Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 25 No. 10
November 2025
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2025; 25(10): 28018-28037 https://doi.org/10.18697/ajfand.147.26260

Date	Submitted	Accepted	Published
	13th August 2025	1st November 2025	11th December 2025

COMPLEMENTARY FEEDING PRACTICES AND THEIR ASSOCIATED FACTORS IN URBAN INFORMAL SETTLEMENTS, NAKURU KENYA

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SCHOLARLY, PEER REVIEWED
Volume 25 No. 10
November 2025
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

Poor nutrition during early childhood increases the risk of malnutrition, morbidity and mortality particularly during the 6-23month period. Children in informal settlements are particularly vulnerable to poor complementary feeding due to high poverty and food insecurity levels. Nakuru County hosts several informal settlements, yet recent literature on complementary feeding practices in these settlements is scarce. This study assessed complementary feeding practices and identified associated factors among children aged 6-23 months in Nakuru urban informal settlements. This cross-sectional study targeted households with children 6-23 months and their mothers, and involved the collection of both quantitative and qualitative data through interviews and focus group discussions (FGDs). Results from the study revealed that the mean age of the mothers was 24.47±5.60 years, 84.1% were married and 51.6% attained secondary education. Mean household size was 4.29±1.45, with 85.2%, 51.9% and 19.5% of households being male-headed, having a monthly income of KSh≤10,000 and being food secure, respectively. The mean age of the children was 14.99±5.20 months. Breastfeeding initiation was nearly universal (99.7%), but continuation declined early, with a mean cessation age of 15.2 months. By one year of age, 40.1% of the children were still breastfeeding, falling to 9.9% by age two. Bottle-feeding was reported in 23.6% of the children. Timely introduction of complementary foods at 6 months occurred in 72.3%, while 17.5% introduced foods early, and 48.9%, 93.4% and 38.7% attained minimum dietary diversity (MDD), minimum meal frequency (MMF) and minimum acceptable diet (MAD), respectively. The mean dietary diversity score was 4.34±1.239. Grains and vegetables dominated diets, whereas animal-source food intake was low (eggs 5.5%). Sweet beverage consumption was also high (39.3%). Household income, mothers' occupation, food security and households head education and employment status were significantly (p<0.05) associated with MDD, MMF and MAD. In conclusion, while breastfeeding initiation and meal frequency were strong, early cessation of breastfeeding, poor dietary diversity, low animal-source food intake, bottle-feeding and reliance on sweetened beverages remain key challenges. Interventions should focus on sustaining breastfeeding, promoting diverse nutrient-dense diets, and supporting caregivers in resource-limited urban informal settlements.

Key words: Complementary feeding practices, urban informal settlements, child-feeding practices

Citation: **Khatenya G, Waswa L and D Mungiria-Mituki** Complementary Feeding Practices and their Associated Factors in Urban Informal Settlements, Nakuru Kenya. *Afr. J. Food Agric. Nutr. Dev.* 2025; **25(10):** 28018-28037. https://doi.org/10.18697/ajfand.147.26260

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ISSN 1684 5374

INTRODUCTION

Child undernutrition is still a major public health concern, affecting an estimated 150 million stunted, 42 million wasted, and 35 million overweight children in 2023 [1]. The burden is disproportionately higher in Africa and Asia, with one-third (31%) of children in sub-Saharan Africa reported as stunted compared to 18% in Kenya [2, 3]. Undernutrition during infancy and early childhood compromises immune function, hinders growth and cognitive development, and can be fatal [4, 5, 6]. Globally, nearly half of all deaths in children under five years of age are attributable to undernutrition [7]. In Kenya, the economic cost of undernutrition is substantial, with annual losses estimated at KSh 373 billion (6.9% of Gross Domestic Product) due to its impact on health, education and productivity [8].

Inappropriate infant and young child feeding (IYCF) practices have been identified as one of the main causes of undernutrition, as they contribute to inadequate nutrient intakes resulting in deficiencies [9]. The World Health Organization recommends exclusive breastfeeding for the first six months of life, after which complementary foods should be introduced from six months alongside continued breastfeeding, up to two years of age and beyond [10]. The complementary foods should be diverse, age-appropriate, and given at the correct frequency for the child's age [10]. The complementary feeding period is therefore a critical stage for ensuring adequate growth and development, and prevent both acute and chronic undernutrition in children through appropriate dietary practices [11]. Complementary feeding practices, however, remain poor especially in sub-Saharan Africa, as foods rich in key nutrients like proteins, vitamins and minerals are offered to infants and young children in very low quantities. This is especially true for animal-based foods, pulses nuts and seeds, fruits and vegetables [12]. Approximately 100,000 under-five deaths are attributed to inappropriate complementary feeding. On the contrary, appropriate complementary feeding practices can prevent 6% of deaths and reduce stunting prevalence by 17% by 24 months of age [11].

Rapid urbanization and rural-urban migration have fuelled the growth of urban informal settlements (UIS), where slightly more than half (54.7%) of Kenya's population resides [13]. These settlements are marked by poverty, food insecurity and poor dietary practices placing children aged 6-23 months at high risk of undernutrition. Previous studies in Kenyan UIS, primarily in Nairobi have consistently reported suboptimal complementary feeding with low dietary diversity contributing to poor nutritional outcomes [14-18]. However, evidence from Nakuru County, which hosts 24 UIS [19] remains scarce. This study, therefore, sought to assess complementary feeding practices and its associated factors in Nakuru UIS.

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MATERIALS AND METHODS

Study setting and design

This study adopted the cross-sectional research design that employed both quantitative and qualitative data collection techniques using structured questionnaires and FGDs, respectively. The study was carried out in three UIS namely: Kwa Rhonda, Kia Murogi and Kaptembwa all located in Nakuru County, with each covering approximately two square kilometres of land. The three UIS are densely populated, with an estimated total population of 93,000 persons [19]. Nakuru UIS are characterised by inadequate housing, limited infrastructure, insecurity and high levels of unemployment [13]. The study focused on households with children 6-23 months and their mothers residing in the three UIS.

Sample size determination

The sample size was calculated using the Fischer's formula as indicated below:

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n= sample size desired
z = the standard normal deviate at 95% confidence level (1.96)
p = estimated prevalence of children 6-23 months in Nairobi UIS who were stunted, 24% [14].
q = 1 – p
d = desired level of precision (0.05)

$$n = \frac{1.96^2(0.24)(1-0.24)}{0.05^2} = 320$$

In order to account for attrition = 10% of 320 =32

Adjustment for a 10% attrition rate led to a sample of 352, which was then rounded off to 360 mother-child pairs.

Sampling techniques

Multistage sampling was used where first, Nakuru County was purposively selected because it hosts a number of UIS. Secondly, Nakuru East and West sub-counties were then purposively selected because of their close proximity to the central business district of Nakuru city. Kaptembwa and Kwa Rhonda informal settlements from Nakuru West sub-County and Kia Murogi informal settlement from Nakuru East sub-County were then randomly selected to be part of the study. Thirdly, probability proportional to size (PPS) sampling was then used to determine the number of children to be sampled from each UIS, which are organized into villages: Kaptembwa

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ISSN 1684 5374

7, Kwa Rhonda 7 and Kia Murogi 10, yielding 24 villages in total. Proportionate sampling calculation resulted to Kaptembwa 105, Kwa Rhonda 105 and Kia Murogi 150 mother-child pairs, with 15 children being drawn from each village in the three UIS. The PPS calculation is indicated below.

Comprehensive lists of all households with children aged 6-23 months from the three sampled UIS was then generated, and simple random sampling was used to select 360 households that participated in the survey.

$$Kaptembwa = \frac{7}{24} * 360 = 105 \qquad 105 \div 7 = 15$$

$$Kwa\ Rhonda = \frac{7}{24} * 360 = 105 \qquad 105 \div 7 = 15$$

$$Kia\ Murogi = \frac{10}{24} * 360 = 150 \qquad 150 \div 10 = 15$$

Data Collection

A structured questionnaire captured data on socio-demographic and economic characteristics of households, while children's feeding practices were assessed through a 24-hour multi-pass dietary recall and a dietary diversity questionnaire. Household food security was measured using the Food Insecurity Experience Scale (FIES). The interviews were conducted by trained enumerators, and the survey respondents were the mothers of the children 6-23 months. The interviews were done in Swahili language. During data collection a small oversample was recruited, yielding a final sample of 364, 1.1% above target. Of the four additional participants, two were from Kaptembwa the other two from Kwa Rhonda UIS. This slight increase in sample size had a negligible effect on statistical power and precision and did not change the pre-specified analysis plan. Additionally, three Focus Group Discussions (FGDs), one in each UIS, were conducted to provide in-depth insights into complementary feeding practices. Kaptembwa FGD had nine participants, Kia Murogi had eight and Kwa Rhonda had nine participants, all who were mothers of the children 6-23 who participated in the survey. The FGDs were conducted in Swahili, and the discussions were facilitated by one researcher, while one enumerator helped in note taking and making observations during the discussions. The venues of the FGDs were in social halls at the chiefs' offices and the discussions were audio recorded for transcription purposes.

Data management and analysis

The children's dietary diversity score (DDS) was calculated by aggregating foods from the eight WHO/UNICEF recommended food groups, with scores ranging 0-8.

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Volume 25 No. 10
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ISSN 1684 5374

A DDS of ≥5 indicated adequate dietary diversity (MDD), while <5 indicated low diversity. Minimum meal frequency (MMF) was determined using the 24-hour recall, based on WHO feeding recommendations for breastfed and non-breastfed children. Minimum acceptable diet (MAD) was then assessed as a composite of MDD and MMF, with criteria varying by breastfeeding status. Household food security measured by the FIES scale had scores from 0-8 classified as food secure (0-3), moderate (4-6) or severe food insecurity (7-8). Quantitative data was analyzed using Statistical Packages for Social Sciences (SPSS v26), while qualitative data was analyzed thematically where various themes were derived from the data to understand meanings and experiences expressed by the participants. Frequencies, percentages, means and standard deviations were used for the descriptive statistics, while chi-square tests (α=0.05) assessed associations, and the variables that were significant at the bivariate level were entered into logistic regression to determine the strength of association, with $p<0.05$ considered significant.

Ethical considerations

Ethical approval to conduct the study was obtained from Egerton University Research Ethics Committee (EUSIREC) REF NO: EUISERC/APP/291/2023. Thereafter, a research permit was obtained from the National Commission for Science, Technology, and Innovation (NACOSTI), NACOSTI/P/23/28560. Informed consent was sought from the participants prior to data collection. Privacy and confidentiality were maintained through anonymization of data and secure storage, and participants were assured of their autonomy and the voluntary nature of their participation in the study.

RESULTS AND DISCUSSION

Socio-demographic and economic characteristics

A total of 364 mother-child pairs were included in the study and there was 100% response rate. The mothers were aged between 17 and 45 years with a mean (±SD) age of 24.47±5.60 (Table 1), which was slightly lower than the mean age (27) reported in an Indian UIS [23]. More than half (51.6%) of the mothers had attained secondary education, 49.7% were unemployed, 84.1% were married, with 85.2% of the households being male-headed. Attainment of secondary education was lower than that reported in Maharashtra (61%) [20], but higher than in Mumbai India (29%) [23]. Moreover, maternal unemployment was lower in the Nakuru UIS than in Ethiopian (64%) and Indian (90%) UIS where most mothers were homemakers [21, 23]. Additionally, the proportion of male-headed households in this study (85%) was higher than the 55% reported in another similar study [21]. The households' size ranged from two to eleven people, with a mean of 4.29±1.45 members, and only 19.5% of the households were food secure. More than half (58.5%) of the household

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ISSN 1684 5374

heads had attained secondary education, with 49.4% of them being casual labourers. Slightly more than half (51.9%) of the households' monthly income was KSh ≤10,000. The children's age ranged from 6-23 months, with a mean age of 14.99±5.20 months. Majority of the children (84.3%) were aged between 9-23 months, with a higher proportion being male (54.1%). The reported household mean size of four members, high proportion of household heads working as casual labourers and the low food security levels observed in this study are consistent with findings from other similar studies in UIS [15, 20, 21, 23]. Moreover, the observed children's mean age of 14 months was consistent with findings from similar studies in other UIS [20, 22, 23].

Breastfeeding practices

Breastfeeding initiation was nearly universal (99.7%); however, continuation declined sharply, with a mean cessation age of 15.25±3.97 months (Table 2). Only 40.1% of children aged 6–11 months and 9.9% of those 20–23 months were still breastfeeding. More male (55.3%) than female children continued breastfeeding beyond 6 months of age. The high initiation of breastfeeding observed aligns with studies from other UIS [20-23], underscoring the widespread uptake of early breastfeeding practices. However, unlike the other studies where continuation of breastfeeding remained high, the current study revealed substantially lower levels of sustained breastfeeding, highlighting a potential area of concern for IYCF practices. Notably, this pattern was only comparable to the findings of one Kenyan UIS where low breastfeeding continuation was also reported [24]. The FGD findings corroborated the low continued breastfeeding rates as mothers stated that they stopped breastfeeding early due to work, maternal well-being and misconceptions and beliefs about breastfeeding.

> *"Working long hours can make breastfeeding inconsistent, and you therefore opt to give other foods to the child"* ***(FGD Kia Murogi)***
>
> *"If you are unable to get adequate food while breastfeeding, the milk quantity reduces, and eventually breastfeeding is stopped* ***(FGD, Kia Murogi)***
>
> *"Breastfeeding for 2 years can delay the milestones of the child and interfere with the consumption of solid foods."* ***(FGD Kaptembwa)***

Breastfeeding beyond six months contributes significantly to dietary adequacy by supplying essential macro and micronutrients, particularly where complementary foods are limited in diversity [25]. This study also assessed bottle-feeding practice, finding that 23.6% of children had been bottle-fed the day preceding the survey, a proportion lower than the national prevalence of 34%, consistent with the 23% found

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November 2025
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ISSN 1684 5374

in Ethiopia [22], but higher than the 18% reported in Mumbai [20] and lower than the 44% observed in Delhi UIS [23]. Bottle feeding practice is discouraged as it increases the risk of infections among children and may interfere with optimal suckling [25].

Commencement of complementary feeding

Timely introduction of complementary foods at 6 months occurred in 72.3% of children (Table 2), which was fairly consistent with findings from Delhi (78.6%), higher than in Baba-Dogo and Korogocho and Viwandani (>85%), but lower than in Mumbai UIS (67.2%) [15-17, 20, 23]. These findings suggest that while adherence to WHO recommendations is relatively strong in UIS, approximately one quarter of children still experience either early or late introduction. In this study 17.5% and 10.5% of children started complementary feeding too early and too late, respectively, with the mean age for commencement of complementary feeding being 5.75±1.22 months. Based on the FGD findings, the main reasons for early introduction of complementary foods were perceived insufficient breastmilk and work commitments.

> *" Some children below six months cry and remain restless even after breastfeeding, but when you offer other foods, they settle, so I feel breastmilk alone is not enough."* ***(FGD Kia Murogi)***
>
> *"If a mother gets a job when her child is less than 6 months old, she will be forced to leave the child behind and thus introduce other available foods to the child."* ***(FGD Kwa Rhonda)***

Timely introduction of appropriate complementary food promotes appropriate child growth [26]. Early introduction of complementary foods increases the risk of infections like diarrhoea, or increases the risk of both under and overnutrition [4, 27], while late introduction of complementary foods may result in nutrient deficiencies and undernutrition [5, 26].

Dietary diversity and food groups consumed

The mean diet diversity score (DDS) was 4.34 (Figure 1), which was higher than the reported 2.7 in a Kenyan UIS [18], with both scores being below the recommended threshold of five food groups considered adequate for ensuring MDD. Moreover, children aged 12-23 months, males and significantly (p<0.05) more breastfed children had DDS scores of 4.43, 4.37 and 4.46 respectively, which were higher compared to their counterparts. The higher DDS in Nakuru UIS could be explained by the fact that Nakuru city has a closer proximity to rural agricultural areas, therefore, may have easier and cheaper access to diverse foods. Additionally, less than half (48.1%) of the children met MDD (≥5 food groups) (Table 2), which was consistent with findings from a Kenyan UIS (50%) [17], but higher than findings from

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Volume 25 No. 10
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ISSN 1684 5374

UIS in other countries [20-23], and the national MDD prevalence (38%) [3]. The low MDD attainment underscores the persistent gap in the quality of complementary foods, as a higher diet diversity is associated with better nutrient adequacy and improved growth outcomes [28]. Moreover, the achievement of MDD was slightly higher in males (48.7%) than in females (47.3%) but not statistically significant ($p>0.05$), but significantly ($p<0.001$) higher among breastfed (53.8%) compared to non-breastfed (33.3%) children (Table 3). Breastfeeding mothers have been reported to be more likely to offer diverse diets to their children, which in turn ensures MDD is achieved [4]. The food groups consumed by the children the day preceding the survey were assessed, and the results are presented in Figure 2. Breastmilk was consumed by 71% of the children; nearly all (99.5%) had eaten from the grains, roots and tubers group, followed by 84.6% who consumed other fruits and vegetables (Figure 1). Just over half (52%) had vitamin-A rich fruits and vegetables, while fewer than a third (29.9%) consumed pulses, nuts and seeds. Except for dairy products that were consumed by 69% of the children, intake of other animal source foods including flesh meats (22.1%) and eggs (5.5%) was notably low. Diets dominated by grains, roots and tubers have also been documented in previous studies in UIS [17, 18, 20, 23]. In the present study, consumption of "other fruits and vegetables" exceeded that of vitamin A-rich fruits and vegetables, a pattern not commonly observed in most populations [29]. Similar findings were reported in a Kenyan UIS where higher intake of other fruits and vegetables was noted [18]. This could be attributed to the fact that "other vegetables" comprise of tomatoes, onions and other vegetables mostly used as ingredients in almost all food preparation processes, while other fruits like pineapples, watermelon and oranges are readily accessible to UIS dwellers as reported in the FGDs. However, it may also signal inadequate consumption of Vitamin A-rich foods, which is concerning, given that vitamin A deficiency continues to pose a significant public health challenge among children under five in low and middle-income countries. The observed low consumption of eggs and flesh foods that are rich in proteins and micronutrients observed in this study is consistent with findings from similar studies in UIS [17, 18, 20, 23], highlighting the low-quality nature of complementary foods in informal settlements. Further results from FGD revealed that financial constraints, negative cultural beliefs and myths, and dynamics in intra-household food distribution were the main reasons for the low consumption of eggs and flesh foods.

> *"When a child gets used to eating eggs his/her tongue becomes heavy and so he/she will not be able to talk."* ***(FGD Kwa Rhonda, Kaptembwa, Kia Murogi)***
>
> *"Most of us desire to purchase meat but then fail to get the money."* ***(FGD Kwa Rhonda)***

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ISSN 1684 5374

" …fish and meat are for the husband…. the husband/father is the one who is served the flesh portion of it while the child is offered soup." ***(FGD Kia Murogi).***

More than a third (39.3%) of the children consumed sweet beverages (Table 2), with a higher proportion among children aged 12-23 months (52.1%) compared to those 6-11 months (14.5%). The sweet beverage consumption prevalence was slightly lower than that reported in the 2022 Kenya demographic and health survey where 49% of the children 6-23 months consumed sweet beverages [3], indicating unhealthy food consumption. Given the high MMF observed in Nakuru UIS, some of that "frequency" might be nutritionally hollow if it includes sugary drinks. Consumption of sweet beverages is discouraged for children 6-23 months since they displace nutrient-dense foods, and can increase the risk of overweight and obesity [26, 30].

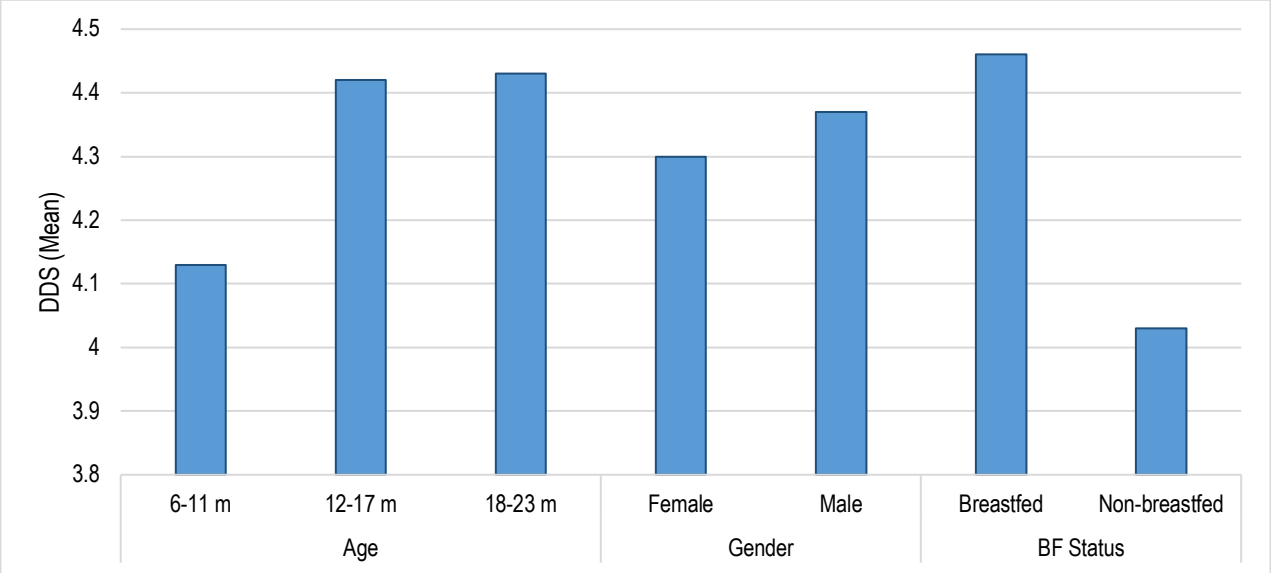

Figure 1: Mean children's diet diversity score by age, gender and breastfeeding status; DDS-dietary diversity score, m-months, BF-breastfeeding

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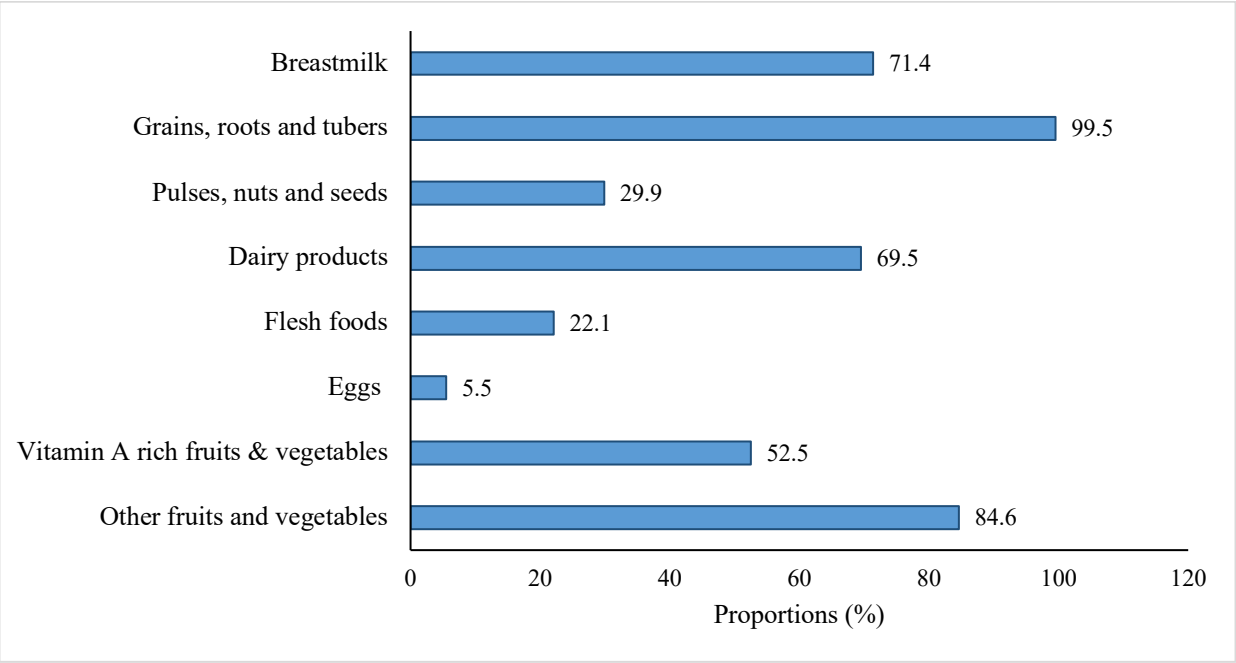

Figure 2: Proportion of children aged 6-23 months who consumed foods from the eight recommended food groups

Meal frequency and MAD

The MMF achievement was 93.4% (Table 2), which was much higher than findings from similar studies in other UIS [20-23], while the average number of meals consumed by the children per day was 4.67±1.434. More females (94% vs 92.9%) and children in the 6-8-month age group (98% vs 92.4%) achieved MMF, while there was no difference in MMF attainment between breastfed (93.5%) and non-breastfed (93.1%) children (Table 3). The high level of MMF suggest that the children were fed the appropriate number of times for their age ensuring sufficient caloric intake to meet daily energy needs. However, only 38.7% of children achieved MAD (Table 2), which was comparable to results from Baba-Dogo (39.5%) UIS in Kenya [17], but lower than UIS in other countries [20-23]. Disaggregation of MAD by age (Table 3) showed higher attainment among those aged 9-23 months compared to those 6-8 months (27.6%). A slightly greater proportion of females (39.5%) than males (38.1%) met MAD. Notably, MAD attainment was significantly ($p<0.001$) higher among breastfed children (51.1%) than their non-breastfed counterparts (6.9%). The low attainment of MDD, which consequently contributed to the poor MAD, could be attributed to the low household income and widespread food insecurity observed in the study area. These findings suggest that children in UIS are likely at risk of micronutrient deficiencies due to inadequate diet diversity. Breastfed children were more likely to achieve MAD compared to their non-breastfed counterparts. Evidence

suggests that breastfeeding mothers are more inclined to provide better quality diets to their children [4].

Factors associated with complementary feeding practices

The study findings demonstrated associations between socio-economic and demographic status with complementary feeding practices and the results are summarized in Table 4. Household income, maternal occupation, food security, and household head's education and employment status were associated with complementary feeding practices. The children were 5.49 and 3.19 less likely to have a diverse diet if their mothers were casual labourers [AOR=0.182, 95% C.I; (0.036±0.918) $p<0.05$], and their household income was KSh<5000 [AOR=0.313, 95% C.I; (0.150±0.649), respectively. Additionally, children whose household income was KSh<5000 [AOR=0.229, 95% C.I; (0.094±0.556) $p<0.05$], whose household head's did not complete primary education [AOR=0.190, 95% C.I; (0.049±0.742) $p<0.05$], and did not have a job [AOR=0.108, 95% C.I; (0.013±0.888) $p<0.05$] were 4.36, 5.26 and 9.25 times less likely to attain MMF, respectively. Moreover, MDD was 4.29 and 2.50 less likely to be achieved if the mothers were casual labourers [AOR=0.233, 95% C.I; (0.061±0.885) $p<0.05$], and the household had an income of KSh<5000 [AOR=0.399, 95% C.I; (0.197±0.809) $p<0.05$]. On the other hand, there was a strong positive association between food security and appropriate complementary feeding practices. Children who came from food secure households were more likely to consume a diverse diet [AOR=3.409, 95% C.I; (1.796±6.474) $p<0.01$], achieve MMF [AOR=8.046, 95% C.I; (1.006±64.376) $p<0.05$] and MAD [AOR=2.858, 95% C.I; (1.509±5.411) $p<0.05$].

Low household income was negatively associated with attaining MDD, MMF and MAD, which is consistent with findings from similar studies in Indian UIS [20, 21, 23]. Low household income reduces economic access to adequate amounts and quality of complementary foods, which then interferes with the frequency and diversity of diets consumed by children. Children of women who were casual labourers were less likely to attain MDD and MAD in this study. Interestingly the case was not the same for women who were unemployed and those self/formally employed. The FGD findings indicated that mothers working as casual labourers faced limited time and money for planning and preparing balanced meals due to their rigid work schedules and the low wages. In the current study, children from households where the head (predominantly men) had low education and were unemployed were significantly less likely to meet MMF. Household heads with low education and employment often have limited income-generating activities, which restrict household resources for food, reducing the ability to purchase diverse and sufficient foods. Food security was also significantly and positively associated with attaining MDD, MMF and MAD. Similar results were reported in a similar study in a Kenyan UIS [15]. Being food

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SCHOLARLY, PEER REVIEWED
Volume 25 No. 10
November 2025
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

secure ensures the availability of adequate and diverse foods for complementary feeding. Unlike findings from other UIS studies where maternal education has been associated with complementary feeding practices [22, 23], this study did not find such a relationship.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOMENT

The complementary feeding indicators show partial achievement of the WHO standards. While breastfeeding initiation and meal frequency were strong, early cessation of breastfeeding, bottle-feeding, poor dietary diversity, low animal source food intake and unhealthy food consumption were key challenges in Nakuru UIS. The factors that influenced complementary feeding practices were: food insecurity, low household income, maternal occupation (especially casual labour/unemployed), and low education/ occupation status of the household head. Overall, these findings indicate inappropriate feeding practices and the influence of low incomes and maternal/paternal socio-economic status on complementary feeding practices in Nakuru UIS. Interventions should focus on sustaining breastfeeding up to two years, promoting diverse nutrient-dense diets, improving household livelihoods, food security and maternal empowerment in the resource-limited UIS.

ACKNOWLEDGEMENTS

The authors acknowledge the Department of Human Nutrition Egerton University, for their institutional support and guidance. We also extend our appreciation to the enumerators for their diligence during data collection and to the local authorities for their cooperation in coordinating fieldwork. Finally, we are grateful to the mothers who participated in the study, whose contributions were essential to the success of this research.

Conflict of Interest

The authors declare no conflict of interest.

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Volume 25 No. 10
November 2025
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
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Table 1: Socio-demographic and economic characteristics of the study population

Characteristic	n	%
Child gender		
Male	197	54.1
Female	167	45.9
Child age (months)		
6-11	124	34
12-23	240	66
Maternal age (years)		
<20	13	3.6
21-25	133	36.4
26-30	130	35.7
>30	88	24.1
Marital status		
Married	306	84.1
Single	52	14.3
Others	6	1.6
Maternal education		
None	1	0.3
Primary	107	29.4
Secondary	188	51.6
Tertiary	68	18.7
Household head		
Male	310	85.2
Female	54	14.8
Household head education		
None	4	1.1
Primary	68	18.6
Secondary	213	58.5
Tertiary	79	21.7

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Volume 25 No. 10
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PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Maternal occupation		
None	181	49.7
Casual labour	68	18.7
Business	101	27.8
Wage employment	11	3
Household income (KSh)		
<5000	50	13.7
5000-10,000	189	51.9
10,000-20,000	101	27.7
Food security		
Food secure	71	19.5
Moderate food insecurity	196	53.8
Severe food insecurity	97	26.6

Table 2: IYCF indicators

Characteristic	n	%
Ever breastfed	363	99.7
Continued breastfeeding at one year	105	40.1
Continued breastfeeding at two years	26	9.9
Continued breastfeeding beyond 6 months by gender		
Females	117	44.7
Males	145	55.3
Timely introduction of complementary foods	263	72.3
Adequate MDD	175	48.9
Adequate MMF	340	93.4
Adequate MAD	141	38.7
Bottle feeding	85	23.6
Sweet beverage consumption	143	39.3
6-11 months	18	14.5
12-23 months	125	52.1

MDD-minimum dietary diversity, MMF-minimum meal frequency, MAD-minimum acceptable diet

https://doi.org/10.18697/ajfand.147.26260

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Table 3: Attainment of MDD, MMF and MAD by age group, gender and breastfeeding status

		MDD [n (%)]	MMF [n (%)]	MAD [n (%)]
Age group	6-8 months	16 (27.6)	57 (98.3)	16 (27.6)
	9-23 months	159 (52)	283 (92.5)	125 (40.8)
	***p* value**	**0.001**	**0.103**	**0.057**
Gender	Female	79 (43.7)	157 (94)	66 (39.5)
	Male	96 (48.7)	183 (92.9)	75 (38.1)
	***p* value**	**0.7786**	**0.669**	**0.777**
Breastfeeding status	Breastfed	141 (53.8)	95 (93.1)	134 (51.1)
	Non-breastfed	34 (33.3%)	245 (93.5)	7 (6.9)
	***p* value**	**0.000****	**0.897**	**0.000****

***p*<0.001 significant by χ2 test, MDD-minimum dietary diversity, MMF-minimum meal frequency, MAD-minimum acceptable diet

Table 4: Factors associated with complementary feeding practices

Variable	B	AOR	C.I (95%)	*p* value
	MDD			
Mothers' occupation (casual labour)	-1.702	0.182	0.036-0.918	0.039*
HH income (<KSh 5000)	-1.163	0.313	0.150-0.649	0.002*
FIES (food secure)	1.227	3.409	1.796-6.474	0.000**
	MMF			
HH income (< KSh 5000)	-1.476	0.229	0.094-0.556	0.001**
HH head education (some primary)	-1.658	0.190	0.049-0.742	0.017*
HH head occupation (none)	-2.228	0.108	0.013-0.888	0.038*
FIES (food secure)	2.085	8.046	1.006-64.376	0.049*
	MAD			
Mothers' occupation (casual labour)	-1.456	0.233	0.061-0.885	0.032*
HH income (< KSh 5000)	-0.918	0.399	0.197-0.809	0.011*
FIES (food secure)	1.050	2.858	1.509-5.411	0.001*

***p*<0.001, **p*<0.5 significant by logistic regression, HH-household, KSh-Kenya shillings, AOR-adjusted odds ratio, CI-confidence interval, MDD-minimum dietary diversity, MMF-minimum meal frequency

MAD-minimum acceptable diet, FIES-food insecurity experience scale

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