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Socio-Demographic Characteristics, Economic Characteristics, Dietary Intake and Nutritional Status of Households with Children Aged 1 - 3 Years in Seme Sub-County, Kenya

Laura Achieng' Wang'ara[1]*, Agatha Christine Onyango[1] and Constance Awuor Gewa[2]

[1]*Department of Nutrition and Health, Maseno University, Kenya*

[2]*Foundation for Food and Agriculture Research, Washington DC, USA*

***Corresponding Author:** Laura Achieng' Wang'ara, Department of Nutrition and Health, Maseno University, Kenya.

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Abstract

Despite several efforts by the Kenyan Government to resolve household food insecurity, Seme Sub-County still has a higher number of households reporting a lack of food or money to purchase food, which is at 41.9%. This rate is higher than the national proportion, which is at 36.2%. The region also has a higher under-five mortality rate at 72 deaths per 1000 live births compared to the national level of 52 deaths per 1000 live births. Despite the high death rate, Seme Sub-County mothers are still more than 50% likely to introduce complementary feeding early, which predisposes their children to a higher risk of undernutrition, including stunting, wasting, and being underweight. The objective of this study was to assess the socio-demographic characteristics, economic characteristics, dietary intake and nutritional status of children aged 1 - 3 years in households in Seme Sub-County, Kenya. A total of 193 families with children aged 1 - 3 years were interviewed. A questionnaire was used to collect data on the socio-demographic and economic characteristics of the households. The nutritional status of the child was assessed using anthropometric assessment. Multiple linear regression was used to determine the relationship between dietary intake and nutritional status of children aged 1 - 3 years. Most children, 38.9%, were stunted, denoting chronic malnutrition and long-term food deprivation in Seme; others were underweight at 16.1%, whereas a few were wasted at 8.8%. These rates are higher than the national rates, where stunting is at 26%, wasting at 4%, and underweight at 11%. The high rates might be attributed to most mothers in Seme Sub-County introducing complementary feeding early, hence predisposing their children to undernutrition (stunting, underweight, wasting). It might also be due to poor consumption of Vitamin A-rich vegetables and tubers by the children, which is 15.6% and most households reporting a lack of food or money to purchase food at 41.9%, which is still higher than the national rate of 36.2%. Further, there was a statistically significant relationship between stunting and low dietary diversity, $p = 0.02$ in children aged 1 - 3 years, with chances of being stunted increasing by 12 in children aged 1 - 3 years consuming a lowly diversified diet, holding moderate diet diversity and high dietary diversity constant, $\beta(95\%CI) = 12(11.92, 12.08)$. This discovery denoted that a child who ate a lowly diversified diet was most likely to be stunted.

Keywords: *Nutritional Status; Dietary Diversity; Stunting; Underweight; Wasting*

Introduction

Food utilization/nutrition status is the health condition of a person as influenced by the intake and metabolism of nutrients. It is essential to understand a child's dietary intake, specifically their diet diversity since eating a variety of food is most likely to increase their nutrient adequacy, and it is also associated with a child's nutritional status [1]. World Food Programme Nutrition Policy 2012 further states that if undernutrition is addressed in the early stages of a child, their lives will be saved, meaning they will grow healthy and to their full potential. Children in food-insufficient households are more likely to report stomach aches, headaches, ear infections, fatigue, dizziness, and colds [2]. Children who do not have normal nutritional status are highly vulnerable to under-nutrition, including stunting, wasting, and underweight, due to their high nutrient requirements for growth and susceptibility to infectious diseases, such as diarrhea and respiratory infections. Consequently, it might hinder nutrient absorption and decrease appetite. The nutrient density offered to children is usually too low to meet their daily nutrient requirements [3]. Therefore, it is necessary to increase their diversity of foods, mostly starches, proteins, fruits, and vegetables, to meet their nutrient need.

Household food insecurity is majorly linked with socio-demographic characteristics like household head gender and household head education status [4]. Food availability, characterized by land ownership, crop production, and livestock ownership, as well as food accessibility, including transport means, distance covered, total household income, expenditure, and psychological factors, affect a child's dietary intake or diet diversity [5]. Consequently, it leads to poor child nutritional outcomes, that is, undernutrition. It further contributes to a child's poor health status, lowers cognitive and academic attainment, increases psychosocial problems, and inadequate food intake [3]. This aspect is asserted by Campbell, who stated that the consequences of food insecurity might include increased vulnerability to poor health outcomes and long-term and sub-optimal quality of life and health, including physical, social, and mental well-being [6]. Consequently, if these issues are not effectively handled, they can lead to child death

Socio-demographic and economic characteristics are crucial determinants of household food security, which include the gender of the household head, their education level, age, marital status, employment, income, and expenditures [5]. Kassie., *et al.* investigated the association between household head gender and food security in Kenya [7]. The researchers found that some distinguishable and indistinguishable characteristics caused the difference in food security between male-headed and female-headed households [7]. They further explained that even if the household heads had the same visible characteristics, the invisible qualities were responsible for the difference in the level of food security in the households [7]. Women are more likely to play a positive role in household food security than men because the latter migrate seasonally and, at times, permanently [23]. Women are also solely responsible for household food preparation, preservation, and processing. Unfortunately, due to gender-biased traditions, the significant problem these women face is a lack of advanced production techniques, including improved seeds, farming methods, marketing facilities, and fertilizers [8]. Contrary to these findings, Felker-Kantor and Wood found that female-headed households are more insecure than male-headed ones [9]. Therefore, the gender of the household head as a demographic characteristic dramatically impacts the household food security status.

The educational status of the household head is also an important indicator of the household's socio-economic status. It plays a vital role in a child's nutrition status, irrespective of education level. It is evidenced by female-headed households with women who have received minimal education being more aware of how to use available resources to improve their nutritional status and that of their families than those with no education [10]. Education also empowers women to make independent decisions, to be accepted by household members, and to have greater access to household resources that are significant to their nutritional status. Furthermore, the educational level of the household head also plays a vital role in household food security. Education gives people knowledge and awareness and increases their chances of obtaining a job [4]. Female education is vital since women prepare food and provide services. Therefore, female-headed households should be prioritized and provided with social security allowance. The more educated a household head is, the more food secure the household will be, and vice versa.

The total household income and expenditure affect the households' purchasing power. Households with low income face food insecurity due to high spending on basic needs because of the increased cost of living and lack of money to purchase food. [5] assessed the economic access to food by households, and the study found that the mean household income was Ksh. 69.59. A study done in Sri Lanka found a significant association between low monthly income and undernutrition among school-going children [11]. The findings match a study by Edris, which found that household income was significantly associated with malnutrition in preschool children [12]. Therefore, children from low-income families are at a higher risk of being stunted, wasted, and underweight.

Methods

This study was conducted in Seme Sub-County, located in the Kisumu West District of Kisumu County. The study population comprised 193 mothers with children aged 1 - 3. Data was collected using questionnaires, whereby mothers were interviewed to obtain information on demographic and socio-economic factors. At the same time, children aged 1 - 3 years were assessed to determine their nutritional status using dietary diversity score and anthropometrics assessment measurements, respectively. Descriptive statistics was used to obtain the mean and mode of socio-demographic characteristics, mode for dietary intake and percentages, and mode for nutritional status of children aged 1 - 3 years. Multiple linear regression was used to determine the relationship between dietary intake, including high, low, and moderate, and the nutritional status of children aged 1 - 3 years, such as underweight, wasted, and stunted. Ethical approval (MSU/DRP/MUERC/00701/19) and research authorization (614025) was sought.

Results

Socio-demographic characteristics of participants

A total of 193 households were interviewed, whereby 103 households, representing 53.4% of the sample, were from West Seme Ward, whereas 90 households, 46.6%, were from North Seme Ward. Most households were headed by males at 166 (86%) and females at 27 (14%). The largest number of household heads, 170, representing 88.1% of the study sample, had attained a form of education. More than half of the educated household heads had attained a maximum of primary school at 139 (72%) as the highest level of education. Most household heads were married at 170 (88.1%) with a mean household size of 5 family members. The least household size was 3 family members while the most was 15 family members. Notably, 107 (55.4%) of female children and 86 (44.6%) of male children aged 1 - 3 years participated in this study. Both the male and female children who participated in the study had not suffered from any illness in the past one week. More than half of the Households, 103 (53.4%), were from the Pentecostal faith, as shown in table 1.

Characteristics	n	(%)
Location		
West Seme	103	53.4
North Seme	90	46.6
Household Head Sex		
Female	27	14
Male	166	86
Household Head Marital Status		
Married	170	88.1
Never Married	1	0.5
Separated	1	0.5
Widowed	21	10.9
Household Religion		

Catholic	28	14.5
Anglican	22	11.4
SDA	9	4.7
Pentecost	103	53.4
Legion Maria	4	2.1
Other	27	14
Educated Household Head		
No	23	11.9
Yes	170	88.1
Household Head Education Level		
None	21	10.9
Nursery	1	0.5
Primary	139	72
Secondary	25	13
College/University	7	3.6
Child Sex		
Male	86	44.6
Female	107	55.4

Table 1: *Socio-demographic characteristics of participants.*

Socio-demographic characteristics and nutritional status of children aged

Multiple linear regression was used to determine if there is a significant relationship between household head education status, female headed households, male headed households, and stunting of children aged 1 - 3 years, as indicated in table 2 below. The model predicted that about 25.4% of the total variability in stunting of a child aged 1 - 3 years old is explained by household head educational status, male headed households, and female headed households. In addition, multiple linear regression showed that there was a significant relationship between female headed households and stunting of a child aged 1 - 3 years, p = 0.02, where chances of getting a child aged 1 - 3 years with stunting decreases by 3 in households headed by females, holding household head education status and male headed households constant, β(95%CI) = -3(-3.92, 1.07).

Multiple linear regression further showed that there was also a significant relationship between the household head's education status and stunting of a child aged 1 - 3 years, p = 0.02, whereby the chances of getting a child aged 1 - 3 years with stunting decreases by 1 in households with educated heads holding female-headed households and male headed households constant, β(95%CI) = -1(-2.92,2.08). However, there was no statistically significant relationship between male headed households and stunting of a child aged 1-3 years, p = 0.4. Notably, the chances of getting a child aged 1 - 3 years with stunting decreases by 0.04 in households with male headed households, holding household head education status and female headed households constant, β(95%CI) = -0.04 (-0.07, 1.32) as shown in table 2.

Demographic Characteristics	**Stunting**			
	ά	**B**	**(95%CI)**	**R_2**
Household Head Education Status	.02*	-1.00*	(-2.92, 2.08)	.254*
Female Headed Households	.01*	-3.00*	(-3.92, 1.07)	.254*
Male Headed Households	.4*	-.04*	(-0.07, 1.32)	.254*
*p < .05				

Table 2: *Socio-demographic characteristics and nutritional status of children aged 1 - 3 years.*

Economic characteristics

The results further established that 170 (88.1%) of household heads earned income, with almost all of the fathers working at 175 (90.7%) and 103 (53.4%) of mothers being self-employed. The primary source of income was from owned businesses at 123 (63.7%), and the most expenditure was made on food at 192 (99.5%). Compared to the previous year, most households felt that they had less income at 117 (60.6%); others thought that the income was the same at 44 (22.8%), and few felt that they made more income at 31 (16.1%). The mean amount earned by the father in the previous month was Ksh. 3700, with the least earning being Ksh. 100. The mean amount earned by the mother during the last month was Ksh. 7084, with the lowest earning being Ksh. 500. Further results are illustrated in table 3.

Characteristics	n	(%)
Household has income		
No	23	11.9
Yes	170	88.1
Compared to last year, the household income was		
More	31	16.1
Same	44	22.8
Less	117	60.6
Mother Work		
No	81	42
Yes	112	58
Mother Employed		
No	168	87
Yes	25	13
Mother Self Employed		
No	103	53.4
Yes	90	46.6
Father Work		
No	18	9.3
Yes	175	90.7
Father Employed		
No	108	56
Yes	85	44
Father Self Employed		
No	102	52.8
Yes	91	47.2
Income Source		
Government Employment	11	5.7
Non-Governmental Employment	63	32.6
Own Business	123	63.7
Farm Employment	43	22.3
Other Income Source	17	8.8

Expenditure		
School	147	76.2
Hospital/Medicine/Health	165	85.5
Veterinary Services	105	54.4
Food	192	99.5
Agriculture: Seeds, Fertilizer, Animal Feed	146	75.6
Home Improvement	123	63.7
Laborers	38	19.7
Taxes	78	40.4
Rent	45	23.3
Clothes	184	95.3
Donations	147	76.2
Drinks	125	64.8
Other Expenses	21	10.9

Table 3: *Economic characteristics.*

Economic characteristics and nutritional status of children aged 1 - 3 years

Multiple linear regression was used to determine if there is a significant relationship between household income and stunting of children aged 1 - 3 years. The model predicted that about 5.8% of the total variability in stunting of a child aged 1 - 3 years old is explained by household income. In addition, multiple linear regression showed that there was a significant relationship between household income and stunting of a child aged 1-3 years, p = 0.03, where chances of getting a child aged 1 - 3 years with stunting decreases by 1 in households with income β(95%CI) = -1 (-2.04, 0.65) as shown in table 4.

Economic Characteristics	**Stunting**			
	ά	**B**	**(95%CI)**	**R_2**
Household Income	.03*	-1.00*	(-2.04, 0.65)	.058*
*p < .05				

Table 4*: Economic characteristics and nutritional status of children aged 1 - 3 years.*

Nutritional status of children aged 1 - 3 years

Most children in this study aged 1 - 3 years were stunted at 75 (38.9%), 70 (36.3%) were normal, and 31 (16.1%) were underweight. The rest of the children were wasted at 17 (8.8%). The children identified as malnourished during the study were referred to Kombewa Hospital for further nutrition management, as shown in figure 1.

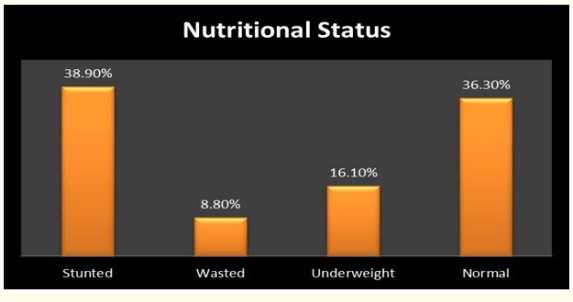

Figure 1: *Nutritional status of children aged 1 - 3 years.*

Dietary intake of children aged 1 - 3 years

The study established that within the last seven days, the children mostly consumed cereals, including maize, maize flour, sorghum, millet, rice, and wheat, at 192 (99.5%). The least consumed was organ meats at 22 (11.4%), with half of the children having consumed a moderately diverse diet at 97 (50.3%); 60 (31.1%) had consumed a lowly diversified diet, and 36 (18.7%) consumed a highly diversified diet as shown in table 5.

Characteristics	n	(%)
Foods (meals and snacks) eaten or drank within the last 7 Days by the child		
Cereals (maize, maize flour, sorghum, millet, rice, wheat)	192	99.5
White roots and tubers (Irish potatoes, white sweet potatoes, cassava)	113	58.5
Other Starches (green bananas, matoke)	35	18.1
Vitamin A-rich vegetables and tubers (pumpkin, carrot, orange sweet potatoes)	31	16.1
Dark Green leafy vegetables (kales, spinach, cowpea leaves, black nightshade, amaranthus leaves, cassava leaves, pumpkin leaves)	191	99
Other Vegetables (tomatoes, onions, cabbage, eggplant)	190	98.4
Vitamin A-rich fruits (ripe mango, ripe papaya)	141	73.1
Other Fruits (oranges, lemons, melons, guavas, tamarind, unripe mango)	130	67.4
Organ Meats (liver, kidney, intestines, heart, lungs)	22	11.4
Flesh Meats (Beef, pork, chicken, lamb, goat, tongue)	53	27.5
Eggs	101	52.3
Fish and Seafood (fresh/dried fish, tilapia, *Omena*, Nile perch etc.)	185	95.9
Legumes, nuts, seeds (dried beans, green grams, cow peas, green peas, lentils, peanuts)	173	89.6
Milk and Milk Products (milk, cheese, yogurt, ice cream)	133	68.9
Oils and Fats (oils, fats, butter, margarine, ghee)	191	99
Sweets (sugar, honey, sodas, juice, candies)	175	90.7
Spices, condiments, beverages (spices, royco, tea, coffee, alcohol)	189	97.9
Dietary Diversity		
Low Dietary Diversity	60	31.1
Medium/Moderate Dietary Diversity	97	50.3
High Dietary Diversity	36	18.7

Table 5: *Dietary intake of children aged 1 - 3 years.*

Dietary intake and nutritional status of children aged 1 - 3 years

Multiple linear regression was further used to determine if there is a significant relationship between nutritional status (underweight, wasted, stunted) and dietary diversity (low, moderate, high) of children aged 1 - 3 years old. The model predicted that about 80.4% of stunting in children aged 1 - 3 years is explained by low dietary diversity, high dietary diversity, and moderate dietary diversity. There was a significant relationship between stunting and low dietary diversity, $p = 0.02$ in children aged 1 - 3 years, with chances of being stunted increasing by 12 in children aged 1 - 3 years consuming a lowly diversified diet, holding moderate diet diversity and high dietary diversity constant, $\beta(95\%\ CI) = 12\ (11.92, 12.08)$. Stunting was not significantly related to moderate diet diversity, $p = 1.28$, and high dietary diversity, $p = 0.84$.

In addition, the model predicted that about 42.1% of wasting in children aged 1-3 years was explained by low diet diversity, high diet diversity, and moderate diet diversity, with chances of being wasted decreasing by 0.13 in children aged 1 - 3 years consuming a highly diversified diet, β(95% CI) = -0.13 (-0.28, 0.02). However, there was no statistically significant relationship between wasting and high dietary diversity, p = 0.78; moderate dietary diversity, p = 0.26; and low dietary diversity, p = 0.62. Moreover, the model predicted that about 83.5% of underweight children aged 1 - 3 years were explained by low diet diversity, high diet diversity, and moderate diet diversity, with chances of being underweight decreasing by 3 in children consuming a highly diversified diet, β(95%CI) = -3(-3.36, -3.06). Notably, there was no statistically significant relationship between underweight and low dietary diversity p = 0.28, moderate diet diversity p = 0.08, and high diet diversity, p = 1.00, as shown in table 6.

Nutritional Status	**Dietary Diversity**									
	Low			**Moderate**			**High**			
	ά	**β**	**(95%CI)**	**ά**	**B**	**(95%CI)**	**ά**	**β**	**(95%CI)**	**R_2**
Stunted	.02*	12*	(11.92, 12.08)	1.28*	.3*	(0.15, 0.45)	.84*	.01*	(0.14, 0.16)	.804*
Wasted	.62*	.13*	(0.28, 0.02)	1.00*	.26*	(0.11, 0.41)	.78*	1.10*	(1.25, 0.95)	.421*
Underweight	.28*	.04*	(0.11, 0.19)	.08*	.05*	(0.05, 0.15)	1.00*	3.21*	(3.36, 3.06)	.835*
*p < .05										

Table 6: *Dietary intake and nutritional status of children aged 1-3 years.*

Discussion

Out of the 193 households interviewed in Seme, few were headed by females, 27(14%), with the households being more likely to have children aged 1 - 3 years who are not stunted, p = 0.01. The chances of getting a stunted child aged 1 - 3 years decreased by 3 times in households headed by females in Seme, β(95%CI) = -3(-3.92, 1.07). It is similar to a study conducted by [8], who discovered that female headed households were more food secure, predisposing their family members to good nutrition; hence, they are most likely to be well nourished [15]. At the same time, women are solely responsible for household food preparation, preservation, and processing. Most women are also critical decision-makers regarding when and what a child eats. Consequently, it might explain why female headed households were most likely to have children who were not stunted. However, there was no statistically significant relationship between male headed households and stunting of a child aged 1 - 3 years, p = 0.40. This finding contradicted a study conducted by [9] in Brazil, who found that male-headed households were more likely to be food secure. The differences in the findings might be because of geographical disparities.

On the other hand, household heads who had any form of education were more likely to have children aged 1 - 3 years who were not stunted, p = 0.02, whereby chances of getting a child aged 1 - 3 years with stunting decreased by 1 in households with educated heads, β(95%CI) = -1(-2.92, 2.08). It is because education gives people awareness and increases chances of obtaining a job which will consequently improve the household's food purchasing power due to economic empowerment [4]. Furthermore, education empowers women to make independent decisions and have greater access to household resources that are significant to a child's nutritional status. The finding is further supported by [10] who stated that education makes women more aware of how to use available resources to improve their nutritional status and that of their families [2]. Therefore, any form of education possessed by the household head plays a significant role in household food security, consequently impacting the child's nutritional status.

The mean total earnings of both the father and the mother in the previous month are similar to what nearly half of Kenyans earn monthly, which is at Ksh. 10,000 and below [13]. Concurrently, most mothers in Seme are self-employed compared to the fathers at 90 (46.6%). Their mean earnings of the previous month are double what working fathers earned during the same month, with the largest source of income coming from owning businesses, 123 (63.7%). These findings rhyme with the results of a survey done by Ipsos Public Affairs, which revealed that the main source of household income in Kenya is self-employment [24]. However, the mean earnings of both the father and the mother in Seme during the previous months were higher than the mean earnings of a similar study done by [5] which was 69. The findings might be attributed to most household heads having gained a form of education that predisposes them to job security coupled with women's self-employment and business ownership.

Both earnings made by the father and mother were mostly spent on food at 192 (99.5%) and on clothes at 184 (95.3%) as they are basic needs. Other expenses included the school at 147 (76.2%); hospital/medicine/health at 165 (85.5%); veterinary services at 105 (54.4%); Agricultural input, including seeds, fertilizer, and animal feeds at 146 (75.6%); home improvement at 123 (63.7%); laborers at 38 (19.7%); Taxes at 78 (40.4%); rent at 45 (23.3%); donations at 147 (76.2%), and drinks at 125 (64.8%) respectively.

Compared to the previous year, more than half of the households felt that they had less income at 117 (60.6%), others thought that the income was the same at 44 (22.8%), and few felt that they made more income at 31 (16.1%). These answers might be attributed to the high cost of living standards coupled with high unemployment rates in Kenya. Households in Seme with income had a significant relationship with stunted children aged 1 - 3 years, $p = 0.03$, whereby the chances of having a stunted child aged 1 - 3 years decreased by 1, $\beta(95\%CI) = -1(-2.04, 0.65)$. It is because the households can purchase food [4]. This aspect is asserted by [11,12], who found that household income was significantly associated with malnutrition in preschool children [10,12]. Overall, children from low-income families are at a higher risk of being stunted, wasted, and underweight because they lack food purchasing power.

Of the 193 households interviewed, 107 (55.4%) had female children and 86 (44.6%) had male children aged 1 - 3 years. Most of the children were stunted at 75 (38.9%), few were wasted at 17 (8.8%), some were underweight at 31 (16.1%), and the rest were normal at 70 (36.3%). These rates in Seme are higher than the national rates, where stunting is at 26%, wasting is at 4%, and underweight is at 11% [13]. The higher rates might be because of a higher percentage of households reporting a lack of food or money to purchase food at 41.9%. This percentage is still higher than the national rate of 36.2% [13]. Notably, it may be due to mothers in Seme practicing early introduction of complementary feeding, predisposing children to undernutrition, including stunting, wasting, and being underweight [14]. However, compared to a study done in Tumpat and Bachok by [15], the underweight rates of Seme, 16.1%, are lower than those at Tumpat and Bachok, which is at 25.2%. The wasting rate at 8.8% and stunting rates at 38.9% were slightly higher than the rates at Tumpat and Bachok, which are 6.2% and 21.1%, respectively [15]. The disparities might be because of different geographical settings.

In general, most children in Seme Sub-County were stunted. This issue might be attributed to the poor consumption of vitamin A-rich Vegetables, 31 (16.1%), which makes the child's diet deficient in Vitamin A, a critical micronutrient that is necessary for growth [16]. The higher stunting rates are also an indication of chronic malnutrition, which symbolizes long-term food deprivation in terms of food security. Unfortunately, it poses a greater risk to the children as some of the adverse outcomes associated with stunting include an increased risk of child mortality, whereby globally, 45% of child mortality is attributed to the different forms of malnutrition, with stunting being the main contributor. It also increases disease risk since stunted children are at an elevated risk of having repeated infection occurrence, hence amplifying child morbidity. Further, it can cause developmental delays and lowered ability to learn, therefore, leading to poor school achievement and reduced lifelong productivity since two-year-old stunted children were associated with a reduced likelihood of formal employment [17]. For that reason, stunting is a nutrition issue that urgently needs to be intervened in Seme.

Most children aged 1 - 3 years in Seme had medium diet diversity at (50.3%) and a few had high diet diversity at (18.7%). These findings are contrary to a study conducted in Nigeria, which reported that most children had low diet diversity at 73.5%, followed by

a medium diet diversity at 25.2% [18]. However, in both studies, few children had high diet diversity, with 18.7% of children in Seme and 13.1% of children in Nigeria having low dietary diversity. These findings might be attributed to increased food insecurity [18] Most children in Seme consumed cereals, including maize, maize flour, sorghum, millet, wheat, and rice at (99.5%) with the least consumed being organ meat at (11.4%). These findings are concurrent with a study done in Western Kenya by Were., *et al*. which established that children under five years mostly consumed cereals [19]. However, the low consumption of organ meat might be due to its high cost [19]. Consequently, these findings can be attributed to the region having a favorable climate for the growth of cereals, and they are more affordable than other food groups, including organ meat.

The consumption of vitamin A-rich vegetables and tubers was also low at 16.1%. This finding is similar to a study conducted by [20] which found that the consumption of vitamin A-rich foods was low at 11%. It was associated with high rates of vitamin A deficiency in the area, which consequently led to most children not meeting their recommended daily micronutrient needs for growth. It might be the case with children from Seme. There was a significant relationship between stunting and low dietary diversity, $p = 0.02$ in children aged 1 - 3 years, with chances of being stunted increasing by 12 in children aged 1-3 years consuming a lowly diversified diet, holding moderate diet diversity and high dietary diversity constant. The relationship showed that a child who ate a lowly diversified diet would most likely be stunted. These results are concurrent with studies conducted by [18,21], as they both found that low diet diversity predisposes children to stunting. A child's diet should also contain vitamin A-rich foods. However, stunting was not significantly related to moderate diet diversity, $p = 1.28$, and high dietary diversity, $p = 0.8$. It suggested that a child who ate a highly or moderately diversified diet would most likely be well nourished as they would have normal nutritional status. Therefore, efforts should be aimed at increasing diet diversity both at home and at school to benefit the children who are at risk.

Moreover, the chances of being underweight decreased by 3 in children consuming a highly diversified diet. However, there was no significant relationship between underweight and low dietary diversity $p = 0.28$, moderate diet diversity $p = 0.08$, and high diet diversity, $p = 1.00$. The finding contradicts a study conducted in rural China [22], which found that low dietary diversity was associated with wasting and underweight but not with stunting. Consequently, it was attributed to the low stunting prevalence in their study sample, which was 3.2%.

However, consuming a highly diversified diet reduced the chances of underweight in children aged 1 - 3 years in Seme. Therefore, from the findings, children should have a highly diversified diet to be well nourished.

Conclusion

Most children in Seme Sub-County were stunted, denoting chronic malnutrition, which is an indicator of long-term food deprivation; others were underweight, and few were wasted. The high rates might be attributed to most mothers in Seme introducing complementary feeding early, thus predisposing their children to undernutrition, including stunting, underweight, and wasting. It might also be due to the children's poor consumption of vitamin A-rich vegetables and tubers, as most households reported a lack of food or money to purchase food. In addition, the chances of getting a stunted child aged 1 - 3 years decreased by 3 times in households headed by females in Seme. This aspect might be because most women are solely responsible for household food preparation, preservation, and processing. Most women are also key decision-makers regarding when and what a child eats. Subsequently, it explains why female headed households were least likely to have children who were stunted. On the other hand, household heads that had any form of education were more likely to have children aged 1 - 3 years who were not stunted, whereas chances of getting a child aged 1 - 3 years with stunting decreased by 1 in households with educated heads. It is because education creates awareness among people and increases chances of obtaining a job which will consequently improve the household's food purchasing power due to economic empowerment. Therefore, any form of education of the household head plays a significant role in household food security, consequently impacting the child's nutritional status.

There was also a statistically significant relationship between stunting and low dietary diversity in children aged 1 - 3 years in Seme, with the chances of being stunted increasing by 12 in children aged 1 - 3 years who consumed a lowly diversified diet. It indicated that a child who ate a lowly diversified diet was most likely to be stunted. Therefore, children should consume a highly diversified diet. Ultimately, there is a need for possible targeted and sustainable interventions to cease the early introduction of complementary feeding, promote household food security, and improve the consumption of a highly diversified diet by the children in Seme.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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