ORIGINAL RESEARCH ARTICLE

Caregiver factors influencing nutritional status of preschool children in Mwingi West, Kitui County Kenya.

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ABSTRACT

Children are at an increased risk of malnutrition, with many undernourished children being highly susceptible to preventable premature death and morbidity. Insufficient dietary intake, infections, food insecurity, and inadequate care are the main causes of child malnutrition. These factors are sequentially influenced by caregivers' characteristics. Despite this, the effect of a caregiver's characteristics on a child's nutrition status has not been exhaustively studied in rural areas of Kenya. It is important to continuously examine the trends in the prevalence of malnutrition for effective interventions. Regular updates on the prevalence of malnutrition are crucial for appropriate interventions. In this study, the nutritional status of children was evaluated alongside their association with caregivers' characteristics. The study was based in Migwani ward, Mwingi West Sub-County in Kitui County. The study was conducted between October and December 2020 and involved 106 caregivers with their 106 children aged 36–42 months. The characteristics of the caregivers were determined by the use of a pretested study questionnaire. To evaluate the nutritional status of children, the height and weight measures, age, and sex of the child were taken and transferred into the WHO Anthro software, and z-scores were derived. The Statistical Package for the Social Sciences (SPSS) was used to carry out additional data analysis. Children's nutritional status and caregivers' characteristics were bivariate tested to determine the association.

In the present study, the prevalence of stunting was 33.0%, wasting was 15.1%, and underweight was 20.8%. In this study, the caregivers that had lower income had more children that were underweight ($\chi 2 = 9.2$ p = 0.02), stunted ($\chi 2 = 10.4$ p = 0.015) and wasted ($\chi 2 = 16.9$, p<0.001) compared to those with higher incomes. More so, the caregivers that were younger had more children that were wasted ($\chi 2 = 20.04$, p<0.001), stunted ($\chi 2 = 9.65$, p = 0.032) and underweight ($\chi 2 = 8.26$, p = 0.041). Households that were headed by women had more children that were stunted (p = 0.022), wasted (p = 0.041) and underweight (p = 0.003). Similarly, respondents with lower education levels had more children that were stunted ($\chi 2 = 14.02$, p = 0.003), wasted ($\chi 2 = 4.85$, p = 0.037) and underweight ($\chi 2 = 4.76$, p = 0.045). In this study, the caregiver's occupation was significantly associated with children's stunting ($\chi 2 = 12.23$, p = 0.007) and underweight levels ($\chi 2 = 6.12$, p = 0.034). The caregiver's occupation had no influence on the children's wasting levels. The present study found that the marital status

of a caregiver did not influence a child's nutritional status. These study results affirm that nutritional problems of stunting, wasting, and underweight among preschool children in Kitui County require public health actions. That caregivers' characteristics play a role in the nutritional status of preschool children in Kitui County. Based on these study findings, priority should be given to children's nutrition programs that incorporate the dynamics of caregivers' characteristics. By doing this, such programs will be more effective.

Key words: Nutritional Status, Caregivers Factors, Children, Rural Areas.

1.0 Introduction

Malnutrition is the main contributor to preventable childhood mortality and morbidity and accounts for about 5.6 million deaths annually of under-five children (World Health Organization, 2020). Globally, about 21.9% of under-fives are stunted, 38.0% are underweight, while 7.3% are wasted (United Nations-World Health Organization, 2019). Africa bears the highest burden of malnutrition due to poverty and food insecurity. According to the Kenya National Bureau of Statistics (KNBS) and ICF Macro (2014), approximately 26% of children under the age of five years in Kenya were stunted, 4% were wasted, and 11% were underweight. These figures exceed the WHO's acceptable levels of malnutrition prevalence among children, necessitating public health intervention (WHO/UNICEF, 2021). Malnutrition remains a public health concern, especially among preschool children. A study by Hui et al. (2014) observed that nutritional problems among preschool children are on the rise. According to WHO/UNICEF (2021), one in every three preschool children is malnourished. Preschool children's poor nutritional status has been linked to increased nutrient requirements for growth and insufficient nutrient intake (Galgamuwa et al., 2017). Conducting regular surveys to document the nutritional status and examine associated factors with malnutrition trends, especially in preschool children, is important since it may assist in developing appropriate interventions to address nutrition-related problems in young children. This study, therefore, focused on evaluating the nutritional status of preschool children in Migwani Ward, Mwingi West Sub-County, Kitui County.

Malnutrition negatively impacts children's health, growth, and development. The nutritional status of children, therefore, remains a fundamental concern (Amugsi et al., 2020). Optimal nutritional status is associated with lower child mortality and illness, as well as higher adult economic productivity (Galgamuwa et al., 2017). Assessing children's nutritional status by the use of anthropometric measures is one way of determining their health and wellbeing. Several studies have reported that caregiver characteristics play a role in children's nutritional status (Kanmiki et al., 2014; Milelu et al., 2017). Despite this, not many studies have examined the association between caregivers' characteristics and the nutritional status of preschool children, specifically focusing on Kitui County. Additionally, most available studies have examined a few caregivers' characteristics, making it difficult to generalise the findings. In Kitui county, the majority of studies that have evaluated caregivers' characteristics concerning children's nutritional status have mainly focused on younger children aged <24 months (Ferguson et al., 2015; Kigaru & Milelu, 2017). According to Wali et al. (2020), older children

aged over 36 months old have a higher prevalence of malnutrition compared to younger children. Understanding the factors that contribute to this trend is important. By conducting the current study, it was possible to identify some of the risk factors that contribute to poor nutritional status in pre-school children. To ensure that nutrition intervention programs are effective in addressing children's malnutrition, caregivers' characteristics should be considered.

2.0 Methodology
2.1 Study design and location
The study design was cross-sectional (analytical). The study was carried out in the months of October and December 2020 in Migwani, Kitui County. According to KNBS & ICF Macro (2014), Kitui County has the highest prevalence of stunting (46%) among under-five children, and this is the main reason the county was selected for the study. The study site was specifically selected. Migwani Ward is food insecure and is the most densely populated ward in Mwingi West sub-county (Kenga et al., 2018; Muinde, 2012).

2.2 Study participants
The study targeted caregivers with children who were between 36 and 42 months old. The selection of the children's age group was informed by the fact that a higher prevalence of malnutrition has been reported among children aged 36 months and above compared to children who are less than 36 months old (KNBS & ICF Macro, 2014). The respondents to the study questionnaire were the caregivers of the children. Additionally, the children's nutritional status was examined. The study included caregivers who gave consent and resided in the locality throughout the study period. Those that had lived in the study area for less than six months were not included in the study. According to the World Health Organization (2013), children with severe malnutrition should be managed in a hospital setup. Therefore, children that appeared very sick with severe malnutrition were not included in the study. The number of participants in this study was 106 child-caregiver pairs. The local administration and community health workers attached to the area helped in the identification of households with children aged 36–42 months old. A list of these households was generated. Systematic random sampling was then used to select children from the identified households. Interviews were conducted at the households of the caregivers.

2.3 Data collection tools and procedure
A structured questionnaire that had been pretested was used to gather information on the characteristics of respondents. The questionnaire was pre-tested among 20 child–caregiver pairs; the pretest subjects were not included in the study. Pretesting was done to ensure the validity and clarity of the study instruments. Some of the information on caregivers' characteristics that was collected included the age of the respondent, marital status, gender, household head, occupation, income, and education level. The study questionnaire also had a section on children's characteristics that was aimed at collecting data concerning their age and sex. The caregivers provided information on the child's age, and this was reconfirmed by the child's immunization card and birth certificate. Anthropometric measures were taken following

the provisions of (WHO, 2008). The weight of the children was evaluated by the use of a UNISCALE (UNICEF). In taking weight measurements, each child stood at the center of the scale with legs slightly apart, with no shoes, and with little wear. The child stood still until the weight was displayed on the scale and documented to the nearest 0.1 kg. Children's height was taken by the use of a height board and this was documented to the nearest 0.1 cm. Height and weight measures were taken three times. Calculations were made for an average, and this was then recorded.

2.4 Data Analysis

The age, sex, weight, and height measures of the child were input into an excel sheet and then exported into WHO anthro software (WHO, 2010) to obtain z-scores to derive the nutritional status of the child. Children's z-scores were derived as the weight for age (WAZ) showing underweight, weight for height (WHZ) reflecting wasting, and height for age (HAZ) an indicator of stunting. The z-scores were then clustered according to WHO (2010) provisions of overweight >2 z-scores, normal >-2 to <2 z-scores, moderate malnourishment < -2 to > -3 z-scores, and severe malnutrition < -3 z-scores. This data was then transferred into SPSS software for further analysis. The information on the caregiver's characteristics was also analyzed using the SPSS software. Descriptive statistics, including mean and standard deviations, were obtained. Bivariate analysis using chi-square was performed to determine the association between caregivers' characteristics and children's nutritional status. At p 0.05, statistical differences were considered significant.

3.0 Results and discussions
3.1 Children characteristics

Results on the characteristics of children engaged in the study are presented in Table 1.

Table 1: Characteristics of study Children

Variable (mean)	Overall
Age (Months)	38.64±1.85
Height (Centimetres)	93.51±3.80
Weight (Kilograms)	13.22±1.61
Male	52 (49.1%)
Female	54(50.9%)

The mean age for the children was 38.64±1.85 months, the mean height was 93.51±3.80 centimeters, and the mean weight was 13.22±1.61 kilograms. In this study, there were more female children at 50.9%, while the male children were at 49.1%.

3.2 Children nutritional status

In the present study, 33.0% of children were stunted, 15.1% were wasted, and 20.8% were underweight, as shown in Figure 1.
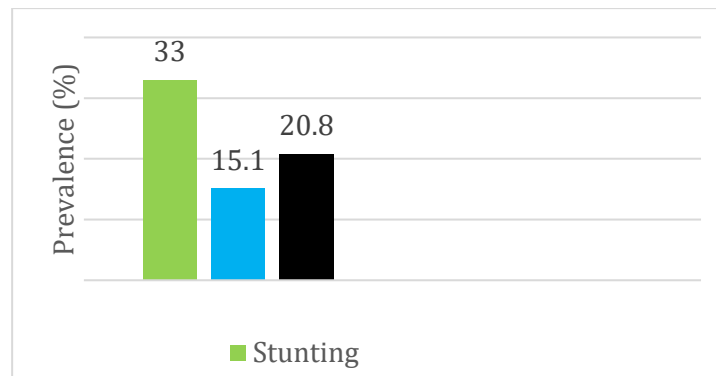
Figure 1: Children Nutritional Status

3.3 Association between children nutritional status and caregivers characteristics

The results on the association between children's nutritional status and caregiver characteristics are shown in Table 2. Cross-tabulation of the caregiver's characteristics and nutritional status showed that there was a significant association between the caregiver's income, age, household head, and nutritional status. There was a significant association between the caregiver's income and stunting ($p = 0.015$), wasting ($p<0.001$), and underweight ($p = 0.020$) levels among the children. The caregivers in the income range of KES <5,000 had the highest proportion of malnourished children. Further, a significant association was found between the household head and the children's prevalence of stunting ($p = 0.022$), wasting ($p = 0.041$) and underweight ($p = 0.003$). In this study, households that were headed by women had the most children who were stunted (19.8%), wasted (18.9%) and underweight (17.9%) compared to those that were headed by men.

Cross-tabulation of results showed a significant association between caregivers' age and the children's nutritional status. The results revealed that the caregivers who were aged 20–29 years had the highest percentage of children that were stunted (21.7%), wasted (11.3%), and underweight (16.1%), while those aged 50 years had no children that were stunted, wasted, or underweight. The study findings also revealed a significant association between the caregiver's occupation and the children's nutritional status. A higher percentage of children in this study, 17.90%, 5.70%, and 17.00% that were stunted, wasted, and underweight, belonged to caregivers whose main occupation was farming. On the other hand, the caregivers that were in formal employment had the least number of children that were malnourished. A significant association was found between caregivers' occupation and children's stunting ($p = 0.007$) and underweight ($p = 0.034$) levels. However, no significant association between the caregiver's occupation and children's wasting levels ($p = 0.966$) was found. This study did not observe a significant association between caregivers' marital status and children's stunting, wasting, and underweight levels.

Table 2: Relationship between Caregivers Characteristics and Children Nutritional Status

Parameter	Total n (%)	Stunting	Chi square (p-value)	Wasting	Chi square (p-value)	Underweight	Chi square (p-value)
Household head							
Female	47 (44.30)	21 (19.80)	9.25(0.022)	12 (18.90)	5.05(0.041)	19 (17.90)	8.84 (0.003)
Male	59 (55.70)	14 (13.20)		4 (3.80)		3 (2.80)	
Education							
None	51 (48.10)	17 (16.0)	14.02 (0.003)	13 (12.30)	4.85 (0.037)	10 (9.40)	4.76 (0.045)
Primary	33 (31.10)	11 (10.40)		3 (2.80)		7 (6.60)	
Secondary	15 (14.20)	4 (3.80)		0		4 (3.80)	
College	7 (6.60)	3 (2.80)		0		1 (0.90)	
Income (KES)							
<5000	55 (51.90)	20 (18.90)	10.40 (0.015)	12 (11.30)	16.90 (p<0.001)	17 (16.00)	9.20 (0.020)
5001-10000	36 (34.00)	14 (13.20)		3 (2.80)		5 (4.70)	
10001-15000	13 (12.30)	1 (0.90)		1 (0.90)		0	
>15001	2 (1.90)	0		0		0	
Age of respondents (years)							
20-29	70 (66.0)	23 (21.70)	9.65 (0.032)	12 (11.30)	20.04 (p<0.001)	17 (16.0)	8.26 (0.041)
30-39	18 (17.0)	9 (8.50)		4 (3.80)		4 (3.80)	
40-49	13 (12.3)	3 (2.80)		0		1 (0.90)	
>50	5 (4.7)	0		0		0	
Occupation							
Unemployed	30 (28.30)	9 (8.50)	12.23(0.007)	5 (4.70)	0.27(0.966)	3 (2.80)	6.12 (0.034)
Business	13 (12.30)	4 (3.80)		2 (1.90)		1 (0.90)	
Formal employment	9 (8.50)	3 (2.80)		3 (2.80)		0	
Farmer	54 (50.90)	19 (17.90)		6 (5.70)		18 (17.00)	
Marital Status							
Separated	31 (29.20)	10 (9.40)	0.33 (1.706)	4 (3.80)	0.85 (0.426)	7 (6.60)	1.97 (0.374)
Married	68 (64.20)	22 (20.80)		12 (11.30)		15 (14.20)	
Widowed	7 (6.60)	3 (2.80)		0		0	

4.0. Discussion

In the current study, 33.0% of children were found to be stunted. This is higher than 26.0% national levels but lower than 46.0% county-specific values. KNBS and ICF Macro (2014) Studies carried out in Kenya have obtained different stunting prevalences among preschool children. According to UNICEF (2011), 35.1% of under-five children in Kitui County are stunted. This is in line with the current study findings. However, a study by Milelu et al. (2017) found that 27.9% of under-fives in Kitui County were stunted. These figures are lower than the ones obtained in this study. According to the World Health Organization (2020), a prevalence of stunting above 30% warrants public health actions. This then implies that child stunting in Kitui County is a public health concern.

In the present study, 15.1% of children were wasted, a figure that is lower than the 18.8% prevalence of wasting found by Situma et al. (2019) among preschool children in Turkana County, which is an ASAL region. However, they are higher than the 3.4% county-specific prevalence reported by KNBS & ICF Macro (2014) and the 8.0% found by Guyatt et al. (2020) among under-five children in Kitui County. Short-term food deprivation results in acute malnutrition (Olivia & Kwagala, 2019). A study by Masibo (2013) in Kenya reported that children's wasting prevalence was on the rise, which is in line with the current study results. Kitui County constantly experiences drought, leading to low food production, acute food scarcity, and inadequate food intake (Cassim & Juma, 2018). This could explain the observed increase in the prevalence of wasting found in the present study. WHO/UNICEF (2021)

observed that the prevalence of wasting among under-five children was 15.0% in 2020, which was about 1.15 times greater than the previous year. This corresponds to the current study results. This was attributed to the COVID-19 pandemic effects that led to disruptions in economic earnings and food acquisition, negatively affecting access to and consumption of nutritious foods.

In the present study, 20.8% of the children were underweight. This figure is akin to the 19.7% county-specific values gotten by KNBS and ICF Macro (2014). However, the values are lower than the 29.9% reported by UNICEF (2011) among under-five children in Kitui and the 50% found by Adeladza (2010) in Kwale. The prevalence of different types of undernutrition in this study and other mentioned studies differs. This could be attributed to variations in geographical locations; characteristics of the target group; and the season or time at which the studies were conducted (Kigaru & Milelu, 2017; Situma et al., 2019). Evidence from the current study and other mentioned studies shows that undernutrition among preschool children is still a problem in Kenya. Regular monitoring of the patterns of preschool children's malnutrition status in different geographical locations is important in developing appropriate intervention strategies.

Children's nutritional status has been associated with various caregiver characteristics (Makori et al., 2018; Wali et al., 2020). In this study, the caregiver's income was significantly associated with the children's nutritional status parameters. These findings correspond with those of Sanusi (2010), who conducted a study among under-five children in Nigeria and Abeywickrama et al. (2018) in Sri Lanka. The mentioned studies observed that income has a direct influence on household food expenditure; the higher the income, the higher the expenditure on food. Therefore, households with higher incomes tend to include a variety of foods in their daily diets, and this then positively impacts nutritional status. A study by Galgamuwa et al. (2017) among preschool children in Sri Lanka revealed that households with higher monthly income were able to offer quality health care and more nutritious foods such as fruits, vegetables, and animal-based foods that positively influence children's nutritional status.

In this study, households that were headed by females had significantly more children that were stunted, wasted, and underweight compared to those headed by males. The current study findings concur with those of Adeladza (2010) and Haidar and Kogi-Makau (2009), who reported that children from female-headed households were more likely to have poor nutritional status in comparison to those from male-headed households. A study by Haidar and Kogi-Makau (2009) among preschool children observed that the majority of female-headed households experience extreme poverty and have limited access to resources and employment opportunities, which results in sub-optimal child nutritional status. The current study results emphasize the importance of taking into consideration caregivers' gender differences in improving children's nutrition and health actions.

In this study, the caregiver's education level was found to have a significant association with children's underweight, wasting, and stunting levels. Comparable results were reported by

Clarke et al. (2021), who conducted a study among preschool children in South Africa. According to Makori et al. (2018), low or lack of education among children's caregivers enhances poverty and the vicious cycle of malnutrition. A study by Casale et al. (2018) examined the pathways through which caregivers' education influences children's nutritional status. The study observed that most of the time, the caregiver's education level is a determinant of financial resources and occupational standing. High education levels among caregivers help in better nutrition decisions and present economic opportunities to improve diets and the well-being of children (Clarke et al., 2021; Mehmood et al., 2022).

The current study findings on the link between a caregiver's occupation and the different children's nutritional status indicators have varying inferences. Caregivers' occupation was significantly associated with children's nutritional status, underweight, and stunting levels. These findings are consistent with Hoffman et al. (2017) and Maseta et al. (2008). However, no association was found between the caregiver's occupation and the children's wasting levels in this study, contradicting the reports by Hoffman et al. (2017). A study by Ndemwa et al. (2017) among under-five children in Kwale, Kenya observed that there was no significant association between caregivers' occupation and children's wasting levels, which is consistent with the current study results. The study attributed this to the complexities of comparing time spent with children with the actual care given or received to the children. Another study by Mkhize & Sibanda (2020) among under-five children in South Africa argues that there may be no differences in children's nutritional status depending on the caregivers' occupation. According to Nankinga and Kwagala (2019), most caregivers that are in informal employment such as farming have more children that have poor nutritional status due to limited resources, which concurs with this study's findings.

Assessment of the caregivers' age and the children's nutritional status revealed a significant association in this study. These findings are in agreement with other past studies among preschool children (Sawe et al., 2020; Ronoh et al., 2017). According to Pelto & Thuita (2016), the majority of young adults in rural areas of Kenya are not economically stable and therefore may not provide optimal care to children. This may explain the high prevalence of child malnutrition among children of younger caregivers observed in this study. Another study by Mutua et al. (2017) among children aged 2–5 years old in Machakos, Kenya observed that young caregivers lack experience and authority in child feeding, predisposing their children to malnutrition compared to children of older caregivers, supporting the present study results. Although caregivers that were married had the highest number of children that were stunted, wasted, and underweight, the caregiver's marital status had no connection with the children's nutritional status.

5.0. Conclusion
The present study results ascertain that nutritional problems of stunting, wasting, and underweight among preschool children in Kitui County remain of public health concern. The present study revealed that low education levels and the low monthly income of caregivers negatively impacted children's nutritional status. Furthermore, in this study, households that

were headed by women had more children with poor nutritional status, suggesting that gender differences should be considered in improving the wellbeing of children. In this study, young caregivers had more children that were malnourished. Therefore, the age of a caregiver is a risk factor for child malnutrition. This study concludes that caregivers' characteristics are valid indicators of the nutritional status of preschool children in Kitui County. It is therefore necessary in conducting studies concerning children's nutritional status to examine these factors. There is therefore a need for consolidated efforts by the various stakeholders to reduce the prevalence of child malnutrition. Considering the geographical location of the study area, an ASAL region that is faced with frequent drought and famine, the Ministry of Health should consider prioritizing nutrition-related interventions to include food-based approaches to increase dietary diversification. The various government agents may consider putting in place measures that reduce income and education disparities among rural households. Improvement of these parameters among caregivers will have a positive impact on the nutritional status of preschool children. Priority should be given to children's nutrition programs that incorporate the dynamics of caregivers' characteristics. By doing this, such programs will be more effective. Other research studies exploring the influence of caregiver characteristics on children's nutritional status in diverse geographical locations should be carried out to confirm the current study findings.

6.5 Declaration of interest

Kenya's National Commission for Science, Technology, and Innovation in Kenya issued the research authorisation permission with reference NACOSTI P/20/5515. The Mount Kenya University Ethical Review Committee awarded approval number 652 for the study on March 17, 2020. It is being done to meet the criteria for receiving a PhD in Food Science and Nutrition.

6.6 Conflict of interest

The authors declare no conflict of interest.

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