

ORIGINAL RESEARCH ARTICLE

Influence of Family Size, Household Food Security Status, and Child Care Practices on the Nutritional Status of Under-five Children in Ile-Ife, Nigeria

Ajao KO^{1*}, Ojofeitimi EO¹, Adebayo AA², Fatusi AO¹ and Afolabi OT¹

¹Department of Community Health, Obafemi Awolowo University, Ile-Ife; ²Department of Economics, Obafemi Awolowo University, Ile-Ife.

*For Correspondence: E-mail: solaaajao2000@yahoo.com

Abstract

Fertility pattern and reproductive behaviours affect infant death in Nigeria. Household food insecurity and poor care practices also place children at risk of morbidity and mortality. The objectives of this study were to assess the influence of family size, household food security status, and child care practices on the nutritional status of under-five children in Ile-Ife, Nigeria. The study employed a descriptive cross-sectional design. A semi-structured questionnaire was used to collect data from 423 mothers of under-five children and their children in the households selected through multistage sampling methods. Food-insecure households were five times more likely than secure households to have wasted children (crude OR=5.707, 95 percent CI=1.31-24.85). Children with less educated mothers were significantly more likely to be stunted. The prevalence of food insecurity among households in Ile-Ife was high. Households with food insecurity and less educated mothers were more likely to have malnourished children (*Afr J Reprod Health* 2010; 14[4]: 123-132).

Résumé

Influence de nombre d'enfants, l'état de la sécurité alimentaire dans le ménage et les pratiques du soin de l'enfant sur la situation nourricière des enfants qui ont moins de cinq ans à Ile-Ife, Nigéria. Le modèle de la fécondité et les comportements de reproduction affectent la mortalité infantile au Nigéria. Le manque de sécurité alimentaire dans le ménage et les mauvaises pratiques du soin exposent les enfants au risque de la morbidité et de la mortalité. Cette étude a comme objectif d'évaluer l'influence de nombre d'enfants, l'état de la sécurité alimentaire dans le ménage et les pratiques du soin de l'enfant sur la situation nourricière des enfants qui ont moins de cinq ans à Ile-Ife, Nigéria. L'étude a été faite à travers un modèle transversal descriptif. À l'aide d'un questionnaire semi structuré nous avons collecté des données auprès des 423 mères des enfants qui ont moins de cinq ans et leurs enfants dans les ménages sélectionnés à étapes multiples. Les ménages qui n'ont pas de sécurité alimentaire ont cinq fois plus la possibilité d'avoir des enfants gâtés que les ménages qui ont la sécurité alimentaire (OR=5,707, 95% CI=1,31-24,85). Les enfants qui ont des mères moins instruites avaient sensiblement la possibilité d'être retardé. La prévalence de l'insécurité alimentaire au sein des ménages à Ile-Ife était élevée. Les ménages qui n'ont pas de sécurité alimentaire et dans lesquels les mères sont moins instruites ont plus la possibilité d'avoir des enfants mal nourris (*Afr J Reprod Health* 2010; 14[4]: 123-132).

Keywords: Family size, food insecurity, stunting, breastfeeding, U5 children nutritional status.

Introduction

Fertility patterns and reproductive behaviours affect infant death. Current fertility is high in Nigeria with a total fertility rate of 5.6 children per woman¹. Unmet need for family planning is also high (18% total; 13% for birth spacing, 5% for limiting). High-risk births, such as among women who have too many births (five or more) or births too closely spaced (less than 24 months apart), are associated with increased infant and childhood mortality¹. Moreover, the potential intellectual and technical capacity of a population depends on good nutrition, particularly

for young children and women in their childbearing years.

Food security exists when a household can reliably gain access to food in sufficient quantity and quality for all household members to enjoy a healthy and active life². A family can be food secure in two main ways: food production and food purchase. Both require adequate resources or income.

It has been reported that early childhood malnutrition can be fundamentally attributed to poverty and lack of economic resources³. However, studies have shown that in poverty-stricken communities with inadequate household food

access, some children grow and develop normally as a result of positive family and caregivers' behaviour⁴⁻⁶. Good care practices include proper feeding, home health care, food preparation, hygiene and the provision of a responsive and stimulating environment to children during their most vulnerable stages⁷⁻⁸. Good nutrition is necessary to achieve a healthy and active life, optimize education performance and enhance productivity. Moreover, food security at the national and household levels, good care practice and access to adequate basic health services are essential prerequisites for reduced under-five mortality⁹.

The 2006 World Bank report on Nigeria stated that the country, with its vast natural and human resources was neglecting the health of future generations with the poor nutrition of its children¹⁰. The major nutritional problems found in Nigeria are protein-energy malnutrition (PEM) and deficiencies in micronutrients, such as vitamin A, iron, iodine, and zinc¹¹. These deficits have been most devastating among the highly vulnerable groups in society, especially children.

The Nigeria Demographic and Health Survey conducted in 2008 estimated the prevalence to be 13.9% for wasting, 40.6% for stunting and 23.1% for underweight among preschool children¹². Wasting represents the failure to receive adequate nutrition and is typically the result of a recent episode of illness, especially diarrhea or a rapid deterioration in the food supply. In Nigeria, 14% of children are wasted. Stunting is the result of failure to receive adequate nutrition over an extended period of time and is also affected by recurrent or chronic illness. Two in five children are short for their ages; half of those undernourished are severely stunted. Being underweight reflects the effect of both acute and chronic malnutrition. Almost one-quarter of all Nigerian children are underweight¹². Inadequate feeding and repeated illness are the immediate causes of the problem, which can be exacerbated by some combination of large family size, household food insecurity and the consequent inability of families to take care of their young adequately¹³.

The aim of this study is to assess the influence of family size, household food security status and child care practices on the nutritional status of under-five children in Ile-Ife, Nigeria.

Methods

Study Population and Sampling

The study was conducted in Ife Central Local Government Area (which includes both urban and rural settlements) in Southwest Nigeria. The study location was randomly selected from among four local government areas that make up Ile-Ife. The study employed a descriptive cross-sectional

design. Four hundred twenty-three (423) households were selected using multistage sampling. The local government areas were first stratified into rural and urban areas, followed by random selection of enumeration areas (EAs) within each (areas designated by the National Population Commission for census purposes). Households were listed within the EAs and their occupants counted; eligible individuals were then selected within the households. Within all selected EAs, houses were selected randomly. All women of child-bearing age with at least one under-five child were eligible for the study. In households with more than one eligible respondent, one mother-child pair was randomly selected.

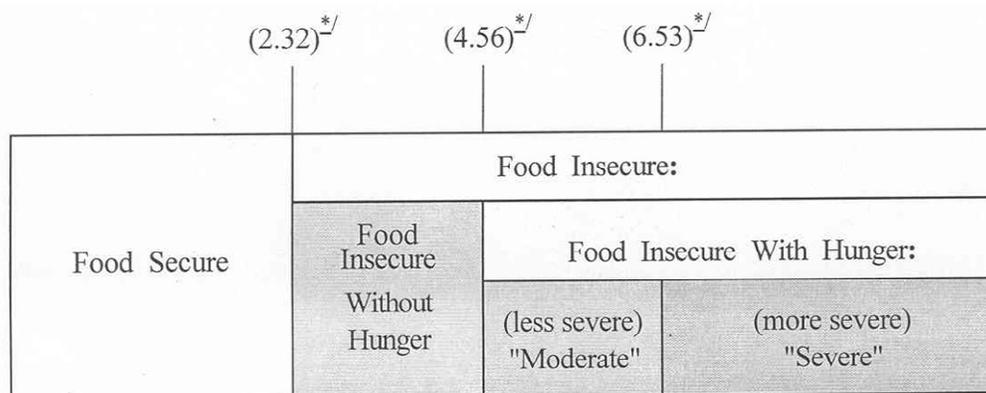
Data Collection

A semi-structured questionnaire was used to interview mothers of under-five children and collect data on their children. Trained interviewers administered the pre-tested questionnaires. The instrument included measures of socio-demographic and household characteristics, child care, feeding practices and household food security. During the interview, mothers were asked their age, occupation, education and ethnicity. The mother also answered questions about the number of children living in the household, number of under-five children and for each of the latter, the history of breastfeeding and complementary feeding, age, sex, vaccination status and place of delivery. Nutritional intake information was collected using a 72-hour mother-child dietary recall.

Household Food Security Status

Food security status within the household was assessed by a series of questions regarding food adequacy and financial constraints in the past 12 months. Questions were based on the household food security module developed by the USDA Food and Nutrition Service to measure food insecurity and hunger¹⁴. The module uses an 18-item set of questions that asks whether a variety of behaviours or conditions had occurred within the past 12 months due to financial constraints. The module uses the responses to these questions to categorize household food security status as food secure (household with no or minimal evidence of food insecurity), food insecure without hunger (household concerned about inadequate resources to buy enough food and has adjusted by decreasing the quality of their family diet, with little or no reduction in household food intake) and food insecure with hunger (food-insecure households in which one or more members have decreased the amount of food they consumed to the extent that they repeatedly experience the physical sensation of hunger) (Figure 1)¹⁴.

Mothers were asked about their perceptions regarding the adequacy of food in the household



Household Food Security Status -- categorical measure

Figure 2: Household food security status measurement

^{*}Located at midpoint between the two adjacent household scale values

Note: 2.32, 4.56, and 6.53 are scale values and status level corresponding to number of affirmative responses for food secure, food insecure, among hunger and food secure with hunger respectively.

and whether any adult, any child, or the mother ever had to skip or reduce a meal because of financial constraints. For this study, the USDA food security module was adapted and translated into the local language (Yoruba) and then back-translated into English.

Anthropometric Measurement

Anthropometric measures were used to assess the nutritional status of the children: height-for-age, weight-for-height, and weight-for-age. Interviewers were trained before data collection and regularly supervised during it. The mother's weight was measured to the nearest 0.5kg on a weighing scale after confirmation that the scale was set at zero. After the mother's weight was recorded, she was asked to step onto the scale holding the child and the combined weight of the mother and child was recorded. The child was weighed wearing minimal clothing. At the time of data analysis, the child's weight was calculated as the difference between the combined weight of the mother and child and the mother's weight. The mother's height was measured as she stood on a flat surface without shoes with her back against a door. A ruler was placed over the mother's head, and a light mark was made. Her height was measured with a standard haberdasher's tape. A UNICEF infant/child-length measuring board and ruler were used to measure the child's recumbent length and height, respectively to the nearest 0.1cm following standard procedures. The child's head was firmly secured and the knees were extended to avoid any undue bending. Measurements were repeated and an average of the two was used.

The dependent variables—stunting, wasting and underweight—were created by taking the child's height/recumbent length and weight and converting them to sex- and age-specific Z scores relative to the National Center for Health Statistics/World Health Organization (NCHS/WHO) standard using EPINUT, a computer program that performs nutritional calculation on EPI INFO files. Stunting was defined as height/length-for-age less than -2 Z score, wasting as weight-for-height less than -2 and underweight as weight-for-age also less than -2. Children whose Z-scores were greater than or equal to -2 were considered to be normal.

Ethical Issues

This research work was approved by Ethical Committee of Obafemi Awolowo University, Teaching Hospitals Complex, Ile-Ife and the informed consent of mothers was freely obtained. The front page of the questionnaire specifically carried statements on "confidentiality and consent," which informed respondents of the objectives of the study and requested their voluntary consent.

Mothers of severely undernourished children were identified and appropriately counseled on the benefits of an adequate diet and good hygiene and mothers whose children needed immediate medical attention were advised to seek medical care.

Data Analysis

Data analysis was undertaken using EPI INFO and SPSS (version 16.0). To calculate the household food security index, responses were scored in accordance with the USDA Food and Nutrition Service criteria¹⁴. For presentation of descriptive

statistics, the distribution of household and child characteristics was calculated and frequencies and percentages were reported. Binary logistic regression was used in assessing the statistical association between under-five children's nutritional status (stunting, wasting, and underweight) and each of the independent variables (family size, household food security status, and child care practices). Crude odds ratios (ORs), 95% confidence intervals (CI) and p-values were obtained and statistical significance was determined at an alpha level of 0.05.

Results

Parental Characteristics

A total of 423 mothers eligible households were interviewed. Data for 11 children were incomplete; thus final analysis was based on 412 mother-child pairs. The socio-demographic characteristics of the respondents are presented in Table 1. The mean age was 30±6.9 years for the mothers. The majority (55.3 to 55.9%) of the mothers were within the ages of 25-34 years. The mean duration of marriage was approximately 7±5.6 years. The majority (388 or 94.2%) of the mothers were married. About half (204 or 49.5%) of the fathers had completed post-secondary school education; 4% of them had no formal education. One hundred fifty-four (37%) mothers had completed post-secondary school education; 60% of them had attended primary school (17%) or secondary school (43%). Three to four percent of mothers had no formal education. Three-quarters (75.7%) of the respondents were Christians and 85.0% were of Yoruba ethnicity. More than 40% of the fathers were traders, farmers or artisans. A large proportion of the mothers (42.7%) were traders. Less than 10% of the heads of households (either parent) were professionals. Of the 412 mothers, a majority (91.3%) had four or fewer children; nearly all the mothers (402) had one or two children under five.

Characteristics of Under-Five Children

As shown in Table 2, 49.5% of the under-five children were females. The mean age of the children was 25±14.9 months. About half of the children were delivered in a government health facility and the rest in a private health facility (25%), mission home (15%), or at home (8.3%). Eighteen (4.4%) were low-birth-weight babies (<2.5kg). Majority of the children (294 or 71.4%) had received all the appropriate vaccinations for their age. Nearly all of the under-five children (410 or 99.5%) had

Table 1: Socio-demographic variables of respondents

VARIABLE	Number	%
Age of mother		
15-19	2	0.5
20-24	58	14.1
25-29	110	26.7
30-34	118	28.6
35-39	76	18.4
≥40	44	10.7
No response	4	1.0
Marital status of the mother		
Never married	14	3.4
Married	388	94.2
Others (divorce, separated, widow etc)	10	2.5
Education of mother		
No formal education	10	2.4
Primary	70	17.0
Secondary	176	42.7
Post-secondary	154	37.4
No response	2	0.5
Religion		
Christianity	312	75.7
Islam	98	23.8
Others	2	0.5
Ethnicity		
Yoruba	350	85.0
Igbo	38	9.2
Hausa	6	1.5
Others	18	4.4
Occupation of mother		
Professional	30	7.3
Civil/public servant	38	9.2
Trader	176	42.7
Farmer	8	1.9
Artisan	92	22.3
Others	68	16.5
Occupation of head of household		
Professional	76	9.2
Civil/public servant	164	19.9
Trader	140	17.0
Farmer	52	6.3
Artisan	176	21.4
Others	188	22.8
No of children		
≤ 4	376	91.3
>4	24	5.8
No response	12	2.9
No of under-five children		
≤ 2	402	97.5
> 2	4	1.0

Table 2: Characteristics of under-five children in life Central Local Government

VARIABLE	Number	%
Age (months)		
<6	6	1.5
6-11	90	21.8
12-17	66	16.0
18-23	42	10.2
24-29	60	14.6
30-35	42	10.2
>35	112	27.2
Gender		
Male	208	50.5
Female	204	49.5
Place of delivery		
Government health facility	202	49.0
Private health facility	102	24.8
Home	34	8.3
Mission home	62	15.0
No response	12	2.9
Where the child is taken when ill		
Hospital	312	75.7
Herbal	62	15.0
Self-care	12	2.9
Others	10	2.4
No response	16	4.0
Vaccination status		
Appropriately vaccinated	294	71.4
Partially vaccinated	68	16.5
Never vaccinated	44	10.7
No response	6	1.5
Ever breastfed		
Yes	410	99.5
No	2	0.5
Duration of exclusive breastfeeding		
<6	80	19.4
≥6	332	80.6
Ever given cow milk or formula		
Yes	222	53.9
No	176	42.7
No response	14	3.4
Birth weight		
<2.5kg	18	4.4
≥2.5kg	268	65.0
No response	126	30.6
Children's feeding pattern based on mother's 72-hour dietary recall		
Energy-giving food	1636	45.2
Body-building food	1360	37.6
Protective food	298	8.2
Refined food	322	8.9

been breastfed. However 222 (53.9%) were also given cow's milk or formula. About 81% of these children were exclusively breastfed for the first six months of life. The average age at which feeding with nonhuman milk or formula was initiated was five months and ranged from three weeks to 12 months. The mean age for introduction of supplementary foods was approximately eight months. Energy-giving foods such as rice, yam flour or corn products were found to be the highest food group offered to the children (45.2%). Both protective and refined foods were offered sparingly; (8.2% and 8.9% respectively). Body-building foods were also consumed regularly (37.6%).

Nutritional Status of Under-Five Children

Figure 2 shows the nutritional status of under-five children in the study location according to age. The overall prevalence rates of stunting, wasting and underweight were 39.3%, 6.3% and 14.1% respectively. Prevalence of stunting was highest (57.15%) for children between the ages of 18 months and 23 months and lowest (25%) for those age 36 months and above. Wasting was highest from 30 months to 35 months (14.3%) and underweight was highest from 24 months to 39 months (20.0%).

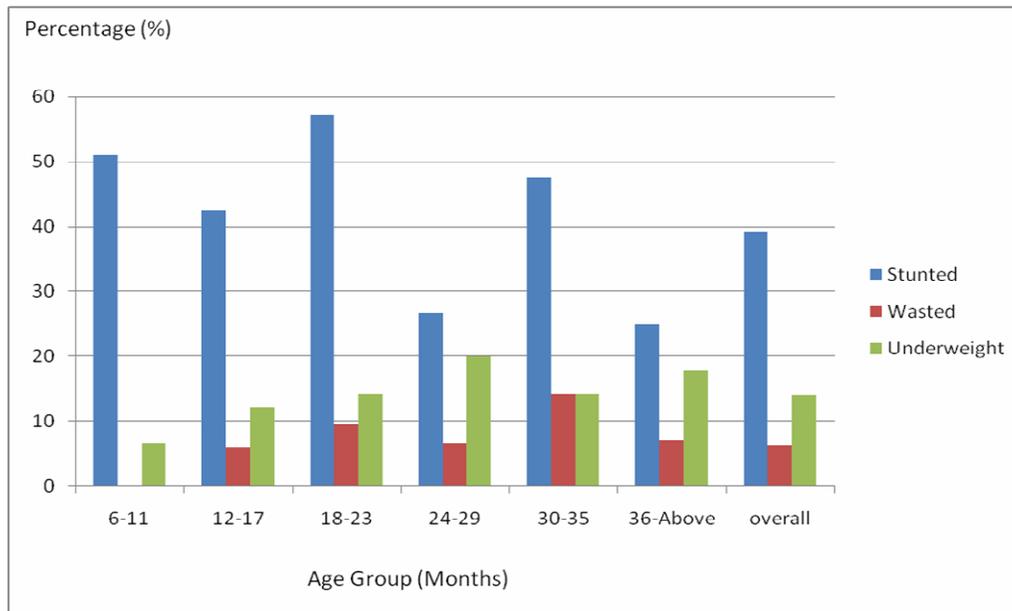
Household Food Security Status

The overall prevalence of household food insecurity and household food security were 65% and 35% respectively (Table 3). Less than 40% of the mothers reported that their households had enough food to eat and the kind they wanted to eat. About 50% of the mothers stated that the food sometimes did not last and they did not have money to buy more. Moreover, more than half of mothers reported that an adult family member had skipped or reduced a meal because of insufficient finances. Half of the mothers (50%) had ever eaten less than they felt they should because of insufficient finances. Almost 11% of mothers had a child who skipped or reduced a meal because of insufficient finances.

Child Care Practices and Nutritional Status of Under-Five Children

Table 4 shows the results of the binary logistic regression using nutritional status (wasting, stunting and underweight) as the dependent variables and months of exclusive breastfeeding, complementary feeding preparation, maternal education, number of children, number of under-five children and birth weight as the independent variables. Stunting was

Figure 2: Nutritional status of under-five children in Ife Central Local Government Area according to age



Stunting-Height-for-age<-2 Z score; **Wasting**-Weight-for-height<-2 Z score; **Underweight**-Weight-for-age<-2 Z score

associated with maternal education. Although marginally significant, mothers who had no formal education were four times more likely than mothers who had completed more than primary education to have stunted children ($p < 0.068$). Children who were breastfed for less than six months were 1.6 times more likely than those breastfed longer to be stunted (OR=1.640, 95% CI=0.95-2.85). There was no significant association between family size or number of children under five and poor nutrition status. Children born with low birth weight were more likely than those with normal birth weight to be underweight (OR=2.988, 95% CI=0.98-9.05).

Household Food Security Status and Nutritional Status of Under-Five Children

Table 5 shows the results of the binary logistic regression for the three nutritional measures as the dependent variables and household food security module items as independent variables. Household food security status was significantly associated with children's nutritional status. Mothers who ate less than they desired because of insufficient finances were significantly more likely than the mothers who ate as desired to have stunted children (OR=2.113, 95% CI=1.40-3.37). Children who skipped or reduced meals because of insufficient finances were significantly more likely to be wasted (OR=4.359, 95% CI=1.71-11.07) than were those who did not and four times more likely than the children who ate regularly to be underweight

(OR=4.177, 95%CI=1.96-8.96). Households that were food insecure were five times more likely than the households that were food secure to have wasted children (OR=5.707, 95% CI=1.31-24.85).

Discussion

This study assessed the association of family size, household food security status and child care practices with the nutritional status of under-five children in Ife-Ife, Nigeria. The prevalence of malnutrition as measured by stunting shown in Table 3 was higher (39.3%) than that reported by the Demographic Health Survey in 1986¹⁵ in Ondo State, Southwest Nigeria (32.4%); it was close to the 40.6% measured in the 2008 DHS survey¹² by the Federal Office of Statistics (43%); and it was lower than UNICEF's estimate of 52.3% for 1994¹⁶. The prevalence of wasting (6.3%) and being underweight (14.1%) was lower in any case. In general, the prevalence of stunting was high, but the prevalence of wasting was low in this area, which usually does not experience food emergency situations¹⁷.

Stunting is a cumulative process that starts in utero and there is substantial evidence that intrauterine growth is a strong predictor of postnatal growth. Several studies have shown that growth faltering in infants starts from seven months upwards because breast milk is no longer enough to meet the child's nutritional requirement¹⁸. These

Table 3: Distribution of responses to household food security module items reported by mothers of 412 under-five children

ITEMS ^a	No (%)
Best description of food eaten in the household in past 12 months	
Enough to eat and the kind we want	160 (38.8)
Enough, but not always the kind we want	106 (25.7)
Sometimes not enough	118 (28.6)
Often not enough	20 (4.9)
Don't know or no response	8 (1.9)
Worry that food would run out before the family has money to buy more	
Never	180 (43.7)
Sometimes	188 (45.6)
Often	30 (7.3)
Don't know or no response	14 (3.4)
Food didn't last and didn't have money to buy more	
Never	170 (41.3)
Sometimes	200 (48.5)
Often	34 (8.3)
Don't know or no response	8 (1.9)
Couldn't afford to eat an adequate meal	
Never	156 (37.9)
Sometimes	210 (51.0)
Often	40 (9.7)
Don't know or no response	6 (1.5)
Has any adult family member skipped or reduced a meal because of insufficient finances?	
No	178 (43.2)
Yes	224 (54.3)
Don't know or no response	10 (2.5)
How often did adult family member skip or reduce a meal because of insufficient finances?^b	
Almost every month	104 (46.4)
Some months but not every month	106 (47.3)
1 or 2 months only	14 (6.3)
Have you ever eaten less than you felt you should have because of insufficient finances?	
No	196 (47.6)
Yes	206 (50.0)
Don't know or no response	10 (2.5)
Has any child in this household skipped or reduced a meal because of insufficient finances?	
No	374 (90.8)
Yes	36 (8.7)
Don't know or no response	2 (0.5)
How often did a child in the household skip or reduce a meal because of insufficient finances?^c	
Almost every month	16 (36.4)
Some month but not every month	26 (59.1)
1 or 2 months only	2 (4.5)
Household food security status	
Food secure	144 (35.0)
Food insecure	268 (65.0)

a. All questions are reference to the past 12 months

b. If adult ever skipped or reduced meal (n=224)

c. If child ever skipped or reduced meal (n=36)

conditions are observed in this study, with increased prevalence of stunting found in the first two years of life between the ages of six months and 23 months. Malnutrition is also exacerbated by giving inadequate complementary foods. Both wasting and being underweight are highest after the age of two years. This may be attributed to the fact that breastfeeding has stopped and food portions may be too small for the child. Children may also have been previously exposed to infections that resulted in reduced dietary intake or may have experienced in their households a high level of food insecurity, as reported in this study.

Although not statistically significant, women in this study who had more than two under-five children were at risk of having underweight children. It would be wrong therefore, to think of child development only in terms of its interaction with malnutrition, infection and social status. The amount of time a mother can spend with her baby may also be of paramount importance. Such attention is inevitably concentrated on the baby, even though the weaned older sibling may not be quite old enough to help him or herself. That child is likely to be ignored much more than is desirable and may not get sufficient maternal stimulation to optimize his neurological development. Particularly in the developing world, pre-school child mortality is much higher among children in families with short birth intervals¹⁹. The total number of members in the family is also related to the incidence of adverse circumstances. Studies have shown that the food available to larger families per head was frequently lower than that available to smaller families and this difference was reflected in the growth rate. Per capita food intake decreases with an increase in family size²⁰. Almost one-third of the respondents were unable to locate their child's delivery card, where birth weight is recorded. Those with birth weights of less than 2.5kg were more likely to be underweight. Low-birth-weight babies are known to be more likely to die in their first year of life as compared to normal-birth-weight babies²¹.

The prevalence of food insecurity observed among the households with under-five children was 65% in this study. A higher prevalence (82%) of household food insecurity has been reported elsewhere²². The prevalence of food insecurity with hunger (61.2%) in this study was much higher than the prevalence of food insecurity with hunger reported in studies conducted in Ibadan and Lagos, Nigeria (32.8%)²³. The higher prevalence in this study could result from the fact that the sample was drawn from a population of Nigeria with low economic resources. The one variable pertaining to food insecurity found to be significantly ($p < 0.05$) associated with child stunting has mothers eating less than they desired because of insufficient finances. Children who skipped or reduced meals

Table 4: Results of binary logistic regression (crude odds ratio [OR] and 95% confidence interval [CI]) for association between under-five children's nutritional status and maternal factors

Variables	Number	Nutritional status		OR	Confidence Interval (CI)	P-value
		No (%)	No (%)			
		Stunted	Normal			
Months of exclusive BF						
≥6 months	332	210 (63.3)	122 (36.7)	1		
<6 months	80	40 (50.0)	40 (50.0)	1.640	0.95-2.85	0.073
Complementary food preparation						
Prepare separately	228	82 (36.0)	146 (64.0)	1		
Not separately	126	58 (46.0)	68 (54.0)	1.415	0.88-2.25	0.145
Maternal education level						
Completed more than primary	330	124 (37.6)	206 (62.4)	1		
Completed primary	70	32 (45.7)	38 (54.3)	1.810	1.02-3.19	0.040
No formal education	10	6 (60.0)	4 (40.0)	4.599	0.89-23.66	0.068
		Underweight	Normal			
No of Children						
≤4	376	50 (13.5)	326 (86.7)	1		
>4	24	6 (25.0)	18 (75.0)	2.039	0.52-7.89	0.302
No of under-five children						
≤2	402	56 (13.9)	346 (86.1)	1		
>2	4	2 (50.0)	2 (50.0)	3.021	0.29-30.48	0.348
Birth weight						
≥2.5kg	268	34 (12.7)	234 (87.3)	1		
<2.5kg	18	6 (33.3)	12 (66.7)	2.988	0.98-9.05	0.053

because of insufficient finances were also significantly more likely to be wasted and underweight than those who did not. According to Naila et al, nutritional status of children is a good indicator of overall well-being of a society and reflects food security status²⁴. This is reflected in the present study by the significant association ($p < 0.05$) between prevalence of wasting and food insecurity. The prevalence of stunting in the food-secure households was 34.7%. The implication of finding high levels of stunting even in food-secure households means that other factors may be in play, particularly maternal education.

Although the association of exclusive breastfeeding with stunting was marginally significant (Table 4) as reported by Ojofeitimi in 2007, breast milk is supreme for infants. It is second to none in terms of meeting the infant's nutrient requirements for the first six months of life²⁵. Exclusive breastfeeding for the first six months of life has been found to enhance child survival in developing countries²⁶.

Child care and feeding practices are better measured through direct observation in households and a longitudinal study design better captures the timing and nature of changes and transitions, as

well as morbidity incidence. The cross-sectional design of this study is one limitation. A second limitation is the inability to validate the accuracy of maternal responses. Mothers may over report socially desirable activities and underreport socially undesirable ones; the extent of bias is difficult to assess. The feeding patterns for the under-five children leaned towards energy-giving foods (45%) and body-building foods (37%), while protective foods were offered sparingly (8%). Protective foods contain essential minerals that are needed for bone, teeth, and muscular development in children²⁶. Furthermore, this study showed that the prevalence of cow's milk or formula feeding in this area is high. This trend is particularly dangerous in an environment where basic hygiene is compromised. Clearly, a household that faces food insecurity has a greater burden when deciding how to ensure that their growing child has a nutrient-dense and appropriate diet. The situation is exacerbated by the introduction of inappropriate complementary foods and reliance on cow's milk or formula, which may be contaminated or of poor nutritional quality.

The study confirmed that mother's education is an asset for the child's proper growth. Low maternal education was significantly associated with stunted

Table 5: Result of binary logistic regression (crude odds ratio [OR] and 95% confidence interval [CI]) for association between under-five children's nutritional status and household food insecurity variables.

Variables	Number	Nutritional status		Adjusted OR	Confidence Interval (CI)	P-value
		No (%)	No (%)			
Mothers ate less than desired because of insufficient finances						
No	196	62 (31.6)	134 (68.4)	1		
Yes	208	100 (48.1)	108 (51.9)	2.113	1.40-3.37	.000
Child in the household skipped or reduced meal because of insufficient finances						
No	374	144 (38.5)	230 (61.5)	1		
Yes	36	18 (50.0)	18 (50.0)	1.391	0.68-2.82	.360
Household food security status						
Food secure	144	50 (34.7)	94 (65.3)	1		
Food insecure	268	112 (41.8)	156 (58.2)	1.336	0.86-2.05	.190
Child in the household skipped or reduced meal because of insufficient finance						
No	374	18 (4.8)	356 (95.2)	1		
Yes	36	8 (22.2)	28 (77.8)	4.359	1.71-11.07	.002
Household food security status						
Food secure	144	2 (1.4)	142 (98.6)	1		
Food insecure	268	24 (9.0)	244 (91.0)	5.707	1.31-24.85	.020
Child in the household skipped or reduced meal because of insufficient finances						
No	374	44 (11.8)	330 (88.2)	1		
Yes	36	14 (38.9)	22 (61.1)	4.177	1.96-8.86	.000
Household food security status						
Food secure	144	12 (8.3)	132 (91.7)	1		
Food insecure	268	46 (17.2)	222 (82.8)	1.918	0.96-3.81	.063

children. Maternal education has been consistently shown to be critically important for child health, nutrition, and survival. Although the precise mechanism by which maternal education affects child outcomes is not fully understood, evidence from various countries indicates that knowledge and practices are key pathways. Educated women are likely to be more aware of nutrition, hygiene and health care. Notably, an African study found that recovery from malnutrition had a stronger association with the mother's education than with household income²⁷.

Conclusion

The prevalence of food insecurity among households in Ile-Ife was high. Households with large family size, food insecurity and poor child care practices were more likely to have malnourished children. Further analysis is important to examine the associations adjusted for the other covariates.

Acknowledgements

We appreciate the support of the Population and Reproductive Health Programme, OAU-JHU partnership. We are also indebted to mothers and their children and the local government board, who have contributed to this study.

References

1. Health Reform Foundation of Nigeria. Child survival in Nigeria. Nigeria health review, 2006. HERFON, 2007:50-8.
2. Gillespie S, Haddad L. Attacking the double burden of malnutrition in Asia and the Pacific. ADB Nutrition and Development Series No. 4. Manila and Washington DC: Asian Development Bank (ADB) and International Food Policy Research Institute (FPRI), 2001.
3. Begin F, Frongillo EA Jr, Delisle H. Caregiver behaviors and resources influence child height-for-age in rural Chad. *J Nutr*;1999;129:680-6.
4. Galler JR, Ramsey FC, Harrison RH, Brooks R, Weiskopf-Bock S. Infant feeding practices in Barbados predict later growth. *J Nutr* 1998;128:1328-35.
5. Pelto GH. Improving complementary feeding practices and responsive parenting as a primary component of

- interventions to prevent malnutrition in infancy and early childhood. *Pediatrics* 2000;106:1300.
6. Greiner T. Sustained breastfeeding, complement-tation, and care. *Food Nutr Bull* 1995; 16:313-9.
 7. Ramalingaswami V, Jonsson U Jr. Commentary: the Asian enigma. *Nutrition:the progress of nations*. New York:United Nations Children's Fund, 1996.
 8. United Nations Children's Fund. Strategy for improved nutrition of children and women in developing countries. UNICEF, 2001.
 9. Ijarotimi OS, Oyeneyin OO. Effect of economy restructuring on household food security and nutritional status of Nigeria children. *J Food Agric Environ* 2005;3 (3&4): 27-32.
 10. World Bank. Repositioning nutrition as central to development: a strategy for large-scale action. Washington DC: World Bank, 2006.
 11. Ojofeitimi EO, Akinyele IA. Nutrition in primary health care. Nigeria health review 2007. Primary health care in Nigeria: 30 years after Alma Ata. Health Reform Foundation of Nigeria, 2008:108-23.
 12. Nigeria Demographic and Health Survey (NDHS). Calverton, Maryland: National Population Commission and Orc Macro, 2008:165.
 13. Frongillo EA Jr, de Onis M, Hanson KM. Socioeconomic and demographic factors are associated with worldwide patterns of stunting and wasting of children. *J Nutr* 1997; 127:2302-9.
 14. Bickel G, Nord M, Prince C, Hamilton W, Cook J. Revised 2000. Alexandria, Va, USA: US Department of Agriculture, Food and Nutrition Services, 2000. Available at: [Http://www.fns.usda.gov/fsec/FILES//FSGuild.pdf](http://www.fns.usda.gov/fsec/FILES//FSGuild.pdf). Accessed March 9, 2006.
 15. Demographic and Health Survey Lagos: Federal Office of Statistics, 1986.
 16. United Nations Children's Fund/Federal Government of Nigeria. Nutritional status of women and children. Participatory information collection study. Lagos: UNICEF, 1994.
 17. Jooste PL, Langenhoven ML, Kriek JA, Kunneke E, Nyaphusi M, Sharp, B. Nutritional status of rural children in the LesothoHighlands. *E Afr Med J*. 1997;74 (11):680-8.
 18. Lewis IA. Young child feeding practices in Nigeria in complementary feeding of young children in Africa and the Middle East. Geneva:World Health Organization,1999:311-5.
 19. Swenson I. Early childhood survivorship related to the subsequent interpregnancy interval and outcome of the subsequent pregnancy. *J Ped Env Child Health* 1978:103-6.
 20. Vis HL, Yourasowsky C, van der Borgh H. A nutritional survey in the Republic of Rwanda. Brussels : Musée Royal de l'Afrique Centrale. Tervaren, Belgique. *Annales-Serie In-8, Sciences Humaines* 1975;No. 87.
 21. Prentice AM. Variations in maternal dietary intake birthweight and breast-milk output in the Gambia. In: Aebi H, Whitehead RG, eds., *Maternal nutrition during pregnancy and lactation*. Berne: Hans Huber, 2006:167-83.
 22. Zalilah MS, Tham BL. Food security and child nutritional status among Orang Asli (Temuan) households in Hulu Langat, Selangor. *Med J Malaysia* 2002;57:36-50.
 23. Sanusi RA, Badejo CA, Yusuf BO. Measuring household food insecurity in selected local government areas of Lagos and Ibadan, Nigeria. *Pakistan J Nutr* 2006;5(1):62-7.
 24. Naila M et al. Gender and household food insecurity, and stunting in Pakistan children. *Food Nutr Bull* 2006;27(2):114.
 25. Ojofeitimi EO. Principle and practice of nutrition for community health workers. Nonesuchhouse, Oluyole Estate, Ibadan. 2007: 38, 68, 76.
 26. United Nations Children's Fund. The state of the world's children. New York:UNICEF, 1993, 1995, 2000, 2006.
 27. Vella V, Tomkins A, Borghesi A, Migliori GB, Oryem VY. Determinants of stunting and recovery from stunting in northwest Uganda. *Int. J Epidemiol* 1994;23:782-6.