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LINKAGE BETWEEN NUTRITIONAL STATUS OF CHILDREN 6-59 MONTHS AND SOME SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF MOTHERS IN MALAVA SUB-COUNTY, KAKAMEGA COUNTY

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ABSTRACT

The world is currently battling the triple burden of malnutrition across all age groups including children. In Kenya, household socio-demographic and economic characteristics have been shown to contribute to malnutrition among children, but there is little known about the magnitude of their contribution at the sub-county level. This study aimed at determining the association between socio-demographic and economic characteristics of mothers and the nutritional status of their children 6-59 months old. This was a cross-sectional study conducted in November and December of 2021 in Malava Sub-county, Kakamega County, Kenya. Data were collected from households using semi-structured questionnaires administered to 344 randomly selected mothers who had children aged 6-59 months. Nutritional status was determined using anthropometric measurements translated to nutrition indicators using WHO Anthro software. Association between the study variables was determined using Chi-square test. About 53% of the mothers were aged < 25 years. Formal education of mothers was low with 14.5% having no education at all and 46.8% having completed primary level only. Poverty rate was high in the study area with 83.7% of the mothers being unemployed and 77.9% earning less than Ksh. 5,000 (50 USD) per month. Only 14.5% engaged in business as an economic activity. Malnutrition prevalence in Malava Sub-county was high with almost 21% of the children being stunted and 8.1% being severely stunted. The prevalence of wasting and underweight were at 12.5% and 7.5%, respectively. Significant associations were observed between the stunting and the age of the mother ($p=0.036$) and education level ($p=0.023$). Education was also significantly associated with wasting ($p=0.008$). Underweight was associated with education level ($p=0.014$), average household monthly income ($p=0.019$) and the household economic activity engagement ($p=0.01$). The study recommends a multi-sectoral collaboration in addressing the household demographic and economic characteristics that may help in reducing the prevalence of malnutrition in Malava Sub-county, Kakamega County.

Key words: Children, Nutritional Status, Stunting, Wasting, Underweight, Malnutrition, Household, Malava, Kakamega

INTRODUCTION

Malnutrition in the form of undernutrition among children may occur either due to intake of inadequate amounts of food than the body requirements, or inability of the body to utilize nutrients among other determining factors [1]. The world is currently struggling with triple burden of malnutrition characterized by underweight, micronutrient deficiencies and overweight across all age groups including children aged below five years. According to the Global Nutrition Report 2020, every country in the world is affected by malnutrition with countries faced by either single, double or triple burden of malnutrition [2]. Globally, the 2021 UNICEF Global Child Nutrition Status estimates reported the prevalence of stunting among children under five years in the world was at 22.0%, wasting at 6.7% and overweight at 5.7%. Children born with a Low Birth Weight (LBW) are at a higher risk of getting stunted [3,4]. The 2014 Kenya Demographic Health Survey (KDHS) reported that 26.0% (1.82 million children) of the children under five years in Kenya are stunted [5]. The nutrition situation of children below five years in Kenya is worse than the global statistics. Comparatively, some counties such as Kitui and West Pokot reported very high prevalence of stunting at 45.8% and 45.9%, respectively with Kakamega having a slightly higher prevalence of stunting (28.4%) than the national level. Thus, the county contributes to the high prevalence of stunting at national level.

According to the UNICEF prevalence thresholds for nutrition indicators in children under five years, any stunting prevalence between 20-29% is considered to be high [6]. The national prevalence of underweight and wasting in the 2014 KDHS report were 11.0% and 4.0%, respectively. The prevalence of underweight children in Kakamega County was closer to the national prevalence at 10.8% and wasting at 1.9% [5]. Based on the prevalence thresholds, this shows a high prevalence of underweight at the national and county levels, which require mitigation measures. An increase in prevalence of wasting has been reported by UNICEF between the years 2000 and 2020 with 45.4 million children wasted globally [4]. This was occasioned by either poor maternal nutrition, low birth weight (LBW) of the child or poor child feeding and care practices. There could be a similar situation in Malava Sub-county, Kakamega where high poverty levels and household food insecurity have been reported in the Demographic Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS) [5,18].

Household demographic and economic characteristics have been shown to influence the prevalence of malnutrition especially among under-fives. However, the Demographic Health Surveys in Kenya provide a blanket analysis of the nutrition status of children; not factoring in the demographic and economic characteristics at the sub-county level. According to the 2019 Kenya Population and Housing Census (KPHC), Kakamega County has a population of 225,919 children and Malava Sub-county has 29,800 children below five years [7]. A high population in one district in western Ethiopia was closely associated with inadequate health coverage, challenges with access to health facilities and lack of proper child care practices [8]. This could be the same scenario in Malava Sub-county, being the largest sub-county in Kakamega County with the highest population according to the 2019 Kenya Population and



Housing Census [7]. Additionally, the Sub-county is in a rural resource limited setting with poor infrastructural development hindering access to health care facilities. A study in Tanzania associated low education level of mothers and single parenthood with a high prevalence of undernutrition [9]. This situation could be similar in Malava Sub-county, Kakamega County where high school drop-outs have been witnessed as compared to the other sub-counties [10]. Associations between mothers' socio-demographic and economic characteristics and child nutritional status have been reported by the 2014 Kenya Demographic Health Survey. However, the survey findings were much generalized across different households with varied socio-demographic and economic statuses and this creates a gap whether similar outcomes would be obtained if replicated in Malava Sub-county. It is upon this background that this study was carried out to determine the linkage between the selected socio-demographic and economic characteristics of mothers and the nutritional status of children 6-59 months in Malava Sub-county, Kakamega - Kenya.

MATERIALS AND METHODS

Study Area and Population

The study was conducted among mothers with children aged 6-59 months in three wards of Malava Sub-county namely: South Kabras, Chemuche and Butali-Chegulo in Kakamega County. The wards have the highest population in the sub-county and the age category of children was selected due to their vulnerability to malnutrition. The sub-county is the largest in size in Kakamega County, has seven administrative wards, with the highest population [11]. The 2019 Kenya Population and Housing Census reported a total of 238,330 people living in Malava Sub-county, 115,511 males and 122,814 females and a population density of 566 persons per square kilometer. The Sub-county has 51,083 households with 29,800 children aged 6-59 months (14,867 males and 14,933 females) [12]. The study included mothers who had children aged below five years and who consented to participate. Mothers with children exceeding or below the cut-off age and who were not residents of Malava Sub-county were excluded.

Study Design

The study was a household-based survey conducted in November and December 2021 and the researchers adopted a cross-sectional descriptive survey design to collect quantitative data.

Sample Size and Sampling Strategy

Sampling was done at household level and a sample size of 344 mother-child pair was calculated using Fisher's *et al.* [13] formula. The prevalence of stunting among children in Kakamega County reported by KDHS was used in the Sub-county were purposively selected as the study area. Three wards were selected out of the seven using a simple random sampling method to avoid bias in the selection process. Each ward was divided into the community health units (CHUs) for ease of identifying the respondents. Proportionate sampling was used to sample the households in each ward while the study populations were selected using a simple random sampling method. Households with mothers and children aged 6-59 months were randomly selected so as

to give them an equal chance to participate in the study. The basis of proportionate sampling was the high number of households and the population of children under five years in each ward.

Data Collection Methods

Primary data on the socio-demographic and economic characteristics of the mothers and age of the children were collected using a semi-structured questionnaire. For households with more than one mother who had children aged between 6-59 months or a mother who had more than one child aged between the target age group, all the children were included in the study. Data on children's nutritional status were collected using an observation checklist, where height and weight were recorded and transformed to indicators of nutrition status using the WHO 2006 standards. Body length was read to the nearest 0.1 cm for children aged 6 to 23 months and those above 24 months who are unable to stand on their own using a horizontal SECA length board that was laid on a flat surface. Height of children above 24 months who are able to stand on their own was measured using a vertical wooden height board by placing the child on the measuring board, and child standing upright in the middle of board. Weight for children who were unable to stand by their own was measured using a SECA salter scale hanged on a strong object to support the weight of the child. For children who were able to stand on their own, weight was measured using a SECA digital weighing scale. For both height and weight, two measurements were taken for each child with minimal clothing and with no shoes and then averaged.

Data analysis

Quantitative data for socio-demographic and economic characteristics were summarized and analyzed in Statistical Package for Social Sciences (SPSS) version 26. Data on children's nutrition status was analyzed in the WHO Anthro software. The children's age, weight and height were converted to nutrition status indicators z-scores. A Chi-square test was performed to test the association between the selected socio-demographic characteristics of the mothers and the nutrition status of their children.

Ethical considerations

An ethical approval was obtained from Masinde Muliro University of Science and Technology Institutional Ethics and Review Committee with approval number MMUST/IERC/200/2021. A research license was obtained from National Commission for Science, Technology and Innovation with license number NACOSTI/P/21/11883. Permission to conduct the study was also obtained from the County and Sub-county Director of Health and the Sub-County Health Administrators. The researchers first obtained a written consent from the mothers with children 6-59 months to participate in the study. The participants were assured of confidentiality of the information they relayed. The data collected did not have any personal identifiers as unique codes generated by the researchers were assigned to each participant.



RESULTS AND DISCUSSION

Socio-demographic Characteristics of Mothers with Children aged 6-59 Months

As detailed in Table 1, most households (81.4%; n=290) were headed by a male. Majority of the mothers (85.2%; n=293) were married. On the mothers' age, 27.3% (n=94) were aged 20-25 years and 25.6% (n=88) were less than 20 years old. The 2013-2014 UNICEF MICS reported that 5.6% of girls in Kakamega County were first married before reaching 15 years and 29.8% were married before the age of 18 years. In the study, 46.8% (n=161), 29.9% (n=103) and 8.7% (n=30) had completed their primary, secondary and tertiary education, respectively. However, 14.5% (n=50) were found to have had no education at all. The major cause of incomplete formal education among mothers in Malava Sub-county was school drop-out which has been reported in other studies in different parts of the country [12,14–18]. Malava Sub-county reported major cases of early/teenage pregnancies and early marriages among girls. When the girls get pregnant, they opt to get out of school and get married to their partners and eventually become young mothers. They never return to school despite the advocacy efforts by various government agencies and thus do not complete their education. Incomplete formal education among mothers has far reaching consequences on social life, health and economy[19-20].

Demographic Characteristics of Children Aged 6-59 Months

Among the 344 children who participated in this study, 54.9% (n=189) were boys and 155 (n=45.1%) were girls. The distribution of their age as per age groups was as follows: 33.4% (n=115) were aged 6-17 months, 26.7% (n=92) were aged 18-29 months, 19.8% (n=68) were aged 30-41 months, 13.7% (n=47) were aged 42-53 months and 6.4% (n=22) were aged 54-59 months.

Socio-economic Characteristics of Mothers with Children Aged 6-59 Months

The Kenya National Bureau of Statistics Economic Survey report 2017 shows the poverty rate in Kakamega County at 49.2% [21]. As summarized in Table 2, this study reported a high unemployment rate (83.7%; n=288) and a very low average monthly household income of less than Ksh. 5,000 (77.9%, n=268) among the mothers who participated in the study. The monthly household income was a combination of what the husband and the mother earned for the married mothers. Only 5.8% of the study respondents had a formal employment and most of these households lived on less than Ksh. 170 per day. The international standards of living by the United Nations 2015 recommends an average household expenditure of not less than Ksh 250 (\$1.90) per day for developing countries. Therefore, this shows the households in Malava Sub-county have a high poverty index. The main source of income for the households was farming (78.2%; n=269) and this happens to be the main economic activity that the mothers engaged in (85.5%; n=294). However, much of the food items produced through farming were utilized for household consumption and the surplus sold. A very small proportion of the respondents (14.5%; n=50) engaged in business as an economic activity. This shows, either there were knowledge gaps on Income Generating Activities (IGAs) that the mothers can engage in or there is little or no support for mothers with business ideas to start their own IGAs to boost their household income. A half of the respondents (50%; n=172) reported that they did subsistence food crop

farming, 32.3% (n=111) did cash crop farming while a few of them (2.6%; n=9) engaged in mixed (subsistence and cash crop) farming. This can be attributed to the increased population in Malava Sub-county and Kakamega County in general that has led to increased land division and thus limited lands to practice large- scale mixed farming methods.

The major food crops grown were cereal crops (41%; n=141) which include maize, wheat, millet, sorghum and vegetables (31.4%; n=108) which include *Sukuma wiki*, cowpeas, amaranth among others. Sugarcane was the predominant cash-crop grown (32.8%; n=113) and this can be associated with the proximity of the study area to West Kenya and Butali Sugar Companies located in Malava Sub-county and the Nzoia Sugar company in neighbouring Bungoma County. The KCIDP 2018-2022 reports maize, sorghum, finger millet, rice, beans, peas, grams, cassava, sweet potato, arrow roots as the major food crops grown in Malava Sub-county, Kakamega County. The production of cereals in Kakamega County is reported to have gradually increased from 1.9 to 2.9 million bags between the years 2013-2017. However, the production of some pulses has declined due to some factors, for example crop diseases. There is lack of diversification in cultivation of food crops in Malava Sub-county, leading to inability to meet the minimum acceptable diets by some households [11].

Nutritional Status of Children 6-59 Months

The results summarized in Figure 1 show the prevalence of stunting in Malava Sub-county was at 20.9% (n=72), with 8.1% (n=28) and 12.8% (n=44) having severe (<-3 Z-scores) and moderate (>-3 to <-2 Z-scores) stunting, respectively. Comparing to the prevalence of stunting in Kakamega County, this may indicate a lower prevalence of stunting but it is still high considering the increase in population of children below five years from the years 2014-2019. The overall prevalence of wasting was found to be high at 12.5% (n=43) compared to the national and county wasting statistics reported by the 2014 KDHS. The researchers also report the prevalence of underweight at 7.5% (n=26). Comparing to the KDHS, 2014 report, there is a lower proportion of underweight cases and a higher proportion of wasting cases in Kakamega County. The UNICEF/WHO/World Bank Joint Child Malnutrition Estimates Edition reports a global decline in stunting since the year 2000 but advocates for a faster progress in order to achieve the 2030 global nutrition targets [4]. The target is to end malnutrition in all its' forms by 2030 including achieving the internationally agreed targets on stunting and wasting in children under 5 years of age by 2025 [22]. However, the UNICEF estimates show alarming increase in global rates of wasting and overweight in 2020 with most cases reported in Asia and Africa. This situation requires a reversal in trajectory if the 2030 target is to be achieved [4].

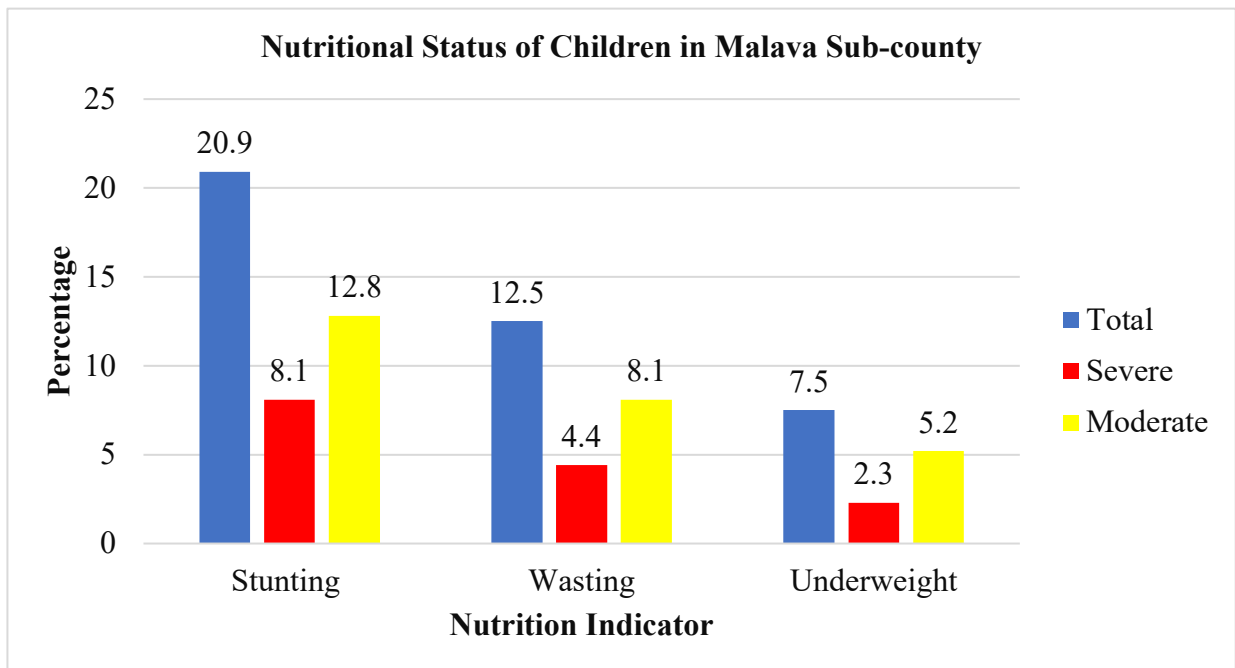


Figure 1: Nutritional Status of Children 6-59 Months in Malava Sub-county Association between Mothers' Socio-Demographic and Economic Characteristics and the Nutritional Status of Children 6-59 Months

The KDHS 2014 reported a higher prevalence of wasting and stunting among children from mothers with no education and from a poorer wealth index [23]. In the current study, the researchers found a significant relationship between stunting of the children and the age of the mother [$\chi^2 (10) = 19.347$, $p=0.036$] as reported in Table 3. In Ghana, children of young mothers were 8 times more likely to be stunted compared to those of adult mothers [24]. Mothers who get pregnant at a young age are less likely to be prepared and thus have inadequate maternal stores for nutrients. They are likely to give birth to underweight and stunted children if they do not receive good nutrition during pregnancy. Other studies have reported the education and literacy level of mothers as a predictor of children's nutritional status [15,16,25,26]. As summarized in Tables 3 and 4, the study found a significant relationship between the level of education of the mother and the prevalence of stunting [$\chi^2 (6) = 14.664$, $p=0.023$], prevalence of wasting [$\chi^2 (6) = 17.242$, $p=0.008$] and prevalence of underweight [$\chi^2 (12) = 25.241$, $p=0.014$]. This indicates that the nutritional status is improved with an increased level of education of the mother. Mothers with a low level of formal and maternal nutrition education have little nutrition knowledge and thus have poor nutritional childcare practices leading to poor child nutritional status [26]. The level of average household monthly income [$\chi^2 (12) = 24.291$, $p=0.019$] and household economic activity engagement [$\chi^2 (4) = 13.368$, $p=0.01$] were found to significantly contribute to the high prevalence of underweight in Malava Sub-county as indicated in Table 5. Mothers with a low monthly income had their children at a higher risk of being underweight than those who were unemployed and had a better monthly income [27-28].

CONCLUSION

The prevalence of stunting and wasting in Malava Sub-county, Kakamega County reported in this study were high. A multi-sectoral approach by the County ministries and other stakeholders is required in improving the household economic characteristics in order to avert the malnutrition situation among children under-five in Malava Sub-county, Kakamega County. The Ministry of Social Services, Youth, Sports and Culture needs to take actions in addressing the increasing cases of early marriages and early/teenage pregnancies. It may be among the factors leading to poor nutritional status of children in Malava Sub-county, Kakamega County. The Ministry of Education, Science and Technology should ensure there are no cases of school drop-outs occasioned by teenage pregnancies. The ministry should strengthen the implementation of the school re-entry policy for girls who become pregnant while at school to avoid cases of early marriages and increased incidence of mothers with incomplete formal education. The Ministry of Finance and Economic Planning needs to develop strategies to alleviate poverty in the community and improve the livelihoods. The community needs to be enlightened on opportunities for self-employment and income generating activities to curb the unemployment and low income. Future policies and programs addressing malnutrition need to target specific needs of children based on the household social-demographic and economic characteristics that were identified as determinants of child malnutrition instead of using general approaches. This would be more impactful in alleviating malnutrition among children under-five at the community level.

Table 1: Socio-demographic Characteristics of Mothers with Children aged 6-59 Months in Malava Sub-county

Characteristic	Category	n	%
Gender of the household head	Male	290	84.3
	Female	54	15.7
Marital status of mother to child	Married	293	85.2
	Single	29	8.4
	Widowed	13	3.8
	Divorced /Separated	9	2.6
Age of the mother	Below 20 years	88	25.6
	20-25 years	94	27.3
	26-30 years	76	22.1
	31-35 years	46	13.4
	36-40 years	38	11
	Above 40 years	2	0.6
Level of education completed	No education	50	14.5
	Primary	161	46.8
	Secondary	103	29.9
	Tertiary education	30	8.7

Table 2: Socio-economic Characteristics of Mothers with Children Aged 6-59 Months in Malava Sub-county

Characteristic	Categories	n	%
Occupation of the mother	Unemployed	288	83.7
	Self-employed	36	10.5
	Employed	20	5.8
Average household monthly income	Less than Ksh.5,000	268	77.9
	Ksh. 5,001-10,000	56	16.3
	Ksh. 10,001-15,000	2	0.6
	Above Ksh 15,000	18	5.2
Main source of income for the household	Salaried employment	29	8.4
	Casual jobs	7	2.0
	Business	39	11.3
	Farming	269	78.2
Major economic activity for the household	Farming	294	85.5
	Business	50	14.5
Type of business engaged in	Wholesale	7	2.0
	Retail	33	9.6
	Hawking	10	2.9
Type of farming	Subsistence food crop farming	172	50.0
	Cash crop farming	111	32.3
	Mixed farming	9	2.6
Food crops grown	Cereal	141	41.0
	Legumes and nuts	17	4.9
	Vegetables	108	31.4
Cash crops grown	Tea	2	0.6
	Sugarcane	113	32.8

Table 3: Association between Mothers' Household Demographic Characteristics and Stunting among Children 6-59 Months in Malava Sub-county, Kakamega County

Variable	Categories	Total n,(%)	HAZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
			Severely stunting n,(%)	Moderate stunting n,(%)	Normal n,(%)			
Gender of the household head	Male	300 (87.2)	24 (7.0)	37 (10.8)	239 (69.5)	0.545	2	0.761
	Female	44 (12.8)	4 (1.2)	7 (2.0)	33 (9.6)			
Age of the mother	Below 20 years	88 (25.6)	2 (0.6)	9 (2.6)	77 (22.4)	19.347	10	0.036
	20-25 years	94 (27.3)	14 (4.1)	10 (2.9)	70 (20.3)			
	26-30 years	76 (22.1)	5 (1.5)	12 (3.5)	59 (17.2)			
	31-35 years	46 (13.4)	7 (2.0)	6 (1.7)	33 (9.6)			
	36-40 years	38 (11.0)	0 (0.0)	7 (2.0)	31 (9.0)			
	Above 40 years	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
Marital status of mother to child	Married	293 (85.2)	23 (6.7)	37 (10.8)	233 (67.7)	5.689	6	0.459
	Single	29 (8.4)	1 (0.3)	5 (1.5)	23 (6.7)			
	Widowed	13 (3.8)	2 (0.6)	2 (0.6)	9 (2.6)			
	Divorced	9 (2.6)	2 (0.6)	0 (0.0)	7 (2.0)			
Level of education completed	No education	50 (14.5)	6 (1.7)	13 (3.8)	31 (9.0)	14.664	6	0.023
	Primary	161 (46.8)	8 (2.3)	18 (5.2)	135 (39.2)			
	Secondary	103 (29.9)	10 (2.9)	10 (2.9)	83 (24.1)			
	Tertiary education	30 (8.7)	4 (1.2)	3 (0.9)	23 (6.7)			
Occupation of the mother	Unemployed	288 (83.7)	25 (7.3)	40 (11.6)	223 (64.8)	3.047	4	0.55
	Self-employed	36 (10.5)	2 (0.6)	3 (0.9)	31 (9.0)			
	Employed	20 (5.8)	1 (0.3)	1 (0.3)	18 (5.2)			
Average household monthly income	< Ksh. 5,000	268 (77.9)	23 (6.7)	36 (10.5)	209 (60.8)	4.675	6	0.586
	Ksh. 5,001-10000	56 (16.3)	2 (0.6)	7 (2.0)	47 (13.7)			
	Ksh. 1,0001-15,000	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
	Above Ksh. 15,000	18 (5.2)	3 (0.9)	1 (0.3)	14 (4.1)			
Main source of income for the household	Salaried employment	29 (8.4)	3 (0.9)	2 (0.6)	24 (7.0)	7.995	6	0.238
	Casual jobs	7 (2.0)	0 (0.0)	3 (0.9)	4 (1.2)			
	Business	39 (11.3)	3 (0.9)	3 (0.9)	33 (9.6)			
	Farming	269 (78.2)	22 (6.4)	36 (10.5)	211 (61.3)			
Major economic activity for the household	Farming	294 (85.5)	24 (7.0)	39 (11.3)	231 (67.2)	0.421	2	0.81
	Business	50 (14.5)	4 (1.2)	5 (1.5)	41 (11.9)			

Key: Stunting indicator used was Height for Age Z-Scores

- i. Severe stunting (<-3 Z-Scores)
- ii. Moderate stunting (\geq -3 to <-2 Z-Scores)
- iii. Normal (\geq -2 Z-Scores)

Table 4: Association between Mothers' Household Demographic Characteristics and Wasting among Children 6-59 Months in Malava Sub-county, Kakamega County

Variable	Categories	Total	WHZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
		n, (%)	Severe Wasting n, (%)	Moderate Wasting n, (%)	Normal n, (%)			
Gender of the household head	Male	300 (87.2)	14 (4.1)	27 (7.8)	259 (75.3)	3.003	2	0.223
	Female	44 (12.8)	1 (0.3)	1 (0.3)	42 (12.2)			
Age of the mother	Below 20 years	88 (25.6)	3 (0.9)	11 (3.2)	74 (21.5)	9.628	10	0.474
	20-25 years	94 (27.3)	4 (1.2)	2 (0.6)	88 (25.6)			
	26-30 years	76 (22.1)	4 (1.2)	7 (2.0)	65 (18.9)			
	31-35 years	46 (13.4)	3 (0.9)	3 (0.9)	40 (11.6)			
	36-40 years	38 (11.0)	1 (0.3)	5 (1.5)	32 (9.3)			
	Above 40 years	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
Marital status of mother to child	Married	293 (85.2)	11 (3.2)	26 (7.6)	256 (74.4)	9.688	6	0.138
	Single	29 (8.4)	2 (0.3)	1 (0.3)	26 (7.6)			
	Widowed	13 (3.8)	0 (0.0)	1 (0.3)	12 (3.5)			
	Divorced	9 (2.6)	2 (0.6)	0 (0.0)	7 (2.0)			
Level of education completed	No education	50 (14.5)	5 (1.5)	9 (2.6)	36 (10.5)	17.242	6	0.008
	Primary	161 (46.8)	4 (1.2)	9 (2.6)	148 (43.0)			
	Secondary	103 (29.9)	4 (1.2)	10 (2.9)	89 (25.9)			
	Tertiary	30 (8.7)	2 (0.6)	0 (0.0)	28 (8.1)			
Occupation of the mother	Unemployed	288 (83.7)	11 (3.2)	25 (7.3)	252 (73.3)	2.178	4	0.703
	Self-employed	36 (10.5)	3 (1.5)	2 (0.6)	31 (9.0)			
	Employed	20 (5.8)	1 (0.9)	1 (0.3)	18 (5.2)			
Average household monthly income	Less than Ksh. 5000	268 (77.9)	10 (2.9)	23 (6.7)	235 (68.3)	1.888	6	0.93
	Ksh 5,001-10000	56 (16.3)	4 (1.2)	4 (1.2)	48 (14.0)			
	Ksh 10001-15000	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
	Above Ksh 15000	18 (5.2)	1 (0.3)	1 (0.3)	16 (4.7)			
Main source of income for the household	Salaried employment	29 (8.4)	2 (0.6)	2 (0.6)	25 (7.3)	7.164	6	0.306
	Casual jobs	7 (2.0)	1 (0.3)	0 (0.0)	6 (1.7)			
	Business	39 (11.3)	4 (1.2)	3 (1.5)	32 (9.3)			
	Farming	269 (78.2)	8 (2.3)	23 (6.7)	238 (69.2)			
Major economic activity for the household	Farming	294 (85.5)	10 (2.9)	24 (7.0)	260 (75.6)	4.471	2	0.107
	Business	50 (14.5)	5 (1.5)	4 (1.2)	41 (11.9)			

Key: Wasting indicator used was Weight for Height Z-Scores

- i. Severe wasting (<-3 Z-Scores)
- ii. Moderate wasting (≥-3 to <-2 Z-Scores)
- iii. Normal (≥-2 Z-Scores)

Table 5: Association between Mothers' Household Demographic Characteristics and Underweight among Children 6-59 Months in Malava Sub-county, Kakamega County

Variable	Categories	Total	WAZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
		n, (%)	Severe Underweight n, (%)	Moderate Underweight n, (%)	Normal n, (%)			
Gender of the household head	Male	292 (84.9)	7 (2.0)	18 (5.2)	267 (77.6)	2.966	4	0.564
	Female	43 (12.5)	1 (0.3)	0 (0.0)	42 (12.2)			
Age of the mother	Below 20 years	84 (24.4)	1 (0.3)	3 (0.9)	80 (23.3)	24.258	20	0.231
	20-25 years	94 (27.3)	1 (0.3)	10 (2.9)	83 (24.1)			
	26-30 years	71 (20.6)	3 (0.9)	1 (0.3)	67 (19.5)			
	31-35 years	46 (13.4)	1 (0.3)	2 (0.6)	43 (12.5)			
	36-40 years	38 (11.0)	2 (0.6)	2 (0.6)	34 (9.9)			
	Above 40 years	2 (0.6)	0 (0.0)	0 (0.3)	2 (0.6)			
Marital status of mother to child	Married	285 (82.8)	7 (2.0)	16 (4.7)	262 (76.2)	12.888	12	0.377
	Single	29 (8.4)	0 (0.0)	0 (0.0)	29 (8.4)			
	Widowed	12 (3.5)	1 (0.3)	0 (0.0)	11 (3.2)			
	Divorced	9 (2.6)	0 (0.0)	2 (0.6)	7 (2.0)			
Level of education completed	No education	49 (14.2)	2 (0.6)	3 (0.9)	44 (12.8)	25.241	12	0.014
	Primary	160 (46.5)	2 (0.6)	5 (1.5)	153 (44.5)			
	Secondary	98 (28.5)	3 (0.9)	10 (2.9)	85 (24.7)			
	Tertiary education	28 (8.1)	1 (0.3)	0 (0.0)	27 (7.8)			
Occupation of the mother	Unemployed	281 (81.7)	6 (1.7)	15 (4.4)	260 (75.6)	3.138	8	0.925
	Self-employed	35 (10.2)	2 (0.6)	2 (0.6)	31 (9.0)			
	Employed	19 (5.5)	0 (0.0)	1 (0.3)	18 (5.2)			
Average household monthly income	Less than Ksh. 5000	261 (75.9)	5 (1.5)	12 (3.5)	244 (70.9)	24.291	12	0.019
	Ksh 5,001-10000	55 (16.0)	2 (0.6)	4 (1.2)	49 (14.2)			
	Ksh 10001-15000	1 (0.3)	0 (0.0)	0 (0.0)	1 (0.3)			
	Above Ksh 15000	18 (5.2)	1 (0.3)	2 (0.6)	15 (4.4)			
Main source of income for the household	Salaried employment	28 (8.1)	1 (0.3)	2 (0.6)	25 (7.3)	13.600	12	0.327
	Casual jobs	7 (2.0)	0 (0.0)	1 (0.3)	6 (1.7)			
	Business	36 (10.5)	2 (0.6)	1 (0.3)	33 (9.6)			
	Farming	264 (76.7)	5 (1.5)	14 (4.1)	245 (71.2)			
Major economic activity for the household	Farming	289 (84.0)	5 (1.5)	15 (4.4)	269 (78.2)	13.368	4	0.01
	Business	46 (13.4)	3 (0.9)	3 (0.9)	40 (11.6)			

Key: Underweight indicator used was Weight for Age Z-Scores
i. Severe underweight (<-3 Z-Scores)
ii. Moderate underweight (\geq -3 to <-2 Z-Scores)
iii. Normal (\geq -2 to <+2 Z-Scores)

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