

Original Research Article

## Household Food Security, Dietary Practices and Nutritional Status of Preschool Children in Bahari Division, Kilifi County, Kenya

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Received: 07/11/2016

Revised: 12/12/2016

Accepted: 22/12/2016

### ABSTRACT

**Background:** Food insecurity is a public health problem of concern since its impact can have detrimental effects on the life of an individual. Worldwide, 12% of people are unable to meet their dietary needs due to household food insecurity. Food insecurity and poor dietary practices has contributed to the high prevalence of malnutrition among preschool children. The importance of nutrition during preschool age has been realized worldwide. However, there exist minimal information on the relationship between food security, dietary practices and nutrition status of preschool children. The study, therefore, focused on household food security, dietary practices and nutritional status among preschool children in Bahari division, Kilifi County.

**Method:** The study adopted cross-sectional analytical study design. A randomly selected sample of 402 mothers/ caregivers was distributed to all the sub-locations within a randomly selected location using proportionate to size sampling method.

**Results:** Based on the findings 20.9% households were food insecure as shown by household dietary diversity score of  $\leq 4$ . The dietary practices were moderate as indicated by a mean number of meals ( $2.85 \pm 0.80$ ): Only 49.4%; 52.4%; 58% preschool children consumed adequate sources of vitamin B3 ( $116.35 \pm 1.53$ ), vitamin B2 ( $1.11 \pm 0.25$ ) and calcium ( $484.70 \pm 31.88$ ). About 4.1% of the preschool children were wasted; 20.7% underweight and 39.7% stunted. The results also indicated that there was an association between dietary practices and nutritional status of the preschool children ( $p < 0.034$ ).

**Conclusion:** Household food security and appropriate dietary practices play a critical role in ensuring optimal nutrition of the preschool children.

**Key words:** Food security, Household, Nutritional status, Preschool children.

### INTRODUCTION

Household food security exists when all people, at all time, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy and an active life. [1] Household food security is determined by food stocks, weather variability, purchasing power, household income level, domestic production, food aid, food safety and hygiene and dietary diversity. [2] Literature has revealed that 805 million people are food insecure [3] In

Africa, nearly 240 million people lack adequate food for active life. [4] In Kenya, 1.5 million people are acutely food insecure. [5] Kilifi County is among the Counties experiencing high prevalence food insecurity as it experiences unreliable rainfall patterns attributing to low crop productions making food stocks prices in the market high. Out of every ten households, six are facing food scarcity. [6]

Poor dietary practices have a negative impact on the nutritional status of the household members and preschool

children being a vulnerable group are at higher risk of developing malnutrition. [7] Inadequate dietary intake characterized by reduced number of meals, failure to consume recommended macronutrients and micronutrients are linked to high risks of diseases, poor physical growth and health outcomes. [8] Because of the increased nutrient need during preschool age when coupled with poor dietary practices contribute to poor nutritional status among the preschool children and eventually premature death. [9] Inadequate nutritional knowledge, poor attitude and practices would contribute to poor dietary practices and when combined with household food insecurity negatively affect the nutritional status of the preschool children. [10]

Nutrition of preschool children is of paramount importance, as it forms the platform for growth and development. Inadequate nutrition among preschool children attributed to inadequate household food security and dietary practices may result in retarded growth. [11] In Kenya, the nutritional status of preschool children varies from region to region because of household food security, different dietary practices and other confounding factors. It is unfortunate most children grow well but when they reach the preschool age prevalence of malnutrition increase. Growth retardation sets in after that as a manifestation of cumulative effects of household food insecurity, dietary inadequacy and frequent episodes of infection. [12] The rate of physical growth is slow during preschool age as compared to the first year of life but continues gradually. [13] A steady gain in height and weight indicates healthy physical growth. However, healthy physical growth calls for an increased need for nutrients. [14] Studies established that most mothers/ caregivers of preschool children lack nutritional awareness. Once a child reaches preschool age, parents divert their attention from their children to other matters and a food becomes secondary issue. [15] Therefore, the nutritional needs of the children are

overlooked hence poor nutrition status sets in.

Though there are reported cases of household food insecurity and poor dietary practices in Kilifi County, their contribution to child malnutrition are insufficiently documented. Therefore, the study will assess food security, determine dietary practices and assess the nutritional status of preschool children in Bahari division, Kilifi County.

## **MATERIALS AND METHODS**

### **Research Design**

The study adapted the cross-sectional analytical design.

### **Study Area**

The study was carried out in Bahari division, Kilifi County. The main economic activities in this area are finishing and tourism due to its proximity to the Indian Ocean. The rain pattern in this study area is unpredictable. The soils are mostly sandy-loam with low water holding capacity and poor in plant nutrients. [16] Cashew nut farming is the primary agricultural activity in the area, but it has declined in the past few years because of the closure of cashew nut factory. This has contributed to food insecurity in the area. This study area was chosen due the reasons that: it is experiencing household food insecurity and due to its accessibility.

### **Study Population**

The study population comprised of mothers and caregiver with preschool children 36 to 59 months having resided in Bahari division for more than one year. Mothers/ caregiver were the primary respondents since they make decisions on behalf the children.

### **Sampling techniques**

Bahari division in Kilifi County was purposively selected because it experiences unpredictable rainfall pattern and also the soils are mostly sandy-loam with poor plant nutrients thus prone to food insecurity. Two location among the five existing locations in Bahari division which are; Township, Tezo, Ngerenya, Roka and Matsangoni were

randomly selected using balloting method. All household in the randomly selected locations with preschool children were established with the assistance of the area chief then a list of sampled households generated. A sample of 402 was distributed to all the sub-locations within the two locations using proportionate to size sampling method. From the list of each sub-location, systematic sampling was used to select the children. If a household had two children, simple random sampling was used to identify one child.

### **Data Collection Procedures**

Structured questionnaires were used to collect data. The 24 hours recall was used to gather information on various foods and drinks consumed in the previous 24 hours by estimation of food sizes and quantities. Household dietary diversity score collected data on the number of individual food group consumed in the past 24 hours by any household member. The seven days food frequency was used to gather information on the frequency of consumption of the local available foods.

Household food security status was assessed using household dietary diversity score. Household members with < 4 food groups were classified food insecure and that consumed > 5 food groups were considered food secure. Height of all eligible preschool children was measured using pediatric height board of standard design with 0.1 centimeter accuracy while weight was measured using SECA scale sensitive to the nearest 100 grams.

### **Ethical considerations**

A permit was obtained from Kenyatta University Graduate School. Ethical clearance from Kenyatta University Ethical Review Committee and research permit from National Council for Science, Technology and Innovation. Furthermore, an informed verbal consent was obtained from each respondent before conducting the interview and also confidentiality was assured to them. The participants were informed that they could withdraw from the study.

### **Data Analyses**

The collected data was checked and cleaned. Then seven days food frequency, food access experiences entered and analyzed using SPSS version 20 software.. Microsoft Office Excel for Window 2007 was then used for creating tables and figures of the analyzed data. Dietary practices data from 24 hours recall for amount of energy (Kcal), proteins, iron, calcium, phosphorus, vitamin A, vitamin C, vitamin B1 and vitamin B2 consumed was analyzed using Nutri-survey for Windows 2007. The information was then used to obtain the percentage adequacy.

Anthropometric data was entered and analyzed using ENA for SMART software version 2010 and then exported to SPSS for further analysis with other variables. Preschool children with (> -2 to +2 Z score) were considered normal, (> -3 to < -2 Z score) moderate and (< -3 Z score) severely malnourished for WHZ, WAZ and HAZ respectively. Global acute malnutrition (GAM) (< -2 Z score) was a combination of moderate malnourished and severely malnourished cases in both cases.

After all forms of analyzed data had been entered, further analysis was conducted using the SPSS software. A Pearson product-moment correlation was run to determine the relationship between: household dietary diversity score and nutrient intake; dietary practices (Kcal) and the nutritional status of the preschool children. Pearson Chi-square test was run to establish the association between: Household food security and child nutritional status, dietary practices and the nutritional status of the preschool children. Multi-nominal regression was also done to predict the contribution of independent variables on the nutritional status of the preschool children. Significance levels were then determined at 95% confidence interval and a p- value of < 0.05 was used as the criteria for statistical significance.

## RESULTS

The study had a sample size of 402 but 393 households responded. The results presented here are based on 393 preschool children aged 36-59 months whose mother/care taker were available and had valid data for all the variables examined during the study period.

### Age Sex Distribution of the Preschool Children

About half (52.9%) of the preschool children included in the study were female and 47.1% males. More than half (61.6%) of the preschool children were between 48-59 months old, followed by 38.4% that were between 36 and 47 months old.

**Table 1: Socio-Demographic Characteristics of the Preschool Children**

| Socio demographic characteristics | N=393  |          |
|-----------------------------------|--------|----------|
|                                   | n      | %        |
| Sex of the child                  | Male   | 185 47.1 |
|                                   | Female | 208 52.9 |
| Age of the child in months        | 36-47  | 151 38.4 |
|                                   | 48-59  | 242 61.6 |

### Socio-demographic Characteristics of the Households with Preschool Children

Majority (63.6%) of the mothers/ caregivers had primary education and (20.9 %) secondary education. Above three-quarters (80.4%) of the households were male-headed. Most (40.7%) of the households size comprised of seven to nine members and then followed by (38.7% ) that consisted of four to six members. Very few households (15.8%) depended on formal employment for their income and 14.5% depended on own farm labor. Regarding the number of people contributing to the total income, over half (59%) of the households,

only one person contributed to the total household income, 39.2% of the households two people contributed to the total income and 1.8% of the household, above three households member contributed to the total income.

### Household food security among household with preschool children

Households that had consumed (0-3) food groups had low dietary diversity and were categorized as food insecure (20.9%), households that had consumed (4-6) food groups had a medium dietary diversity (61.1%) and were grouped as food secure, households that had consumed (7-12) food groups that had a high dietary diversity (18%) and were considered as food secure (79.1%). From the study findings, 20.9% of the households were food insecure since they had a consumption of  $\leq 4$  Food groups. Over three-quarter, 79.1% of the households were food secure since they consumed  $\geq 5$  food groups.

**Table 2: Household Dietary Diversity Score**

| Food Security Status by HDDS |                      | N= 393 |      |
|------------------------------|----------------------|--------|------|
|                              |                      | n      | %    |
| Food secure                  | $\geq 5$ Food Groups | 311    | 79.1 |
| Food Insecure                | $\leq 4$ Food Groups | 81     | 20.9 |

**Key:**  $\leq 4$  Food Groups Poor food secure;  $\geq 5$  Food Groups Good food secure (FAO, 2013). Mean food groups consumed  $5.22 \pm 1.55$

### Gender of the household head

Household head defines food security status of a household. The majority (80.4%) of the households in the study area were headed by men indicating they were not vulnerable to food insecurity and 19.6% were being headed by women.

**Table 3: Number of Meals Consumed by the Study Population**

| Food Consumption Pattern                                    |                      | N= 393                          |      |
|---|----------------------|---------------------------------|------|
|   |                      | n                               | %    |
| Number of meals normally per day                            | Two meals            | 31                              | 7.9  |
|   | Three meals          | 68                              | 17.3 |
|   | Four meals           | 224                             | 57   |
|   | Five meals and above | 70                              | 17.8 |
| <b>Mean meals/ day</b>                                      |                      | <b>2.85<math>\pm</math>0.80</b> |      |
| Number of meals consumed the day proceeding data collection | Two meals            | 35                              | 8.9  |
|   | Three meals          | 71                              | 18.1 |
|   | Four meals           | 223                             | 56.7 |
|   | Five meals and above | 64                              | 16.3 |
| <b>Mean meals/ day</b>                                      |                      | <b>2.80<math>\pm</math>0.81</b> |      |

### **Dietary practices of the preschool children**

Over half (57 %) of the preschool children were consuming four meals per day, 17.8% five meals and above, 17.3% three meals and those that took two meals were the minority (7.9%). On average the **Adequacy of Consumption of Energy and other Selected Nutrients Consumed by Preschool Children**

Above three quarters (86.0%) of the preschool children met the adequate recommended daily intake for energy with a mean (SD) kilocalorie (Kcal) 1634.39±448.97 against the recommended 1350 Kcal. Over three thirds (87.28%) of the preschool children consumed adequate proteins as attributed to the consumptions of eggs, omena and fish that are good dietary sources of protein. The mean (SD) protein intake

study population consumed a mean; SD of 2.85 ±0.80. The number of meals one day before to the data collection day was assessed and still above half (56.7%) of preschool children consumed four meals, 18.1 % took three meals, 16.3% five meals and above and 8.9% two meals. was 17.85±2.52 against the standard 16g protein. Over three quarters (45.2%) of the preschool children consumed adequate recommended daily intake for vitamin A; phosphorus; iron; and vitamin C. Only 58% preschool children consumed an adequate RDI for calcium, 52.4% for vitamin B2 and 49.4% for vitamin B3. Vitamin B3 and zinc were the micronutrients that were not adequately consumed. For instance, 50.6% and 82.3% preschool children consumed inadequate recommended daily intake for vitamin B3 and zinc respectively.

**Table 4: Adequacy of consumption of energy and other selected nutrients consumed y preschool children in the last 24 hours (N= 393)**

| Nutrient        | Estimated consumption Mean (SD) consumption | RDI for Preschool children | % adequate |
|-----------------|---|----------------------------|------------|
| Energy (Kcal)   | 1634.39±448.97                              | 1350                       | 86.0       |
| Proteins (g)    | 17.85±2.52                                  | 16                         | 87.3       |
| Iron (mg)       | 10.03±1.55                                  | 10                         | 59.2       |
| Calcium (mg)    | 484.70±31.88                                | 500                        | 58.1       |
| Zinc (mg)       | 11.70±7.20                                  | 12                         | 17.7       |
| Phosphorus (mg) | 800.89±14.32                                | 800                        | 92.9       |
| Vitamin A (mg)  | 249.01±2.85                                 | 250                        | 45.2       |
| Vitamin B2 (mg) | 1.11±0.25                                   | 1.05                       | 52.4       |
| Vitamin B3 (mg) | 116.35±1.53                                 | 117                        | 49.4       |
| Vitamin C (mg)  | 20.68±0.83                                  | 20                         | 93.4       |

References for RDI: WHO, 2008; FAO & WHO, 1996, NB: The nutrient values presented here are food only consumed

### **Food Consumption Practices of Preschool Children**

Cereals were most regularly consumed (6 or more days); 56.7% of the preschool consumed diets made from cereals and grain product up-to seven days. Consumption of spices, condiments and beverages followed with 42.7% preschool children consumed ≥6days. The consumption of oil/ fat rich diet followed with 21.1% preschool children consumed oil/fat rich diets ≥6days in a week. Then other food groups followed. 20.6% preschool children consumed sweets ≥6days in a week. Dark and green leafy vegetables and other vegetables were not continuously consumed throughout the week, but at 10.2% of the preschool children consumed

vegetable ≥6days within the week. Some food groups were not frequently consumed throughout the week. Almost the entire respondents (99.5%) consumed ≤2days of eggs.

Fruits were not also mostly frequently consumed; 98.7% of preschool children consumed fruits ≤2days; 96.4% preschool consumed meat for than two days in a week; pulses 94.7%; fish 80.9% and milk 79.9% were also not frequently consumed, they were consumed ≤2days within the week.

### **Nutritional status of the preschool children in the study area**

Based on weight for height 3.3% preschool children were moderate wasted and 0.8% severely wasted. In terms of

weight for age 14.8% of the preschool children were moderate underweight and 5.9% severe underweight. Finally, in terms

of height for age 24.2 % of the preschool children were moderate stunted and 15.5 severely stunted.

**Table 5: Food Consumption Practices of the preschool children**

| Food group             | Frequency of consumption patterns per week |      |         |      |        |      |
|------------------------|--|------|---------|------|--------|------|
|                        | <2days                                     |      | 3-5days |      | ≥6days |      |
|                        | N  | %    | N       | %    | N      | %    |
| Cereals                | 15   | 3.8  | 155     | 39.4 | 223    | 56.7 |
| Tubers/roots           | 358  | 91.1 | 23      | 5.9  | 12     | 3.1  |
| Vegetables             | 244  | 62.1 | 108     | 27.5 | 41     | 10.2 |
| Fruits                 | 388  | 98.7 | 4       | 1    | 1      | 0.3  |
| Meats                  | 379  | 96.4 | 13      | 3.3  | 1      | 0.3  |
| Eggs                   | 391  | 99.5 | 2       | 0.5  | 0      | 0    |
| Fish                   | 318  | 80.9 | 65      | 16.5 | 10     | 2.5  |
| Pulses, legumes & nuts | 372  | 94.7 | 21      | 5.3  | 0      | 0    |
| Milk                   | 314  | 79.9 | 60      | 15.3 | 19     | 4.8  |
| Oil/fat                | 140  | 35.6 | 170     | 43.3 | 83     | 21.1 |
| Sweets                 | 107  | 27.2 | 205     | 52.2 | 81     | 20.6 |
| Spices                 | 25   | 6.4  | 200     | 50.9 | 168    | 42.7 |

### Relationship between Dietary Diversity and Nutrient Intake among Preschool Children

The results of the Pearson correlation coefficient(r) demonstrated a positive correlation between dietary diversity and the nutrients consumed which was statistically significant: energy (r= 0.201, p < 0.006); proteins (r = 0.745, p < 0.014); Iron (r = 0.351, p < 0.041); Calcium (r = 0.508, p < 0.025); and Vitamin C (r = 0.891, p < 0.002). The positive significant association between the dietary diversity of preschool children the nutrients they consumed justified that dietary diversity enhances the amount and the varieties nutrients consumed in the diet.

**Table 6: Correlation between dietary diversity score of preschool children and nutrient intake**

| Nutrients | N=393 r | p-value |
|-----------|---------|---------|
| Energy    | 0.201   | 0.006*  |
| Proteins  | 0.745   | 0.014*  |
| Iron      | 0.351   | 0.041*  |
| Calcium   | 0.508   | 0.025*  |
| Vitamin C | 0.891   | 0.002*  |

### Relationship between Household Food Security and Nutritional Status of the Preschool Children

Association between household food security and Nutritional status of the preschool children was also investigated. According to the study findings, there was a statistically significant association between dietary diversity (Pearson Chi-square test; p

< 0.001); reduced number of meals (Pearson Chi-square test; p <0.009) with stunting of the preschool children. The study findings demonstrated that there was no statistically significant association between the source of dominant food consumed (Pearson Chi-square test; p <0.964) with the wasting of the preschool children. Go whole night without eating anything (Pearson chi-square test; p< 0.01); the household head (Pearson chi-square test; p <0.025) were statistically significantly associated with the wasting of preschool children. Eating a limited variety of food (Pearson Chi-square test; p < 0.01) had a relationship with the underweight of the preschool children.

### Association between Dietary Practices and the Nutritional status of the Preschool Children

Number of meals was significantly associated with wasting and stunting among pre-school children ( $\chi^2 = 12.926$ , p<0.012) and ( $\chi^2= 14.871$ , p<0.005) respectively. The study findings demonstrated that preschool children that were consuming varieties of food groups achieved diet diversity, therefore, had a minimal likelihood of being wasted and stunted. It implies that there was a statistically significant association between dietary diversity score and wasting; stunting of the preschool children ( $\chi^2 = 11.653$ , p <0.041) and ( $\chi^2 = 20.605$ , p<0.001) respectively.

**Table 7: Relationship between Household Food Security and Nutritional Status of Preschool Children**

| Household food security Vs Nutritional status        |                             |                 |               | $\chi^2$ | p value |
|--|-----------------------------|-----------------|---------------|----------|---------|
| <b>Dietary diversity score</b>                       | <b>(Stunting)</b> Normal    | <b>Moderate</b> | <b>Severe</b> |          |         |
| Low dietary diversity                                | 36(9.2%)                    | 22(5.6%)        | 24(6.1%)      |          |         |
| Medium dietary diversity                             | 149(37.9%)                  | 59(15 %)        | 32(8.1%)      |          |         |
| High dietary diversity                               | 52(13.2%)                   | 14(3.6%)        | 5(1.3%)       | 20.939   | 0.001*  |
| <b>Household head</b>                                | <b>(Wasting)</b> Normal     | <b>Moderate</b> | <b>Severe</b> |          |         |
| Husband  | 307(78.1%)                  | 8(2 %)          | 1(0.3%)       |          |         |
| Mother   | 70(17.8%)                   | 5(1.3%)         | 2(0.5%)       | 7.409    | 0.025*  |
| <b>Source of dominant food</b>                       | <b>(Wasting)</b> Normal     | <b>Moderate</b> | <b>Severe</b> |          |         |
| Own production                                       | 50(12.7%)                   | 1(0.3%)         | 0(0.00%)      |          |         |
| Purchase   | 322(81.9%)                  | 12(3.1%)        | 3(0.8%)       |          |         |
| Gifts from /family                                   | 5(1.3%)                     | 0(0.00%)        | 0(0.00%)      | 1.424    | 0.964   |
| <b>Food access experiences and coping strategies</b> |                             |                 |               |          |         |
| <b>Eat limited variety of food</b>                   | <b>(Underweight)</b> Normal | <b>Moderate</b> | <b>Severe</b> |          |         |
| No   | 69(17.6%)                   | 8(2%)           | 1(0.3%)       |          |         |
| Rarely   | 98(24.9%)                   | 21(5.3%)        | 8(2%)         |          |         |
| Sometimes  | 97(24.7%)                   | 18(4.6%)        | 4(1%)         |          |         |
| Often  | 48(12.2%)                   | 11(2.8%)        | 10(2.5%)      | 16.104   | 0.013*  |
| <b>Go whole night without anything to eat</b>        | <b>(Wasting)</b> Normal     | <b>Moderate</b> | <b>Severe</b> |          |         |
| No   | 233(59.3%)                  | 3(0.8%)         | 2(0.5%)       |          |         |
| Rarely   | 102(26 %)                   | 10(2.5%)        | 0(0.00%)      |          |         |
| Sometimes  | 34(8.7%)                    | 0(0.00%)        | 0(0.00%)      |          |         |
| Often  | 8(2 %)                      | 0(0.00%)        | 1(0.3%)       | 29.369   | 0.001*  |
| <b>Reduced number of meals</b>                       | <b>Stunting:</b> Normal     | <b>Moderate</b> | <b>Severe</b> |          |         |
| No   | 42(10.7%)                   | 23(5.9%)        | 12(3.1%)      |          |         |
| Rarely   | 95(24.2%)                   | 28(7.1%)        | 11(2.8%)      |          |         |
| Sometimes  | 57(14.5%)                   | 26(6.6%)        | 16(4.1%)      |          |         |
| Often  | 43(10.9%)                   | 18(4.6%)        | 22(5.6%)      | 17.147   | 0.009*  |

**Table 8: Significant Relationship between Dietary Practices and Nutritional Status of Preschool Children**

| Dietary Practices Vs    | Child Nutritional Status | Chi-square ( $\chi^2$ ) | p-value |
|-------------------------|--------------------------|-------------------------|---------|
| <b>Wasting</b>          |                          |                         |         |
| Number of Meals         |                          | 12.926                  | 0.012*  |
| Dietary Diversity Score |                          | 11.653                  | 0.041*  |
| <b>Stunting</b>         |                          |                         |         |
| Number of Meals         |                          | 14.871                  | 0.005*  |
| Dietary Diversity Score |                          | 20.605                  | 0.001*  |

**Table 9: Predictors of Preschool Children Nutritional Status**

| Predictors of Preschool children nutritional status | Odds ratios | 95% CI             | p value |
|---|-------------|--------------------|---------|
| <b>Independent variables</b>                        |             |                    |         |
| Dietary diversity score                             |             | <b>Wasting</b>     |         |
|   | 0.332       | 0.48 - 2.320       | 0.041*  |
| Number of meals per day                             |             | <b>Wasting</b>     |         |
|   | 0.309       | 0.022 - 4.314      | 0.015*  |
| Education level of mother/ caregiver                |             | <b>stunting</b>    |         |
|   | 0.914       | 0.713 - 1.171      | 0.002*  |
| Amount of money spent on food weekly                |             | <b>Stunting</b>    |         |
|   | 0.953       | 0.791 - 1.147      | 0.004*  |
| Household income per month                          |             | <b>Underweight</b> |         |
|   | 0.896       | 0.590 - 1.362      | 0.021*  |
| Failed to eat preferred food                        |             | <b>Underweight</b> |         |
|   | 0.66        | 0.431 - 1.011      | 0.061   |
| Consumption of limited variety of food              |             | <b>Underweight</b> |         |
|   | 0.525       | 0.332 - 0.832      | 0.001*  |
| Reduced number of meals per day                     |             | <b>Wasting</b>     |         |
|   | 0.831       | 0.271 - 2.547      | 0.008*  |

Significance at p < 0.05

### Predictors of nutritional status

Dietary diversity score (OR=0.332, p< 0.041) was a predictor of wasting among the preschool children. The number of meals preschool children consumed were predictors of wasting; (OR=0.309,p< 0.015). Maternal/caregiver's education level

(OR=0.914,p<0.002); amount of money spent on food weekly (OR=0.953, p<0.004) were predictors of stunting among the preschool children. Household income per month (OR=0.896, p<0.0021) was also a predictor of underweight among the preschool children.

Household food security experiences and coping strategies such as Reduced number of meals per day (OR=0.831,  $p < 0.008$ ) was a predictor of wasting among the preschool children. Failed to eat preferred food (OR=0.66,  $p < 0.061$ ) was not predictor of wasting. Consumption of limited variety of food (OR=0.525,  $p < 0.001$ ) was a predictor of underweight. Reduced numbers of meals per day predicted wasting among the preschool children (OR= 0.831,  $p < 0.008$ ).

## **DISCUSSION**

### **Food Security Status of the Study Population**

Despite measures to alleviate food insecurity, food insecurity is still a global problem of concern. Findings of a study established that 240 million people could not access adequate food for healthy life. [1] Another study conducted in Kenya by found out that about 1.5 million people are experiencing acute food security in Kenya. [5] Based on the results of the household dietary diversity score, the study findings indicated that 20.9% of the households were food insecure since they had a consumption of  $\leq 4$  Food groups. Over three-quarter, 79.1% of the households were food secure since they consumed  $\geq 5$  food groups. The present study indicated that eggs; meat/poultry/offal; fruits; white tubers and roots were inadequately consumed. These foods groups were inadequately consumed because for example, fish were available but expensive, roots and tubers were not locally available. The findings of this study were similar to the findings of a research conducted in rural parts of Ethiopia that suggested preschool children should be consuming at least four to six food groups per day to meet their increased nutritional need. [17]

The gender of the household head defines household food security status. [18] As supported by the findings of a study conducted in Nigeria established that households that are headed by men are more food secured as opposed to households that

are headed by women. [19] Another study findings conducted in rural parts of Kenya identified that female-headed households are still less food secure under a counterfactual case. [20] The present study majority of the household were being headed by men indication that they were not prone to food security. The gender of the household greatly influences the food status of a household as it was being associated with the ownership of resources.

### **Dietary Practices of the Preschool Children in the Study Area**

Frequent and adequate diet is critical for preschool children because of their vulnerability to malnutrition. [21] Several studies conducted by stressed that increased number of meals guarantee the high need for proteins, vitamins, energy and other essential nutrients among preschool children. [22,23] Information gathered from the 24-hour recall indicated that majority of the preschool children consumed four meals per day. The findings were similar with the findings of other studies that established with at least four meals and snacks between meals, preschool children will become less vulnerable to wasting, stunting and underweight. [24] Although, it has been recommended that preschool children should be consuming 4-6 meals a day because of their rapid growth many cases, they consume four meals. The respondents reported that sometimes they encounter challenges when it comes to feeding the preschool children because sometimes don't have appetite.

In many African settings, preschool children tend to consume diets that are highly rich in energy and deficient in proteins and micronutrients despite their importance in the body. [25] This is because the diets are primarily based on starchy foods with little or no animal products few fruits and vegetable. Consumption of food items from cereals, roots/ tuber groups does not only confirm that the diets of preschool children are mainly starchy but it is also possible that the quality of carbohydrate obtained from these food groups are not

enough to meet the macronutrient needs of the preschool children. [26] This study also found similar results. According to the findings of this study, a large proportion of preschool children met the recommended allowance for energy which is critical for metabolic rates and physical activities since most of their meals were from cereals and cereal products. The study findings also demonstrate that majority of the preschool children consumed the recommended nutrient requirements for proteins because of eating fish, beans, peas and omena and also some of the micronutrients. The preschool children in the study area consumed diets that were low in a number of micro-nutrients and the micronutrients they contained were often in a form that was less bio-available because majority of the preschool children did not meet the recommended dietary intake for most of the selected micronutrients. The dietary practices of the preschool children therefore in-terms of consumption of selected macronutrients and micronutrients were moderate in the study area.

The study findings revealed that cereals, fats/oils and sugars were frequently consumed almost daily in the seven days. Legumes, meat, eggs were consumed less than two days within a week. The findings of this study are in agreement with the results of a study conducted in rural parts of Kenya and Uganda that found most communities in the rural areas frequently consume cereals and cereal, fats/ oils and sugar food groups because of poverty. [27]

Majority of the mothers/ caregivers cited that low local production and high market prices were the major reasons for the low consumption of fruits, eggs and meat among the preschool children. Therefore, the food consumption practices of the study area were moderate. There is a need to put a food and nutrition security intervention in place that will bring about consumption of the less consumed food groups.

Nutritional Status of the preschool children

In general, the levels of malnutrition were high among the male boys preschool

children based on the nutritional indices (wasting, underweight and stunting). The prevalence of stunting was above that of the national level which is 26%. [28] If compared with previous studies done in Kilifi County the stunting levels of the study shows an improvement. [28,30] The higher levels of stunting could have been attributed to overall poor economic conditions especially moderate and mild infections, chronic or repeated infection and inadequate intake of nutrients. The prevalence of wasting and underweight of the study among the preschool children were not close to the findings of others studies that had been conducted in the area. [29] This is an indication that the factors that affect wasting and underweight are still the same.

### **Relationship between Household Food Security and the Nutritional Status of Preschool Children**

Past studies have investigated the association between various components of household food security and the nutrition status of the preschool children. Household food security significantly influences the nutritional status of the preschool children as it determines food availability, accessibility, utilization and stability. [17] There is a need, therefore, to ensure that households are food secure so as to reduce the vulnerability to malnutrition. [27]

Households that were food secure as defined by household dietary diversity score were significantly slightly to have stunted preschool children than those that were food insecure. This is because food secure household with preschool children consumed variety of food items thus they were meeting dietary diversity. A study conducted in Burundi on dietary diversity and nutrition status of preschool children established that poor dietary diversity is strongly associated with high malnutrition rate among household with limited access to resources to buy varieties of foods. [25] Households that were headed by males were significantly slightly unlikely to have wasted. Such claim is because; female-headed households encounter various

challenges that make them more vulnerable to food insecurity. For example; female have limited access to land, market and access to information. The study findings are similar to the study conducted in the rural Kenya established that female-headed households are more vulnerable to food insecurity than male-headed households in the rural Kenya. [20]

### **Relationship between Dietary Practices and the Nutrition Status of the Preschool Children**

Researchers have tried to investigate the various aspects of dietary practices and its impact on the nutritional status of the preschool children. Scholars mentioned that a number of meals, consumption of recommended amount of macronutrients and micronutrients and food consumption patterns are associated with the nutrition status of the preschool children. [31] The study findings demonstrated that the more the numbers of meals the preschool children consumed, significantly, the lower the chances of preschool children becoming wasted and stunted respectively as they are able to meet the increased nutrient need for growth. Significantly, the varieties of food groups' preschool children consumed the lower the chances of becoming wasted. The study results were in line with the findings of the other studies that established that dietary practice may impact both positively and negatively on the nutrition status of the preschool children. [32]

### **CONCLUSION**

The study findings demonstrated that household food security and dietary practices play a critical role on the overall nutritional status of the preschool children. Household food security influenced dietary practices and nutritional status a child. Therefore, the government and NGOs dealing with under-five malnutrition should educate people on positive coping strategies such as kitchen garden so as to improve food security among households with preschool children. The government in conjunction with the private sector should

provide food aid to poor households and food insecure households so as to improve the dietary practices of preschool children. Program planners and policy makers should implement measures to promote appropriate dietary practices that should target all the stakeholders and not only the mother and caregiver of the children. The strategies should target community leaders, health professionals, aunts, grandmothers, grandfathers, as they strongly influence the mother's choice on the dietary practices to adopt.

### **ACKNOWLEDGEMENT**

I wish to acknowledge Dr. Chege and Dr. Nyamota for their professional guidance and encouragement during my research period.

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How to cite this article: Chea MS, Peter C, Nyamota MW. Thyrotoxicosis during infection: etiologies and outcome. *Int J Health Sci Res.* 2017; 7(1):237-247.

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