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Comparison of Complementary Feeding Between Children in Households with and Those Without Kitchen Gardens in Kakamega County, Kenya

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Abstract- ***Sub-optimal feeding and nutrition among infants and young children less than 59 months old are leading causes of under nutrition in least developed countries. Recent agri-nutrition interventions, focused on kitchen gardening in developing countries revealed its impact on children's complementary feeding and nutrition status, despite insufficient empirical evidence. This study aimed at comparing nutrition status and complementary feeding of 64 children aged between 6 and 23 months in households with and 64 others without kitchen gardens in Lurambi Sub-County, Kakamega County. The study used a comparative cross-sectional and analytical research design. The findings on nutritional status were compared with WHO, 2006 Child Growth Standards. Researcher-administered interviews for selected study participants households, key informants and focus group discussions. Data on infant and young child feeding (IYCF), nutrition assessment, and kitchen gardening was elicited and analyzed using SPSS, comparing variables from households across the groups. The results indicate that kitchen gardening households were four times more likely to grow kales (OR=4.058) and three times more likely to grow both jute mallow (OR=2.524) and cow peas (OR=3.246). Most households without kitchen gardens did not grow micronutrient rich vegetables. Minimum dietary diversity was the only index that was statistically significantly different across the groups, (p-value=0.013); with 71.9% and 53.1% meeting MDD in kitchen and non-kitchen gardening households, respectively. Diet among children in households without kitchen gardens was mainly consisting of cereals (maize), obtained from their farms. Majority of kitchen gardening households had a high crop diversity grown, which resulted in attaining a higher children proportion having MDD. Organizations implementing agricultural programs should collaborate with the Ministry of Health and focus on improving household nutrition, health and food security through agri- nutrition, including kitchen gardening.***

Index Terms- ***Infant and Young Child Feeding,*** **Complementary feeding** ***Nutrition, Kitchen Garden, Dietary diversity***

I. INTRODUCTION

Complementary feeding is the process that begins when breast milk alone is no longer sufficient to meet an infant's nutritional needs. It applies to children aged 6–24 months and involves continued breastfeeding alongside the introduction of appropriate foods and liquids as depicted by [1].The World Health Organization (WHO) recommends that children aged 6–23 months receive meals at age-appropriate frequencies, referred to as Minimum Meal Frequency (MMF), and consume foods from at least five of eight recommended food groups to meet the Minimum Acceptable Diet (MAD) as observed in [2]. Achieving Minimum Dietary Diversity (MDD) increases the likelihood that a child consumes at least one fruit or vegetable and one source of animal protein daily in addition to staple foods. Despite these recommendations, only 29% of children globally receive a minimum acceptable diet, with much lower proportions in Sub-Saharan Africa and East Africa [3, 4]. In Kenya, the 2014 Kenya Demographic and Health Survey (KDHS) reported that only 21% of children aged 6–23 months met MAD. Although KDHS 2022 shows some improvement — 37% attaining MDD, 71% meeting MMF and 31% achieving MAD — substantial gaps in child feeding practices remain [5].

Undernutrition remains a major public health problem in Kenya, contributing to approximately 35,000 child deaths annually among children under

five years [6, 7]. In Western Kenya, 84% of hospitalized children below five years have been reported to be undernourished [8]. Poor complementary feeding practices significantly contribute to malnutrition and may irreversibly affect growth and cognitive development, particularly within the first two years of life [3]. Monotonous diets dominated by cereals, roots and tubers are often deficient in essential micronutrients and are associated with stunting, underweight and increased susceptibility to infections [10, 11].

Agriculture has increasingly been recognized as a nutrition-sensitive intervention that can improve dietary outcomes when integrated with appropriate nutrition education and infant and young child feeding (IYCF) practices [13]. A shift toward agricultural approaches that emphasize nutritional quality, including production and consumption of indigenous green leafy vegetables and small animal species, has been recommended [14]. When combined with improved production methods and crop diversification, such approaches can enhance dietary diversity and nutritional status at the household level [15]. Complementary feeding practices may particularly benefit from these interventions through the promotion of kitchen or home gardens.

A home garden refers to land around the homestead used to grow vegetables, fruits, herbs and spices either seasonally or year-round to meet household nutritional needs [16, 17]. Kitchen gardening, often used interchangeably with home gardening, involves cultivating diverse crops on small plots close to the household primarily for subsistence [18]. In Western Kenya, crop diversity, especially African Leafy Vegetables (ALVs) and indigenous fruits, has been shown to improve nutrient utilization and dietary quality [19]. Historically, households in Kakamega County cultivated a wide variety of ALVs and fruits such as avocados, passion fruits, pineapples, paw paws, bananas and mangoes within kitchen gardens before the expansion of commercial sugarcane farming [20].

Evidence from different settings suggests that home gardening interventions can increase household availability of micronutrient-rich foods, improve dietary diversity, and in some cases reduce stunting and wasting among children [21, 22, and 23]. However, reviews also indicate that the relationship between agricultural interventions and measurable improvements in child nutritional status remains inconsistent, partly due to methodological limitations and contextual differences [24, 25]. In Kenya, initiatives such as urban and peri-urban agriculture programs and county agri-nutrition strategies have promoted kitchen gardening to improve household dietary diversity and reduce micronutrient deficiencies. Nevertheless, empirical evidence linking kitchen gardening specifically to complementary feeding practices and nutritional status among children aged 6–23 months in Kakamega County remains limited.

This study therefore sought to address this gap by comparing complementary feeding practices and nutritional status among children aged 6–23 months in households with kitchen gardens and those without kitchen gardens in Lurambi Sub-County, Kakamega County. The findings contribute to the growing body of evidence on nutrition-sensitive agriculture and inform policies and programs aimed at improving infant and young child feeding and nutrition outcomes. Some complementary foods may therefore increase the risk of malnutrition, morbidity, stunting and mortality if they do not adequately supply required nutrients [26]. Studies have recommended kitchen garden ownership as a strategy for improving household nutrition through the production of vegetables, fruits, poultry and other small livestock, particularly benefiting children under five years [27]. While evidence suggests that home gardening interventions can improve production, knowledge and practices, existing empirical evidence remains limited [28].

Kakamega County has high agricultural potential due to its bimodal rainfall pattern, which supports crop production for both human and animal consumption [29]. Government initiatives, including urban and peri-urban agriculture programmes, have promoted the use of small land parcels to grow fruits and vegetables for improved food security. Additionally, the County has developed the Kakamega County

Agri-Nutrition Implementation Strategy (CANIS), which adopts a food-based approach to promote agricultural production of nutritious foods, dietary diversity and food fortification to address malnutrition and micronutrient deficiencies [30].

However, despite these initiatives and the recognized potential of kitchen gardening, there is limited empirical evidence on the extent to which kitchen gardening contributes to dietary diversity and nutritional status among children aged 6–23 months in Kakamega County, thereby necessitating this study.

II. METHODOLOGY

The study employed a comparative cross-sectional design using both quantitative and qualitative approaches to examine complementary feeding practices and nutritional status of children aged 6–23 months in households with and without kitchen gardens in Lurambi Sub-County, Kakamega County. A total of 128 households (64 with kitchen gardens and 64 without) were selected using multistage sampling techniques.

Data were collected through researcher-administered questionnaires, anthropometric measurements, focus group discussions, key informant interviews, and observation checklists. Nutritional status was assessed using WHO Child Growth Standards (WAZ, HAZ, and WHZ), while complementary feeding practices were evaluated using WHO Infant and Young Child Feeding indicators. Quantitative data were analyzed using SPSS version 25.0 and ENA for SMART software, applying descriptive and inferential statistics, including chi-square tests, t-tests, Mann–Whitney U tests, and logistic regression. Qualitative data were analyzed thematically. Ethical approval and informed consent were obtained prior to data collection.

III. STUDY OBJECTIVES

This study sought to compare complementary feeding practices and the nutritional status of children aged 6–23 months in households with kitchen gardens and those without in Lurambi Sub-County, Kakamega County. Specifically, the study aimed to:

i. *Identify the types of crops grown and their utilization in households with and without kitchen gardens in Lurambi Sub-County.*
ii. *Compare complementary feeding practices among children aged 6–23 months in households with and without kitchen gardens in Lurambi Sub-County.*

The study tested the following null hypotheses:

H01: There is no statistically significant relationship between kitchen gardening and dietary diversity among children aged 6–23 months.

H02: There is no statistically significant relationship between kitchen gardening and nutritional status among children aged 6–23 months in Lurambi Sub-County.

IV. RESEARCH FINDINGS

The research established that households with and without kitchen gardens were generally comparable in socio-demographic characteristics, including caregiver sex, marital status, education level, occupation, and child age distribution. Most caregivers were married, had completed primary education, and relied on farming or casual labour as their main source of livelihood. Children had a mean age of approximately 14 months across both groups.

However, significant differences emerged in land ownership characteristics, crop diversity, complementary feeding practices, and child nutrition outcomes. Households with kitchen gardens were more likely to own and utilize smaller parcels of land intensively for food production. Kitchen gardening was strongly associated with the cultivation of a wider range of nutrient-dense crops, particularly African leafy vegetables.

Children from households with kitchen gardens demonstrated significantly better complementary feeding practices, including higher dietary diversity, higher attainment of minimum acceptable diet, and higher rates of continued breastfeeding up to two years. Although no significant differences were observed for weight-for-age and weight-for-height

indices, children from kitchen gardening households had significantly better height-for-age scores, indicating lower levels of chronic malnutrition (stunting).

Qualitative findings supported quantitative results, with caregivers reporting that kitchen gardens improved food availability, reduced food costs, and enhanced access to vegetables for infant and young child feeding. Key informants highlighted gaps in funding, training, and community awareness as constraints to optimal utilization of kitchen gardening for nutrition.

Table 1 shows Socio-demographic characteristics of the respondents and children 6 to 23 months of age by study groups.

Among the study participants, 50.8% were male and 49.2% were female. In households with kitchen gardens, 57.8% were male, while in households without kitchen gardens, 56.2% were female. Most mothers (42.2%) were aged 26–35 years, and 88% of respondents were married. Over half of the mothers (58.6%) had completed primary school, while only 3% had no formal education. Regarding income, 60% of respondents did not earn from farming, whereas 40.9% were engaged in farming as their main occupation.

The mean age of children was 14 ± 0.5 months, with children in households with kitchen gardens averaging 14.3 ± 5.2 months and those without averaging 13.7 ± 5.4 months. Almost one-third (43.8%) of children were under 13 months, including 39.1% from households with kitchen gardens and 48.4% from households without.

Table 1: Socio-demographic characteristics of the respondents and children 6 to 23 months of age by study groups

Variable	With kitchen garden n=64 n (%)	Without kitchen garden n=64 n (%)	Total number N=128 n (%)
Sex of respondent			
Male(care givers)	37 (57.8)	28 (43.8)	65 (50.8)
Female	27 (42.2)	36 (56.3)	63 (49.2)
Mothers age (Years)			
17-18	7 (10.9)	3(4.7)	10(7.8)
19-25	20(31.3)	29(45.3)	49(38.3)
26-35	32(50)	22(34.4)	54(42.2)
36-50	5(7.8)	9(14.1)	14(10.9%)
> 50	0(0)	1(1.6)	1(0.8)
Marital status			
Married	54 (84.4)	58 (90.6)	112 (87.5)
Widowed	1 (1.6)	1 (1.6)	2 (1.6)
Divorced	1 (1.6)	1 (1.6)	2 (1.6)
Single	8 (12.5)	4 (6.3)	12 (9.4)
Mothers' /caregivers education level			
None	2 (3.1)	2 (3.1)	4 (3.1)
Primary Incomplete	22 (34.4)	14 (21.9)	36 (28.1)
Primary complete	37 (58.7)	38 (59.4)	75 (58.6)
Vocational (secondary)	2 (3.1)	9 (14.1)	11 (8.5)
Income (farm produce)			

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Yes	24 (37.5)	24 (37.5)	48 (37.5)
No	39 (61.0)	39 (61.0)	78 (60.9)
Mothers' occupation			
Farmer	26 (40.6)	26 (40.6)	52 (40.6)
Housewife	6 (9.4)	7 (10.9)	13 (10.2)
Formal employment	20 (31.2)	17 (26.6)	37 (28.9)
Student	11 (17.2)	13 (20.3)	24 (18.8)
Sex of children			
Male	37 (58.1)	28 (43.8)	63(49.2)
Female	27 (42.2)	36 (56.3)	65 (50.8)
Children's age (months)			
< 13	25(39.1)	31(48.4)	56(43.8)
13-17	16(25)	14(21.9)	30(23.4)
18-23	23(35.9)	19(29.7)	42(32.8)
Age (mean±SD)	14.28± 5.2	13.73± 5.4	14± 0.5

N= Total number ; n=total per group; (%) percentage

A summary of the socioeconomic status of the participant households is presented in table 2 and compared across households with and without kitchen gardens.

Variable	With garden	itchen	Without kitchen garden		Total number		Chi-square/ Fishers exact value	P-value
	n = 64		n = 64		N=128			
	n	%	n	%	N	%		
Source of income								
Casual labour	35	54.7	37	57.8	72	56.3	1.614	0.656
Farm produce	3	4.7	6	9.4	9	7		
Formal employment	18	28.1	15	23.4	33	25.8		
Business	8	12.5	6	9.4	14	10.9		
Land ownership								
None	0	0	2	3.1	2	1.6	3.209	0.361
Owned	59	92.2	58	90.6	117	91.4		
Leased	2	3.1	3	4.7	5	3.9		
Ancestral	3	4.7	1	1.6	4	3		
Land size owned(arable)								
None	0	0	2	3	2	1.6	9.52	0.023*
<0.5 acres	28	43.8	15	23	43	33.6		
Between 0.5 and 1 acres	27	42.2	28	44	55	43		
> 1 acre	9	14.1	19	30	28	21.9		
Land size used for farming								

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None	2	3.1	4	6.3	6	4.7	9.102	0.028*
<0.5 acres	34	53.1	19	29.7	53	41.4		
Between 0.5 and 1 acres	22	34.4	26	40.6	48	37.5		
> 1 acre	6	9.4	15	23.4	21	16.4		

Table 2: Socio-economic parameters of mothers with children aged between 6 and 23 months in months in households with kitchen gardens and those without kitchen gardens

*Means significant 95% confidence interval

Mothers and caregivers of children aged 6–23 months reported that kitchen gardening had a limited impact on accessing complementary foods. The small size of most gardens restricted production to a few staples such as maize and kale, necessitating the purchase of other foods from the market. Household food was often insufficient to meet recommended complementary feeding practices, with items such as oranges, mangoes, carrots, and Irish potatoes typically bought externally. Many caregivers highlighted that market prices were high, making it difficult to provide adequate food for their children. The table 3 describes crops grown in households without kitchen gardens.

Table 3: Crops grown in households with and those without kitchen gardens

Variables	With Kitchen garden	Without kitchen garden	95% CI			P-value
	N = 64	N = 64				
	n (%)	n (%)	OR	Lower	Upper	
Kales						
Grown	44 (68.8)	1 (1.6)	4.058	2.763	5.96	<0.001*
Not grown	63 (98.4)	20 (31.2)	1			
Slender leaf						
Grown	18 (28.1)	0 (0)	2.391	1.918	2.981	<0.01*
Not grown	64 (100)	46 (71.9)	1			
Jute mallow						
Grown	22 (34.4)	0 (0)	2.524	1.995	3.192	<0.001*
Not grown	64 (100)	42 (65.6)	1			
Cow peas						
Grown	37 (57.8)	1 (1.6)	3.246	2.357	4.47	<0.001*
Not grown	63 (98.4)	27 (42.2)	1			
Pumpkin						
Grown	12 (18.8)	0 (0)	2.231	1.823	2.73	<0.001*
Not grown	64 (100)	52 (81.3)	1			
Amaranthus						
Grown	6 (9.4)	0 (0)	2.103	1.746	2.534	<0.001*
Not grown	64 (100)	58 (90.6)	1			
Spider plant						
Grown	4 (6.3)	0 (0)	2.067	1.723	2.479	<0.001*

Not grown	64 (100)	60 (93.7)	1			
Black nightshade						
Grown	17 (26.6)	0 (0)	2.362	1.901	2.934	<0.001*
Not grown	64 (100)	47 (73.4)	1			
Onions						
Grown	3 (4.7)	0 (0)	2.049	1.712	2.452	0.021*
Not grown	64 (100)	61 (95.3)	1			
Tomatoes						
Grown	0(0)	0(0)	.	.	.	.
Not grown	63(98.4)	64(100)				

N= Total population per group; n=frequency; n (%) = percentage;
OR -Odds Ratio; CI – Confidence Interval

Other crops grown in households with and without kitchen gardens

Other crops grown by households with and without kitchen gardens were summarized in percentages and frequencies. There was a significant difference in growing of maize with p = < 0.011 as well as yams p= < 0.019 across the two groups. Table 4 has a summary of the findings.

Table 4: Other crops grown in households by study groups

Other Crops Grown by both groups	With kitchen gardens N = 64 n (%)	Without kitchen gardens N = 64 n (%)	Chi-square	p-value
Maize	5 (7.8)	24 (37.5)	16.095	<0.01*
Yams	13 (20.3)	4 (6.3)	5.4944	0.019*
Sweet potatoes	9 (14.1)	11 (17.2)	0.237	0.626
Other Crops Grown by one Group				
Sugar cane	0 (0)	9 (14.1)		
Cassava	0 (0)	7 (10.9)		
Pawpaw	4 (6.3)	0 (0)		
Avocadoes	5 (7.8)	0 (0)		

Utilization of crops grown in households with and without kitchen gardens
Figure 1 illustrates the proportion of produce from households with and without kitchen gardens that is used for subsistence versus sale. Among households with kitchen gardens, 39.1% of the produce was retained for household consumption, while 60.9% was sold. In households without kitchen gardens, 42.2% of the produce was consumed at home, and 57.8% was sold.

These results indicate that households with kitchen gardens tend to allocate a slightly higher proportion of their produce for sale compared to subsistence, suggesting that kitchen gardens may contribute not only to household

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food security but also to income generation. The differences between the two groups, however, are relatively small, indicating similar patterns of produce allocation regardless of the presence of a kitchen garden.

During the FDGs, mothers /caregivers of children who are age 6 to 23 months stated that food produced from kitchen gardens was sufficient for subsistence. The excess food was sold and what they lacked was bought from the market. The surplus food harvested from their farms were given to relatives and neighbors, summarized in Fig. 1 below.

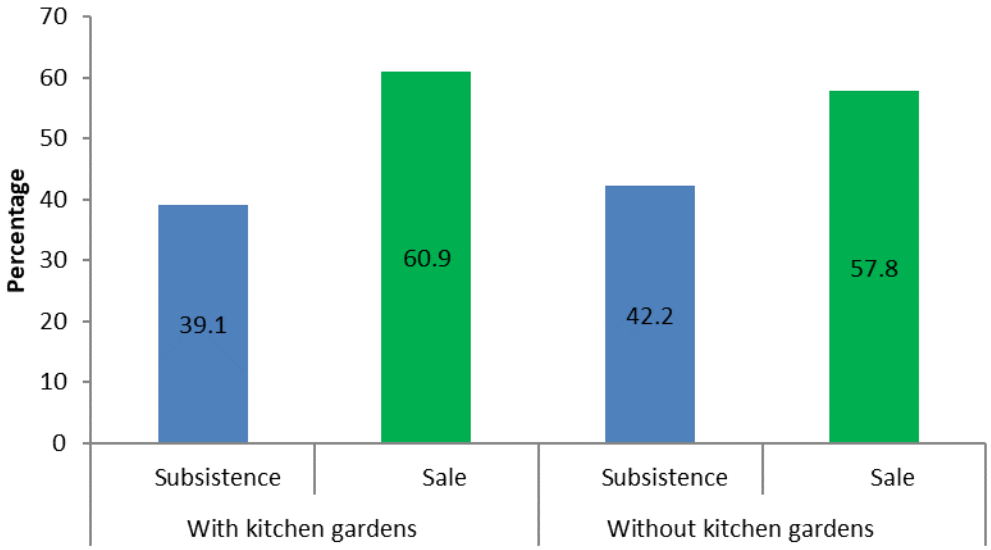

Figure 1: Utilization of crops grown from households with and those without kitchen gardens

Table 5 presents the utilization of income from sold crops among households with and without kitchen gardens. The findings indicate a statistically significant relationship between household type and how the money obtained from crop sales was used ($p = 0.014$). Specifically, slightly over one-third of households with kitchen gardens (35.9%) and more than half of those without kitchen gardens (57.8%) reported using the income to purchase clothes, furniture, and contribute to table banking activities. Additionally, there was a statistically significant difference in the amount of food sold between the two groups ($p < 0.01$), highlighting variations in household engagement in food sales.

Table 5: Utilization of earnings from surplus food sold from households with and those without kitchen gardens

Use of earnings from surplus food sold	With kitchen gardens N=64 n (%)	Without kitchen gardens N=64 n (%)	Chi-square	P-value
Barter trade for casual labour Provided	23 (35.9)	37 (57.8)	14.192	0.014*
Buy food	17 (26.6)	5 (7.8)		
Buy household groceries (soap, body oil)	18 (28.1)	10 (15.6)		
Pay fees	4 (6.3)	10 (15.6)		

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Invest in business	1 (1.6)	2 (3.1)		
Others	1 (1.6)	0 (0)		

	M (IQR)	M (IQR)	Mann-Whitney	
Amount sold	50 (550)	0	-4.675	<0.011*
Amount consumed	500 (1090)	75 (1725)	-0.796	0.426

N=frequency; n(%) = percentage ; M=median; IQR=Interquartile Range

Child feeding practices at 6 and 23 months of age in households with and those without kitchen gardens

Feeding among children who are age 6 to 23 months was analyzed in line with World Health Organization indicators and recommendations (WHO, 2021). Of the children, 60.9% from households with Kitchen gardens while 39.1% of children from those without kitchen gardens continued breastfeeding as they were complementary fed at the age of 20 to 23 months. From the results, the Infant and Young Child feeding indicator of continued breastfeeding children up to 2 years (between 20 to 23 months) was the only index that was statistically significantly different across the groups, p-value=0.013. A summary of the feeding practices is shown in table 6.

Table 6: Breastfeeding practices for children aged between 6 and 23 months old in households with and those without kitchen gardens

	With kitchen gardens n=64	Without kitchen gardens n=64	Total	%	Chi-square	P-value
	n(%)	n(%)	N=128			
Infant and Young Child Feeding Indicators						
Continued Breastfeeding At one-year (12-15 months)	7 (10.9)	15 (23.4)	22	17.2	3.513	0.061
At 2 years (20-23 months)	39 (60.9)	25 (39.1)	64	50	6.125	0.013*
Discontinued breastfeeding	9 (14.1)	15(23.4)	24	18.8	1.8462	0.174

*Significant ; N=frequency; n= total per group; % = percentage ;

Mothers of children aged 6 to 23 months shared their experiences regarding infant and young child feeding during the FGDs. A significant difference was observed in complementary feeding practices between the two groups (p = 0.013). The majority of children from households practicing kitchen gardening (71.9%) consumed a minimally diverse diet, compared to 53.1% of children from households without kitchen gardens.

It was additionally observed that continued breastfeeding up to two years was significantly higher among children from kitchen garden households (p = 0.013), with the highest rates observed across both groups (p = 0.028).

Among children aged 6 to 8 months, 46.8% from households with kitchen gardens achieved the minimum meal frequency of two times per day while still breastfeeding, compared to 14.1% from households without kitchen

gardens. Furthermore, 54.7% of children from kitchen garden households, versus 39.1% from households without kitchen gardens, met the minimum acceptable diet. Intake of iron-rich and iron-fortified foods was comparable between the groups, with 20.3% of children from households with kitchen gardens and 21.9% from households without kitchen gardens consuming such foods as described in table 7.

Table 7: Other complementary feeding practices of children between 6 and 23 months old in households with and those without kitchen gardens

Variable	With kitchen gardens n=64 n(%)	Without kitchen gardens n=64 n(%)	Total N=128	%	Chi-square	P-value
Complementary feeding practices						
Minimum Dietary Diversity						
Met minimum dietary diversity (≥5 food groups)						
Attained	46(71.9)	34(53.1)	80	62.5	4.8	0.028*
Did not attain	18(28.1	30(46.9)	48	57.5		
Minimum Meal Frequency						
Breastfed 2 times (6-8 months)						
Attained	3 (4.6)	9 (14.1)	12	9.4	3.311	0.063
Did not attain	61(95.3)	55(85.9)	116	90.6		
Breastfed 3 times (9-12 months)						
Attained	10(15.6)	10 (15.6)	20	15.6	0.996	0.978
Did not attain	54(84.4)	54(84.4)	108	84.4		
Non-breastfed 4 times (between 6 and 23 months)						
Attained	9 (14.1)	15(23.4)	24	18.8	1.8462	0.174
Did not attain	55(85.9)	49(76.6)	104	81.3		
Minimum Acceptable Diet						
Attained	35 (54.7)	25 (39.1)	60	46.9		
Did not attain	29 (45.3)	39 (60.9)	68	53.1	3.137	0.077
Intake of iron-rich or iron fortified food (previous 24 hours)	13 (20.3)	14 (21.9)	27	21.1	0.047	0.861

*Significant

The nutritional status of children from households with and without kitchen gardens was compared using anthropometric Z-scores (Table 8). There were no significant differences between the two groups in weight-for-age (WAZ) (mean ± SD: 0.31 ± 1.23 vs. 0.46 ± 1.16; t = -0.7, p = 0.493) or weight-for-height (WHZ) (1.35 ± 1.64 vs. 0.93 ± 1.43; t = 1.58, p = 0.121), indicating similar outcomes for overall and acute nutritional status. In contrast, height-for-age (HAZ), a marker of chronic nutritional status, was significantly lower among children from households with kitchen gardens (median [IQR]: -1.31 [1.86]) compared to those without kitchen gardens (-0.71 [2.04]; Mann-Whitney Z = -2.545, p = 0.011). These results suggest that kitchen gardens were not associated with improvements in weight-related indicators but may have a nuanced relationship with long-term growth patterns.

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Further analysis indicates that the observed differences in HAZ may reflect underlying factors beyond household food production, such as maternal nutrition, frequency of infections, or care practices, which were not directly captured in this study. While kitchen gardens are likely to enhance dietary diversity and micronutrient intake, their impact on linear growth may require sustained access to a variety of nutrient-rich foods over time, coupled with optimal caregiving practices.

These findings underscore the importance of integrating nutrition-sensitive agriculture with broader child health and care interventions to achieve measurable improvements in chronic nutritional outcomes.

Table 8: Comparison of children's nutritional status in households with and those without kitchen gardens

Variable	With Kitchen garden N = 64		Without kitchen garden N = 64			
	M	SD	M	SD	T-value	P-value
Weight for age Z-scores (WAZ)	0.31	1.23	0.46	1.16	-0.7	0.493
Weight for Height/ Length Z-scores (WHZ)	1.35	1.64	0.93	1.43	1.58	0.121
Variable	M	IQR	M	IQR	Mann-Whitney Z value	
Height/Length for age Z-scores (HAZ)	-1.3075	1.858	-0.71	2.037	-2.545	0.011*

M=Mean; SD=Standard Deviation; IQR=Interquartile Range

Relationship between nutrition status and dietary diversity of children between 6 and 23 months from households with and without kitchen gardens

The relationship between dietary diversity and nutritional status of children in households with and without kitchen gardens was assessed using Spearman's correlation. As shown in Table 9, dietary diversity demonstrated a weak and non-significant negative correlation with weight-for-age z-scores (WAZ; $\rho = -0.08$, $p = 0.371$) and weight-for-height z-scores (WHZ; $\rho = -0.167$, $p = 0.061$). Height-for-age z-scores (HAZ) showed a very weak positive correlation with dietary diversity ($\rho = 0.021$, $p = 0.812$), which was also not statistically significant.

These results suggest that, within this study population, higher dietary diversity was not significantly associated with improved anthropometric indicators of child nutrition. The trend toward a negative correlation for WHZ, although not statistically significant, may indicate that factors other than dietary diversity such as infection, household food security, or feeding practices—also play an important role in determining acute nutritional status.

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Table 9: Relationship between dietary diversity and nutrition status of children in households with and those without kitchen gardens

Variable	Spearman Rho	P-value
WAZ & Dietary Diversity	-0.08	0.371
HAZ & Dietary Diversity	0.021	0.812
WHZ & Dietary Diversity	-0.167	0.061

Stakeholder Perspectives

Findings from the Key Informant Interview revealed that there were very few kitchen gardens in households within the Sub-County. The Ministry of Health staff engage the community members through Community Health Volunteers (CHV) when having chiefs *barazas*, dialogue and action days. The Ministry had not set aside financial resources to create awareness to the community about IYCF and dietary diversity. The officer had received training on Infant and Young Child Feeding (IYCF). The nutrition assessment of children 6 to 23 months was carried out regularly during the Child Welfare Clinic visits. The 24-hour recall was carried out for children found to be under-weight or wasted. Community members in the Sub-County did not have adequate capacity to appropriately utilize food for IYCF. It was also revealed that not all staff in the health facilities had the necessary skills to carry out nutrition assessment like anthropometric measurements. Most of the community members were not aware of dietary diversity, thus poorly practiced.

The challenges encountered by Nutritionists in IYCF information dissemination include inadequate funding for CHV to carry out these extension services in community as well as retraining of staff. Further, some health workers also lack current information on updated practices.

The Agricultural extension officer at the Sub- county revealed that there were various programs carried out in Lurambi Sub- County relating to kitchen gardening. These included Urban and Peri-urban Agriculture Program (UPAP), Agri-nutrition Project, Njaa Marufuku Kenya (NMK), Small holders Horticulture Empowerment Project (SHEP UP), Sustainable Land and Forest Management (SLM).

The purpose for implementing the kitchen gardening programs was to enable households have supply of diverse diet, enable the family to have a surplus for sale and supply safe food for their household. The information given to community members on kitchen gardening included the supply of fresh, nutritious diet that was cheap, readily available and safe (free from contamination). To ensure food supply throughout the year, they were to stagger the planting of various crops, practice crop rotation, organically farm and irrigate their farms during the dry seasons. The crops grown were carbohydrate, protein, vitamin based, as well as herbs and spices to provide a diverse diet. The establishment and management of a multi-storey, key hole and hanging gardens, moist beds, integrated agriculture as kitchen gardens was also done. The Ministry of Agriculture extension officers were involved in group trainings and demonstrations, formation of stakeholder forums and innovation platforms. Individual farms were targeted for the activities. The CHVs were trained on agri-nutrition, thus transferring the information to community members.

The Extension officers also indicated that they had received training on kitchen gardening and its relationship to dietary diversity. Community members were trained and demonstrated to on establishment of kitchen gardens, thus gaining capacity to start kitchen gardening in their homes. Some groups were given grants to actuate the same. Of the farmers that were trained, 65% of them adopted the kitchen gardening technology.

The households consumed some of the food obtained through kitchen gardening, selling the surplus.

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VI. CONCLUSION

The study found that kitchen gardening in households with children aged 6–23 months was associated with greater crop diversity, improved dietary diversity, and better nutritional status, particularly lower stunting. Common crops in kitchen gardens included kales, cowpeas, and yams, while non-garden households mostly grew maize.

Policy and practice should focus on promoting nutrition-sensitive agriculture, including diverse crops and livestock, supporting households with technical guidance, and building capacity for preparing nutritious complementary foods. Future research should explore ways to enhance dietary diversity, the relationship between household agricultural practices and child nutrition, and the acceptability of kitchen gardening in Kakamega County

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