



Relationship between Exclusive Breastfeeding and Childhood Obesity among Under-five Children in Ibadan North and Ido Local Government Areas, Oyo State; Nigeria

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Authors' contributions

This study was collaboration between both authors. Author OTA approved, supervised the design and protocol of the study, and handled the technical aspect. Author OBB designed the study and supervised data collection, wrote the protocol and the first draft of the manuscript. Author OTA reviewed the draft and approved the final manuscript

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ABSTRACT

Aim: This study aimed to investigate the relationship between exclusive breastfeeding and obesity among under-five children in Ibadan North and Ido Local Government Areas (LGAs), Oyo State, Nigeria.

Study Design: The study was cross-sectional in design

Place and Duration of Study: The study was carried out within Ibadan metropolis using one urban and one rural Local Government Areas between November and December 2015.

Methodology: A four-stage random sampling technique was used to select 450 (214 males and 236 females) under-five children from Ibadan North and Ido Local Government Areas of Ibadan, Nigeria. Pre-tested, interviewer-administered semi-structured questionnaire was used to collect information on demographic characteristics of the children and breastfeeding practices of mothers. Anthropometric indices were taken and categorised according to WHO standards. The risk

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categories were defined using age and sex-specific body mass index (BMI) percentile. Data were analysed using descriptive statistics and Logistic regression with a level of significance set at $p < 0.05$.

Result: Mean age of the children was 29.8 ± 17.0 months with 52.4% being female. Prevalence of overweight, obesity and exclusive breastfeeding among the children was 14.4%, 20.2% and 17.3% respectively. Child's sex and practice of exclusive breastfeeding were significant predictors of overweight and obesity in the LGAs ($p < 0.05$). Male children were 1.6 times more likely to be overweight or obese than the female children (OR=1.6; 95% CI=1.06-2.41), and children residing in urban LGA were 2.7 times likely to obese or overweight than those from rural LGA (OR=2.7; 95% CI=1.56-4.71). Exclusively breastfed children were 6.7 times less likely to become obese than non-exclusively breastfed children (OR=6.7; 95% CI=1.21-36.46).

Conclusion: Exclusive breastfeeding has protective factor against obesity among under-five children. Efforts geared towards increasing exclusive breastfeeding practice among mothers are needed to prevent childhood obesity among under-five children in these communities.

Keywords: Exclusive breastfeeding; overweight; obesity; under-five children.

1. INTRODUCTION

The increasing prevalence of childhood obesity is of global severe public health concern and considered a worldwide epidemic by the World Health Organization (WHO) [1]. The number of overweight or obese infants and young children (aged 0 to 5 years) increased from 32 million globally in 1990 to 42 million in 2015. In the WHO report for African Region alone, the number of overweight or obese children increased from 4 to 9 million over the same period [2]. The vast majority of these overweight or obese children live in developing countries, where the rate of increase is 30% higher than developed countries. This current trend of growth in overweight or obese infants and young children if not controlled or curbed will lead to an increase of 70 million globally by 2025. Childhood obesity is one of the six global nutrition targets aimed at improving maternal, infant and young child nutrition by 2025 which was agreed upon at the 2012 World Health Assembly [3].

Studies have reported a significant relationship between exclusive breastfeeding (EBF) and childhood obesity, and the world health organisation also recommended exclusive breastfeeding as one of the preventive measures against childhood obesity [4,2]. UNICEF [5] stated that an exclusively breastfed child is 14 times less likely to die in the first six months than a non-breastfed child, and breastfeeding drastically reduces deaths from acute respiratory infection and diarrhoea, the two major child killers. The progress made in increasing the rate of exclusive breastfeeding across the globe is

relatively modest despite all measures put in place to ensure that mothers exclusively breastfeed their children. This rate, however, differs among regions and countries. Only 39 percent of children less than six months of age in the developing world are exclusively breastfed [6]. In Nigeria, the rate of EBF is 17% [7].

Forty-five percent of all mortality among children less than 5 years of age is linked to malnutrition [8]. In many countries of the world, only a minority of children are growing healthily. In Nigeria, Bangladesh, Democratic Republic of Congo, Ethiopia, and Pakistan, for example, the percentage of under – 5 children who are growing normally is less than 48 percent. Nigeria has also been classified as one of the countries not meeting the world health target for reduction in obesity rate. Although the country has been classified among countries making progress, for exclusive breastfeeding, the rate of progress is relatively slow and the nation is not meeting with the world health assembly target [3].

Without intervention, obese infants and young children will likely continue to be obese during childhood, adolescence and adulthood. Obesity in childhood is associated with a wide range of serious health complications and an increased risk of premature onset of illnesses, including diabetes, dyslipidemia, orthopaedic disorders psycho-social issues and heart disease [9,2]. Obesity affects the health and quality of life of individuals, both in short and long terms; thus exclusive breastfeeding from birth to 6 months of age is an important way to help prevent infants from becoming overweight or obese [2].

In order to prevent overweight and obesity in infants and young children, WHO recommends that there should be early initiation of breastfeeding within one hour of birth and exclusive breastfeeding for the first 6 months of life, the introduction of nutritionally-adequate and safe complementary (solid) foods at 6 months together with continued breastfeeding up to two years of age or beyond. Young children should also receive a variety of foods including meat, poultry, fish or eggs as often as possible. Foods high in fats, sugar and salt should be avoided, and as child grows there should be increased consumption of fruits and vegetables, legumes, whole grains and nuts, and engagement in regular physical activity (60 minutes a day) [2,10]. This study was therefore undertaken to investigate the relationship between exclusive breastfeeding and obesity among under-five children in Ibadan North and Ido Local Government areas of Oyo State, Nigeria.

2. METHODOLOGY

The study was descriptive cross-sectional in design, involving a four-stage sampling technique in choosing the Local Government Areas (LGAs), the wards and households of respondents. Considering the prevalence of obesity as 5.2% among under-five children in Nigeria [11] the sample size of 450 under-five children was arrived at using the sample size formula for a single proportion. The sample size from Ibadan North and Ido LGAs were calculated proportionately based on the population of the LGAs. All the instruments used were validated to ensure they measured what they were supposed to measure.

A pre-tested, semi-structured interviewer-administered questionnaire which was adapted from the National Demographic and Health Survey (NDHS) was used to obtain information on demographic characteristics of the children from their mothers. Anthropometric indices of weight and height were used to calculate the body mass index for age, which was then used to determine the nutritional status of the children. Obesity among children under 5 years of age was determined by assessing their height and weight using the WHO growth standard for children [12] and compared with the WHO growth pattern for a reference population based on the assumption that well-nourished children from zero to five years in all populations follow similar growth patterns [12]. The risk categories were

defined using body mass index (BMI) percentile which was age and sex-specific, and new WHO growth charts. The height of the children was measured in meters, and the weight (in kilogramme) was measured with the children wearing light clothing. For children less than two years their length was taken. For children of two years and above, their height was taken with a non-stretchable measuring tape while standing upright, barefoot, on a flat surface, leaning against a wall with arms hanging alongside the body.

The new WHO growth standard was used to define overweight and obesity. Children whose weights were more than 85th percentiles BMI for age and sex were considered as overweight and more than 95th percentiles BMI for age and sex were considered obese. In assessing the nutritional status, the growth curves of World Health Organization [13] were used, with the aid of the ANTHRO 3.1 software 21. The data was analysed using descriptive statistics and correlation on SPSS version 19, and level of significance set at $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1 Demographic Characteristics of the Children and Infant Feeding Practices

Table 1 shows the demographic characteristics of the children that participated in the study. A total of 47.6% of the children were males and 52.4% were females. About forty-eight percent (48.4%) of the male and 51.6% of the female preschool children were from Ibadan North while 47.6% males and 52.4% females were from Ido LGA. There was no significant difference ($P = .05$) in the selection of male and female children from the two LGAs. The overall mean age of the children was 29.8 ± 17.0 months (Ibadan North 29.1 ± 16.8 and Ido 31.9 ± 17.4 months). Overall, 7.6% of the children were below six months, 12.0% were aged 7 -12 months, 24.4% between 13 and 24 months, while 56.0% were within the age range 25 – 59 months.

About one-third (30.6%) of the children were first born to their mothers, 25.9% were second born, while 21.4%, 13.8% and 8.3% were third, fourth or fifth and beyond child of their mothers respectively. The prevalence of exclusive breastfeeding in the study areas was 17.3% (Ibadan North LGA 18.0%, and 14.9% from Ido LGA, ($p < 0.05$)).

Table 1. Demographic characteristics of children and infant feeding practices

Character	Ibadan north LGA N (%)	Ido LGA N (%)	Total
Sex of children			
Male	169 (48.4%)	45 (44.6%)	214 (47.6%)
Female	180 (51.6%)	56 (55.4%)	236 (52.4%)
Age of children (months)			
0-6	27 (7.7)	7 (6.9)	34 (7.6)
7-12	43 (12.3)	11 (10.9)	54 (12.0)
13-24	87 (24.9)	23 (22.8)	110 (24.4)
25-36	74 (21.2)	23 (22.8)	97 (21.5)
37-48	62 (17.8)	14 (13.8)	76 (16.9)
49 -59	56 (16.1)	23 (22.8)	79 (17.6)
Mean age	29.1 ±16.8	31.9 ±17.4	29.8 ±17.0
Position of child in the family			
First	117 (33.5)	20 (20.2)	137 (30.6)
Second	85 (24.4)	31 (31.3)	116 (25.9)
Third	78 (22.3)	18 (18.2)	96 (21.4)
Fourth	45 (12.9)	17 (17.2)	62 (13.8)
Five and above	24 (6.9)	13 (13.1)	37 (8.3)
Practice of exclusive breast feeding			
Not exclusively breastfed	286 (81.9)	86 (85.1)	372 (82.7%)
Exclusively breastfed for 6 months	63 (18.1)	15 (14.9)	78 (17.3%)
Type of complementary food introduced			
Formula	115 (33.2)	23 (23.0)	138 (30.9%)
Local	231 (66.8)	77 (77.0)	308 (69.1%)
Period complementary feeding was introduced			
< 4 months	187 (53.4)	53 (53.0)	240 (53.6%)
4-5 months	47 (13.4)	13 (13.0)	60 (13.4%)
6 months	71 (20.3)	21 (21.0)	90 (20.1%)
> 6 months	45 (12.9)	13 (13.0)	58 (12.9%)
Period water was introduced to the child			
< 4 months	272 (78.2)	84 (83.2)	356 (79.3%)
4-5 months	18 (5.2)	0 (0)	18 (4.0%)
6 months	37 (10.6)	13 (12.8)	50 (11.1%)
> 6 months	21 (6.0)	4 (4.0)	25 (5.6%)
Did you feed on demand			
No	20 (5.7)	2 (2.0)	22 (4.9%)
Yes	329 (94.3)	99 (98.0)	428 (95.1%)
Number (total)	349 (77.4)	101 (22.6)	450 (100)

A large proportion of the respondents (69.1% mothers) introduced local complementary food (pap), while 30.9% introduced infant formula to their children before six months of age. More than half (53.6%) of the children were introduced to complementary food before four months, 13.4% were fed complementary foods between 4-5 months, while 20.1% and 12.9% were

introduced to complementary food at 6 months and beyond respectively. Majority of the mothers (79.3%) introduced water to their children before 4 months of age, and 95.1% fed their children on demand.

The low prevalence of exclusive breastfeeding among infants below six months of age observed

in this study (17.3%) corresponds to the finding of only 17% exclusively breastfed children under six months of age in Nigeria by NDHS 2013 [7] and Agho et al. finding of 16.4% average exclusive breastfeeding rate among infants younger than 6 months in the nation [14] but higher than NDHS 2008 [15] report of a decrease in compliance with the WHO/UNICEF recommendations in the practice of exclusive breastfeeding, as one in ten (13%) infants below six months of age were exclusively breastfed in the nation. However the prevalence of exclusive breastfeeding in this study is lower than the finding of Onadeko et al. [16] in a study to evaluate factors that are associated with exclusive breastfeeding in Ibadan, Nigeria, and reported that exclusive breastfeeding rate of children in Ibadan dropped from 57.4% at 1 month to 23.4% at 6 months of age. This implies that the practice of exclusive breastfeeding has not increased appreciably over the years, indicating a need for more advocacy and behavioural change communication on importance of the practice. The early introduction of complementary foods and water to the children before four months of age by large proportion of respondents was believed to contribute significantly to the observed low prevalence of exclusive breastfeeding and high prevalence of overweight and obesity among the study population. Most mothers (95.1%) reportedly fed their children on demand, and this may also be linked to the high prevalence of overweight and obesity recorded in this study.

3.2 Prevalence of Overweight and Obesity among the Under-five Children

The overall prevalence of overweight and obesity among the children were 14.4% and 20.2% respectively. Classifying the prevalence of overweight and obesity according to the sex of the children, showed that a higher prevalence of overweight and obesity was seen among male (15.9% and 24.3% respectively) under-five children (Fig. 1). More than half of overweight (52.3%) and obese (56.5%) children were male. The sex of the child and practice of exclusive breastfeeding were significant predictors of overweight and obesity in the LGAs ($P = .05$). A male child is 1.6 times more likely to be overweight or obese than the female child, and the odd of being obese or overweight is 2.7 times higher in urban than in the rural LGA. There was a significant relationship between exclusive breastfeeding and prevalence of obesity, as

children who were exclusively breastfed were 6.7 times less likely to become obese than a child who was not exclusively breastfed. Also, apart from children between ages 12-24 months, children from all other age groups were at least 2 times more likely to be overweight or obese than children between 0-6 months.

The relationship between infant feeding practices and childhood overweight and obesity as seen in Table 2, indicates that a child that is exclusively breastfed is 6.7 times less likely to become obese than a child that was not exclusively breastfed. This finding is in agreement with the report that longer period of exclusive breastfeeding decreases the risk of developing obesity later in childhood [17] (WHO/FAO, 2003). Also the report of Arens et al. [4] after adjusting for potential confounding factors concluded from a meta-analysis of nine studies that breastfeeding has a small but consistent protective effect against childhood obesity. The American Academy of Pediatrics [18] also reported that breastfeeding reduces infant mortality and illness, and may protect against obesity, sudden infant death syndrome, some forms of diabetes, and several other diseases.

In another meta-analysis of 17 studies on the effects of duration of breastfeeding on risk of overweight, Harder et al. [19] reported an inverse and linear association for each month of breastfeeding. There was a 4% reduced risk of overweight during childhood, adolescence and adulthood (the latter two age groups measured only in a few studies). The effect was apparent for infants who were breastfed for up to nine months and was independent of the definition of overweight and the age at follow-up. Infants included in these studies were either partially or exclusively breastfed and were compared against exclusively formula-fed infants.

The sex of the child was another significant predictor of overweight and obesity identified in this study. This finding is similar to that of Müller et al. [20] which reported that the prevalence of overweight was significantly higher among males ($P = .030$) and also inversely proportional to the child's age ($P = .032$).

The study also revealed that all under-five children are at risk of becoming overweight and obese, as grouping the children in different age groups revealed that apart from children between 12-24 months, children from all other age groups were at least 2 times more likely to be overweight or obese than children between 0-6 months. This

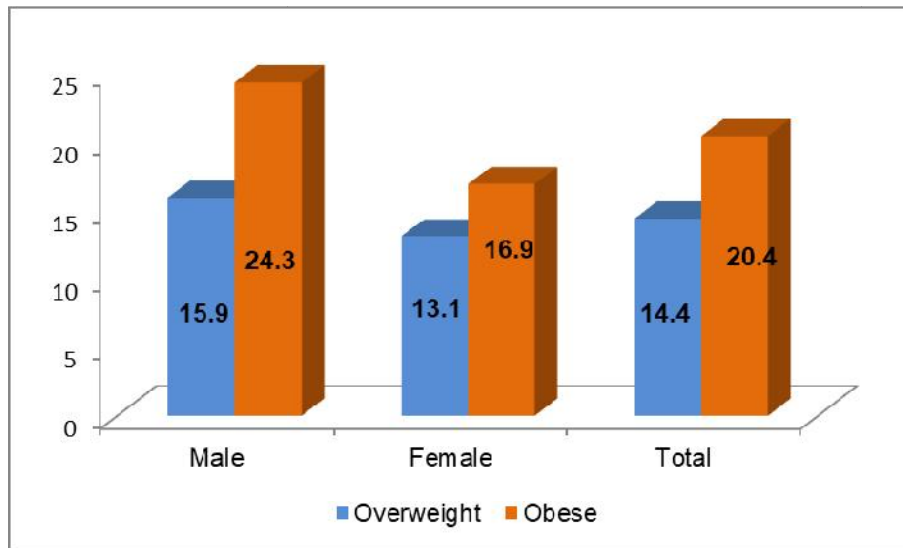


Fig. 1. Classification of overweight and obese children according to sex

Table 2. Factors that predict overweight and obesity in the two LGAs

Character	Odd ratio (Exp B)	P value	95% C.I. for Exp (B)	
			Lower	Upper
Sex				
Male	1.60	0.025	1.062	2.414
Female	1			
Residence				
Urban	2.71	0.000	1.560	4.707
Rural	1			
Child age group				
0-6 months		.014		
7-12 months	2.637	.039	1.052	6.613
13-24 months	1.718	.204	0.745	3.961
25-36 months	3.470	.001	1.720	6.999
37-48 months	2.948	.003	1.430	6.075
49 and above	2.514	.017	1.183	5.342
Practice of exclusive breast feeding	6.651	.029	1.213	36.457

may be because of the protective influence of exclusive breastfeeding observed in this study among this age group. This finding however differs from that of Müller et al. [20] who stated that in classifying the children according to their age, an inverse linear association was observed; the younger the child, the greater the prevalence of excessive weight (P = .049).

The prevalence of overweight and obesity (14.4% and 20.4% respectively) in this study was higher than Senbanjo&Adejuyigbe [11] report of a prevalence of 5.2% in Ifewara Nigeria. The observed difference in this study can be linked to cultural differences between the two study sites as well as the early introduction of complementary feeding to children in this study

location. Müller et al. [20] concluded that the prevalence of obesity in their study could be related to the early introduction of foods. Also, Saldiva et al. [21] reported that other factors that determine exogenous obesity in childhood are early discontinuation of breastfeeding with introduction of inadequate complementary food and improper use of infant formula diluted incorrectly.

The observed higher prevalence of overweight and obesity in the urban LGA (Ibadan North) compared to rural LGA (Ido LGA) can be linked possibly to level of physical activity the under-5 children in the rural LGA are exposed to due to less restriction by parents, unlike those in the urban area who are always

being restricted either by parents and/or lack of space.

4. CONCLUSION

The study revealed a relationship between the magnitude of overweight/obesity and exclusive breastfeeding in the Local Government Areas studied. This implies that preventive measures for overweight and obesity should focus on promotion and protection of exclusive breastfeeding for six months and continuous breastfeeding with adequate complementary foods after 6 months during infancy and early childhood. This is a powerful and easy strategy to fight the increasing levels of childhood obesity. The adoption of measures which encourage healthy eating habits and child feeding practices and physical activity from an early age is highly recommended, as parents should be involved in the prevention of obesity, given that children tend to imitate their "model" of eating and physical activity habits.

CONSENT

The authors declare that informed consent was obtained from the participants of this study.

ETHICAL APPROVAL

Ethical approval was sought and obtained from appropriate authority.

COMPETING INTERESTS

The authors declare that there is no competing interest on this study, as it was solely sponsored by them.

REFERENCES

1. UNICEF/WHO/World Bank. Joint child malnutrition estimates: Levels and Trends; 2015. Available:<http://www.who.int/nutgrowthdb/estimates/en/>. Joint Child Malnutrition Estimates. (Accessed June 15, 2015) Available:<http://data.worldbank.org/child-malnutrition>
2. World Health Organization: Commission on ending childhood obesity (ECHO). WHO Report World Health Organization Press, 20 Avenue Appia, 1211 Geneva 27, Switzerland; 2016.
3. Global nutrition report: Actions and accountability to advance nutrition and sustainable development - a peer-reviewed publication. International Food Policy Research Institute, NW Washington DC; USA; 2015.
4. Arens SV, Kries R. Protective effect of breastfeeding against obesity in childhood: Can a meta-analysis of published observational studies help to validate the hypothesis? *Adv Exp Med Biol.* 2009;639: 145-52.
5. UNICEF. "Breastfeeding." UNICEF: New York; 2014.
6. World Health Organization. Plan of action for the prevention of obesity in children and adolescents. Report of a joint WHO/ Pan American Health Organization; 2015. Geneva: 66th Session of the Regional Committee of WHO for the Americas.
7. Nigeria Demographic and Health Survey (NDHS). National Population Commission. National Population Commission and ICF International. 2014 National Population Commission and ICF Macro, Rockville, Maryland, USA; 2013.
8. Black RE, Victoria CG, Walker SP, Bhutta ZA, Christian P, de Onis M, Ezzati M, Grantham-McGregor S, Katz J, Martorell R, Uauy R. The maternal and child nutrition study group. Maternal and child under-nutrition and overweight in low-income and middle-income countries. *Lancet.* 2013;382(9890):427-451.
9. Güngör Neslihan Koyuncuoğlu. Over weight and obesity in children and adolescents Louisiana state university health sciences center-shreveport, Department of Pediatric Endocrinology, Shreveport, LA, USA. *J Clin Res Pediatr Endocrinol.* 2014;6(3):129-143.
10. World Health Organization. Global strategy on diet, physical activity and health. WHO report; 2017.
11. Senbanjo IO, Adejuyigbe EA. Prevalence of overweight and obesity in Nigerian preschool children. PMID: 18087870 [Pub Med - indexed for MEDLINE] *Journal of Nutrition and Health;* 2007.
12. World Health Organization. WHO Child Growth Standards: Head circumference-for-age, arm circumference-for-age, triceps skin-fold-for-age and sub-scapular skin-fold-for-age Methods and development, A WHO Publication Printed in China, Hong

- Kong Special Administrative Region; 2007. ISBN: 978 92 4 154718 5
13. World Health Organization. Global strategy on diet, physical activity and health. WHO report; 2008.
 14. Agho KE, Dibley MJ, Odiase JI, Ogbonmwan SM. Determinants of exclusive breast feeding in Nigeria. *Bio MC Pregnancy and Childbirth*. 2011;2.
 15. Nigeria Demographic and Health Survey. National population commission federal republic of Nigeria. Abuja, Nigeria 2008. ICF Macro Calverton, Maryland, USA; 2009.
 16. Onadeko MO, Olawuyi JF, Lawoyin TO. Factors associated with exclusive breastfeeding in Ibadan, Nigeria; 2001.
 17. World Health Organization (WHO)/Food and Agriculture Organization of United Nations (FAO). Technical Report Series 916; Diet, nutrition and the prevention of chronic diseases. Report of a Joint WHO/FAO Expert Consultation, World Health Organization: Geneva; 2003.
 18. American Academy of Pediatrics. Policy statement on breastfeeding and the use of human milk: Organizational principles to guide and define the child health care system and/or improve the health of all children section on breast feeding. *Pediatrics*. 2005;115(2):496-506.
 19. Harder T, Bergmann R, Kallischnigg G, Plagemann A. Duration of breast feeding and risk of overweight: A meta-analysis. *American Journal of Epidemiology*. 2005; 162:397–403.
 20. Müller Rde M, Tomasi E, Facchini LA, Piccini RX, da Silveira DS, Siqueira FV, Thumé E, Silva SM, Dilélio AS. Prevalence of overweight and associated factors in under-five-year-old children in urban population in Brazil. *Brazilian Journal of Epidemiology*. 2014;17(2):285-96.
 21. Saldiva SRDM, Venancio SI, Gouveia AGC, Castro ALS, Escuder MML, Giugliani ERJ. Influência regional no consumo precoce de alimentos diferentes do leite materno em menores de seis meses residentes nas capitais Brasileiras e Distrito Federal. *Cad Saúde Pública*. 2011;27(11): 2253-62.

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