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Socio-economic and Demographic Characteristics of Caregivers as a Determinant of Nutritional Status of Children Aged 6-59 Months in Kericho County, Kenya

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Child growth and well-being are critically dependent on proper nutrition, particularly during the developmental phase between the ages of 6 and 59 months. Poor nutritional status is associated with an increased prevalence of mortality and morbidity in Kenya and globally. This study aimed to identify the factors influencing the nutritional status of children aged 6 months to 5 years in Kericho County, Kenya. The research employed a cross-sectional analytical design, targeting children attending outpatient child welfare clinics at Kericho County Referral Hospital and Kapkatet Sub-County Hospital. A total of 172 children were selected through systematic random sampling, and data was collected using a structured questionnaire. Key findings revealed that stunting affected

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25% of the children, while wasting and underweight were prevalent in 23.8%. Dietary practices showed that only 39.2% of children aged 6 to 23 months met the minimum dietary diversity, and 39.2% received a minimum acceptable diet. Moreover, 45.3% of children experienced illness in the past month. Regression analysis identified several key predictors of malnutrition: Children of caregivers without formal education were more likely to be underweight (AOR = 0.70, p = 0.01). This study underscores the critical role of caregiver education in shaping child nutritional outcomes and highlights the need for targeted interventions to improve caregiver knowledge and practices.

Keywords: Dietary practice; morbidity status; nutritional status; stunting; underweight; wasting.

DEFINITIONS, ACRONYMS, ABBREVIATIONS

Dietary diversity score: is a numerical representation of the variety of food groups consumed by a child within a specified period, serving as an indicator to predict the sufficiency of both macro and micro-nutrients in their diet.

Dietary practice: Refers to the reported behaviours, actions, or individual choices regarding dietary practices such as meal frequency and dietary diversity.

Morbidity status: The state of having illnesses or symptoms of illnesses.

Nutritional status: The health condition of children, influenced by the intake and utilization of nutrients, often assessed through anthropometric indicators such as height-for-age, weight-for-age, and weight-for-height.

Stunting: A condition characterized by a child's height-for-age falling below a specified standard, typically expressed as a Z-score, indicating a level of growth retardation.

Underweight: A child's weight-for-age falling below a specified standard, usually expressed as a Z-score, suggesting a deficiency in overall body mass relative to age.

Wasting: A condition marked by a child's weight-for-height falling below a specified standard, often expressed as a Z-score.

AOR: *Adjusted Chances Ratio*
BMI: *Body Mass Index*
CWC: *Child Welfare Clinic*
DDS: *Dietary Diversity Score*
FBP: *Food by Prescription*
FFQ: *Food Frequency Questionnaire*
HAZ: *Height-for-age*
KCRH: *Kericho County Referral Hospital*
KEPI: *Kenya Expanded Program on Immunization*
KSCH: *Kapkatet Sub-County Hospital*
MUAC: *Mid-Upper Arm Circumference*
PEM: *Protein Energy Malnutrition*
SPSS: *Statistical Package for Social Sciences*
WASH: *Water, Sanitation and Hygiene*
WAZ: *The weight-for-age z-score*
WHZ: *weight-for-length/height z-score*
WHO: *World Health Organization*

1. INTRODUCTION

According to the World Health Organization (2017), our nutritional status is determined by the nutrient composition of the food we consume, our nutritional demands, and our body's capacity to digest, absorb, and utilize those nutrients (World Health Organization [WHO], 2017). Children's nutritional health is crucial between the ages of 6 and 59 months since that's when they're developing and growing the most. Indirectly and directly, the growth of a nation is impacted by the nutritional well-being of its children since it shows that the government, communities, and

households are investing in the health of their families (UNICEF, 2022). In the context of early childhood, chronic and frequent malnutrition can have severe and prolonged negative effects on the mental growth and development of young children (UNICEF, 2022). Malnutrition can also predispose such children to several cognitive impairments and infectious diseases. It has also been linked with chronic diseases, exacerbating high mortality and morbidity rates among young children (UNICEF, 2022). Regionally, it has been established that East African countries take the lead in the prevalence of poor nutritional status among six- to fifty-nine-month-old children globally (Yusuf, 2017). Kenya had a crude mortality rate of 0.8 per 10,000 children per day between 2013 and 2017, with more than 66% of these deaths attributed to drought (Kigaru & Milelu, 2017). Undernutrition remains a key public health issue in less developed countries like Kenya because of poor sanitation, household food insecurity, infections like diarrhoea, and poor dietary consumption.

According to KDHS 2022, in Kenya, the frequency of stunting, wasting, and underweight was 18%, 5%, and 10%, respectively (KNBS and ICF, 2023). Multiple international and local studies have examined the nutritional condition of children between the ages of six and fifty-nine months (Bayih et al., 2022, Kigaru & Milelu, 2017, Mboya et al., 2015, Kahsay et al., 2015, Kwena & Baliddawa, 2012, UNICEF, 2022). However, there are few studies on the determinants of the under-five children's nutrition status, and therefore the study was necessary to breach the gap.

1.1 Problem Statement

According to recent research by the United Nations Children's Fund (UNICEF), more than 25% of children in Kenya below the age of five have stunted development (UNICEF, 2022). Severe wasting and wasting have been closely linked to preventable child mortality. Gudu et al. (2020) reported that approximately 35,000 Kenyan children aged below five years die annually due to undernutrition (Gudu et al., 2020).

Deficiency in essential macronutrients like fat, carbohydrates, and protein can trigger protein-energy malnutrition (PEM) 11. (Chakrabarty & Chakrabarty, 2019). A combination of macronutrient and micronutrient deficiencies results in severe health problems for young children (Kiani et al., 2022). Malnourished young children, particularly those suffering from severe malnutrition, are at elevated risk of mortality from illnesses like malaria, pneumonia, and diarrhoea. While poor nutrition status is a leading contributor to diseases and mortality in children under five, limited research has explored the specific factors affecting the nutritional status of children aged six months to five years in Kenya. Moreover, few data exist about the predictors of nutritional outcomes for children in Kericho County. This research aims to fill this gap by identifying the determinants of the nutritional condition of children aged 6 to 59 months in Kericho County. The findings of this research will contribute new knowledge by uncovering context-specific factors influencing child nutrition, thereby informing targeted interventions for improving nutritional outcomes in this vulnerable age group.

1.2 Justification of the Study

The Big Four Agenda, which includes national health care, diet, and food security, is one of the main goals of the Kenyan government. The major goal of the study on the factors that affect children's nutritional status between the ages of 6 and 59 months in Kericho County, Kenya, is to improve the eating habits and nutritional status of babies, young children, and moms. The government in partnership with international players, including UNICEF, and the implementation of nutritional services and strategies underscore the importance of addressing nutrition-related issues in the region. The mention of UNICEF's provision of counselling to 1.6 million caregivers on optimal feeding practices for young children and infants in 2020 further emphasizes the ongoing efforts to enhance nutritional outcomes, providing context for the study's examination of factors influencing the nutritional status of children in the specified age group in Kericho County. The research is in support of the Kenyan government’s nutritional interventional programs by providing empirical evidence regarding the factors that contributed to malnutrition among children aged below 6-59 months in Kericho County.

While prior literature identified multiple risk factors for malnutrition, individual factors varied from one country to another and with time. As such, the then characterization of such factors in other counties may have not provided an empirical basis for the nutritional intervention programs in Kericho County. The findings regarding the nutritional status of children aged 5-59 months in Kericho County will enable this county to address malnutrition which is a public health problem.

1.3 Study Limitations and Delimitations

Limitation 1: The research was cross-sectional, conducted at a single point in time.

Delimitation 1: To overcome this, data was collected from a relatively large sample size to enhance representativeness.

Limitation 2: The availability of food due to production and supply at the time may have affected the interpretation of participants' dietary characteristics.

Delimitation 2: The study accounted for this by employing rigorous data collection methods, considering temporal factors such as food production and supply.

Limitation 3: Dietary practices may have been influenced by prevailing high food prices and inflation.

Delimitation 3: The study acknowledged the impact of high food prices and inflation, incorporating sophisticated statistical analyses for nuanced insights.

1.4 Scope of the Study

The study scope was spelled out to set up the confines and parameters within which the research was done. It defined specific aspects, participants, and locations included in the investigation. In the study on the determinants of nutritional status in children aged 6 to 59 months in Kericho County, Kenya, the scope encompassed a defined geographical area, Kericho County. The age comprised 6 to 59 months specified as the target population. The study explored factors that influenced nutrition, including, socioeconomic conditions within this specified demographic. The scope set the context for the study's focus and the extent of its findings.

1.5 Socio-economic and Demographic Factors

A study by Ahmad et al. (2020) sought to find out the outcome that socioeconomic factors had on nutritional status amongst the under-fives in Punjab province, Pakistan. Stunted growth was statistically linked to a sanitation facility, family size, age, wealth quintile, and maternal education. More male children were wasted and underweight as compared to girls of the same age. (Ahmad et al., 2020). Additionally, wasting was mostly associated with food shortages and children or urban areas. Underweight was also associated with access to treated water and incomplete immunization. The researchers concluded that the increase in malnutrition cases among the under-fives was directly proportional to the population's lower socioeconomic status, especially those originating from rural areas. They suggested multiple policies to combat wasting, including the need for the government to take the necessary social, political, and economic policy measures to improve personal hygiene habits, increase nutritional access, promote healthcare education, and enhance economic activities.

Igbokwe et al. (2017) conducted research to know whether socio-demographic variables affected the nutritional quality of young children in Enugu, Nigeria. They sampled nine private primary schools and five public primary schools within a three-month period of the research using cross-sectional descriptive study design. The papers showed that among the research subjects 3.3%, 3.0%, and 0.8% were underweight wasted, and stunted correspondingly (Igbokwe et al., 2017). Comparing students of lower socioeconomic classes with the students of upper socioeconomic classes, the former was more wasted, underweight, and children, while the latter had higher levels of obesity and overweight (Igbokwe et al., 2017). ; Similarly, in the same study, authors established that the diet and feeding of the child were significantly influenced by the main source of income of the family, the parent's level of education, the sex of the child, and the age of the child. Stunting and wasting were significantly higher among poor children in public schools while obesity and overweight were higher among the rich children who attend private schools as found out by Igbokwe et al.

In their study, Chaudhary and Agrawal (2018) investigated the different dietary habits, and determinants of malnutrition among children of six-59 months of age as well as the association between demographic variables and malnutrition in India. The research has reported somewhat higher incidences of stunting than the National Family Health Survey 4 at 43 % (Chaudhary & Agrawal, 2018). That meant 56% of the research subjects were born underweight when recruited into the study. (Chaudhary & Agrawal, 2018). The researchers also found that the people of India were not utilizing the Integrated Child Development Services ICDs in an appropriate manner. They laid down recommendations that can help enhance the delivery of Anganwadi services.

A hospital-based case-control study conducted by Gudu et al. (2020) sought to unveil the components influencing poor nutrition among the under-fives in Western Kenya. These researchers found several factors that were associated with undernutrition, including pre-lacteal feeding, deworming, and failure of the mother to attend an antenatal clinic (Gudu et al., 2020). Other factors that were found to be independently correlated with undernutrition included paternal lack of formal education, low birth weight, and delayed developmental milestones (Gudu et al., 2020). The study recommendations included improvement of deworming programs, child feeding practices, and prenatal care in order to combat malnutrition in Western Kenya.

In order to establish the degree of relationship between demographic factors and malnutrition cases among children of one day to twenty-four months in Kwale County, Kenya, the study by Ndemwa et al. (2017) adopted a KWAME County population. In their findings, the sex, underweight, stunting, and age showed some variability they noted this was due to age. They found out that the children had higher rates of global acute malnutrition, being underweight, and Growth stunting. The males presented larger numbers of stunted growths than the females in the research done. Not surprisingly, if the children grew stunted or underweight, there was a substantial increase in both growing with the age of the children (Ndemwa et al., 2017).

Ole-Tankoi et al. (2016) identified antecedents of the nutritional status of children aged 6-59 months in Trans- Mara East sub country. Data was gathered employing descriptive cross-sectional research design and a structured self-administered questionnaire. These findings detail indicate that poverty, the mother's employment status as a homemaker, and the size of the household were the major determinants of stunting in children. When it came to the gender of the child, the likelihood of males being captured as being obese in comparison to the female children was higher. The study used the prevalence of nutrition and undernutrition to determine that poor nutritional status was twice as high in the rural areas of Trans-Mara East sub-county (Ole Tankoi et al., 2016).

If at all, there are very few studies that have been conducted in this field: that gap has been filled by our study, as indicated in the literature review above. Further, the research studies undertaken in Kenya appeared to have focused on identifying the role of specified sociodemographic/socioeconomic predictors on the nutritional status of children in the age group of 6-59 months. The study aimed to breach this gap by focusing on the level and magnitude of all the socio-economic and demographic factors on the nutritional status of these children.

2. MATERIALS AND METHODS

The research was done at Kericho County Referral Hospital (0.3713° S, 35.2801° E) and Kapkatet Sub-County Hospital (-0.629716, 35.197243). The two hospitals are situated in Kericho County in Kenya.

An institution-based cross-sectional analytical research design was used. The cross-sectional design allowed the researcher to examine data from both the children and the caregivers of 6-59-month-old children at one particular moment in time.

2.1 Independent Variables

Independent variables included socioeconomic and demographic traits such as farm ownership and size, profession, income, number of children, age of the main carer, and educational attainment. They also included nutritional habits including eating often, varying one's diet, and nursing.

The study included:

i. Primary caregivers included any person who was responsible for the child's day-to-day well-being and care (Ole Tankoi et al., 2016). Specifically, the primary caregivers included biological mothers, aunts, grandparents, and others who acted as primary caregivers for children whose biological parents were not available or deceased.
ii. Only caregivers who gave their informed consent were included in the study.

2.2 Sampling Technique and Recruitment Process

The study adopted a systematic random sampling method to get the participants from the target population. This sampling method was chosen based on the pilot study conducted at Longisa County Referral Hospital during the data collection tools pretesting stage which showed that some days especially the market days had an upsurge in the number of children being brought to the clinics with no morbidities. Other extraneous variables also included rainfall which is abundant in Kericho County as well as

agricultural activities and it was associated with low numbers and more morbidities. Systematic random sampling also involves making a sample from the already defined total population using an equal interval. In this case, the target population was composed of caregivers of children 6 to 59 months old who attended child welfare clinics at Kericho County Hospital and Kapkatet Sub-County Hospital, only on the study day. For this purpose, collaboration with the medical practitioners and clinic managers of the study sites were informed. Such collaborations also made it easy to access potential participants and plan for all the necessary approvals and support from the clinic. The average number of children within the target population who attended the child welfare clinics based on health records of the previous 18 months indicated about 40 caregivers per day. To recruit participants more systematically and mitigate bias, every fourth caregiver was selected to participate in the study and additionally, a maximum of 10 participants were recruited per day.

2.3 Sample Size

The sample size was determined based on Fischer's formula (2003) as follows:

$$N= Z^2Pq/d^2$$

Where, N denoted the desired sample size from a sample size of over 10,000

Z denoted the standard deviation at 1.96 as the required confidence level

P= the proportion within the target population of the study. Kericho County prevalence of malnutrition =12.4% (Kenya National Bureau of Statistics and ICF, 2023).

$$q = 1-P$$

D = the set level of statistical confidence, which is 95% CI (0.005).

$$\text{Therefore: } N= (1.96^2 \times 0.124 \times (1-0.124))/0.005^2$$

Using this formula, the initial sample size determined was 167. To account for the possibility of attrition the sample size of the primary caregivers of children aged 6-59 years was increased by 3% (Anino et al., 2015). Thus, the total sample size determined was 172.

2.4 Data Collection Tools

The researcher-administered structured questionnaire was employed in data collection of the primary caregivers' socio-demographic and economic characteristics.

2.5 Data Collection Tools Pretesting

Pretesting was conducted in Longisa County Referral Hospital in Bomet County, Kenya among 17 participants which was about 10% of the sample size expected. Pretesting was done to assess the practical problems associated with the researcher-administered questionnaire. Longisa County Referral Hospital had similar characteristics to the study hospitals making it a suitable choice.

2.6 Data Collection Tool Validity

The data collection tool's validity was checked by a panel of experts in the field.

2.7 Data Collection Tools' Reliability

The tool's reliability was determined through the test-retest method. This was done by administering the tool to a small group of participants and then repeating the procedure five days later. A correlation coefficient of above 0.80 was considered acceptable (Bayih et al., 2022), the correlation coefficient for the study tool was 0.67 and after validation, it increased to 0.84.

2.8 Data Collection Procedures

2.8.1 Nutritional status

Anthropometric data was collected according to the WHO guidelines which include the weight and height of the child. Prior to collecting this data, each child's age was determined with a view of ensuring that it was within the range of 6 to 59 months. In this regard, the z scores were computed in line with the WHO child growth standards of the year 2006 (Turck et al., 2013).

2.8.2 Socio-economic and demographic data

The demographic as well as the socio-economic variables of the study children's primary caregivers were assessed. This included size of farmland, ownership of livestock, occupation, education, income, family size, religion, ethnicity, marital status, and head of household. The child characteristics included sickness status, type of birth, gestation age, place of delivery, birth order, sex, and age (Ali et al., 2019).

2.9 Data Analysis and Presentation

The collected data was analyzed with the help of ENA for SMART, statistical package for social sciences, that is, SPSS version 27 and Microsoft Excel 2010. All the other variables were assessed using Excel and SPSS. For the analysis of data, the researcher used the chi-square test as well as bivariate testing and logistic regression analysis for multivariate testing, and descriptive statistics including percentages were also computed. Thus, to describe the respondents' characteristics, the results of descriptive analysis of the socio-demographic and economic parameters were considered. The percent score was also offered for the percent of respondents who attained a certain value on all of the evaluated factors. Each nutritional status indicator was ascertained from a percent analysis of nutritional status.The chi-square test was employed to test the relationship between nutritional status and socio-demographic and economic characteristics of caregivers. Between the nutritive condition of children and the dietary practices of the caregiver chi-square tests were used. In this study, children whose regression coefficients were statistically significant for the variables in question, between the ages of 6-59 months had their nutritional status assessed. Chi-square analysis was then followed by regression analysis on the variables that showed significance. With the view of controlling for such factors, we also computed the Adjusted Chances Ratio (ACR) and the Crude Chances Ratio (CCR). Using a confidence interval of 95% the level of statistical significance was tested at $p<0.05$.

3. RESULTS AND DISCUSSION

3.1 Response Rate

Each of the participants identified and approached to participate in the study agreed to do so which gave a 100% response rate, and this increased the validity of the study results obtained in the study. Additionally, the fact that no one declined to participate also means the results represent the target population the investigator was interested in studying.

3.2 Socio-demographic and Economic Characteristics

Tables 1 and 2 display the participants' socio-demographic characteristics as they pertain to children and caregivers, whereas Table 3 displays their socio-economic features.

3.3 Child-specific Socio-demographic Characteristics

As shown in Table 1, 75 (43.6%) of the children were aged 24-59 years, followed by 55 (32%) who were aged 9 to 23 months and 42 (24.4%) who had an age range of 6 to 8 months. Additionally, 88 (51.2%) of the children were males and 84 (48.8%) were females. The majority of the children (n = 163, 94.8%) were given birth at the health facility. The mode of delivery for about three-quarters of the children (n = 131, 76.2%) was vaginal.

3.4 Caregiver-specific Socio-demographic Characteristics

As shown in Table 2, the age range of the respondents was 14 to 47 years, with 163 (92.4%) of them aged 20 to 47 years. The majority of the caregivers practiced Christianity (n = 169, 98.3%) and were either married or cohabiting (63.4%). Households were majorly headed by males (102, 59.3%), and about an equal proportion of the households had 1 to 3 members (n = 80, 46.5%) and 4 to 6 members (n = 79, 45.9%). An almost equal proportion of the household size was observed for households with members ranging from 1 to 3 (n = 80, 46.5%) and 4 to 6 (n = 79, 45.9%). Additionally, 47 (27.3%) of the caregivers used alcohol.

3.5 Socio-economic Characteristics

The results on the socio-economic characteristics of the caregivers are shown in Table 3. The findings revealed that about two-thirds of the caregivers had secondary (n = 77, 44.8%) and tertiary education (n = 41, 23.8%). Casual labor, with a proportion of 46 (26.7%) of the respondents, followed by 40 (23.3%) of respondents on salaried employment and 35 (23.3%) of respondents on farming, was the leading source of income for the caregivers. Over half of the caregivers (n = 103, 59.9%) owned land, but only a third (n = 58, 33.7%) had a kitchen garden. Though the majority of the caregivers (n = 85, 49.4%) served food first to a child, they served the prime portion to the father (50%) and mother (30.8%), respectively.

3.6 Association between the Study Variables

The correlation between the dependent variable nutritional status and the independent variables was done using the logistic regression test.

Table 1. Child-specific socio-demographic characteristics

Variable	N (172)	% (100)
Age of the child	42	24.4
6-8	55	32.0
9-23	75	43.6
4-59		
Sex of the child	88	51.2
Male	84	48.8
Female		
Place of childbirth	9	5.2
At home	163	94.8
Health facility		
Mode of delivery	41	23.8
CS	131	76.2
Vaginal		

Source: Field data, 2024

Table 2. Caregiver-specific socio-demographic characteristics

Variable	N (172)	% (100)
Age of the caregiver	13	7.6
14 to 19 years	159	92.4
20 to 47 years		
Marital status	51	29.7
Never married	109	63.4
Married or cohabiting	12	7
Separated/divorced/widowed		
Religion	169	98.3
Christian	2	1.2
Muslim	1	0.6
None		
Household head	70	40.7
Female	102	59.3
Male		
Caregivers use alcohol	47	27.3
Yes	125	72.7
No		
Household size	80	46.5
1-3	79	45.9
4-6	13	7.6
7-9		

Source: Field data, 2024

Table 3. Socio-economic characteristics

Variable	N (172)	% (100)
Educational status	11	6.4
No formal education	43	25
Primary	77	44.8
Secondary	41	23.8
Tertiary		
Occupation	19	11
None	46	26.7
Casual laborer	35	20.3
Farmer	40	23.3
Salaried employed	32	18.6
Self-employed		
Household land ownership	103	59.9
Yes	69	40.1
No		
Have kitchen garden	58	33.7
Yes	114	66.3
No		
Served food first	85	49.4
Child	41	23.8
Father	43	25
Mother	3	1.7
Grandparents		
Prime portion	28	16.3
Child	86	50
Father	53	30.8
Mother	5	2.9
Grandparents		

Source: Field data, 2024

Table 4. Logistic regression analysis of nutritional status and socio-demographic and economic characteristics

Variables	Underweight [a]	Wasting [a]	Stunting [a]	Normal nutritional status
Mode of delivery				
Vaginal	1	1	1	1
Caesarean	2.36 (1.17-3.34) *	0.72 (0.30-1.71)	2.40 (1.83-2.75) *	0.26 (0.21-0.90)
Educational status				
Tertiary education	1	1	1	1
Primary education	0.51 (0.35-0.84)	1.60 (0.58-4.43)	1.52 (1.06-1.89)	1.05 (0.60-3.27)
Secondary education	0.79 (0.26-1.03)	1.35 (0.53-3.43)	0.62 (0.40-0.74)	2.03 (0.76-5.45)
No formal education	2.61 (1.82-2.99) *	0.92 (0.17-5.10)	0.29 (0.21-0.32)	0.48 (0.07-0.93)
Age of child				
24-59 months	1	1	1	1
9-23 months	1.66 (0.76-3.62)	2.20 (1.76-2.95)	1.67 (0.78-3.60)	0.99 (0.62-1.34)
6-8 months	0.57 (0.21-1.58)	1.09 (0.88-1.92)	0.53 (0.19-1.46) *	1.16 (0.35-4.63)
Who is served first				
Child	1	1	1	1
Father	2.29 (0.88-5.96)	0.75 (0.60-0.97)	2.20 (0.85-5.74)	0.57 (0.04-3.22)
Mother	1.33 (0.13-1.83)	1.30 (0.99-2.18) *	1.29 (0.28-2.89)	1.24 (0.22-2.22)
Other relatives	-	0.43 (0.09-1.10)	-	-

Source: Field data, 2024

*Normal nutritional status is the reference category, [a] Crude chances ratio, * Statistically significant*.

Table 5. Binary logistic regression analysis for socio-demographic and economic factors associated with nutritional status

Variables	Underweight [a]	Wasting [a]	Stunting [a]	Normal nutritional status
Mode of delivery				
Vaginal	1	1	1	1
Caesarean	3.39 (1.44-7.97) *	2.33 (1.40-3.68)	3.12 (1.32-7.37) *	1.28 (1.86-6.23)
Educational status				
No. formal education	1	1	1	1
Primary education	2.04 (0.78-5.33)	1.57 (0.54-4.57)	2.23 (0.85-5.88)	1.91 (0.13-3.25)
Secondary education	0.34 (0.12-0.96) *	1.03 (0.38-2.77)	0.43 (0.16-1.17)	2.92 (1.17-4.02)
Tertiary education	0.25 (0.08-0.67) *	0.98 (0.25-1.54)	0.68 (0.24-1.25)	0.31 (0.07-2.04)
Age of child				
6-8 months	1	1	1	1
9-23 months	2.74 (1.12-6.71) *	1.04 (0.41-2.66)	2.70 (1.10-6.61) *	2.03 (1.01-7.02)
24-59 months	2.25 (1.64-3.82)	1.23 (0.76-3.40)	3.18 (1.25-5.01)	0.95 (0.64-5.21)
Who is served first				
Child	1	1	1	1
Father	3.60 (0.12-10.86)	0.43 (0.03-6.18)	3.40 (1.14-10.14)	2.19 (1.01-7.20)
Mother	2.33 (0.73-3.32)	1.11 (0.08-14.84)	2.18 (0.21-8.27)	1.03 (0.99-5.16)
Other relatives	-	2.21 (1.34-4.55)	-	-

Source: Field data, 2024

*Normal nutritional status is the reference category, [a] Model adjusted for variables in the table, * Statistically significant, - no respondent.*

3.7 Association between Nutritional Status and Socio-Demographic and Economic Characteristics of the Participants

The unadjusted logistic regression analysis result of the relationship between socio-demographic characteristics and nutritional status is also shown in Table 4. Caesarean section babies were also more likely to be low birth weight compared to vaginal delivery babies (OR = 2.36, 95% CI: 1.17-3.34, *p* = 0.01). The same trend was observed in children grouped under stunting where odds of being stunted if a child was delivered through caesarian section were higher compared to vaginally borne children (OR = 2.40, 95% CI: 1.83-2.75, *p* = 0.03). Additionally, children with caregivers who had no formal education had higher chances of being underweight compared to those who were with caregivers who had attained tertiary education (OR = 2.61, 95% CI: 1.82-2.99, *p* = 0.01). Children aged 6 to 8 months had reduced chances of being stunted with OR = 0.53 (95% CI: 0.19-1.46, *p* = 0.02). Furthermore, when the mother was served first, there were higher chances of children being wasted compared to when children were served first (OR = 1.30, 95% CI: 0.99-2.18, *P* = <0.01).

The results of adjusted logistic regression analysis on the association between socio-demographic characteristics and nutritional status presented in Table 5 indicated that children born through caesarean section had an association with an increased risk of being underweight and stunted. (aOR = 3.39, 95% CI: 1.44-7.97, p = 0.03) and (aOR = 3.12, 95%: 1.32-7.37, p = 0.04), respectively. Children whose caregivers had secondary and tertiary education were also significantly associated with reduced chances of being underweight, with aOR = 0.34 (95% CI: 0.12-0.96, p = 0.03) and aOR = 0.25 (95% CI: 0.08-0.67, p = 0.02) in that order. Additionally, children aged 9 to 23 months were more likely to be underweight and stunted. Their adjusted chances ratio was aOR = 2.74 (95% CI: 1.12-6.71, p = 0.04) for underweight and aOR = 2.70 (95% CI: 1.10-6.61, p = 0.02) for stunted growth. In the adjusted model, being served first was not associated with any form of nutritional status.

4. DISCUSSION

4.1 Socio-demographic and Economic Characteristics

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The findings of this study demonstrated many socio-demographic factors that are precise to children and might influence their nutritional status between 6 and 59 months. The distribution of children across different age groups reveals that a substantial proportion (43.6%) falls within the age range of 24-59 months, indicating a concentration of older children in the sample. This observation aligns with other studies that focused on child nutrition, where older children may face different nutritional challenges compared to their younger counterparts (Akseer et al., 2017). The study also reveals that the majority of children (94.8 percent) were born in hospitals, attributing to good antenatal and perinatal care which translates to early childhood good nutritional status (UNICEF, 2020). The mode of delivery, with 76.2% of children born through the vagina, may have implications for early microbial colonization and subsequent health (Levin et al., 2016). Furthermore, the gender distribution indicates a slightly higher proportion of male children (51.2%), and gender disparities play a vital role in child nutrition outcomes (Santoso et al., 2019). Comparing these findings with other studies, it is essential to consider contextual factors such as geographic location, cultural practices, and healthcare infrastructure to contextualize and interpret the observed patterns (Jones et al., 2019).

The predominance of caregivers aged 20 to 47 years highlights the reproductive age group's crucial role in childcare and nutrition (Nyamasege, 2021). The majority of caregivers who are married or cohabiting have outlined that the presence of a family support system plays a key role in impacting child-feeding practices (Mahmood et al., 2021). The educational attainment of caregivers, particularly with approximately 45 percent having secondary and 24 percent having tertiary education, is a positive factor for child nutrition, as maternal education is consistently associated with improved child health outcomes (Chakona, 2020, Mensch et al., 2019). Important factors in allocating resources, such as the size of the family and the gender of the head of the household, may affect the accessibility to healthy food (Drammeh et al., 2019). Notably, the presence of alcohol use among 27 percent of caregivers raises concerns, as substance use may impact caregiving practices and household priorities.

While a considerable proportion of caregivers' land is their own, the limited presence of kitchen gardens raises concerns about the accessibility of diverse and nutrient-rich foods. According to Rehman et al. (2019), ownership of land is positively associated with improved child

nutritional status, indicating a potential link between household land ownership and enhanced access to resources that positively influence children's well-being (Rehman et al., 2019). The dynamics of food distribution within households are evident, with caregivers often prioritizing serving food to children initially (Raza et al., 2020).

Besides, the results revealed agree with the cross-sectional studies from other countries on household economic status and child malnutrition. For example, cross-sectional study was conducted in Bangladesh to show that students from higher economic status had a lower prevalence of stunting and wasting as compared to students from lower economic status (Chowdhury et al., 2020). This is in agreement with results from Kericho County where casual labour income was established to be the leading source of income implying that poor families may not be able to feed their children adequately and meet other nutritional needs. However, due to COVID-19 restrictions, there has not been effective construction, existence, and utilization of kitchen gardens, which are critical in providing food for families, hence escalating the use of purchased foods that in most cases are poor in diet diversity (Mwangi, 2022). In connection with the experience of Kericho County, such policies as those concerning household food security, which encourage the establishment of kitchen gardens and support non-farm income-generating activities may have high potential for combating malnutrition and improving children's health. The nature of this analysis underscores the fact that child malnutrition is a complex phenomenon and not just a function of either socio-demographic characteristics or the economic status of households.

4.2 Association between Nutritional Status and Socio-Demographic and Economic Characteristics of the Participants

It was revealed that maternal education status and mode of delivery are significant predictors of underweight. Those children of mothers or caregivers with no education had higher odds of being underweight than those of caregivers with tertiary education. These findings were consistent with a study conducted in Bangladesh that reported that children of mothers with secondary and higher education had a lower risk (RR: 0.83, 95% CI: 0.78, 0.88) of experiencing underweight compared to children of mothers who had no formal education (Hasib et al., 2020). Additionally, another study described that these children were 23% less likely to be underweight if their mothers had secondary education than the children whose mothers had no education level (Chowdhury et al., 2020). Maternal education was inversely related to underweight; the findings are endorsed by Woldeamanuel & Tesfaye (2019) (Woldeamanuel & Tesfaye, 2019) and (Mtongwa et al., 2021). This may be attributed to the fact that educated mothers have a boost of information regarding appropriate feeding practices and general child rearing, which could have a positive impact on child nutrition. It also found that underweight was 2.36 more likely to occur in cesarean compared to those that were a result of vaginal delivery. This result goes against the available studies that portrayed an overall 1.88-fold rise in the likelihood of overweight or obesity in children who were aged between 2- 5 years but born through cesarean section compared with the children born through vaginal delivery (Papadopoulou et al., 2023). However, infants born by CS had a significantly lower risk of being underweight, 0.71 times that of infants born vaginally, according to Abbasi et al. (2018). The above results may be due to health policies and initiatives, whereby more emphasis is placed on policy than on initiatives. The research also found that the order of serving has a relationship with malnutrition in children, with a test result of less than 0.05. The analysis of the results showed that children whose mothers were served first had a 1.30 times higher risk of wasting. These findings are similar to the study that reported an odds ratio of 2.18 for acute malnutrition related to children who were served meals with their families, especially for mothers who had other children.

5. CONCLUSION

The study also supported the center's assertion that socio-demographic and economic factors play a huge role in the current state of nutrition. Individuals with a secondary or higher degree were less likely to be underweight. Maternal education influences optimal feeding practices, and the study revealed its pivotal role in fostering children's nutritional well-being. The associations observed between child age, hierarchical food distribution, and wasting echo established knowledge, highlighting the need for tailored interventions that account for children's evolving dietary needs and household dynamics. Importantly, while some variables in the analysis did not show significant associations, the complex interplay of multifaceted factors

influencing a child's nutritional status is evident. This aligns with the understanding that child nutrition outcomes are shaped by a combination of socio-economic, cultural, and behavioral influences that extend beyond singular demographic factors. The higher chances of underweight and stunting among children born via caesarean sections underscore the need for specialized care for this group. This study also outlines the significance of caregiver education, intra-household dynamics, and early feeding practices. The correlation between maternal education and reduced child underweight underscores the empowering impact of education on child well-being.

The findings stressed the need for targeted interventions and adherence to evidence-based guidelines to optimize child growth. Further research is warranted to explore potential trends in underweight and the duration of illness, contributing to a broader understanding of integrated health and nutrition programs for child well-being. These findings align with existing research, thus emphasizing the need for integrated health and nutrition programs.

6. RECOMMENDATIONS

The research outcomes resulted in 2 notable recommendations as follows:

1. There is a need to establish a nutrition-specific intervention program in Kericho County targeting children aged 6 to 59 months. This program should comprehensively address both acute and chronic malnutrition.

2. There is a need to intensify the promotion, awareness, and support among caregivers on exclusive breastfeeding for the first six months of life, followed by the introduction of safe complementary foods while continuing breastfeeding up to two years of age or beyond

CONSENT

All authors declare that ‘written informed consent was obtained from the parent of the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

This study initially sought approval from the Mount Kenya University Institutional Scientific and Ethical Review Committees (ISREC). There is also the need to obtain a research authorization from NACOSTI (the National Commission for Science, Technology, and Innovation) before conducting any study. The Kericho County Government and the administrative units of the participating health institutions offered their blessings for the research exercise.

Participants’ identity was maintained throughout the study by providing them with numerical codes and in the self-completed questionnaire, there were no questions on identifying details of the participants. Each of the child’s caregivers was asked for their permission to participate in the study for them to be selected and they were free to pull out at any time without any penalties during the study process. In the case of the underage caregivers, consent was sought from the guardian of the minor, The primary caregivers responded to the questionnaire on behalf of the child they consented.

To assess the demographic, and socio-economic characteristics of each child, a pre-tested trans-adapted structured questionnaire was completed by the responding primary caregivers. In addition, the pilot testing of the questionnaire was also conducted, and the results were used to make modifications to the main one. The interviewer had good knowledge of some of the local languages, in this case, she was able to interview the primary caregivers some of whom could barely communicate in English or Kiswahili. The mother or primary caregiver of each child was expected to answer the interviewer’s questions. Furthermore, all information sources were cited as they should.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The author hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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