

Obarisiagbon OE
Omuemu VO
Okojie OH

CC –BY **Nutritional status and its possible determinants among children attending early child care centres in Benin City, Edo State, Nigeria**

DOI:<http://dx.doi.org/10.4314/njp.v45i3.3>

Accepted: 19th September 2018

Obarisiagbon OE (✉)
Omuemu VO, Okojie OH
Department of Community Health
College of Medical Sciences
University of Benin, Benin City
Edo State, Nigeria
Email: obasotas@gmail.com
otaniyenuwa.obarisiagbon
@uniben.edu

Abstract: *Background:* Nutritional status of children has become a worldwide public health issue and its assessment has been adjudged the best global indicator of well-being in children. One in three children under the age of five (178 million children) in developing countries are stunted due to chronic under-nutrition and poor quality diets. Without addressing malnutrition, the Sustainable Development Goal 2 of ending hunger, achieving food security and improved nutrition may not be attained. This study assessed the nutritional status and its possible determinants among children attending Early Child Care Centres in Benin City, Edo State, Nigeria.

Methods: A descriptive cross-sectional study was carried out on 544 under-five children attending ECCCs in Benin City. Data was obtained with pretested interviewer-administered questionnaires. Nutritional status was assessed using anthropometric measurement. Data was analyzed

with IBM SPSS version 21.0 and statistical significance was determined using Chi square with p value set at < 0.05.

Results: Seventy nine (14.5%) of the children were stunted, while 68 (12.5%), 67 (12.3%) and 13 (2.8%) were underweight, wasted, and obese respectively. Significant possible determinants of being underweight and wasted among the children were age of child (p = 0.041) and exclusive breastfeeding (p = 0.011) while the predictor for wasting was exclusive breastfeeding (p = 0.011).

Conclusion: Over a tenth of the respondents were either stunted, underweight or wasted while a few of the children were obese. All stakeholders involved in ensuring and promoting proper nutrition among under-five children should work as a team in order to develop intervention programmes and ensure adequate nutrition in children.

Key words: Nutritional Status; Determinants; Early Child Care Centers

Introduction

Adequate nutrition during infancy and early childhood is essential for health, growth and development of children so that they can attain their full potential.^{1,2} Nutritional status of children has become a worldwide public health issue and its assessment has been adjudged the best global indicator of well-being in children.^{3,4} Nutritional status has a direct relationship with dietary intake, however, factors other than food play important roles in the nutritional status of children amongst which include diseases and infestations.⁵⁻⁷ The nature of the environment where a child is cared for is important to assure adequate growth and development, hence, the interplay that exists between health, nutrition, sanitation and education. A balance in these factors helps ensure that the child maintains proper development.⁸

Early Childcare Centres (ECCCs) are pre-primary facilities for children aged 0 – 5 years where optimal development of children is assured via a stimulating environment, adequate nutrition and social interaction with attentive caregivers.¹¹ They serve as the alternative option regarding childcare when mothers take paid employment outside the home in order to augment the family income.⁸⁻¹⁰ Various policies guide the operations of the Early Childcare Centres and these include National Policy on Education, Universal Basic Education Act, National Policy for Integrated Early Childhood Development, and the National Minimum Standard for early child care centres.^{11,12} Around the world, 10 million children die before their fifth birthday every year.¹³⁻¹⁴ Over a half of these deaths are associated with malnutrition.¹⁴ One in three children under the age of five (178 million children) in developing countries is stunted due to poor

quality diets and chronic under-nutrition.¹⁵⁻¹⁷ Sub-Saharan Africa continues to have the highest prevalence of undernourished children. An estimated 126 million African children are underweight, 200 million are chronically malnourished and 5 million die of hunger annually.¹⁸ In Nigeria, the National Nutrition and Health survey conducted in 2014 revealed that, 32.0% of children under-5 years are stunted indicating chronic malnutrition, 8.7% and less than a quarter (21.0%) are wasted and underweight, respectively.¹⁹⁻²⁰ Without addressing malnutrition, the Sustainable Development Goal 2 of ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture will not be realized. Research has revealed that malnutrition during early development (0-3years) can harm the body and lead to learning and memory deficits, lower intelligence quotient (IQ), poor school achievement and behavioral problems in childhood and adolescence.²¹⁻²² Research by several authors has also revealed that the primary determinants of malnutrition, relate to poor nutrient intake and repeated infections, or a combination of the two.²³⁻²⁶

Early Childcare Centres (ECCCs) are environments where children have been demonstrated to be more susceptible to acquiring repeated infections as well as diseases.²⁷⁻³¹ This may be because many of these centres are overcrowded, lack proper infrastructure and facilities. Over two-thirds of the staff have been found to lack good personal hygiene, hence facilitating the spread of parasitic and skin infections among the children.³²⁻³⁴ This could further increase the prevalence of malnutrition. In order to achieve one of the targets of SDG 3 which is to end preventable deaths of newborns and children under-five years of age, there is need to identify and overcome the barriers to a healthful nutritional status in the children. This study therefore assessed the nutritional status of children attending ECCCs as well as its determinants with a view to providing baseline data which will be useful in the development of appropriate interventions and improve child health outcomes.

Methodology

This descriptive cross sectional study was carried out from March 2014 – June 2015 among children less than five years of age who attend ECCCs in Benin City, Edo State. Benin City is made up of three Local Government Areas; Ikpoba-Okha, Oredo and Egor. There are 435 public and private ECCCs in these 3 LGAs. A minimum sample size for the children attending ECCCs was calculated using the Cochran formula for single proportion ($n = (Z_{1-\alpha/2} + Z_{1-\beta})^2 pq/d^2$)³⁵ where n=minimum sample size, $Z_{1-\alpha/2}$ = standard normal deviate (1.96), $Z_{1-\beta}$ = Power of study (1.282) d= degree of precision (4%), $q=1-p$, p = prevalence of wasting in under-five children in a cross sectional study to assess nutritional status in Buthan (4.3%).³⁶ Thus the minimum sample size was 481. Addition of 10% non-response rate (48) increased sample size to 529. However, 544 children participated in the survey. This study was part of a larger study that

assessed the level of implementation of the policy on Early Child Care Centers (ECCCs) by ECCCs in Benin City, Edo State. Thus, a total population of the children in the selected ECCCs, whose parents agreed to participate in the survey was studied for the assessment of nutritional status and its possible determinants.

Data for this study was obtained with pretested structured interviewer-administered questionnaire (adapted from the 2008 NDHS questionnaire).¹⁹ It comprised of open and closed ended questions which covered the objectives of the study. The questions were broadly divided into sections: Socio-demographic characteristics of the respondents (parents of the under-five children were the respondents), nutritional history of the under-five children, determinants of nutritional status and clinical findings that reflected the clinical status of the children. The nutritional status of the children was assessed using anthropometric measurements of the children's weight and height.

Weight measurement: The weights of the children were measured in kilogram (kg) using an electronic scale (Sonachi® model no ssc-2208) with a capacity of 150kg. The scale was calibrated to zero reading before each weighing session and standardized every day using a 6 kg dumbbell. The scale was placed on an even floor with the child standing in the centre, hands by the sides and in light clothing. For the very young children (less than 2 years old), the weight of the adult alone was taken. Thereafter, adult's weight was taken with the adult carrying the child. Subtraction of the adult's weight from the combined weight gave the weight of the child.³⁷

Height measurement: The very young children (less than 2 years) and those that were yet to stand erect without support were laid on flat platforms and measured from the vertex to the heel.

Height of the children aged 2 years and above was measured in Centimetres (cm) using a stadiometer (Axiom® RGZ-160) according to the National Health and Nutrition Examination Survey (NHANES) protocol.³⁸

The questionnaires were screened for completeness by the researcher after which they were coded, entered into the IBM SPSS version 21.0 software and analysed. The WHO Anthro® version (1.0.6) software was used to calculate Body mass index (BMI) plot the graphs (weight-for-age, height-for-age, weight-for-height). For height for age; Z score values $-2SD$ was regarded as stunted. For weight for height, Z score values $-2SD$ was regarded as wasted and for weight for age, Z score values $-2SD$ was regarded as underweight, Z score values $> +2SD$ to $<+3SD$ was regarded as overweight while Z score values $+3SD$ was regarded as obese. Test of associations were carried out using Chi-squared tests or the Fishers' Exact test where appropriate to determine associations between socio-demographic characteristics and the nutritional status of the children. Multivariate analysis using binary logistic regression

was carried out using the 'enter approach' to further determine significant predictors of stunting, underweight, wasting as well as overweight and control for confounders. The International Standard Classification of Occupations (ISCO-08) was adapted and modified to group the occupation of the parents/caregivers of the children into skill level 1 to skill level 4 and unemployed.³⁹ The statistical measure for the analysis was the adjusted odds ratio at 95% confidence interval. The level of significance was set at $p < 0.05$ for all statistical associations. Frequency tables were used to present the results.

Ethical clearance was obtained from the University of Benin Teaching Hospital Ethics and Research Committee. Permission to carry out this study was sought and obtained from the Chief Inspector for Education (in the Ministry of Basic Education, Benin City), the Primary Health Care Coordinators of the various LGAs and owners of the Early Childcare Centres. The study was described to the parents/caregivers of the children who were the respondents and written informed consent obtained from them. In order to ensure confidentiality, serial numbers rather than names were used to identify the respondents. Respondents were informed that they had the right to decline participation or to withdraw from the study at any time they wished. Respondents were also informed that there were no penalties or loss of benefits for refusal to participate in the study or withdrawal from it.

Results

A total of 544 children who attended Early Child Care Centers participated in this study. The mean age of the children was 41.5 ± 11.9 months with a higher proportion 165 (30.3%) seen to be in the 48 – 59 months age group. Over half of them 281 (51.7%) were females and 182 (33.5%) were of the first birth order. Majority 498 (91.5%) had 4 siblings and 342 (62.9%) had a household size of 5 – 7. Three hundred and thirty four caregivers (61.4%) had secondary level of education and over two-thirds of their spouses 401 (73.7%) as well. Two hundred and fifty six (47.1%) of the caregivers earned an average monthly income of ₦24,999 (69.442 USD). (Table 1)

Majority of the children 510 (93.8%) had eaten food made from grains (rice, noodles), 314 (57.7%) vegetables and 210 (38.6%) fruits in the 24 hours preceding the survey. Three-quarters of the respondents 408 (75.0%) and 461 (84.7%) had eaten fresh or dried fish and snacks, respectively as part of their meals in the 24 hours preceding the survey. (Table 2) Seventy nine (14.5%) of the respondents were stunted, 68 (12.5%) and 67 (12.3%) were underweight and wasted, respectively. (Table 2)

Table 1: Socio-demographic characteristics of the under-fives and their care givers

| Variables | Frequency (n = 544) | Percent |
|----------------------------------|---------------------|---------|
| Age group (months) | | |
| 12 - 23 | 122 | 22.4 |
| 24 - 35 | 115 | 21.1 |
| 36 - 47 | 142 | 26.1 |
| 48 - 59 | 165 | 30.3 |
| Mean age \pm SD (months) | 41.5 \pm 11.9 | |
| Sex | | |
| Male | 263 | 48.3 |
| Female | 281 | 51.7 |
| Birth order | | |
| First | 182 | 33.5 |
| Second | 132 | 24.3 |
| Third | 119 | 21.9 |
| Fourth | 55 | 10.1 |
| Fifth or more | 56 | 10.3 |
| Number of siblings | | |
| 4 | 498 | 91.5 |
| >4 | 46 | 8.5 |
| Level of education of care giver | | |
| No formal education | 26 | 4.8 |
| Primary | 71 | 13.1 |
| Secondary | 334 | 61.4 |
| Tertiary | 113 | 20.8 |

Table 2: Dietary diversity of the children in the 24 hours preceding the study

| Variables | Frequency (n = 544) | Percent |
|---|---------------------|---------|
| *Carbohydrates | | |
| Food made from grains (rice, noodles) | 510 | 93.8 |
| Food from roots (potatoes, yam and cassava) | 266 | 48.9 |
| *Fruits and vegetables | | |
| Vegetables | 314 | 57.7 |
| Fruits | 210 | 38.6 |
| *Proteins and fats | | |
| Meat/milk | 290 | 53.3 |
| Liver, kidney and heart | 63 | 11.6 |
| Eggs | 230 | 42.3 |
| Fresh or dried fish | 408 | 75.0 |
| Beans/peas | 229 | 42.1 |
| Oils | 287 | 52.8 |
| *Snacks | 461 | 84.7 |

*Snacks include Biscuits, Chin chin, etc.

*Multiple response

A higher proportion of children in the 36 – 47 months age group 23 (16.2%) were stunted compared to other age groups, however, the association between age group and stunting status was not statistically significant ($p = 0.421$, OR = 1.447, 95% CI = 0.589 – 3.589). A higher proportion of the males were stunted 41 (15.6%) compared with the females 38 (13.5%). (Table 3)

Age group 36 – 47 months had the lowest proportion of children who were underweight 12 (8.5%) compared to other age groups. The association between age group and underweight status of the respondents was statistically significant ($p = 0.0041$, OR = 0.472, CI = 0.229 – 0.970). Children who were exclusively breastfed were higher in proportion with regards to their underweight status 46 (15.9%) compared to children who were not exclusively breastfed 22 (8.7%) Children who were exclusively breastfed were 1.990 times likely to be underweight compared with those not who had been not been exclusively breastfed. The association between the

underweight status and exclusive breast feeding was statistically significant ($p = 0.011$, $CI = 1.170 - 3.460$).

Table 3: Factors associated with stunting among children attending ECCCs

| Variable | Stunting | | Odds ratio | 95%CI | p-value |
|---|----------------------|-----------------------|------------|---------------|---------|
| | Yes | No | | | |
| | (n = 79) Freq (%) | (n = 465) Freq (%) | | | |
| <i>Age group (months)</i> | | | | | |
| 12 – 23 | 17 (13.9) | 105 (86.1) | 1.402 | 0.687 – 2.863 | 0.354 |
| 24 – 35 | 17 (14.8) | 98 (85.2) | 0.643 | 0.323 – 1.279 | 0.208 |
| 36 – 47 | 23 (16.2) | 119 (83.8) | 1.447 | 0.589 – 3.589 | 0.421 |
| 48 – 59 | 22 (13.3) | 143 (86.7) | | | |
| <i>Sex</i> | | | | | |
| Male | 41 (15.6) | 222 (84.4) | 1.246 | 0.709 – 2.191 | 0.445 |
| Female | 38 (13.5) | 243 (86.5) | | | |
| <i>Caregivers' level of education</i> | | | | | |
| None | 4 (15.4) | 22 (84.6) | 0.657 | 0.202 – 2.130 | 0.484 |
| Primary | 11 (15.5) | 60 (84.5) | 0.720 | 0.260 – 1.997 | 0.528 |
| Seco- ndary | 45 (13.5) | 289 (86.5) | 0.834 | 0.279 – 2.489 | 0.745 |
| Tertiary | 19 (16.8) | 94 (83.2) | | | |
| <i>History of worm infection in the last six months</i> | | | | | |
| Yes | 24 (18.9) | 103 (81.1) | 1.530 | 0.89 – 2.580 | 0.110 |
| No | 55 (13.2) | 362 (86.8) | | | |
| <i>Exclusively breastfed</i> | | | | | |
| Yes | 36 (12.4) | 254 (87.6) | 0.733 | 0.430 – 1.120 | 0.136 |
| No | 43 (16.9) | 211 (83.1) | | | |

Table 4: Factors associated with underweight among children attending early child care centres

| Variable | Underweight | | Odds ratio | 95%CI | p-value |
|---|----------------------|-----------------------|------------|---------------|---------|
| | Yes | No | | | |
| | (n = 68) Freq (%) | (n = 476) Freq (%) | | | |
| <i>Age group (months)</i> | | | | | |
| 12 – 23 | 14 (11.5) | 108 (88.5) | 0.663 | 0.331 – 1.325 | 0.244 |
| 24 – 35 | 15 (13.0) | 100 (87.0) | 0.767 | 0.388 – 1.516 | 0.445 |
| 36 – 47 | 12 (8.5) | 130 (91.5) | 0.472 | 0.229 – 0.970 | 0.041 |
| 48 – 59 | 27 (16.4) | 138 (83.6) | | | |
| <i>Sex</i> | | | | | |
| Male | 33 (12.5) | 230 (87.5) | 1.008 | 0.605 – 1.677 | 0.974 |
| Female | 35 (12.5) | 246 (87.5) | | | |
| <i>Caregivers' level of education</i> | | | | | |
| None | 1 (3.8) | 25 (96.2) | 0.271 | 0.560 – 7.859 | 2.098 |
| Primary | 6 (8.5) | 65 (95.5) | 0.864 | 0.321 – 3.872 | 1.115 |
| Seco- ndary | 50 (15.0) | 284 (85.0) | 0.468 | 0.442 – 5.919 | 1.161 |
| Tertiary | 11 (9.7) | 102 (90.3) | | | |
| <i>History of worm infection in the last six months</i> | | | | | |
| Yes | 17 (13.4) | 110 (86.6) | 1.110 | 0.604 – 1.980 | 0.760 |
| No | 51 (12.2) | 366 (87.8) | | | |
| <i>Exclusively breastfed</i> | | | | | |
| Yes | 46 (15.9) | 244 (84.1) | 1.990 | 1.170 – 3.460 | 0.011 |
| No | 22 (8.7) | 232 (91.3) | | | |

The proportion of children who were exclusively breastfed 26 (9.0%) were less than those who were exclusively breastfed 41 (16.1%) and they were 0.5101 times less likely to be wasted compared with those not who had been not been exclusively breastfed. The association between the underweight status and exclusive breast feeding was statistically significant ($p = 0.011$, $CI = 0.3000 - 0.860$). (Table 5)

A higher proportion of children in the 36 – 47 months age group 19 (13.4%) were overweight compared to

other age groups, however, the association between age group and overweight status was not statistically significant ($p = 0.070$, $OR = 2.177$, $95\% CI = 0.939 - 5.048$). A higher proportion of the females were overweight 26 (9.3%) compared with the males 25 (9.8%). (Table 6)

Table 5: Factors associated with wasting among children attending ECCCS

| Variable | Wasted | | Odds ratio | 95%CI | p-value |
|---|----------------------|-----------------------|------------|---------------|---------|
| | Yes | No | | | |
| | (n = 67) Freq (%) | (n = 477) Freq (%) | | | |
| <i>Age group (months)</i> | | | | | |
| 12 – 23 | 4 (3.3) | 118 (96.7) | 1.410 | 0.669 – 2.974 | 0.366 |
| 24 – 35 | 16 (13.9) | 99 (86.1) | 0.952 | 0.476 – 1.904 | 0.889 |
| 36 – 47 | 19 (13.4) | 123 (86.6) | 1.131 | 0.575 – 2.226 | 0.721 |
| 48 – 59 | 28 (16.9) | 137 (83.1) | | | |
| <i>Sex</i> | | | | | |
| Male | 37 (14.1) | 226 (85.9) | 0.681 | 0.407 – 1.141 | 0.145 |
| Female | 30 (10.7) | 251 (89.3) | | | |
| <i>Caregivers' level of education</i> | | | | | |
| None | 1 (3.8) | 25 (96.2) | 0.508 | 0.104 – 2.493 | 0.404 |
| Primary | 6 (8.5) | 65 (95.5) | 0.522 | 0.119 – 2.282 | 0.388 |
| Seco- ndary | 50 (15.0) | 284 (85.0) | 0.963 | 0.195 – 4.747 | 0.963 |
| Tertiary | 11 (9.7) | 102 (90.3) | | | |
| <i>Birth order</i> | | | | | |
| First | 18 (9.9) | 164 (90.1) | 0.830 | 0.320 – 2.152 | 0.701 |
| Second | 17 (12.9) | 115 (87.1) | 0.812 | 0.302 – 2.181 | 0.679 |
| Third | 20 (16.8) | 99 (83.2) | 0.900 | 0.327 – 2.481 | 0.839 |
| Fourth | 7 (12.7) | 48 (87.3) | 0.823 | 0.258 – 2.625 | 0.742 |
| Fifth or more | 5 (8.9) | 51 (91.1) | | | |
| <i>History of worm infection in the last six months</i> | | | | | |
| Yes | 14 (11.0) | 113 (89.0) | 0.850 | 0.44 – 1.570 | 0.613 |
| No | 53 (12.7) | 364 (87.3) | | | |
| <i>Exclusively breastfed</i> | | | | | |
| Yes | 26 (9.0) | 264 (91.0) | 0.510 | 0.300 – 0.860 | 0.011 |
| No | 41 (16.1) | 213 (83.9) | | | |

Table 6: Prevalence of overweight and obesity among children attending ECCCS and associated factors

| Variable | Overweight and Obesity | | Odds ratio | 95%CI | p-value |
|---|------------------------|-----------------------|------------|---------------|---------|
| | Yes | No | | | |
| | (n = 51) Freq (%) | (n = 493) Freq (%) | | | |
| <i>Age group (months)</i> | | | | | |
| 12 – 23 | 9 (7.4) | 113 (92.6) | 0.997 | 0.378 – 2.632 | 0.996 |
| 24 – 35 | 12 (10.4) | 103 (89.6) | 1.335 | 0.531 – 3.358 | 0.540 |
| 36 – 47 | 19 (13.4) | 123 (86.6) | 2.177 | 0.939 – 5.048 | 0.070 |
| 48 – 59 | 11 (6.7) | 154 (93.3) | | | |
| <i>Sex</i> | | | | | |
| Male | 25 (9.5) | 238 (90.5) | 1.080 | 0.581 – 2.007 | 0.808 |
| Female | 26 (9.3) | 255 (90.7) | | | |
| <i>Caregivers' level of education</i> | | | | | |
| None | 4 (15.4) | 22 (84.6) | 0.418 | 0.089 – 1.962 | 0.269 |
| Primary | 5 (7.0) | 66 (93.0) | 0.512 | 0.152 – 1.728 | 0.281 |
| Seco- ndary | 29 (8.7) | 305 (91.3) | 0.686 | 0.186 – 2.539 | 0.573 |
| Tertiary | 13 (11.5) | 100 (88.5) | | | |
| <i>History of worm infection in the last six months</i> | | | | | |
| Yes | 9 (7.1) | 118 (92.9) | 1.463 | 0.691 – 3.096 | 0.320 |
| No | 42 (10.1) | 375 (89.9) | | | |
| <i>Exclusively breastfed</i> | | | | | |
| Yes | 21 (7.6) | 257 (92.4) | 1.510 | 0.838 – 2.721 | 0.170 |
| No | 30 (11.3) | 236 (88.7) | | | |

Discussion

Nutrition is of utmost importance to the growth of children. Adequate nutrition and healthy eating habits are fundamental skills for young children and it is important to help children learn about and enjoy a variety of nutritious foods each day as this lays the foundation of growth, early child development and education.⁴⁰⁻⁴² In this study, food made from grains such as rice and noodles were the most frequently consumed and organ meats, fruits, beans/peas and eggs were the least consumed food groups. This is in line with the findings from a study conducted in South Western Nigeria in 2013.⁴³ This finding may be as a result of the fact that generally, food made from grains are convenient foods and can be prepared in a variety of ways. Additionally, children have been noted to have a certain preference for these kind of meals.⁴⁴ Over-consumption of carbohydrates without a proper balance with proteins, vitamins and vegetables which were observed to be the least consumed groups in this study, can lead to Protein– Energy Malnutrition among these children and the resulting consequences such as growth and developmental problems, mental problems as well as frequent ill health.

Less than a fifth of the children in this study were stunted, underweight, wasted. This is at variance with findings from a study carried out in Anambra State, Nigeria in 2009 where 7.7%, 2.4% and 7.7% were stunted, underweight and wasted respectively.⁴⁵ Another study carried out among day care attendees in Port Harcourt, Rivers State in 2015 also reported similar findings of 5.5% prevalence of stunting and 3.0% prevalence of underweight and 7.1% prevalence of wasting.⁴⁶ More males than females were stunted in this study. This is similar to findings from a meta-analysis of 16 demographic and health surveys carried out in countries in Sub-Saharan Africa where the average prevalence of stunting was found to be consistently higher in the males (40.0%) compared to females (37.0%).⁴⁷ A similar study carried out in Democratic Republic of Congo also had a 46.1% prevalence of stunting in the males and 41.7% in the females.⁴⁸ However, a study carried out in Osun State, Nigeria in 2011, presented contrasting findings of 3.2% prevalence of stunting in the males which was lower compared to 5.2% observed in the females.⁵⁰ The prevalence of wasting in this study was also higher among the males. This is in contrast to findings reported from studies carried out in day care centres in Port Harcourt, Rivers State and Osun State in 2015 and 2011 respectively.^{46, 50}

This is worrisome because wasting reflects a recent and in some cases, severe process of weight loss which is often associated with acute starvation and /or severe disease. The prevalence of wasting that exceeds 5% according to WHO standing is alarming as this may be a pointer to an increase in mortality of the children. The consequences of stunting in children is also dire as stunted children grow to become stunted adults and may also give birth to stunted children making it intergenerational.⁵⁰ Children who consume inadequate amount of

food necessary to meet the body's energy and nutrient requirements, have diminished cognitive abilities, reduced school performance, growth retardation, impaired resistance to infections and increased morbidity and mortality rates.² More parents and caregivers needs to be enlightened about the importance of providing their children with proper nutrition and this may translate into improved nutritional status. This could be a step forward towards achieving the SDG 2 and 3 in Nigeria.

An interesting finding in this study was that children who were exclusively breastfed were more likely to be underweight and children who were not exclusively breastfed were more likely to be stunted. A study carried out in San Pablo, Ecuador in 2012, however reported contrary findings which stated that exclusive breastfeeding had no effect on the stunting status of the children.⁵¹ There is often the wrong notion among mothers that breast milk alone may be sufficient even after 6 months of age for growth and development of the children, but this notion could result in under-nutrition and subsequently the children being underweight which is an acute disorder. On the other hand however, stunting has been found to be as a result of early malnutrition and is a chronic disorder, so children who were not exclusively breastfed from birth have higher chances of being stunted as breast milk has been widely shown to contain all the nutrients that a child under 6 months could possibly need for proper growth and development.⁴³

Overall prevalence of overweight and obesity in this study was 9.8%. This is in contrast to studies carried out in Port Harcourt, Nigeria in 2015, and Jeddah, Saudi Arabia in 2017, where overall prevalence of overweight and obesity reported were 23.6% and 25% respectively.⁵²⁻⁵³ The prevalence of overweight in this study was 6.98%. This is in contrast to studies done in Bahrain in 2013 and Lagos State, Nigeria in 2014, where the reported prevalence of overweight of 9.8% and 13.7% respectively.⁵⁴⁻⁵⁵ The prevalence of obesity in this study was 2.8%. This finding is far lower than results from studies done in Eastern province of Saudi Arabia in 2010 and Port Harcourt, Nigeria in 2015 which reported prevalence of obesity of 18.1% and 8.6% respectively.^{46, 56} The varied prevalence rates may be attributed to the difference socioeconomic status of the studied populations. In addition, the methods of assessing overweight and obesity differed among the various studies. Childhood obesity is one of the most serious public health challenges of the 21st century.⁵⁷ Overweight and obese children are likely to stay obese into adulthood and more likely to develop non communicable diseases like diabetes and cardiovascular diseases at a younger age.⁵⁷ Overweight and obesity, as well as their related diseases, are largely preventable. Intervention programmes targeted at prevention of childhood obesity are needed to reverse this condition.

The strength of the findings of this study is that a large sample size was utilized and the nutritional status of the under-fives was assessed and compared with WHO standards. However, a limitation of this study is that the die-

tary history was based on self-report by the caregivers and the children's nutrition and perhaps their nutritional status may have been affected either positively or negatively by virtue of their attendance at the Early Child Care Centres.

wasted among the children were age of child and exclusive breastfeeding while the predictor for wasting was exclusive breastfeeding. There were no significant determinants for overweight and obesity in this study. It is therefore pertinent that more awareness campaigns and health seminars on proper nutrition in children be embarked upon by the government and stakeholders involved so as to further educate the mothers.

Conclusion and recommendation

Majority of the children were well nourished, however, over a tenth were either stunted or underweight while nearly a tenth of them were overweight and obese. Significant possible determinants of being underweight and

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| <p>Conflict of Interest: None Funding: None</p> |
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