



## **Maternal Factors Influencing Low Birth Weight in West Pokot County, Kenya**

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### **Abstract:**

Worldwide an estimated 20% babies are born LBW and the impact of LBW on infant mortality is enormous. Child survival and development need more focus on healthy start of life. The objective of this study was to investigate maternal characteristics associated with LBW. Cross-sectional mixed study design was employed to collect data from 7 randomly selected health facilities using interviewer administered questionnaire. A sample of 223 eligible mothers was selected and associations analyzed using chi square tests and regression analysis to confirm their statistical significance. Maternal nutrition; MUAC (B = 1.890, p=0.045), Antenatal Care attendance (B=2.236 p<0.001), Mothers education (B = 1.399, p=0.003), marital status (B=-5.647, p<0.001), FGM (B = 1.532, p<0.001). Socio-demographic and cultural characteristics were strongly predictive in mothers giving birth LBW babies. Interventions that focus on improving the socio-demographic characteristics recommended improving birth outcome (LBW).

Key Words: Maternal, Influence, Low Birth Weight, West Pokot

### **Introduction**

Worldwide, it is estimated that about 15 to 20% (20 million births per year) of babies born, are Low Birth Weight (LBW) (WHO, 2012c). LBW is as a result of intrauterine growth restriction (Khushboo et al., 2016; WHO, 2012d) and is an important measure of newborn health and survival (WHO, 2013b). LBW is a critical health risk for young children (WHO, 2012c) and contributes to developing non-communicable diseases and stunting later in life. LBW babies are 20 times more likely to die from complications than heavier babies ((Tessa et al., 2004; WHO, 2012c) especially during the first year of life (WHO, 2012a) compared to healthier babies (Amosu et al., 2014; Awiti, 2014). The risks of LBW are more marked in countries of sub-Saharan Africa and South East Asia.

A broad consensus exists in available literature that factors associated with delivering LBW among women correlated with LBW, were shaped by factors working in mother's immediate environment and associated characteristics (Gwenaelle et al., 2015; Muchemi et al., 2015; Isiugo-abanihe, 2011; Younas, Khan, & Alam, 2015; (Abbasi, 2015; Betew et al., 2014; Demelash et al., 2015; Mahumud, Sultana, & Sarker, 2017)) but available information varied within different settings and communities; an observable fact for consideration in conducting research.

The objective of this study was to examine factors likely to influence giving birth to LBW babies among women of reproductive age (18-49 years) in West Pokot County in north rift part of Kenya (County, 2018; WP County, 2017). Analytical hospital based cross-sectional mixed study design was employed in this study to collect data from 7 selected health facilities located.



In order to understand the factors associated with giving birth to LBW babies in the context of West Pokot, total of 223 women of reproductive age (18-49 years) randomly selected and gave informed consent were studied by the researcher. Knowledge from the study would be useful to researchers, policy makers and program managers in designing better program strategy to address the challenge of high prevalence of LBW and provide opportunity for further research.

## **The Problem**

In Kenya, LBW is responsible for approximately 4% deaths of babies and 40% of these deaths occurring in the first month of a baby's life (Tony, 2010; WHO, 2013b). Babies born LBW are likely to die especially during the first year of life (WHO, 2012a). LBW is an important risk factor for developmental difficulties, disability and development of non-communicable diseases and low productivity in adulthood (Konstantyner et al., 2007; WHO, 2013b).

Considerable variations were observed in prevalence of LBW across different regions however, the greater majority of LBW births occur in low and middle income countries, more commonly in most highly susceptible populations (Betew et al., 2014; WHO, 2012c). West Pokot County reported an estimated prevalence rate of 17.6% of babies born LBW (Gwenaelle et al., 2015) in spite of a great proportion (73.6%) (KNBS, 2014a) of babies born at home and/or weighed within 24 hours of birth (KNBS, 2014b).

Maternal characteristics have been shown to have high potential in influencing LBW but considerable variations exist within different settings (Muchemi et al., 2015). LBW has also been associated with areas with high stunting rates (Gwenaelle et al., 2015). According to a study in Kenya (KNBS, 2014a) the burden (45.9%) of chronic malnutrition in children less than 5 years in West Pokot County was ranked the highest in Kenya, hence the critical need to ascertain the significance of maternal characteristics that might significantly contribute to LBW in West Pokot County where stunting is prevailing. Women of reproductive age in West Pokot County have poor reproductive health indicators which might be anticipated to have significant influence on giving birth to low birth weight and other birth outcomes in infants (MOH, 2009). Factors that shape this could not be understood without considering cultural context within which maternal behavioral factors take place. This would contribute to providing contextual information on key drivers of low birth weight in order to design strategies focused on addressing factors contributing to LBW in view of reducing chronic malnutrition; a global approach in reducing stunting in infants and young children (Konstantyner et al., 2007). This will consequently promote increase in the West Pokot community's economic productivity and subsequently wealth. An increase in height has been associated with 2.4% increase in wages. The aim of this study was to examine maternal characteristics that were thought might possibly be associated with LBW among mothers of infants (<12 months old at research date) attending 7 selected hospitals in West Pokot County during the data collection period. All the interventions designed and implemented would be sensitive to the beliefs and preferences of women with respect to their health, the unbalanced gender relation and power distribution.

## **Objective**

The objective of this study was to determine the association between maternal factors and low birth weight of infants in West Pokot County.



## **Literature Review**

Low Birth Weight (LBW) has been defined by WHO as weight of a baby at birth less than 2500 grams measured within 24 hours of birth regardless of gestation due to prematurity and /or restricted growth in the uterus (Unicef, 2013; WHO, 2011). Low birth weight reflects reproductive health status of a population (Gwenaelle.et al., 2015) and has been used to measure intrauterine growth retardation (IUGR) in developing countries since suitable assessment of gestational age is limited.

Globally, about 5.9 million children die under the age of 5 years an under five mortality, of which 45% are infants (WHO, 2016). Sub-Sahara Africa record the highest proportion of child mortality with over 50% of neonatal deaths occurring in India (Sharma.et al., 2013) and 4% in Kenya. Moreover over 74% of infant deaths occurring during the first month of birth due to being LBW and 40% of deaths observed in Kenya (Tony, 2010; WHO, 2013b), whereas limited information was available to support this phenomenon was documented from available literature for West Pokot County. It is estimated that 15% are born LBW, 15.9% LBW reported in developing counties (Mahumud et al., 2017) , highest incidence reported in South Asia despite of the fact that the data on LBW remain unreliable (KNBS, 2014a; Mahumud et al., 2017).

Maternal health behavior especially in the prenatal period is shaped by factors operating in mothers immediate surroundings comprising of social cultural end points. The cultural aspects of maternal characteristics of LBW had not been explored in the study area. Significant associations have been shown between low birth weight and maternal characteristics from some studies conducted in developed and developing countries (Abbasi, 2015; Betew et al., 2014). Similar observations were seen in a study by Olubukola in Ibadan, Nigeria (Isiugo-abanihe, 2011)

## **Maternal Factors Associated with LBW of Infants**

Maternal factors that have shown significant relationship with LBW include; socio demographic and economic factors; age, weight, short stature, nutrition status, level of education/illiteracy, religion, occupation, income, residence and maternal diseases, obstetric factors; parity , birth interval and antenatal care (Demelash et al., 2015; Mahumud et al., 2017), cultural practices; Female Genital Mutilation and use of traditional medicine. However different variations on potential factors influencing LBW have been observed based geographic, socio economic, obstetric and cultural factors in different settings. Thus, it was crucial to examine factors within immediate maternal environment prevailing in this particular study area that might be responsible for the high prevalence of LBW to provide contextual direction of focus on the intervention to address it.

Child and mother are both a single unit socially, culturally or biologically and the kind of biologic support a child receives in the course of its growth during pregnancy depends on the kind of nourishment a mother receives during pregnancy (Verma et al, 2016) hence Maternal nutrition is an important predictor of low birth weight. A study in Nigeria in 2011 reported higher risks of giving birth LBW babies by malnourished mothers (Amosu. et al., 2014; Isiugo-abanihe, 2011). In the contrary in Kenya, a study at Olkalou did not find any relationship with maternal nutrition status (Muchemi et al., 2015). The differences support the importance to consider context specific studies in research as assumption in inference of finding may not apply to all settings considering the different dynamics within different communities. It was important to understand what was prevailing in West Pokot County. In addition low maternal weight during pregnancy might lead to intrauterine growth retardation which has strongly been associated with LBW (Akombi, 2017). It was important



in this study for the researcher to understand the cultural practices that could be underlying nutrition status of the women in the context of the study area.

Short stature has been linked to intrauterine growth retardation (Keverenge-ettyang, Lichtenbelt, & Esamai, 2006). Studies have shown a high prevalence of low birth weight in poorly nourished mothers (Makoka, 2013; Shahnawaz et al., 2014). In addition higher weight and heights of mothers are significantly related to odds of having a normal birth weight; the higher the weight the less likely the odds of having a low birth weight baby (Isiugo-abanihe, 2011; Makoka, 2013; Shahnawaz et al., 2014). It was important to determine the relationship of stature and low birth weight among women in West Pokot County where stunting is prevailing. A study in Ethiopia reported significant association between maternal MUAC of less than 23cm more likely (2.9 times) predictor variable for low birth weight. No documentation was available on the relationship between maternal nutrition and low birth weight in West Pokot County. A better understanding of relationship of low birth weight and maternal nutrition status was critical to be determined in the study area.

Rural communities have less access to health services and more specifically antenatal care (ANC) and nutrition compared to urban communities (Mosha et al., 2011) whereas more than two thirds (2/3) of women reside in rural areas compared about one third (1/3) living in urban areas (Solanke et al., 2015). Women living in rural areas have greater risk of giving birth to LBW than those living in urban settings and have a common behavior of delivering their babies at home (Mahumud et al., 2017). According to a research conducted in Ethiopia in 2015, women residing in rural areas, were shown to face health problems during pregnancy and those without any antenatal care follow-up were more likely to give low birth weight babies (Demelash et al., 2015). In addition another study in south East Ethiopia, low birth weight was attributed to maternal rural residence among other maternal characteristics (Demelash et al., 2015). Additionally, Mutugi in Kenya reported significance ( $p=0.044$ ) in rural residence. It was more likely that low birth weight would be attributable to ANC and nutrition status for the influence of their seeking behavior for rural residency.

Education influences people's perceptions towards behaviors such as maternal feeding practices and maternal health service utilization. Studies conducted in selected countries in Africa; Tanzania Malawi and Zimbabwe to assess impact of influence of maternal education on maternal nutrition status hence reported high prevalence of low birth weight associated with maternal education (Makoka, 2013) similar to findings from multi level analysis of prenatal care and birth weight in Kenya indicated that mothers with formal education have heavier infants compared to those without formal schooling, holding other factors constant (Awiti, 2014) contrary to a survey conducted in Pumwani hospital in Kenya reporting no significant association with education (Mogire, 2013). Mothers who had no formal education were 1.4 times likely to give birth to LBW babies compared to those who had at least secondary education (Mutugi, 2012; Shahnawaz et al., 2014). High spouse education indicated high significance in association to LBW by influencing income and food security ((Mutugi, 2012). Moreover there was indication that prevalence of LBW reduced with increasing level of maternal education (Unicef, 2012). High illiteracy level, over 50% reported in West Pokot County was alarming coupled with high fertility rate (7.2%) providing an opportunity for undesirable behaviors to be practiced posing more risks on women giving birth to LBW (KNBS, 2014a). The cultural aspects of behavior that might influence socio economic factors in West Pokot community could not be overlooked in this study.

Occupation has been shown to be significantly associated with LBW. There was a strong association between laborers and LBW (Prudhivi, 2015) but the study found no association between house wives and LBW. Similar relationship was observed by Kashif in 2015 (Shahnawaz et al., 2014). Women in west Pokot County predominantly carry the most



workload in the community (Gwenaelle et al., 2015) and it was important to understand if this would be associated with giving birth to low birth weight babies in their context.

Religious affiliation provide a strong influence on utilization of health services; maternal antenatal visits and greater women autonomy (Solanke et al., 2015). A study in India identified religion as a significant risk factor to LBW (Shahnawaz et al., 2014). Another study in Narok County in Kenya by Mutugi reported significance in association between religion and LBW and higher prevalence seen between Muslims, traditionalists, and non-religious compared to Christians (Mutugi, 2012).

There were higher risks of delivering low birth weight by single mothers than married found in Kenya in a study by Migwi in 2012 (Mutugi, 2012). According to Sharma and company there was increased risk of delivering low birth weight in unmarried women (Sharma et al., 2013) than married women. Whether or not marital status influenced giving birth to LBW babies in West Pokot County was not known.

West Pokot County has poor reproductive indicators among women whereas it has been shown reproductive health could be responsible for LBW and neonatal mortality. It is evident that antenatal care is significantly risk factor for LBW in developing countries (Mahumud et al., 2017) but a magnitude of risks appeared to contrast significantly in different setting depending on ANC systems and degree of attendance. Use of iron supplements during pregnancy reduce odds for having a low birth weight whereas inclusion of illness variable mitigate the effect of antenatal care which had been shown to have significant prediction of low birth weight as less than six antenatal visits had increased odds for delivering a low birth weight compared to mothers who had at least six visits (Isiugobanihe, 2011). Contextual assessments were critical to be included in the current study.

Primi paras have a higher risk of LBW than multi-paras and Lower parity has been significantly associated with LBW (Linda et al., 2011) as they have been linked with having lower wealth index. In contrast, across sectional study recorded high prevalence (46%) low birth weight which was 1.46 times higher in multi parity compared to prim parity (Sachin S Mumbare et. al, 2012).

Maternal health behavior is shaped by factors working in her immediate environments comprising of social cultural beliefs and practices (Fryberg et al., 2007). Female genital mutilation (FGM) is a cultural practice that has been linked to obstetric complications, gynecological problems and long term negative effects on women's wellbeing (MOH, 2009). Psychological consequences such as stress and anxiety could reflect in starvation of pregnant woman in fear of large baby and consequently extra pain during pregnancy (WHO, 2012b). when stress levels increase in women there is more likelihood of delivering LBW (Sharma et al., 2013). It is also linked to girl child and adolescent pregnancy and subsequently development of LBW and neonatal mortality (MOH, 2009). FGM is an obstacle to education and is practiced widely in SSA and West Pokot where girls are excluded from basic education denying them advantages and opportunities about health and legal rights (Ismael et al., 2015). FGM a modifying factor underlying the socio economic and obstetric factors and low birth weight and their potential influence of these factors could not have been disregarded in this study to ascertain their relationships.

Prevalence of use of herbal medicine is estimated at about 70% globally and the extend of use vary from country to country (WHO, 2013a) but more commonly used in rural areas compared to urban areas. Herbal medicine is believed to be a source of health care; to protect from harm, stimulate prolonged labour (Hillary, 2013) and education if important in regulating use of herbal medicine (Sarmiento et al, 2016). Moreover, herbal medicine use increases with decrease in ANC attendance and this could be a presumed scenario in West Pokot County considering the reported high level of illiteracy (50%). Generally women believe herbal medicine are natural safe and work better than conventional medicine



(Hillary, 2013). Herbal medicine is widely used but the influence it might have on development of low birth weight was not documented in West Pokot County.

While maternal education and socio-economic factor influence on delivering LBW babies from different studies were conflicting, generalization of studies across different settings should not be the norm even for the current study. Maternal cultural characteristics might be the driving force behind maternal social and health behaviors and contextual studies should be undertaken considering diverse community dynamics around these factors to fill the existing gap. Secondly, it was the expectation of the researcher that a comprehensive understanding of probable maternal characteristics influencing low birth weight in the study area would be achieved.

## **Methodology**

A cross sectional explanatory sequential mixed study design was adopted in the present study. In this study design, 2 phases of data collection were employed where, first, quantitative data was collected and analyzed to provide a general picture on maternal factor significantly influencing LBW using interviewer administered interview schedule.

Qualitative data were collected and analyzed second in the sequence to help explain the general picture on the quantitative results obtained from the first phase to provide a broader more complete context specific and comprehensive understanding of maternal factors influencing LBW using an FGD discussion script at each study site (health facility). The qualitative phase build on the quantitative phase and the two were connected in the intermediate state in this study. The study variables included in this study were; dependent variable (LBW) and independent variables (maternal characteristics; age, weight, height, MUAC, marital status, education, occupation, Residence, parity, FGM and use of herbal medicine during pregnancy).

This study was carried out in West Pokot County, one of the 14 counties in the northern part of the Great Rift Valley region of Kenya. The sample size of this study was proportionately allocated to selected health facilities based on caseloads of each health facility; KCRH 103 mothers, Kacheliba SCH 30, Sigor SCH 30, Chepareria SCH 30, Keringet HC 10, Serewo 10, and Tamugh 10 mothers.

## **Quantitative Study Phase**

The study population comprised of biological mothers of infants (babies aged <12 months old at the date of interview) attending selected study sites (health facilities) during the study period. Mothers of infants not captured for quantitative data collection phase selected at the study sites.

The study included biological mothers of infants (babies aged <12 months old at the date of interview) aged 18 years and above who were able to give own voluntary informed consent (see appendix I). The mothers who were residents of West Pokot County, who delivered the index child in a hospital through normal vaginal delivery at term (37 completed weeks of gestation) and their babies weighed at birth or within 24 hours of birth. The babies had their birth weights verified through mother and/or child legal documents and/or maternity registers. The study excluded mothers who met the selection criteria but; could not give own informed consent, had altered mental status and those who were not residents of West Pokot County.

Systematic random sampling of selected biological mothers who presented to the health facility daily during the study period with infants (babies aged <12 months old at the date of interview) who met the inclusion criteria were invited to the study for quantitative data.



The selected participants were explained to the study and its objectives and those who gave own informed consent was recruited into the study. A predesigned interview schedule which contained information on maternal characteristics was administered by an interviewer (researcher and/or trained research assistant) upon recruitment of each respondent. Birth weights of babies were recorded upon confirmation from child birth records.

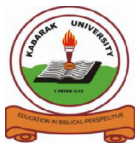
The subject selection of qualitative data collection was purposeful; participants were selected based on who could best inform the research questions and enhance understanding of maternal factors influencing low birth weight among women of reproductive age who had similar characteristics with study participants for the quantitative part (mothers of infants). Given that qualitative data was collected through interactions with participants through use of FGDs, the researcher screened in participants who had experience with low birth weight and were willing to speak about their experiences were selected for the detailed qualitative study. FGD script was used to guide the discussions maternal experiences on maternal characteristics and their influence of giving birth to a low birth weight baby.

The sampling frame for this study was the population of mothers of live infants (babies aged <12 months old preceding the study date) accounting for 3.8% of mothers attending the selected study sites, who delivered at hospital through SVD and/ or had their babies weighed within 24 hours of birth. In that case the target population size was 24.0% hospital deliveries of live births (26,402) attending child welfare clinic during the study period. The estimated prevalence of LBW used to calculate the sample size for this study was 17.6% (Gwenaelle et al., 2015) using standard error of 5% and confidence interval of 95%, the sample size for this study was determined using Fisher's formula ( $n = n = Z^2pq/d^2$ ) (Fisher's et al.1991).

The targeted number of women was proportionately assigned to the health facilities based on the case loads of CWC attendance seen at the respective health facilities (see Table 1).

Table 1: Sampling Procedures for Quantitative Data

Name of site (Health Facility)	Target sample	Average number of mothers attending the Health facility/day	Required sample (mothers)/day	Start number	n <sup>th</sup> number picked
Kapenguria referral hospital	103	50	5	5	Every 10 <sup>th</sup> mother
Chepareria Sub County Hospital	30	25	1.5	21	16 <sup>th</sup> and/or every 17 <sup>th</sup> mother alternately
Sigor Sub County Hospital	30	10	1.5	8	6 <sup>th</sup> and every 7 <sup>th</sup> mother alternately
Kacheliba Sub County Hospital	30	10	10		every 6 <sup>th</sup> and every 7 <sup>th</sup> mother alternately
Keringet Health Centre	10	6	1	2	every 6 <sup>th</sup> mother every day
Tamugh Health Centre	10	3	1	4	every 3 <sup>rd</sup> mother was picked every day
Serewo Health Centre	10	2.3	1	6	every 2 <sup>nd</sup> or every 3 <sup>rd</sup> mother alternately every day



## **Qualitative Study Phase**

Purposive sampling was used to invite participants to this study at the seven study sites selected used for the quantitative study. Appropriate size of sample appropriate for an FGD was 7-10 participants. A sample size of 62 participants was reached for the qualitative study from the 7 selected study sites. In this study, data were collected from selected respondents using pretested semi-structured interviewer administered interview schedule (see appendix III) which was prepared after reviewing similar literature. The choice to use an interview schedule as a tool was due to its ease of administration and its relative low cost and versatility and is usually suitable for collecting data in cross sectional studies. A semi-structured interview schedule was pre-designed to be used by the interviewer to collect quantitative data from individual respondents.

In order to explore the opinions of women of reproductive age (18-49 years) on maternal factors influencing LBW, a total of 7 FGDs (one FGD per study site) consisting of an average of 8-10 participant, were conducted using semi-structured FGD guide (Appendix II) used open ended questions. This was aimed at providing a more complete understanding of maternal aspects of LBW to explain the relationships of these characteristics with LBW in the context of West Pokot County. The members of each FGD were selected purposively by the researcher and moderated by trained research assistant and/or a trained note taker.

Research assistants who were health professionals who were able to speak the local language (Pokot) and Swahili were recruited and trained for one day on how to administer the data collection tools (interview schedule, anthropometric equipment, FGD guide) before pretest of data collection tools was conducted. The data collection tools were pretested with individuals in a randomly selected health facility (Murkwijit dispensary) located within the study area and possess similar characteristics with the population in the selected study sites on the second day of the training to test for validity, content, reliability, and consistency on the tools. Debrief meeting was then held on the 3<sup>rd</sup> day and issues which emerged from the pretest regarding the use of the tools were addressed. All sections which were identified to be source of errors and were likely to give unreliable data were reviewed and corrected to guarantee quality. Some of the areas identified included the modification of FGD script questions to provide focused questions.

Some of the actions that this study considered in ensuring data quality included; Training of research assistants, Pretesting of research tools (interview schedule, weighing scales, MUAC Tape and stadiometer) and checking completeness of questionnaires on daily basis, Translation and back translation of the interview schedule and FGD guide thoroughly done, Backing up of data, Ensuring of safe storage place of filled Interview schedule and meetings organized with research team to sort out data collection issues as they arose.

In this study pretesting of the research instruments/tools allowed for identification of errors. This study validity was done by appropriate administration of research tools; calibration the scales, confirming efficiency of weighing scale, MUAC tape and stadiometer, reviewing relevant legal documents such as the mother child booklets/birth notification forms and/or maternity registers to confirm age and birth weights of babies, use of identity cards/baptism card of women where they were available to confirm age mother and use of well-developed calendar of events for age determination of mother where a legal identity were not available, training of research assistants on how to administer the research tools to provide expertise and thorough back and forth translation of interview schedule and FGD guide. Reliability of the instruments was assessed through standardization process





during training of the research assistants where the measurements were administered by two different persons to the same person.

Data collection exercise for quantitative part was done concurrently in the 7 selected sites (see appendix V) within a period of one month. Trained and competent research assistants participated in the exercise throughout the data collection period using the semi structured predesigned interviewer administered interview schedule. Qualitative data collection involved an informal one-on-one interview using a purposeful sample of 62 women at different stages of reproductive health cycle (18 -49 years) using 7 FGD groups. A structured FGD interview guide was used to collect subjective data emphasizing on words and not numbers.

Data collected from individual respondents were keyed into an excel sheet and transferred to Statistical Package for Social Science (SPSS) computer software. Variances were used to examine the associations between maternal characteristics and low birth weight. The association of categorical variables on birth weight was examined by cross tabulation and Chi square tests were done to confirm statistical significance in the relationships. Further logistic regression analysis was conducted to determine the magnitude of significance of influence using variables that contributed significantly to birth weight (dichotomous variable); NBW (reference group) and LBW) as the predictor variables of the birth weight (confirmed from Chi square tests). Binary logistic statistics was used to examine these relationships to determine Odds of the maternal factors to influence baby's birth weight. The data analysis was done to interpret the data collected from the statements from the participants in the 7 FGDs and the resulting themes and sub themes facilitated understanding of the influence that maternal socio and cultural factors influenced maternal behavior leading to maternal malnutrition and subsequently low birth weight. This was done through interpretive analysis. Qualitative data was analyzed by reading of notes from focused group discussions interview scripts and picking out of key statements and breaking them down into codes. Coded data were organized and categorized into two major themes; poor health seeking behavior and lack of social support.

Approval of the study was sort and obtained from relevant bodies after explaining the purpose of the research. Voluntary Informed consent was sort from 223 respondents and FGD participants before structured interview was conducted to the selected individual respondents and confidentiality was assured to respondents.

## **Results**

The results of this study showed at strong influence of maternal characteristics; age, education, occupation, marital status, religion, residence, obstetric and cultural practices; use of herbal medicine, FGM, and the influence of these factors on babies' low birth weights and FGDs further affirmed the relationships. FGD were further used to explore further on the association between the LBW and independent variables and links that existed between these characteristics.

An estimated proportion of 25.6% of mothers attending selected health facilities had infants delivered with LBW (<2500gms) with thematic network showing links existing between maternal characteristics poor health care seeking behavior and lack of maternal psycho-social support and LBW from FGD participants.

## **Quantitative**

### **Maternal Factors Associated with Low Birth Weight of Infants**



Relationship between MUAC and birth weight of infants was strongly significant ( $\chi^2 = 5.528, p=0.019$ ) whereas no significant associations between height ( $\chi^2=83.127, p=0.655$ ) and weight ( $\chi^2=150.472, p=0.257$ ) and birth weight was shown in the present study. ANC attendance and birth weight was found to be significant ( $\chi^2 = 29.067, p<0.001$ ) while parity was not significant ( $\chi^2= 3.500, p=0.174$ ). There was association between marital status ( $\chi^2 = 154.127, p<0.001$ ), Mothers educational levels ( $\chi^2 =37.774, p<0.001$ ), area of residence ( $\chi^2 = 35.359, p<0.001$ ), mothers' occupation ( $\chi^2= 50.862, p<0.001$ ) revealed statistically significant relationship while religious affiliation ( $\chi^2 = 3.079, p=0.214$ ) showed no significant associated with LBW. FGM ( $\chi^2 = 28.580, p<0.001$  and use of herbal medicine ( $\chi^2 = 9.928, p=0.002$ ) were shown to have high potential to influence birth weight of infants.

**Maternal Factors Most Likely to Predict Low Birth Weight of Infants**

The collated results (Table 2) ,only six factors had significant odds of influencing LBW among infants in the study area; MUAC (B = 1.890, p=0.045) influence by close to about 6 ½ times; attendance to ANC (B=2.236 p<0.001) a likelihood to influence delivery of LBW by almost 9 and 1/3 times; maternal education level (B = 1.399, p=0.003) with observed Odds ratio(OR) of 4.050 showed that a unit decrease in education level increases the odds of delivering a LBW baby by close to 4 times and marital status (B=-5.647, p<0.001) showed Odds ratio of 0.004 indicating that a unit change in marital status has a very minimal chance of influencing a change in birth weight. FGM (B = 1.532, p<0.001) increases the odds of delivering low birth weight babies by close to 4 ½ times revealing a significant relationship with LBW.

Table 2: Maternal Characteristics Significantly Influencing Birth Weight of Infants

Maternal Characteristics	Variable	$\beta$	P-value*	Exp B (Odds Ratio)
Anthropometric factors	MUAC	1.890	0.045	6.617
Obstetric Factors	ANC	2.236	0.001	9.356
Socio-economic Characteristics	Marital status	5.647	0.001	0.004
	Mothers education level	1.399	0.003	4.050
Cultural Factors	Female Genital Mutilation	1.532	0.001	4.625

\*Binary Logistic Regression

**Qualitative**

The key drivers to poor maternal characteristic from further analysis of qualitative data revolved around; lack of social support, poor care seeking behavior and cultural beliefs and attitudes. It was evident from qualitative information that relationships between maternal factors influencing LBW were interlinked. Lack of social support coupled with poor health seeking behavior lead to poor maternal nutrition which was directly associated with low birth weight according to FGD participants.

**Recommendations and Areas for Further Study**



All nutrition and health stakeholders within the county to design interventions focusing on;

- behavior change communication on improving ANC,
- discouraging FGM and use of herbal medicine during pregnancy for women and adolescent girls,
- Community Mobilization and education,
- Conducting further research to explore on inter-relationships of maternal factors underlying and significantly contributing to mothers giving birth to LBW
- Including measures of mental health such as assessment of impact of stress/depression and social support allow for a fuller exploration of these relationships and isolate their effects in developing LBW and develop appropriate solutions.

## Conclusions

That a diversity of maternal characteristics was largely associated with low birth weight among babies in West Pokot County. Pregnant women had a high risk of social and cultural commitments modifying their care seeking behavior. There was evidence that mothers with LBW babies tended to have inferior characteristics and their socio-economic situations were largely inadequate. In addition they had a high likelihood of engaging in detrimental alternative cultural practices.

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