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Association of maternal nutrition knowledge and child feeding practices with nutritional status of children in Calabar South Local Government Area, Cross River State, Nigeria

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Abstract

Maternal nutrition knowledge and child feeding practices are essential in child's growth and development. Without adequate nutrition knowledge and optimal feeding practices, poor nutritional status among children can arise even in households with adequate income and food, good sanitation and health services. The consequences of Undernutrition can have long-term limiting impact on child's growth. This paper presents the level of maternal nutrition knowledge and their child feeding practices, and the influence they have on child's nutritional status in an urban area in Nigeria. A validated interviewer-administered questionnaire was used to collect information from mothers of children 6-23 months of age. The level of maternal knowledge on child health and nutrition was examined; overall knowledge was classified as good, fair and poor. Also, the child feeding practices among mothers using the World Health Organization indicators for assessing infant and young child feeding was assessed. The weights and heights of the children were measured using standard procedures and converted to indices that were used to measure stunting, underweight and wasting. The findings showed that most of the mothers had insufficient nutrition knowledge as they fell into the category of fair and poor knowledge and most of the children were sub-optimally fed. Thus, it was not surprising when their nutritional status revealed high prevalence of malnutrition. Consequently, poor maternal nutritional knowledge and feeding practices is found to be a predisposition to malnutrition in children in their first two years of life.

Keywords: Nutritional status, infants and young children feeding practices, maternal nutritional knowledge, malnutrition, child care, urban Nigeria.

1. Introduction

According to UNESCO (2012) ^[1], health and nutrition during early childhood is a strong reflection of a country's level of development. For the individual, adequate nutrition ensures proper growth and physical development, high reproductive level and capability of immune system from conception to adulthood (David 2002) ^[2]. Nutritional status defined as the evidence of nutrition of an individual, can be determined by the quality of nutrients consumed and the body's ability to utilize the nutrients for its metabolic need (Amosu *et al.* 2011) ^[3]. Several underlying factors however, dictate, for example, the quality and quantity of available food that a child will receive such as the household's ability to secure food and other factors such as the level of knowledge of the mother with respect to child nutrition and care (UNICEF 1998) ^[4].

A mother is the major provider of the principal care that her child needs during the first five years of life. Knowledge about dietary needs is essential for good health and overall nutritional status especially when resources are few. Sometimes mothers do not know the importance of variety and balance in the diet and the right amount and types of foods needed by children to meet these dietary needs. Without adequate knowledge, malnutrition and poor nutritional status can occur in households with sufficient income, food and health services (FAO 2011) ^[5]. This is not to say that mothers of malnourished children are necessarily ignorant or that all illiterate mothers whether their children are healthy or not, are ignorant, but their knowledge level on child health and nutrition can have a major toll on the children's general health.

Optimum feeding of infant and young children is one of the main essential determinants of their growth and survival (Michaelson *et al.* 2003) [6]. According to WHO (2008) [7], infant and young child feeding practices directly affect the nutritional status of children under two years of age and, ultimately, impact child survival. For a healthy and optimum child growth, recommendations are that infants should be breastfed immediately after delivery (within one hour), given no pre-lacteal feeds, exclusively breastfed for the first six months of life, and given complementary foods from six months of age with continued breastfeeding up to two years of life (BBS/UNICEF 2007) [8]. However, common feeding options practiced by mothers in developing countries including Nigeria maybe doing some harm than good for the development of young children.

It is reliably estimated that, globally, below five years, 161 million children under age 5 are stunted, 51 million are wasted, and 42 million are overweight; none of these children are growing healthily (UNICEF/WHO/World Bank 2015) [9]. According to NPC (Nigeria) & ICF International (2014) [10], stunting is more common in rural areas (43%) than urban areas (26%) and wasting is less common (14%) but equal in the rural and urban areas. Conversely, the nutritional situation in Cross River State (CRS) has not been encouraging. Child malnutrition remains high. According to NPC (Nigeria) & ICF International (2014) [10], 2013 prevalence rates in CRS for stunting, wasting and underweight were 21.7%, 9.8%, and 14.8% respectively. Due to the enormity of malnutrition in the State, a committee on food and nutrition has been inaugurated by the State government to minimize the widespread (CRS Ministry of Information 2011) [11]. Although the causes of nutritional problems and their effects are widely documented, their prevalence and influence on nutritional status differ from one area to another. Similarly, few studies have been conducted on the relationship between the knowledge of mothers as regards child health and nutrition and nutritional status of their under-five children especially in CRS, Nigeria. Therefore, the main purpose of this study is to assess the influence of mothers' nutrition knowledge and child feeding practices on the nutritional status of their children 6-23 months in Calabar South in CRS, Nigeria.

2. Methodology

2.1 Study design

The study design was a descriptive cross-sectional survey.

2.2 Study area

This survey was conducted in Calabar South Local Government Area of Cross River State, Nigeria. Calabar South has an area of 264 km² with a density of 725.4inh/km² and a population of 191,630 (NPC 2006) [12]. It is an urban area and consists of 12 wards and the people are predominantly traders, fishermen and civil servants.

2.3 Sample population

The sample population selected for the study was women of childbearing age and their children (6-23 months) residing in study area.

2.4 Sample size

The sample size was determined using the Cochran formula (Cochran 1963) [13].

$$N = \frac{Z^2 pq}{d^2}$$

A total sample of 326 was used for the study to allow for a response rate of 80%.

2.5 Sampling procedure

A multi-stage sampling procedure was adopted in selecting respondents for this study. The sampling procedure involved a three stage sampling process. The study area is composed of 12 wards and each ward has between 3 and 13 communities. In the first stage; four wards were selected out of the 12 wards by balloting. Next, from each of the wards, two communities were selected by simple random sampling making a total of eight communities selected. Finally, from each of the communities, 41 households were selected by simple random sampling making a total of the sample population needed for the study. From each household, only one mother-child pair was selected for the study.

2.6 Ethical approval/ informed consent

Ethical clearance was obtained from the Ethics Committee of the University of Calabar Teaching Hospital, Calabar. Informed consent of mothers was obtained, requesting their voluntary consent orally.

2.7 Data collection

Information was collected from respondents using a content validated interviewer-administered questionnaire.

2.8 Measure

Anthropometric measurement of the child was assessed by taking weight and height measurement and converted to nutritional status indicators; weight-for-height (WFH), weight-for-age (WFA) and height-for-age (HFA), and is expressed as z-scores based on a standard reference of measurement using the WHO Anthro software. Children were classified as wasted (WFH -2 z-score), severely wasted (WFH -3 z-score); underweight (WFA -2 z-score), severely underweight (WFA -3 z-score); stunted (HFA <-2 z-score), severely stunted (HFA <-2 z-score) (WHO 2006) [14]. Maternal knowledge on child health and nutrition was assessed, and the overall knowledge variable classified as poor, fair and good. Maternal feeding practices were measured using WHO Infant and young child feeding indicators (WHO 2010) [15].

2.9 Data analysis

Data was analyzed using the statistic software IBM SPSS 20. Descriptive statistics was carried out for all the variables. Binary association between the independent variables; maternal knowledge and feeding practices, and the dependent variables, nutritional status indicators, were tested using Chi-square test. Significant level for all associations was set at $p < 0.05$.

3. Results

Maternal and household characteristics showed that mean age of mothers was 25.6±4.16 years. Majority (93.0%) were within the reproductive age range, while about 5.8% were less than 20 years. Most of the mothers (91.1%) were married, while 8.3% were single mothers. More than half of the mothers (59.5%) had a secondary education as their highest level of education followed by those who had primary education (17.8%); only about 1.2% of the mothers had no formal education. About 42.9% of the mothers were unemployed, 36.9% were self-employed and 17.5% were civil servants. Mean age of children was 14.54 ± 5.38 months; 37.7% were aged 6-11 months, 28.5% were 12-17 months and 33.7% were 18-23 months.

3.1 Maternal knowledge on child health and nutrition

Maternal knowledge on child health and nutrition is shown in Table 1. Most of the mothers (91.7%) had knowledge about exclusive breastfeeding; and the duration of exclusive breastfeeding was also known by majority of the mothers (82.8%). However, on the period to commence complementary foods it was observed that only 28.5% of the mothers knew the appropriate age to do so; as even lesser proportion (8.6%) of the mothers knew the duration of time breastfeeding must continue for the child. Most of the mothers (83.1%) knew the importance of immunisation. More than half (52.0%) of the mothers knew what balanced diet meant. The proportion that had knowledge about the classes of nutrient was 35.0%, against 65% who had no knowledge. Knowledge about sources of vitamins was 24.8%. Some mothers (42.9%) had knowledge of diarrhoea and about 24.3% knew the causes of diarrhoea, with only 21.2% observed to have the knowledge on how to manage diarrhoea in children. Overall, 20% of the mothers had good knowledge on health and nutrition of their children, 44.6% had fair knowledge, while 35.3% had poor knowledge.

Table 1: Maternal knowledge on child health and nutrition of the respondents

Characteristics	N	%
Knowledge about exclusive breastfeeding		
Incorrect	27	8.3
Correct	299	91.7
Knowledge about duration of exclusive breastfeeding		
Incorrect	56	17.2
Correct	270	82.8
Knowledge about duration of breastfeeding		
Incorrect	298	91.4
Correct	28	8.6
Knowledge about when to start complementary foods		
Incorrect	233	71.5
Correct	93	28.5
Knowledge about importance of immunization		
Incorrect	55	16.9
Correct	271	83.1
Knowledge about balance diet		
Incorrect	189	58.0
Correct	137	52.0
Knowledge about classes of nutrient		
Incorrect	212	65.0
Correct	114	35.0
Knowledge about sources of vitamins		
Incorrect	245	75.2
Correct	81	24.8
Knowledge about diarrhea		
Incorrect	186	57.1
Correct	140	42.9
Knowledge about how to manage Diarrhea		
Incorrect	257	78.8
Correct	69	21.2
Overall health and nutrition knowledge		
Poor	114	35.3
Fair	150	44.2
Good	62	20.6

3.2 Infant and young child feeding practices

Table 2 presents infant and young child feeding practices of the respondents. Almost all the children (98.8%) in the study had been breastfed before and only 1.2% of the children had never received breastmilk before. The proportion of children who were still breastfeeding at one year was observed to be

more than half (56.9%). The proportion of infants who were receiving solid, semi-solid and soft foods at 6-8 months was 75%. Most of the children (63.5%) had received the minimum diet diversity; this rate was lowest (46.0%) for infants 6-11 months and highest (80.7%) among infants 12-17 months. The proportion of children who received the minimum feeding frequency as recommended was only 26.2%. The rate of feeding children the minimum acceptable diet was 17.7%. The rate of continued breastfeeding at two years was shown to be 11.8%. Children who received foods with a feeding bottle were shown to be 30.3% and non-breastfed children who met the criteria for milk feeding frequency were 33.8%. On initiation of breastfeeding, majority of the mothers (65.3%) reported to have fed their child with breastmilk immediately child was delivered. Colostrum feeding showed that only 3.1% did not feed their children during early infancy with colostrum. This small fraction of mothers who did not feed their children with colostrum gave reasons such as; colostrum being harmful to the child (60%) and advice not to feed colostrum (20%). Pre-lacteal feeding rate was observed to be 22.6%. Within first six months most of the children (45.8%) were fed breastmilk in combination with other foods such as infant formula or other semi-solid and soft foods, whereas, the rate of exclusive breastfeeding for six months was 39.6%.

Table 2: Infant and young child feeding practices of the respondents

Characteristics	N	%
Continued breastfeeding at one year		
Did not continue	28	43.1
Did continue	37	56.9
Introduction of solid, semi-solid and soft foods 6-8 months		
Did not introduce solids at 6-8 months	9	25.0
Did introduce solids at 6-8 months	27	75.0
Minimum dietary diversity		
Did not meet the minimum dietary diversity criteria	114	36.5
Did meet the minimum dietary diversity criteria	198	63.5
Minimum meal frequency		
Did not meet the minimum meal frequency criteria	208	73.8
Did meet the minimum meal frequency criteria	74	26.2
Minimum acceptable diet		
Did not meet the minimum acceptable diet criteria	247	82.3
Did meet the minimum acceptable diet criteria	53	17.7
Continued breastfeeding at two years		
Did not continue	67	88.2
Did continue	9	11.8
Bottle feeding		
Did not bottlefeed	225	69.7
Did bottlefeed	98	30.3

3.3 Nutritional status of children

Mean and standard deviation values for the anthropometric indicators for all the children are as follows weight-for-height: -1.58 ± 0.94 , weight-for-age: -1.98 ± 0.75 and height-for-age: -1.58 ± 1.11 (Table 3). The overall prevalence of wasting was 27%. Among the females prevalence of wasting was 28.4% and 25.6% among the males, severe wasting was 6.7% in all children with the female having higher prevalence than males (7.4% against 6.1%). Prevalence of underweight was 38.7% for all the children, the prevalence underweight for males was higher 43.9% than the females (33.3%), males were also more severely underweight than the female children (10.4% against 7.4%). Prevalence of stunting was 8.9% and about 43.3% of males (43.3%) were stunted while about one-third (29.0%) of

female were seen to be stunted; males also had higher prevalence for stunting than the females (9.8% against 3.1% respectively).

Table 3: Prevalence of malnutrition by gender (N = 326)

Anthropometric indicators	Males	Females	All
	%	%	N (%)
Wasting (WFH<-2 z-score)	25.6	28.4	88 (27) (22.0, 32.0 95% CI)
Severe Wasting (WFH<-3 z-score)	6.1	7.4	6.7 (3.9-9.6 95% CI)
Underweight (WFA<-2 z-score)	43.9	33.3	126 (38.7) (33.2-44.1 95% CI)
Severe Underweight (WFA<-3 z-score)	10.4	7.4	8.9 (5.7-12.0 95% CI)
Stunting (HFA<-2 z-score)	43.3	29.0	118 (36.2) (30.8-41.6 95% CI)
Severe stunting (HFA <-3 z-score)	9.8	3.1	5.5 (2.9-8.2 95% CI)

3.4 Association of malnutrition by maternal nutrition knowledge and feeding practices

Analysis indicated a statistically significant ($p<0.05$)

association between maternal knowledge on child health and nutrition with underweight and stunting, but not with wasting. Underweight and stunting prevalence was lowest among mothers who exhibited good knowledge about health and nutrition of children compared with those who showed poor or fair knowledge (Table 4). Introduction to complementary foods at 6-8 months was significant only with wasting and underweight, as children who had not yet been introduced to complementary foods were more predisposed to wasting and to underweight. Similarly, children who had not received the minimum dietary diversity were also predominantly more wasted, underweight and stunted. These associations were all statistically significant ($p<0.05$). Receiving the minimum meal frequency was statistically associated with underweight and stunting; in the manner that prevalence of wasting was higher among children who were not receiving the minimum feeding frequency. Although receiving the minimum meal frequency indicated lower rate for wasting relative with those not receiving, this association failed to show statistical significance. As with meal frequency, the rate of underweight and stunting was higher among children who did not meet the minimum acceptable diet criteria. Bottle feeding was significantly associated with stunting in bivariate level.

Table 4: Association of malnutrition by maternal nutrition knowledge and feeding practices

	Wasting				Underweight				Stunting			
	%	Total	X ²	P	%	Total	X ²	P	%	Total	X ²	P
Maternal knowledge												
Poor	28.9	114	0.340	0.844	49.6	115	11.151	0.004	45.6	114	11.995	0.002
Fair	26.0	150			36.1	154			36.0	150		
Good	25.8	62			25.4	67			19.4	62		
Introduction of solids at 6-8 months												
No	77.8	9	14.954	0.000	77.8	9	6.438	0.011	33.3	9	0.044	0.835
Yes	11.1	27			29.6	27			29.6	27		
Minimum dietary diversity												
No	34.2	114	5.828	0.016	48.2	114	8.302	0.004	47.4	114	9.668	0.002
Yes	21.7	198			31.8	198			29.8	198		
Minimum meal frequency												
No	28.8	208	0.949	0.330	45.2	208	9.927	0.002	41.3	20.8	3.898	0.048
Yes	23.0	74			24.3	74			28.4	74		
Minimum acceptable diet												
No	27.9	247	0.255	0.614	44.1	247	11.639	0.001	40.1	247	4.512	0.034
Yes	24.5	53			18.9	53			24.5	53		
Bottle feeding												
No	26.7	225	0.027	0.869	36.9	225	1.401	0.236	44.9	98	4.246	0.039
Yes	27.6	98			43.9	98			32.9	225		

4. Discussion

The poor knowledge level of the mothers on child health and nutrition suggests a lack of sufficient nutrition and health education of mothers in Calabar South. This could be attributed to the level of education of the mothers as it has also been suggested to have an effect on mothers' health and nutrition knowledge, attitudes and on dietary intake of children (Imdad *et al.* 2011) [16]. Previous evidence has shown significant influence of maternal nutrition and child health-related knowledge on children's nutrient intake (Akerodolu *et al.* 2014) [17].

Infant and young child feeding practices of mothers involve care practices during breastfeeding and complementary

feeding of children. In the present study, there was a positive attitude towards breastfeeding which was not different from the NDHS 2008 survey for the state's prevalence of breastfeeding. This breastfeeding rate was also similar to earlier studies in a developing country (CBS 2004; Ngatia *et al.* 2005) [18, 19]. Meanwhile, on exploring the duration of time mothers intend to breastfeed their children, it was observed that very few mothers had the intentions of breastfeeding the children up to two years of age and above and maternal knowledge on duration of breastfeeding seen to be very low, implying a lack of awareness; this raises concerns on whether mothers in this study area consider breastfeeding of infants up to two years of age to be beneficial for child growth and

development. Thus, more attention is required in this aspect for healthy breastfeeding practice.

The result observed in this study for children who received solid, semi-solid or soft food at the recommended time was not markedly different from the national figure (NPC/ICF Macro 2009) ^[20] and other studies in other countries (Bernadette *et al.* 2011; Senarath *et al.* 2012) ^[21, 22] which have documented similar rates on timely introduction of complementary food at the age of 6-8 months. Results indicated that the proportion of children who met the minimum diversity criteria was slightly higher than the national figure (NPC/ICF Macro 2009) ^[20]. However, this comparison should be interpreted with caution since the NDHS survey did not utilise the current WHO indicator for measuring IYCF practices. Poor diet diversity is a common practice in poor populations because the main complementary diets are mainly starch based staples, with few animal products and vegetables (Styen *et al.* 2006) ^[23].

It was observed in this study that minimum feeding rate was much lower than the national average (NPC/ICF Macro 2009) ^[21]. This low rate may be attributed to the challenges of household food insecurity which is a common phenomenon in low income communities (Akinyele 2009) ^[24]. A high proportion of children were not fed in accordance with the minimum acceptable diet for infants 6-23 months of age as recommended. To meet the minimum acceptable diet, mothers need to be able to feed their children diverse diet and the recommended number of meals which may be difficult for many mothers to achieve especially in poor societies due to the factors that independently affect the types of diet mothers give their children and the frequency of offering meals. Compared to this study, NDHS 2008 study revealed a lower number of infants between 6-11 months that used bottle with a nipple to feed their infants (NPC/ICF Macro 2009) ^[20]. High incidence of diarrhoea has been reported among children due to poor hygiene in bottle feeding (Horta & Victora 2013) ^[25]. Feeding bottles are not only sources of infections, but also reduce breast sucking time and interferes with on-demand breastfeeding (PAHO/WHO 2002) ^[26]. A more appropriate means of feeding infants is by the use of spoons or cups.

The finding on nutritional status of the children were seen to be high when compared with the NDHS survey for the prevalence of malnutrition among under five children in Cross River State (NPC (Nigeria) & ICF International (2014) ^[10]). This findings indicate that undernutrition in Calabar South is of high public health importance and suggest an immediate intervention. There was a strong association of maternal knowledge on child health and nutrition by underweight and stunting which could be attributed to the fact that mothers who has better knowledge on health and nutrition may allocate their resources more effectively and efficiently in improving their children's nutritional condition.

As observed in the study, similar association of wasting and underweight with not meeting timely introduction of complementary feeding criteria has been observed in other studies (Bernadette *et al.* 2011; Disha *et al.* 2012) ^[21, 27]. The finding of the present study indicates that failure to introduce complementary foods at the appropriate age has the likelihood of resulting in wasting and later underweight of children. Because the indicator, introduction of semi-solid, solid or soft food at 6-8 months does not measure the quality or frequency of diets for children, for wasting and underweight to result due to delay in introduction of complementary food, it is obvious that energy need of the young child has not been met. As seen in this study, older studies have shown significant

association between dietary diversity and nutritional indicators in preschool children (Onyango *et al.* 1998; Ruel *et al.* 2004) ^[28, 29]; however other studies have also showed no associations between nutritional indices and dietary diversity (Badake *et al.* 2014) ^[30]. Consequently, malnutrition in those areas may be as a result of other factors other than mainly having a diversified diet. While no association was found between bottle feeding with both wasting and underweight, the practice of feeding infants with bottle significantly associated more with child stunting, and remained significant in multiple regression. Feeding children with bottle with teats is strongly discouraged for feeding of infants because they carry infections.

5. Conclusion

The findings of this study showed a significant relationship between maternal nutrition knowledge and feeding practices with the nutritional status of children. Maternal nutrition knowledge, minimum feeding frequency and minimum acceptable diet were significantly associated with underweight and stunting while minimum dietary diversity included wasting. Bottle feeding showed significant association with stunting while introduction to solids at 6-8 months included underweight. These significant associations therefore indicated that poor maternal knowledge on nutrition and child health and sub-optimal child feeding practices predispose to malnutrition in children in their first two years of life. However, the findings of this study have clearly shown that there remain important gaps in knowledge about desirable infant and young child feeding practices and even where the knowledge exist, there is a gap between the ideal and practice with regards to infant feeding practices.

6. Recommendations

Nutrition and health education of mothers should be initiated to improve women's health and nutrition knowledge. Furthermore, intervention efforts to improve nutritional status of children through nutrition and educational inputs should emphasize optimal feeding practices.

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