

## **Nutritional Status of Under – Five Year Children in Selected Villages of Mvomero and Kongwa Districts, Tanzania**

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### **Abstract**

*Malnutrition remains a significant public health problem in Tanzania. The study was carried to determine the prevalence of malnutrition and causes associated with it in Mvomero and Kongwa Districts, Tanzania. A structured questionnaire was used to determine dietary pattern of the households and anthropometric measurements were taken to assess the nutritional status of the under-five years of age children. Sixty mothers with under-five year's children were recruited. Data for this study were analyzed to obtain frequencies, percentages, means and standard deviation. Chi square test and Analysis of Variance (ANOVA) were used to assess the association between a child's nutritional status and the independent variables considered relevant for this study. The findings indicate that most of the mothers were between the age of 25 and 34 years with a mean age of 31.6 years. Majority of the respondents (66.5%) were married, and the mean family size was 6.2 people per household. The main economic activity in the study area was farming. A total of 74 under-five year's children were involved, of which 55.4% were males and 44.6% were females. Household dietary pattern was of medium diversity. Protein foods and fruits were rarely consumed. Consequently the nutritional status of children was generally suboptimal. The overall prevalence of stunting was higher in Kongwa District 67.3% for children aged 12 to 23 months compared to 33.3% in Mvomero. Factors which were significantly associated with nutritional status of the children include location where the child lives, the child's age as well as the mother's educational level, introduction of complementary foods, type of complementary food, feeding frequency and the sex of the household head. It is therefore recommended that female education, nutritional education and gender training be adopted because they will improve the nutritional status of children.*

**Keywords:** Gender, under-five malnutrition, nutritional status, Tanzania

## **Introduction**

**R**eduction of malnutrition among under five years children remains as a challenge in developing countries around the world, despite a slight decrease from 38% to 34% between 1990 and 2008 period (UNICEF, 2009). In spite of this low achievement, 36% of children below five years globally are still chronically malnourished (UNICEF, 2012). The nutritional status of under-five year old children remains as a sensitive indicator of a country's health status as well as economic condition.

High prevalence levels of chronic malnutrition among children of under-five years of age are found in Africa (UNICEF, 2012). Among African countries, Tanzania ranks third from among the worst countries with high rates of malnutrition. Tanzania also ranks tenth in terms of contribution to the world's chronic undernourished children (Muhimbula and Issa – Zacharia, 2010). In Tanzania 42% of under – five years children are stunted, 16% are underweight and 5% are wasted (NBS, 2011).

In Dodoma region the prevalence of stunting is 56.2%, that of underweight is 6.8% and wasting is 5.2%. Meanwhile in Morogoro region the rate of stunting is 44.4%, the rate for underweight is 16% and wasting is 5.3% (NBS, 2011). Despite the introduction of dairy goats and production of root crops in Kongwa and Mvomero Districts to address food security (Mosha-Kilave and Lyimo-Macha, 2013), little is known regarding levels of child malnutrition and factors associated with it in the study area. The aim of this study was to determine the prevalence of malnutrition and underlying causes by assessing the nutritional status of children under-five year of age and by assessing household dietary pattern of the project beneficiaries.

## **Methodology**

A cross-sectional study was conducted in two districts of Kongwa and Mvomero in Dodoma and Morogoro region respectively. The districts were chosen because the dairy goat and root crops intervention for addressing food security in the area was going on (Mosha-Kilave and Lyimo-Macha (2013). Kongwa district is located between latitudes 5°30' to 6°00' South of Equator and longitudes 36°15' to 36°00' East. The population of Kongwa district was 149 221 male and 160 752 female (URT, 2013). Mvomero district is located at North East of Morogoro region between latitude 5°58' and 10°00' South and longitude 37°00' and 28°22' East. Population of Mvomero district was 154 843 male and 157 266 female (URT, 2013). In both districts, agriculture is the predominant economic activity.

Four villages of Masinyeti, Ihanda, Kunke in Kongwa district and Wami Luhindo in Mvomero district were purposively selected according to where dairy goats and improved root crops initiatives was being implemented. A total of 60 women who had children under-five years were recruited from 107 household. From these, 74 children under-five years of age were involved in this study. The objective of this study was to determine the prevalence of malnutrition and underlying causes by assessing nutritional status of under-five year of age children and by assessing household dietary pattern of the project beneficiaries.

### **Data Collection and Analysis**

A structured questionnaire was used to collect data from respondents, in order to determine their dietary pattern and anthropometric measurements were taken to assess the nutritional status of under – five year children and their mothers. The assessment of the children's nutritional status was done by means of anthropometric measurements where weights were taken using electronic weighing scales (SECA Vogel and Hakel, Hamburg Germany) while heights were measured using Standard UNICEF height board to the nearest 0.1cm. In the case of weight, children were weighed wearing light clothes on an electronic scale. Children who were not able to stand by themselves were weighed while being held in their mother's arms, and then the mother's weight was subtracted to give the child's weight to the nearest 0.1 kg.

The food frequency questionnaire (FFQ) was used to establish the common types of food consumed by the household members and the frequency of consumption. The FFQ covered 9 food groups namely; animal (and animal products) and fish (including fresh/dry fish), pulses and nuts; root, cereal, vegetables, fat/oils, fruits, sugars and beverages. Respondents were provided the option of answering in terms of frequency per day, week, and month or never consumed.

Data were analyzed using WHO Anthro for windows (WHO, 2011) and SPSS 16.0 for windows (SPSS INC., Chicago, Illinois). Results are summarized as frequency distribution, percentages, mean and standard deviation. Inferential statistics that were computed include; the chi square test and analysis of variance (ANOVA), which were used to assess the association between a child's nutritional status and the independent variables considered in the study

## **Results and Discussion**

### **Socio – economic characteristic of mothers**

Findings on socio – economic characteristic of the mothers are shown in Table 1. Most of them (45%) were between the age of 25 and 34 years with a mean age of 31.6 years. Most of them were married, 82.1% were from Kongwa District. In Mvomero District all 21 of the respondents were married. Most of the mothers had one to four children, 66.7% in Kongwa and 76.1% in Mvomero Districts. The mean family size was 6.2 people per household. Mothers with some form of education were 46.2% in Kongwa and the same proportion of the respondents had no primary education. In Mvomero Districts the proportions were 76.2 and 23.8% respectively. Main economic activity in the area was farming where 71.8% in Kongwa and 47.6% in Mvomero Districts. These indicate that generally, majority of women were adult and were married. The mean household size was higher than the national level of 4.8 people (NSB, 2009) and above the rural average household size of 5.1 people (URT, 2002). Having big families is one of the causes of increase in nutritional demand within the household hence increasing risk of malnutrition (NBS, 2009). The level of education was also low and subsistence farming was the main means of livelihood for them.

### **Child characteristic**

A total of 74 children under five years were involved. Results from Table 2 showed that, among children in the study, more than a quarter (38% and 29.2% in Kongwa and Mvomero districts respectively) were between 6 – 23 month old. This age group is prone to malnutrition since they are taking complementary foods. The findings also showed that, all children had been breastfed in their life. In both districts more than a quarter of the children were being breastfed, while more than half of the children in both districts of Kongwa (54.0%) and Mvomero (54.2%) were no longer being breastfed at the time of study. On average 20.0% of mothers' in Kongwa breastfed their children for two years compared to 12.5% in Mvomero.

**Table 1: Socio –economic characteristics of mothers**

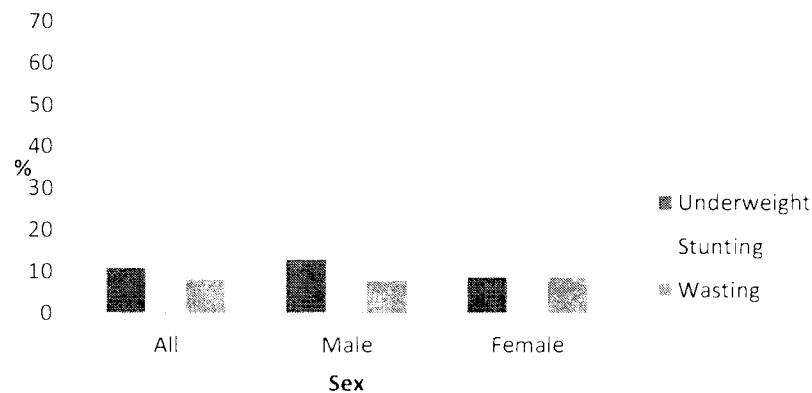
| Variables                       | Category                      | Kongwa<br>N = 39 |              | Mvomero<br>N = 21 |              | Sample total<br>N=60 |              |
|---------------------------------|-------------------------------|------------------|--------------|-------------------|--------------|----------------------|--------------|
| Age                             |                               | N                | %            | N                 | %            | N                    | %            |
|                                 | 16 - 24                       | 8                | 20.5         | 4                 | 19.0         | 12                   | 20           |
|                                 | 25 - 34                       | 17               | 43.6         | 10                | 47.6         | 27                   | 45           |
|                                 | 35 - 45                       | 11               | 28.2         | 7                 | 33.3         | 18                   | 30           |
|                                 | 45 - 55                       | 3                | 7.7          | 0                 | 0.0          | 3                    | 5            |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100</b>   |
| <b>Marital status</b>           | married                       | 32               | 82.1         | 21                | 100.0        | 53                   | 88.3         |
|                                 | single                        | 2                | 5.1          | 0                 | 0            | 2                    | 3.3          |
|                                 | window                        | 2                | 5.1          | 0                 | 0            | 2                    | 3.3          |
|                                 | cohabit                       | 3                | 7.7          | 0                 | 0            | 3                    | 5.0          |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100.0</b> |
| <b>Total number of children</b> | 1 – 4                         | 26               | 66.7         | 16                | 76.1         | 32                   | 53.3         |
|                                 | 5 – 7                         | 10               | 25.6         | 4                 | 19.0         | 14                   | 23.3         |
|                                 | 8 – 11                        | 3                | 12.8         | 1                 | 4.7          | 4                    | 6.6          |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100.0</b> |
| <b>Household size</b>           | 1 - 4 people                  | 7                | 17.9         | 1                 | 4.8          | 8                    | 13.3         |
|                                 | 5 - 8 people                  | 30               | 76.9         | 19                | 31.7         | 49                   | 76.7         |
|                                 | 9 - 11 people                 | 2                | 5.6          | 1                 | 1.7          | 3                    | 5.0          |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100.0</b> |
| <b>Education Level</b>          | No formal education           | 18               |              | 5                 |              | 23                   | 38.33        |
|                                 | Primary education             | 18               | 46.2         | 16                | 76.2         | 34                   | 56.67        |
| <b>Economic activities</b>      | Secondary education           | 2                |              | 0                 |              | 2                    | 3.333        |
|                                 | College                       | 1                | 2.6          | 0                 | 0.0          | 1                    | 1.667        |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100</b>   |
|                                 | Farming                       | 28               | 71.8         | 10                | 47.6         | 38                   | 63.3         |
| <b>Economic activities</b>      | farming and poultry           | 3                | 7.7          | 1                 | 4.7          | 4                    | 6.6          |
|                                 | farming and livestock keeping | 5                | 12.8         | 3                 | 14.3         | 8                    | 13.3         |
|                                 | farming and small business    | 1                | 2.6          | 5                 | 23.8         | 6                    | 1.0          |
|                                 | selling of local brew         | 1                | 2.6          | 0                 | 0            | 1                    | 1.7          |
|                                 | Employed                      | 1                | 2.6          | 0                 | 0            | 1                    | 1.7          |
|                                 | small business                | 0                | 0            | 2                 | 9.5          | 2                    | 3.3          |
|                                 | <b>Total</b>                  | <b>39</b>        | <b>100.0</b> | <b>21</b>         | <b>100.0</b> | <b>60</b>            | <b>100.0</b> |

**Table 2: Child characteristics**

| Variable                  | Category     | Kongwa<br>n = 50<br>(%) | Mvomero<br>n = 24<br>(%) | Sample<br>total<br>N=74<br>(%) |                 |                              |
|---------------------------|--------------|-------------------------|--------------------------|--------------------------------|-----------------|------------------------------|
| Child age in month        | 0 -5         | 6 (12.0)                | 4 (16.7)                 | 10 (13.5)                      |                 |                              |
|                           | 6 - 23       | 19 (38.0)               | 7 (29.2)                 | 26 (35.1)                      |                 |                              |
|                           | 24 - 35      | 4 (8.0)                 | 2 (8.3)                  | 6 (8.1)                        |                 |                              |
|                           | 36 - 47      | 14 (28.0)               | 4 (16.7)                 | 18 (24.3)                      |                 |                              |
|                           | 48 - 60      | 7 (14.0)                | 7 (29.2)                 | 14 (18.9)                      |                 |                              |
|                           | <b>Total</b> | <b>50 (100.0)</b>       | <b>24 (100.0)</b>        | <b>74 (100.0)</b>              |                 |                              |
| Age in month              | <b>Yes</b>   |                         | <b>No</b>                | <b>Yes</b>                     | <b>No</b>       | <b>Sample total<br/>N=74</b> |
|                           |              |                         |                          |                                |                 |                              |
|                           |              |                         |                          |                                |                 |                              |
|                           |              |                         |                          |                                |                 |                              |
|                           |              |                         |                          |                                |                 |                              |
|                           |              |                         |                          |                                |                 |                              |
|                           |              |                         |                          |                                |                 |                              |
| Child breastfed yesterday | 0-5          | 6 (12.0)                | 0                        | 4(16.7)                        | 0               | 10 (13.5)                    |
|                           | 6-11         | 7(14.0)                 | 0                        | 3(12.5)                        | 0               | 10(13.5)                     |
|                           | 12-23        | 10(20.0)                | 2 (4.0)                  | 3(12.5)                        | 1(4.1)          | 16 (21.6)                    |
|                           | 24-35        | 0                       | 4(8.0)                   | 1(4.1)                         | 1(4.1)          | 6 (8.1)                      |
|                           | 36-47        | 0                       | 14(28.0)                 | 0                              | 4(16.7)         | 18 (24.3)                    |
|                           | 48-60        | 0                       | 7(14.0)                  | 0                              | 7(29.1)         | 14 (18.9)                    |
|                           | <b>Total</b> | <b>23 (46)</b>          | <b>27(54.0)</b>          | <b>11(45.8)</b>                | <b>13(54.2)</b> | <b>74(100.0)</b>             |

## Nutritional Status of Children

The overall prevalence of malnutrition is summarized on Figure 1 where, stunting, wasting and underweight were 54.1, 8.2 and 11.0% respectively. The prevalence of stunting, wasting and underweight for male children were 61.5, 7.7, and 12.8% respectively while for female was 45.7, 8.6 and 8.6% respectively. There were disparities of malnutrition by sex with males having higher prevalence, although the differences were not statistically significant ( $p > 0.05$ ). The prevalence of stunting was very high based on the WHO's classification for assessing severity of malnutrition by prevalence range among under-five year's children. Meanwhile, wasting and underweight according to this index, can be classified as medium. The rate of stunting and wasting were higher in the study area than national rate which is 42% and 5% respectively (NBS, 2011). These findings are with the national report on Demographic and Health Survey done in 2011.



**Figure 1: Study area malnutrition status**

### Child Nutritional Status by District

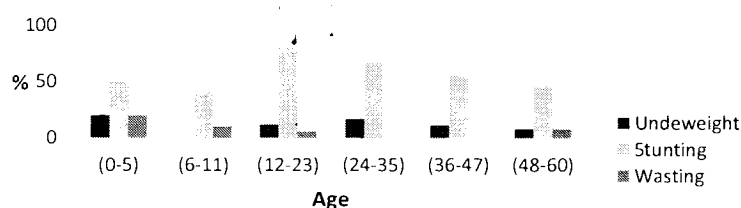
The prevalence of stunting, wasting and underweight according to District and sex is summarized on Table 3. The prevalence of moderate stunting in Kongwa District was 38.5% for males and 30.5% for females while in Mvomero District the prevalence of moderate stunting was 30.8% for males and 18.2% for females. Severe stunting in Kongwa District was 42.3% for males and 21.7% for females while in Mvomero District the level of severe stunting was 7.7% for males and 9.1% for females. There were differences by location with Kongwa having higher prevalence of stunting than Mvomero District, the differences in the levels of stunting were statistically significant at  $p = 0.045$ . Kongwa district is rural and semi arid area with minimum rainfall, which affects production of food crops resulting in severe crop failure while Mvomero District is semi urban with enough rainfall. These findings are consistent with those of other studies conducted in other developing countries, such as the study by Kritz and Makinwa-Adebage (1999) in Nigeria, Rajaram *et al.* (2007) in India and Lawal and Samuel. (2010) in Nigeria. These studies reported that children in rural areas are at a higher risk of malnutrition than those in urban areas.

**Table 3: Child nutritional status by districts**

|                    | Kongwa (N=50) |        |        | Mvomero (N = 24) |        |        | Sexes combined |          |         |
|--------------------|---------------|--------|--------|------------------|--------|--------|----------------|----------|---------|
|                    | Male          | Female | Total  | Male             | Female | Total  | Male           | Female   | Total   |
|                    | %             | %      | %      | %                | %      | %      | %              | %        | %       |
|                    | (n=26)        | (n=24) | (n=50) | (n=15)           | (n=9)  | (n=24) | (n= 41)        | (n = 33) | (n =74) |
| Normal             | 53.8          | 30.4   | 42.9   | 30.8             | 27.3   | 29.2   | 28.1           | 37.1     | 26.7    |
| <b>Stunting</b>    |               |        |        |                  |        |        |                |          |         |
| Moderate           | 38.5          | 30.5   | 34.6   | 30.8             | 18.2   | 25     | 24.7           | 36.3     | 25.7    |
| Severe             | 42.3          | 21.7   | 32.7   | 7.7              | 9.1    | 8.3    | 36.8           | 19.4     | 28.4    |
| <b>Wasting</b>     |               |        |        |                  |        |        |                |          |         |
| Moderate           | 0             | 4.3    | 2.0    | 0                | 0      | 0      | 7.7            | 8.6      | 8.2     |
| Severe             | 0             | 0      | 0      | 0                | 0      | 0      | 0              | 0        | 0       |
| <b>Underweight</b> |               |        |        |                  |        |        |                |          |         |
| Moderate           | 7.7           | 8.7    | 4.1    | 7.7              | 9.1    | 8.3    | 10.2           | 5.8      | 8.3     |
| Severe             | 3.8           | 0      | 6.1    | 0                | 0      | 0      | 2.6            | 2.8      | 2.7     |

### Child Nutritional Status in Relation to Age

A child's nutritional status is related to their age as shown in Figure 2. About 30% of the children below six month had wasting. The prevalence of underweight was higher among children aged below six month at about 20%, followed by children aged 24 – 35 month at about 16.7%. The prevalence of stunting was 88.2%, mostly observed in children aged 12 – 23 months. This was statistically significant in relation to age group of the child at  $p < 0.05$  in Post hoc analysis. This shows that, stunting was significantly different within the age group where most children aged 12 – 23 months were affected. As a child grows, they become less dependent on breast milk and they start complementary feeding. Children at this age are in their active growth period, and if their diet is inadequate to meet their physiological need they end up being malnourished (Gipson, 1990; Adeladza, 2009). Studies in Ethiopia showed an increase in malnutrition associated with increasing age of a child (Yimer, 2000; Samson and Lakech, 2002).



**Figure 2: Status of malnutrition in relation to age (in month) of the child**



## Feeding Practice

Complementary food becomes important when the child grows and breast milk is no longer enough. Results on introduction of complementary foods are summarized on Table 4 which shows that mothers start complementary feeding at early age, before six months. In Kongwa 34% of under-five year's children start complementary foods at age of 4–5 months compared to 16.7% in Mvomero district and 28.4% for the whole sample. Children who start complementary feeding at age of 2–3 month represented 16% in Kongwa and 8.3% in Mvomero district, being 13.5% for the whole sample. Some of the children in both districts introduction of complementary foods start as early as one month of age representing 2% in Kongwa, 4.2% in Mvomero and 2.7% for the whole sample. Timing for complementary food introduction affects the growth of the child. According to the Demographic and health survey report for Tanzania (2011), early introduction of complementary foods contribute to increase prevalence of stunting. This information is in line with the findings of this study where prevalence of stunting was associated with the time of introducing complementary food. Another study done by Anderson *et al.* (2010), explains that if complementary foods are introduced at an early age before six month of life the child is likely to be stunted. It is well known that the period from birth to two years is the “critical window” for promoting good growth and health as well as behavioural development of a child. Hence, optimum feeding of infant and young child is crucial during this period (UNICEF, 2008).

Foods introduced during complementary feeding include milk (cow/goat) and cereal based porridge. The leading complementary food used in both study areas was thin porridge made from maize flour flavored by sugar or salt, which is reported by 82.0% of the respondents in Kongwa and 87.5% in Mvomero districts. Majority of children therefore consumed maize porridge, but it lacks many nutrients, particularly zinc, iron and selenium, and it has a low energy density (Lin *et al.*, 2008). Hence, use of thin porridge has been associated with child being undernourished throughout the developing world. Findings from this study are consistent with those of another study done in China which indicates that poor quality of the complimentary food had association with underweight of the children below five years (Zhou *et al.*, 2012).

**Table 4: Feeding pattern of the children**

|                                                |                | Kongwa    |              | Mvomero   |              | Sample total |              |
|------------------------------------------------|----------------|-----------|--------------|-----------|--------------|--------------|--------------|
|                                                |                | N         | %            | N         | %            | N            | %            |
| <b>Age complementary foods were introduced</b> | 1 month        | 1         | 2            | 1         | 4.2          | 2            | 2.7          |
|                                                | 2 – 3 month    | 8         | 16           | 2         | 8.3          | 10           | 13.5         |
|                                                | 4 – 5 month    | 17        | 34           | 4         | 16.7         | 21           | 28.4         |
|                                                | 6 month        | 16        | 32           | 13        | 54.2         | 29           | 39.2         |
|                                                | >6 month       | 2         | 4            | 1         | 4.2          | 3            | 4.1          |
|                                                | Breastfeeding  | 6         | 12           | 3         | 12.5         | 9            | 12.2         |
|                                                | Total          | <b>50</b> | <b>100</b>   | <b>24</b> | <b>100</b>   | <b>74</b>    | <b>100</b>   |
| <b>Types of complementary foods</b>            | Cow milk       | 2         | 3.9          | 0         | 0.0          | 2            | 2.7          |
|                                                | Goat milk      | 1         | 2.0          | 0         | 0.0          | 1            | 1.4          |
|                                                | Thin porridge  | 41        | 82.0         | 21        | 87.5         | 62           | 83.8         |
|                                                | breastfeeding  | 6         | 11.8         | 3         | 13.0         | 9            | 12.2         |
|                                                | Total          | <b>50</b> | <b>100.0</b> | <b>24</b> | <b>100.0</b> | <b>74</b>    | <b>100.0</b> |
| <b>Feeding frequency</b>                       | Breast feeding | 6         | 12.0         | 3         | 12.5         | 9            | 12.2         |
|                                                | 1              | 1         | 2.0          | 0         | 0.0          | 1            | 1.4          |
|                                                | 2              | 13        | 26.0         | 4         | 16.7         | 17           | 23.0         |
|                                                | 3              | 30        | 60.0         | 11        | 45.8         | 41           | 55.4         |
|                                                | 4              | 0         | 0.0          | 5         | 20.8         | 5            | 6.8          |
|                                                | 5              | 0         | 0.0          | 1         | 4.2          | 1            | 1.4          |
|                                                | Total          | <b>50</b> | <b>100.0</b> | <b>24</b> | <b>100.0</b> | <b>74</b>    | <b>100.0</b> |

Most of the children consumed three meals per day, being 60% in Kongwa district compared to 45.8% in Mvomero district and 55.4% for the whole sample. In Kongwa District no children consumed four or five meals a day but these categories constituted about 25% of the children in Mvomero district. The findings in this study indicate that factors like the time of introduction, type of food introduced and the frequency of feeding complementary food are associated with the prevalence of wasting at  $p < 0.001$ . As reported earlier, the prevalence of wasting was more common in Kongwa District mainly among females (Table 2). Although this is not statistically significant by sex at  $p = 0.05$ , but a study that was done in Nepal (Sapkota and Gurung, 2009) showed that the female sex was strongly associated with a child's wasting. Another study, which was done in western Tanzania reported that, women spent less time cooking and feeding

their children during the peak labour seasons such as during farming season. In addition, preparing a child's food separately requires time and extra firewood for cooking which many rural mothers cannot afford. For this reason the frequency of feeding a child depends on the number of times the family takes meals (Wandel and Holmboe-Ottesen, 1992).

#### **Feeding observed in 24 hours for children**

In Kongwa District, 37.8% of children consumed maize porridge as breakfast while in Mvomero District 17.6% consumed tea with snack for breakfast (Table 5). In the afternoon the main staple consumed was stiff porridge. In Kongwa district 37.8% consumed stiff porridge with vegetables while in Mvomero District 14.9% of the children consumed stiff porridge with pulses. Stiff porridge with vegetable or pulse was consumed mostly by children as dinner for both districts. Meat was rarely eaten by the majority of respondents, which was associated with high prevalence rates of under nutrition in children.

**Table 5: Feeding observed in 24 hours**

| Time             | Type of Food                            | Kongwa District<br>n=50 |             | Mvomero District<br>n=24 |             | Sample Total<br>N = 74 |            |
|------------------|-----------------------------------------|-------------------------|-------------|--------------------------|-------------|------------------------|------------|
|                  |                                         | n                       | %           | N                        | %           | n                      | %          |
| <b>Breakfast</b> | Porridge                                | 28                      | 37.8        | 7                        | 9.5         | 35                     | 47.3       |
|                  | Black tea with snack                    | 5                       | 6.8         | 13                       | 17.6        | 18                     | 24.3       |
|                  | No                                      | 9                       | 12.1        | 1                        | 1.4         | 10                     | 13.5       |
|                  | Breast feeding                          | 6                       | 8.1         | 3                        | 4.1         | 9                      | 12.1       |
|                  | Stiff porridge with dry fish            | 1                       | 1.4         | 0                        | 0           | 1                      | 1.4        |
|                  | Cassava boiled                          | 1                       | 1.4         | 0                        | 0           | 1                      | 1.4        |
|                  | <b>Total</b>                            | <b>50</b>               | <b>67.6</b> | <b>24</b>                | <b>32.4</b> | <b>74</b>              | <b>100</b> |
| <b>Lunch</b>     | Stiff porridge with milk                | 3                       | 4.1         | 1                        | 1.4         | 4                      | 5.4        |
|                  | Stiff porridge with vegetables          | 28                      | 37.8        | 5                        | 6.8         | 33                     | 44.5       |
|                  | Stiff porridge with pulse               | 6                       | 8.1         | 11                       | 14.9        | 17                     | 22.9       |
|                  | Stiff porridge with fish                | 1                       | 1.4         | 1                        | 1.4         | 2                      | 2.7        |
|                  | Stiff porridge with meat                | 1                       | 1.4         | 2                        | 2.7         | 3                      | 4.1        |
|                  | No                                      | 4                       | 5.4         | 1                        | 1.4         | 5                      | 6.8        |
|                  | Stiff porridge with eggs and vegetables | 1                       | 1.4         | 0                        | 0           | 1                      | 1.4        |
|                  | Breast feeding                          | 6                       | 8.1         | 3                        | 4.1         | 9                      | 12.1       |
| <b>Dinner</b>    | <b>Total</b>                            | <b>50</b>               | <b>67.6</b> | <b>24</b>                | <b>32.4</b> | <b>74</b>              | <b>100</b> |
|                  | Stiff porridge with milk                | 5                       | 6.8         | 0                        | 0           | 5                      | 6.8        |
|                  | Stiff porridge with vegetables          | 23                      | 31.1        | 3                        | 4.1         | 26                     | 35.1       |
|                  | Stiff porridge with pulse               | 6                       | 8.1         | 5                        | 6.8         | 11                     | 14.8       |
|                  | Stiff porridge with fish                | 1                       | 1.4         | 2                        | 2.7         | 3                      | 4.1        |
|                  | Stiff porridge with meat                | 1                       | 1.4         | 1                        | 1.4         | 2                      | 2.7        |
|                  | Rice with meat                          | 0                       | 0           | 2                        | 2.7         | 2                      | 2.7        |
|                  | Rice with pulses                        | 1                       | 1.4         | 1                        | 1.4         | 2                      | 2.7        |
|                  | Porridge                                | 0                       | 0           | 3                        | 4.1         | 3                      | 4.1        |
|                  | Milk                                    | 0                       | 0           | 2                        | 2.7         | 2                      | 2.7        |
|                  | No                                      | 7                       | 9.5         | 2                        | 2.7         | 9                      | 12.2       |
|                  | Breast feeding                          | 6                       | 8.1         | 3                        | 4.1         | 9                      | 12.2       |
|                  | <b>Total</b>                            | <b>50</b>               | <b>67.6</b> | <b>24</b>                | <b>32.4</b> | <b>74</b>              | <b>100</b> |

In each District few (1.4%) children consumed meat with stiff porridge as dinner. Likewise fruits were seldom eaten by children in both districts. Lack of balanced diet has a negative impact on the wellbeing of children because all the aspects of early child development are interrelated and interdependent (McConnell, 2004). These results are consistent with those of Arimond and Ruel (2004), Kalimbira and Chipwantali (2007) and Rusinga and Moyo (2012) where the main food consumed by children lacked diversity being deficient in animal source foods and fruits,

## Education of the Mother and a Child's Nutritional Status

Findings in relationship to mothers' education and a child's nutritional status for the whole sample are summarized on Table 6. The mother's education was associated with a child's nutritional status especially stunting at  $p < 0.001$ . Other factors like economic activities and household size have no contribution to a child's nutritional status.

**Table 6: Association of mothers' education and child nutritional status**

| Characteristic               | Nutritional status of children |                                   |                       |
|------------------------------|--------------------------------|-----------------------------------|-----------------------|
| Education of the mother      |                                |                                   |                       |
|                              | <b>Severe stunting</b><br>n(%) | <b>Moderate stunting</b><br>n (%) | <b>Normal</b><br>n(%) |
| No formal                    | 12 (16.2)                      | 8 (10.8)                          | 9(12.2)               |
| Incomplete primary education | 0                              | 4 (5.4)                           | 1 (1.4)               |
| Primary education            | 12 (16.2)                      | 10 (13.5)                         | 14 (18.9)             |
| Secondary                    | 1 (1.4)                        | 0                                 | 2 (2.7)               |
| College                      | 1(1.4)                         | 0                                 | 0                     |
|                              | <b>Severe wasting</b>          | <b>Moderate wasting</b>           | <b>Normal</b>         |
| No formal                    | 0                              | 4 (5.4)                           | 25 (33.8)             |
| Incomplete primary education | 0                              | 0                                 | 5 (6.8)               |
| Primary education            | 1 (1.4)                        | 1 (1.4)                           | 34(45.9)              |
| Secondary                    | 0                              | 0                                 | 3 (4.1)               |
| College                      | 0                              | 0                                 | 1 (1.4)               |
|                              | <b>Severe underweight</b>      | <b>Moderate underweight</b>       | <b>Normal</b>         |
| No formal                    | 1 (1.4)                        | 4 (5.4)                           | 24 (32.4)             |
| Incomplete primary education | 0                              | 1 (1.4)                           | 4 (5.4)               |
| Primary education            | 0                              | 2 (2.7)                           | 34(45.9)              |
| Secondary                    | 0                              | 0                                 | 3 (4.1)               |
| College                      | 0                              | 0                                 | 1 (1.4)               |

This study established that a low level of maternal education contributes to the prevalence of stunting. This is in line with the study done by Gulati (2010) which explains that women's education is strongly associated with children's malnutrition in developing countries. Other studies have similarly concluded that a mother's education plays a significant role in reducing the prevalence of stunting (Yimer, 2000; Rayhan and Khan, 2006) because maternal education can break traditions; enhance or facilitate adoption of the alternative practices in child feeding, and increase the capacity of the mothers to manipulate their environment. An educated

mother is more conscious about her children's health; so they tend to look after their children in a better way (Lawal and Samuel, 2010).

### **Child Malnutrition in Relation to Sex of Household Head**

The sex of the household head was analyzed for association with the nutritional status of the children. The household head has ultimate authority for decision-making and allocation of resources within the household. According to findings in Table 7, there were 54 (73%) children who lived in male headed households and 20 (27%) children who lived in female headed households (FHH). A high percentage of children in male headed household (MHH) (25.9%) were found to be severely stunted compared to 20% in FHH. Likewise 38.9% of the children in MHH were moderately stunted compared to 5% in FHH. Conversely, 75% of the children in FHH were normal compare to only 35.2% in MHH.

Male household headship was significantly associated with stunting. Also, child nutritional status was analyzed by headship and marital status and it was found that 22.2% of children lived in MHH was severely stunted and 38.9% were moderately stunted. This was statistically significant in relation to married couple which the head of the family is male at  $p = 0.002$ .

**Table 7: Child malnutrition by household headship**

| Marital status | Nutritional status |          | MHH |       | FHH  |       | Sample | Total |
|----------------|--------------------|----------|-----|-------|------|-------|--------|-------|
|                | Category           | Status   | N   | %     |      | %     |        |       |
|                | Stunting           | Normal   | 19  | 35.2  | 15   | 75    | 34     | 45.9  |
|                |                    | Moderate | 21  | 38.9  | 1    | 5     | 22     | 29.7  |
|                |                    | Severe   | 14  | 25.9  | 4    | 20    | 18     | 24.3  |
|                | Subtotal           |          | 54  | 100   | 20   | 100   | 74     | 100   |
|                | Wasting            | Normal   | 50  | 92.6  | 18   | 90    | 68     | 91.9  |
|                |                    | Moderate | 4   | 7.4   | 1    | 5     | 5      | 6.8   |
|                |                    | Severe   | 0   | 0.0   | 1    | 5     | 1      | 1.4   |
|                | Sub-total          |          | 54  | 100   | 20   | 100   | 74     | 100   |
|                | Underweight        | Normal   | 46  | 85.2  | 20   | 100.0 | 66     | 89.2  |
|                |                    | Moderate | 7   | 13.0  | 0    | 0.0   | 7      | 9.5   |
|                |                    | Severe   | 1   | 1.9   | 0    | 0.0   | 1      | 1.4   |
|                | Subtotal           |          | 54  | 100.0 | 20   | 100.0 | 74     | 100.0 |
| Married        | Stunting           | Normal   | 18  | 33.3  | 8    | 40.0  | 26     | 35.1  |
|                |                    | Moderate | 21  | 38.9  | 0    | 0.0   | 21     | 28.4  |
|                |                    | Severe   | 12  | 22.2  | 3    | 15.0  | 15     | 20.3  |
| Single         | Normal             | 0        | 0   | 3     | 15.0 | 3     | 4.1    |       |
|                | Moderate           | 0        | 0   | 0     | 0.0  | 0     | 0      |       |
|                | Severe             | 2        | 3.7 | 0     | 0.0  | 2     | 2.7    |       |
| Window         | Normal             | 0        | 0   | 3     | 15.0 | 3     | 4.1    |       |
|                | Moderate           | 0        | 0   | 0     | 0.0  | 0     | 0.0    |       |
|                | Severe             | 0        | 0   | 1     | 5.0  | 1     | 1.4    |       |
| Cohabit        | Normal             | 1        | 1.9 | 1     | 5.0  | 2     | 2.7    |       |
|                | Moderate           | 0        | 0   | 1     | 5.0  | 1     | 1.4    |       |
|                | Severe             | 0        | 0   | 0     | 0.0  | 0     | 0.0    |       |
| Subtotal       |                    | 54       | 100 | 20    | 100  | 74    | 100    |       |

Lack of male involvement in infant and child care has a negative impact on children's nutrition. It is well known that women used more resources to ensure good health and nutrition of their dependents, so children benefit more from expenditure in FHH rather than MHH (Bruce 1989). Women in rural areas have low economic power, thus a father who contributes little to his family income increases the risk of poor health and nutritional status of children and women in the household (Bruce and Lloyd, 1997). The position mothers have within the household influence children's nutritional status. In addition, the time spent by women to care for children may at

times be reduced due to increased workload such as during farming season (Gulati, 2010). All these factors contribute to children being under nourished within male headed households. This finding is not in line with most studies which explain that malnutrition is mostly seen in female headed household than male headed households (Haidar and Kogi – Makau, 2009). People in the study area used to eat more of the less diversified food which lack protein and fruit. Also they ate tree meals per day both adult and children. Feeding recommendations by Ministry of Health and Social Welfare are four to five meals per day for health child (TFNC, 2013). These factors contribute to these findings.

### **Household Dietary Pattern**

Data on household dietary diversity score (HDDS) showed that the diet consisted mainly of cereal, green vegetables, and pulses with addition of oil. The main staple food was maize stiff porridge (*ugali*) with green vegetables. Animal protein foods and fruits were rarely consumed. The average dietary diversity was 5.8 which mean that households have minimum dietary diversity. The results agree with the baseline data that the study area had minimum consumption score (IRLI, 2013).

### **Conclusion and Recommendations**

This study attempted to provide identify factors that may account for children in the study area to be nutritionally vulnerable. The study revealed that prevalence of chronic malnutrition is more pronounced in Kongwa (a rural district) than Mvomero (a semi-urban) districts. Demographic and social parameters such as location where the child lives, age of the child and educational level of the mothers was associated with a child in the study area being undernourished. Inappropriate child feeding practices such as the time for introducing complementary foods, type of complementary food and feeding frequency predominate as factors that contribute to children's poor nutritional status. In addition, MHH were associated with a higher prevalence of stunting. Hence, both food and poor feeding practices influence the quality of complementary feeding on the children's nutritional status and health. Families and mothers in particular therefore need to be supported in terms of training for them to practice good complementary feeding. The household dietary pattern was of medium diversity with stiff porridge and green leafy vegetable as staple food. Protein foods and fruits were consumed only on rare occasions.



The primary intervention strategy should therefore be to address female education along with their economic empowerment. Nutrition education is also a feasible strategy, which should aim at addressing the preparation, processing, and combination of various types of inexpensive, locally available indigenous food sources which have potential in improving nutritional status in rural communities. Moreover, gender training would improve awareness and the importance of male members of the family to be involved in child nutrition within the households.

### **Study Limitation**

The finding of this study cannot be generalized to all communities in the whole area because the study samples was purposively selected to represent families who were beneficiaries of the Dairy goat and roots crops project, which is still in its initial stages. Also, weighing food that is consumed by children was not possible due to lack of equipment. Moreover, data on promotion and protection of optimum child feeding practice to improve children's nutritional status was not available. In addition, the expected number of households to be studied was reduced because some of the respondents decline to participate. All these contribute to missing some of the results, such as the average quantity of food given to a child per meal. Despite these limitations the results obtained present a true picture of the nutritional status of under-five children in the study areas and will be used to evaluate the impact of the project on nutritional status at the end of the project.

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