. The people in the district are predominantly Builsas (89%), minority groups' form 11% of the population and comprise of Kantosis, Mamprusis, Sissala, Nankana, Mossis and Akans.

The District has one hundred and thirty (130) communities that are grouped into six sub districts for the purpose of health care delivery.

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Malaria accounted for 76% of a total OPD attendance of 64,761 in 1999 while URTI, skin diseases and ulcers and Pneumonia accounted for 11.4% and 9.0% respectively.

The district recorded a total OPD registration of 38,566 (37.2 %) and an attendance of 64,761 (62.4 %)[26].

In 1999, 28.4% of the children under two years in the district were stunted, 15.6 % wasted and 35.3% underweight[27]

More than sixty (60%) percent of economic activity in the district is subsistence agriculture.[28] The vast and fertile oncho-free valleys to the south of the district are used for commercial rice cultivation. Female involvement in agriculture is quite high in the district and may partly account for the heavy workload of women with consequences for their nutritional status and that of their children including incidence of LBW. Traditional practices prevail in the district that restricts the intake of certain foods such as meat, fish and eggs during pregnancy. These practices may tend to act synergistically to worsen maternal nutrition and hence LBW rates since the foods restricted are necessary for the intrauterine growth of the baby and the general health of the mother.

3.2 Study population

The delivery records of total of 1,077 women in five health facilities in the Builsa district between January 1998 and June 2000 were collected and analysed. Out of the 1,077 women,

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277 delivered between January and June 2000. Thirty five (35) of these mothers who had low birth weight deliveries were all selected to be interviewed. Of the remaining 242 mothers who had normal deliveries, 100 were randomly selected and interviewed.

3.3 Study design

A retrospective comparative study design was used to collect and analyse data on the antenatal and delivery records of a sample of mothers of normal and low birth weight children born in between January 1998 and June 2000 in five health facilities in the Builsa district where maternity services are rendered, Sandema hospital, Chuchuliga, Wiaga, Fumbisi and Siniensi health centres.

Data on the diet history and workload of mothers who delivered between January and June 2000 was obtained by questionnaire interviews.



The main effect variables were mother's nutritional factors (gestational weight gain and food intake), workload and mothers health during pregnancy as well as age at last delivery, parity and birth interval. The outcome measure was infant birth weight. The relationship of the effect variables among women who delivered Low Birth Weight (LBW) babies was compared with those who delivered Normal Birth Weight (NBW) babies in 1,077 mother-child pairs.

A checklist was used to extract information from the antenatal and delivery records of the mothers. Hb level, age at last delivery, weight gain and illness history during pregnancy,

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number of children and their spacing and the birth weight of their last children were recorded. A questionnaire was used to collect information from the mothers on their food intake and workload during pregnancy. To minimise the effect of recall bias, information on food intake and workload was restricted to mothers who delivered in the last six months (January to June) of the year 2000.

3.4 Study units

The units of the study included:

- A mother of a baby born Between January 1998 and June 2000 in 5 health institutions in the Builsa
- A baby born in five health facilities in the same period in the district

3.5 Sample size

A total of 1,077 delivery records were reviewed at the following five health facilities in the district; Sandema hospital, Fumbisi Health centre, Wiaga clinic, Chuchuliga Health centre and Siniensi clinic.

A total of 277 mothers who delivered (242 delivered NBW babies and 35 delivered LBW babies) between January and June 2000 in the same facilities, constituted the sampling frame for field interviews.

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Thirty-three (33) out of 35 mothers who delivered low birth weight babies in these facilities between January and June 2000 were recruited and interviewed; two of these mothers could not be traced. Of 242 mothers who delivered normal birth weight babies in the facilities within the same period, 100 were randomly selected but only 94 could be traced and interviewed. The mothers were traced to their houses and interviewed.

Fifty two (52) delivery records were included in the 1077 delivery records used for analysis because they were either twin deliveries, stillbirths or neonatal deaths.

3.6 Sampling technique

Information on 1077 deliveries recorded in the delivery registers between January 1998 and June 2000 at all the five facilities covered were included for analysis. All Mothers who delivered low birth weight babies between January and June 2000 were recruited and interviewed. Out of 242 mothers who delivered normal birth weight babies within the same period, 100 were selected using systematic sampling techniques with a sampling interval of 2 and interviewed.

3.7 Data collection

Data collection was in two parts:

- Review of existing data from maternity records and antenatal registers

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- Interview of mothers

3.8 Ensuring data quality

A total of six (6) field assistants were recruited and trained on data collection and interview techniques The questions were translated from English to Buili and retranslated back to English during the training to ensure that they were asked in Buili the way they should. This was to minimise errors due to the way the questions were asked. The field assistants were drawn from the volunteer corps of the Red Cross Society of the Builsa district. The volunteers were Senior Secondary School graduates who had been involved in mobilising communities for relief operations and first aid training.

During the data collection, on the spot checks were made to ensure that sampling procedures, the study protocol and appropriate interview techniques were strictly adhered to. Editing of completed questionnaires and forms was made on the field and errors corrected before they were returned for entry. Community entry protocols were observed to obtain the maximum co-operation of community members.

3.9 Data analysis

EPI info version 6 was used to create a questionnaire for data collection, data entry and analysis.

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The following statistical measures were calculated:

- Means
- Percentages
- Frequency distributions
- Comparing LBW rates among women with the selected effect variables with rates among those who were not exposed to the selected variables.

Mantel Haenszel chi-squared techniques were to measure the statistical significance of any differences observed in the rates at 0.05 p level.

3.10 Information dissemination

Preliminary findings were presented at the second quarter review meeting of DHMT with attendance of the sub district staff. Comments and suggestions made at this meeting were taken into account in coming out with this final report.

3.11 Ethical issues

The study was approved by the School of Public Health, the Regional Health Administration of the Upper East Region, the District Health Administration and District Assembly of the Builsa district where it was carried out. For all the mothers who were interviewed, the objectives of the study were carefully explained to them and their consent obtained before the interviews

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were conducted. They assured that information obtained from them will be treated confidentially and used only for the purpose of the study. They were also made aware that no health service will be withheld if they declined to participate. Information was given on optimal breastfeeding practices and immunisation to mothers who participated.

3.12 Limitations of the study

One weakness of the study, which is retrospective and facility-based, is that data on birth weight and other related factors may be biased towards a select group who had access to the facilities due to the following reasons:

- Proximity to the facilities
- Access to information on benefits of services provide at health facilities
- Ability to meet the cost of health care
- Pathological pregnancy or bad previous obstetric history

A general weakness of retrospective, hospital-based studies has been noted to include the inherent selection of premature deliveries and of mothers with a pathological pregnancy or bad previous obstetric history and other biases[29,30,31]

Another weakness was the quality of facility-based data with respect to completeness and uniformity, which makes comparison sometimes very difficult. Data on maternal height was

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not available at the facilities and could not be obtained on the field due to lack of equipment at the time of the study. This made it impossible to obtain information on the Body Mass Index (BMI) of mother, an indicator of prepregnancy nutritional status.

3.12.1 Maternal recall bias

Self reported data were used to seek information on workload, food intake, level of education and marital status over a period of six months, which were included in the analysis in this study. These variables, except for marital status and educational level, may introduce some degree of maternal recall bias or differentials in how mothers remembered their prenatal care experiences. At the time of the study there was no previous data available to enable a systematic assessment of the influence of these measurement biases.

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CHAPTER 4

4.0 RESULTS

4.1 Demographic characteristics

Information on the demographic characteristics of the mothers, their husbands and infants collected in the study is presented in table 1 below. Maternal demographic characteristics included age, marital status, Number of children and level of education. Information on the educational level of husbands of the mothers and the sex of their infants was also obtained.

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Table:1 Distribution of selected demographic characteristics of 1077 mothers, their husbands and infants included in a LBW study in the Builsa district

Maternal demographic characteristics	Number	Percentage	Mean (SD)
Age of mother			26 (6)
15-19	157	19.0	
20-34	578	69.6	
35-49	95	11.4	
Total	830	100.0	
Educational level of mother			
No school	70	55.1	
Prim/Mid/JSS	34	26.7	
SSS/Equiv/ above	23	18.1	
Total	127	100.0	
Educational level of father			
No school	62	50.4	
Prim/Mid/JSS	23	18.7	
SSS/Equiv/ above	38	30.9	
Total	123	100.0	
Marital Status			
Married	125	98.4	
Divorced	1	0.8	
Single	1	0.8	
Total	127	100.0	
Number of children			2
Primiparous	366	34.5	

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1-4	585	55.2	
5-9	109	10.3	
Total	1060	100.0	
Sex of infant			
Male	556	52.1	
Female	512	47.9	
Total	1068	100.0	
Weeks of gestation			36 (2)
<37	335	44.1	
≥37	425	55.9	
Total	760	100.0	
Birth interval			5 (2)
<2 years	1	1.2	
2-5years	59	72.0	
6-12years	22	26.8	
Total	82	100.0	

4.1.1 Mother's Education

Out of 127 mothers interviewed, 55.1% never went to school while 26.7% had either primary school or secondary education. Those who attained senior secondary or equivalent level or university education constituted only 18.1%. There was no significant difference between low

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birth weight babies born to educated mothers and those who had not attended school before (P-value 0.122, table 2a).

4.1.2 Husband's Education

Mothers who were interviewed were also asked about the educational level of their husbands. The 123 mothers who responded to this question, indicated that 50.4% of their husbands never went to school. About nineteen (18.7%) percent attended Primary or JSS while 30.9% had SSS education or equivalent or higher. Similar to mother's educational level, the study did not find any significant association between father's educational status and the incidence of LBW (P-value 0.446, table 2a).

4.1.3 Sex of baby

Of a total of 1068 delivery records where the sex of the babies was indicated, 512 were Female and 556 male. Out of a total of 153 LBW deliveries with sex indicated, 79 (51.6%) were female while 74 (48.4%) were male. The difference in LBW rate between the sexes was not statistically significant (P-value 0.323, table 2a).

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4.1.4 Duration of pregnancy and birth weight

Of a total of 1077 birth records examined, 652 or 60.5% were pregnancies with a gestational age less than 37 months while 425 were of a gestational age of 37 months and above.
107 or 16.4% of the mothers who had gestational age less than 37 weeks delivered LBW babies while 51 or 13.6% out of 374 mothers whose gestational age was above or equal to 37 months delivered LBW babies.

The difference in LBW rate between mothers with gestational age below 37 months and those 37 months and above was not statistically significant.

4.1.5 Age of mothers

Only 830 out of the 1077 records examined had their ages specified in the delivery registers in the health facilities. Records of 257 mothers who delivered at the Wiaga Clinic did not have information on the age of the mothers.

The mean age of the 830 mothers was 26 years (SD= 6), the youngest woman was 15 years old and the oldest 49 years. The modal age was 20 years.

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About nineteen percent (19.0%) or 158 deliveries out of 830 recorded in the five health facilities (Sandema Hospital, Fumbisi Health Centre, Wiaga, Chuchuliga and Siniensi Clinics) were by mothers between the ages of 15-19 years. Of the babies delivered to mothers 15-19 years, 41 or 25.9% were LBW babies while 117 were NBW babies. There was significant difference in LBW rates between teenagers and older mothers (P = 0.004). Teenage deliveries therefore appear to be contributing to the high LBW rate in the Builsa district.

Teenage delivery	Low Birth Weight		**Total**
	Yes	No	
Yes	**41**	108	**149**
No	117	564	**681**
Total	**158**	**672**	**830**

P-Value = 0.004

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Table 2a: Selected characteristics and birth weight of infants in Builsa District (Jan. 1998-June 2000)

Characteristics	NBW	LBW (%)	Total (%)	P-value
Parity				0.0002
Multi. (>1)	627	84 (53.2)	711 (66.0)	
Prim. (1)	292	74 (46.8)	366 (34.0)	
Total	919	158(100.0)	1077(100.0)	
Hb level				0.0213
≥10.0g/dl	38	3 (7.3)	41 (45.6)	
<10.0g/dl	35	12 (25.5)	47 (53.4)	
Total	73	15 (17.0)	88 (100.0)	
Gestational weight gain				0.0056
≥4.0kg	46	6 (18.2)	53 (40.9)	
<4.0kg	48	27 (81.8)	73 (59.1)	
Total	94	33(100.0)	127 (100.0)	
Health facility				
Sandema Hosp.	486	127 (80.4)	613 (56.9)	
Fumbisi H/C	112	15 (9.5)	127 (11.8)	
Wiaga Clinic	230	8 (5.1)	238 (22.1)	
Chuchuliga H/C	61	7 (4.4)	68 (6.3)	
Siniensi Clinic	30	1 (0.6)	31 (2.9)	
Total	919	158 (100.0)	1077 (100.0)	

Percentages in parenthesis

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Table 2b: Factors that did not appear to be associated with LBW in the Builsa district

CHARACTERISTICS /EXPOSURE	NUMBER	NOT EXPOSED WITH LBW	EXPOSED WITH LBW	P-VALUE
Illness during pregnancy	Ill 54 Not ill 76 **Total 127**	21	12	0.607
Father's education	No education 65 Some education 62 **Total 127**	15	18	0.446
Mother's education	No education 70 Some education 57 **Total 127**	11	22	0.122
Received help in household chores	Yes 89 No 38 **Total 127**	6	25	0.266
Sex of baby	Male 512 Female 556 **Total 1068**	Male 74	Female 79	0.323

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4.1.6 Parity and LBW

Of a total of 1077 records examined with information on parity, it was noted that the highest number of children borne by a single woman was 9, the mean parity was 2, modal parity was 0. 34.5% (366) of mothers were having their first delivery while 18.7% had delivered one child each.

Of a total of 366 mothers who were primiparous, 74 0r 20.2% had LBW deliveries while 292 or 79.8% (table2) had NBW. The difference in LBW rate between primiparous and multiparous women was significant (p =0.0002). There was also significant difference between the LBW rate in women with parity less than two (2) and those with parity above two (2) (p= 0.0037) table 3. This shows that women who are pregnant for the first time (primiparous) or have delivered once have a higher risk of delivering low birth weight babies in the Builsa district than those who have delivered two or more times (multiparous).

Table 3: Parity of mothers and birth weight of infants in Builsa,

Parity	NBW	LBW (%)	Total
≥2	440	56 (35.4)	**496 (46.1)**
<2	479	102 (64.6)	**581 (53.9)**
Total	**919**	**158 (100.0)**	**1077(100.0)**

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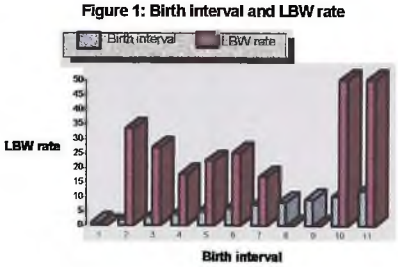
There was however no significant difference in LBW rate between women with parity less than four (4) and greater than four (4). By the risk approach to maternal care, any pregnancy with parity greater than 4 is considered a risk factor influencing pregnancy outcome.

4.1.7 Birth interval

Records on birth interval were obtained from eighty-two (82) out of the 127 mothers interviewed. There were no records available on birth interval for 45 mothers. The minimum birth interval reported was one year while the highest was 12 years. The mean and modal intervals were 5years and 3years respectively.

There was no significant difference between LBW rate among mothers with birth interval below two years and those above. Figure 1 below shows the relationship between LBW rate and birth interval.

Figure 1: Birth interval and LBW rate



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4.2 Prevalence of LBW in Builsa district

The study found that the LBW rate in the Builsa district was generally high compared the WHO cut off point of 10% and the rate in Ghana (8.0%) in general in 1999.

The LBW rate was also found to vary from a level of 12.4% in 1998 to 11.2% in 1999 while it increased to 14.4% for the period January to June 2000. The slight reduction in the LBW in 1999 could be due to an increase in rate of stillbirths from 2.5% in 1998 to 3.7% in 1999. Most of the babies born dead could probably be LBW infants who could not survive. Twin births constituted 1.0% of total births in 1998, 2.6% in 1999 and 1.6% from January to June 2000. (details in table 4 below)

Table 4: Birth weight and delivery data in five Health facilities in the Builsa district (January 1998-June 2000)

lity	Total Births			Live Births			LBW Deliveries			Still Births			Twins Deliveries		
	2000	1999	1998	2000	1999	1998	2000	1999	1998	2000	1999	1998	2000	1999	1998
i.	146	259	208	143	238	198	24	52	39	2	15	6	3	8	0
ıbisi	24	43	65	22	43	64	8	4	7	4	1	1	0	1	0
ga	56	107	89	52	101	87	2	2	2	0	1	1	0	1	4
chuliga.	16	40	28	16	34	25	1	3	1	0	0	2	0	2	0
ensi	11	14	13	9	14	13	0	2	0	0	0	0	1	0	0
al	253	463	403	242	430	387	35	63	49	6	17	10	4	12	4
le							14.4	11.2	12.4	2.4	3.7	2.5	1.6	2.6	1.0

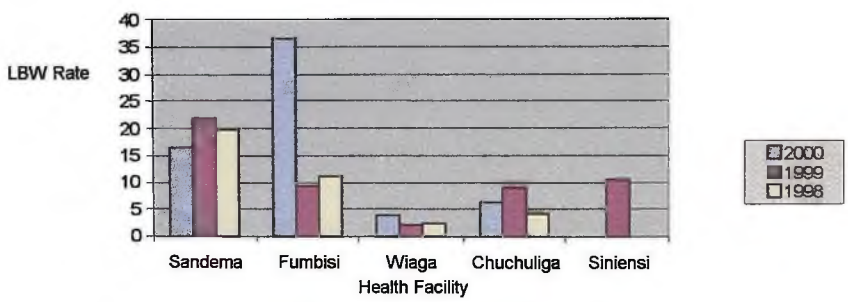
*Data for 2000 covers only delivery records for the first half of the year (January-June)

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4.2.1 Health facility and LBW

Figure 2 below shows the distribution of LBW by and health facility. The Sandema Hospital, which is a referral, centre for the whole district and neighbouring districts such as West Mamprusi in the Northern Region and Kassena /Nankana District, recorded higher LBW rates for 1998 and 1999. The Fumbisi health centre however recorded a large increase in LBW between January and June 2000. This could be due to delivery by mothers from the inaccessible parts ("over seas") of the Northern region who have poor access to Health services.

FIGURE 2: LBW Rate by year and Health Facility



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4.2.2 Distribution of birth weight by community

From the 1077 records analysed for the period January 1998 to June 2000 LBW rates ranging from 20.0- 30.0% are prevalent in communities such as Balansa, Bilimonsa, Kaljisa, Kori, and Tankunsa. The lowest LBW rates of below 10.0% occurred in communities such as Chiok, Guuta, Azugyeri, Kadema, Longsa and Sinyansa. Communities with LBW rates between 10.0 and 20.0% were Abiliyeri, Nyansa, and Suwarinsa.

4.3 Medical Factors

4.3.1 Haemoglobin level and LBW

Eighty-eight (88) mothers who delivered at Sandema Hospital and Wiaga Clinic and were interviewed had their Hb level taken during previous visits to ANC.

The HB level at the Sandema and Wiaga Clinics were assessed using the Cynanmethaemoglobin (Photometric) method and recorded as grams/dl.

Out of the eighty-eight (88) women 47 (53.4%) had Hb levels below 10.0g/dl while 41 (45.6%) had their Hb levels above 10.0g/dl. The percentage of women with low Hb level (<10g/dl) or anaemia who had LBW babies was 25.5% (table 2). The highest HB level recorded was 16.9g/dl and the lowest 5.7g/dl with a mean of 10.27g/dl (SD= 2.05).

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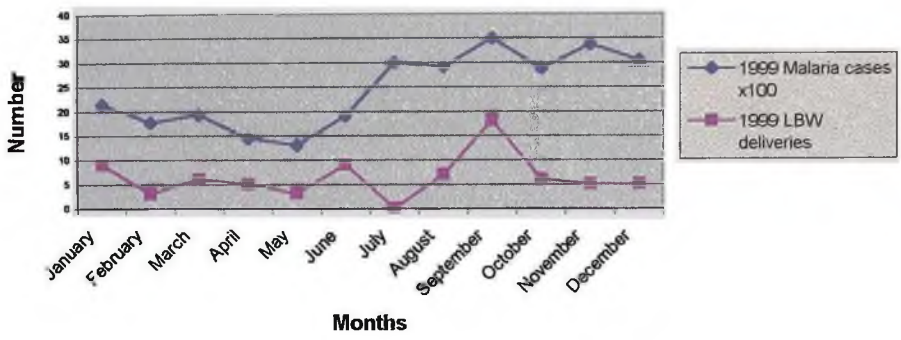
The difference between mothers with low Hb level who delivered LBW babies and those with normal HB level (>10g/dl) who delivered LBW babies was statistically significant (P = 0.0213). This is an indication that pregnant women with Hb levels below 10g/dl are more likely to deliver LBW babies than those with higher Hb levels in the Builsa district.

4.3.2 Illness during pregnancy

Fifty-one 51 out of the 127 (40.2%) mothers were ill during the period of their pregnancy. Of the fifty-one (51) mothers who reported to have been ill during pregnancy, 66.0% indicated they had fever and medical records available made a diagnosis of malaria, based on the clinical examination as against any laboratory confirmation. Figure 3 below shows similar trends of Malaria cases and birth weight deliveries for the year 1999 suggesting that the incidence of malaria could be associated low birth weight deliveries. Other common illnesses reported by the mothers included vomiting (6.0%), no blood (6.0%) diarrhoea (4.0%), Dizziness (4.0%) a few others included headache, cough, oedema and abdominal pain.

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Figure 3: Trends of malaria cases and LBW deliveries in Builsa in 1999



The illnesses reported by the mothers were not disaggregated between the three trimesters of pregnancy; as such information on relative effect of illness during the various trimester was not obtained.

There was no significant difference in the rate of LBW among mothers who reported to have fallen ill and those who did not (P-value 0.607, table 2a).

4.4 Health Care Factors

4.4.1 Antenatal Clinic (ANC) Visits

Attendance for ANC services by the mothers interviewed was very high. Out of the 127 mothers interviewed, 98.2% (125 mothers) received antenatal care when they were pregnant

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while 4.8% did not. Retention of the ANC card after delivery by the mothers was also as high as 94.0%.

The average number of visits made by the 125 mothers during pregnancy was 6 (SD 2.5), which is higher than the national target of 4 visits. Two mothers made the highest number of 13 visits.

The common service package received by the mothers who attended ANC in all the five facilities included:

- Registration and history taking including information on age, parity, previous breastfeeding experience, previous medical conditions.
- Measurement of blood pressure
- Weight measurement
- Palpation through which gestational age of the pregnancy is assessed
- Health education on various topics including breastfeeding and diarrhoea
- TT immunisation
- Supplementation with vitafol (iron supplement)
- Malaria prophylaxis using chloroquine

At the Sandema and Wiaga subdistricts, where laboratory facilities exist, haemoglobin levels of the mothers are regularly checked. Urine analysis is also carried out to assess sugar and protein levels in the urine. The height of the mothers is also taken at the Sandema subdistrict but the procedure used is so crude that it only indicates whether the mother is below or above or

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exactly five feet. It is designed to meet the requirement of the risk approach to obstetric care with respect to height below five feet.

Vitafol is given as iron supplement to be taken on daily basis. It has a good combination of other essential nutrients but also contains 6,000iu of Vitamin A. The teratogenic effect of a daily dose could be a threat to the baby since an excess of daily requirement is stored in the body.

4.5 Nutritional Factors

4.5.1 Dietary patterns

Ninety-nine (99) out of the 127 women could remember if there was any change or not in the quantity of food they ate during pregnancy. Emphasis was on the difference in the food consumption between the period the mother was not pregnant and the last two trimesters of pregnancy.

About sixty-two (61.6%) percent of the 99 mothers reported that their food intake was either the same or less in the last two trimesters compared with the period when they were not pregnant.

The reasons given by the mothers for eating less or the same quantity of food are shown in table 5a below.

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Table: 5a Reasons for reduced or same amount of food intake during pregnancy in Builsa

Reason	Number	Percentage
Loss of appetite	19	31.1%
No food available	11	18.0.%
Vomiting	12	19.7%
Sickness	2	3.3%
Cultural restrictions	2	3.3%
No particular reason	15	24.6%
Total	61	100

Common foods the mothers reported constituted their regular diets included:

- TZ (thick cereal porridge) with vegetable soup
- Rice with groundnut or palm nut soup
- Beans with okro stew
- Yam with stew or beans stew
- Porridge
- Fufu with light soup.

Other foods/substances some of the mother reported to have eaten while pregnant outside their routine diet included:

- Pito Mash
- Cola nuts

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- Fried plantain with palm oil
- Bread and tea
- Eggs and Meat

4.5.2 Foods forbidden during pregnancy

About thirty six percent (36.4%) of 127 mothers reported they were forbidden to eat certain foods while they were pregnant. Such foods listed in table 5b below are vital sources of both macro and micronutrients needed for foetal growth and the health of the mother during pregnancy. Restriction of the intake of such foods could contribute to retarded foetal growth.

Table 5b: Foods pregnant women are forbidden from eating

Foods forbidden during pregnancy	Number of mothers affected	Total	Percentage
Fresh meat	18	127	14.2
Beans/Groundnuts	2	127	1.6
Rice	3	127	2.4
Mangoes	2	127	1.6
Sugary Foods	2	127	1.6
Fresh cold milk	6	127	4.7
Fish	4	127	3.1
Gari	2	127	1.6
Eggs	4	127	3.1
Oily foods	2	127	1.6
Banana	2	127	1.6
Cold or left over TZ	16	127	12.6



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The reason given for such restrictions where as follows:

- Food such as eggs and oil will make the unborn baby grow too big such that the mother will not be able to deliver normally
- Fresh meat and left over TZ will destroy the placenta and cord of the baby.

  Left over TZ may also lead to stomach pain which will also affect the health of the baby
- Fresh meat, eggs and banana make us sick.

  Eating oil will worsen jaundice if a woman already has it.

4.5.3 Weight gain during pregnancy

The weight gain during pregnancy was calculated from data available on eight-four (84) mothers. The weight gain was calculated by subtracting the first weight of the mother on her first attendance to ANC and her weight in the last three months of pregnancy.

The mean weeks of gestation of the mothers at their first visit to ANC were twenty-one (21) weeks with modal weeks of gestation being sixteen (16) weeks. Some women started attending ANC as early eight (8) weeks while others did so as late as thirty-four (34) weeks.

The mean weight gain among the women was 3.96kg (SD= 2.97). Two of the mothers actually lost weight (maximum weight loss was – 0.44kg) while the maximum weight gain was 10.9kg. About fourteen (13.7%) of the mothers did not gain any weight.

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About ninety-five (95.2%) percent of the mothers gained less than 10.0 kg during the entire period of pregnancy.

The was significant difference in LBW rate between mothers with weight gain less than 4.0kg and those with weight gain above 4.0kg (p= 0.0056), table 2. There was also a significant difference at a weight gain above 5.0kg (p-value= 0.0519).

4.6 Physical and reproductive stress

4.6.1 Work pattern of mothers

Responses were obtained from a hundred and twenty three (123) mothers as to whether the routine work they did while they were not pregnant increased, remained the same or reduced during the period of pregnancy.

Emphasis was placed on any change in work pattern during the last two trimesters of pregnancy and also on type of work that was considered heavy. About forty nine percent (48.8%) of the mothers reported that their work pattern increased or remained the same during their pregnancy period, especially in the third trimester.

The type of work the mothers reported to be engaged in was classified in table 6 below.

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Table 6: Category of work done by women during pregnancy in Builsa

Heavy	**Yes**	**No**	**Total**
Weeding / farming	25	98	123
Sowing Crops	37	86	123
Fetching firewood or water	98	25	123
Harvesting crops	49	74	123
Plastering buildings	23	100	123
Grinding grains on a local mill	47	76	123
Picking shea-nuts	18	105	123
Picking stones for sale	2	121	123
Light			
Sweeping	86	37	123
Washing utensils	74	49	123
Washing clothing	51	72	123
Cooking meals	112	11	123
Sewing clothing	7	116	123
Food Vending.	24	99	123

Most of the mothers combined both light and heavy during the farming season in particular, it was therefore difficult to compare LBW rates among mothers who did only light work and

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those who did only heavy work. In general the effect of work pattern on LBW rate was not statistically significant.

Twenty eight (28.0%) percent of the mothers reported they did not receive any help from their relations or friends to do their work when they were pregnant because there was nobody to help them. This however had no significant difference on the LBW rate (P-value 0.266, table 2a).

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CHAPTER 5

5.1 DISCUSSION

The study has confirmed high LBW rate in Builsa and also indicated that there were differences in LBW rates between the various subdistricts.

Nutritional factors such as prepregnancy weight, prepregnancy Body Mass Index (BMI) and gestational weight gain are known to be risk markers of LBW. During the study, missing data on height of mothers and weight before pregnancy was a limitation for assessing the impact of these factors on LBW rate in the district.

Available data however, showed that there was poor weight gain among the mothers during pregnancy with a mean weight gain of 4.25Kg. It was also found that 95.5% of the mothers gained less than 10.0kg, the usual recommended lower limit[32] during pregnancy. This could be directly related to the proportion of women who continue to work hard during pregnancy and also due to restrictions on food intake due to reasons related to culture, food shortages and fear of difficulty in delivery of fat babies documented in the study.

The mean gestational weight gain of 4.25kg reported in this study is quite close to a weight gain of 5.6kg (SD 6.0) kg reported by Anderson and Bergstrom in a study of 1477 women in Gamboula town in the Central African Republic in 1997[33]. In the Gamboula study only 22% of

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the women were found to have gained more than the usual recommended lower limit of 9.0kg whereas in this study only 4.8% of the women gained more than the recommended lower limit. In this study, there was significant difference in the LBW rates between mothers with weight gain less than 4.0 kg and those with weight gain more than 4.0kg (p-value = 0.0076). The Gamboula study also found that birth weight was related to gestational weight gain with a coefficient of determination (r^2) of 4.5%.

In Builsa over 90% of the women who deliver at the health facilities go for ANC services during pregnancy. Nurses in these clinics could improve the quality of nutrition education given so as to dispel fears of the association between eating certain foods and difficult delivering due to big babies thus facilitating improved weight gain during pregnancy.

In the study, health care factors were limited to the number of visits made by a mother to ANC throughout her period of pregnancy. A basic assumption made here is that a mother who visits ANC automatically received the following service package provided at the five health facilities studied in the Builsa district:

- Registration and history taking including information on age, parity, previous breastfeeding experience, previous medical conditions.
- Measurement of blood pressure
- Weight measurement
- Palpation through which gestational age of the pregnancy is assessed
- Health education on various topics including breastfeeding and diarrhoea
- TT immunisation

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- Supplementation with vitafol (iron supplement)
- Malaria prophylaxis using chloroquine

At the Sandema and Wiaga subdistricts, where laboratory facilities exist, haemoglobin levels of the mothers are regularly checked. Urine analysis is also carried out to assess sugar and protein levels in the urine. Therefore the measured relationship of ANC care factors to LBW incidence was based on quantitative utilisation rather than content of care.

The results showed that 98.2% of the 127 mothers interviewed, visited ANC at least once before they delivered. This was found to be the same level of attendance as recorded by the GDHS 1998 for the national level.

The study did not find any significant effect of number of visits to ANC on LBW rate. The findings of the study seem to be consistent with a similar retrospective case control analysis study involving 3905 African- American women who either received or did not receive selected prenatal care interventions. That study concluded that nationally recommended initial clinical screening procedures and health promotion advice in prenatal care content do not appear to be associated with a reduction in LBW for African-American women. Several studies have suggested, but not proven, that the receipt of specific clinical services, diagnostic tests and health promotion advice, as well as adequate utilization of services during pregnancy is associated with improved birth outcomes. Some recent articles have however questioned the effectiveness of prenatal care interventions[17].

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A number of medical factors are known to influence infant birth weight including; obstetric causes such as parity and birth interval, as well as illness of the mother during pregnancy. Parity and birth interval are important in the Builsa district since family planning acceptor rate is very low (7.2% in1998 and 7.8% in 1999).

Malaria on the other hand has been the leading cause of OPD attendance and admission in the health facilities in the district since 1997. Kasumba[23] reported that maternal malaria appears to one of the principal causes of LBW among the infants produced during the first and second pregnancies.

From the results, there was significant difference between the LBW rate in women with parity less than two (2) and those with parity above two ($p= 0.0037$) table 3.

In light of what Kasumba has reported, the results of the study tend to suggest that malaria infections in the primiparous women and those with first deliveries play a significant role in the high incidence of LBW in the Builsa district. This evidence is further strengthened when the monthly trend of malaria cases and LBW deliveries are compared for the year 1999. Figure 3 shows a similar trend in 1999 for both malaria cases and LBW deliveries. The peak of malaria infections between the months of June and September each year seems to coincide with the highest LBW deliveries. This trend however has to be interpreted with caution since population changes due to migration, number of births and deaths can serve as confounders.

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Further still, 66.0% of 50 mothers who reported having fallen ill during pregnancy indicated they had malaria (clinic records confirmed the mothers claims in 90.0% of the responses).

This finding is also consistent with other studies, which showed that by giving malaria prophylaxis in the form of tablets, a trend towards higher mean birth weight was observed[34].

Other infections that are transmitted across the placenta such as HIV and syphilis are also known to be associated with decreased birth weight. Primary herpes infection is known to be associated with IUGR[9]

From morbidity data available in the Builsa district, there were 35 reported cases of HIV/AIDS in 1999 and 19 from January to June 2000. Records on syphilis and Primary herpes were not available most probably due to very low prevalence rather than lack of diagnostic facilities. The impact of these diseases on LBW would therefore be less important in the district.

Anaemia in pregnancy is a condition where the Hb level of a women is less than 10.0g/dl (MOH, Ghana) and may be caused by poor dietary intake of iron and other micronutrients, infections such as malaria, hookworm, blood loss and other medical conditions.

The results show a significant difference in LBW rate among anaemic (Hb level< 10.0g/dl) and non-anaemic mothers (Hb level> 10.0g/dl). This suggest that low Hb level is an important factor influencing LBW rate in the Builsa district.

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This finding is supported by the evidence that the foetus of an iron deficient mother accumulates less iron reserves and has smaller haemoglobin mass ("hidden iron deficit") than their normal counterparts, which further magnifies LBW due to preterm delivery[9].

In the Builsa district, anaemia is among the ten most prevalent diseases responsible for OPD attendance and admissions in health facilities form 1998 to June 2000. There is the needed to establish through further studies whether the anaemia recorded is due to malaria or dietary causes.

The study also found high rate of teenage delivery, involving women aged 15-19 years, in the district constituting 36.7% of 830 delivery records significantly contributed to the high LBW rate recorded in the Builsa district. The 36.7% teenage deliveries recorded in the Builsa district is higher than that reported at the regional level. In the Upper East Region, 14.0% of women were reported to have started child bearing at the ages of 15-19 years[19]

Literature shows that pregnancy during adolescence carries many health risks including increased risk of delivering babies preterm and with LBW[15] Scholl found that birth weight is compromised when adolescents were still growing while they are pregnant[35]

The study found that 48.8% of 123 mothers worked harder or same throughout their pregnancy. There was however no significant effect on LBW due to working harder or doing the same amount of work throughout pregnancy. This finding agrees with the results of Ann Whitehead's study in the Bawku district in the upper East region in 1994, which showed that women's workload has increased dramatically in recent days.

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Data on workload was collected by interviews with mothers, which made it difficult to measure energy expenditure and how this affected birth weight. More detailed studies are therefore required to do quantitative measurement of the effect of the observed workload on birth weight in the district. This is necessary, in view of existing evidence that physical exertion might diminish uterine blood and thus hinder the supply of nutrients and oxygen to the foetus apart form adversely affecting maternal nutrition with an indirect influence on birth weight[9] However, Durnin suggested that women adapt to the high energetic burden of reproduction and use energy more efficiently when their system is energetically stressed[36] It is not clear if this has accounted for the apparent lack of effect of increased workload on birth weight as found in the study.

Except for age of the mother, none of the demographic factors investigated (sex of infant, marital status of mother, educational level of mother/father) were found to have a significant effect on LBW rate in the Builsa district.

Socio-economic status has been found to be an important factor in LBW. The difference in birth weight that could be attributed to living conditions during pregnancy was found to be 88g (CI 48-128g)[33] Marital status is a proxy indicator for measuring socio-economic support received from a husband. If a woman is married she is more likely to be supported by her husband.

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Over 90.0% of the mothers interviewed were married so that if the above situation holds, then one does not expect marital status to be an important factor in LBW rate in the Builsa district as the results of the study show.

With respect to the educational status over 50.0% of the women attained only Primary or JSS level or had no schooling at all, yet there was no significant difference in LBW rate between these mothers and those with higher education. This trend could be expected since all the mothers interviewed were motivated to seek prenatal care and actually go to deliver in health facilities and therefore were adequately exposed to advice from health workers.

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CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study confirmed that LBW rate is high in Builsa and appears to be more prevalent in the Sandema, Fumbisi and Siniensi subdistricts. LBW is a public health problem in Builsa district since the rate is higher (12.4% in1998 and 11.2% in 1999) than the WHO cut off point (10.0%).

The major causes of high LBW rate in the district appear to be teenage deliveries, low Hb level of women during pregnancy, poor gestational weight gain during pregnancy. Parity less than two was also found to be associated with LBW in the district.

Further studies are required to investigate the effect of maternal workload on LBW rate in Builsa since information collected in the study on this factor was based on self-reported data that could introduce some degree of maternal recall bias.

Improvement in the content of ANC services to include specific messages on maternal nutrition, monitoring of adolescent and maternal nutritional status are required to help reduce the high LBW rate.

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6.2 Recommendations

1. There is the need to orientate health workers to appreciate the health implications of high LBW rate in the District.

2. The DHMT should initiate measures to improve the Health management information on deliveries in all maternity units in the district to improve the quality of data available for planning. Annual reports of the DHMT should include information on delivery to draw attention to LBW and other indicators since information on these exist.

3. Conscious efforts should be made to put in place interventions to reduce the level of LBW through:
   - Effective screening at prenatal clinics (ANC) for early identification of risk factors leading to LBW deliveries.
   - Appropriate counselling and support tailored to the specific needs of women at risk
   - Timely referral of mothers who need specialised attention
   - Adequate supply and ensuring mothers compliance to supplementation with haematinics and malaria prophylaxis
   - Design and include messages on causes and effects of LBW in community durbars, and public education sessions to encourage spouses and family members to provide support to reduce maternal workload and minimise food restrictions during pregnancy

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4. Improve recording and reporting of information on maternity indicators including LBW, still births and teenage deliveries and ensure these receive attention during programme planning

5. Orientate staff of maternity units in the district to adhere to standard format for recording data on deliveries.

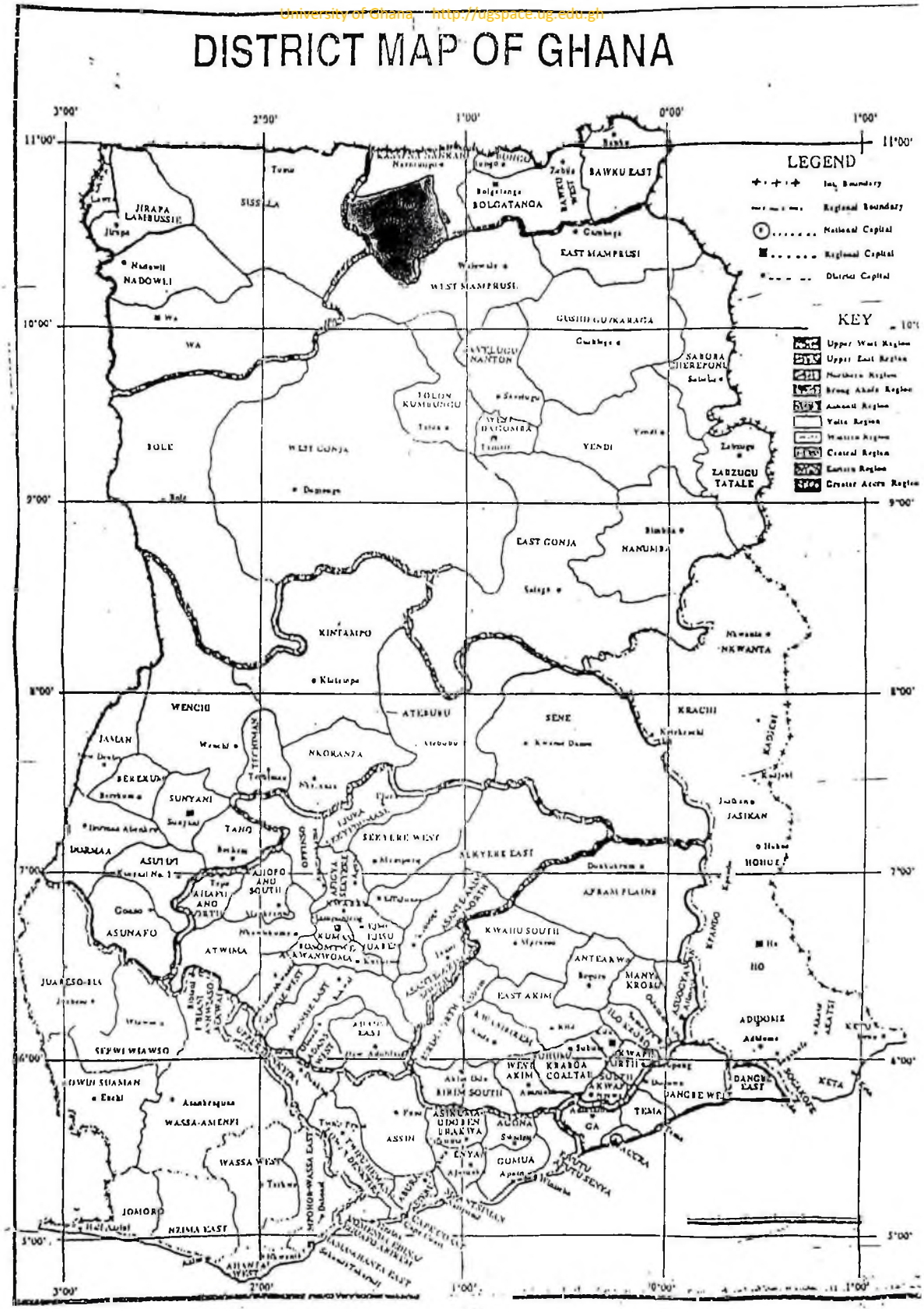
6. The DHMT should take advantage of the high attendance for ANC services to raise the coverage of supervised deliveries in the district where mothers at risk can receive adequate attention.

7. Monitoring of adolescent and prepregnancy nutritional status using school health services and community weighing teams respectively will provide information for planning interventions to reduce the risk of LBW deliveries.

8. Create awareness on LBW, its causes and consequences among all stakeholders in the district including the District Assembly, NGO's and community members to mobilise support for interventions to address these.

Appendix 1 Map of Ghana showing Builsa District

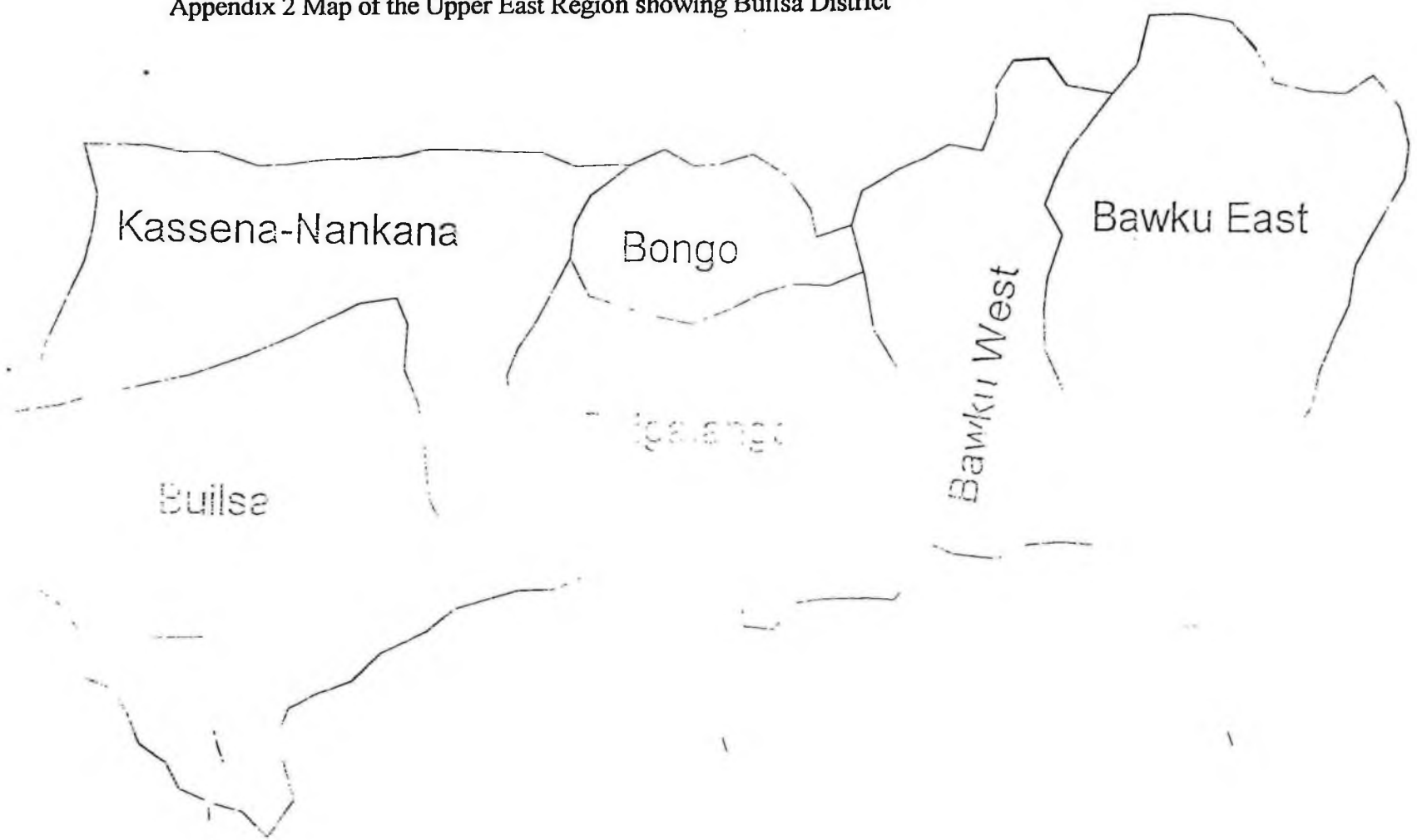
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DISTRICT MAP OF GHANA
LEGEND
Int. Boundary
Regional Boundary
National Capital
Regional Capital
District Capital
KEY
Upper West Region
Upper East Region
Northern Region
Brong Ahafo Region
Ashanti Region
Volta Region
Western Region
Central Region
Eastern Region
Greater Accra Region
BAWKU EAST
BAWKU WEST
BOLGATANGA
EAST MAMPRUSI
WEST MAMPRUSI
NADOWLI
JIRAPA LAMBUSSIE
WA
BOLE
WEST GONJA
EAST GONJA
YENDI
SABOBA CHEREPONI
ZABZUGU TATALE
NANUMBA
KINTAMPO
NKWANTA
WENCHI
ATEBUBU
SENE
KRACHI
JASIKAN
HOHOE
BEREKUM
SUNYANI
TANO
DORMAA
ASUTUIFI
ASUNAFO
ATWIMA
JUABESO-BIA
SEFWI WIAWSO
AFRAM PLAINS
KWAHU SOUTH
EAST AKIM
ANTEAKWA
MANYA KROBO
ADEIDOME
KETA
DANGBE EAST
DANGBE WEST
TEMA
GA
ACCRA
BIRIM SOUTH
KRABOA COALTAR
AKWAPIM SOUTH
ASIKUMA-ODOBEN-BRAKWA
AGONA
ASSIN
ENYAN
GOMOA
WASSA-AMENFI
WASSA WEST
JOMORO
NZIMA EAST
AHANTA WEST
SEKYERE WEST
SEKYERE EAST
NKORANZA
TECHIMAN
OSUDOKU
KUMASI
EJISU JUABEN
KWAMANKESE
ASOKORE MAMPONG
OFFINSO
ADANSI WEST
ASANTEHENE
ASUOFO ANO SOUTH
ASUOFO ANO NORTH
ASUTUIFI
ASUNAFO
ATWIMA
JUABESO-BIA
SEFWI WIAWSO
OWIN SUAMAN
WASSA-AMENFI
WASSA WEST
JOMORO
NZIMA EAST
AHANTA WEST
ASSIN
ENYAN
GOMOA
BIRIM SOUTH
KRABOA COALTAR
AKWAPIM SOUTH
ASIKUMA-ODOBEN-BRAKWA
AGONA
TEMA
GA
ACCRA
DANGBE EAST
DANGBE WEST
ADEIDOME
KETA
HO
KADJEBI
JASIKAN
HOHOE
ANTEAKWA
MANYA KROBO
EAST AKIM
KWAHU SOUTH
AFRAM PLAINS
SEKYERE EAST
SEKYERE WEST
OFFINSO
ADANSI WEST
ASANTEHENE
KUMASI
EJISU JUABEN
KWAMANKESE
ASOKORE MAMPONG

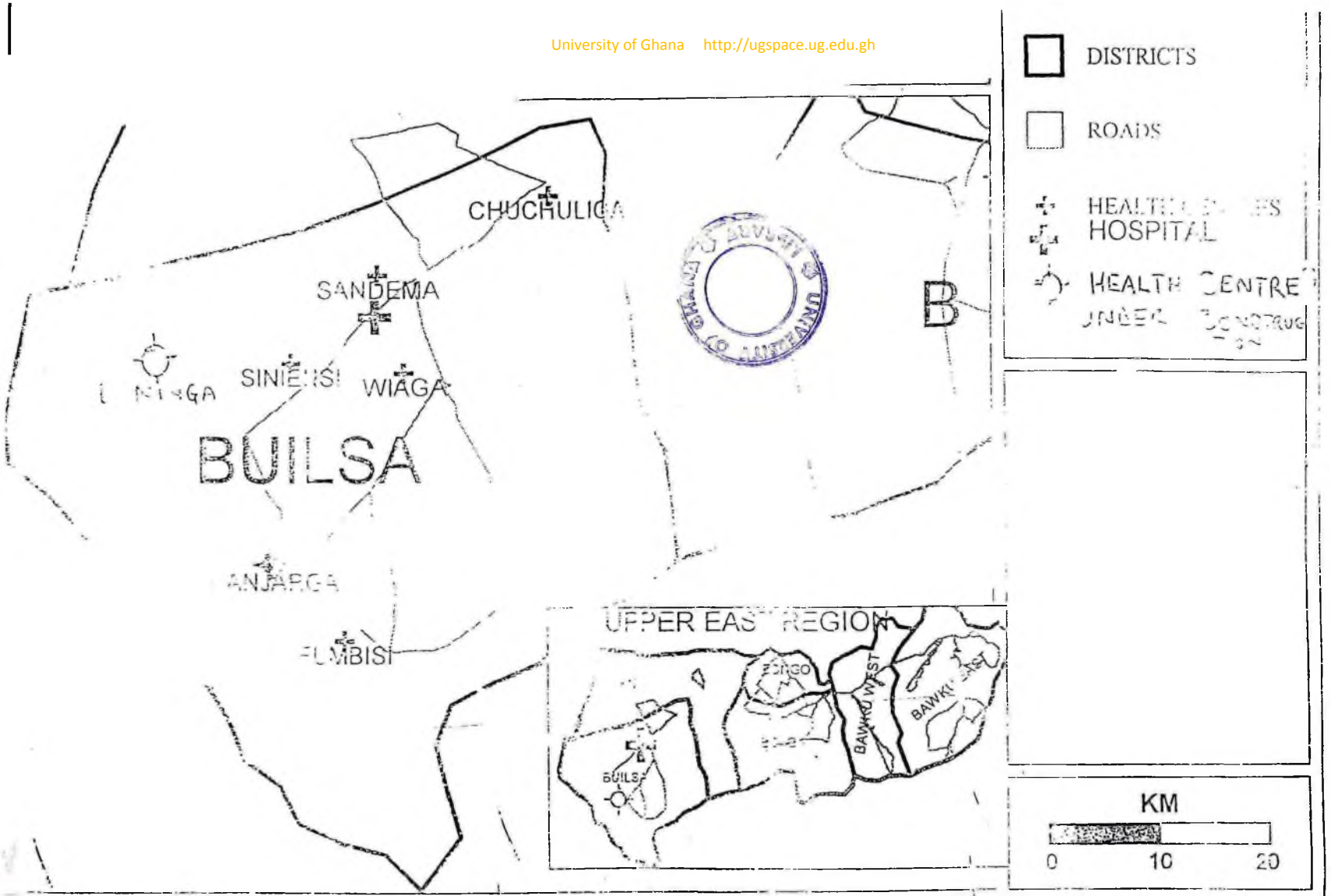
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MAP OF UPPER EAST REGION

Appendix 2 Map of the Upper East Region showing Builsa District



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Appendix 4 Variables, indicators, methods for measurement and sources of measure

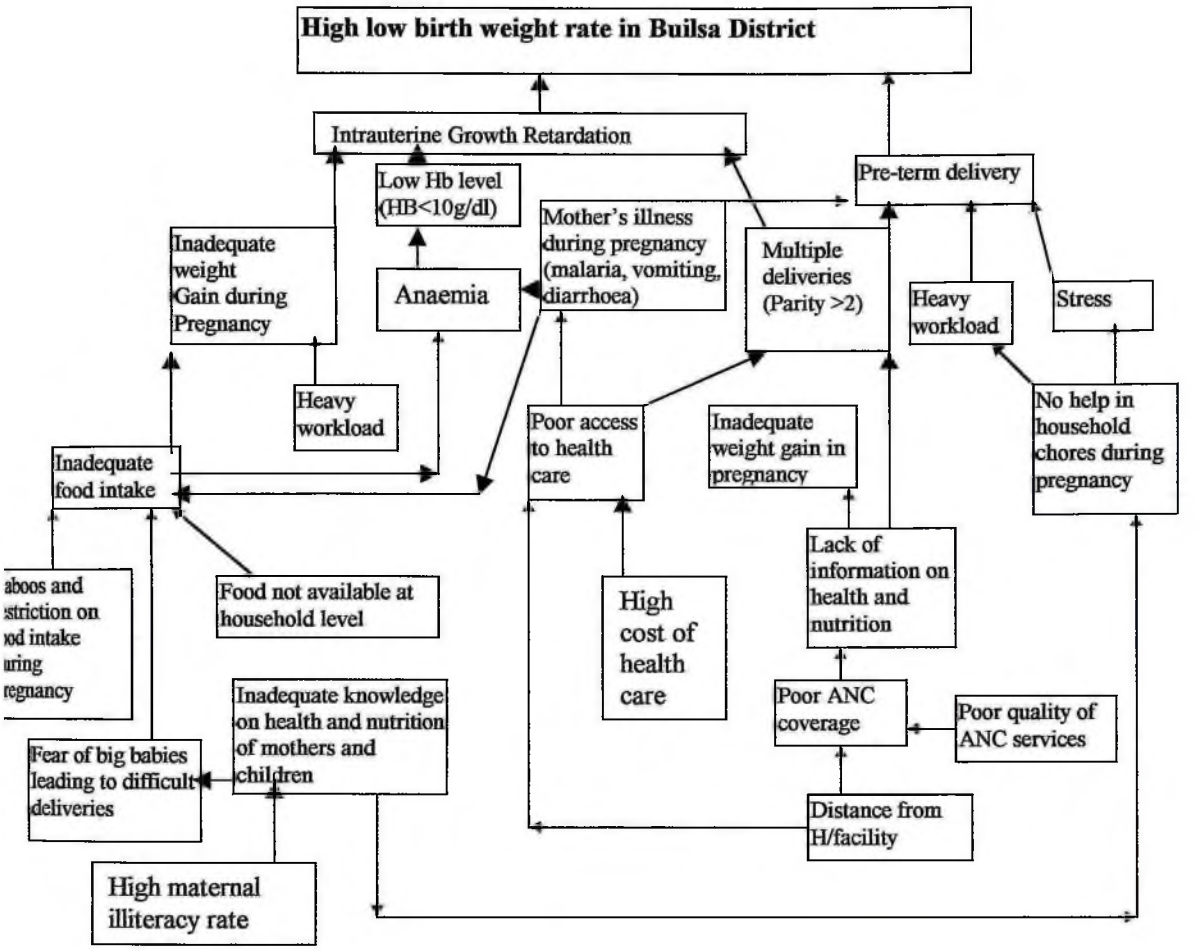
Factor	Variable	Description of variable	Indicator	How measured	Source	Objective
	Dependent variable					
Low birth weight	Birth weight	The weight of a baby in grammas taken within 24 hours of delivery	% Of babies with birth weight < 2500g	Review existing records	Maternity registers	1
	Independent variables					
Inappropriate age at delivery	Age of mother	Age of the mother at birth	Proportion of mothers aged < 20 and >35 years at time of delivery	Review existing records	ANC register/card	2
Inadequate weight gain during pregnancy	Weight gain during pregnancy	Difference in weight (Kg) between weight at first visit to ANC and last three months of pregnancy	Proportion of mothers with weight gain < 10 Kg during pregnancy	Review existing records	ANC register/card	2
Heavy work load	Work load	Increase or no change in amount of work done in last two trimesters of pregnancy	Proportion of mothers who reported increased or same amount of work done in last two trimesters	Interview mothers and discuss in focus groups	Questionnaire/FGD	7
Pre-term delivery	Gestation period	Duration of pregnancy in weeks	Proportion of mothers with weeks of gestation < 37	Review existing records	ANC register/card	4
Poor ANC coverage	ANC coverage	Number of visits made to ANC during pregnancy	Proportion of mothers who made <4 ANC visits before delivery	Review existing records	ANC register/card	5
Taboos and restrictions on food intake during pregnancy	Food intake	Restrictions or prohibitions on food intake during pregnancy for cultural or other reasons	Proportion of mothers who reported restrictions on their diets during pregnancy	Interview mothers and discuss in focus groups	Questionnaire/FGD	3, 5
Inadequate food intake during pregnancy	Food intake during pregnancy	Reduction or same amount of food eaten during pregnancy as indicated by mother	Proportion of mothers who reduced or maintained same amount of food	Interview mothers	Questionnaire	6, 3

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			intake in their last two trimesters of pregnancy			
Mother's sickness during pregnancy	Mother's health during pregnancy	Occurrence of any illness in mother during pregnancy as stated by mother or diagnosed by a prescriber	Proportion of mothers who reported sick during pregnancy	Interview mothers Inspection of clinic records	Questionnaire, Inspection of clinic records	4
Anaemia	Haemoglobin level	Level of haemoglobin in g/dl measured by the cynanmethaemoglobin method	Proportion of mothers with HB level<10g/dl	Review existing records	ANC card	4
Many children	Parity	Number of children ever delivered by a mother	Proportion of having their 1st delivery or with > 4 children	Review existing records	ANC card	3
Lack of education	Level of education	The last level of education attained by a mother/father	Proportion of mothers/fathers with no education or only primary education	Interview mothers	Questionnaire	
No support from spouse	Marital status	Type of marital relationship as stated by mother	Proportion of mothers who are not married	Interview mothers	Questionnaire	
Too close deliveries	Birth interval	Time in years between the birth of the last two children of a mother	Proportion of women birth intervals < 2 years	Interview mothers	Questionnaire	4

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APPENDIX 5: Problem Analysis Diagram



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WORK PLAN

APPENDIX 6: WORK PLAN

Activity	Time period	Person responsible
1. Data collection and proposal writing	Jan, 24-Feb., 29, 2000	James Asedem
2. Submission of first draft of proposal	March, 20	James Asedem
3. Finalisation of proposal	March, 25-30	James Asedem
4. Seek funding	April, 1-May, 15	James Asedem
5. Discussion with DHMT of Builsa	May, 25-30	James Asedem and DDHS
6. Recruiting of field assistants	June 1-7	James Asedem and DHMT
7. Training of assistants	June, 9	James Asedem
8. Pre testing of data collection tools	June, 12	James Asedem /supervisors /F. Assistants
9. Finalisation and production of tools	June, 13	James Asedem /supervisors /F. Assistants
10. Obtain logistics	June, 12-16	James Asedem
11. Inform health facilities and communities	June, 14-15	James Asedem
12. Carry out data		

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collection	June, 20-25	James Asedem /supervisors /F. Assistants
13. Data cleaning and entry	June, 21-24	James Asedem /Data entry clerks
14. Data analysis	June 27-30	James Asedem
15. Dissemination of preliminary findings	July, 1-7	James Asedem/DHMT
16. Report writing	July, 10-18	James Asedem
17. Submission of report SPH	August, 15	James Asedem

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Appendix 7: Mother's Questionnaire

STUDY OF LOW BIRTH WEIGHT DELIVERIES IN THE BUILSA DISTRICT, UPPER EAST REGION, JUNE 2000

MOTHER'S QUESTIONNAIRE

District: _____ Health Facility: _____

Interviewer's Name: _____ Date of interview: _____

1. Name of mother: _____ 2. Age: _____

3. Marital Status: _____ **(M=married, S=single, D=Divorced Se=Separated)**

4. Educational level: _____ **(1=Prim. 2=Middle/JSS, 3=SSS/Equivalent or above, 4=No schooling)**

Name of child's father _____

Father's educational level: _____ **(1=Prim., 2=Middle/JSS, 3=SSS/Equivalent or above, 4=No schooling)**

CURRENT NUTRITIONAL STATUS OF MOTHER

5. Weight of mother:_____ Weight of child_____ (WFA _____)

6. Height of mother:_____ Height of child_____ (WFH _____)

7. (BMI:_____) Age of child_____ (HFA_____)

(Note: Items in brackets should not be filled in the field)

REPRODUCTION

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8. How many times have you delivered? _____

9. How many children are alive? _____

10. How old was your last child when this one was born? _____

11. Did you ever visit ANC when you were pregnant? Yes ☐ No ☐

12. If yes, do you have an ANC card? (Ask to see card)

Yes (Seen) ☐ Yes (not seen) ☐ No (No card) ☐

13. (Inspect card if and record number of visits)
No of ANC visits _____

14. If no, why did you not go to ANC?

_____

HEALTH OF MOTHER

15. Did you experience any sickness when you were pregnant?

Yes ☐ No ☐

16. What sickness did you experience?

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Diarrhoea	
Fever	
Cough	
No blood	
Other (specify)	

(Tick against correct response in boxes above)

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17. Did you go to hospital because of your sickness? Yes ☐ No ☐

18. (**Check in ANC/clinic card if available, and record any diagnosis and treatment given**)

Diagnosis _____

Treatment _____

DIETARY FACTORS

19. What foods did you often eat when you were not pregnant?

_____

20. Did you eat something different when you were pregnant?

Yes ☐ No ☐

21. If yes what did you eat that was different?

_____

22. During pregnancy did you eat less, more or same of what you often ate?
(Use the list of foods given in question 19 to ask question 22)

Food	0-3 months	4-5 months	6-9 months
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S

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(Indicate by circling L=less, M= more or S= same against foods listed and under the right period of pregnancy)

23. If you ate less, what were the reasons?

Reason	0-3 months	4-5 months	6-9 months
Vomiting			
Loss of appetite			
No food available			
Cultural restriction			
Other (specify)			

(Tick against the right response in the boxes under the appropriate period of pregnancy above)

24. Are there certain foods that you were not allowed to eat when you were pregnant? Yes ☐ No ☐

25. If yes what foods are they?

_____

_____

26. Why were you not allowed to eat these foods?

_____

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MOTHER'S WORK

27. What work do you often do on daily basis both inside and outside the house?

Work	Dry season	Farming season

(Indicate by ticking whether work is done in dry or farming seasons)

28. Was your last pregnancy in the dry season or farming?

_____

29. During your last pregnancy were you doing less (L), more (M) or same (S), amount of your routine work?

Work	0-3 months	4-5 months	6-9 months
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S
	M L S	M L S	M L S

(Indicate by circling L=less, M= more or S= same against work indicated and under the right period of pregnancy)

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30. If you did more or same amount of work why was it so?

_____

31. Did you receive any help from your family members to do your work because of your pregnancy? Yes ☐ No ☐

32. Extract the following information from the mother's ANC card if available.

Weight of mother on first visit _____

Height of mother _____

Duration of pregnancy on first visit _____

weight of mother in last three months of pregnancy _____

HB level: 1st Trimester_____ 2nd Trimester_____ 3rd Trimester_____

(BMI _____)

(Weight gain during pregnancy _____)

(Items in brackets should not be filled in on the field)

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APPENDIX 8: FORMAT FOR EXTRACTING BIRTHWEIGHT DATA

ormat for extracting birth weight data from maternity register

erial o.	Name	Address	Age	Occupation	Parity	Gestation (weeks)	B/Wt	Sex	Type of Deliver	Medical Condition

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