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## **Health Facility Factors Associated with Low Birth Weight among Neonates at Thika Level Five Hospital in Kiambu County, Kenya.**

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### Abstract

**Purpose:** To assess the health facility factors associated with low birth weight at Thika Level Five Hospital in Kiambu County, Kenya.

**Methodology:** Cross sectional convergent design was employed. The target group composed of mothers who delivered in the hospital during the study period (July-August, 2019). A sample was obtained from all willing mothers. Sample size was determined using the Cochran formula assuming a proportion (p) of 16.4% of low birth weight. Desired sample size was 210 mothers which was adjusted to 215 participants. Independent variables included: medical equipment and supplies, medical personnel and accessibility of health facility. Dependent variable was LBW which was classified further as very LBW, extremely LBW. The primary focus was first to identify LBW which was then categorized according to the standard classification. Quantitative and qualitative data were collected and analyzed using logistic regression and NVivo respectively.

**Findings:** Accessibility to a health facility OR= 0.45, p=0.04, CL [0.21-0.97] was associated with very low birth weight. The mothers (FGDs) indicated that there were challenges at the laboratory; some health workers were not good; and ANC counselling sessions were inadequate. Health workers who were Key Informants (KI) reported inadequacy of resources and suggested campaigns to reach mothers in order to attend ANC early and a provision of a preconception centre at the Hospital.

**Unique contribution to theory, practice and policy:** Inaccessibility of a health facility by pregnant mothers is a risk factor for very low birth weight neonates. ANC guidelines to be revised to cater for the concerns of mothers. Preconception centres should be established in hospitals.

**Keywords:** *Equipment and Supplies, Medical Personnel, Accessibility of a health facility, Low birth weight.*

## 1.0 Introduction

### 1.1 Background to the Study

Low birth weight (LBW), defined as a birth weight less than 2500 g, remains a significant public health problem in many parts of the world and is associated with a range of both short- and long-term adverse consequences (UNICEF & WHO, 2018). Although about one-half of all LBW babies in industrialized countries are born preterm (less than 37 weeks' gestation), most LBW babies in developing countries are born at term and are affected by intrauterine growth restriction that may begin early in pregnancy (UNICEF et al., 2018). Preterm birth accounts for 70% of all low birth weight babies. Preterm birth contributes to the majority of the prenatal morbidity and mortality due to the resultant prematurity. Sub-categories are; Extreme preterm birth – less than 28 weeks' gestation, Severe preterm birth – 28 – 32 weeks' gestation, and Moderate preterm birth – 32 – 37 weeks' gestation (Blencore, 2012).

In 2018, about 22 million neonates (16%) had LBW globally (UNICEF, 2019). Approximately 97% of LBW occurs in low-and-middle-income countries, particularly among the vulnerable populations, including the poor in remote areas (UNICEF et al., 2018). South Asia has the highest prevalence of LBW of 28%, followed by Sub-Saharan Africa at 13%, Latin America and the Caribbean at 9%, and 6% in East Asia and the Pacific (Kim & Saada, 2013; UNICEF & WHO, 2004; WHO, 2018). Center for Disease Control and Prevention shows great variation in LBW by place of residence (CDC, 2014); LBW is higher in rural areas (8%) compared with urban areas (6%), and varies across the country's regions, from 5% in Battambang/Pailin provinces to over 12% in Siem Reap Province (National Information Service (NIS), 2015).

Developing countries have consistently recorded a high prevalence of LBW. A study carried out earlier by Were found out that ninety-two percent (92%) of Low Birth Weight (LBW) babies are born in developing countries, 70% in Asia and 22% in Africa (Were, 1998). WHO and UNICEF estimate LBW in Kenya as 11% and 6% by 2009 Kenya Demographic Health Survey. The same survey estimated LBW to be 9.2% in Central Province, Kenya Demographic Health Survey [KDHS, 2017]. The prevalence of low birth weight in Kiambu County stands at 42% (Ministry of Health [MoH], 2017). The Sub Counties of Kiambu County have the following prevalence of low birth weights: Gatundu North 35%; Gatundu South 43%; Githunguri 16%; Juja 43%; Kabete 42%; Kiambaa 40%; Kiambu 76%; Kikuyu 11%; Lari 21%; Limuru 30%; Ruiru 62%; Thika 86% (MoH, 2017).

### 1.2 Statement of the Problem

There is paucity of data on the factors contributing to the high prevalence of low birth weight in Kiambu County. From the promulgation of 2010 constitution and the devolution of health services; this has brought economic and political challenges hence paralysing a number of healthcare systems in Kenya. This paralysis has resulted to critical concerns including whether inadequate health workers (MoH, 2014b), lack of equipment and medical supplies (Raatakainen *et al.*, 2015) or poor health service (Ijadunola, 2010) factors have contributed to poor birth outcomes reflected in LBW. While several studies have established determinants of LBW (Asp *et al.*, 2014; Class *et al.*, 2017; Kaur, Upadhyay, Srivastava, Srivastava, & Pandey, 2014; Miranda, Edwards, Chang, & Auten, 2013), there still exist a gap in understanding the high prevalence of LBW in Thika Level Five Hospital. Additionally, researchers do not know the degree of each determinant's effect on

LBW. Due to this knowledge gap, health delivery systems face issues, as the same techniques of health care delivery continue to be applied which are not effective in tackling the problem of low birth weight.

It is alarming, at 86% of the LBW prevalence in Thika Level Five hospital in Kiambu County, this is significantly higher than the national average. With over ten thousand infants born each year, the incidence of LBW might be worrying for a county whose health care system is already eroding. As the notion of social suffering implies, LBW poses social obstacles to the family (Kleinman, 2010). Additionally, the repercussions of LBW are manifested not only through impaired cognitive development or prenatal morbidity and mortality, but also through chronic illnesses such as diabetes and hypertension later in life (Linsell, Malouf, Morris, Kurinczuk, & Marlow, 2015; Risnes *et al.*, 2011). The cost expense of addressing such chronic illnesses (UNICEF *et al.*, 2018) may be a significant burden on government, as health care in Kenya is primarily funded by public funds. Conn *et al.* (2010) noted that reducing the prevalence of LBW results in long-term economic benefits for a county, including increased quality of life.

## 1.2 Objective of the Study

To assess health facility factors associated with low birth weight among neonates at Thika Level Five Hospital in Kiambu County, Kenya.

## 2.0 Literature Review

Low birth weight is a valuable public health indicator of maternal health, and health care delivery (UNICEF *et al.*, 2004). A well-functioning health system is key in ensuring the health of a pregnant mother and her child (UNICEF, 2004). Quality of maternal healthcare services also requires availability of functional equipment. These include radiological obstetric ultrasounds, Doppler scans and laboratory testing capabilities including testing of blood for transfusion as well as the availability of operating theatres, wards to avoid bed sharing and general clean environment to improve the quality of care (Prata, Weidert, & Sreenivas, 2013).

Studies have generally shown that maternal health services in some countries of sub-Saharan Africa are deficient in terms of providing basic emergency obstetric care (Conrad *et al.*, 2012; Ijadunola *et al.*, 2010) and lack the capacity to perform tests for syphilis and bacteriuria or address the effects of severe anemia and malaria in pregnancy (Raatikainen *et al.*, 2015). Maternal health services have also been noted to lack essential drugs, reagents and instruments, to have poor quality patient education, to lack timely referral and transportation services, and to have an inadequate number and mix of skilled providers (Tamir, 2016). Many studies have also evaluated maternal health care utilization outcomes in their assessment of the quality of maternal health services and have concluded that in many parts of sub-Saharan Africa, levels of maternal health care are poor (Ijadunola, 2010). However, few studies have linked the supply aspects of maternal health care to demand for maternal health services.

A health assessment survey of 2016 in Tanzania confirmed that most facilities lacked electricity and sterile equipment and this kept women from using them (Cotter, 2016). The Kenya Health Sector Strategic and Investment Plan (2012-2018) estimates that current staff levels meet only 17% of minimum requirements needed for effective operation of the health system, Kenya has only 7 nurses per 4,000 residents, half the number (14 per 4,000) recommended by the World Bank (Bourbonnais, 2013; MoH, 2014a). The task force on strengthening health service delivery

(Ministry of Health [MoH], 2013), indicated persistent insufficient infrastructure, equipment and staffing. Only about 36 percent of public health facilities have all the basic delivery room infrastructure and equipment while lower level facilities unequipped (MoH, 2015). Many women in developing countries do not use health facilities due to long distance to the nearest health care facility (Magadi, 2010). Other factors that prevent women in developing countries from getting the lifesaving health care needs include: cost (direct fees as well as the cost of transportation, drugs and supplies); multiple demands on women's time; women's lack of decision-making power within the family. The poor quality of services, including poor treatment by health providers, also makes some women reluctant to use the services (WHO, 2016).

In another study, Banchani noted that in order to ensure women accesses quality care, adequate number of trained health workers, sufficient equipment and supplies; and adequate referral or reliable transportation to a hospital or other health facilities in the event of an emergency is required (Banchani, 2014). Improving quality of care for clients means understanding their cultural values, previous experiences and perceptions and the role of the health system (Saha, 2018). Patient-centered care is not limited to communication and often focuses on other aspects of care such as convenience of office hours, ability to get appointments when needed, being seen on time for appointments and having services near one's place of residence (Saha, 2018).

Pregnant women expect care that is acceptable and focuses on their individual needs. ANC services should be available to pregnant women without any restrictions. Attending ANC less than three times has been associated with increased risk for pre-term maturity and delivery of low birth weight babies and caesarean delivery (Sultan & Sacker, 2017).

## **2.1 Theoretical Framework**

There are theories that have explained the factors associated with low birth weight. They include the origins of the developmental origins, the thrifty genes, and the stage-matched interventions theories.

### **2.1.1 The Origins of the Developmental Origins Theory**

The theory of origins of the developmental origins explains how gene inheritance and lifestyle are associated with low birth weight. Human life operates like a computer system, which only lives on the philosophy of "garbage in garbage out". In other words, it is our genetic inheritance and lifestyle that determine our health status (Sata, 2016). In the medical arena, it is confirmed that ebb and flow conventionality expresses that coronary illness results from the undesirable ways of live of westernized grown-ups with a commitment from hereditary legacy. This does not give a safe premise to a version of the infection (Costello *et al.*, 2007). Geological investigations provided the main insight that the malady starts amid intra-uterine advancement. Varieties in mortality from the infection crosswise over England and Wales were appeared to relate intimately with past contrasts in death rates among infants. In the past, most passing away among babies were accredited to low birth weight. This prompted the speculation that malnutrition in utero for all time changes the body's structure, capacity, and digestion in manners that lead to coronary illness in later life. The connection between low birth weight and coronary illness has been affirmed in longitudinal investigations of people far and wide. The formative model of the roots of the illness offers another root forward (Barker, 2007).

### **2.1.2 The Thrifty Genes Theory**

The thrifty theory explains that the life of unborn child can be affected when a mother is not well nourished with balanced diet or she experiences injury as well as sickness. Under nourished mother or a sick mother is likely to have babies with low birth weight.

According to Epidemiologist, an hypothesis proposing that numerous occasions that happen amid the intrauterine life and right off the bat in early stages can impact the event of numerous sicknesses that will create in adulthood (Barker, 2007). This hypothesis suggested that under-sustenance and other affront or antagonistic upgrade “in utero” and amid early stages can forever change the body’s structure, physiology, and digestion. The enduring or deep-rooted impacts of under-sustenance will rely upon the period in the improvement at which it happens. The signs that drove Barker to his decisions began to be found when he was concentrating the fleeting patterns in the frequency of ischemic coronary illness in England and Wales. In reflection to what was recorded by Hertfordshire records, gathered in the start of the only remaining century, he found that the rates of mortality by ischemic coronary illness were a lot higher in youngsters brought into the world in less well-off districts and generally in those with low birth weight. After his underlying discoveries, a heap of illnesses has been noted to be connected to under-nourishment “in utero” in reference to low birth weight and in the neonatal period. These ailments were then designated grown-up sickness with fetal cause. These epidemiological discoveries propose that “in utero” and early postnatal life have basic significance for long haul programming of wellbeing and sickness, opening interesting possibilities for essential avoidance of incessant illnesses (Isomaa, 2013)

### **2.1.3 The Stage-Matched Interventions Theory**

The stage-matched interventions theory considers pre-term birth as one of the causes of low birth weight.

Even though the scholars have not ascertained the precise reasons for children born before the expected date of delivery (EDD) are not known, smoking of cigarette has been identified as one of only a handful couple of elements related with low birth weight which can be concentrated (Webb, 2008). In reference to both Martin and Curtin of 1999 and Joseph et al., 1998, they argued that, the infants born of under 2,500 grams in weight (LBW), especially very low birth weight of underneath 1,500 grams (VLBW) during childbirth, are the biggest supporter of perinatal grimness and death in the United States what is more in Canada, LBW newborn children are not just as more noteworthy being dangers than their typical weight peers, however, they likewise seek to the biggest gathering of babies who bite the dust in the principal years in a lifetime, with the greatest part of immediate passing happening among VLBW newborn children (Malon, 2010). In the United States, the prevalence of LBW infants has been gradually ascending to its present dimension since 1976 of 7.6% (Lawrence & Haslam, 2007). A noteworthy pattern toward more quantities of babies being delivered at low birth weight or extremely low birth weight has happened in spite of advancements of an assorted of medications to anticipate preterm birth. Low birth weight newborn children additionally have a higher prevalence rates of youth in physical and mental weakness (Lawrence & Haslam, 2007).

## **2.2 Empirical Review**

A study that was carried out by Basel& Singh, 2020 on low birth weight and its associated risk factors at health facilities of Dang District of Nepal employed an unmatched case-control study.

The objectives of the study included socio-demographic, maternal factors of the mother and co-morbidity experienced during pregnancy. The study found out that kitchen in the same room living house, iron intake less than 180 tablets during pregnancy, weight gain less than 6.35 kg during the second and third trimester, co-morbidity during pregnancy, and preterm delivery were associated risk factors of low birth weight (Basel & Singh, 2020). The research did not indicate why mothers did not take enough iron tablets. It did not prove whether there were adequate iron tablets in health facilities and the reason why some mother took less than 180 tablets. The current research addresses the medical equipment and supplies of the facility and how they are associated with low birth weight.

A similar study carried out by Mwigwi (2014) on prevalence of low birth weight deliveries and associated factors in Narok District, Kenya, addressed five specific objectives. They included the determination of socio-demographic and economic characteristics of women delivering at Narok Hospital; the weight of newborns delivered at the hospital; the maternal feeding practices of the study population; the maternal morbidity experienced during pregnancy; and the establishment of the maternal socio-economic and demographic, nutritional status, dietary practices and morbidity experience were associated with low birth weight in the study area. Mwigwi answered four questions, namely, what are the socio-demographic and economic characteristics of women delivering at the hospital? what is the prevalence of low birth weight deliveries in Narok Hospital?; what are the maternal practices of the study population?; what is maternal nutrition status of women delivering at Narok Hospital?; what is the morbidity experience of mothers delivering at Narok Hospital?; is there relationship between maternal socio-economic and demographic characteristics, feeding practices, nutritional status and morbidity experience and birth weight in the study population? (Mwigwi, 2014). He also had a hypothesis which stated that low birth weight is not significantly associated with the maternal socio-economic and demographic characteristics, feeding practices, nutritional practices, nutritional status and morbidity experience during pregnancy in Narok (Mwigwi, 2014).

This research also failed to address the health facility factors that are background factors of low birth weight. The other factors are intermediate factors that can be tackled by individual mothers once advised what they should do. The difference between Mwigwi's research and this research is way he collected his qualitative data. He had five focus groups and six Key Informants. Five focus groups were held in the catchment area of the Nark District Hospital. The groups were as follows: two for men and two for pregnant women; one each in an urban and rural set-up. Participants for the fifth FGD were traditional birth attendants and circumcisers. Each group had 8 to 12 participants (Mwigwi, 2014). Sample size for the key informants were six. Six interviews were conducted with the District Nutrition Officer (DNO), Hospital Gaenecologist/obstetrician, District Reproductive Health Coordinator (DRHC), the District Gender and Social Development Officer (DGSDO) and two representatives of community health workers from the catchment area (Mwigwi, 2014). In conclusion, religion of the mother, multiple deliveries, gestation period and nutritional status of the mother (Mwigwi, 2014). The Focus Group Discussions did not target the right group. Men and pregnant women selected from the catchment area of Narok Hospital may not be necessarily utilizing the hospital. They may also not be aware of the low birth weight burden in the hospital. Similarly, the traditional birth attendants, circumcisers may not be aware of the prevalence of low birth weight and its dangers. Community health worker, unless they are attached to Narkor Hospital may not have an information on low birth weight of infants.

The Key Informants were also not a suitable target group. District Nutrition Officer (DNO), Hospital Gynecologist/obstetrician, District Reproductive Health Coordinator (DRHC), the District Gender and Social Development Officer (DGSDO) and two representatives of community health workers from the catchment area do not work directly under mothers and infants. The nutritionist in charge of Narkor hospital would be in a better position of knowing the risk factors of low birth weight of neonates at Narkor hospital than the District Nutrition Officer who is in charge of all the hospital in Narkor District. The Hospital Gynecologist/obstetrician deals with special cases with complications. He/she may not be aware of the other mothers who deliver low birth weight babies and the associated risks. The District Reproductive Health Coordinator (DRHC) does not work directly under the mothers like the in charge of MCH Clinic, in charge of maternity, in charge of postnatal ward and newborn unit. He/she only receives reports of reproductive health such as family planning. District Gender and Social Development Officer (DGSDO) know very little about Narkor hospital and low birth weight. His/her work is to deal with social groups and their development. This is a department which can come up with a strategy of dealing with low birth weight but not identifying those factors. Further concern is also on the results of the focus group discussions and key informant interviews. They did not feature anywhere in the results. This implies that the information might have been irrelevant to the study. This study has selected the right population both for quantitative and qualitative data. It has focused on an area that many researches have omitted, health facility factors.

### **3.0 Research Methodology**

#### **3.1 Study Area Description**

The study was carried out at the maternity, the post-natal ward, MCH clinic, and Newborn unit at Thika Level Five Hospital in Kiambu County, Kenya. This hospital is a general public hospital with a capacity of 265 beds. It is strategically placed to serve three counties namely; Kiambu, Muranga, and Machakos. The hospital delivery services are provided 24 hours.

#### **3.2 Study Design**

Cross-sectional convergent study design was employed.

#### **3.3 The Study Population**

The study population constituted of women who delivered at the Thika Level 5 Hospital during the study period.

##### **3.3.1 Inclusion Criteria**

Mothers, above 18 years who delivered at the Thika Level 5 Hospital during the period of study and consented were incorporated into the study. Mothers under 18 years old were considered as emancipated minor whereby if the mother was an orphan, heading a household, adolescent living in the street, married, parent/legal guardian was absent then the minor consented (WHO, 2018). If the parent/guardian was present at the time of study he/she took consent on behalf of the mother and the minor only assented (WHO, 2018).

##### **3.3.2 Exclusion Criteria**

Immediate referral of a mother after delivery, stillbirth.

### 3.4 Sample Size Determination

The population sample was resolved utilizing the normal proportion (p) of 16.4% from the predominance of LBW in the recorded report done in Narok District Hospital in 2011 (Migwi, 2012)

In the determination of population sample, Cochran formula (1963:75) was utilized (Israel, 1992).

$$n_0 = \frac{z^2 \times p \times q}{e^2}$$

Where;

$n_0$ : anticipated population sample to use;

$z$  : standard typical deviation at 95% CI of 1.96

$p$  : the extent evaluated in the objective populace  $1-p$  ( $0.164$ ) =  $0.836$

$e$  : the level of precision at 95% CI of 2.5% two-tailed test.

$$n_0 = \frac{1.96^2 \times 0.164 \times 0.836}{0.025^2} = 210$$

Therefore, the sample size was 210. This sample size was adjusted to 215 participants.

### 3.5 Sampling Technique

All mothers who delivered at Thika Level Five Hospital during the study period and were willing to participate in the study were recruited. The recruitment process was done at the post-natal ward and it was guided by the delivery records. The order of the interview depended on the length of period a mother stayed in the facility, mothers who were discharged on the same day of delivery were interviewed first, followed by those with long stay. Purposive sampling was used to recruit mothers for focus group discussions (FGDs).

### 3.6 Variables

The independent variables included: medical equipment and supplies, medical personnel and accessibility of health service. The dependent variable was LBW which as classified further as very LBW, extremely LBW. The primary focus was first to identify LBW which was then categorized according to the standard classification.

### 3.7 Data Collection Instruments

Three types of instruments were developed for data collection. An interviewer administered questionnaire was used to collect quantitative data from 215 mothers, while Focus Group Discussions (FGD) guide was used to collect qualitative from the discussants. The questionnaire was designed in English, but was administered to the respondent in Kikuyu (local language), Kiswahili, or English subject to the choice of the client. Each FGD consisted of 6 mothers. A Key Informant guide was used to collect qualitative data from health workers mainly nurses who were the in-charges of maternity, post-natal ward, MCH Clinic and newborn unit.

### **3.8 Data Collection Procedures**

#### **3.8.1 Quantitative Data**

The interviewer explained to the mothers the importance of the study and why their participation would be significant. Those who agreed to participate in the study were asked to sign a consent form before the questionnaire was administered to them through face to face interview. Prior to the interview, the interviewer was blinded on the birth weight of the neonates to the selected mothers to avoid bias. Once the client was selected, she was interviewed in a private room in the maternity unit so as to ensure privacy. Mothers who had undergone caesarian section were recruited after 48-72 hours. A note was fixed on the outside to indicate that an interview was in progress.

#### **3.8.2 Qualitative Data**

Focus Group Discussions (FGD) was conducted on a different group of mothers who delivered at Thika Level Five after quantitative data collection had been completed. FGDs gave diverse information on low birth weight babies and the characteristics of the mothers giving birth to these children. A FGD guide was used to guide the focused group discussion. The room for discussions took place within the hospital set up where the environment was conducive with circular seating arrangements. Discussions were tape recorded. The discussion took a maximum of 20 minutes moderated by the Research assistant. An open-ended interview guide was used for Key Informant Interviews (KII) to collect qualitative data from health workers working directly under mothers. They included nurses in charge of the following areas: maternal child health (MCH) clinic, maternity, postnatal ward, and newborn unit.

### **3.9 Quality Assurance Procedures**

#### **3.9.1 Pre-testing of Data Collection Tools**

Pre-testing took place at Machakos Level Five Hospital to test whether the questions in the questionnaires had captured the needed information as well as checked for redundant and misleading words. The pre-test was also to ensure mothers of different background were asked appropriate questions. This was important since it ensured that the interviewer was able to administer the questions properly. The questionnaire was standardized based on the consistency of the results obtained.

#### **3.9.2 Recruitment of Research Assistant**

Two research assistants who were nurses working at Thika Level Five Hospital and trained on data collection were used. They also had previous experience in data collection. They spoke Kikuyu, Kiswahili, and English.

#### **3.9.3 Training of Research Assistant**

The research assistants were trained on the following: the purpose and objective of the study; their role and motivation; duties and responsibilities; strategies of recruiting the respondents; how to use the questionnaire and conduct the actual interview; how to overcome difficulties that may be encountered such as a nervous or reluctant respondent; distracting environment or interference from others present; how monitoring of data collection was to be conducted and finally on ethical issues.

### **3.9.4 Monitoring of Data Collection**

The research investigator received all the filled questionnaires on a daily basis and she critically reviewed interviewers' returns and checked for unusual or inconsistent responses in the questionnaire. She met daily with the research assistants to check together if the responses were properly filled and completed, moreover to discuss any difficulty that might be encountered.

### **3.10 Data Management**

The Data was stored in a laptop of the Research investigator and a backup copy in an external hard drive that was accessible to the Researcher Investigator and the two research assistants only. The original data remained unmodified and in case of modifications, one was able to track how and which changes were made and by whom. A score was kept on who had access to analysis of data and with whom data has been shared with. Data was always accompanied by a file that included a description of the data. In statistical analyses, the codes were written in a format that anyone who would like to repeat the analyses was able to do so by following the codes made by the researcher.

#### **3.10.1 Data Entry, Cleaning, and Coding**

Data obtained from the field was edited in order to eliminate errors and biases that might have resulted from data collection. The data was cleaned, coded and entered into a computer and analyzed. Codes were assigned to categorical data before entering it on the computer. Numerical data such as the weight of the neonates was entered with the same precision as they were measured and the unit of measurement remained constant. Missing values were also coded. An asterisk to indicate missing values was used. Typing mistakes were the most frequent source of errors when data was entered. The double entry was done to compare the two data sets using Microsoft Excel..

#### **3.10.2 Quantitative Data Analysis**

Data was entered and analyzed using Stata statistical software version 14. Univariate analysis, multiple logistic regression and a two-tailed test of significance with a 95% confidence interval Descriptive analysis was done to determine the prevalence of low birth weight and factors associated to LBW of neonates for mothers delivering at Thika Level Five Hospital. Bivariate, stratified and logistic regression analysis was performed to determine the association between the independent and the outcome variable and to control for potential confounders. A two-tailed test of significance was used. The measures of association were reported with a 95% confidence interval. Factors with a p-value of  $<0.05$  will be regarded as statistically significant.

#### **3.10.3 Qualitative Data Analysis**

The recordings were translated verbatim, using a transcription developed protocol thematic analysis by NVivo version 14. The accuracy of the transcripts was verified. A content-driven, thematic codebook using an interactive process was created each focus group transcripts were viewed independently and new themes were created. All codes were defined using NVivo12 (QSR, 2012) and applied to the transcripts. The incremental progression of theme identification by log to determine when each code was identified. Code frequencies were then documented whereby the number of focus groups in which a code tallied. Data was also analyzed based on a 90% metric to provide a more robust measurement of saturation. Code frequencies were used as a proxy measure and to group the results into -low, medium and high frequencies in order to determine salient of the themes.

### 3.11 Ethical Considerations

Permission to carry out the study was obtained from the Kenyatta National Hospital Ethical Committee and the medical superintendent of Thika Level 5 Hospital. The purpose of the study was explained to the mothers and subsequently consent was obtained for participation in the study. The respondent mothers were interviewed in a private room. No name was recorded on the questionnaire or any other identifier relating to the respondent. A study subject number was used as the unique identifier. Mothers under 18 years old were considered as emancipated minor whereby if the mother was an orphan, heading a household, adolescent living in the street, married, parent/legal guardian was absent, then the minor consented. If the parent/guardian was present at the time of study he/she took consent on behalf of the mother and the minor was only to asset.

## 4.0 Presentation on the Findings, Analysis and Interpretation

### 4.1 Accessibility of Health Facility and Satisfaction with Services Offered

Table 1 indicated that 25.3% of the mothers with neonates who had low birth weight accessed health facilities while 74.7% indicated that health facility was not accessible. Of the mothers with neonates who had low birth weight, 86.4% indicated that they were satisfied with the services while 13.6% were not satisfied. About 4.2% of the mothers with neonates who had low birth weight, indicated that they were hindered by distance to get to the health facility while 95.8% were not hindered by distance. Frothy three point eight percent (43.8%) of those who had low birth weight neonates were referred to this health facility while 56.2% of those who had low birth weight neonates were not referred to this health facility.

**Focus Group Discussions of Mothers:** *“We are satisfied with the services of this facility. At times we have challenges with the laboratory services and time at the ANC clinic is short and does not address our problems adequately. Not all health personnel are good. It depends on who is on duty during the time of the visit. Others are good and others have their own moods”* Mother 3.

**The Key Informants:** *“Currently we are not in a position to prevent and control low birth weight. For us to counter this challenge, a campaign should be done to mothers in order to start ANC clinics early enough. The hospital should also build a pre conception service care center where mothers will be nurtured and given counseling from their onset days of pregnancy until delivery”*.  
Nurse 1.

**Table 1: Accessibility of health facility and satisfaction with services offered**

	Low birth weight	
	Yes n (%)	No n (%)
<b>Accessibility of health facility</b>		
Yes	19 (25.3)	64 (45.7)
No	56 (74.7)	76 (54.3)
<b>Satisfied with services</b>		
Yes	19 (86.4)	55 (87.3)
No	3 (13.6)	8 (12.7)
<b>Hindrance by distance</b>		
Yes	3 (4.2)	6 (4.3)
No	69 (95.8)	133 (95.7)
<b>Referred</b>		
Yes	32 (43.8)	27 (19.42)
No	41 (56.2)	112 (80.6)

Table 2 shows that accessibility to a health facility OR= 0.40, p= 0.004 and CL [0.22-0.75] was significantly associated with low birth weight.

**Table 2: Univariate analysis of health facility factors associated with low birth weight**

Variable	Odds Ratio	Std. Err.	Z	P>z	95% Conf. Interval	
Hindrance by distance	0.9637681	0.696326	-0.05	0.959	0.233871	3.97163
Satisfied with services	0.9212118	0.670112	-0.11	0.91	0.221398	3.83305
Accessibility of facility	0.4029019	0.126944	-2.89	0.004	0.217274	0.747121
Times attended ANC	0.9311577	0.1218136	-0.55	0.586	0.720558	1.203309

Table 3 shows that respondents who had a problem accessing a health facility OR=0.40; p=0.004; CL [0.22-0.75] were likely to have neonates with low birth weight.

**Table 3: Multivariable analysis of health facility factors associated with LBW**

Variable	Odds Ratio	Std. Err.	Z	P>z	95% CI	
Accessibility of facility						
No	Reference					
Yes	0.4029019	0.126944	-2.89	0.004	0.217274	0.747121
Constant	0.7368421	0.129766	-1.73	0.083	0.521757	1.040592

### Analysis for Each Type of Low Birth Weight

#### 1 Low Birth Weight (below 2.5 – 1.5 kg)

The univariate analysis in table 4 shows that distance and accessibility to a health facility were not associated with low birth weight of neonates. No multivariate analysis required.

**Table 4: Univariate analysis for health facility factors associated with low birth weight**

Low birth weight	Odds Ratio	Std. Err.	Z	P>z	95% CI
Distance to health facility	0.7166667	0.773252	-0.31	0.758	0.086478 5.939184
Accessibility to health facility	0.5055072	0.220916	-1.56	0.119	0.214652 1.190471

### 2 Very Low Birth Weight (below 1.5-1kg)

Table 5 shows that very low birth weight has an association with accessibility to a health facility OR=0.45; p=0.04; CL [0.26]

**Table 5: Univariate analysis for health facility factors associated with very low birth weight**

Very low birth weight	Odds Ratio	Std. Err.	Z	P>z	95% CI
Distance to health facility	1.31746	1.083733	0.34	0.737	0.262752 6.605867
Accessibility to health facility	0.4463102	0.176198	-2.04	0.041	0.20587 0.967567
Satisfied with health facility services	0.4166667	0.315667	-1.16	0.248	0.094388 1.839329

### 3 Extremely Low Birth Weight (below 1kg)

This research found out that there was not associated with accessibility of a health facility.

**Table 6: Univariate analysis for health facility factors associated with low birth weight**

Extremely low birth weight	Odds Ratio	Std. Err.	Z	P>z	95% CI
Accessibility to health facility	0.7926829	0.977249	-0.19	0.851	0.070747 8.881624

The multivariate analysis in table 7 indicates that accessibility to a health facility is associated with very low birth weight CL [0.21-0.97]; p=0.04; OR=0.18

**Table 7: Multivariable analysis for health facility factors associated with very low birth weight**

Very low birth weight	Odds Ratio	Std. Err.	Z	P>z	95% CI
Accessibility to health facility					
No	Reference				
Yes	0.4463	0.1762	-2.04	0.041	0.2059 0.9676
Constant	0.3069	0.0630	-5.75	0	0.2052 0.4590

## 5.0 Summary, Conclusions and Recommendation

### 5.1 Summary of Findings

From qualitative analysis, mothers indicated that they were satisfied with the services being offered at the facility by the health workers. However, they had a challenge of laboratory services and failure to have enough counseling sessions during the antenatal clinics. They also complained of some health personnel who developed negative attitudes towards them. Health workers indicated that campaigns to mobilize mothers to attend ANC clinics early enough and a pre-conception centre were required in order to tackle the problem of low birth weight. The multivariate analysis indicated that accessibility of a health facility OR=0.04, p=0.004, CI [0.22-

0.75] was significantly associated with low birth weight. The specific type of low birth was very low birth weight OR=0.18; p=0.04, [CI=0.21-0.97]

## 5.2 Conclusion

Accessibility of a health facility is associated with low birth weight in particular, very low birth weight.

## 5.3 Recommendations

### 5.3.1 Recommendations for Policy

1. The County Government of Kiambu as an important player in this study, should develop interventional strategy to tackle low birth weight burden at Thika Level Five Hospital in order to safe children the consequences of low birth weight. In the same spirit, the county government should provide the necessary resources that the health workers at Thika Level Five Hospital require in order to bring down the prevalence of low birth weight.
2. The County Government and the local players, need to develop suitable strategies of strengthening maternal and child services at community level in order to reach out to all mothers.
3. ANC guidelines should be revised to include mothers' concerns.

### 5.3.2 Recommendations for Further Research

1. A research need to be conducted to determine the particular factor that makes a health facility inaccessible.
2. There is need to assess the satisfaction and happiness of pregnant mothers who attend Thika Level Five Hospital

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