WEANING HABITS AND NUTRITIONAL STATUS DETERMINANTS AMONG UNDER-5 CHILDREN IN NIGERIA

ABSTRACT

Introduction: High household income may not guarantee a satisfactory nutritional outcome of the children if households are lacking of care, dietary quality and health care access. Malnutrition will persist despite rapid income growth if more effective approach to combat the problem is absent. This study was carried out to determine the influence of correct feeding habits on the nutritional status among under-fives in an urban city in southwestern Nigeria.

Methodology: This was a community based, cross-sectional, descriptive study, investigations such as dietary survey, anthropometry and clinical examination were done. A multistage sampling technique was used in the study. Data were collected via pretested, close ended, interviewer administered questionnaire. The questionnaires obtained from the study were analyzed using statistical package for social sciences (SPSS version 20) software program.

Result: A total of 407 participants with the mean age of 26.58 ± 10.10 months were recruited into the study. Exclusive breastfeeding was practiced by 39.8 % of the mothers. About 56.5% of the mothers reported having given their babies the first milk (colostrum). The mean age of weaning off breast was 7.4 ±1.5 months. Immunization coverage among the respondents were BCG- 82.1%, Oral polio= 81.3%, Pentavalent [DPT 3] = 87.2% and Measles=88.7%. The mid upper arm circumference revealed 30(55.6%) of male were at greater risk of malnutrition than female 24(44.4%), while 45(56.1%) of males had severe malnutrition. Mean head circumference for age Z-score test between boys and girls in age group 13 to 24 months [p=0.009, C.I= -0.27-0.19] and 25 to 36 months were significant statistically (p =0.003, - 0.35-0.22). The value for age group 37-48 months was p=0.53, C.I= 0.015-0.59 and p=0.57, C.I= 2.59-1.70 for 49-60 months was not statistically significant.

Conclusion: This study has shown that the mean age of weaning was 7.4 ±1.5 months. It also reported the mean values of head circumference to be significantly lower among girls than boys below 36 months and this may have developmental and nutritional implications in Nigeria and other African countries.

Keywords: Weaning; Malnutrition; Under 5; MUAC; Nigeria

INTRODUCTION

One in every three under-five children have been reported to be malnourished globally while 165 million were underweight, 101 million were stunted and 52 million were wasted [1-2]. Malnutrition among these under five children is influenced by several interconnected network of factors such as cultural, behavioral and environmental factors. Cultural factors determine quality and quantity of food intake. It can also be a strong determinant in social accessibility to health care among these children especially in the developing countries [3-4].

Several studies have demonstrated that low income among the caregivers of the under five children is a major cause of childhood malnutrition [5-6]. However, the relationship between poverty and childhood malnutrition may be unpredictable and at times difficult to determine. Several studies had shown that high household income may not guarantee proper nourishment of the children if households are lacking of care, dietary quality and health care access [7-10]. Malnutrition can affect any households irrespective of economic status. Malnutrition will continue to be a major threat despite increasing income growth even if there is improved and more effective approach to combat its absent [11-12].

Two major primary determinants of malnutrition among young children as reported by several authors are unsatisfactory food intake and severe and repeated infections. The interactions of these two conditions determine the nutritional status and overall health of the child. The interaction of these two factors with the culture and way of life of the caregivers have been major predictors of child health. This has been reflected in the UNICEF Conceptual framework of child survival [12]. Briefly, the

model characterizes the correlates of malnutrition as factors that impair access to food, maternal and child care, and health care. It is these factors that determine the growth of these young children. Consequently, anthropometric measurement has been shown to be a valid indicator for young children's growth and wellbeing. Infant mortality and morbidity rates have also been shown to be a suitable indicator for predicting households' access to food, health and care [14].

Many previous studies concentrated majorly on the socio-economic status differences measured in terms of income, wealth status and housing index [12]. Very few studies explored the impact of other determinants such as dietary intake, food security, caring practices and the role of women on children's nutritional status [13-14]. Every healthy child should have weight and height measurements that compare very well with the standard normal distribution of heights (H) and weights (W) of children of the same age and sex. Therefore, the best way to assess the nutritional status and overall health of a child is to compare the child's growth indices with the set cut-off points in the standard normal distribution of adequately fed children that are associated with normal growth [4, 12]. This study was therefore carried out to determine the influence of correct feeding habits on the nutritional status among under-fives in an urban city in southwestern Nigeria.

MATERIALS AND METHODOLOGY

STUDY AREA

Lagos state was the former federal capital of Nigeria. However, it still remains the commercial capital of Nigeria. It consists of 20 local government areas. Its geographical coordinates are 6° 39' 0" North, 3° 43' 0" East. Agbowa Ikosi is one of the political constituencies under Epe Local Government Area of Lagos State. It has a public General hospital located in Agbowa, E1 (Agbowa)

Agbowa-Ikosi on the south bank of a creek that extends from Lagos inland to Ikorodu. It lies 35 kilometers north of Epe Division, It comprises of towns and villages such as Ota-Ikosi, Ikosi Beach, Orugbo-Iddo, Igbalu, Oke-Olisa, Gberigbe, Oko-Ito, Imope, Imota, Odo Ayandelu Ado-Ikosi, Owu, Iganke. The inhabitants are mostly farmers and fishermen, though there are several commercial activities replica of an urban area. The religion of the people are Christianity, Islam and traditional beliefs. Agbowa Ikosi consists of 6 political wards namely Agbowa I, Agbowa II, Owuotta, Ajebo/orugbo, Ifesowapo and Ketu/ejirin. According to 2006 population census the total number of children within Lagos was 35194

STUDY DESIGN

This is a community based, cross-sectional, descriptive study, investigations such as dietary survey, anthropometry and clinical examination were done.

SELECTION CRITERIA

All children aged 0–59 months whose parents reside within Agbowa-ikosi, and whose guardian or parent consented to participate in the study were included. Children with acute illness such as fever, diarrhea etc in the last one month, children with cardiovascular diseases and congenital anomalies were excluded from the study.

SAMPLE SIZE DETERMINATION

The sample size was determined by using the formula for descriptive studies, $n = Z^2 p q / d^{2,}$ Where n = calculated sample size, Z= the standard normal deviate, usually set at 1.96 which corresponds to the 95% confidence interval. P = 71% the prevalence of the proportion of nutritional status in the target population [15], d = Permissible error of estimation (0.05) and q = 1.0-p

$$n = \frac{(1.96)^2 \times 0.71 \times 0.29}{(0.005)^2} = \frac{0.79098544}{0.0025} = 316.394$$

10% attrition 316.394 + 31.396 = 347.79 ≈ 400 questionnaires

SAMPLING TECHNIQUE

A multistage sampling technique was used in the study.

Out of the 20 local governments in Lagos state, Epe local government area was selected by balloting and Agbowa Ikosi political constituency was selected from Epe LGA. Furthermore, simple random sampling (by balloting) was used to select 3 wards out of the total 6 wards in the local government area which were Agbowa 1, Agbowa 2 and Ejirin.

At the ward level, simple random sampling (by balloting) was used to select 15 streets per ward totaling 45 streets to create for equal proportion of the participant streets (estimated number of streets in each ward are 48, 39 and 27respectively) the streets were numbered, small pieces of papers were wrapped with a number each representing each street, any paper randomly picked was selected to be used for the study

At the street level, systematic random sampling was used to select 10 houses per street. Individual household were selected at regular intervals from the sampling frame. The intervals were chosen to ensure an adequate sample size. The houses were numbered and the sum was divided by the number of questionnaires to be distributed. In all, there was an average of 45 streets containing 3150, it then followed that 3150/400 = 7.875 ≈ 8^{th} house. Therefore, every 8^{th} household was selected into the study. One household per house was selected. In houses where there were more than one household in

the house, the selection was done using simple random sampling (by balloting). In total 450 households were selected.

DATA COLLECTION

This study commenced at the community with advocacy visit to the Head of the community. Permission and cooperation was also sort from the staff of the health centre in the area. Three community health extension workers and five health attendants were trained for three days to assist in administering the questionnaires. Checklist was used for clinical examination. This study was carried out within the period of two months (April-June, 2018).

The pretest comprised of 10% of the total questionnaire was administered at Sotubo, a town under Sagamu Local Government. The data were collected and analyzed using SPSS version 20 to ascertain the validity of the instrument.

STUDY INSTRUMENT

The study instrument was interviewer administered questionnaire containing 5 sections to collect Information regarding patients' age, sex, residence, birth weight, natal history of prematurity, breast feeding practices, age at introduction of other types of food, types of complementary food in the first year of life and habit of frequent intake of food was obtained from parents/guardians. Additional information that was elicited include caretaker's occupation, information about family size and education level of the parents.

ANTHROPOMETRIC PARAMETERS

Anthropometry is a technique that uses human body measurements to draw conclusion about the nutritional status of individuals and population and often applied to pre-school children below the age of 5 years. Measurements were taken by flexible, non-stretch tape made of fiber glass or steel for children of 1-5yrs. In order to ensure consistency and reduce error in taking the measurements during field work, each measurement was taken twice, and the mean of the two readings was

recorded during training. If any pair of readings exceeded the maximum allowable difference for a given variable, the measurements were repeated.

Steps followed in taking the MUAC measurement of a child were

- The mid-point between the elbow and the shoulder (acromion and olecranon) was determined as shown on the picture below.
- The tape measure was placed around the LEFT arm (the arm should be **relaxed** and hang down the side of the body).
- The MUAC was measured while ensuring that the tape neither pinches the arm nor is left loose.

The measurement was read from the window of the tape or from the tape and was recorded to the nearest 0.1 cm or 1mm. Using a 3-colour tape: a measurement in the green zone means the child is properly nourished; a measurement in the yellow zone means that the child is at risk of malnutrition; a measurement in the red zone means that the child is acutely malnourished.
The measurement was repeated two times to ensure an accurate interpretation.

Head and chest circumference: Measurement of head circumference is important because it is closely related to brain size. It is often used with other measurements to detect pathological conditions too. [16]

Dietary survey: Dietary assessment protocol is designed to assess nutrient intakes after implying questionnaire, records, and recall methods [16]

The Road to health chart (RTHC) was used to record immunization coverage and to calculate the Z-score

DATA ANALYSIS

The questionnaires obtained from the study was analyzed using statistical package for social sciences (SPSS version 20) software program. The data was presented in frequency distribution tables with percentages. Frequency tabulation was used to describe the socio-demographic characteristics of respondents. Inferential statistical analysis was also used to determine the association between some variables and nutritional status of the study population. The level of significance was taken at $p \leq 0.05$.

Participants were categorized using the indices that were compared with standard reference values of World Health Organization (WHO) standards recommendations to obtain the *Z*-scores.

Diagnostic criteria for Severe acute malnutrition in children aged 6–60 months

Chart 1: Indicator of malnutrition based on measurements and cut-off.

Indicator	Measure	Cut-off
Severe wasting (2)	Weight-for-height (1)	< -3 SD
Severe wasting (2)	MUAC	< 115 mm

Based on WHO Standards (www.who.int/childgrowth/standards

Mid upper arm circumference: children whose mid upper arm circumference is below 12.5cm are considered malnourished, hence it is significant during the diagnosis of protein energy malnutrition.

RESULTS

Sociodermographic Characteristics

Four hundred and fifty (450) questionnaires were administered to respondents while four hundred and seven (407) were fully completed and returned. The response rate was 90.44%. The mean age of respondents was 47.38 ± 9.83. Majority 391(96.1%) were married, 178(43.7%) had no formal education, 225(55.3%) were on income of <10,000 monthly while 228(56.0%) were multigravida this shown in **Table 1**

Health care seeking practices

The mean age of the children under study was 26.58 ± 10.10 months, about half 210 (51.6%) were males and 181(44.5%) were severely malnourished. Common symptoms reportedly experienced by the children were pale eyes (14.3%), poor appetite (10.6%) and malaria (10.3%), headache (8.1%), and brittle finger nails (7.4%). All the caregivers 407(100.0%) Seek health care assistance whenever their child was sick, 105(25.8%) resolved to pharmacy for medication while 86(21.1%) showed one symptom or the other. **Table 2**

Only 301(74.0%) completed the immunization for the children at appropriate time. While 226(55.5%) of the children were dewormed in the last 3 months. As shown in Table 3 Immunization coverage among the respondents were BCG- 82.1%, Oral polio= 81.3%, Pentavalent [DPT 3] = 87.2% and Measles=88.7%. **Figure 1**

Breastfeeding and weaning practices

Exclusive breastfeeding was practiced by 39.8 % of the mothers. About 56.5% of the mothers reported having given their babies the first milk (colostrum) while the rest (43.5%) discarded it. Majority (77.4%) of the mothers introduced complementary feeding at 5-8 months. The mean age of weaning off breast was 7.4 ±1.5 months. This is shown in Table 3. Tea (90.3%) and Porridge (61.5%) were the most commonly used food for complementary feeding followed by maize with (50.0%), and milk (31.3%). The percentage range of respondents that fed their children with diver's type of

food from one week to one month, only 31.3% fed their children with milk 7 times a week, 10.8% fed with fish 7 times per week while 61.5% gave porridge to the children 7 times per week and 90.3% fed the children with tea 7 times per week, this showed that the common food for the children after one month weaning of weaning was tea affordably while only fewer percentages were able to afford other forms of food. The food recall frequency table is shown in **Table 4**

Anthropometric indices of the respondents

The mid upper arm circumference revealed 30(55.6%) of male were at risk of malnutrition greater than female 24(44.4%), while 45(56.1%) of males were also severe compared to 40 (43.9%) females. The mean head circumference increased with increasing range of age and was higher for boys in comparison with girls among age group 13 to 24 months (CI: -0.75 to -0.71; $p = 0.001$). The mean HC of age range 25 to 36 months among boys and girls were also statistically significantly different (CI: 0.59 to -0.68; $p = 0.037$). However, mean HC between boys and girls among age range 37 to 48 as well as 49 to 60 months was not statistically significant ($p > 0.05$). **Table 5**

Mean head circumference for age Z-score test between boys and girls in age group 13 to 24 months [p=0.009, C.I = -0.27-0.19] and 25 to 36 months were significantly different statistically ($p = 0.003$, C.I = - 0.35-0.22). The value for age group 37-48 months was p=0.53, C.I = 0.015-0.59 and p=0.57, C.I = 2.59-1.70 for 49-60 months was not statistically significantly different. **Table 6**

DISCUSSION

The study revealed the apparent significance of breastfeeding and complementary feeding pattern of the mothers. Majority of the mothers do not practice exclusive breastfeeding while only 56.5% gives first milk (colostrum). However this finding is higher than the 17% reported by the National health survey [19]. Exclusive breastfeeding is being recommended globally as the mainstay of nutrition in the first 6months of life especially in poor income countries. Early initiation of breastfeeding (within one hour of birth) facilitates breast milk production and consumption of colostrum which appears right after delivery. This implies that there is a low level of health education about breastfeeding among the mothers. Mother's education had a significant influence on their breastfeeding habit. This finding is similar to findings in several studies [4-6] which established that a more educated mother/caregiver raises a better quality child than a less educated mother.

The mean age of weaning off breast was 7.4 ±1.5 months. As a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues up to two years or beyond [7-9, 18]. However early weaning as reported in this study should be discouraged. Mothers especially those in low resource countries should be encouraged to continue this practice of exclusive breastfeeding at least for the first 6 months of life with introduction of complimentary feeds at this time and to prolong breastfeeding duration as long as possible. Mass educational program to ensure correct complimentary feeding and programs to control malaria and diarrheal diseases should be vigorously pursued by health authorities especially ministry of health.

Immunization coverage among the respondents was high in this study compared to that which has been reported in the country. Only 1 out of 4 children aged 12–23 months in Nigeria completes their routine immunization schedule [19] while almost 20 million infants about three-fifths of them found in 10 under-developed countries globally including Nigeria did not receive routine immunization in

2016 [20]. Place of residence has been proven to be more important in predicting high immunization coverage when compared to other personal attributes of children or their parents [21-22]. This may be due to inequalities in the use of maternal and child health services between rural and urban dwellers. However, the efficacy of immunization has been well proven against childhood diseases [23].

The study shows that the mean values of head circumference to be significantly lower among girls than boys below 36months. The fact that females cope better with adverse physiological condition than their male counterpart is well documented in several studies [15,16]. This might be explained by the fact that food for weaning are typically introduced to children in the younger age group, thus increasing their exposure to infections and susceptibility to illnesses which are more tolerated by females. This tendency, coupled with inappropriate or inadequate feeding practices, may contribute to faltering nutritional status among children in these age groups [11-13, 17].

Conclusion

This study shows that the mean age of weaning off breast was 7.4 ±1.5 months. Only 39.8% of the mother practice exclusive breastfeeding while 56.5% gives first milk (colostrum). It also reported that mean values of head circumference to be significantly lower among girls when compared to boys. Mothers especially those in low resource countries should be encouraged to continue this practice of exclusive breastfeeding at least for the first 6 months of life and to prolong its duration as long as possible. The care takers need to be educated on the weaning practices to be adopted**.** Female education cannot be over-emphasized as this will broaden the horizon of female gender on the necessity of being a mother.

Mass educational program to ensure correct complimentary feeding and programs to control malaria and diarrheal diseases should be vigorously pursued by health authorities especially ministry of health. Health education at all levels including school, University, health services and community level should be implemented.

Declarations

Ethics approval and consent

Ethical approval was obtained from Health Research and Ethics Committee of Olabisi Onabanjo University Teaching Hospital Sagamu with No: OOUTH/HREC/218/2018AP. This research was performed in accordance with the declaration of the Helsinki. Adequate permission was obtained from the local authority such as community head and the hospital staff. Written informed consent was obtained from the respondents who are the parent and/or legal guardian of our study participants after adequate explanation of the study procedure. Confidentiality of the information obtained was ensured.

Competing interest

The authors declare that they have no competing interests.

Funding:

The research was solely funded by the Authors. There was no source of external funding

Authors" Contribution

Adebayo OT conceived the study and participated in its design and collection of data, Amoran OE participated in the conception, analysis and helped to draft the manuscript, Sodehinde K.O, Mautin J.G, Salako A.A & Ekundayo A.A. participated in the design and coordination. All authors read and approved the final manuscript.

Acknowledgement

The authors acknowledge all the members of staff of the department of CMPC, Olabisi Onabanjo University teaching hospital, Sagamu, Nigeria who have ontributed in one way or the other to the success of the research work.

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Table 1: Socio-demographic characteristics of Caregivers

VARIABLES	FREQUENCY	PERCENTAGE
Mean age ± SD of caregiver = 47.38 ± 9.83		
Age group of caretaker in years		
≤24	9	2.2
25-39	64	15.7
40-49	154	37.8
50-59	135	33.2
≥60	45	11.1
Type of marriage		
Monogamy	234	57.5
Polygamy	173	42.5
Type of family		
Nuclear	244	60.0
Extended	163	40.0
Marital		
Married	391	96.1
Separated/Divorce	16	3.9
Education of respondents		
Tertiary	9	2.2
Complete secondary	90	22.1
Complete primary	130	31.9
No formal education	178	43.7
Income of respondents		
< N10,000	225	55.3
N10,000 – N50,000	121	29.7
N50,000 – N100,000	61	15.0
Occupation of respondents		
Artisan	293	72.0
self employed	71	17.4
house wife	36	8.8
Blue collar job	7	1.7
Parity of respondents		
0-4	192	47.2

>4	215	52.8
Position of the child in the family		
Firstborn	179	44.0
second born or later	228	56.0

Table 2: Child history

VARIABLES	FREQUENCY	PERCENTAGE
Mean age ± SD of children = 26.58 ± 10.10		
Sex of the child		
Male	210	51.6
Female	197	48.4
Age of child group in month	65	16.0
6-12	37	9.1
13-24	140	34.4
25-36	181	44.5
37-48	26	6.4
49-59	23	5.7
MUAC		
Severe malnutrition (<11.5 cm)	98	24.1
Moderate malnutrition (11.5 -12.5 cm)	64	15.7
Malnutrition at risk (12.5 -13.5 cm)	54	13.3
Normal (>13.5 cm)	191	46.9
Birth weight (kg)		
≤2.5	219	53.8
>2.5	188	46.2
Immunization scheme		
Complete	301	74.0
Incomplete	106	26.0
Child been dewormed in the last 3 months		
Yes	226	55.5
No	181	44.5

Table 3: Breastfeeding and weaning practices

VARIABLES	FREQUENCY	PERCENTAGE
Mean age ± SD = 7.4± 1.5		
Colostrum given		
Yes	230	56.5
No	177	43.5
You put your baby to the breast		
Immediately	202	49.6
Within 1st day	179	44.0
within 1st 3days	26	6.4
Child still breastfeeding		
Yes	223	54.8
No	184	45.2
The baby was exclusively breastfed		
Yes	162	39.8
No	245	60.2
Age complementary food was initiated		
5-8	315	77.4
9-12	91	22.4
≥13	1	.2
Complementary food		
Porridge		61.5
Tea (Lipton with a small sachet of powdered milk)		90.3
Maize		50.0
Milk		31.3
Millet		12.8

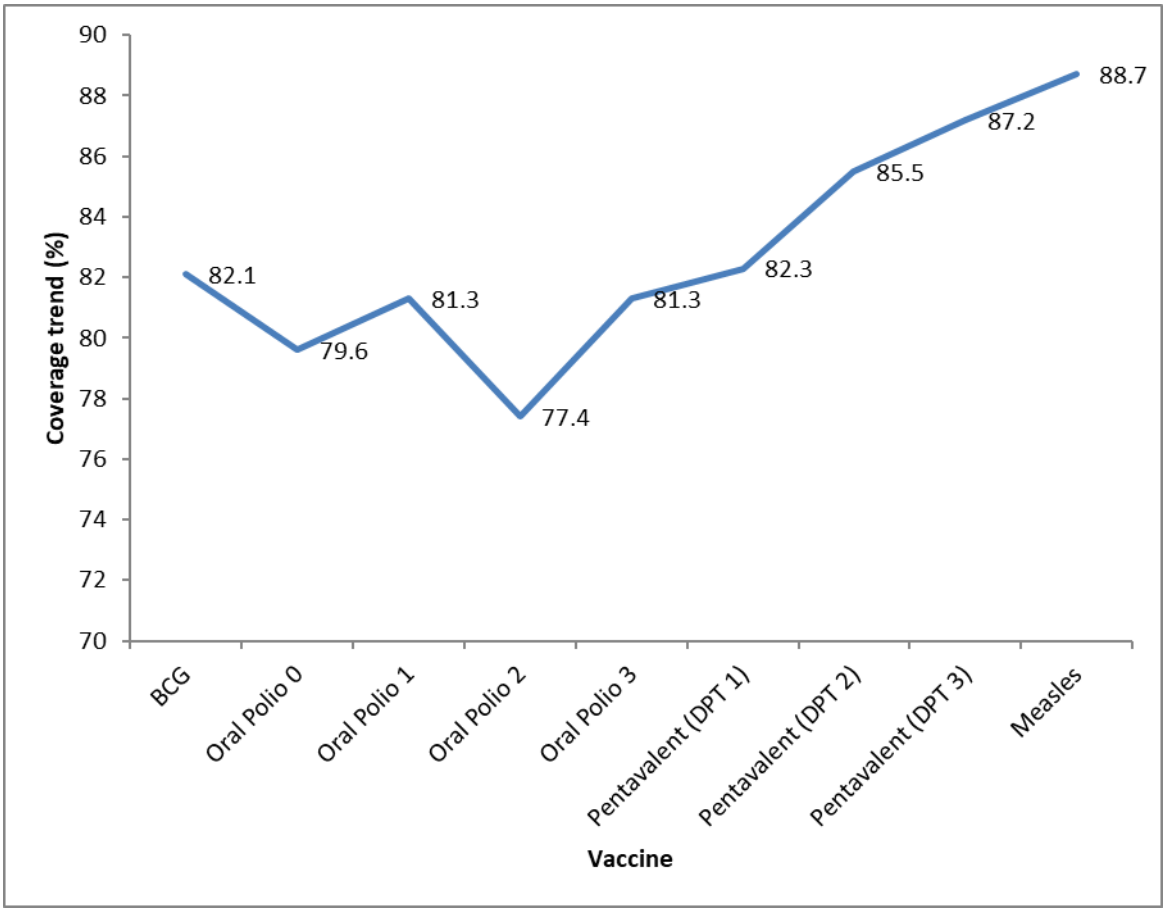

Figure 1:Trends in immunization coverage of children

Table 4: Food consumption frequencies

Food consumption frequencies Food	Once a week	Twice a week	3 times a week	4 times a week	5 times a week	6 times a week	7 times a week	Once a month	Never consumed
Milk	4.0	2.6	6.2	8.4	5.7	1.8	31.3	0.4	39.2
Eggs	16.5	24.3	19.3	9.6	3.2	2.8	5.0	2.3	17.0
Beef	39.5	24.5	10.5	7.7	1.4	8.6	3.6	5.4	2.3
Liver	5.6	19	-	-	0.5	-	0.5	23.2	68.4
Chicken	13.1	2.8	-	-	-	-	0.5	51.4	32.2
Fish	31.5	17.8	8.9	4.7	0.9	0.9	10.8	10.3	14.1
Fruits	10.8	11.8	19.1	18.6	7.4	7.8	4.4	1.5	18.6
Legumes, beans, Lentils	8.2	10.0	45.9	29.1	2.7	0.9	1.8	-	1.4
Green Vegetables	1.5	2.5	22.5	43.1	10.8	4.9	10.8	1.0	2.9
Porridge	0.5	1.9	5.3	8.2	1.4	1.0	61.5	1.4	18.8
Tea	0.7	-	-	0.7	-	-	90.3	-	8.2
Soft drink	0.5	-	0.5	1.1	-	-	5.2	-	4.3
Cassava	-	-	-	-	-	-	5.7	1.6	11.3
Maize	-	-	10.0	5.0	-	-	50.0	-	35.0
Sorghum	12.7	13.2	43.9	22.9	1.5	0.5	2.9	0.5	2.0
Millet	3.0	9.4	35.5	30.0	4.4	0.5	12.8	-	12.8

Table 5: Mean Head Circumference (HC) based on the age and sex specific distribution of the children

Age month	Boys	Girls	Mean of HC (cm)				
			Boys Mean ± SD	Girls Mean ± SD	Z test	*p* value	95% CI
13-24	72	68	48.15 ± 2.18	48.13 ± 2.17	-3.72	0.001	-0.75 to -0.71
25-36	93	88	48.22 ± 2.18	48.07 ± 2.18	-4.56	0.037	0.59 to -0.68
37-48	8	13	49.42± 2.31	48.08 ± 2.28	-0.272	0.519	2.65 to -1.36
49-60	13	10	48.04±2.09	47.08 ± 1.75	.291	0.774	1.94 to -1.47

Table 6: Mean Head Circumference for age Z- score (HCAZ) based on the age and sex specific distribution of the children

Age month	Boys	Girls	Mean of HC (cm)				
			Boys Mean ± SD	Girls Mean ± SD	Z test	p value	95% CI
13-24	72	68	-1.08 ± 1.07	-1.12 ± 1.28	-0.33	0.009	-0.27 to 0.19
25-36	93	88	-1.26 ± 1.27	-1.33 ± 1.40	-0.48	0.003	-0.35 to 0.22
37-48	8	13	-1.48 ± 1.14	-1.19 ± 1.58	1.87	0.532	0.015 to 0.59
49-60	13	10	-1.49 ± 1.16	-1.20 ± 1.57	2.01	0.567	2.59 to 1.70