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Factors associated with stunting among under-five children of teenage mothers: Evidence from the 2022 Kenya Demographic and Health Survey

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KEY FINDING
Stunting prevalence was 23.3%. After adjustment, children aged ≥24 months had 2.71 times the prevalence of stunting compared with children aged <6 months.

Abstract

Background: Children born to adolescent mothers may face heightened risk of chronic undernutrition because of maternal biological immaturity, limited nutritional reserves, and socioeconomic disadvantage. Despite Kenya's substantial burden of childhood stunting, evidence specific to children born to adolescent mothers remains limited. This study examined the prevalence and factors associated with stunting among children born to adolescent mothers aged 15–19 years in Kenya.

Methods: A cross-sectional analysis was conducted using 2022 Kenya Demographic and Health Survey data for 815 adolescent mother–child pairs. Maternal and child characteristics were summarized using weighted frequencies and percentages. Associations with stunting were examined using Pearson's chi-square tests. Modified Poisson regression with robust variance was used to estimate crude and adjusted prevalence ratios (PRs and aPRs) with 95% confidence intervals, accounting for the complex survey design.

Results: Overall, 23.3% (95% CI: 19.7–27.4%) of children were stunted. Maternal education ($p = 0.004$) and child age ($p < 0.001$) were associated with stunting in bivariate analysis. Stunting increased from 14.3% among children aged <6 months to 22.3% among those aged 6–23 months and 36.8% among those aged ≥24 months. In the adjusted model, child age was the only independent predictor: children aged ≥24 months had nearly three times the prevalence of stunting compared with those aged <6 months (aPR = 2.71; 95% CI: 1.67–4.39; $p < 0.001$).

Conclusion: Stunting affected nearly one in four children born to adolescent mothers in Kenya. The risk increased substantially with child age and was highest among children aged ≥24 months. Nutrition interventions should strengthen support during the complementary feeding period and throughout the first 1,000 days, with particular attention to adolescent mothers.

Keywords: stunting; adolescent mothers; child undernutrition; Kenya; antenatal care; KDHS 2022

Introduction

Malnutrition in its various forms, including stunting, wasting, underweight and overweight, remains a major global public health concern and contributes substantially to morbidity, disability and mortality. Stunting, commonly defined as a height-for-age Z-score (HAZ) below −2 standard deviations from the

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World Health Organization (WHO) Child Growth Standards median, is an important marker of chronic undernutrition in children under five years of age.[1] Undernutrition is estimated to contribute to a large proportion of child deaths globally, while Sub-Saharan Africa and South Asia carry a substantial share of the global burden of childhood stunting.[2,3]

Stunting has consequences that extend well beyond physical growth. Children affected by chronic growth restriction may experience impaired cognitive and developmental outcomes, poorer educational attainment, shorter adult stature and increased vulnerability to chronic disease. Psychological and social consequences may also persist into later life.[4] The origins of stunting are multifactorial. Maternal undernutrition during pregnancy can contribute to intrauterine growth restriction and low birth weight, while socioeconomic conditions, immunization, antenatal care, birth spacing, feeding practices and the timing and quality of complementary feeding may also influence growth.[5–7]

Although nutrition programmes and other public health interventions have contributed to reductions in childhood stunting, important inequalities remain. Children born to adolescent mothers represent a particularly vulnerable group because adolescent pregnancy may occur before the mother has completed her own physical growth and nutritional development. Adolescent motherhood is also frequently associated with interrupted education, poverty, limited caregiving experience and restricted access to health and social support.[17,22–24]

In Kenya, national estimates describe a substantial burden of childhood stunting, yet evidence focused specifically on children born to adolescent mothers remains comparatively limited. Understanding whether the determinants observed in the general under-five population operate similarly in this vulnerable maternal–child group is important for designing targeted interventions. The present study therefore examined the prevalence of stunting and the maternal, household and child characteristics associated with stunting among children aged 0–59 months born to mothers aged 15–19 years in Kenya, using nationally representative data from the 2022 Kenya Demographic and Health Survey (KDHS).

Methods

Study aim, design and data source

The aim was to determine the prevalence of stunting and identify factors associated with stunting among children under five years of age born to adolescent mothers in Kenya. The study used secondary data from the 2022 Kenya Demographic and Health Survey (KDHS), a nationally representative survey conducted by the Kenya National Bureau of Statistics (KNBS). An analytical cross-sectional design was adopted to examine associations between stunting and selected maternal, household and child characteristics.

Study population and eligibility

The analytic population comprised children aged 0–59 months whose mothers were aged 15–19 years at the time of the survey and who were resident in Kenya. Anthropometric information and relevant maternal and child characteristics were extracted from the KDHS dataset. Children with missing or implausible information on height, age or sex were excluded. The final analytic sample comprised 815 adolescent mother–child pairs.

Outcome variable

The dependent variable was child stunting. A child was classified as stunted when the height-for-age Z-score was less than −2 standard deviations from the WHO Child Growth Standards median, with the assessment adjusted for child sex.

Independent variables

The analysis considered maternal, household, child, antenatal and delivery-related characteristics. Maternal variables included age, age at first birth, educational attainment, wealth index, urban or rural residence, height and body mass index. Antenatal and delivery variables included number and location of antenatal visits, breastfeeding counselling, delivery method and place of delivery, and postnatal care. Maternal and child-care behaviours included early initiation of breastfeeding, exclusive breastfeeding, feeding patterns involving plant- and animal-based foods, current breastfeeding status and indicators of mother–child bonding. Bonding was considered positive when the mother interacted with the child, for example through playing, reading or outings, within the three days preceding the survey, when the child had not been left alone with other children for more than one hour, and when immediate contact occurred after birth.

Statistical analysis

Weighted frequencies and percentages were used to describe the study population. Pearson’s chi-square tests were used to assess associations between categorical characteristics and stunting. Modified Poisson regression with robust variance was used to estimate crude and adjusted prevalence ratios (PRs and aPRs) with 95% confidence intervals. Survey weights, primary sampling units and strata identifiers were incorporated using Taylor linearized variance estimation and the svy procedures in Stata BE 17.0 to account for the complex sampling design. Statistical significance was assessed at $p < 0.05$. Multicollinearity was assessed before multivariable modelling.

Results

Characteristics of adolescent mothers

Among the 815 adolescent mothers included in the analysis, 75.0% were aged 18–19 years and 25.0% were aged 15–17 years. Nearly half had secondary or higher education (48.1%), while 45.2% had primary education and 6.7% had no formal education. Almost half were not married (45.6%), while 38.4% were married and 10.0% were cohabiting. One-third of participants were in the poorest wealth quintile, 79.9% lived in rural areas, and 78.5% were not currently working. Most mothers reported their first birth at 16–19 years (79.0%), and 79.2% had one child (Table 1).

Table 1. Socio-demographic characteristics of the 815 adolescent mothers

Characteristic	n	%
Age (years)		
15–17	204	25.0
18–19	611	75.0
Highest educational level		
No education	55	6.7
Primary	368	45.2
Secondary/higher	392	48.1
Current marital status		
Not married	372	45.6
Married	313	38.4
Cohabiting	82	10.0
Previously married	49	6.0
Wealth index		
Poorest	274	33.6
Poorer	248	30.5
Middle	137	16.9
Richer	112	13.7
Richest	44	5.3
Religion		
Christian	703	86.3
Muslim	59	7.3
Other/Atheist	52	6.4
Type of place of residence		
Urban	164	20.1
Rural	651	79.9
Currently working		

Characteristic	n	%
No	640	78.5
Yes	175	21.5
Household size		
<5 members	308	37.8
≥5 members	507	62.2
Age at first birth (years)		
11–15	171	21.0
16–19	644	79.0
Total children ever born (parity)		
1 child	646	79.2
2–3 children	169	20.8
Total	815	100.0

Characteristics of children

Of the 815 children, 54.9% were aged 6–23 months, 24.5% were younger than six months and 20.5% were aged 24 months or older. Females represented 52.2% of the sample. Most children were first-born (87.8%). In the two weeks preceding the survey, 34.9% had experienced fever or cough and 27.5% had experienced diarrhoea (Table 2).

Table 2. Characteristics of the 815 children

Characteristic	n	%
Child age (months)		
<6	200	24.5
6–23	448	54.9
≥24	167	20.5
Sex of child		
Male	390	47.8
Female	425	52.2
Birth order		
1	716	87.8
2–3	99	12.2
Fever/cough (last 2 weeks)		
No	531	65.1
Yes	284	34.9
Diarrhoea (last 2 weeks)		
No	591	72.5
Yes	224	27.5
Total	815	100.0

Prevalence of stunting

Overall, 23.3% (95% CI: 19.7–27.4%) of children born to adolescent mothers aged 15–19 years were stunted, while 76.7% (95% CI: 72.6–80.3%) were not stunted. The prevalence increased progressively across child age groups.

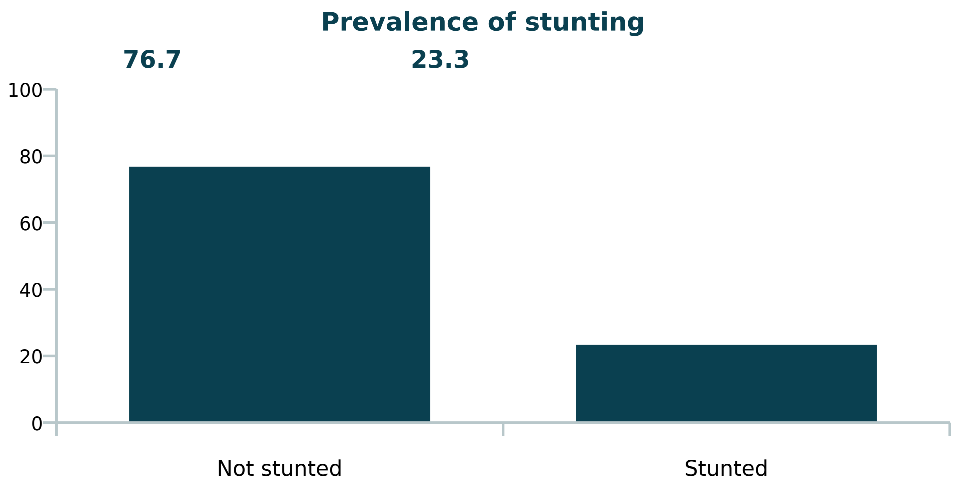

Figure 1. Prevalence of stunting among children of adolescent mothers aged 15–19 years in Kenya.

Bivariate association between stunting and background characteristics

Pearson's chi-square tests identified statistically significant associations between stunting and maternal educational attainment (p = 0.004) and child age (p < 0.001). No statistically significant associations were observed for maternal age, marital status, wealth index, religion, place of residence, working status, household size, age at first birth, child sex, parity, birth order, recent fever or cough, or recent diarrhoea. Stunting increased from 14.3% among children aged <6 months to 22.3% among those aged 6–23 months and 36.8% among those aged ≥24 months. Children of mothers with primary education had the highest observed prevalence of stunting (29.2%), compared with 19.6% among children of mothers with no education and 18.3% among those whose mothers had secondary or higher education. Although not statistically significant, an inverse socioeconomic gradient was observed, with prevalence decreasing from 27.2% in the poorest group to 10.1% in the richest group. Stunting was also more common in rural than urban settings (24.9% versus 17.0%).

Table 3. Bivariate association between stunting and background characteristics (Pearson's chi-square analysis)

Variable	Stunted, n (%)	Non-stunted, n (%)	p-value
Maternal age (years)			**0.966**
15–17	41 (23.2)	135 (76.8)	
18–19	123 (23.4)	402 (76.7)	
Maternal education			**0.004**
No education	9 (19.6)	38 (80.4)	
Primary	92 (29.2)	224 (70.8)	
Secondary+	61 (18.3)	275 (81.7)	
Marital status			**0.370**
Not married	72 (22.6)	247 (77.4)	
Married	57 (21.2)	212 (78.8)	
Cohabiting	20 (28.0)	51 (72.0)	
Previously married	14 (34.5)	27 (65.5)	
Wealth index			**0.407**
Poorest	64 (27.2)	172 (72.8)	
Poorer	51 (23.8)	162 (76.2)	
Middle	27 (23.3)	91 (76.7)	
Richer	17 (17.9)	79 (82.1)	
Richest	4 (10.1)	34 (89.9)	
Religion			**0.459**
Christian	146 (24.1)	458 (75.9)	
Muslim	8 (15.4)	43 (84.6)	

Variable	Stunted, n (%)	Non-stunted, n (%)	p-value
Other	10 (21.6)	35 (78.4)	
Residence			**0.159**
Urban	24 (17.0)	117 (83.0)	
Rural	139 (24.9)	420 (75.1)	
Working status			**0.438**
No	124 (22.5)	426 (77.5)	
Yes	39 (26.2)	111 (73.8)	
Household size			**0.245**
<5 members	54 (20.5)	210 (79.5)	
≥5 members	109 (25.0)	326 (75.0)	
Age at first birth (years)			**0.444**
11–15	38 (26.0)	109 (74.0)	
16–19	125 (22.6)	428 (77.4)	
Child age (months)			**<0.001**
<6	24 (14.3)	147 (85.7)	
6–23	86 (22.3)	299 (77.7)	
≥24	53 (36.8)	91 (63.2)	
Child sex			**0.143**
Male	89 (26.5)	246 (73.5)	
Female	74 (20.4)	291 (79.6)	
Parity			0.507
1 child	**126 (22.7)**	**429 (77.3)**	
2–3 children	37 (25.7)	108 (74.3)	
Birth order			0.364
1	**147 (23.9)**	**468 (76.1)**	
2–3	16 (19.2)	69 (80.8)	
Fever/cough			0.383
No	**101 (22.1)**	**355 (77.9)**	
Yes	62 (25.5)	182 (74.5)	
Diarrhoea			0.380
No	**125 (24.6)**	**382 (75.4)**	
Yes	38 (19.9)	154 (80.1)	

Note: P-values are from Pearson's chi-square tests of association between each characteristic and child stunting status.

Crude and adjusted regression analysis

In the crude analysis, child age was the only variable significantly associated with stunting. Children aged ≥24 months had 2.58 times the prevalence of stunting compared with those aged <6 months (PR = 2.58; 95% CI: 1.62–4.12; $p < 0.001$). The 6–23-month group showed a borderline association (PR = 1.57; 95% CI: 0.99–2.47; $p = 0.054$). After adjustment, child age remained the sole statistically significant predictor. Children aged ≥24 months had aPR = 2.71 (95% CI: 1.67–4.39; $p < 0.001$), while the association for children aged 6–23 months remained borderline (aPR = 1.54; 95% CI: 0.98–2.40; $p = 0.059$). No other maternal, household or child characteristic reached statistical significance in the adjusted model. Muslim religion approached the 10% significance level in the adjusted analysis (aPR = 0.62; 95% CI: 0.36–1.06; $p = 0.079$).

Table 4. Crude and adjusted modified Poisson regression with robust variance for stunting

Variable	Crude PR (95% CI)	p	Adjusted PR (95% CI)	p
Maternal age (years)				
15–17	1.00 (Ref)	—	1.00 (Ref)	—
18–19	1.01 (0.71–1.43)	0.966	0.86 (0.56–1.33)	0.496
Age at first birth				
11–15	1.00 (Ref)	—	1.00 (Ref)	—

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Variable	Crude PR (95% CI)	p	Adjusted PR (95% CI)	p
16–19	0.87 (0.61–1.24)	0.439	1.20 (0.79–1.80)	0.390
Maternal education				
No education	1.00 (Ref)	—	1.00 (Ref)	—
Primary	1.49 (0.94–2.37)	0.088	1.27 (0.78–2.08)	0.339
Secondary/higher	0.93 (0.58–1.51)	0.782	0.83 (0.48–1.44)	0.514
Marital status				
Not married	1.00 (Ref)	—	1.00 (Ref)	—
Married	0.94 (0.65–1.35)	0.721	0.83 (0.56–1.25)	0.379
Cohabiting	1.24 (0.73–2.08)	0.425	1.01 (0.62–1.66)	0.961
Previously married	1.53 (0.87–2.67)	0.139	1.15 (0.62–2.16)	0.653
Wealth index				
Poorest	1.00 (Ref)	—	1.00 (Ref)	—
Poorer	0.88 (0.60–1.27)	0.488	0.90 (0.61–1.34)	0.611
Middle	0.86 (0.54–1.35)	0.499	0.91 (0.57–1.47)	0.709
Richer	0.66 (0.32–1.34)	0.251	0.74 (0.38–1.42)	0.362
Richest	0.37 (0.08–1.69)	0.200	0.50 (0.11–2.38)	0.385
Religion				
Christian	1.00 (Ref)	—	1.00 (Ref)	—
Muslim	0.64 (0.36–1.15)	0.133	0.62 (0.36–1.06)	0.079
Other/Atheist	0.90 (0.39–2.04)	0.797	0.89 (0.44–1.81)	0.753
Residence				
Urban	1.00 (Ref)	—	1.00 (Ref)	—
Rural	1.47 (0.84–2.56)	0.177	0.98 (0.58–1.68)	0.953
Working status				
No	1.00 (Ref)	—	—	—
Yes	1.16 (0.80–1.69)	0.431	—	—
Household size				
<5 members	1.00 (Ref)	—	—	—
≥5 members	1.22 (0.87–1.71)	0.250	—	—
Child age (months)				
<6	1.00 (Ref)	—	1.00 (Ref)	—
6–23	1.57 (0.99–2.47)	0.054	1.54 (0.98–2.40)	0.059
≥24	2.58 (1.62–4.12)	<0.001	2.71 (1.67–4.39)	<0.001
Child sex				
Male	1.00 (Ref)	—	1.00 (Ref)	—
Female	0.77 (0.54–1.09)	0.144	0.80 (0.58–1.10)	0.167
Parity				
1 child	1.00 (Ref)	—	—	—
2–3 children	1.13 (0.79–1.63)	0.503	—	—
Birth order				
1	1.00 (Ref)	—	—	—
2–3	0.80 (0.50–1.30)	0.375	—	—
Fever/cough				
No	1.00 (Ref)	—	—	—
Yes	1.15 (0.84–1.59)	0.379	—	—
Diarrhoea				
No	1.00 (Ref)	—	—	—
Yes	0.81 (0.50–1.31)	0.390	—	—

PR = prevalence ratio; CI = confidence interval; Ref = reference category.

Discussion

Prevalence of stunting

This study found that 23.3% of children born to adolescent mothers aged 15–19 years in Kenya were stunted (95% CI: 19.7–27.4%). Although this estimate is slightly lower than the approximately 26% national estimate reported for Kenyan children under five years, it remains of substantial public health importance.[8,13] The estimate is also comparable with the 26% reported in the 2022 Uganda Demographic and Health Survey.[9] In contrast, the observed prevalence was lower than estimates reported across broader low- and middle-income country populations and pooled estimates from Sub-Saharan African countries.[10,11] Studies from Ethiopia, Uganda and Rwanda have reported higher levels of stunting, illustrating considerable geographic variation in childhood undernutrition across the region.[2,12,15,16]

The prevalence observed in this adolescent-mother subgroup is important because stunting prevalence above 20% has been described as a public health concern.[13] The burden may reflect the combined effects of biological immaturity, inadequate maternal nutritional reserves, poverty, suboptimal infant and young-child feeding practices and limitations in access to maternal and child health services.[17,18] Previous studies have also linked young maternal age with child undernutrition in Ghana and Indonesia.[18–21] These contextual factors reinforce the importance of integrating child nutrition interventions into programmes that serve adolescent mothers.

Association between child age and stunting

Child age was the clearest and most consistent predictor of stunting in this study. Compared with children aged <6 months, those aged ≥24 months had almost three times the prevalence of stunting after adjustment (aPR = 2.71; 95% CI: 1.67–4.39; $p < 0.001$). Children aged 6–23 months also had a higher prevalence, although the adjusted association was borderline (aPR = 1.54; 95% CI: 0.98–2.40; $p = 0.059$). Similar age-related patterns have been reported in analyses of DHS data from multiple low- and middle-income countries and in studies from Uganda and Rwanda.[2,10,11,15]

The observed pattern is biologically plausible. During the first six months of life, exclusive breastfeeding can provide adequate nutrition and protection against infection for many infants. After six months, however, nutritional requirements increase substantially and children become increasingly dependent on complementary foods. In many low- and middle-income settings, complementary foods may be introduced too early or too late, may lack dietary diversity, or may be provided in inadequate quantities. Repeated infections, poor sanitation and restricted access to health services can further impair nutrient absorption and increase metabolic demands.[17,25,26] Because stunting reflects cumulative growth faltering rather than an acute nutritional deficit, differences may become more visible as children move through the second year of life.

The findings also support the importance of focusing prevention efforts before growth faltering becomes established. Evidence on catch-up growth suggests that some children classified as stunted early in life may subsequently experience catch-up growth, but recovery in linear growth does not necessarily imply complete recovery of neurodevelopmental or longer-term outcomes.[27–31] Consequently, interventions should not wait until severe growth faltering is apparent.

Other maternal and child characteristics

Maternal education was significantly associated with stunting in bivariate analysis, with the highest observed prevalence among children of mothers with primary education. However, education was not independently associated with stunting after adjustment. Similarly, wealth, residence, maternal age, marital status, sex of the child, parity, birth order and recent illness were not statistically significant predictors in the adjusted analysis. The absence of independent associations should not be interpreted as evidence that these factors are unimportant. Rather, their effects may operate through pathways that were not fully captured in the cross-sectional dataset or may be attenuated after accounting for other characteristics.

Although male children had a higher observed prevalence of stunting than female children, the difference was not statistically significant in this study. Previous studies have reported sex differences in childhood stunting, but the direction and magnitude of these differences vary across settings.[11,12,21] The present findings therefore suggest that, within this adolescent-mother population, child age was a more consistent marker of vulnerability than child sex or the other background characteristics examined.

Conclusion and recommendations

Stunting affected 23.3% of children born to adolescent mothers aged 15–19 years in Kenya. Child age was the only independent predictor identified in the multivariable analysis, with children aged ≥24 months experiencing substantially higher prevalence than infants aged <6 months. These findings highlight the importance of strengthening nutrition support during the complementary feeding period and throughout the first 1,000 days of life. Practical priorities include nutrition education for adolescent mothers, support for appropriate complementary feeding and dietary diversity, timely treatment of childhood illness, and routine growth monitoring. Integrating these interventions into adolescent maternal and child health services may improve the nutritional outcomes of children born to adolescent mothers.

Limitations of the study

The use of secondary cross-sectional data limits causal interpretation. Some self-reported variables, including the timing of the first antenatal care visit, may be affected by recall bias, particularly where events occurred several years before the survey. In contrast, anthropometric measurements such as child height and weight were collected directly and are not subject to the same recall limitations. Although the magnitude of recall bias cannot be quantified or fully corrected in this analysis, the authors considered it likely to be largely non-systematic. The nationally representative design of the KDHS nevertheless provides an important basis for understanding stunting among children born to adolescent mothers in Kenya.

List of abbreviations

ANC — Antenatal care
HAZ — Height-for-age Z-score
KDHS — Kenya Demographic and Health Survey
KNBS — Kenya National Bureau of Statistics
NGO — Non-governmental organisation
PR — Prevalence ratio
SPS — Standardized prevalence of stunting
UDHS — Uganda Demographic and Health Survey
UNICEF — United Nations Children’s Fund
USAID — United States Agency for International Development
WHO — World Health Organization

Declarations

Ethics approval and consent to participate

An ethical waiver was granted because the study analysed publicly available secondary data from the 2022 Kenya Demographic and Health Survey. The DHS programme maintains procedures for protecting respondent and household privacy. Access to the unrestricted dataset was obtained through the DHS programme following review of the researchers’ proposal.

Consent for publication

Not applicable.

Availability of data and materials

The data supporting the findings are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors’ contributions

RCW, CN and JN conceptualized the study. PT contributed to data analysis. RCW, FA, JN and RN wrote the first manuscript. JN prepared the final manuscript. All authors read and approved the final manuscript.

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