



The Prevalence of Malnutrition among Children under Five Years in Sanda Loko Chiefdom Karene District, Northwestern Sierra Leone

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Abstract

Introduction: Malnutrition in children under 5 years remains a significant public health challenge as it spurs child mortality and morbidity in developing countries, including Sierra Leone. Malnutrition is a significant public health problem of developmental concern with both health and socioeconomic consequences, and it contributes to under-five mortality and mortality. This mixed-method cross-sectional study aimed to explore the maternal factors of malnutrition in children under 5 years of age in Sanda Loko chiefdom.

Method: This mixed-method cross-sectional study was restricted to the under-five children of Sanda Loko, Chiefdom Karene District. A random sample was taken from the population, and a semi-structured questionnaire and interviews were used to collect data from June 2000 to June 2023. Data were analysed using Statistical Packages for the Social Sciences (SPSS), Version 22, and Microsoft Excel software.

Results: The study revealed a 14% prevalence of malnutrition among the under-five children in Sanda Loko, Chiefdom. Counselling on tube feeding (28%) was uncommon in Sanda Loko, Chiefdom. The study also found that counselling on planning and developing healthy eating habits and nutritional education was standard (59% and 62%, respectively). The only maternal factors that have a statistically significant relationship to the prevalence of malnutrition are the highest level of education of mothers ($\chi^2=33.974$, $p\text{-value}<0.0001$), the economic status of mothers ($\chi^2=28.941$, $p\text{-value}<0.0001$) and mother's access to three square meals ($\chi^2=61.887$, $p\text{-value}=0.001$).

Conclusion: Policymakers should develop educational interventions to improve the mother's nutritional knowledge.

Keywords: Malnutrition, children, Sanda Loko, Chiefdom Karene District, Sierra Leone.

Introduction

The issue of malnutrition and its effects on children's growth and wellbeing, as well as related issues like infant mortality and child welfare, is a significant public health challenge in developing countries. This challenge hinders these countries' ability to achieve positive health outcomes. It is closely linked to high rates of undernutrition, malnutrition, infant and maternal mortality, and overall development and wellbeing. According to the World Health Organization (WHO) (2020), in 2013, there were 178 million malnourished children globally, with 20 million suffering from severe malnutrition at any given time. Malnutrition contributes to the deaths of 3.5 to 5 million children under the age of five each year. Malnutrition can refer to deficiencies, excesses, or imbalances in a person's intake of energy and nutrients. There are two main types of malnutrition: over-nutrition, which is more common in developed countries and results in overweight, and under-nutrition, which includes wasting, underweight, growth retardation, low immunity, and oedema. Malnutrition among children under the age of five is a significant problem in developing countries, particularly in Sub-Saharan Africa, where 41% of children in this age group are malnourished and malnutrition-related deaths are on the rise. Malnutrition remains a significant public health concern in low-income countries, especially in Sub-Saharan Africa and South Asia (Kimokoti & Hamer, 2008).

Though the prevalence of malnutrition varies from one country to another and is more prevalent in developing countries, the situation is grimmer in countries like Sierra Leone, which still has one of the highest rates of both infant and maternal mortality rates in the world (WHO, 2020). The situation in the urban areas in terms of malnutrition and access to nutritious resources for children under five is a lot better; in the rural areas, the problem is generally grim, as mothers typically lack the financial means to afford the most basic food for their children who require specific protein or body-building food at their infant stage (WHO, 2020) infants mortality Report.

In Sierra Leone, malnutrition among children under five is still a prevailing phenomenon, which has significantly contributed to stunted growth among children, infant mortality, and poor growth. This has been made worse by the fact that malnutrition tends to prevail when there is an increase in food insecurity, absolute poverty, famine, ignorance, and poor maternal nutrition, all of which are among other major contributing factors for malnutrition. Accordingly, the nutritional status of children in Sierra Leone is generally poor; so, for instance, a recent report indicated that 30% of children in Sierra Leone under age five are stunted (short for their age), 5% are wasted (thin for their height), 14% are underweight (thin for their age), and 5% are overweighting (heavy for their height) (SLDHS, 2019). This is especially the situation for the rural population, where families lack the means and resources to provide their children with appropriate meals. Consequently, malnourished survivors are left with mental developmental delay, poor school performance, and reduced intellectual achievements-which have multiplying implications for the overall development of society.

This research would predicate and premise its focus and context exclusively in Karene district, which is undoubtedly one of the poorest districts in the country and has some of the worst public

health data growth indicators in Sierra Leone. The most dominant form of under-nutrition among children in Karene district is invariably PEM, which is clinically characterised as stunting, underweight with syndromes such as marasmus, marasmus kwashiorkor, and Kwashiorkor, features such as scanty hair, and oedema, especially of the feet, coupled with low immunity (Focus 1000, Infant Mortality Report, 2020). These forms of undernutrition account for between 19% among children under age 6 months and peak at 40% among children aged 24-35 months, and this, by every health indication, is a significant adverse health variable. Wasting is most prevalent (13%) among children aged 6-8 months and least pervasive (3%) among children aged 48-59 months, SLDHS (2019). Given their vulnerability status, children are more susceptible to a whole range of infections and their growth rate is easily affected by poor nutrition; hence, in most countries, their nutritional status measurements are a good indicator of overall community health (Galgamuwa, 2017). This study seeks to unravel the causes of malnutrition among children under five in Karene district and its consequential impacts on the health and wellbeing of the children, mothers, and the wider society.

Problem statement

In simple terms, the issue of undernutrition in children is a significant problem in countries like Sierra Leone, particularly for those who are impoverished. This is because poor nutrition or undernutrition in children is not only a cause of various diseases but also hurts their overall health. According to UNICEF (2009), approximately 195 million children under the age of five are stunted, and over 28 million suffer from severe acute malnutrition. Malnutrition hinders children from reaching their full physical and mental potential. The health consequences of prolonged malnourishment in children include delays in physical growth and motor development, lower intelligence, behavioural problems, deficient social skills, and increased susceptibility to diseases.

Additionally, child malnutrition is responsible for about 60% of deaths among children under the age of five in Sub-Saharan Africa. It is important to note that multiple factors influence a child's nutritional status, including illness, disease, and biological causes. Still, cultural, psychological, social, and political factors must be considered in the child's environment. This understanding has become fundamental to various social science research and practices. Mosley and Chen (1984) conducted a study on the causes of death in children in developing and low-income countries, where they identified risk factors within an analytical framework that includes the interactions among socioeconomic, cultural, environmental, and biomedical factors. This framework emphasises the importance of these factors in determining the risk of death, i.e. the proximity of the risk posed to the children.

Improved nutrition is a good platform for health, education, and eradicating inequality in any progressive society. Adequate nutrition ensures overall health, including physical, mental and cognitive development. In addition to all these factors, nutrition helps develop the immune system from a very early age. Therefore, it is crucial to provide proper nutrition right from the birth. Maternal nutrition is as essential as a child's nutrition because a healthy mother gives birth to a healthy child, and this eradicates the chances of malnutrition by high margins, but this, in reality, is not the case in Sierra Leone, data from the (2019) demographic health survey indicated

significant proportions of malnutrition both among mothers and children under the age of 5 across the country.

The early years of life are very vulnerable. The growth is very rapid at this age. The nutritional requirements of various nutrients, such as energy, protein, iron, and calcium, are high. Children fulfil these requirements through breast milk as well as complementary feeding. So, if infant and young child feeding practices are not proper, not giving a timely or inappropriate quantity as well as quality - this would ultimately lead to inadequate nutrition, and that further may lead to malnutrition and irreversible changes in nutritional status - which could have consequential implications on the health and wellbeing of the children.

The result from the Sierra Leone National Nutrition Survey (SLNNS) (2017) reported that the nutrition situation in the country is poor, with a global acute malnutrition (GAM) rate of 5.1%. Data from that survey provides a consistent, significant, and national database that can be used to analyse patterns of malnutrition in Sierra Leone. However, the survey did not provide complete data on the malnutrition situation of individual districts and chiefdoms. This study has shown that malnutrition is much more prevalent in rural parts of the country than in urban areas. The results also show that children's chronic malnutrition is highly prevalent in the entire region, with rates largely above 40 per cent. Sierra Leone has a deficit of food and limited food productivity despite the country's enormous potential for agricultural production, and this has significantly contributed, according to health NGO Focus 1000, to compounding malnutrition both among children under five and among lactating mothers and pregnant women across the country.

Purpose of the Study

The research aims to investigate the factors responsible for the prevalence of malnutrition among under-five children in Sanda Loko Chiefdom Karene District and to propose ways to mitigate its occurrence.

General Objectives

The general objective of this study is to assess the maternal factors associated with malnutrition among children under five years old in Sanda Loko, Chiefdom Karene District.

- To investigate how prevalent malnutrition is among the under-five children of Sanda Loko, Chiefdom
- To assess some of the maternal factors that influence malnutrition among under-five children in Sanda Loko, Chiefdom
- To investigate the available nutritional support services for parents and under-five children in Sanda Loko, Chiefdom
- To assess the relationship between maternal factors and the prevalence of malnutrition among under-five children in Sanda Loko, Chiefdom

Research questions

The study aims to answer the following research questions.

- RQ1: How prevalent is malnutrition among the under-five children of Sanda Loko, Chiefdom?
- RQ2: What are some of the maternal factors that influence malnutrition among under-five children in Sanda Loko, Chiefdom?
- RQ3: What are some of the nutritional support services available to the parents and under-five children of Sanda Loko, Chiefdom?
- RQ4: Is there a statistically significant relationship between maternal factors and the prevalence of malnutrition among under-five children in Sanda Loko, Chiefdom?

Analysis of Variables

Dependent variable

The prevalence of malnutrition in under-five children is the dependent variable.

Independent variables

- Maternal factors (i.e. the age of the mother, educational level of the mother, economic status of the mother, mother the head of the household, mother affected by any infection and mother's access to three square meals a day) and;
- Nutritional support services

Definitions Key of Terms

Prevalence of Malnutrition: This is measured against the standard weight of an under-five child (2.5kg.)

Maternal Factors: Refers to the age of the mother, educational level of the mother, economic status of the mother, mother the head of the household, mother affected by any infection and mother's access to three square meals a day.

Nutritional Support Services include nutritional education, tube feeding counselling, and planning and developing healthy eating habits.

Scope of the Study

The study considers children under five living in Sanda Loko Chiefdom Karene District. Children under five are usually the most at risk of malnutrition within households and communities in North-West Sierra Leone.

Limitations of the Study

One of the limitations of this study is the limited financial and human resources available at the disposal of the research team, who is currently a student. Undertaking research of this nature requires considerable financial resources to enable the research team to crisscross the length and breadth of the study location, and this potentially hamper accurate data collection. In any case, the research team is committed to ensuring that all the relevant research questions are covered in

the best way possible and that the overall accuracy and credibility of the final data are not tainted or undermined by any other considerations.

A second limitation of this research or study is the poor infrastructure in the study area. For instance, the lack of good roads in the area under review could constitute a challenge, which may hinder the research team from visiting all the proposed study areas.

Third, the research team is also acutely aware that he is not familiar with all of the local languages spoken in the proposed study area - and would therefore have to rely on the services of other people to help him in conducting interviews and data collection, but, that the language barrier may invariably undermine the accuracy or validity of some of the data, the research team would ensure that this challenge does not, however, undermine the overall outcome of this research.

The study relied only on anthropometric methods to assess malnutrition. It did not include biochemical tests that would have determined specific micronutrient deficiencies. The malnourished children were only captured from the PHU registers; those whose information is not in the PHU registers were not included in the study. The study only focuses on children under five years of age, not those above five years of age. The study was also limited to those who have lived in the Chiefdom for at least three months, so by implication, those who live less than three months in the study area are not covered by this study -whether they are malnourished or not.

Significance of the Study

This study evaluates the prevalence of undernutrition among Sanda Loko Chiefdom children and further explains the factors associated with severe malnutrition among undernourished children. Whereas some studies have been done that revolve around the malnutrition of children under five in the country, there has not been specific, context-based research that would irrefutably speak to data on the prevalence of malnutrition among children under five in the study area; this study is, therefore, a credible attempt to unravel factors responsible for the scourge of malnutrition in the study area.

The results from this study will significantly identify the significant causes of death in severely malnourished children. This study's findings would also help guide and facilitate interventions for severe forms of malnutrition to prevent early infant mortality. Also, by providing realistic evidence, the results of this study will contribute to the growing body of knowledge about the factors influencing malnutrition in under-five children. They could also affect the formulation of appropriate policies to address those factors. Relevant interventions could then be designed to mitigate the incidence of malnutrition in under-five children, not just in the Sanda Loko area but also in similar places across the country.

The results of this study will contribute to the growing body of knowledge about the factors influencing malnutrition in under-five children by providing numerical evidence. The study will also provide information that could be used for nutritional surveillance and targeting programs focusing more on at-risk populations, particularly under-five children. The study will make a

significant, irrefutable material contribution to future research by contributing to the existing literature, particularly on nutrition among children.

Literature Review

This chapter presents a review of the literature that was studied. The literature review aims to familiarise the reader with practical or theoretical issues relating to the problem and help the research team lay a foundation for the study. A literature review indicates what is known about an area of inquiry and suggests ways to study the topic of interest (Polit & Beck, 2012). This section, however, focuses on reviewing the literature of previous studies about the problem within the study locality and other areas. It discusses what has been accomplished, what is not clear, and what has not been done and points out the gaps in knowledge to be filled during the execution of this study.

Malnutrition among Under-Five Children

Research indicates that inadequate nutrition during childhood is a significant factor that hinders children's physical and mental development. This leads to a cycle of malnutrition that continues from one generation to the next. The effects of malnutrition in early childhood can have permanent consequences and extend into adulthood (Jesmin et al., 2011). This poses a significant threat to public health in developing countries. Proper nutrition is crucial for the development and wellbeing of children, particularly during the first two years of life. However, this period is often negatively impacted by factors such as insufficient growth, deficiencies in essential nutrients, and common childhood illnesses like diarrhoea and respiratory infections (Sotiraki et al., 2022). Recent data from Demographic and Health Surveys (2015) and (2019) shows a decline in the proportion of stunted and underweight children in Sierra Leone over the past few years. However, the prevalence of wasting remains unchanged, particularly in rural areas and impoverished communities where data is limited. Overall, there has been an improvement in the nutrition of people under five in the country.

Individuals can become undernourished either because they do not get enough of the correct nourishment to eat or are debilitated. Beyond this, the principal factors that poor households do not have access to water and sanitation or access to essential health services and that there are insufficient behavioural change interventions targeting women of reproductive age all play a part in the (Millennium Development Goal [MDG], 2011; Sioux Lookout First Nations Health Authority [SLFNSI] Plan, 2012, 2016). Sierra Leone has one of the highest malnutrition rates and child mortality rates in the world. More than one-third of children are chronically malnourished and underweight (22%), and 44% are stunted (SUN Movement Sierra Leone Report, 2015). Because of the conflict in Sierra Leone's recent past, malnutrition has recently come into focus as a concern.

Classifications of Malnutrition

Malnutrition in children can be stunting, wasting, or being underweight (Mahgoub et al., 2006). Children whose weight-for-age indicator is more than two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately

or severely underweight (WHO, 2011b). Children whose height/length-for-age indicator exceeds two or three standard deviations below the median for the international reference population (0-59 months) are considered moderately or severely stunted (World Bank, 2016). Children whose weight-for-height/length indicator exceeds two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately or severely wasted (Botswana Ministry of Health & UNICEF, 2019).

Pathophysiology of Malnutrition

According to Porter and Kaplan (2011), a decreased metabolic rate is the initial metabolic response to malnutrition. To supply energy, the body first breaks down adipose tissue. Later, when these tissues are depleted, the body may use protein for energy, resulting in a negative nitrogen balance. Visceral organs and muscles are broken down, and a decrease in weight occurs. Loss of organ weight is most significant in the liver and intestines, intermediate in the heart and kidneys, and least in the nervous system.

Children who are malnourished are at far greater risk of contracting pneumonia, measles, diarrhoea, malaria, and HIV/AIDS and of dying from these conditions (Save the Children, 2016). Malnutrition affects a child's growth, morbidity, mortality, cognitive development, and physical work capacity. It also impacts human performance, health, and survival (Mahgoub et al., 2006).

Child Malnutrition in Sierra Leone

A survey conducted by specific, measurable, achievable, realistic, and time-bound (SMART, 2010), which essentially utilised data generated from the (Sierra Leone Demographic Health Survey [SLDHS], 2013), conducted which was carried out in collaboration with the Ministry of Health and Sanitation, in that survey, a total of 13,006 households were targeted, involving 16,658 female and 7262 male respondents. The survey included women aged 15-49 and men aged 15-59 from randomly chosen households as its target groups. Data on children under 5 years old, including their weight and height, were also collected from eligible women. The survey used a multistage sampling design, with a two-stage design in rural areas and a three-stage design in urban areas. The overall prevalence of underweight children in 2015 was found to be 16%, while the prevalence of stunting was 38%. There was a significant difference in the prevalence of underweight and stunting between the urban poor and non-poor. Poor children had higher rates of underweight (18%) and stunting (40.5%) compared to non-poor children (13.4% underweight and 32.7% stunting). The study concluded that household income played a significant role in the disparity of malnutrition factors. However, the study did not investigate whether factors such as the mother's age, education, cultural food habits, or religious beliefs were connected to malnutrition, particularly in rural areas of Sierra Leone. The survey also found that poor Mende children had higher rates of underweight (18.6%) and stunting (44.7%) compared to other ethnic groups. However, the reasons for this were not adequately explained, and other major ethnic groups were not thoroughly evaluated. Poor children with illiterate mothers had a higher risk of underweight (18.5%) and stunting (40.7%) compared to those with mothers who had at least a secondary education. Additionally, poor children whose mothers were unemployed and had no access to media had a higher risk of being underweight and stunted. Bangura (2013)

conducted a comprehensive study on the underlying causes of child mortality and malnutrition in the Western Rural areas of Sierra Leone.

In 2013, Bangura conducted a comprehensive study in the Western Rural Region of Sierra Leone to investigate the causes of child mortality and malnutrition and identify the factors contributing to these issues. The study involved over 2000 participants, predominantly women, surveyed through questionnaires, interviews, and focus group discussions. The research revealed that low economic income, illiteracy, cultural beliefs and habits related to food consumption by parents, and limited access to proper nutrition are all associated with both child mortality and malnutrition.

Child-related Factors of Under-five Malnutrition

Research teams have found several demographic variables that significantly influence malnutrition in the under-five age group. However, the study focused on a few of them, including the child's sex, age, birth order, birth interval, and mother's age at birth.

Sex of Child

From the reviewed literature, there is a consensus that malnutrition among under-five children is more significant among boys than girls. The cause of this discrepancy is not well established in the literature, but it is believed that boys are more influenced by environmental stress than girls (Henry et al., 2007; Sarmistha, 1999). According to a study done in Kwara State, Nigeria, Babatunde (2011) reported that there was a significant relationship between the sex of a child and malnutrition; male children were more likely to be malnourished than their female counterparts. This is probably due to increased attention paid to female children, unlike male children.

Another study done in Botswana revealed that stunting, wasting and underweight were also significantly more prevalent among boys than girls (Salah & Nnyepi, 2017). Olwedo et al. (2008), on the factors associated with malnutrition in internally displaced persons camps of Northern Uganda, indicated that a male child was nearly two times more likely to suffer from acute malnutrition compared to a female child (Adjusted OR of 1.56, [CI: 1.15-2.13], $p=0.004^{**}$). This situation could be because boys are rare at home, given that they tend to be active running around in the neighbourhood compared to female children, who, in most cases, eat whatever small feeds their mothers got since they are always with them at home.

Age of Child

Recent studies have found that younger children are less likely to be malnourished than older children. In the growth life cycle of children, weaning and less breast milk make them more vulnerable to under-five malnutrition. However, after weaning, the children get adequate nutrition when they get used to complementary feeding (Shrimpton et al., 2001). It is important to note that at specific ages, children's nutritional status is sensitive to feeding, weaning practices, care, and exposure to infection. A cumulative indicator of growth retardation (height-for-age) in children is positively associated with age. A study done in Ethiopia has also shown an increase in malnutrition with an increase in the age of the child (Yimer, 2014).

The findings are similar in Sanda Loko chiefdom, where children aged 37-48 months were five times more likely to be underweight than their counterparts aged less than 12 months. A study conducted by Nguyen and Kam in Vietnam found that the risk of malnutrition increases with the age of a child. Children in the youngest age group, 0-11 months, had a significantly lower risk of being stunted, underweight and wasted than children in the older age groups, Nguyen and Kam. (2008). The low risk of malnutrition may be due to the protective effect of breastfeeding since almost all children are breastfed throughout the first year of life. Higher malnutrition rates after 12 months are linked to inappropriate food supplementation during the weaning period.

According to UBOS and Macro International (2007), malnutrition in children increases as they age during the first three years of life but then decreases in the fourth and fifth years. The increase is especially significant in the first two years, with the percentage rising from 13% among children aged 6-8 months to 45% among children aged 18-23 months. This could be because parents tend to give less attention to older children when they have a new child who requires more care and attention. Similar findings have been reported in other countries, such as Kwara State in Nigeria (Babatunde, 2011) and rural India (Sarmistha, 1990). These findings are reasonable considering that many younger children are still being breastfed, and chronic malnutrition typically occurs after weaning (Babatunde & Qaim, 2010).

Birth Order

Research findings indicate that malnutrition is rare among under-five children of birth order 2-3 and that higher birth order (5+) is positively associated with child malnutrition, Sommerfelt et al., (1994); Jeyaseelan, (1997). In a study carried out among 6939 children under five years old in Bangladesh, the prevalence of stunting increased with birth order; hence, most of the children who were of birth order more than two had greater chances of stunting and wasting, Rayhan and Hayat., (2006). Worthy to note is that few studies, according to the literature research, have been conducted on the subject of childbirth order and malnutrition among under-five children. UNICEF (2014) found it relatively easy to get actual information concerning birth order because the respondents found it easy to recall. After all, they could quickly tell by looking at their children.

Birth Interval

In another study conducted in Bangladesh, children within the first birth interval were 1.66 times more likely to be stunted, and children whose preceding birth interval was less than two years were 1.32 times significantly more likely to be stunted as compared to children of a preceding birth interval 24 months or above. Similar results were observed for underweight children (Nure et al., 2011). The study indicated that preceding birth intervals and child stunting were statistically significant ($p < 0.05$). Preceding birth intervals of 18-35 months had a marginally positive significance on stunting, whereas the interval of more than 48 months shows a negative relationship.

According to UBOS and Macro International (2017), malnutrition is highest if the birth interval is less than 24 months (41 per cent) since it is an essential indicator of the nutritional status of

children. Childbirth intervals were statistically insignificant in the study conducted in another study conducted by Focus 1000 in Waterloo and its outlying communities, so data on this are insufficient to gauge; it is quite likely that given the economic and educational status of the population at Sanda Loko, they could be intense correlation child interviews and malnutrition.

Mother's age at birth

The age of mothers at the time of giving birth has been linked to malnutrition in children under the age of five. For instance, a study conducted in Bangladesh found that children whose mothers were under 20 years old when they gave birth were 1.22 times more likely to experience stunted growth, wasting, and being underweight compared to children whose mothers were 20 years old or older when they gave birth (Nure et al., 2011). Similarly, Bachou (2006) identified several common risk factors for protein-energy malnutrition, including severely malnourished infants born to young mothers who had low birth weight and limited access to breastfeeding, which is crucial for the infants' protein intake. Additionally, the study found that 34% of children received supplementary food by three months, and some mothers stopped breastfeeding earlier than recommended. Several studies have reported that a mother's age at birth is one of the most important determinants of malnutrition among under-five children. It has been suggested that the risk is more significant in younger mothers, particularly those below 24 years because they are not ready to take care of the child, including providing all the necessary attention required for the baby.

Also, under-five malnutrition is higher among children whose mothers give birth when they are older, especially after 35 years. This is because giving birth at an older age is associated with a higher likelihood of giving birth to babies with a low birth weight (Shrimpton et al., 2001; Jeyaseelan, 1997). However, it is essential to note that children of younger mothers are traditionally cared for by their grandmothers in Turkey, and this was associated with low levels of malnutrition among children of younger mothers less than 24 years old (Ergin et al., 2007).

Maternal Education

The mother's education level affects the child's nutrition through her choices and health-seeking skills related to food, hygiene, preventive care, and disease treatment. The mother's responsibility to care for herself during pregnancy and her child through the most vulnerable stages of their life significantly affects under-five child malnutrition. Several studies have found that mothers' education is associated with good nutrition practices, particularly under-five child nutrition (Babatunde & Qaim, 2010; Olwedo et al., 2008). These studies have pointed out that most women with low education spend more time in gardens and feed their children less nutritious foods.

Women who spend more time gardening have limited time to attend to their children and prepare nutritious meals, unlike their educated counterparts, who usually focus on good child nutrition practices even when they are absent from home most of the time. According to Sommerfelt et al. (1994), there is a negative association between the mother's education and under-five child malnutrition. The higher the level of a mother's education, the lower the percentage of under-five

children classified as undernourished. According to the study, malnutrition was most prevalent among children whose mothers attended primary school. With the increasing level of mothers' education, the proportion of children who are malnourished goes down, as found in the (Uganda Demographic and Health Survey, 2011; UBOS and Macro International Inc., 2017). This result is consistent with the findings of Webb and Block (2004), which highlighted the importance of human capital investment in improving child nutrition status. This implies that educated mothers are better aware of the nutrition requirements of their children by providing improved health care (Babatunde, 2011).

According to Lisa (2000), a mother's education has several potentially positive effects on the quality of care of children and, consequently, malnutrition. More educated women can better process information, acquire skills and model positive caring behaviours. More educated women tend to be better able to use healthcare facilities to interact effectively with healthcare providers, comply with treatment recommendations and keep their living environment clean. Education also increases women's ability to earn income, but this increases the opportunity cost of their time, which may mitigate against some important caregiving behaviours, such as breastfeeding.

Marital Status

In the study about mothers' marital status and under-five child nutrition, findings in Ethiopia reveal that child malnutrition is significantly associated with marital status. It was found that under-five child malnutrition is higher among unmarried rural and divorced/separated women compared to married ones (Teller, 2000). Similarly, being a married mother was positively associated with good nutritional status among children under five years in the Volta region of Ghana (Appoh & Krekling, 2005). Contrary to the above, a study in Tanzania revealed that mothers who are married were more likely to have undernourished children, unlike those who were unmarried, perhaps because of the cost of maintaining families; hence, sometimes these families fail to produce nutritious supplements for the under-five children (Johnson et al., 2015).

Maternal Occupation

Previous studies have found that mother's occupation is one of the determinants of under-five malnutrition in most developing countries. A study in Vietnam revealed that children from mothers who were labourers or farmers and housewives had a greater prevalence of stunting, underweight and wasting than those from mothers who worked in office or were housewives, Nguyen and Kam, (2008). This is because working mothers rarely get time to take care of their children. They also leave their children at home with other siblings who may neglect to feed them following the right frequency, and this sometimes worsens the problem of malnutrition. It is also common for mothers to fail to provide complementary feeds, including protein foods, since most of them cannot afford them (Olwedo et al., 2008; Rukundo, 1998). Such findings are accurate, especially among peasant farmers in Karene district in Sierra Leone.

A Review of Child Malnutrition

According to the World Health Organization (WHO), findings cited in a study by Nzala et al. (2011) showed that 60% of all deaths occurring among children aged less than 5 years in

developing countries can be attributed to malnutrition. Based on recent estimates, 115 million children under 5 years of age worldwide are malnourished, and about 178 million others are too short for their age or stunted (WHO, 2018).

Nzala et al. (2011) estimated that 50% of children aged 12 to 15 months are malnourished, and more than one-third of children less than 5 years are stunted. Murray (2020) found that there has been an increase in malnutrition cases among children in India in recent years. His study estimated that 85% of children are suffering from malnutrition, and some of them are recovering from malnutrition. This verifies that malnutrition is still a challenging health problem that needs further studies to identify the underlying factors contributing to malnutrition's persistence in world society. However, it may also be hypothesised that social transformation and complexity of social activities have undermined parental care and responsibilities for the children, which is resulting in malnutrition as a health problem.

Nzala et al. (2011) conducted a cross-sectional study to determine associations of demographic, cultural and environmental factors with the frequency and severity of malnutrition among children under 5 years of age in Zambia. The research teams used data from the Zambia Multiple Indicator Cluster Survey of 1999-2000 and included 6,142 children in the survey. Their study discovered that child malnutrition was associated with the male gender, a low education level on the part of the householder and mother, poverty, incomplete vaccination status, and the type of toilet used by the child.

A population-based multicenter nested case-control study conducted by Shargi et al. (2011), which included 76 underweight children and 76 controls in the city of Namin in Iran, showed that the female gender, poverty, short maternal height, and the use of unhygienic latrines in the home were significantly associated with childhood malnutrition. In an age-matched case-control study including 102 severely malnourished under-five children and 102 well-nourished children, Amsalu and Tigabu (2006) found that severe acute malnutrition in Ethiopia was independently associated with a lack of exclusive breastfeeding for the first six months of life and late initiation of complementary diet.

To assess the nutritional status and to determine potential risk factors of malnutrition in children under 3 years of age in the Northern Town of Hillara, in Northern Nigeria, Hien and Kiburu (2009) conducted a cross-sectional descriptive survey using a structured questionnaire and measurements of weight and height of children aged 6-36 months. The research found that region of residence (urban or rural), ethnicity, mother's occupation, household size, mother's body mass index, number of children in the family, weight at birth, time of breastfeeding initiation, and duration of breastfeeding were significantly correlated with child malnutrition.

Turyashemerwa et al. (2009) assessed using a cross-sectional descriptive study using both qualitative and quantitative methods of data collection, the prevalence of malnutrition and the factors influencing the nutritional status of children under 5 years of age in a peri-urban environment in Kabarole District in western Uganda. They administered a questionnaire to 93 caretakers of children aged 6-59 months in randomly selected households and held focus group discussions with a few selected participants. The findings from their study revealed that the

education level of the mother/caretaker, age of the child, receipt of information on child feeding, and time of introduction of other foods were significantly correlated with child stunting.

Mahgoub et al. (2006) conducted a cross-sectional descriptive survey using a structured questionnaire and measurements of the weight and height of children. Four hundred households and mothers of children under 3 participated in the study, whose objective was to evaluate the level of malnutrition and the impact of some socioeconomic and demographic factors of households on the nutritional status of children under 3 years of age in Botswana. The study revealed that malnutrition was significantly higher among boys than among girls, underweight was less prevalent among children whose parents were involved in informal business, children brought up by single parents suffered from underweight to a significantly higher level than children living with both parents, the prevalence of underweight decreased significantly as family income increased, the higher the level of the mother's education, the lower the level of child underweight observed. Breastfeeding was found to reduce the occurrence of underweight among children.

The research team has noticed the following limitations from the above-mentioned studies. In some of the studies, participants were restricted to children under 3 years of age (Hien & Hoa, 2009); Mahgoub et al., 2006). Nnyepi et al. (2010), Nzala et al. (2011), Turyashemererwa et al. (2009), and Rayhan and Khan (2006) applied a cross-sectional study design to investigate the factors associated with child malnutrition in their respective investigations. Joubert and Ehrlich (2007) report that although cross-sectional studies are relatively easy and economical to conduct and help evaluate the relationships between exposures that are relatively fixed characteristics of individuals, they also have some limitations. Cross-sectional studies cannot distinguish between factors that cause the disease and factors that prolong the period of the disease. Compared to cohort studies and case-control studies, cross-sectional studies provide weaker evidence about disease causation and do not assess and compare the occurrence of new disease cases (incidence) in the group of people with and without the disease.

In the current study, the research team extended the age of participant children up to 59 months and applied a case-control study design because of budget and time constraints (a cohort study is costly and time-consuming). Another reason for choosing this study design is that the research team wanted to provide more substantial evidence about the causation of malnutrition than has been the case in previous cross-sectional studies. He also wanted to assess and compare the occurrence of new cases of underweight (incidence) in two groups.

Methodology

Research methodology refers to how a research problem can be solved systematically through exhaustive investigation (Gagliardi et al., 2016). The methodology used in the study takes a qualitative and quantitative (mixed-methods research) approach. Quantitative research is a formal, objective, systematic process using numerical data to obtain information about the world (Burns & Grove, 2005). The choice of this research paradigm was justified by the fact that the purpose of the study is to fundamentally examine the factors responsible for the prevalence of malnutrition among under-five children in the Sanda Loko Chiefdom Karene District.

Study Design

This research employed a mixed cross-sectional and phenomenological design to identify the maternal factors contributing to the prevalence of malnutrition in under-five children in the Sanda Loko, Chiefdom Karene District. It was essentially and almost exclusively a community- and health facility-based study in which health workers and parents/caretakers were interviewed at the community and the Sanda Loko health facility centre.

Study Setting

This study was conducted in Sanda Loko Chiefdom, Karene District. Sanda Loko, Chiefdom was selected invariably because of its huge population size. It has by far the largest concentration of people than any other Chiefdom in Karene District (Source: 2021MTPHC). This large population enabled the research team to access many able and willing respondents from various demographics. Sanda Loko Chiefdom is in Karene District in the North Western Province of Sierra Leone.

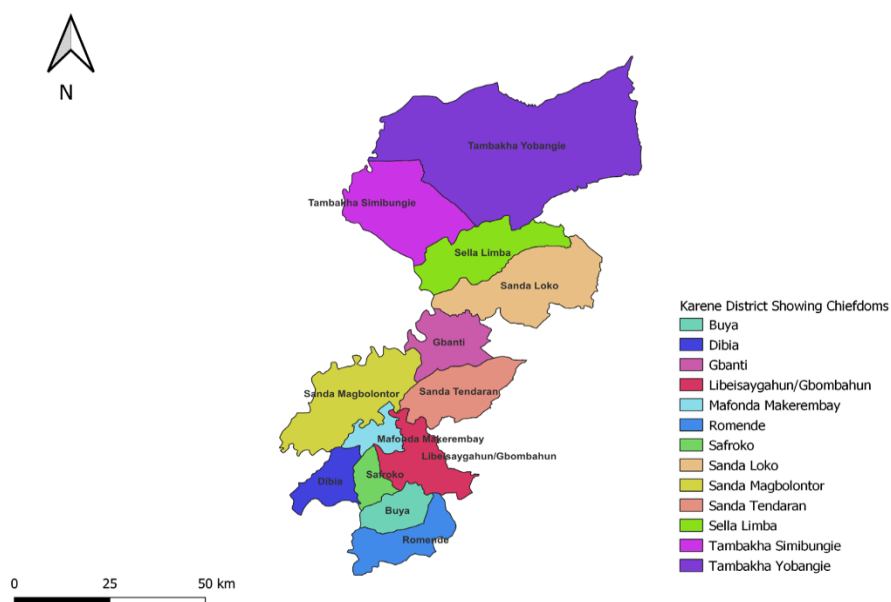


Figure 4: Sanda Loko, Chiefdom Karene District, North Western Province of Sierra Leone, District Map

Population and Sample Selection

The sample was selected from a random sample of health workers, parents and caretakers of children under 5 years attending reproductive and child health clinics in Sanda Loko. A cross-sectional study was conducted among Health workers and Parents/caretakers who were conveniently selected from a couple of child Health clinics.

The inclusion criteria for the Parents/caretakers were:

- The child must have been residing in Sanda Loko for at least three consecutive months before the study was conducted.

- Children had to be under the age of 5 years and had to have had a first-time diagnosis of moderate or severe malnutrition at any Sanda Loko Child Health Clinic from June (2022) to June (2023).

The inclusion criteria for the Health Worker were:

- The health worker had to have been working in the Department of Reproductive and Child Health for not less than three consecutive months
- The health worker had to be knowledgeable about the diagnosis of children suffering from malnutrition

Sample Size Calculation and Sample Size

The random sample size for this study was calculated using the formula for cross-sectional study. Based on the 5.5% malnutrition prevalence in a study done in Sierra Leone (Ghazzawi et al., 2022), the formula is:

$$n = \frac{z^2 p (1-p)}{\epsilon^2}$$

Where n =expected minimum sample

z = standard, corresponding to 95% confidence; 1.96

P= prevalence of malnutrition 5.5%

ε = maximum likely error is taken as 4%

Hence, the minimum sample size calculated was 124.

The study employed a semi-structured questionnaire for the quantitative data collection and an interview guide for the key informant interviews (qualitative data collection).

Sampling Technique

Streefkerk(2023) argued that the sampling technique of selecting a part of the aggregate or totality is based on which a judgment or inference about the aggregate or totality is made. It selects a group of people, events, behaviours, or other elements to conduct a study.

Primary Data

Primary data can be defined as fresh information gathered for the first time that happens to be original. Streefkerk(2023) described primary data as the original research work or raw data without interpretation or pronouncements presented in official opinion or position. Face-to-face interviews were conducted with parents and caregivers to obtain the quantitative data for this study. In contrast, key informant interviews were conducted with nurses to obtain the qualitative data for this study.

Secondary Data

Secondary data are those obtained from a literature source. They are data that others have already collected for other purposes. This is second-hand information and includes published information (Streefkerk, 2023).

The research teams would use secondary data in this study, mainly from clinics and other hospitals or medical facilities at Sanda Loko. Where necessary and applicable, the research team would also consult and use existing relevant secondary literature from open or public sources.

Validity and Reliability of the Research Instrument

Validity was used to determine whether the research was measured, what it intended to measure, and to approximate the truthfulness of the results—validity concerns whether the findings are really about what appeared (Saunders et al., 2009). The study ensured that only valid questions were asked. Reliability is the consistency of measurement or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects. Reliability of the instrument refers to the degree to which the instrument consistently measures whatever it is measuring.

Ethical Procedures

The study was conducted after the School of Postgraduate Studies of the University of Makeni approved the research proposal. The hospital administration was asked to grant permission to conduct the study at the Kabala Government Hospital. All the study participants obtained Consent to participate through an informed consent form. The confidentiality of the participants was ensured by identifying them using unique identifier codes rather than their names and conducting a one-on-one interview.

Data Analysis Plan

Data generated for this study was presented for a complete sample. Software packages like SPSS, Excel, GoogleGIF Maker, and Flourish were used to analyse and present the data. Data generated from the field was cleaned by removing duplicate or irrelevant observations, fixing structural errors like typos and incorrect capitalisation, checking for outliers and filtering them when found, handling missing data, and validating the data to see if the data collected made sense. Once this was complete, the necessary coding was done before the data was analysed.

Data Presentation of Findings

This paper analyses the data gathered for the study “Factors Affecting Malnutrition of Under-five Children in Sanda Loko, Chiefdom.” The study employed quantitative and qualitative research approaches to obtain the required data.

Quantitative Data Analysis

The quantitative data collected during this study have been presented in the following order: response rate, socio-demographic characteristics of the under-five children of Sanda Loko chiefdom, and presentation of research findings relating to research questions.

Response Rate

One hundred respondents participated (100), yielding an 80.6% response rate out of the 124-sample size estimated for this study.

Socio-demographic Characteristics of the Under-five Children of Sella Limba, Chiefdom

This subsection presents findings on the socio-demographic characteristics of the under-five children of Sanda Loko chiefdom. The findings have been presented in the following order: age, gender, and current weight.

Age of the Under-five Children of Sanda Loko Chiefdom

Figure 4.1 below shows that most of the under-five children in the study area whose parents do post-natal visits in the study area (Sanda Loko, Chiefdom) are above 12 months old $n= 50$, (50%), followed by those between 6 to 12 months $n= 42$, (42%) and then below 6 months $n= 8$, (8%).

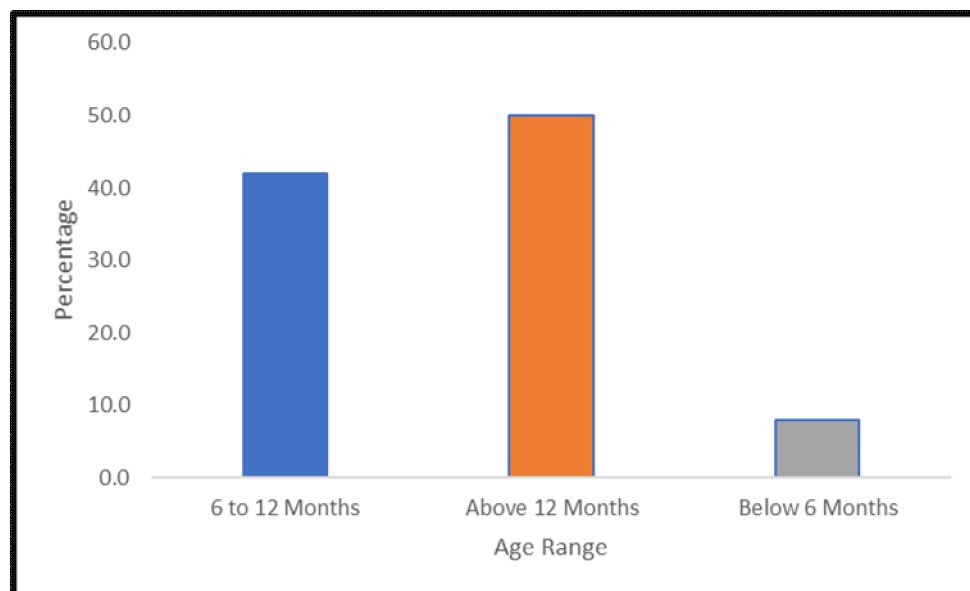


Figure 4.1: Age of the Under-five Children of Sanda Loko Chiefdom

Gender of Children of the Under-five Children of Sanda Loko Chiefdom

Figure 4.2 below shows that most of the under-five children in the study area whose parents do post-natal visits in the study area (Sanda Loko, Chiefdom) were males, $n= 58$, (58%) followed by females, $n= 42$, (42%).

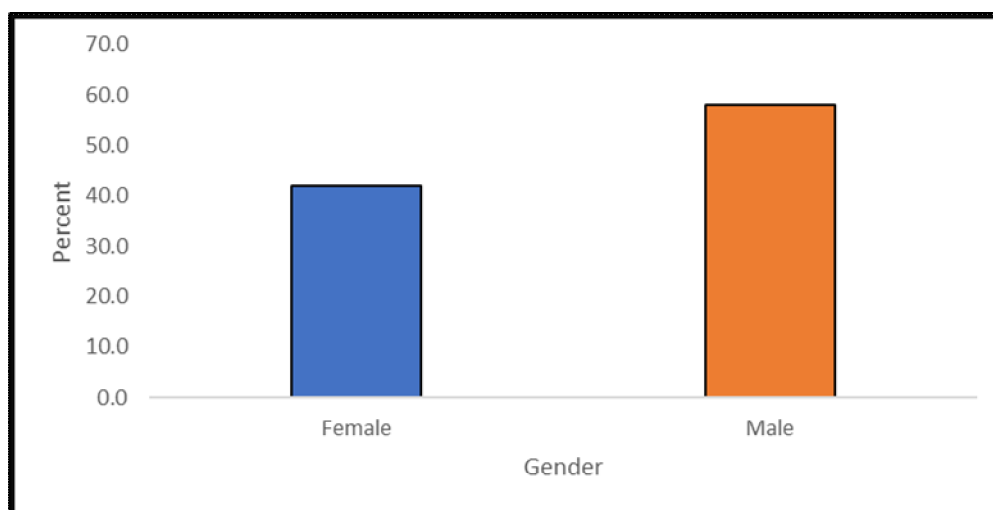


Figure 4.2: Gender of the Under-five Children of Sanda Loko Chiefdom

Birth Weight of the Under-five Children of Sanda Loko Chiefdom

Figure 4.3 below shows that the birth weight of most of the under-five children in the study area (Sanda Loko Chiefdom) whose parents do post-natal visits is either 25kg or above ($n=73$, 73%), followed by those with a birth weight below 25kg ($n=27$, 27%). This finding suggests that most children whose parents do pay post-natal visits in the study area do not have high birth weights.

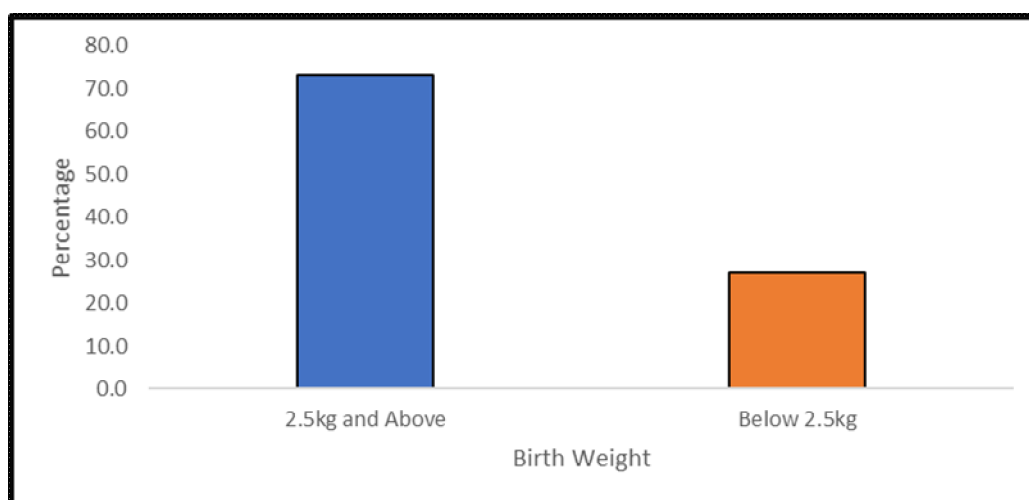


Figure 4.3: Birth Weight of the Under-five Children of Sanda Loko Chiefdom

Current Weight of Child by Age of the Child

Table 1 below presents findings on the current weight of the children whose parents do post-natal visits in the study area (Sanda Loko Chiefdom) by age. Table 1 shows that children's weight between 6 to 12 months is between 7.5kg to 10kg ($n=40$, 95.2%), followed by those between 2.5kg to 7.4kg ($n=2$, 4.8%). For those children who are above 12 months old, the current weight of most of them is above 10kg ($n=40$, 80%), followed by those between 7.5kg to 10kg ($n=10$, 20%) and for those children below 6 months, half of them have weights between 2.5kg to 7.4kg ($n=4$, 50.0%) and the other half have weights below 2.5kg ($n=4$, 50%). The findings in Table 1 suggest that most of the children in the study can have normal or required weight.

Table 1: Current Weight of Child by Age of Child

Current Weight of Child	Age of Child			Total
	6 to 12 Months	Above 12 Months	Below 6 Months	
2.5kg to 7.4kg	2(4.8%)	0(0.0%)	4(50.0%)	6(6.0%)
7.5kg to 10kg	40(95.2%)	10(20.0%)	0(0.0%)	50(50.0%)
Above 10kg	0(0.0%)	40(80.0%)	0(0.0%)	40(40.0%)
Below 2.5kg	0(0.0%)	0(0.0%)	4(50.0%)	4(4.0%)
Total	42(100.0%)	50(100.0%)	8(100.0%)	100(100.0%)

Presentation of Research Findings Related to Research Questions

This subsection presents data on the research findings related to the following research questions:

- RQ1: How prevalent is malnutrition among the under-five children of Sanda Loko Chiefdom?
- RQ2: What are some of the maternal factors that influence malnutrition among under-five children in Sanda Loko chiefdom?
- RQ3: What are some of the nutritional support services available to the parents and under-five children of Sanda Loko Chiefdom?
- RQ4: Is there a statistically significant relationship between maternal factors and the prevalence of malnutrition among under-five children in Sanda Loko chiefdom?

The findings are presented in the following order below:

Presentation of Research Findings Related to Research Question 1

This subsection answers the study question, “How prevalent is malnutrition among the under-five children of Sanda Loko Chiefdom?” The results are presented below in chronological sequence.

Malnutrition Status of the Under-five Children of Sanda Loko Chiefdom

Table 2 provides the malnutrition status of the children under 5 years of age. Of the 100 sample participants selected, most children (86%, $n=86$) were not malnourished, while 14% ($n=14$) were.

Table 2: Malnutrition Status of the Under-five Children of Sanda Loko Chiefdom

Malnutrition Status of Child	Frequency	Per cent
Malnourish	14	14.0
Not Malnourish	86	86.0
Total	100	100.0

Age of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status

Table 3 aggregates the ages of Sanda Loko and Chiefdom children by their malnutrition status. Findings in Table 3 show that among the 14 malnourished children sampled for this study, the prevalence of malnutrition is highest ($n=8$, 57.1%) among children above 12 months, followed by those below 6 months ($n=4$, 28.6%) and then those between 6 and 12 months ($n=2$, 14.3%).

Table 3: Age of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status

Variable	Response	Malnutrition Status of Child		Total
		Malnourish	Not Malnourish	
Age of Child	6 to 12 Months	2(14.3%)	40(46.5%)	42(42.0%)
	Above 12 Months	8(57.1%)	42(48.8%)	50(50.0%)
	Below 6 Months	4(28.6%)	4(4.7%)	8(8.0%)
	Total	14(100.0%)	86(100.0%)	100(100.0%)

Gender of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status

Table 4 is an aggregated analysis of the gender of the children of Sanda Loko Chiefdom by their malnutrition status. Findings in Table 4 show that among the 14 malnourished children sampled for this study, the prevalence of malnutrition is highest ($n= 8$, 57.1%) among male under-five children compared to female under-five children ($n= 6$, 42.9%).

Table 4: Gender of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status

Variable	Response	Malnutrition Status of Child		Total
		Malnourish	Not Malnourish	
Gender of Child	Female	6(42.9%)	36(41.9%)	42(42.0%)
	Male	8(57.1%)	50(58.1%)	58(58.0%)
	Total	14(100.0%)	86(100.0%)	100(100.0%)

Birth Weight of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status of Child

Table 5 is an aggregated analysis of the birth weight of the children of Sanda Loko Chiefdom by their malnutrition status. Findings in Table 5 show that among the 14 malnourished children sampled for this study, malnutrition prevalence is highest ($n= 12$, 85.7%) among children with birth weights that are above 25kg and followed by those with birth weights below 25kg ($n= 2$, 14.3%) and then those between 6 to 12 months ($n= 2$, 14.3%). The findings in Table 5 imply that malnutrition is higher among children born with high birth weight than those with low birth weight.

Table 5: Birth Weight of the Under-five Children of Sanda Loko Chiefdom by Malnutrition Status of Child

Variable	Response	Malnutrition Status of Child		Total
		Malnourish	Not Malnourish	
Birth Weight of Child	2.5kg and Above	12(85.7%)	61(70.9%)	73(73.0%)
	Below 2.5kg	2(14.3%)	25(29.1%)	27(27.0%)
	Total	14(100.0%)	86(100.0%)	100(100.0%)

Presentation of Research Findings Related to Research Question 2

This subsection answers the study question, “What are some of the maternal factors that influence malnutrition among under-five children in Sanda Loko chiefdom?” The results are presented below.

Maternal Factors of Under-five Malnutrition in Sanda Loko Chiefdom

The univariate analyses describing maternal factors of under-five malnutrition in Sanda Loko chiefdom are presented in Table 6 below. Of the 100 sampled mothers selected for this study (47%, $n=47$) were between the ages of 26 to 35 years (41%, $n=41$) were between 15 to 25 years and (12%, $n=12$) were between 36 to 45 years. Moreover, (56%, $n=56$) of these mothers never attended school (21%, $n=21$), attended up to secondary level (19%, $n=19$), went up to primary level and (4%, $n=4$) tertiary level.

Table 1 further shows that the economic status of (36%, $n=36$) of the sampled mothers for this study is average, while the economic status of (64%, $n=64$) is poor. Based on whether the mother is the head of the household, only (9%, $n=9$) of these sampled mothers are the heads of their households, while (91%, $n=91$) are not. On breastfeeding type received by the children (44%, $n=44$) received breastfeeding plus water, 35% ($n=35$) received exclusive breastfeeding, while (21%, $n=21$) received breastfeeding with water and other foods. Regarding whether mothers are affected by any infection, most of the mothers sampled for this study (52%, $n=52$) stated that they were not affected by any infection, while (48%, $n=48$) stated they were affected. Mothers with access to three square meals a day (87%, $n=87$) cannot access 3 square meals a day, while only (13%, $n=3$) can afford them.

Table 6: Maternal Factors of Under-five Malnutrition in Sanda Loko Chiefdom

Variable	Response	Frequency	Per cent
Age of Mother	15 to 25 years	41	41.0
	26 to 35 years	47	47.0
	36 to 45 years	12	12.0
	Total	100	100.0
Educational Status of Mother	Never Attended School	56	56.0
	Primary	19	19.0
	Secondary	21	21.0
	Tertiary	4	4.0
	Total	100	100.0

Economic Status of Mother	Average	36	36.0
	Poor	64	64.0
	Total	100	100.0
Is the Mother the Head of the Household?	No	91	91.0
	Yes	9	9.0
	Total	100	100.0
Breastfeeding Type	Breastfeeding with Water Only	44	44.0
	Breastfeeding with Water and other Foods	21	21.0
	Exclusive	35	35.0
	Total	100	100.0
Mother Affected by Any Infection	No	52	52.0
	Yes	48	48.0
	Total	100	100.0
Access to Three Square Meal a Day	No	87	87.0
	Yes	13	13.0
	Total	100	100.0

Presentation of Research Findings Related to Research Question 3

The study question “ What are some of the nutritional support services available to the parents and under-children of Sanda Loko Chiefdom?” is answered in this subsection. The results are presented below:

Nutritional Support Services

Table 7 below presents findings on the various nutritional support services received by the sampled mothers for this study. Table 7 shows that most (59%, $n=59$) of these mothers have received counselling on planning and developing healthy eating guidelines, while (41%, $n=41$) have not. The result further revealed that of the 59 mothers who claimed to have received counselling on planning and developing healthy eating guidelines, only (22.0%, $n=13$) have always received such counselling (64.4%, $n=38$) stated seldom, and (13.6%, $n=8$) said they could not remember how often they do receive counselling on planning and developing healthy eating guidelines.

Most (72%, $n=72$) of the mothers sampled for this study claimed not to have been counselled on tube feeding, while (28%, $n=28$) claimed to have been counselled. The findings further revealed that of the 28 sampled mothers who have received counselling on tube feeding, it was recommended to (60.7%, $n=17$) that tube feeding is better than hand feeding (25.0%, $n=7$) that hand feeding is better than tube feeding and (14.3%, $n=4$) stated they cannot remember.

On nutritional education, the majority (62%, $n=62$) of the mothers sampled for this study claimed to have received nutritional education from a healthcare worker, while (38%, $n=38$) claimed not to have received such education. The findings in Table 7 further revealed that, out of the 72

mothers who claimed to have received nutritional education, only (19.4%, $n=12$) do always receive nutritional education (69.3%, $n=43$) claimed seldom, and (11.3%, $n=7$) cannot remember how often they do receive nutrition education.

Table 7: Nutritional Support Services

Variable	Response	Frequency	Per cent
Have you ever received counselling on planning and developing healthy eating guidelines?	No	41	41.0
	Yes	59	59.0
	Total	100	100.0
How often do you receive this counselling on planning and developing healthy eating guidelines?	Always	13	22.0
	I cannot remember	8	13.6
	Seldom	38	64.4
	Total	59	100.0
Have you ever received counselling on tube feeding	No	72	72.0
	Yes	28	28.0
	Total	100	100.0
What was recommended for tube feeding?	Hand feeding is better than tube feeding	7	25.0%
	I can't remember	4	14.3%
	tube feeding is better than hand-feeding	17	60.7%
	Total	28	100.0
Have you ever received nutrition education from a healthcare worker?	No	38	38.0
	Yes	62	62.0
	Total	100	100.0
How often do you receive this nutrition education?	Always	12	19.4
	I cannot remember	7	11.3
	Seldom	43	69.3
	Total	62	100.0

Presentation of Research Findings Related to Research Question 4

The study question “Is there a statistically significant relationship between maternal factors and the prevalence of malnutrition among under-five children?” is answered in this subsection. The results are presented below:

Pattern of Association between the Socio-demographic Characteristics of the Respondents and Nutrition Status of Children

The analysis in Table 8 presents findings on the association pattern between the respondents' socio-demographic characteristics (i.e. mothers who do post-natal visits in the study area) and the nutrition status of their under-five children. The socio-demographic characteristics presented in this study include the age of the mothers, the highest level of education, the economic status of mothers, mother the head of the household, breastfeeding type, the mother affected by any

infection and the mother's access to three square meals. The following null hypothesis (HO) and alternate hypothesis (HA) were tested to answer the research question.

- HO: There is no statistically significant relationship between maternal factors (i.e. mother's age, highest level of education of mother, economic status of mother, mother the head of the household, breastfeeding type, mother affected by any infection and access to three square meal) and the prevalence of malnutrition among under-five children
- HA: There is a statistically significant relationship between maternal factors (i.e. mother's age, highest level of education of mother, economic status of mother, mother the head of the household, breastfeeding type, mother affected by any infection and access to three square meal) and the prevalence of malnutrition among under-five children.
- The findings in the table show that only the highest level of education of mothers ($\chi^2=33.974$, $p\text{-value}<0.0001$), the economic status of mothers ($\chi^2=28.94$, $p\text{-value}>0.0001$) and mother's access to three square meals ($\chi^2=61.887$, $p\text{-value}<0.0001$) are they selected maternal factors that have a statistically significant relationship with the prevalence of malnutrition among the under-five children of Sanda Loko chiefdom. This finding suggests that only the highest level of education of the mothers, their highest level of education, their economic status and their access to three square meals a day are the only significant predictors among the selected maternal factors of this study of the prevalence of malnutrition among the under-five children in Sanda Loko chiefdom.

Furthermore, the below-mentioned null hypothesis is rejected as a result of this finding;

- HO 1: There is no statistically significant relationship between the highest level of education of mothers and the prevalence of malnutrition among under-five children
- HO 2: There is no statistically significant relationship between the economic status of the mother and the prevalence of malnutrition among under-five children
- HO: No statistically significant relationship exists between access to three square meals and the prevalence of malnutrition among under-five children.

Table 8: Pattern of Association Between the Socio-demographic Characteristics of the Respondents and Nutrition Status of Children

Variable	Response	Malnutrition Status of Child		Total	X ²	p-value
		Malnourish	Not Malnourish			
Age of Mother	15 to 25 years	4(28.6%)	37(43.0%)	41(41.0%)	4.634 ^a	0.099
	26 to 35 years	10(71.4%)	37(43.0%)	47(47.0%)		
	36 to 45 years	0(0.0%)	12(14.0%)	12(12.0%)		
	Total	14(100.0%)	86(100.0%)	100(100.0%)		
Highest Level of Education of Mother	Never Attended School	1(7.1%)	55(64.5)	56(56.0%)	33.974 ^a	<0.0001
	Primary	4(28.6%)	15(17.4%)	19(19.0%)		

	Secondary	5(35.7%)	16(18.6%)	21(21.0%)		
	Tertiary	4(28.6%)	0(0.0%)	4(4.0%)		
	Total	14(100.0%)	86(100.0%)	100(100.0%)		
Economic Status of Mother	Average	14(100.0%)	22(25.6%)	36(36.0%)	28.941 ^a	<0.0001
	Poor	0(0.0%)	64(74.4%)	64(64.0%)		
	Total	14(100.0%)	86(100.0%)	100(100.0%)		
Is the Mother the Head of the Household?	No	14(100.0%)	77(89.5%)	91(91.0%)	1.610 ^a	0.204
	Yes	0(0.0%)	9(10.5%)	9(9.0%)		
	Total	14(100.0%)	86(100.0%)	100(100.0%)		
Breastfeeding Type	Breastfeeding with Water Only	6(42.9%)	38(44.2%)	44(44.0%)	.641 ^a	0.726
	Breastfeeding with Water and other Foods	2(14.3%)	19(22.1%)	21(21.0%)		
	Exclusive	6(42.9%)	29(33.7%)	35(35.0%)		
	Total	14	86	100		
Mother Affected by Any Infection	No	9(64.3%)	43(50.0%)	52(53.0%)	.984 ^a	0.321
	Yes	5(35.7%)	43(50.0%)	48(48.0%)		
	Total	14(100.0%)	86(100.0%)	100(100.0%)		
Access to Three Square Meal a Day	No	3(21.4%)	84(97.7%)	87(87.0%)	61.887 ^a	<0.0001
	Yes	11(78.6%)	2(2.3%)	13(13.0)		
	Total	14(100.0%)	86(100.0%)	100(100.0)		

Qualitative Data Analysis

Six (6) key informant interviews facilitated by an interview guide (see appendix) were held to gather the qualitative data required for this study. The key informant interview subjects were purposively chosen. The key informants for this study are the heads of six peripheral health units in Sanda Loko chiefdom. The subjects covered in this section are the prevalence of malnutrition among the under-five children of Sanda Loko chiefdom, the status of nutrition support services in Sanda Loko chiefdom, and the maternal factors that influence the prevalence of malnutrition in Sanda Loko chiefdom.

Status of Malnutrition Among Under-five Children in Sanda Loko Chiefdom

All the key informants interviewed noted a high prevalence of malnutrition among under-five children in Sanda Loko chiefdom. When asked about the difference in prevalence of malnutrition between male and female under-five children, the majority of the key informants noted that malnutrition is more prevalent among male under-five children than female. This finding, therefore, correlates with the quantitative findings in Table 4, where 57.1% of malnutrition was observed among male under-five children compared to 42.9% among their female counterparts.

Regarding age, most of the interviewed participants noted a high prevalence of malnutrition among children above 12 months old. This finding also confirms the findings in Table 3, where a 57.1% malnutrition prevalence was observed among children above 12 months. Furthermore, most of the participants think that malnutrition is higher among children born with low birth weights than those with high or normal birth weights. This finding, however, contradicts the findings in Table 5, where 87.5% of malnutrition was observed among children with a birth weight of 2.5kg and above.

These are some of the responses from the key informants regarding the status of malnutrition among under-five children in Sanda Loko chiefdom;

“We have a substantial amount of malnourished cases that we deal with in this peripheral health unit; at least one out of every ten under-five children that we see in this unit is malnourished”.

“In terms of gender, malnutrition is more prevalent among under-five children than female”.

“Regarding age, malnutrition is more prevalent among children above 12 months old than those 12 months or below.

“There is less prevalence of malnutrition among children born with low birth weight than those born with normal or high birth weight”.

Status of Nutrition Support Services in Sanda Loko Chiefdom

This subsection deals with the different nutrition support services mothers in Sanda Loko chiefdom received. All of the key informants noted it interviewed that nutritional education, counselling on planning and developing healthy eating guidelines and counselling on tube feeding are very high in Sanda Loko chiefdom. This finding is not in line with those in Table 7, which showed that 59% of the respondents claimed to have received counselling on planning and developing healthy eating guidelines, only 28% claimed to have received counselling on tube feeding, and 62% claimed to have received nutrition education. These are some of the responses of the participants;

“When it comes to nutritional education, apart from that which we do at the peripheral health units, we also do involve community health workers (CHWs) to complement our efforts at the community level; if only parents can go by advice, malnutrition will be eradicated in Sanda Loko chiefdom.”

“Even when you advise mothers to breastfeed and limit tube feeding exclusively, they will ignore.”

Maternal Factors That Influence the Prevalence of Malnutrition in Sanda Loko Chiefdom

This subsection deals with which maternal factors influence the prevalence of malnutrition among the under-five children in the study area. The majority of the participants noted that the age of mothers, their highest level of education, their economic status and their access to three

square meals a day are the maternal factors that influence the malnutrition of under-five children in Sanda Loko chiefdom. Apart from the ages of the mothers, this finding agrees with findings in Table 8, where it was revealed that only the highest level of education, their economic status and the mother's access to three square meals are the only maternal factors that have a statistically significant relationship to the prevalence of malnutrition. These are some of the responses of the participants;

“The under-five children born of mothers who have attained at least a secondary school level of education are less likely to be affected by malnutrition than those who have not attained that level of education; this may be as a result of the difference in level of enlightenment between those who have attained a secondary school level of education and those who have not”.

Poverty levels of mothers are a significant factor in malnutrition among under-five children; because their economic status can allow them to cater for the nutrition needs of their children, under-five children born by affluent parents are less likely to be malnourished than those born by poor”.

“Most mothers who can afford three square meals a day can cater for the nutrition needs of their babies; hence, there is less likelihood for the babies born by these mothers to be malnourish”.

Discussion, Conclusion and Recommendation

This study, “Factors Affecting Malnutrition of Under-five Children in Sanda Loko Chiefdom,” investigated how some maternal factors affect under-five malnutrition in Sanda Loko Chiefdom and the availability of some nutritional support services in Sanda Loko Chiefdom.

Interpretation of Findings

This study examined the prevalence of malnutrition in Sanda Loko chiefdom, the patterns of association between the selected maternal factors, the prevalence of malnutrition in the study area and the availability of some nutritional support services in the study area.

Prevalence of Malnutrition Among the Under-five Children of Sanda Loko Chiefdom

In this study, there was a below-average prevalence of malnutrition among the under-five children of Sanda Loko chiefdom (14%). Out of the 100 children sampled for this study, 14 were malnourished. This finding suggests that about 2 out of every 10 under-five children in Sanda Loko chiefdom are malnourished. Although the survey shows average malnutrition, the number of undernourished children in the study area (14 out of every 100 under-five children is however alarming; hence, more efforts are needed to reduce malnutrition prevalence in Sanda Loko chiefdom. This study's findings were consistent with that of Othosedic (2016), where an ewhere4.7% malnutrition rate was observed among the under-five children in the study area.

Prevalence of Malnutrition by Child's Gender

In this study, malnutrition prevalence was higher among male under-five children in Sanda Loko chiefdom ($n= 8$, 57.1%) than their female counterparts ($n= 6$, 42.9%). This finding was consistent with the studies by Imam et al. (2020) and Mzumara et al. (2018) on Nigeria and Zambia, respectively. Imam et al. investigated the prevalence and risk factors for stunting among children under 5 attending acute malnutrition treatment programs in north-western Nigeria. Imam et al. found that a male relative to a female child was significantly correlated with an increased probability of stunting in north-western Nigeria. Moreover, Mzumara et al. examined the factors linked with malnutrition in children under 5 years of age in Zambia. They found that malnutrition was more prevalent in male and female children. Ndemwa et al. (2017) found a statistically significant difference in malnutrition status between male and female children under 24 months old in Kwale County, Kenya.

Prevalence of Malnutrition by Child's Age

The study showed that there was a high prevalence of malnutrition among the under-five children of Sanda Loko chiefdom who are above 12 months ($n= 8$, 57.1%), followed by those below 6 months ($n= 4$, 28.6%) and then those between 6 to 12 months ($n= 2$, 14.3%). Although this finding contrasts that of Mzumara et al. (2018), where it was observed that malnutrition is more prevalent among younger under-five children than their older counterparts, it is, however, consistent with the finding of Imam et al. (2020) where it was observed that malnutrition is more prevalent among younger under children than their older counterparts.

Nutrition Support Services

This study's selected nutritional support services included counselling on planning and developing healthy eating guidelines, tube feeding, and nutritional education.

Counselling on Planning and Developing Healthy Eating Guidelines

The study's results showed that a little over half of the mothers with under-five children in the Sanda Loko chiefdom have been counselled on planning and developing healthy eating guidelines (59%). The finding also revealed that only a few who have received such counselling always receive such counselling (22%). This finding aligns with that of Omotesho et al. (2019), who observed a high amount of counselling on planning and developing healthy eating guidelines among the study participants.

Counselling on Tube Feeding

From the study, most of the mothers of Sanda Loko's chiefdom have received counselling on tube feeding (72%). It was also found that most mothers who received tube feeding counselling were told it was the best form of feeding (60.7%). This finding is consistent with that of Omotesho et al. (2019), who observed that counselling on tube feeding was very common among mothers in the study area who took their under-five children for post-natal visits.

Nutritional Education

The study found that nutritional education was typical among the mothers of Sanda Loko chiefdom's under-five children (62%). Although the number of mothers in Sanda Loko chiefdom who have received nutritional education is very high, only a few always receive such education (18.4%). This finding is in line with that of Omotesho et al. (2019), who observed that nutritional education is very high among the research participants of his study.

Patterns of Association between the Selected Maternal Factors the Prevalence of Malnutrition

The selected maternal factors considered in this study are mothers' ages, educational status, economic status, whether or not the mother is the head of the household, breastfeeding type, whether or not the mother is affected by any infection, and whether or not the mother has access to three square meals a day.

Age of Mother

The study result reveals no statistically significant relationship between the mother's age and the prevalence of malnutrition in children under 5 years in Sanda Loko chiefdom ($\chi^2=4.634^a$, $p=0.099$). This finding is inconsistent with that of Mawa and Lawoko (2018), who found that the age of mothers was a significant predictor of malnutrition among the under-five children in the study area. Mawa and Lawoko, in their study, observed that children born to older mothers are less likely to be malnourished than those of younger mothers.

Mothers' Education Status

Moreover, this study showed a statistically significant relationship between the mother's education level and the prevalence of malnutrition in children under 5 years in Sanda Loko chiefdom ($\chi^2=33.974^a$, $p\text{-value}<0.0001$). Different studies on malnutrition, including Omotesho et al. (2019), Tasnim (2018), Mawa and Lawoko (2018), and Khattak et al. (2017), found similar outcomes. For instance, Omotesho et al. assessed the determining factors of malnutrition in children under 5 years of age in rural households and resulting morbidity and mortality rates in Benue state, Nigeria. Omotesho et al. found that maternal education was among the determining factors that had a statistically significant relationship with malnutrition in children under 5 years in Benue State. In the same vein, Tasnim found a statistically significant relationship between child malnutrition and parental level of education in a systematic review and methodological appraisal of 36 articles to determine factors that cause child malnutrition in developing countries. In addition, I found that children of mothers who attained primary and tertiary levels of education were more likely to be malnourished compared with children of mothers who attained secondary level or no education. This finding supported Mawa and Lawoko, who found that children whose mothers had acquired only primary education were three times more likely to waste or stunt than those with maternal education above the primary level.

Mothers' Economic Status

Mother's economic status had a statistically significant relationship with malnutrition in children in Sanda Loko chiefdom, as shown in this study ($\chi^2=28.941, p\text{-value}<0.0001$). This finding is consistent with related studies by Maje et al. (2019) and Singh et al. (2019). A similar survey of Nigeria by Maje et al. that explored the prevalence and socioeconomic influencers of malnutrition in children under 5 years in Kano State revealed that maternal and paternal socioeconomic status related to their occupation and income levels were significantly associated with child malnutrition in Kano State. Singh et al. also examined the effect of socioeconomic inequalities on malnutrition in children under 5 years in India. They found an inverse relationship between children of parents in high socioeconomic groups and malnutrition of children in the country. This was supportive of a finding in my study that children of mothers in the low socioeconomic class were nearly one and a half times more likely to become malnourished when compared with children of mothers in the high socioeconomic class. Khan et al. (2017) that children from deprived homes are twice as likely to be malnourished relative to children from wealthier homes.

On the other hand, I found that children of mothers who belonged to the average socioeconomic class were more likely to become malnourished than children of mothers of low economic status. Singh et al. and Khan et al. indicated that children of mothers in a high socioeconomic class did not receive adequate nutrition or dietary attention from their mothers compared to children of mothers in an average socioeconomic class.

Mother, the Head of the Household

There was no statistically significant relationship between mothers being the head of the household and the prevalence of malnutrition among the under-five children in Sanda Loko chiefdom ($\chi^2=1.610, p\text{-value}=0.204$). This finding is consistent with that of Moyo et al. (2021), who observed that children born in homes where the mother is the head are more likely to be malnourished than those born in homes where the mother is not.

Breastfeeding Type

There was no statistically significant relationship between breastfeeding type and malnutrition in children under 5 years in Sanda Loko chiefdom, as revealed in this study ($\chi^2=0.641, p\text{-value}=0.726$). This finding does not support studies by Mutuku et al. (2019), Amare et al. (2018), and Pravana et al. (2017), which affirmed that breastfeeding type was a significant predictor of malnutrition in children. Mutuku et al. analysed risk predictors of severe acute malnutrition among children in developing countries and found that cessation of breastfeeding under 6 months and instigating complimentary food on children under 6 months were significant determinants of severe acute malnutrition in children under 5 years. In a case and control study in Nepal by Pravana et al. (2017), bottle feeding and failure to start complementary feeding after 6 months contributed significantly to the prevalence of severe acute malnutrition in children under 5 years.

Recommendations

Considering the outcomes of this study, future research using a larger sample with broader geographical coverage will be necessary for a more robust investigation of malnutrition risk factors in children. A study that includes mothers' nutrition and micronutrient status of children and children would enhance the quality of findings. In this study, I adopted a quantitative cross-sectional approach. Therefore, prospective research teams should adopt a mixed-method research design, including quantitative and qualitative techniques, to provide more information about participants in the study. Moreover, future research teams need to use longitudinal primary data. This would allow for including important information omitted in the secondary data. The research teams, through a longitudinal dataset, would better understand the participants' behavioural patterns over time.

Health practitioners at various levels in public and private health facilities must focus on educating mothers and making them see reasons to adopt good or evidence-based practices in caring for their children. The research team encourages the Ministry of Health and Sanitation and other relevant health authorities to sensibly sensitise mothers about the ills of malnutrition in children under five years. Policymakers should formulate policies that would create jobs and income-earning opportunities for women.

Implication of the Study

Preventing and reducing the challenges of malnutrition, especially among under-five children in Sanda Loko chieftdom, is a cost-effective strategy that promotes healthier societies with improved social and health outcomes. The findings of this current study have some implications for professional and social change. The results could influence future practices of healthcare practitioners and enhance the approaches and interventions they use to curb malnutrition among children. Reducing malnutrition among children under five years old would be beneficial in bringing down child morbidity and mortality rates.

Furthermore, the outcomes of this current study would promote positive social change. The findings of this study have the potential to assist caretakers and mothers of children under five years of age in adapting better dietary intakes for the health benefit of their children. This would improve health outcomes with a healthier population to support growth and development. The findings of this study support a target of the sustainable development goals: to reduce child mortality by three-fourths across the globe (Pravana et al., 2017).

This study, therefore, contributes to existing knowledge and supports social awareness and education of caretakers and mothers to reduce malnutrition in children under five years in Sella Limba chieftdom. Improved collaborative efforts by health practitioners, local health authorities, and non-governmental bodies will go a long way in fighting malnutrition across and beyond the Sanda Loko chieftdom.

Conclusion

This mixed-method cross-sectional study aimed to explore maternal factors of malnutrition in children under five years old in Sanda Loko chieftdom. The findings from this study showed a 14% prevalence of malnutrition among the children of Sanda Loko chieftdom. The study also observed a high amount of counselling on planning and developing healthy habits, tube feeding and nutritional education among the mothers of under-five children in Sanda Loko children. With the relationship between maternal factors and the prevalence of malnutrition, only the education status of mothers, their economic status, and their having access to three square meals a day have a statistically significant relationship to the prevalence of malnutrition among under-five children. Longitudinal studies using primary data and considering mothers' nutrition status, underlying ailments of mothers or children, and micronutrient status of children were, amongst others, recommended.

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