

Effect of Family Structure on Nutritional Status of Pre-School Children (2 – 5years) in a Rural Nigerian Population

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Abstract

Objectives: This study evaluated the effect of family structure on nutritional status of three hundred (300) pre-school children randomly selected in the rural area of Ikwuano Nigeria. A high percentage (70.0%) had married parents, 85.0% were from monogamous families and 80.0% live with both parents. The major (45%) family size was 4 – 5persons, 36% had parents whose age was less than 36years old. Thirty percent of their fathers were civil servants and 70% of mothers were skilled laborers who earned between ₦11,000.00 – 20,000 per month. As much as 40% spend <₦6,000.00 on monthly food expenditure. The mean (SD) of anthropometric indices were height 1.0 (1.8)m, weight 18.4 (4.2)kg, Bicep 9.2 (1.6)mm, Triceps 9.2 (1.6)mm; MUAC 7.4(1.9)mm. Low percentages (0.7%) were severely under-weight, 25% were severely stunted and 6% were severely wasted. The BMI of subjects revealed that 35% were obese, 6.7% overweight and 10.7% were at risk of overweight. The position of the child in the family and type of family significantly influenced ($P<0.05$) the weight-for-age Z-score at 14.4% variability. The position of the child also influenced the height-for-age Z-score at 18.8% and weight-for-age at 9.1% variability.

Key words: Family structure, nutritional status, pre-school children, rural population.

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1. Introduction

Family is a group of people affiliated by consanguinity, affinity or co-residence (George *et al.*, 2005). As a social group characterized by common residence, economic co-operation and reproduction; it contains adults of both sexes, two of whom maintain a socially approved sexual relationship and one or more children biological or adopted of the sexually cohabiting adults (George *et al.*, 2005; Clark, 1993). The family is structured according to roles, rules, power and hierarchies (Biblarz and Gottainer, 2000). These structures are based on whether the parents or either of them is involved in the training of the children (Schneider *et al.*, 2005). The pre-school child belongs to an important life cycle stage that is of paramount importance to human development. The growth of these children is very rapid and have to be sustained by constant supply of adequate essential nutrients to enable them attain their full potential. Malnutrition has been known to constitute a huge problem for the family and the global community at large. It has been documented that as much as 60% of the global community is affected by malnutrition (Shrimpton, 2006). In fact in Africa, the prevalence of malnutrition is 34.5% (de Onis *et al.*, 2000), while in Nigeria as much as 42% of 1 -5years children are affected by chronic long standing malnutrition (Maziya Dixon *et al.*, 2004). This problem of malnutrition has reached the stage where it is now being referred to as the “double burden of malnutrition”, a situation where under nutrition and over nutrition co-exist, at first more in urban than rural areas, but then increasingly in the same communities and eventually even in the same households (Standing Committee on Nutrition-SCN, 2006). This implies that everybody (both young and old, rich and poor) is battling with the problem of malnutrition. It is also reported that having overweight parents (typically more mothers than fathers) and underweight children in the same household is a paradox (Doark *et al.*, 2005). This transition towards the double burden of malnutrition is associated with economic development, industrialization food insecurity and urbanization (Shrimpton, 2006; World Health Organization (WHO), 2005). The problem facing the pre-school child includes not only macro and micro nutrients deficiencies but also their dependence on others to procure, prepare and feed them good foods. These problems can only be addressed in a stable environment. Various studies have tried to investigate the effect of different factors on the nutritional status of various age groups (WHO, 2006). Some of these studies have generated enormous information, while some are still experiencing dearth of knowledge. It becomes pertinent at this point to investigate the effect of family structure on the nutritional status of pre-school children.

2. Materials and Methods

2.1 Study Design

A cross-sectional study of the effect of family structure on nutritional status of three hundred (300) pre-school children was conducted in the rural area of Ikwuano Local Government Area of Abia state, Nigeria.

2.2 Study Area

Ikwuano Local Government Area is located nine (9) kilometers east of Umuahia, Abia state capital on the Umuahia-Ikot Ekpene Road (Okezie, 2009). It has a population of one hundred and fifty seven thousand, six hundred and fifty six people (157,656) and forty-four autonomous communities (Okezie, 2009). It has boundaries with Bende LGA, Isi-ala Ngwa, Umuahia North LGA and Akwa-Ibom state. The climate is typical of the humid tropics and fairly even and uniform temperature throughout the year. The crops commonly grown in the area includes cassava, maize, yam, rice, sweet potatoes, African Yam Bean etc. The majority of the people are predominantly skilled laborers, followed by traders who engage in different business activities alongside civil service and farming.

2.3 Sampling Procedure

Twenty percent of the forty-four autonomous communities in Ikwuano LGA were purposively selected from which a simple random sampling method was used to select 300 pre-school children from households who gave their consent.

2.4 Data Collection

A structured interviewer-administered questionnaire was designed for the study. It was validated for content by nutrition experts in the Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture Umudike and pre-tested before administering it to the respondents. The respondents were the parents of the pre-school children (subjects) as they could not fill the questionnaires by themselves. The questionnaire was used to obtain information on children's personal data, family structure, parents' socio-economic characteristics and food consumption pattern of the subjects. Anthropometrics data such as weight, height, Body Mass Index (BMI), skinfold thickness and Mid-upper Arm circumference (MUAC) of the subjects were assessed. The weights of the children were taken with minimal clothing on a bathroom scale (Model BR 9012). The scale was placed on a flat surface and always set at zero reading before every measurement. Measurements were read and recorded to an accuracy of 0.1kg (Lohman *et al.*, 1988). The height was also measured to the nearest 0.01meter using a height gauge – a vertical calibrated board with a fixed base and a movable headpiece. This was placed on a hard leveled surface against a wall. The child was made to stand erect on the base plane without shoes and head gear in order to give accurate distance between the side of the feet and the crown of the head. As the child was looking straight ahead, the headpiece was lowered on top of the head and measurement were read and recorded to the nearest 0.01m (Lohman *et al.*, 1988). MUAC was measured using a flexible non-stretchable tape. The subjects were made to stand straight with the arms hanging as free as possible. The tape was then wound round the midpoint of the left upper arm between the shoulders and elbow tip making sure that it was neither too tight nor too loose; the measurements were read and recorded to the nearest 0.1cm. The selected skin fold thicknesses were measured using skin fold caliper. The flesh of the respondent at the selected point was picked up with the caliper and the readings recorded to the nearest 0.1mm.

2.5 Data Analysis

Data generated from this study were coded and then keyed into Excel spreadsheet and later summarized using statistical software STRATA 8A which employed descriptive statistics of mean \pm standard deviations (SD), frequencies and percentages. The effect of family structure was estimated using ordinary least squared regression function $Y = F(X_1, X_2, X_3, X_4, X_5) + e$; where Y = nutritional status (BMI), X_1 = marital status, X_2 = family type, X_3 = household size, X_4 = child position in the family, X_5 = age of the parents, e = error term. The weight and height measurements were used to calculate the BMI (weight (kilogram)/height (meter)²). The children were classified using the WHO (2012) reference BMI-for-age and height-for-age $-Z$ -scores for pre-school children. Children $>+2SD$ were classified as obese, between $+1SD$ and $<+2SD$ as overweight; $<-1SD$ to $-2SD$ was classified as underweight, while $<-2SD$ were classified as thin. For stunting, children $<-3SD$ were classified as severely stunted; those $<-2SD$ as moderately stunted; and those $<-1SD$ as mildly stunted. The skin fold thicknesses and MUAC value were compared with WHO reference standard (1998).

3. Results

3.1 Personal and family structure of rural pre-school children in Ikwuano Abia state

The age of the children ranged from 2-5 years (Table 1). More than half (57.7%) were males while 42.3% were females. Approximately 37% were in Nursery three, 32.7% in nursery two and 30.6% in nursery one. A high percentage (70.0%) of the children had married parents; 15%, 5% and 10% had single, divorced and widowed parent respectively. Majority (85.0%) of the children came from monogamous than polygamous (15%) families. Eighty percent of the children live with both parents while 15% and 5% live with only mother and only father respectively. Many (45%) were from moderate size families with 4 – 5 persons; 25% from families with 6 – 7 persons while 15% were from families with 8 – 9 persons and 2 – 3 persons respectively. Up to 30% were 3rd children in the family, 2nd and 4th position 20% each, while 1st children were only 10%. Twenty-five percent of the parents were less than 36years old; the same percentage was within the age range of 36 -40 years and 46 – 50

years respectively; 10% were aged between 41 – 45% years old and 15% were above 50years old.

3.2 Socio-economic characteristics of families of rural pre-school children

As much as 42.3% use public transport (school bus, tricycle etc) to school; 38.3% used private vehicles while 19.3% trek to school. Most of their houses were of bungalow (80%) with corrugated iron sheets (table 2), storey building (10%), mud (6%) and others (4%). More mothers (70%) than fathers (60%) had secondary education while more fathers (40%) than mothers (30%) had tertiary education. The primary occupation of mothers was skilled labor (70%) and fathers trading (50%). Thirty-five percent of the parents had a monthly income range of ₦11,000 – ₦20,000 while as much as 15% earned less than ₦11,000 monthly. The monthly food expenditure was less than ₦6,000 for 40% of the families, and less than ₦20,000 for 5% of the families.

3.3 Food consumption pattern of rural pre-school children in Ikwuano

Table3 shows that foods eaten by the children were determined by availability of food (80%), nutritional value (15%) and child's choice (5%). Family food purchases were frequently made by mothers (70%) while 6% fathers, 15% relations and 9% house-helps were also involved. Decision on what food is eaten is made by 55% fathers, 30% mothers and 15% relations. Food preparation was by mothers (85%), fathers (5%) and relation (10%). Most (85%) of the children ate their meals individually, only 5% had collective meals while 10% ate both individually and collectively. A high percentage of the children feed themselves, 15% and 5% were fed by parents (mothers 15%, fathers 5%). The daily frequency of meals was more than 3times for 70% of the children, 3times for 17.3% and less than 3times for 12.7% of the children. The quantity of meals eaten was adequate for 90% of the children and inadequate for 10%. Sixty-five percent claimed that the meals eaten by the children were nutritious while 35% of the respondents said that the children ate meals that were not nutritious. The children favorite foods included noodles (45%), rice and stew (40%) and beans and plantain (15%). Most (70%) of the children skipped meals while 30% claimed that they do not skip meals. The frequency of meal skipping was less than once a week for 35% of the children and 1 – 2 times a week for 64.3%. Unavailability of food (42.9%), food dislike (42.9%), no one to cook (7.1%) and limited time to feed (7.1%) were the reasons for meal skipping. Meals usually skipped were breakfast (92.9%) and lunch (7.1%). Sixty-five eat small quantity of meals when sick while 35% starve when sick. All the children snacked and favorite snacks were biscuits (60%) and cheese balls (40%). The frequency of snack consumption was daily for 75% of the children and 2 times a week for 25%. Reasons for snacking were likeness (60%) and unavailability of food (40%). The frequency of food consumption (table 4) shows that 53 children consumed meat and fish, 36 legumes, 72 bread and cereals, 119 roots and tubers, 64 fats and oil, 74 fruits and 78 vegetables 5–6 times a week and 130 milk and milk products 3–4 times a week.

3.4 Nutritional status of pre-school children in Ikwuano Abia State

The mean and standard deviation (SD) of the children anthropometric indices was 18.4(4.2)kg weight, 1.0 (1.8)m height, 18.1 BMI, 7.4 (1.9)cm MUAC, 9.2(1.6)mm Biceps and 9.2 (1.6)mm Triceps (table 5a). The weight-for-age data revealed that 0.7%, 1.7% and 97.7% of the children were severely underweight, underweight and normal respectively (table 5b). Height-for-age shows that 25% were severely stunted, 6% stunted and 69% had normal weight-for-age. Six percent of the children were severely wasted, 6.7% wasted and 87.3% had normal weight-for-height. The BMI of the children shows that as much as 35.3% were obese, 6.7% overweight, 40.7% at risk of overweight and 47.3% normal. Regression estimate of the effect of family structure on the nutritional status of pre-school children (table 6) shows that position of the child in the family (1st /2nd) and living in polygamous family significantly influenced the weight-for-age; height-for-age z-score and weight-for-age were influenced by position of the child in the family; while BMI of the children was significantly influenced by age of the parents (old) and single parent family.

4. Discussion

The data obtained from this study revealed that most of the children had good family structure as majority had married parents in their active age, were from monogamous and moderately-sized families and live with both parents. These characteristics translated to a suitable home environment that can support the well-being of children. According to Schneider *et al.* (2005) the child's well-being is affected by his/her environment (including the home) which is largely influenced by the family structure, composition and relationship to members in the household. Several authors have reported the importance of stable family union to child health, development and well-being (Morrison and Cherlin, 1995; Gallahar and Baker, 2004; Brown, 2006). The fact that majority of the children were from monogamous family stems from the study area, Ikwuano in Eastern Nigeria, an area largely habited by Christian faithful who advocates the marriage of one man one wife and stability of marriage unions. The staying together of parents suggests that both parents will be involved in catering for their children. On the contrary, Amato (2000) revealed that both parent may live together but not intact in their engagement or commitments towards child general training. The moderate-sized families of 4 -5 persons, and the active age (<50years) parents could be a pre-requisite to achieving food security - a situation that pertains when "all people", "at all times", have physical and economic access to sufficient, safe and

nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2002). Individuals with large family responsibility need to be economically viable to ensure food security (Ene-Obong, 2001). In this study, the active age parent will be physically and economically able to fend for moderate-sized families as compared with older parents with diminished physical capacity to engage in productive work to sustain a good standard of living. This is because there are indications that the ability of older adults compared to younger adults to generate sufficient income from their labor/work is restricted (Ogwumike and Aboderin, 2005). Keino (2004) revealed that the educational level of individuals significantly affect their health and nutritional status. Wardlaw and Hampl (2007) also reported that an individual level of education affects his/her income level which can lead to under-nutrition for illiterate ones. Most of the parents of the study children had secondary education status and it is therefore expected that they will know what constitute an adequate diet. According to Duffy (2002), an individual who does not know what constitute an adequate diet is not likely to consume the right type of food. The educational level of 85% of the study parents translated to a monthly income of ≤ ₦50,000 and food expenditure of ≤ ₦15,000 for 85% of the parents. These are some of the basic and underlying causes of malnutrition. De Irara-Esterez *et al.*, (2000) stated that low income groups have the tendency to consume less adequate diets. Similarly FAO/WHO (1992) revealed that with better purchasing power, an individual can get better and nourishing meals. Availability of food was the main determinant of what is eaten. This is because in rural areas households consume what is seasonally available from their farmland and forest; unlike in the urban areas where household income is the main determinant of what is eaten. Mothers in this study were mainly in charge of food purchases and preparation. This is conformity with the work of Steven (1999) who reported that mothers are culinary experts that prepare food to be consumed by family members. In this study, father's decision plays a significant role in influencing what meals the family consumed. This is because in a typical African setting, fathers are seen as the traditional heads of household, a chief breadwinner whose central role is to provide for both immediate and extended family members (Extended family culture, 2012). They are accorded enormous respect and mothers usually strive to please them in conformity with the African adage which says that "the way to a man's heart is through his stomach;" consequently, mothers usually request to know what the fathers' will like to be serve and ensure it will be served. The individual meal distribution as employed by most of the study families provides an opportunity for ascertaining what each child consumes at a time. Many of the children were fed by older relatives. This is could be because child feeding requires time and patience and most parents are usually engaged in activities to make ends meet to spare ample time for child feeding. Majority of the children in this study ate >3 times in a day. This is expected because in rural communities where there are lots of farms and forests that provide enormous fruits and vegetables, parents have less control over what their children eats in the afternoon (after school). The poor quality food fed to the children as reported in this study is in consonance with the work of Ene-Obong and Ekweagwu (2012) who reported that the quality of food consumed by rural families is likely to reduce due to poor storage facilities, inadequate reheating and the losses due to reheating. The favorite meals (stewed rice and noodles) consumed by the study children is because rice is a major staple in the study area (Olusanya, 1977); it could also be because of palatability and convenience as these meals are easily eaten without stress. Children are known to favor tasty meals that will give them less stress. Most of the children skipped breakfast. This finding is similar to the work of Sjoberg (2003) who reported that despite the benefits of consumption of breakfast, it is the meal commonly skipped by young people. The skipping of breakfast by the study population was because parents are always in a hurry to send their children to school so as to catch up with their businesses. Onofiok *et al.* (1996) stated that the usual practice of skipping breakfast is a function of most subject leaving home early for trading (in this case school) and will pre-dispose certain individual to the inability to meet the requirement for most of the problem nutrients in the region. The high level of meal skipping as recorded in this study was attributed to unavailability of food and food dislike. Popkin (1998) documented that high cost of food stuff influences what people eat and the food choices available to them. The frequency of meal skipping and the particular meal skipped in this study implied that these children may not meet their nutritional needs. Similar observation were reported by Keski-Rahkonen *et al.*(2003) who reported that skipping breakfast is associated with health compromising behaviors in adult and adolescents. It is important to note that despite the level and frequency of meal skipping in this study, all subjects still ate snacks; indicating that the skipped meals were later substituted with snacks. This study recorded a high frequency of snacking. Olumakaiye *et al.* (2010) reported that frequency of snacking can adversely affect students' health status given the abundance of energy dense and high fat ingredients they contain. The reasons for snacking (likeness and availability) are similar to the work of Yahia *et al.* (2008) where subjects selected fast foods due to its palatability, availability and convenience. The eating of small quantity of foods or skipping of meals when sick by the study children is attributed to loss of appetite. Ill health has been known to affect the appetite of the affected. The high weekly frequency of consumption of roots and tubers (Table 5) was because these foods form the major staple produced in the study area. Tropical tuber crops feature as major food items in the diet of people (Onwueme, 1978). Vegetables, fruits, breads and cereals and fat/oil

were also highly consumed. These foods are usually very much available in rural communities. The consumption of meat, fish and legumes were appreciably low. This finding indicates that although these foods were equally available in the study area, they are usually seen as luxury foods and are very expensive; only economically viable households can afford them on a daily basis. The overall consumption of milk and milk products was very low as none of the study children consumed them up to 5 – 6 times a week. This is very unfortunate since milk is extremely valuable in the diet and can contribute to the daily nutrients intake of children and adults alike. According to Kon (2002), milk is nutrient-rich food that provides a large number of nutrients relative to the calories consumed. Its' products have been shown to reduce plague and stimulate saliva which helps to keep the mouth clean, very good for strong and healthy teeth (Mocquot, 1992); prevent many forms of illness and diseases (FAO, 1968). Not all the children consumed foods from fat/oil, meat/fish, and bread/cereals groups. This is worrisome because Florence et al. (2008) identified diet adequacy, variety and increased consumption of fruits and vegetables as specific aspects of diet quality important to academic performance. It is therefore not surprising that there is the existence of double burden of malnutrition among the study children. Some were severely underweight, stunted, wasted and obese. This situation calls for urgent action since malnutrition even in its mildest forms during childhood can have detrimental effects on the behavior of children, their school performance and overall cognitive function (Burger *et al.*, 2005). However many of the children had normal weight for age, normal height for age and normal weight for height; very few were underweight; that is, the prevalence of underweight in this study was 2.4%, stunting 31% and wasting 12.7%. This is quite low compared to previous studies of rural school children in low income countries which reported overall prevalence of stunting and underweight to be high; Partnership for Child development (1998) 48 – 56% stunting; 34 – 62% underweight; Nabag (2011) 59.1% underweight; 47.7% stunting in Khartoum State, Sudan; Olusanya (2010) 49.3% - 51.3% underweight; 21.6% stunting in Ogun State Nigeria. This could be attributed to the good family structure, meal and snacking frequencies of the study children. Family structure variables like the position of child in the family and the type of family (polygamous) significantly influenced the weight-for-age z-score. This indicates that family size tend to deplete the resources of the family more because of huge demands from the members. This is in agreement with the report of Ene-Obong (2001) that the number of people in a household would affect the quantity and quality of food consumed. The position of the child also influenced the height-for-age and weight-for-age z-score. Old age and single parent family also influenced the BMI of the respondents. This is because younger parents are stronger and more agile in terms of day to day welfare and nutrition of their children than the aged. Scheider *et al.* (2005) already documented that it is necessary for both parents to be involved in child's upbringing.

5. Conclusion

All the family structure variables studied have significant influence on the nutritional status of the rural children. It is therefore imperative to advocate that families should reproduce children based on the capacity of care; parents should live together to help their children achieve full potential; conducive home environment and nutrition education for all families.

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Table 1 Personal and family structure characteristics of rural pre-school children:

Personal/characteristics		Frequency (%)
Gender	Male	173 (57.7%)
	Female	127 (42.3%)
Age	2 years	69 (23.0%)
	3 years	73 (24.3%)
	4 years	77 (25.7%)
	5 years	81 (27.0%)
Nursery class	One	92 (30.6%)
	Two	98 (32.7%)
	Three	110 (36.7%)
Marital status	Married	210 (70.1%)
	Single	45 (15.0%)
	Divorced	15 (5.1%)
	Widowed	30 (10.0%)
Family type	Polygamous	45 (15%)
	Monogamous	255 (85%)
Child lives with	Both parents	240 (80.0%)
	Mother alone	45(15.0%)
	Father alone	15 (5.0%)
Family size	2-3 persons	45(15.0%)
	4-5 persons	135 (45.0%)
	6-7 persons	75 (25.0%)
	8-9 persons	45 (15.0%)
Child position in the family	First	30 (10.05)
	Second	60 (20.0%)
	Third	90 (30.0%)
	Fourth	60 (20.0%)
	Others	60 (20.0%)
Parents' age	<36	75 (25.0%)
	36-40	75 (25.0%)
	41-45	30 (10.0%)
	46-50	75 (25.0%)
	>50	45 (15.0%)

Table 2 Socio-economic characteristics of families of rural pre-school children

variables		Frequency (%)	
Means to school	Trekking	58 (19.3%)	
	Public vehicles	127 (42.3%)	
	Private vehicles	115 (38.3%)	
Housing type	Bungalow	240 (80.0%)	
	Storey building	30 (10.0%)	
	Mud house	18 (6.0%)	
	Others	12 (4.0%)	
Parental occupation	Civil servant	90 (30.0%) F	-
	Skilled laborer	-	210 (70.0%)M
	Unskilled labor	45 (15.0%) F	90 (30.0%) M
	Trading	150 (50.0%) F	-
	Farming	15 (5.0%) F	-
Parental education	Secondary level	180 (60.0%)F	210 (70.0%)M
	Tertiary level	120 (40.0%)F	90 (30.0%)M
Monthly income	< ₦11,000	45 (15.0%)	
	₦11,000 – ₦20,000	105 (35.0%)	
	₦21,000 – ₦30,000	15 (5.0%)	
	₦31,000 – ₦40,000	45 (15.0%)	
	₦41,000 – ₦50,000	30 (10.0%)	
	> ₦50,000	60 (20.0%)	
	food expenditure /month	< ₦6,000	120 (40.0%)
	₦6,000 – ₦10,000	135 (45.0%)	
	₦16,000 – ₦20,000	30 (10.0%)	
	> ₦20,00	15 (5.0%)	

F= Father, M= Mother

Table 3a Food and snack consumption pattern of rural pre-school children in Ikwuano:

Consumption pattern variables		Frequency (%)
Determinant of food consumed	Availability	240 (80.0%)
	Child's choice	15 (5.0%)
	Nutritional value	45 (15.0%)
Family food purchases by	Mother	210 (70.0%)
	Father	18 (6.0%)
	Relation	45 (15.0%)
	House help	27 (9.0%)
Decision of what is eaten	Mother	90 (30.0%)
	Father	165 (55.0%)
	Relation	45 (15.0%)
Food preparation by	Mother	255 (85.0%)
	Father	15 (5.0%)
	Relation	30 (10.0%)
Food distribution	Individually	255 (85.0%)
	Collectively	15 (5.0%)
	Individually collectively +	30(10.0%)
Child feeding	Mother	45 (15.0%)
	Father	15 (5.0%)
	Self	215 (71.7%)
	House help	25(8.3%)
Number of times eaten per day	<3 times	38 (12.7%)
	3 times	52 (17.3%)
	>3 times	210 (70.0%)

Table 3b Food and snack consumption pattern of rural pre-school children in Ikwuano:

Consumption pattern variables		Frequency (%)
Quantitative adequacy of meals	Adequate	270 (90.0%)
	Not adequate	30 (10.0%)
Qualitative adequacy of meals	Nutritious	105 (35.0%)
	Not nutritious	195 (65.0%)
Child's favorite meal	Noodles	135 (45.0%)
	Rice and stew	120 (40.0%)
	Beans and plantain	45 (15.0%)
Meal skipping	<1 times per week	75 (35.7%)
	1 – 2 times per week	15 (64.3%)
Reasons for skipping meals	No one to cook it	15 (7.1%)
	Food not available	90 (42.9%)
	Food dislike	90 (42.9%)
	Limited time to feed	15 (7.1%)
Meals usually skipped	Breakfast	195 (92.9%)
	lunch	15 (7.1%)
eating pattern when sick	Eat small quantity	195 (65.0%)
	Skip meals	15 (7.1%)
Snack consumption	Eats snacks	300 (100%)
Favorite snacks	Biscuits	180 (60.0%)
	Cheese balls	120 (40.0%)
Snacking	Daily	225 (75.0%)
	2 times per week	75 (25.0%)
Reasons for snacking	Likes snacks	180 (60.0%)
	Food not available	120 (40.0%)

Table 4: The frequency of food consumption

Type of food	frequency			
	5 – 6 times/week	3 – 4 times/week	1 – 2 times/week	0 times/week
Meat & fish	53	100	127	20
Milk & products	-	130	170	-
Legumes	36	146	118	-
Bread & cereals	72	95	129	4
Root & tubers	119	81	100	-
Fats & oil	64	56	135	45
Fruits	74	125	90	11
vegetables	78	147	75	-

Table 5a: Anthropometrics indices of pre-school children in Ikwano

Anthropometric index	Mean	Standard deviation
Weight (kg)	18.4	4.2
Height (m)	1.0	1.8
BMI (kg/m ²)	18.1	2.3
MUAC (cm)	7.4	1.9
Bicep(mm)	9.2	1.6
Triceps(mm)	9.2	1.6

Table 5b: prevalence of malnutrition among rural pre-school children in Ikwano

variables	Frequency (%)	
Weight-for-age	Severely underweight	2 (0.7%)
	Underweight	5 (1.7%)
	Normal	293 (97.7%)
	Total	300 (100%)
Height-for-age	Severely stunted	75 (25.0%)
	Stunted	18 (6.0%)
	Normal	207 (69.0%)
	Total	300 (100%)
Weight-for-height	Severely wasted	18 (6.0%)
	Wasted	20 (6.7%)
	Normal	262 (87.3%)
	Total	300 (100%)
BMI	Obese	106 (35.3%)
	Overweight	20 (6.7%)
	Possible risk of overweight	32 (10.7%)
	Normal	142 (47.3%)
	Total	300(100%)

Table 6: Regression estimate of the effect of family structure on the nutritional status of pre-school children

Factors	Unstandardized coefficients	t-value	Significant
Weight-for-height			
Constant	1.161	9.468	0.00
First/second child	1.251	5.995	0.00
Polygamy	0.712	2.720	0.07
R² = 0.144			
Height-for-age			
Constant	0.932	4.621	0.00
First/second child	-3.057	-8.303	0.00
R² = 0.188			
Weight-for-age			
Constant	1.406	15.483	0.00
First/second child	-0.908	-5.478	0.00
R² = 0.091			
BMI			
Constant	2.043	8.910	0.00
First/second	1.297	4.898	0.00
Old age (>46years)	0.940	-3.347	0.01
Unmarried	-0.829	-3.129	0.02
R² = 0.181			

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