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Original Research Article

Determinant of stunting among children aged 6-59 months in Kapenguria ward of West Pokot County, Kenya

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ABSTRACT

Background: According to the 2022 Kenya Demographic and Health Survey, 18% of children under 5 years in Kenya were stunted, with West Pokot County recording the second-highest prevalence at 34%. Nevertheless, there is a lack of robust evidence explaining the persistent factors contributing to these high levels of stunting. This study, therefore sought to assess the prevalence and predictors of stunting among children aged 6-59 months in Kapenguria Ward, West Pokot County, Kenya.
Methods: This cross-sectional study was conducted among 517 caregivers of children aged 6-59 months selected through multistage sampling. Data were collected using structured interviewer-designed questionnaires and analysed in SPSS. Descriptive statistics summarized participant characteristics. Associations were assessed through chi-square and t-tests and significant variables ($p<0.05$) were entered in a binary logistic regression to determine the predictors of stunting at 95% CI. Qualitative component involved thematic analysis to explore insights.
Results: Findings showed a 32.3% stunting rate. Significant predictors of stunting were household income (OR=0.314, CI=0.181-0.545, p=0.001) and phone ownership (OR=0.627, CI: 0.410-0.959, p=0.031). Child's age (overall wald X2=19.515, p=0.001), breastfeeding status (OR=0.456, CI=0.286-0.729, p=0.001) and vaccination card ownership (OR=0.463, CI=0.299-0.718, p=0.001) were also significant factors influencing child stunting.
Conclusions: Stunting level in Kapenguria Ward has slightly decreased compared to 2022 rates, although still comparatively high as per WHO thresholds. These results highlight the necessity of multisectoral interventions, including poverty reduction, improved maternal-child healthcare and full child vaccination.

Keywords: Height for age, Malnutrition, Stunting

INTRODUCTION

During early childhood, nutrition is essential to promote health and prevent diseases. Nutrition is the cornerstone of appropriate growth, mental development and general health in children.[1] More specifically, the period of 6 months to 59 months is the most vulnerable because undernutrition during this period might result in irreversible damage.[1] Stunting is a major public health problem that affects millions of children under 5 years old each year throughout the world. Approximately 148.1 million or 22.3 percent of children worldwide were stunted in 2022.[2] In 2024, 150.2 million children of all the children worldwide showing a stubborn predicament.[3] The biggest burden of these cases fell disproportionately on low-and middle-income countries, especially in Sub-Saharan Africa.[2] Besides being a marker of chronic undernutrition, stunting is also indicative of negative health outcomes in the future, such as poor academic and economic productivity and vulnerability to the development of chronic ailments.[2] Due to the high

population growth in Africa, there has been an increase in the number of children who are stunted, unlike other parts of the world.[4] Almost one child in every three under five years of age in Africa suffers from malnutrition so chronic as to cause stunted growth. This is supported by a narrative review which pointed out the fact that children who are at age of one to four years in Sub-Saharan Africa are currently affected by stunting the most.[5] The Kenya Demographic and Health Survey (KDHS) indicates that the prevalence of stunting in Kenya in 2022 was at 18 percent among children between 6 months and 59 months.[6] Reported stunting rates in arid and semi-arid areas have been as high as >30 per cent, much higher than what is regarded as "very-high" globally.[2,7] Stunting is still endemic in West Pokot County, fueled by a complex and interdependent combination of socio-economic, cultural and environmental factors.

Studies conducted in the past have found a broad diversity of interrelated factors that lead to child stunting. Among them are low maternal education, household poverty and poor asset ownership, large family size, inadequate antenatal and postnatal care and poor infant/ child feeding practices.[8-14] These determinants tend to interact in various complex ways and can affect child nutrition outcomes, especially in resource-poor environments like West Pokot. By addressing such factors, child malnutrition will be reduced and the world goal of halting stunting by 40% by 2030 will be achieved, as recommended by the WHO and UNICEF.

It is essential to understand the prevalence and the sociodemographic, maternal and childcare factors leading to stunting in this high-risk area to guide evidence-based policies and interventions towards making interventions specific to child nutrition and health. This study, therefore, sought to determine the prevalence of stunting and evaluate the factors associated with it among children aged 6-59 months in Kapenguria Ward, West Pokot County, Kenya.

METHODS

Research design and site

A mixed-methods approach was adopted, combining both qualitative and quantitative data collection techniques. Quantitative component adopted a cross-sectional design using a structured, interviewer-administered questionnaire. This was supplemented by the qualitative data that was captured from key informant interviews including community health promoters, public health officers and nurses. Focus group discussions were also held with selected caregivers. In March 2024, the study was conducted in Kapenguria Ward, West Pokot County, Kenya. The County is located in the North Rift region of Kenya and has a population of 624,241 people and 115,761 households with four constituencies, namely Pokot South, Sigor, Kacheliba and Kapenguria.[6] Kapenguria ward hosts the headquarters of the county, its administrative units and the Kapenguria County Referral Hospital where most of the population in the entire county seek medical services. In addition, it is the most accessible Ward.

Study population

This study targeted all children 6-59 months and their mothers/caregivers who reside within Kapenguria Ward. Those who had lived for ≥6 months and those who consented to participate in this study were included, while those with physical malformations that would impair accurate measurements were excluded from the study.

Sample size

To calculate the sample size, Cochran formula was adapted to an infinite population 15. Using a 95% confidence level (Z=1.96), a prevalence rate of malnutrition in West Pokot County 9 of 46% (p=0.46) and a 5% margin of error (e=0.05), the initial sample size was calculated as 382. A design effect of 1.35 was used to compensate for the decreased sampling efficiency of the cluster sampling leading to a final estimate of 517 households.

A purposive sampling procedure was employed for qualitative component. One focus group discussion was held by caregivers in each ward, with each group comprising of 6 and 10 participants to promote effective interaction and minimize bias arising from dominant individuals. Four informant interviews were conducted with community health promoters, public health officers and public health nurses.

Sampling criteria

A multistage proportional sampling approach was adopted to determine the number of respondents from Chewoyet, Kamatira and Mwotot locations in Kapenguria Ward based on 2019 national census and updated records from the County KNBS office. The study employed a PPS method to ensure the number of sampled households from each of the 29 villages reflected the actual population distribution. 15 villages were randomly selected for data collection and the sample was proportionally allocated to ensure representativeness across the ward.

Within each village, households were randomly selected. A recognizable landmark was identified as a starting point where a bottle or pen was spun to determine the direction to proceed. Every household along that path was chosen for the surveys until the target number of households was reached. Within each household, all children who met the inclusion criteria were listed and assigned numbers. One child was randomly chosen in households with multiple eligible children. If no eligible children were found in a household, the next household

was chosen. The process was repeated until the sample quota for each village was fulfilled.

Data collection methods and procedures

Quantitative data was collected using a pretested structured questionnaire whose reliability was measured by Cronbach's alpha. Each of the three variables domains, i.e., sociodemographic characteristics (α=0.791), child clinical factors (α=0.704) and maternal clinical care factors (α=0.848), fulfilled the minimum 0.7 criterion. Anthropometry details were also collected. The primary outcome variable of this study was stunting and was defined and measured by the WHO standard on height-for-age Z-scores (HAZ<-2 SD) based on anthropometric measurements. For the qualitative data, guides for key informant interviews and focus group discussion were developed to gather insights for triangulation.

Data analysis

Quantitative data was analyzed using SPSS version 27. Descriptive statistics, including percentages and frequencies, were used to summarize the data. The chi-square test was employed to assess the significance of associations between categorical variables while the independent t-test was utilized in continuous variables. Furthermore, binary logistic regression was conducted to determine the strength of the relationship between various factors and stunting. Statistical significance was set at p≤0.05, with 95% CI. Qualitative data were analyzed thematically to extract insights, for triangulation with quantitative data.

Ethical considerations

Ethical approval was sought from the MKU board (MKU/ISERC/3399, approval no 2443) and a permit from NACOSTI (NACOSTI/P/23/32213) was granted. Participation was voluntary and informed written consent was administered.

RESULTS

General characteristics of respondents

The average household size was 6.69±2.52 members. Most households were male headed (73.31%). 65.57% of households reported a monthly income below Kshs 5,000, with only 34.43% earning above Kshs 5,000.

72.34% of mothers had a primary level education or below, while 27.66% had attained secondary education or higher. 57.06% of mothers owned a mobile phone and 80.85% of mothers had fewer than four Antenatal care (ANC) visits during pregnancy. Similarly, 65.76% of mothers delivered at home, with only 34.24% delivering in health facilities.

Most households (85.69%) owned mosquito nets. Child age distribution was relatively even across the age groups. Gender distribution was almost balanced, with males accounting for 52.22% and females 47.78%. 68.28% of children were not breastfed and 31.72% of children had vaccination cards.

Prevalence of stunting

The prevalence of stunting among children aged 6 to 59 months at Kapenguria Ward was found to be 32.30%. Stunting rates differed by study location, as shown in table 2. Children from rural locations (Kamatira and Chewoyet) were more stunted than those from Mwotot location, which is mostly urban given its proximity to Kapenguria town. Kamatira location had a higher proportion of stunted children at 38.64%, followed by Chewoyet (34.95%) and lastly Mwotot (10.99%).

Higher stunting rate in Kamatira location can be explained by narrations in the group discussion: “In Kamatira, there are no well-equipped hospitals. And those that are available, are very far from the community because they are located near the main road that links Kapenguria and Lodwar. So many mothers have no option other than attending clinic in Kapenguria town which is far and costly. In most cases, mothers miss both antenatal and post-natal clinics. These mothers are also not so well educated. But we are currently doing educational programmes to empower them on the better infant and young child feeding practices”-(FGD, 1).

The distribution of the height-for-age z-scores (HAZ) follows closely a normal curve, indicating a near-normal distribution. This suggests that most children’s heights in the 5-59 months age group in Kapenguria Ward are close to the average for their age. There are fewer children who are slightly taller and conversely, another smaller group who are slightly shorter. With an increase in sample size of children 5 to 59 months, the distribution of HAZ scores follows a normal curve and the data fits a normal distribution. This is consistent with results from skewness (0.327 lies within the range of -0.5 and 0.5) and kurtosis value of 3.264, indicating normality.

Bivariate analysis of sociodemographic, maternal and childcare factors associated with child stunting

Regarding the socioeconomic factors influencing stunting, mothers’ education ($\chi2$=21.7697, p=<0.001), household monthly income ($\chi2$=41.3768, p=<0.001), mother’s phone ownership ($\chi2$=23.089, p=<0.001) and child age ($\chi2$=21.7059, p=<0.001) were found to be statistically significant hence entered into a binary logistic regression analysis. Stunting was not statistically associated with gender of the household head ($\chi2$=0.0916, p=0.762), household size (t=-1.81, p=0.0711), child gender ($\chi2$=0.5080, p=0.476), mother’s place of delivery ($\chi2$=0.2613, p=0.609) and mosquito net ownership (($\chi2$=0.2613, p=0.609).

In bivariate analysis of maternal and childcare factors associated with stunting, antenatal care visits ($\chi2$=0.2237, p=0.636), breastfeeding status ($\chi2$=4.2609, p=0.039) and vaccination status ($\chi2$=4.260, p=0.039) were statistically significant, hence entered into binary logistic regression. The place of delivery ($\chi2$=0.1310, p=0.717) was statistically insignificant.

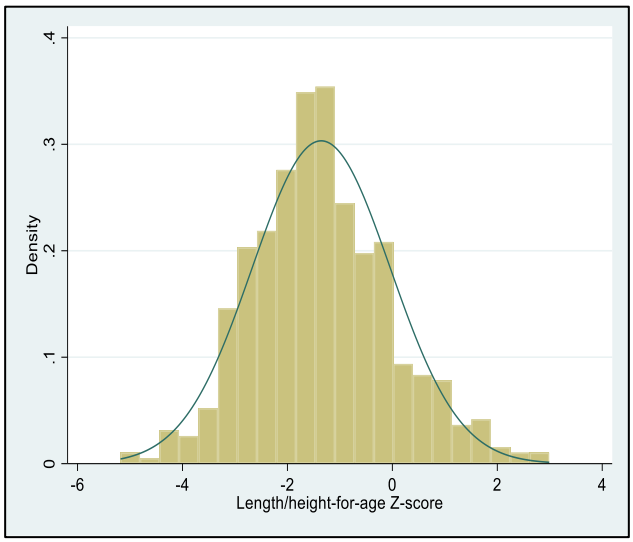

Figure 1: HAZ distribution.

Binary logistic regression of factors associated with stunting

Table 5 provides logistic regression analysis of factors on child stunting. The results showed that household income was strongly associated with the odds of stunting. Children from households earning more than Kshs 5,000 per month were 3.1 times less likely to be stunted compared to those from lower-income households (OR=0.314, 95% CI: 0.181–0.545, p<0.001). This finding was consistent with the narrations of a community health promoter who noted that: "Many people here eat one type of meal, which is ugali (a staple food made from maize flour). They eat ugali for lunch and dinner. Even in the morning, they have tea with ruukwo (leftover ugali). Rarely will you find them eating meat or even fruits. Sometimes even they lack the ability to take stunted children to medical check-ups. We are sometimes forced to use our own money to transfer such children to hospitals to get supplements."-CHP, Mwotot. Regarding phone ownership, the study revealed that children whose mothers owned a mobile phone had 37% lower odds of being stunted compared to those whose mothers did not own a phone (OR=0.63, 95% CI=0.410-0.959, p=0.031).

Child's age emerged as a significant predictor of stunting. Specifically, children in older categories of 12-23 months, 24-35 months and 36-47 months were 2.7, 3.6 and 2.4 times more likely to be stunted compared to those in the 6-11 months. In contrast, children aged 48-59 months were only 1.2 times more likely to be stunted compared to those in the 6-11 months age group, a difference that was not statistically significant.

These findings were consistent with insights from a key informant interview conducted at Kapenguria Referral Hospital, where a Public Health Officer noted: "Children often become at risk of stunting as they grow older because, with the introduction of complementary feeding and increased mobility, they face elevated risk due to poor feeding practices, increased susceptibility to infections and inadequate access to health services" Public Health Officer.

The results reveal that children who were breastfeeding were 54.4% less likely to be stunted compared to those who were not breastfed (OR=0.456, 95% CI: 0.286–0.729, p=0.001). Additionally, the results showed that ownership of a vaccination card was also significantly associated with lower odds of stunting. Children whose caregivers could present a vaccination card were 53.7% less likely to be stunted than those without a card (OR=0.463, 95% CI: 0.299–0.718, p=0.001).

Table 1: General characteristics of respondents.

Variable	Categories	Frequency	Valid %	Mean	SD
Household size					
Gender of the household head	Female	138	26.69		
	Male	379	73.31		
Household monthly income	Below Kshs 5,000	339	65.57		
	Above Kshs 5,000	178	34.43		
Mothers' education	Primary and below	374	72.34		
	Secondary and above	143	27.66	6.69	2.52
Mother own a phone	No	222	42.94		
	Yes	295	57.06		
Mother ANC visits	Below 4 visits	418	80.85		
	Above 4 visits	99	19.15		
Mother place of delivery	Home	340	65.76		
	Health facility	177	34.24		

Continued.

Variable	Categories	Frequency	Valid %	Mean	SD
Mosquito net ownership	No	74	14.31		
	Yes	443	85.69		
Age of the child in months	6–11	79	15.28		
	12–23	115	22.24		
	24–35	122	23.60		
	36–47	101	19.54		
	48–59	100	19.34		
Gender of the child	Female	247	47.78		
	Male	270	52.22		
Child currently breastfeeding	No	353	68.28		
	Yes	164	31.72		
Child has vaccination card	Yes	213	41.20		
	No	304	58.80		

Table 2: Prevalence of stunting.

Categories	Kamatira	Mwotot	Chewoyet	Overall	Chi-square test
Not stunted	61.36% (135)	89.01% (81)	65.05% (134)	67.70% (350)	X^2=23.6008
Stunted	38.64% (85)	10.99% (10)	34.95% (72)	32.30% (167)	P value=0.001

Table 3: Bivariate analysis of sociodemographic factors.

Variable	Categories	Not Stunted (N, %)	Stunted (N, %)	Chi-square (χ^2)	P value
Mother's education level	Primary and below	231 (61.76)	143 (38.24)	21.7697	<0.001
	Secondary and above	119 (83.22)	24 (16.78)		
Household head gender	Female	92 (66.67)	46 (33.33)	0.0916	0.762
	Male	258 (68.07)	121 (31.93)		
Household monthly income	≤Kshs 5,000	197 (58.11)	142 (41.89)	41.3768	<0.001
	>Kshs 5,000	153 (85.96)	25 (14.04)		
Household size	(mean±SD)	350 (67.70)	167 (32.30)	-1.8088	0.071
Child's age (in months)	6–11	65 (82.50)	14 (17.50)	21.9544	<0.001
	12–23	73 (63.79)	42 (36.21)		
	24–35	68 (55.74)	54 (44.26)		
	36–47	66 (65.35)	35 (34.65)		
	48–59	78 (78.00)	22 (22.00)		
Child's gender	Female	171 (69.35)	76 (30.77)	0.5080	0.476
	Male	179 (66.30)	91 (33.70)		
Phone ownership	No	125 (56.31)	97 (43.69)	23.089	<0.001
	Yes	225 (76.07)	70 (23.73)		
Mosquito net ownership	No	52 (70.27)	22 (29.73)	0.2613	0.609
	Yes	228 (67.27)	145 (32.73)		

Table 4: Bivariate analysis of maternal and childcare factors.

Variable	Categories	Not stunted (N, %)	Stunted (N, %)	Chi-square (χ2)	P value
Maternal factors					
ANC visits	<4 visits	281 (67.22)	137 (32.78)	0.2237	0.636
	≥4 visits	69 (69.70)	30 (30.30)		
Place of delivery	Home	232 (68.24)	108 (31.76)	0.1310	0.717
	Health facility	118 (67.04)	59 (33.33)		
Childcare factors					
Breastfeeding status	Not breastfeeding	230 (65.16)	123 (34.84)	3.2895	0.070
	Currently breastfeeding	120 (73.17)	44 (26.83)		
Vaccination status	No vaccination card	155 (72.77)	58 (27.23)	4.2609	0.039
	Has vaccination card	195 (64.14)	109 (35.86)		

Table 5: Binary logistic regression on social demographic and stunting.

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C I for EXP(B)	
								Lower	Upper
Step 1	Mothers' education	-0.385	0.296	1.685	1	0.194	0.681	0.381	1.217
	Primary education	Ref							
	Household income	-1.158	0.281	16.980	1	0.000	0.314	0.18wald1	0.545
	Below Ksh 5,000								
	Mother owns phone	-0.467	0.217	4.646	1	0.031	0.627	0.410	0.959
	Mother has no phone	Ref							
	Child age			19.515	4	0.001			
	Child age (12-23)	0.993	0.369	7.228	1	0.007	2.700	1.309	5.571
	Child age (24-35)	1.271	0.364	12.176	1	0.000	3.566	1.746	7.283
	Child age (36-47)	0.862	0.379	5.157	1	0.023	2.367	1.125	4.979
	Child age (48-59)	0.199	0.401	0.246	1	0.620	1.220	0.556	2.678
	Child age (6-11)	Ref							
	Constant	-1.188	0.143	69.318	1	0.000	0.305		

Table 6: Binary logistic regression on childcare factors and stunting.

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C I for EXP(B)	
								Lower	Upper
Step 1	Child breastfeeding	-0.785	0.239	10.797	1	0.001	0.456	0.286	0.729
	Not breastfeeding	Ref							
	Has vaccination card	-0.769	0.223	11.858	1	0.001	0.463	0.299	0.718
	No vaccination card	Ref							
	Constant	-0.973	0.116	70.266	1	0.000	0.378		

DISCUSSION

The study established the prevalence of stunting to be 32.30% which is slightly lower than the 2022 and 2014 KDHS reports that found 34% and 46% stunting rates in West Pokot County respectively.[6,9] As evidenced in the past, West Pokot County has had stunting rates that surpassed both WHO and UNICEF stunting rate recommendations that consider rates above 30% to be very high.[2] For example, the stunting status as of June 2019 was 35.1% as reported by the Integrated Smart Survey, a collaboration of Action Against Hunger, the County government and the Ministry of Health.[7]

Factors such as lack of food security because of rain delays, access to health and nutrition services and poor water, sanitation and hygiene have been largely associated with this continued high prevalence of stunting. For instance, only about 8% of mothers and caregivers were reported to wash their hands at all critical times before caring for their children.[7] In addition, according to the 2022 KDHS, the level of access to basic sanitation was also at 20% among West Pokot households.[6] Variability of stunting rates based on different locations is in concurrence with findings from previous studies that found rural areas of residence being significantly associated with stunting.[16] The present study established that an increase in monthly income reduced the odds of stunting, as in line with other similar studies.

For instance, an Ethiopian study among children aged 6 to 59 months established a statistically significant association between household income and stunting.[10] The study noted that a rise in income levels was associated with improved dietary diversity, in turn promoting nutritional intake and ultimately contributing to the better nutritional status of the children. Likewise, limited household income exerts negative impacts on children's nutrition as poor households lack the monetary ability to obtain foods that are rich in nutrients.[17]

Owning a phone by a caregiver was strongly associated with a reduction in stunting. This finding supports the importance of access to information and communication for improved nutrition and health outcomes. This is in agreement with previous studies done in Tanzania and India, which established that ownership of phones provided critical health information to mothers, positively promoting child health outcomes and a lower likelihood of having stunting for those women with phones as compared to those without respectively.[18,19] Similar evidence is supported by Adedokun and Yaya, who note that exposure to media provides women with the opportunity of obtaining information on child nutrition.[17]

The child's age was established as a predictor of stunting, especially those greater than 11 months, which is similar to Tanzanian and Ethiopian studies.[10,14] This is likely to be due to changes in dietary patterns or even increased

resilience arising from adaptive factors over time. With the increase in age, there is an increased demand for nutrients for the children to grow, which cannot be provided by breast milk. Additionally, with the increase in age, children become more mobile and are more likely to get infections as they encounter contaminated materials, thereby increasing the risk of infections, which then increases the risk of stunting.

The study also concludes that breastfeeding and vaccination status are statistically significant in influencing stunting. Concerning breastfeeding, the study finds that children who were breastfeeding were less likely to be stunted because breast milk contains the appropriate proportion and quantity of all the nutrients an infant requires for the six months of life. Regarding the influence of vaccination, the study establishes that child vaccination is a crucial determinant of stunting. This finding aligns with the public health literature which states that children who receives vaccines such as BCG, DTP1 are less likely to be stunted.[5]

It is important to note that our study adopted a cross-sectional approach, which involved collecting data from households within Kapenguria Ward over one month. Therefore, the study did not monitor the changes in children's stunting status over time. Study findings are therefore not to be generalized to other areas, given the unique characteristics such as cultural dynamics, environmental and climatic factors in West Pokot County.

CONCLUSION

This study concludes that stunting levels of among children aged 6-59 months has slightly decreased to 32.30% as compared to the level reported by the KDHS in 2022 which was 34% in Kapenguria Ward, although still comparatively "very high" by WHO and UNICEF. Household income, household size and phone ownership were among the major predictors of stunting. The age and vaccination status of the child played an important role as well as place of birth and education of the mother. These results highlight the necessity of multisectoral interventions, which need to include not only poverty but also maternal-child healthcare. There is a need to address these determinants to minimize stunting and meet national and international nutrition and child health goals.

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