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CHILD CARE PRACTICES AND NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN TANZANIA: EVIDENCE FROM FISHING COMMUNITIES IN PANGANI DISTRICT

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ABSTRACT

Undernutrition is still a public health problem in Tanzania despite national and global efforts in combating it. However, little availability of suitable data limits understanding of why the problem still persists. This chapter aimed at finding out the determinants of undernutrition among under-five children in Tanzania. Specifically, this paper assessed the influence of child care practices on nutritional status of under-five children focusing on local fishing communities in Pangani District. A sample of 355 under-five children was selected from households using systematic sampling method. Cross-sectional research design was employed to collect both anthropometric quantitative and qualitative data. ENA for SMART software version 2011 was used to generate indices for weight-for-height, height-for-age and weight-for-age. The findings confirm that under-nutrition is still a public health problem in Pangani as indicated by higher level of stunting (27.9%) and wasting (5.1%). Binary Logistic Regression was employed to assess the influence of individual characteristics of a child and care practices by mothers/care-takers on under-nutrition in children under-five. Place of delivery, delivery assistance, sex of a child, having siblings under-five, immunization status, essential ANC visits and exclusive breast feeding were the most important factors associated with under-nutrition. The findings call for collaborative action between Government, NGOs and the District Nutrition Officer on how to curb malnutrition in Pangani.

Contribution/ Originality: This study contributes to the existing literature that the determinants of nutritional status of children under-five years are area specific and undernutrition is still a public health problem. The role of pre and post natal care practices by the mothers on child health was clearly established. Educational interventions at household level on positive behavioural change strategies on child care practices; and ante-natal and post-natal visits are important strategies for improving child health and reducing undernutrition among children under-five years.

1. INTRODUCTION

Despite global and national efforts for improving child health and availability of nutrition interventions, malnutrition remains a significant burden in developing countries. It continues to be the foremost cause of morbidity and mortality worldwide, particularly in developing countries (Black *et al.*, 2008). Fifty per cent of child

deaths in the developing countries are related to the consequences of malnutrition. Victora *et al.* (2008) ascertained that malnutrition is a significant contributing factor for infant and child mortality, poor nutritional status during childhood and also an important implication for adult economic activities. World Health Organization (WHO) (1995) defines malnutrition as a clinical condition that includes several overlapping syndromes, such as growth failure and muscle wasting in adults. Malnutrition literally means imperfect nutrition that technically includes both over and undernutrition, and this paper focuses more on the latter. Undernutrition places children at an increased risk of impaired physical and mental growth, poor socio-emotional development due to deficiencies of nutrients like protein, iron, iodine and vitamin A. Undernourished children are more likely to become short adults, have lower educational development, and give birth to smaller children (Victora *et al.*, 2008). Therefore, nutritional status of under-five children is important because it can serve as a proxy indicator for assessing the entire health status of any population and also as a major predictor of child survival.

Tanzania has one of the highest undernutrition burdens in East and Southern Africa, threatening not only individual lives but also the next generation's economic advancement, and loss of income and opportunities. Nationwide, 34% of children under-five are stunted or short for their age, which is a sign of chronic malnutrition. Five per cent of children under-five are wasted or too short for their height, a sign of acute malnutrition. Fourteen per cent of children are underweight or too thin for their age as reported in the TDHS-MIS, 2015-2016 (Ministry of Health Community Development Gender Elderly and Children (MOHCDGEC), 2016). The regional prevalence indicates that Rukwa (56%), Njombe (49%) and Ruvuma (44%) regions have the highest prevalence of stunting. Even though Tanga is among the regions with moderate prevalence of stunting (39%) but it has the highest stunting level along the coast of the Indian Ocean as compared to Dar es Salaam (14.6%), Lindi (35.2%) and Mtwara (37.7%); (MOHCDGEC, 2016). The study was conducted in Pangani District, which is part of Pangani River that empties its water into the Indian Ocean.

The theoretical approach of this paper is based on macroeconomic models of production and allocation of household resources, and care and support of children as pioneered by Becker (1965;1981) and Engle and Ricciuti (1995) respectively. Becker (1965) has demonstrated, in enlightening the household determinants of nutrition that a nutrition production function relates to child's nutritional status measured by anthropometric indicators to a set of health "inputs". These inputs could be child nutrients intake, preventive and curative medical care, and the quantity of time of the mother and care givers. In 1981, Becker analysed households' decision on the quantity and quality of children. He argued that households derive utility from conventional goods as well as from the number and quality of children measured by expenditure per child. Engle *et al.* (2000) looked into the behaviour and practices of caregivers that provide food, stimulation and emotional support necessary for children's healthy, growth and development. These practices translate food security and health care into child's well-being.

Prevalence and determinants of nutritional status among under-five children in other developing countries have been widely documented by a number of researchers (for example (Rayhan and Khan, 2006; Nguyen and Nguyen, 2009; Solomon and Amare, 2012)). In Tanzania, similar information has widely been documented. For example, Abubakar *et al.* (2012) reported the prevalence and socio-economic risk factors of stunting among children aged 1-35 months in Same District, Kilimanjaro Region and found that chronic malnutrition was associated with child's sex and age, mother education, family size and number of ante natal visits. In Jibondo and Chole Islands, Moshy *et al.* (2013) revealed that underweight was attributed to substantial reduction in breastfeeding. A cross-sectional study by Safari *et al.* (2015) in Nzega, Tanzania, assessed the prevalence of malnutrition among children aged 6 to 59 months and showed that the factors associated with a high stunting rate are sex, age, family size, age of the mother and number of antenatal visits.

Despite the enormous literature that details the causes of undernutrition, little is known about the linkage between under-five nutritional status and care practices, especially along the coast of the Indian Ocean in Tanzania where the population is characterized by multiple economic activities including agriculture, non-agricultural and

fishing activities. An understanding of the connection of these multiple economic activities and care practices and their influence on under-five nutritional status, especially in fishing communities is essential in designing appropriate response interventions for addressing undernutrition. To fill this knowledge gap, this paper assessed the nutritional status of children under-five focusing on undernutrition. Specifically, the paper (i) examined the socio-demographic characteristics of the children under-five years, (ii) determined the levels of undernutrition among under-five children, (iii) analyzed child care practices among the households with children under-five old, and (iv) assessed the influence of individual characteristics and child care practices on nutritional status of under-five children.

The United Nations' Millennium Development Goal No. 4 (MGD 4) requires countries to scale up interventions for addressing malnutrition and other burden of diseases among children (Semali *et al.*, 2015). Although there is global improvement in child health, but undernutrition remains a significant problem in some developing countries including Tanzania. This paper is therefore noteworthy to provide feedback for the shortcomings of failure in reaching the target for reaching MDGs' targets in 2015. The findings for this paper serve as a road map to the post MDGs dubbed Sustainable Development Goals (SDGs), specifically goal No. 2 which is about ending all forms of malnutrition for all people by 2030, including achieving the internationally agreed targets of 40% reduction in stunted children and maintain wasting to less than 5% (International Food Policy Research Institute (IFPRI), 2016). As part of the commitment to addressing undernutrition, the government of Tanzania has launched a comprehensive five years National Multi-Sectoral Nutrition Action Plan (NMNAP 2016-2021) intended to address the burden of child undernutrition (United Republic of Tanzania (URT), 2016)). The findings from this paper contribute to translate these commitments into action by providing information that guide stakeholders, nutritionists, academicians, researchers and programmes aimed at addressing undernutrition among children under-five years in Tanzania.

2. METHODOLOGY

2.1. Description of the Study Area

Pangani District is the smallest in size and the least populated among the eight districts in Tanga Region but is strategically situated with good access to the Northern highlands and the coastal belt of Tanzania. Administratively, the district is divided into four divisions, 13 wards, 33 villages and 94 hamlets (Regional Secretariat/Regional Health Management Team (RS/RHMT), 2013). As elsewhere along the coast of the Indian Ocean in Tanzania, fishing is the major occupation of the people living in the study area. Except for a few, their livelihood depends directly or indirectly on agriculture, crop and livestock farming, income from business and employment (RS/RHMT, 2013). These diverse socio-economic activities are likely to influence nutritional status of children under-five years in different ways. Thus, understanding the nature of care practices by the mothers on this population group is important so that nutrition interventions can be more focused.

2.2. Research Design

A cross-sectional research designs was used because it was considered to be suitable to assess the existing influence of child's characteristics and care practices on nutritional status of under-five children in Pangani District. The design allows more than one method to be used at a time, but also allows data to be collected at a one point in time and is suitable for descriptive analysis and determination of relationship among variables (Bailey, 1994; Kothari, 2004; Walliman, 2006).

2.3. Sampling Frame and Sample Size

Purposive sampling was used to select 2 divisions, Mwera (representing the river side) and Pangani (representing the ocean side). Two wards from each division and two villages from each ward were randomly

selected making a total of 8 villages. Purposive sampling was conducted to select households with children under-five years as a sample. The main sampling unit in this paper was an individual mother or care taker of children under-five years. A sample size of 340 households was determined by using Cochran's formula as adopted by Bartlett *et al.* (2001). Where a household had two or more children under-five years all were included in the sample, therefore a total of 355 children were involved in the study. A total of 18 Key Informants (KIs), (2 Health Officers from the District Hospital, 2 MCH coordinators, 4 Wards Community Development Officers, 2 NGO representatives from each ward, and 8 Village Officers) were selected. Participants in the Focus Group Discussions (FGD) were purposively selected from among mothers or caregivers within the households with children under-five years.

2.4. Data Collection

Variables such as weight, height, birth weight, age and sex of children were taken during home visits. Length of the children less than 24 months was measured in a recumbent position to the nearest 0.1 cm using a board with an upright wooden base and a movable head piece. Height of children aged 24 and above 24 months was measures in a standing position to the nearest 0.1 cm using a vertical board with a detachable sliding piece (Assaf *et al.*, 2015). An electronic SECA weighing machine with a scale graduation of 100 grams and a capacity of 100 kilograms was utilized for measuring weight of children with minimum clothing and without shoes to the nearest 0.1 kg. A household survey questionnaire which consisted of both open ended and close ended questions was used to collect information on individual characteristics of children that were not captured in anthropometric measurement. Data such as place of birth, number of siblings under-five, vaccination status, child care and feeding practices were obtained from clinic cards and mothers' recalls.

Four FGDs, one from each ward comprising 8 participants, were conducted for the purpose of supplementing the information of the influence of child care practice on nutritional status of under-five children. Bryman (2004) and Barbour (2011) suggest that 6 to 12 participants are enough for effective participation and good quality data in FGDs. The household survey questionnaire mentioned above was used to collect information on child health care practices in the study area. In-depth interviews with KIs at the district hospital, village health centres, community development officer and district nutritionist were purposively conducted for the purpose of supplementing information collected using the questionnaire on the status and causes of malnutrition in Pangani.

2.5. Data Analysis

Emergency Nutrition Assessment (ENA) for smart software version 2011 was used to generate measurement indices of height-for-age, weight-for-age, and weight-for-height. The indices generated were compared with standard reference values for WHO (2006) to obtain Z-scores. Z-score of -2 standard deviations is the most commonly adopted cut-off point for all nutrition indicators (Zewdie and Abebaw, 2013). In this study a child with Z-scores below -2 SD in respective nutritional status indicator was considered malnourished i.e. stunted, wasted or underweight (WHO, 2006).

Descriptive statistical analysis was performed by using the Statistical Package for Social Sciences (SPSS) Version 16.0, whereby means, standard deviations, percentages and frequencies were generated in order to categorize socio-demographic characteristics, care and feeding practices for children under-five years old. Prevalence of malnutrition was estimated by computing percentages of malnutrition cases among children under-five from the entire sample. Binary logistic regression model was employed to determine the relationship between the outcome categorical variable (Pallant, 2007) (height-for-age, weight-for-height, and weight-for-age) and predictor variables (health facility, delivery assistance, sex of a child, age of a child, born premature, number of siblings, given pre-lacteal foods, immunization status, breast feeding after birth, exclusive breast feeding, duration of breastfeeding, number of meals per day, and essential ANC visits). Those predictor variables were a mixture of

categorical and continuous variables. Therefore, this model allows testing to predict categorical outcomes with two or more outcomes. Furthermore, the model combined the predictor variables to estimate the probability that a particular event would occur i.e. a subject will be a member of one of the groups defined by a dichotomous outcome variable. Analysis of the results from the model focused on interpretation of β-coefficients for measuring the directions of the relationship, p-values for testing significance of the relationship, and odds ratios (Exp (B) values) for predicting the number of times various predictor variables have chances to occur relative to one another regarding the relationship between individual characteristics and care practices on undernutrition of children under-five years.

The binary logistic regression model used is shown in Equation 1.

$$\text{Log}\,(P_i/1\text{-}P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_{2+} \ldots + \beta_{13} X_{13} + e \quad \text{Equation 1}$$

Where: Log $(P_i/1\text{-}P_i)$ = is the natural logarithm of the status of a child being malnourished (underweight/wasted/stunted) or not, Pi = Probability of the i^{th} child being malnourished

$1\text{-}P_i$ = probability of the i^{th} child not being malnourished

β_0 = Constant (Y- interception)

$\beta_1 - \beta_{13}$ = Logarithm of regression coefficient of independent (predictors) variables, X_1= place of child delivery (1= health facility, 0 = home delivery); X_2 = delivery assistance (1 = health professionals, 0 = Tradition Birth Attendants (TBA) and relatives); X_3 = sex of a child (1 = Male, 0 = Female) , X_4 = born premature (1 = Yes, 0 = No); X_5 = have sibling under-five years (1 = Yes, 0 = No); X_6 = pre lacteal feeding (1 = Yes, 0 = No); X_7 = immunization status (1 = Yes, 0 = No); X_8 = breastfeeding soon after birth (1=Yes, 0 = No); X_9 = exclusive breastfeeding (1 = Yes, 0 = No); X_{10} = breastfeeding duration continuous); X_{11} = number of meals per day (continuous); X_{12} = essential ANC (continuous); X_{13} = age of a child (continuous). Finally, content analysis was then used to analyse qualitative information collected through FGDs and interviews with KIs. In content analysis, the recorded discussions and interviews were broken down into units of information and ideas to supplement quantitative data analysis and discussion.

3. RESULTS AND DISCUSSIONS

3.1. Socio - Demographic Characteristics of Children Under-Five Years

The socio-demographic characteristics of the under-five children sampled are summarized in Table 1. The results show that out of 355 children in the sampled households, 47.9% were male while 52.1% were female. The distribution of children based on age groups indicated that 76% of the children were between 13 and 36 months, implying that the majority of the children in the study area were at weaning age. The overall mean (± SD) age of the children was 28.93 months (±14.44). The results from this study showed that the majority of the children (93.2%) had birth weight of greater than or equal to 2500 g while only 6.8% had low birth weight of less than 2500 g. These results project that the chances of children to have higher incidence of morbidity are low as only 6.8% were born with low birth weight hence this decreases the chance of being undernourished due to low birth weight.

Birth weight of a child is usually linked to the chances of child's morbidity and mortality. Children with low birth weight or weight below 2500 g, as defined by WHO, are at high risk 20 times of morbidity and mortality at birth and during early days of life time than healthier babies (Suman and Rajani, 2016). Further analysis indicated that 4.2% of the surveyed children were born prematurely with 12.4% children having oedema and 25.4% having siblings under-five years of age.

Table-1. Socio-demographic profile of children under-five years (n = 355).

Variable	n	%
Sex of the children		
Male	170	47.9
Female	185	52.1
Age (months) of the children		
01 -06	19	5.4
07- 12	27	7.6
13 -24	96	27.0
25 - 36	174	49.0
37 - 48	35	9.9
49 – 60	4	1.1
Birth weight		
Greater than or equal to2500g	331	93.2
Less than 2500g	24	6.8
Child born prematurely		
Yes	15	4.2
No	340	95.8
Bilateral Pitting Oedema		
Yes	44	12.4
No	311	87.6
Have Sibling Under-five years		
Yes	90	25.4
No	265	74.6

Note: n = number of respondents, % = per cent.

3.2. Nutritional Status of Children Under-Five Years

Anthropometric analysis of children under-five years indicated that the prevalence rates of stunting, wasting and underweight were 27.9, 5.1 and 13.9% respectively as detailed in Figure 1. Although the current level of stunting in Pangani is lower than the stunting rate in Tanga Region (49%) and in Tanzania (42%) in general, but it is still higher than the acceptable level by the WHO of less than 20%. Similar results were reported by Safari *et al.* (2015) that few children are thin for their age (wasting) but many are stunted. These findings indicate that stunting is still recognized as a serious health problem in the study area. It is evident that children who are deprived of healthy growth (stunted children) are also deprived of healthy brain development and immune system development. Studies conducted in Ghana, Tanzania and Nepal (Beasley *et al.*, 2000) concluded that stunted children are less likely to be enrolled in school, are more likely to enrol late and have poorer cognitive ability than non-stunted children. The level of wasting was not only higher than the national level of 5% (TDHS-MIS, 2015-2016), but also exceeded the acceptable level of 5%.

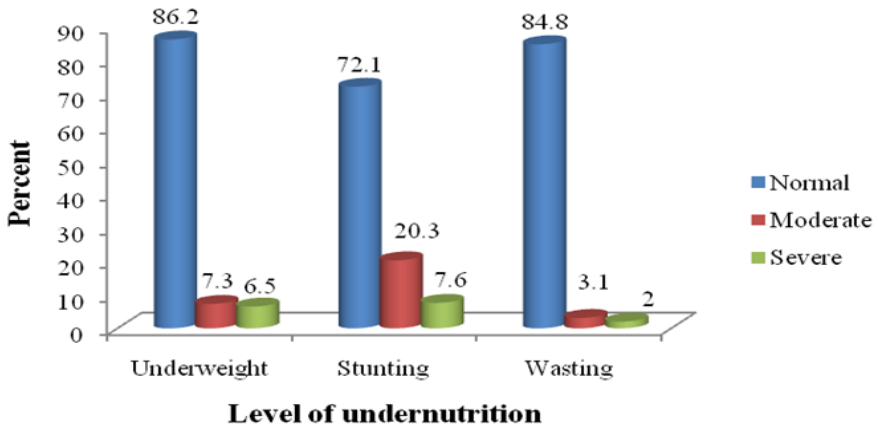

Figure-1. Anthropometric analysis of children under-five (n = 355).

Source: Survey data (2016).

Wasting is usually due to recent illness and/or insufficient dietary intake caused by food shortages, feeding practices, or other events (Safari *et al.*, 2015). Wasting leads to significant weight loss; it indicates deficits in tissue and fat mass compared with amount expected in a child of the same height or length and may result either from failure to gain weight or from actual weight loss (WHO, 2000).

The descriptive analysis of nutritional status of children under-five years based on demographic characteristics of a child is summarized in Table 2. On gender aspects the study findings reveal that girls (24.9%) were more prone to malnutrition than boys (21.6%). A comparison of stunting between male and female showed that more female (14.6%) were stunted compared to 13.2% of male. Male children had also better height-for-age and weight-for-age than female children but had slightly higher percentage of weight-for-height. This result is contradictory with results of study by Wamani *et al.* (2007) who found that male children are more stunted than female children. The findings from this chapter concur with findings by Gibson (2005) who reported that female children are often deprived of resources due to socio-cultural settings. The relationship between sex of a child and nutritional status has been reported as favourable for male children, with discriminatory breastfeeding and supplementary practice for female children. Infant girls are breastfed less frequently, for shorter durations, and over short periods than boys.

Table-2. Nutritional status of Children under-five years in Pangani Districts (n =355).

Age groups (in months)	Normal		Stunted		Wasted		Underweight		Overweight		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
1 - 6	11	3.1	4	1.1	1	0.3	3	0.8	5	1.4	19	5.4
7 - 12	17	4.7	3	0.8	3	0.8	4	1.1	6	1.7	27	7.6
13 - 24	55	15.4	26	**7.3**	3	0.8	12	**3.4**	13	3.7	99	27.0
25 - 36	77	21.6	58	**16.3**	11	**3.1**	28	**7.8**	07	1.9	174	49.9
37 - 48	25	7.0	08	2.3			2	0.5			35	9.9
49 - 60	04	1.1									04	1.1
Birth Weight												
≥ 250 g	173	48.6	95	26.7	1	4.5	47	13.2			311	87.61
< 250 g	16	4.5	4	1.1	2	0.5	2	0.5			24	6.8
Sex of a child												
Male	93	26.2	47	13.2	11	3.1	19	5.3			170	47.9
Female	96	27.0	52	**14.6**	7	**1.9**	30	**8.4**			185	52.1

Note: *: Age range with highest level of undernutrition.

Further analysis showed that the highest rate of malnutrition as indicated by stunting, wasting and underweight increased with age and decreased as the children got older Figure 2. The increase was especially rapid during the second to the third years of life, as evidenced in the highest percentage of stunting rate of 23.6% from 13 to 36 months and underweight rate of 11.2% in the same age group. Nyaruhucha *et al.* (2006) reported similar results that children with age between 24 and 36 had high rate of malnutrition. Similar findings have also been reported in different countries for example in Nigeria, Kenya and rural India (Sarmistha, 1999; Kabubo-Mariara *et al.*, 2006; Babatunde, 2011).

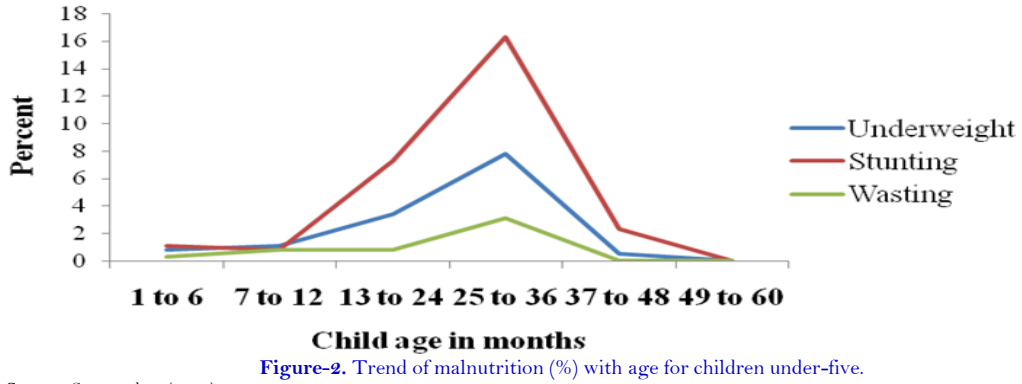

Figure-2. Trend of malnutrition (%) with age for children under-five.

Source: Survey data (2016).

This trend may be explained by the fact that in some instances parents tend to give less attention to older children, especially when they give birth to a new child who needs more attention and care. Similarly, the time mothers introduce complementary foods, types of food used for complementary feeding; feeding practices by mothers or care-takers including number of meals given in a day and the feeding frequencies may also contribute to the problem. It is also worth noting that in some studies it has also been concluded that the problem of malnutrition is age sensitive, that younger children are less likely to be malnourished than older ones (Shrimpton *et al.*, 2001).

3.3. Under-Five Child Care Practices by the Mothers/Caregivers in Pangani District

Child care involves all measures and behaviours which are necessary to translate available resources (food and health) into good child growth and development. Improved under-five child care practices which start when the mother is pregnant and go all the way to proper feeding practices, immunization status and health care behaviour can have impact on child health (Ramji, 2009). In this paper child care practices focused on health seeking behaviour by the mothers during pregnancy, child vaccination status and feeding practices among children under-five years.

3.3.1. Health Seeking Behaviour by the Mothers

Antenatal Care (ANC) coverage indicated good findings in the study areas since more than 90% of pregnant women had attended ANC Table 3. The results also showed that 69.9% of the mothers had attended a minimum of four times; 19% had attended 2 to 3 times during pregnancy while only 6.2% did not remember the number of times they had attended to ANC. The majority of the children (80.6%) were born at health facilities including the district hospital, village/community health centres or dispensaries compared to 19.4% who were born at home with assistance of either TBA or assisted by relatives. Of all under-five children, 71.5% were fully immunized while 28.5% were partially immunized. Antenatal care links the mothers/care-takers with the formal health system, thus increase the chance of using skilled medical attendants at birth. This may guarantee the child with better care; educating mothers on feeding practices and care during illness as a result reduce the chances of undernutrtion. According to RS/RHMT (2013) Pangani District has 22 health facilities, one of them being the district hospital, 1 health centre and 20 dispensaries. The availability of these health facilities apparently guarantees accessibility of immunization facilities. In order for children to be fully immunized, they have to get the six required vaccines: BCG for tuberculosis, OPV for polio, DPT for diphtheria-tetanus- pertussis and measles.

Table-3. Utilization of health services and child care practices (n = 355).

Variable	Frequency	Per cent
Antenatal clinic visits		
None	22	6.2
1-3	69	19.4
4+	248	69.9
Place of delivery		
Home	69	19.4
Healthy facility	286	80.6
Type of delivery assistance		
Health professionals	266	74.9
Traditional Birth Attendant (TBA)	51	14.4
Relatives	38	10.7
Child immunization coverage is up to date		
Partially immunized	101	28.5
Fully immunized	254	71.5

Note: n = number of respondents, % = per cent.

3.3.2. Infant Feeding Practices

The findings on infant feeding practices are presented in Table 4. The findings show that the majority of children 61.1% were breastfed within 30 minutes after birth. Although the prevalence of breastfeeding was higher compared to the nationwide status of 51% (TDHS-MIS, 2015-2016), the appropriate exclusive breast feeding was not practised. This was evidenced by the status of pre-lacteal feeding which shows that 27.6% of children were given plain water; 5.1% were fed with glucose or sugary water and 9.6% were given cow milk, baby formula and soft cassava porridge. This finding is supported by the FGDs. For example, during an FGD, one participant said: *"We give breast milk 2 to 3 days after delivery to allow mothers time to recover. In the mean time we give warm sugary water, cow milk or cassava porridge to the baby to stop the child crying..."* (A woman participant in FGD, Mwera Village).

Inappropriate feeding practices and their consequences were also observed in a study by Safari *et al.* (2015). They ascertained that delayed initiation of breast milk deprives infants of the nutritional benefits of colostrum and is likely to increase risks of neonatal mortality and impede nutritional status. Sub-optimal breastfeeding results in more than 800,000 under-five death annually worldwide. Of these, 22.3% of the neonatal deaths could be prevented if all children were breastfed in the first hour of their life (Liben *et al.*, 2016). WHO also recommends that an infant should be introduced to breast milk immediately after birth between 30 minutes to 1 hour (Black *et al.*, 2013; WHO and UNICEF, 2013).

More than two-fifths (43.1%) of children were provided with complementary food at the age below 6 months, while 9.6% started being given such food after 6 months. The findings also showed that the majority of the children (72.1%) were fed 3 to 4 times a day, but that 20.6% of children who were fed once or twice a day. Although the findings indicated that the frequency of feeding was reasonably satisfactory, there was early introduction of complementary food. This implies that exclusive breast feeding is not well practised in the study area to the extent of threatening health of under-five children. This consequently triggers a risk of infection due to early introduction of other solid foodstuffs. During FGDs participant stated that *"I had to give my grandchild soft porridge because her mother breastfed her in the morning and went to the shore to work and returned late in the evening"*..... (A grandmother caring for a four-month old infant in Bweni Village).

Table-4. Breastfeeding practices for children under-five years in Pangani District (n=355).

Variable	n	%
Breastfeeding immediately after birth (in hours)		
Within 30 minutes to 1 hour	217	61.1
After 2 hours to 24 hours	97	27.3
After 2 to 3 day	41	11.6
Child was given anything to eat/drink in the first 3 days		
None	205	57.7
Plain or sugary water	116	32.7
Cow or baby formula	34	9.6
Age at introduction of complimentary food (in months)		
Below 6 months	153	43.1
At 6 months	168	47.3
After 6 months	34	9.6
Duration of breastfeeding (in months)		
Still breastfeeding	120	33.8
Below 24 months	111	31.3
Within 24 months	108	30.4
After 24 months	16	4.5
Number of meals (per day)		
1- 2 times/day	73	20.6
3 - 4 times/day	256	72.1
5 – 6 times/day	26	7.3

Note: n = number of respondents, % = per cent.

This result suggests a need for a further study to realize the impact of women's gender roles on child health focusing on undernutrition. Similar results were reported in a study done by Moshy *et al.* (2013) which covered Chole and Jibondo Island. They revealed that women resume sea weed farming after 40 days to sustain family income; as a result, they reduce breast feeding frequencies and opt for early introduction of complementary foods. According to WHO (2008) breast milk alone is the right food for children until the age of six months. After six months, a child needs a variety of foods in addition to breast milk to meet the additional requirements for energy and nutrients.

3.3.3. Dietary Diversity

Dietary diversity among children under-five years in a week as described by parents and care givers is summarized in Figure 3. The findings indicate that 85.6% of the parents and care givers reported that cereals and tubers are consumed on a daily basis; 3.1% mentioned beef and 3.1% mentioned that eggs are less consumed. Although the study was conducted among fishing communities, the findings revealed that the consumption of fish and fish products was less than 50%. This is partly due to low catch resulting from climate change. Paricipants in an FGD in Ushongo village said. *"..we don't get big and enough fish due to climate variability; we only eat sardines (called dagaa in Kiswahili). If at all we manage to get big fish we sell them all to sustain our income"*. This implies that a good catch is only meant for business, and families rely on sardines which are considered as inferior. Although beef as well as chicken meat is not consumed on a daily basis but at least they are consumed two to three days in a week (55.8%), and dark green vegetables are consumed daily (31%) and two to three times in a week (40.3%). These results suggest that, apart from fish and fish products, beans and legumes are the most important sources of protein and dark green vegetables for minerals.

One of the key informant interviewees (KIIs) (Acting District Nutritional Officer) confirmed that, *"…there is a problem of balancing diet; the majority of the community memebres depend on only stapple foods like cassava, maize, yams, and food made from wheat and rice. The main source of protein is beans; green vegetables are only consumed to supplement protein foods, but not as part of diet. Although Pangani District is leading in milk production in Tanga Region, but milk is only meant for business purposes and not for family consumption…"*. These findings suggest that there is a need for a nutritional education programme, especially for pregnant and nursing mothers on how to balance diet using locally available food items.

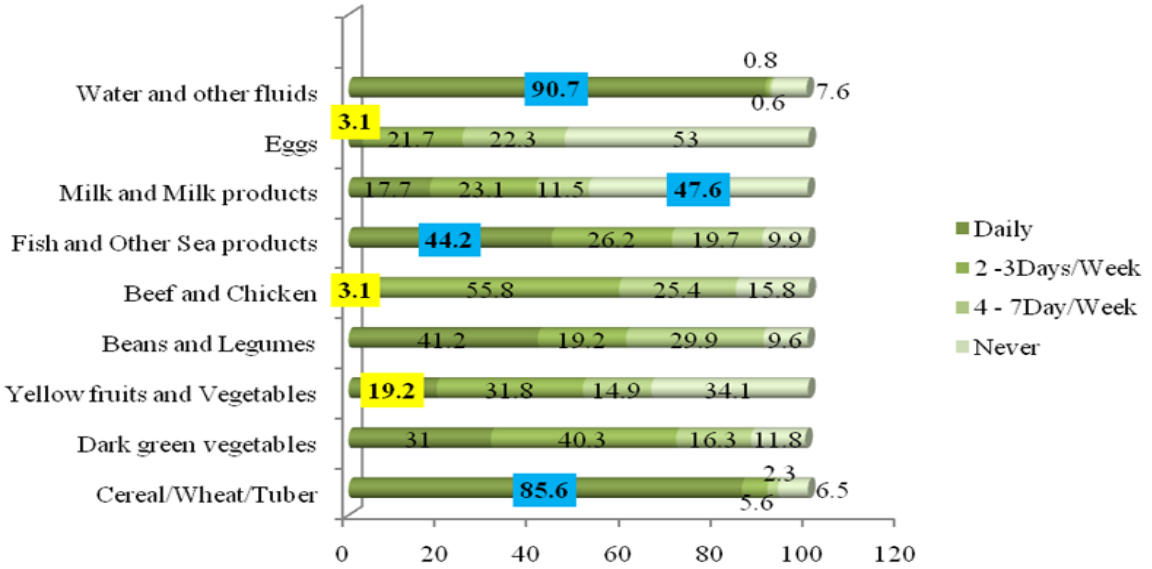

Figure-3. Dietary diversity and feeding frequency for children under-five in Pangani.

Source: Survey data (2016).

3.4. Influence of Individual Characteristics of a Child and Child Care Practices on Nutritional Status of Children Under-Five

The influence of child's individual characteristics and care practices by mothers or care givers was subjected to Cox's logistic regression model in order to single out specific factors that have influence on a child being malnourished (stunted, underweight or wasted) or otherwise. In order to ensure the credibility of the results multi-collinearity was performed. The term refers to a relationship among independent variables in multiple regressions. Multi-collinearity exists when some pairs of independent variables are highly correlated i.e. $r \geq 0.9$ (Pallant, 2007). A goodness of fit test using the Omnibus Test Model of Coefficients showed the Chi-square of 60.221, p-value of 0.000 indicating that the model fitted well with the data. This was supported by the Hosmer and Lameshow test result of 8.356 with p-value of 0.401. The amount of variation in the variable gave a Cox and Snell R Square of 0.172 and a Nagelkerke of R Square of 0.473 implying that 17.2 to 47.3% of the variance in the outcome variable was explained by the variables that were entered in the model. ß-coefficient with positive or negative signs indicates the direction of the relationship between dependent and independent variables; either ß increases (positive sign) or decreases (negative sign) the likelihood of the problem of malnutrition to occur. Wald test measures the magnitude of the problem and p-value is for testing the significance of influence of the predictors.

The results in Table 5 show that sex of a child had the highest influence (Wald 15.99; $p \leq 0.001$) on the likelihood of a child being stunted. The negative coefficient (ß = -1.08) indicates that male children were less likely to be stunted than female children. These findings confirmed the results of cross-tabulation Table 2, which indicated that more female children were stunted than male children and therefore support the conclusion by Gibson (2005) that male children are more favoured in nutritional care than female children, something which puts female children at a higher risk of being malnourished compared to male children.

The findings indicated that appropriate exclusive breastfeeding has significant influence on undernutrition as shown by its association with stunting and wasting levels. Although the findings indicated a significant association with stunting but the influence was not that severe as the odds ratio was less than 1, meaning that for every child who was not exclusively breastfed the chances of being stunted were only by 0.432. However, exclusive breastfeeding indicated a significant influence on the child being wasted (ß = 3.564, Wald 3.994, p = 0.059). The Wald positive coefficient indicates that exclusive breastfeeding increases the chances of a child being not wasted. Similarly, number of meals given to a child per day had negative influence on a child being underweight (ß = -3.46, Wald 15.46, p = 0.000). The negative coefficient of the number of meals given to a child in a day indicates that children who are fed more frequently in a day are less likely to be underweight.

In an FGD, participants said: "*children are fed with what is available and the feeding is done on demand and availability of the food…*" (A participant from Ushongo village). Children fed frequently with balanced meals are protected from malnutrition while infrequent child feeding contributes to child malnutrition. This is due to the fact that the child's stomach cannot accommodate a large amount of food at once (Smith and Haddad, 2000) during complementary feeding the food given to a child should be rich in nutrients or (balanced food) to promote developmental growth of a child. Feeding frequency has been found to protect children against malnutrition.

Empirical findings of this study suggest that there is a strong relationship between sib-ship size and the health outcomes. This is evidenced by the Wald statistics values, which showed that having siblings under-five in the same household had the highest negative impact (ß = -1.08, Wald = 8.435, p = 0.004) and (ß = 0.16, Wald = 13.54, p = 0.00) on the likelihood of children being wasted and underweight respectively. The odds ratio for number of sibling was 9.689, suggesting that having a sibling under-five years increases the chances of children being wasted by 9.689. The influence of number of siblings under-five years and health outcomes has also been explained by other researchers. For instance, Blake (1989) uses "Resource Dilution Model" to explain the relationship between sib-ship size and health outcome. The model posits that parental resources are finite and that as the number of children increases, the resources accrued by anyone child also decreases. This implies that the presence of more than one child in the household not only brings resource constraints but may also bring competition among siblings over

resources as a result of unequal health outcomes such as undernutrition.

Despite successful immunization coverage in the study area, the regression analysis showed that immunization status has significant influence on wasting and underweight as indicated by the odds ratio for wasting and for underweight, which were 3.2 and 59.82 respectively. This implies that poor immunization coverage has over 3 and 59 times likelihood of causing malnutrition (wasting and underweight respectively) than any other variable. Immunization status is one among the most important care practices which have significant influence on under-five nutritional status. Non-immunized children are at a high risk of increase or reoccurrence of infectious diseases and subsequently at risk of malnutrition or early death than fully immunized ones. The results also showed that ANC visits had the highest impact (ß = 7.9, Wald = 23.43, p = 0.005) on the likelihood of children being underweight. This can be interpreted that ANC visits reduce the chances of having undernourished children. Ozor and Omuemu (2014) reported similar results that women who do not utilize pre-natal care are six times more likely to have low birth weight infants, which may lead to undernutrition.

In order to achieve the full life-serving potentials that ANC promises for women when pregnant and during delivery, at least four ANC visits providing essential evidence based interventions are required. Essential interventions on ANC include identification and management of obstetric complications, tetanus immunization, intermittent preventive treatment for malaria during pregnancy, and identification and management of infections including HIV, syphilis and other sexually transmitted diseases. ANC is also an opportunity to promote the use of skilled attendants at birth and health behaviours such as breastfeeding. These findings coincide with the theoretical approach proposed by Becker (1965;1981) that a child's nutritional status reflects the combined effects of many factors including dietary diversity, health, individual characteristics of a child and health behavioural factors governed by parents or caregivers.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

This paper assessed the influence of child care practices on nutritional status of under-five children in Pangani District, Tanzania. Specifically, the paper determined the level of undernutrition and analysed the child care practices among the households with children under-five years old. The study findings revealed that malnutrition is still a public health problem because of higher level of stunting which is above national level with wasting, which is also beyond the acceptable level. Although descriptive analysis indicated that malnutrition is age sensitive, but its influence on undernutrition was not statically confirmed. Stunting and underweight was more profound in girls than in boys, meaning that malnutrition is more likely to affect girls than boys. Having another sibling under-five in the same household also showed a significant contribution to a child being wasted and underweight. Although overweight was not part of the study but it pictured out in the results; therefore specific attention is needed to determine its magnitude, causes and effects among under-five children in Pangani.

Descriptive analysis showed that nearly half of the children were given pre-lacteal feeding within three days after birth, and exclusive breastfeeding was not appropriately practised. These contributed to the status of malnutrition because children who were not exclusively breast fed were either underweight or wasted. Likewise, duration of breast feeding and number of meals given to the child in a day have impact on stunting and underweight. This implies that apt feeding practices play a major role in improving nutritional status of children under-five. This calls for emphasis on nutritional education and awareness on the importance of care practices on child health and development.

Table-5. Results of logistic regression on the influence of child individual characteristics and care practice by mothers on nutritional status of children under-five years (n=355).

Variables entered in the model	Stunting					Wasting					Underweight				
	ß	S.E	Wald	p-value	OR	ß	S.E	Wald	p-value	OR	ß	S.E	Wald	p-value	OR
Place of delivery	-0.683	0.405	2.839	0.092	0.505	-1.99	0.802	6.210	0.013	0.135	1.370	1.094	1.569	0.210	3.936
Delivery assistance	-0.840	0.380	4.898	0.027	0.432	-0.432	0.730	0.351	0.554	0.649	0.543	1.192	0.207	0.649	1.721
Sex of a child	-1.08	.272	15.99	0.000	0.337	-1.90	0.794	5.756	0.016	0.149	-0.002	0.933	0.000	0.998	0.998
Age of a child	0.112	0.153	0.538	0.463	1.119	-0.301	0.385	0.610	0.435	0.740	0.668	0.496	1.812	0.178	1.950
Have sibling U5	-0.153	0.328	0.218	.641	0.858	2.271	0.782	8.435	0.004	9.689	-4.12	1.120	13.54	0.000	.016
Immunization status	-0.312	0.318	.962	0.510	1.237	1.187	0.716	2.744	0.098	3.276	4.699	1.335	12.38	0.000	59.82
Essential ANC	-0.312	0.318	.962	0.327	0.732	-1.48	0.759	3.840	0.050	0.226	3.154	1.119	7.949	0.005	23.43
Breast fed after birth	0.108	0.332	.106	0.745	1.114	-.555	0.877	0.400	0.527	0.574	1.902	1.074	3.135	0.077	6.696
Exclusive breast feeding	0.241	0.272	.782	0.027	0.432	1.385	0.733	3.564	0.059	3.994	-1.09	1.027	1.142	0.285	0.334
Number of meals	-0.940	0.293	10.29	0.001	0.391	-0.817	0.754	1.173	0.279	0.442	-3.46	0.880	15.46	0.000	0.031
Constant	1.797	1.040	2.984	0.084	6.033	-0.778	2.14	0.131	0.717	0.459	0.508	3.094	0.027	0.870	1.662

Model fitting information: Omnibus test Chi-square = 60.221 (p = 0.000), Hosmer and Lameshow test = 8.356 (p = 0.401), -2 log likelihood 83.81[a], Cox and Snell R^2 = 0.172, Nagelkerke R^2 = 0.473.

The influence of child care practices and nutritional status of under-five were well demonstrated in this paper. It was observed that place of birth, kind of assistance mother received during delivery, ANC visits and immunization status were significantly associated with stunting, wasting and underweight. Children of mothers who delivered at health facilities under the assistance of health officers had lower chances of being malnourished. These results suggest that mothers who deliver at health facilities have opportunities of being served by health professionals and at the same time their new-borns have more access to vaccinations than otherwise. Therefore, delivery at health facilities guarantees the mothers opportunity to be served by health professionals and receive the entire required immunization for their child protection from infections which may lead to undernourished children.

4.2. Recommendations

Based on the above conclusions, the following recommendations are important: first, the problem of undernutrition observed in the study area was due to inappropriate feeding behaviours and child care practices by the mothers or care providers. The study recommends that the Government and other relevant stakeholders dealing with child's health and nutrition should upscale educational interventions at household level on positive behavioural change communication strategies on child care and feeding practices, ANC, immunization and proper feeding behaviours. Along with this, it is high time for Nutritional Officers at the District level to conduct education programmes among the communities in their localities.

Finally, the paper recommends the following further studies: that the contradiction of influence of sex and nutritional status needs to be explored in order to understand if the influence is based on social aspects or there is scientific explanation. Second, a further study should be done on the influence of maternal factors on under-five nutritional status; and third a study should be done to access to health services and health outcomes in order to rule out the influence of hospital delivery versus home delivery on the nutritional status of a child. The current paper focused on the individual characteristics of a child rather than on household characteristics in general. Therefore, a follow up research should be directed towards understanding the influence of household socio-economic characteristics on under-five nutritional status in order to devise appropriate measures which will assist directly the local communities.

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