

EFFECTS OF NUTRITION EDUCATION OF MOTHERS ON ANTHROPOMETRIC INDICES OF PRESCHOOLERS AND MOTHERS' NUTRITION KNOWLEDGE IN UMUGUMA, IMO STATE, NIGERIA

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ABSTRACT

Background: Many rural women have little or no knowledge of nutritive value of foods, and what constitute an adequate diet, as a result, most Nigerian families often depend on processed complementary foods low in nutrient density which contributes to growth faltering among infants.

Objective: The study determined the anthropometric indices of the children and the nutritional knowledge of their mothers as well as evaluated the effect of nutrition education on the anthropometric indices of preschoolers.

Methods: A community-based longitudinal study using stratified sampling technique was conducted among 284 mothers and children within the age of six months to five years in Umuguma Owerri-West Local Government Area, Imo State. Data on nutritional knowledge of the mothers and anthropometric measurements were collected before nutrition education and evaluation was carried out on the same group after six months of applied nutrition education programme. Mothers were taught on formulation and preparation of complementary and family food both for their families and their preschoolers using demonstration method. The anthropometric measurements were processed using the WHO Anthro-plus software. Descriptive statistics was used in analyzing the data. Chi-square was used to determine the significance of difference. The decision criterion was placed at $P < 0.05$.

Results: The study observed improvement in the women's nutritional knowledge after nutrition education. The mean Z-Score of the children on anthropometric parameters was improved in both sexes but higher in female than male children after nutrition education. Prevalence of malnutrition present among the preschoolers (undernutrition and wasting) disappeared after nutrition education. Significant ($P < 0.05$) associations was observed between mothers' nutrition knowledge and preschoolers' prevalence of wasting, stunting and underweight before nutrition education. But after nutrition education, there was no statistically significant ($P > 0.05$) association between wasting, underweight and nutrition knowledge, though stunting had a significant ($P < 0.05$) association with nutrition knowledge of the mothers.

Conclusion: Nutrition education improved the nutritional knowledge of the mothers which improved the nutritional status of their children.

Key words: Malnutrition, complementary food, adequate diet, demonstration method

INTRODUCTION

Healthy diets contain many different foods that together provide calorie, nutrients and other beneficial substances in amounts that promote the optimal functioning of cells (1). A variety of food is required to obtain all the nutrients needed for normal functioning of the body. No one food contains all the nutrients; many different combinations of food can make up a healthy diet (1).

Inadequate and excessive intake may contribute to the development of more than one disease and produce disease by more than one mechanism (1).

The knowledge of foods is acquired through nutrition education. Most rural women eat what they want to eat because they are not informed about their food habits. Insufficient knowledge, traditions and taboos or poor understanding of the relationship between diet and health, can adversely affect nutritional status which is as result of undesirable food habit and nutrition related practices. Nutrition education would help individuals to develop the attitudes; skills and confidence needed to improve nutrition practices. Nutrition education enhances nutrition knowledge

with positive effect on attitude and food habits which leads to improved nutritional status.

Successful nutrition education goes beyond simple accumulation of knowledge, towards positive action, which involves active participation of people, awareness of their nutrition problems and their willingness to change. Effective nutrition education program must be planned and executed in such a way as to motivate beneficiaries to develop skills and confidence for the adoption of positive and lasting practices. Nutrition education is an instructional method for promoting healthful food related behavior (2). For nutrition education to be successful, it must communicate clear messages with a specific behavior change for the vulnerable group, by providing the correct knowledge on the nutritional value of foods, quality, and safety methods of preservation, processing and handling of food.

Many women especially in the rural setting, have little or no knowledge of nutritive value of foods, what constitute adequate diet, making appropriate food choices, hygienic food preparation and handling, preservation and storage of foods (3). Poor nutrition knowledge is one of the main factors that causes malnutrition, and needs to be addressed (4). Other factors include inappropriate nutrition education, misconception and passing on of harmful nutritional practices from parents to children (5). However, most women have already developed some of the bad food habit right from their parents' house before they got married and thus, they continued with it.

Moreover, as a result of unaffordability of fortified nutritious complementary foods, most Nigerian families often depend on nutritionally inadequate processed traditional foods consisting mainly of unsupplemented cereal porridges from maize, sorghum and millet (6). Some families may not know how to prepare complementary foods from locally available foods or may be poor to provide sufficient nutritious foods. Poor nutrition affects productivity, children's performance in school, poor immune system, social and economic insecurity, poor maternal health, high morbidity rate and high mortality rate.

Intervention that provides counseling to caregivers on initiation and continuation of appropriate and adequate complementary feeding early in life, along with improved hygiene and caring practices, may effectively tackle malnutrition (7). Although, nutrition education has been a part and parcel of public health intervention strategy, it has not made much impact because it is mostly done using lecture method other than demonstration method. Therefore, the study evaluated the effect of nutrition education of mothers on the anthropometric indices of

preschoolers and mothers' nutrition knowledge in Umuguma, Imo State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Umuguma the headquarters of Owerri West Local Government Area, Imo state. Umuguma is a semi-urban community. Residents of Umuguma are mainly farmers, civil servants, traders, artisans and housewives.

Survey Design

A longitudinal design was adopted for the study.

Informed Consent

The study was approved by the State Ministry of Health. The Pastors and President General of Umuguma were informed for wide publicity in different Churches and Community. Informed oral consent was obtained from the mothers before data collection.

Population and Sampling

Two hundred and eighty-four mother-child pairs (96 males and 188 female children) were selected from the five villages in Umuguma after obtaining their consent. The women were assembled at the community hall and were stratified into five different strata namely, farmers, civil servants, traders, artisan and housewives. About 11 mother-child pairs were randomly selected from each stratum resulting to a subtotal of 55 mother-child pairs from each of the five villages plus extra 9 selected randomly for drop-outs totaling to 284. Only one child under five years old per household was randomly selected from a list of all the children under five years old residing at a home (8).

Exclusion and Inclusion criteria

Mothers who are visitors to the community and also mothers whose children are above 5 years old were excluded. Children from six months to five years old were included in the study.

Administration of Nutrition Education

The method according to Roy *et al.* (7) was adopted with little modification. Nutrition Education was delivered to the women using their local language (Igbo) to avoid any communication gap in the course of the research work. The study was explained to the selected women in a simplified manner. Information on nutritional knowledge was obtained from each selected woman using questionnaire (for the literate women) and interviewer method (for the illiterate women) before the introduction of the nutrition education package on the first week. Anthropometric measurements were carried out on the children in the second week. On the third week, nutrition education on nutrients (basic functions and food sources),

formulation, preparation and feeding of energy and protein-rich local complementary food rich in micronutrients such as fortified gruel (with soy bean, groundnut paste, milled crayfish and fruit juice in different combinations) and fortification of instant noodle with vegetables like carrots, green beans, fresh tomatoes and leafy vegetables was taught to the mothers for five days using demonstration method of nutrition education. Teaching aids such as food models, raw food materials and kitchen utensils were used. On the fourth week, the same questionnaire introduced at the commencement of the study was re-distributed to the literate respondents, while the illiterate respondents were interviewed by research assistants.

Data Collection

A pre-tested structured questionnaire was designed for the study. It was validated for content by nutrition experts in the Department of Nutrition and Dietetics, Imo State University before administering it on the respondents. Questionnaire containing socioeconomic factors as well as nutrition knowledge was given to the women before and after nutrition education. The literate mothers were asked to fill the questionnaire, while the illiterate mothers were assisted in filling the questionnaire. Data was collected in a short interval of four weeks and evaluation was carried out on the same group after six months of administering nutrition education exercise.

Anthropometric Measurements

Anthropometric measurements for length/height and weight of the children were taken following the standard procedures by WHO (9).

Data Processing

Data on anthropometric measurement of the children was processed using the WHO Anthro-plus software (9), standard deviation and Z scores were obtained. The weight and height measurements were converted to anthropometric indices: weight for height (wasting), height for age (stunting) and weight for age (underweight). Any child whose anthropometric index was below -2SD median value of WHO standard was regarded as malnourished. Mothers' nutritional knowledge was assessed using a 14 question instrument. Each correctly answered question was assigned 1 mark. A composite scale was calculated for each respondent and a total score of 14 was obtained. The scores were classified into two as follows; 1-6 = inadequate knowledge and 7-14 =adequate knowledge.

Statistical Analysis

Data from questionnaire were analyzed using descriptive statistics (frequency, percentages, mean

and standard deviation). Chi-square was used to determine significant associations between nutrition education and anthropometric characteristics of the children. Significant ($P<0.05$) differences between nutrition knowledge of the mothers before and after nutrition education was carried out using Chi-square test. The decision criterion for rejecting the null hypothesis was set at $p<0.05$.

Results

Table 1 shows the socio-economic characteristics of the mothers, the highest percentages of women that had secondary school education was 37.3%, while 7% of the women were illiterate. Also civil servants among the women were 22.5%, and 34% of the mothers earn less than ten thousand naira ($<₦10,000$) monthly income.

Before nutrition education intervention exercise, 45.8% of women had inadequate nutrition knowledge, while 54.2% had adequate nutrition knowledge. However, after nutrition education intervention, the percentage of the women that had adequate nutrition knowledge increased from 54.2% to 70%, and the percentage of women that had inadequate nutrition knowledge decreased from 45.8% to 29.6% (Table 2). The differences between the nutrition knowledge performance before and after the nutrition education intervention was statistically significant ($t\text{-ratio}=5.81$; $p<0.05$).

Table 3 shows that the prevalence of malnutrition among the children. Before nutrition education intervention, 12.5% and 32.0% of the male and female children respectively were wasted before nutrition education intervention. But after nutrition education, none of the children were wasted. Prevalence of stunting among the children decreased from 48.0% to 40.0%, and 37.2% to 24.0% among male and female children, respectively. Before nutrition education, 31.0% of male and 21.3% female children were underweight. It was also observed that 2.0% and 2.6% of the male and female children, respectively, were overweight. But after nutrition education, none of the children were either underweight or overweight.

The associations between the nutritional knowledge of the mothers and the prevalence of wasting and underweight in the children were significant ($P<0.05$) before nutrition education, but was not after nutrition education intervention (Table 5). However, the association was only significant ($P<0.05$) for the prevalence of stunting in children after the nutrition education intervention (Table 4).

Table 1. Socio-economic characteristics of the women.

Socio- Economic Factors	Frequency n (284)		Percentages (%)	
1).Age(years)				
20-30	62		21.8	
31-40	76		26.8	
41-50	70		24.6	
>50	76		26.8	
2).Education				
Primary	76		26.8	
Secondary	102		37.3	
Tertiary	82		28.9	
None	20		7.0	
3). Occupation				
Farmer	56		19.7	
Trader	60		21.1	
Housewives	60		21.1	
Civil servant	64		22.5	
Artisan	44		15.4	
4). Monthly income (₦)				
<10,000	96		33.8	
10,000- 25,000	54		19.0	
26, 000- 35,000	40		14.1	
36, 000- 50,000	46		16.2	
None	48		16.9	

Table 2: Nutrition Knowledge Performance of the Women.

Nutrition	Before nutrition education		After nutrition education	
	n	%	n	%
Adequate knowledge	154	54.2	200	70.40
Inadequate knowledge	130	45.8	84	29.60

Table 3: Prevalence of malnutrition among the children

Anthropometric Indices	Before nutrition education				After nutrition education			
	Male		Female		Male		Female	
	N	%	n	%	N	%	N	%
Weight for height								
Normal	84	87.5	128	68.0	96	100.0	188	100.0
Wasting	12	12.5	60	32.0	0	0	0	0
Total	96	100.0	188	100.0	96	100.0	188	100.0
Height for age								
Normal	46	48.0	118	63.0	58	60.4	142	76.0
Stunting	50	52.0	70	37.2	38	40.0	46	24.0
Total	96	100.0	188	100.0	96	100.0	188	100.0
Weight for age								
Normal	64	67.0	143	76.1	96	100.0	188	100.0
Underweight	30	31.0	40	21.3	0	0	0	0
Overweight	2	2.0	5	2.6	0	0	0	0
Total	96	100.0	188	100.0	96	100.0	188	100.0

Table 4: Association between nutritional knowledge of mothers and anthropometric indices of the children

Anthropometric	WHO Standard				Decision
	below median		above median		
	n	%	N	%	
a) Weight for height					
i) Before nutrition education					$\chi^2 = 4.94$
Inadequate knowledge	65	22.9	60	21.1	$p < 0.05$
Adequate knowledge	85	29.9	74	26.1	d.f=1
ii) After the nutrition education					$\chi^2 = 0.46$
Inadequate knowledge	29	10.2	50	17.5	$p > 0.05$
Adequate knowledge	75	26.4	130	45.7	d.f=1
b) Weight for age					
i) Before nutrition education					$\chi^2 = 5.65$
Inadequate knowledge	44	15.5	50	10.2	$P < 0.05$
Adequate knowledge	15	29.9	74	26.1	d.f=1
ii) After the nutrition education					$\chi^2 = 0.05$
Inadequate knowledge	17	6.0	27	9.5	$p > 0.05$
Adequate knowledge	77	27.1	163	57.4	d.f=1
c) Height for age					
i) Before the nutrition education					$\chi^2 = 0.05$
Inadequate knowledge	60	21.1	49	17.3	$P < 0.05$
Adequate knowledge	100	35.2	75	26.4	d.f=1
ii) After the nutrition education					$\chi^2 = 3.97$
Inadequate knowledge	30	10.6	25	8.8	$P < 0.05$
Adequate knowledge	54	19.9	175	61.6	d.f=1

DISCUSSION

The educational qualification of the women shows that majority of the women had secondary school education. It can be deduced that the women were literate. This explains the reason why a greater percentage of women had knowledge of nutrition and were able to perform effectively during the nutrition education exercise (10). Education particularly for the girls and women brings improvement in family life including improved nutrition and elevated status (11). Nevertheless, education is one of the important

factors affecting the ability to manage resources efficiently and make informed choices (12). The women were involved in different occupations (13). It was also observed that the highest percentage of the women earned less than ₦10, 000 per month (34%), this shows that income generated by the women was poor (14).

The study agrees with previous study that nutrition education improved the nutrition knowledge of the women (15). The findings of the study showed that before nutrition education, malnutrition was

prevalent and women had inadequate nutrition knowledge, but the proportion decreased after nutrition education. After nutrition education, neither of the children was wasted, underweight nor overweight. This is because the mothers were exposed to nutrition education which helped them to make use of their limited resources in properly caring and feeding their children. This helped the children to recover from the acute nutritional insult they had at that moment. Previous study in Bangladesh (7) revealed that nutrition education intervention improved dietary intake and weight gain among the children. Wasting and underweight is an indication of acute malnutrition mostly associated with poverty, inappropriate feeding practices and illness (16).

The anthropometric indices mean Z-scores of the children were higher after six months of practicing what they learnt during the nutrition education exercise in both male and female children (Table 5). This could be as a result of the readiness of the mothers to adopt better nutrition practices. Nutrition education in the community is the applications of the science of nutrition to everyday life of the people (17). This means that education is related to social, economic and cultural values of food in such a way that people are motivated to make food choices which will result in their optimal nutritional well-being. However, the purpose of nutrition education programs is to bring about change in food consumption patterns which then leads to improved health and nutritional status (18) as observed in the present study.

Besides, method of education based on good personal relationship is usually more effective than impersonal instruction. Success in improving good nutritional practices by the mothers could have largely depended on people's confidence in the reliability and practicability of the advice given by the educator. The Z-score was significantly ($P < 0.05$) higher in females than in males. The difference between the anthropometric indices of males and females in this study agrees with previous studies, which observed that males had a lower mean Z-scores for wasting, underweight and stunting than in females (19, 20). This is because females generally have a greater body fat percentage than males and are less active resulting in less energy expenditure than males (21, 22).

The observation that the percentage of women with inadequate nutrition knowledge whose children were wasted or underweight reduced and also that the percentage of women with adequate nutrition knowledge increased after nutrition education intervention could be as a result of the discussion and demonstration method of education that was used which made the women to understand the basic information about nutrition education and health. Knowels *et al.* (23) states that "adults retain new information best when they are actively involved in

problem-solving exercise and hands on learning which enabled them to assimilate, practice and use the information in meaningful ways".

Improvement in the nutritional knowledge of the mothers which improved their children's weight for height could be as a result of their children's acceptance of the fortified pap (gruel) and the fortified noodle during and after the nutrition education exercise, because every child and mother had a taste of the food after the cook shop. Supporting the present study, the position of the American Dietetic Association (24), suggests that involving parents in nutrition education may be more likely to result in long term behavioral change. Also, Dosthuizen *et al.* (25) states that "nutrition education program should be conducted simultaneously with other family members (children and others), as the caregivers in the communities were responsible for food choices, food preparation and food purchases".

Significant associations were found in the association between low height for age index of children and the nutrition education. The associations between the anthropometric indices of the preschool children and nutrition knowledge of their mothers could be that, the prevalence of low height for age among the preschool children is higher in most cases than the prevalence of low weight for age and weight for height indices of the preschool children (26, 27). Besides, the nutrition knowledge of the women could have improved the food habits and attitude of the women. Sharma *et al.* (28) observed that nutrition knowledge is significantly ($P < 0.05$) related to food habit. Nutrition knowledge of the mothers could have had significant impact on the food behaviour of the mothers and how they feed their families (18, 29). Nutrition knowledge and social consciousness enables citizens to participate intelligently in the adoption of public policy affecting the nutrition of people around the world. However, although there were increments in the percentages of the women with adequate nutrition knowledge whose children were above median $-2SD$ after the nutrition education intervention, but there were no significant ($P < 0.05$) differences between nutrition knowledge of the mothers and height and weight for age indices of the preschool children after nutrition education.

The reason why there was a greater percentage of mothers who had adequate nutrition knowledge with their children above $-2SD$ WHO reference standard could be attributed to their high level of educational attainment, because most of them had secondary and tertiary education which enabled them to do well in the nutrition knowledge questions before nutrition education.

Conclusion: Nutrition education improved the nutritional knowledge of the mothers of the preschool children as well as the nutritional status of malnourished children in Umuguma, by using locally

available food material and family's resources. More specifically, the result has implication for the design of improved complementary food. Nutrition education intervention is needed to promote appropriate complementary feeding practices. Moreover, it is suggested that nutrition education should be incorporated into primary health care and in school curriculum.

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