FEEDING PRACTICES AND NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN A PERI-URBAN SETTING IN IBADAN, SOUTHWEST NIGERIA: A COMPARATIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Background: **Existing literature suggests inequalities in nutritional and feeding practices for children in rural communities compared to their urban counterparts. However, with increasing urbanization and changing social norms, re-assessment of rural-urban differences in feeding practices for under-five children is essential. This study therefore aimed to assess the feeding practices and nutritional status of children in a peri-urban setting in Ibadan.**

Methods: **We conducted a community-based cross-sectional comparative study in peri-urban LGA (Lagelu) in Ibadan. Participants were 617 caregivers of under-five children identified, from wards typical of rural and urban settings, through a multistage sampling technique. Caregivers' sociodemographic details, 24-hour dietary recall of the child's feeding, and anthropometric measurements were obtained.**

Results: **Nearly half of the children were 2 years or older (rural: n=142, 47.2%; urban: n=147, 46.2%). There was significant difference between settings in terms of maternal age and education, father's education, caregiver's occupation and socioeconomic status. In total, 611 children (99.0%) were breastfed. Of those breastfed, 45% and 39% in rural and urban settings respectively were initiated within an hour of delivery. Children in rural setting had longer duration of breast feeding. However, they are less likely to be exclusively breast fed for 6 - months compared with children whose caregivers are urban dwellers. Dietary diversity was similar in both settings but higher among males. (20.3% male, 11.7% female in rural; 17.3% male and 15.5% female in urban). Overall, 108 (22.3%), 107 (21.9%), 152 (30.6%) and 34 (7.0%) of children aged 6-59 months were cachetic, underweight, stunted, and overweight respectively but commoner among children in rural settings.**

Conclusion: **Feeding and nutrition programmes need to apply a gender lens if sustained behavioural interventions on child nutrition are to reach equitable outcomes.**

Keywords: Under-five nutritional status, Feeding practices, Dietary diversity, Peri-urban, Nigeria

INTRODUCTION

Adequate nutrition is essential for a child's optimal wellbeing, growth, and development. It is also a cornerstone of poverty alleviation, good health and wellbeing, human capital, and economic development.[1,2] It is therefore an integral part of the United Nations Convention on the rights of the child - every infant and child must be allowed to grow, learn, play, develop and flourish with dignity and they have the right to the best health care possible, clean water to drink, healthy food and a clean and safe environment to live in.[3] With the increasing burden of chronic non-communicable diseases in low and middle-income countries, including Nigeria, a focus on nutrition in early childhood is crucial as many non-communicable diseases have links to nutrition and feeding practices in early childhood.[4,5] The global community has acknowledged the crucial role of nutrition: hence it is enshrined in the sustainable development goals (SDGs). Though SDG 2 is 'Zero Hunger', at least 12 of the 17 SDGs are related to nutrition.[6]

Malnutrition is characterized by either a deficiency (undernutrition) or an excess intake of nutrients (overnutrition). Undernutrition is a significant cause of

morbidity and mortality among under-five children and is associated with 2.7 million child deaths annually.[7] Globally, in 2020 an estimated 149 million under-five children suffered from stunting, and 45 million had wasting. Of these, 41% of those who were stunted and 27% of those with wasting were in Africa.[8] Overnutrition is also a growing public health concern as 39 million under-five children were estimated to be overweight or obese in 2020, and 27% of these were in Africa.[8] Therefore, Africa currently faces a dual burden of child malnutrition. The number of under-five children in Africa who are overweight has increased by 24% since 2020, and the continent has the highest burden of malnutrition after Asia.[8]

In 2005, the National Policy on Infant and Young Child Feeding in Nigeria was formulated then reviewed in 2010 to ensure the optimal growth, protection and development of the Nigerian child from birth through the first 5 years of life largely through exclusive breastfeeding for the first 6months of life followed by adequate complementary feeding and breastfeeding for up to 24months.[9] Also, the Home-Grown School Feeding and Health Program was initiated by Nigeria's federal government to reduce child malnutrition and poverty while improving school enrolment. The program ensures a free meal for a child each school day that is adequate in quality and quantity.[10] Despite these efforts, Nigeria has the second highest burden of stunted children in the world with an estimated 2 million children suffering from severe acute malnutrition (SAM), and 1 out of every 5 children with SAM has access to treatment[11] suggesting low policy impact. In fact, according to the 2018 National Demographic Health Survey (NDHS), 37% of children aged 6-59 months were stunted, 7% were wasted and 22% were underweight[12] with wide variations in these indices across states and geopolitical zones. In Oyo state, 34.5% and 14.2% of children under-5 were stunted and severely stunted respectively: highest in southwest Nigeria. These children are unlikely to reach their full intellectual, social and economic potentials.[13]

Nigeria is only on track to meet one of the 8 global targets on nutrition by the year 2025.[8] While exclusive breastfeeding rate among children aged 0-6 months has increased from 17% in 2013 to 29% in 2018, it is still below the global target of 50% for the prevention of common childhood illnesses such as pneumonia and diarrhea.[14] while 72% of children aged 6-8 months received timely complementary feeding.[12,15]

Studies in Nigeria have identified factors such as child gender, parental education and socioeconomic status, maternal age and nutritional status to be associated with under-five nutrition.[16,17] Differences in the prevalence of childhood malnutrition across different geopolitical zones in Nigeria however suggests that these factors have heterogeneous effects, and may be mediated by other underlying factors such as cultural beliefs, environmental, economic, and political factors. Hence, there is a need for context specific local empirical data on child nutrition.[12] In the southwest of Nigeria, Oyo state has the highest burden of malnutrition, and rural-urban disparity in child nutrition has not been recently studied.[12] Therefore, this study assessed the feeding practices for children under-five in a peri-urban setting in Ibadan, Southwest Nigeria, and specifically to compared feeding practices between urban and rural contexts in this setting. Findings from this study can support local implementation of nutrition programmes in the region.

METHODS

We conducted a comparative cross-sectional study, as part of a larger study comparing vaccination card retention among caregivers of under-five children in urban and rural settings of Ibadan, Oyo State. Data was collected between October and December 2019.

Study area

The study was conducted in Lagelu Local Government Area (LGA), Ibadan, Oyo state. Ibadan is the second most populous city in southwest Nigeria with estimated population of over 5 million people. Ibadan has 11 LGAs (5 urban and 6 peri-urban). The city is about 120km east of the Nigerian border with the Republic of Benin. The main economic activities of the people in Ibadan include agriculture, trade and public service. Lagelu LGA is one of the six peri-urban LGAs in Ibadan, with a population of 148,133 people according to the 2006 national census.[18] In 2022, the estimated population of Lagelu LGA was 211,700 people.[19] The LGA has 14 political wards, 22 primary health facilities, and 3 public secondary-level health facilities.[20]

Study population

Children under the age of 5 years residing in Lagelu LGA.

Sample size determination

The target sample of 422 was based on the primary study question to compare vaccine card retention between urban and rural settings, and we did not conduct a post-hoc power calculation for this pre-planned secondary analysis. We used the formula for calculating sample size for comparing two proportions, where p1=0.43 (urban) and p2=0.23 (rural), with 80% power and 95% confidence intervals.[21]

Sampling strategy

Multi-stage cluster sampling was used to select respondents. In stage one, we randomly selected one of the six peri-urban LGAs in Ibadan metropolis (Lagelu LGA). Stage two involved stratified random selection of two wards typical of rural setting and another two urban wards typical of urban setting. In stage three, 2 communities were randomly selected from each ward with subsequent inclusion of contiguous communities when the sample size was not reached. In total, nineteen communities were included in the study. The list of communities in Lagelu LGA was obtained from the state government secretariat. All compounds in selected communities were approached for participation. The unit of enquiry was children under-five residing in the selected communities. In each eligible household, one child under-five was selected. If the household had more than one eligible child, the youngest was included.

Data collection

Data was collected through an interviewer administered questionnaire, which was piloted in a different LGA in Ibadan. Three data collectors, with a minimum secondary level education, were recruited locally and trained for 3 days, followed by 2-weeks piloting. We obtained information on the child's family and socio-demographics, ante-natal and perinatal history, feeding patterns, anthropometric data (mid-upper arm circumference (MUAC), height, weight, occipito-frontal circumference), vaccine records and retention of the index child's vaccine card. Anthropometric data was measured by the data collector. Data was collected on Android tablet using Open Data Kit software (ODK) and underwent regular checks for accuracy.

Analysis

Anthropometric data were analyzed using ENA (Emergency Nutrition Assessment) software using the WHO 2006 standards.[22] Z scores for weight for age (WAZ), height for age (HAZ), and weight for height (WHZ) were calculated according to the WHO guidelines. Nutritional indicators were defined as follows: underweight, WAZ <-2 standard deviation (SD); stunting, HAZ <-2 SD; wasting, WHZ <-2 SD; and overweight, WHZ >+2 SD; acute malnutrition, MUAC <125mm; severe acute malnutrition, MUAC <115mm. Nutritional status and dietary intake were described and limited to children aged 6-59 months. 'Minimum dietary diversity' was defined as the child having a diet containing four or more food groups. 'Minimum daily meal frequency' was defined for breastfed children as food consumption twice, and three times for children aged 6-8 months and 9-23 months respectively.[23] Wealth index was generated using the 11-item questions from the Nigeria Equity Tool.[24]

Descriptive and inferential statistics were used to summarize and compare the study participants between urban and rural settings. Chi-square test was used to test associations with dietary diversity, wasting, stunting, underweight, and overweight between settings. We analyzed the data using STATA version 14 at 5% level of significance.

Ethics

Ethical approval was obtained from the Oyo State ethical committee (ref: AD 13/479/1433A). Verbal informed consent was obtained from all subjects.

RESULTS

Participants' characteristics

A total of 617 caregivers consented to participate in the study (Table 1). In both rural and urban settings, the proportion of male children included was slightly higher (52.8% in rural, and 53.8% in urban). Nearly half of the children were 2 years or older (rural: n=142, 47.2%; urban: n=147, 46.2%). There was significant difference between settings in terms of: maternal age and education, father's education, caregiver's occupation and socioeconomic status. In the urban setting, more mothers were <35 years (79.9% vs. 72.3%) and a higher proportion had tertiary education (42.1% vs. 18.4%). More respondents were self-employed in the rural group (n=251, 83.9%) compared to urban group (n=206, 64.8%). Overall, 22.2% in the rural groups and 5.2% of the respondents in the urban group belonged to the middle wealth quintiles or below.

Breastfeeding practices

In total, 611 children (99.0%) surveyed were breastfed, however, a higher proportion in rural areas (45% rural, 39% urban) initiated breastfeeding within an hour of delivery. Of the children who were never exclusively breastfed for any period (n=141), more were from urban setting (n=83, 58.9%, p=0.048). Yet exclusive breastfeeding for 6-months was more commonly practiced in urban compared to rural settings, with 75.8% and 62.9% of children aged 6-59 months exclusively breastfed for 6 months in the urban and rural settings respectively (p=0.012). More children in rural setting however were breastfed up to one year compared to their counterparts in urban areas (p=0.027). Bottle feeding (feeding from bottle with nipple) was practiced more in the urban setting (Table 2).

Tables 1: Sociodemographic characteristics of study participants in Lagelu LGA, Ibadan, Oyo State Nigeria.

Variable	Rural (N=299) Frequency (%)	Urban (N=318) Frequency (%)	Total (N=617) Frequency (%)	P-value
Sex of child				
Male	158 (52.8)	171 (53.8)	329 (53.3)	0.299
Female	141 (47.2)	147 (46.2)	288 (46.7)	
Age of index child				
Mean age ± SD in months	24.5 ±16.8	23.6±17.2	24.0±17.0	0.495
Age of child				
0-5 months	51 (17.1)	56 (17.6)	107 (17.4)	
6-11 months	29 (9.7)	42 (13.2)	71 (11.5)	0.527
12-23 months	77 (25.8)	73 (23.0)	150 (24.3)	
24-25 months	142 (47.4)	147(46.2)	289 (46.8)	
Number of siblings index child has				
None	75 (25.1)	92 (28.9)	167 (27.1)	
One	83 (27.8)	86 (27.1)	169 (27.4)	0.548
More than one	141 (47.2)	140 (44.0)	281 (45.5)	
Mother's age in years n=592				
< 35 years	209 (72.3)	242 (79.9)	451 (76.2)	**0.031**
≥ 35 years	80(27.7)	61 (20.1)	141 (23.8)	
Father's age in years N=542				
< 35 years	110(43.1)	132 (46.0)	242 (44.7)	0.504
≥ 35 years	145 (56.9)	155 (54.0)	300 (55.3)	
Mother's level of education				
No formal education	11 (3.7)	8 (2.5)	19 (3.1)	<0.001
Primary	45 (15.0)	11 (3.5)	56 (9.1)	
Secondary	185 (61.9)	165 (51.9)	350 (56.7)	
Tertiary	58 (19.4)	134 (42.1)	192 (31.1)	
Father's level education (n=588)				
No formal education	7 (2.3)	3 (0.9)	10 (1.6)	<0.001
Primary	23 (7.7)	5 (1.6)	28 (4.5)	
Secondary	180 (60.2)	130 (40.9)	310 (50.3)	
Tertiary	89 (29.8)	180 (56.6)	269 (43.6)	
Mother's religion				
Christianity	153 (51.2)	172 (54.1)	325 (52.7)	0.649
Islam	144 (48.2)	145 (45.6)	289 (46.4)	
Others+	2 (0.6)	1 (0.3)		
Father's religion N=616				
Christianity	132 (44.3)	160 (50.3)	292 (47.4)	
Islam	162 (54.4)	156 (49.1)	318 (51.6)	0.244
Others+	4 (1.3)	2 (0.6)	6 (1.0)	
Caregiver's occupation				
Employed	31(10.4)	74 (23.3)	23.4802	<0.001
Self-employed	251 (83.9)	206(64.8)		
Unemployed	17 (5.7)	37 (11.9)		
Wealth index N=577				
Poor	7 (2.4)	0 (0.0)	7 (1.2)	
Middle	57 (19.8)	15 (5.2)	72 (12.5)	<0.001
Wealthy	224(77.8)	274 (94.8)	498 (86.3)	

Dietary patterns

There were no significant differences in food group consumption across the two settings, though vitamin A rich food (29.0%), dairy products (24.8%), and other fruits and vegetables (16.4%) were consumed slightly more in the urban setting, whereas meat, fish and egg were consumed by slightly higher proportions of children in rural settings. Grains, roots, and tuber (95% in both settings) and legumes and nuts (37% in urban, 36% in rural) were the two most consumed food groups (Figure I). The three most common liquids consumed among children aged 6-59 months were plain water, tea, and unfortified pap. Children from urban settings were more likely to be fed with infant formula (p=0.002), and fortified pap (p=0.007) – Table 3.

Table 2: Breastfeeding practices for surveyed under-five children in Lagelu LGA, Ibadan, Oyo State, Nigeria

Variables	Rural (N= 299)	Urban (N=318)	Total (N=617)	P value
Ever breastfed	Frequency (%)	Frequency (%)	Frequency (%)	
Yes	297 (99.3)	314 (98.7)	611 (99.0)	0.456
No	2 (0.7)	4 (1.3)	6 (1.0)	
Initiation of breastfeeding N=608				
Less than an hour after birth	133 (45.1)	122 (39.0)	255 (42.0)	**0.046**
Less than 24 hours	101 (34.2)	135 (43.1)	236 (38.8)	
Days after delivery	61 (20.7)	56 (17.9)	117 (19.2)	
Not exclusively breastfed for any period				
Yes	58 (19.4)	83 (26.1)	141 (22.9)	**0.048**
No	241 (80.6)	235 (73.9)	476 (77.1)	
Current exclusive breastfeeding (n=107) [a]				
Yes	42 (82.4)	49 (87.5)	91 (85.1)	0.456
No	9 (17.6)	7 (12.5)	16 (14.9)	
Exclusive breastfeeding among older children [b] N=373				
Yes	122 (62.9)	138 (75.8)	260 (69.7)	**0.012**
No	69 (36.1)	44 (24.2)	113 (30.3)	
Continued breastfeeding at 1 year (n=64) [c]				
Yes	18 (62.1)	12 (34.3)	30 (46.9)	**0.027**
No	11 (37.9)	23 (65.7)	34 (53.1)	
Breastfeeding discontinuation				
Mean age in months (±SD)	17.5 (±4.2)	15.5 (±3.6)	16.5 (±4.2)	**<0.001**
Used baby bottle with nipple N=179				
Yes	12 (14.8)	27 (27.6)	39 (21.8)	**0.040**
No	69 (85.2)	71 (72.4)	140 (78.2)`	
Counselled on infant and young child nutrition				
Yes	129 (43.1)	170 (53.5)	299 (48.5%)	**0.010**
No	170 (56.9)	148 (46.5)	318 (51.5)	

[a] *infants 0-5 months of age who received only breast milk during the previous day/infants 0-5 months of age*
[b] *Proportion of children aged 6-59 months exclusively breastfed for 6 months*
[c] *children 12-15 months of age who received breast milk during the previous day/ children 12-15 month*

Dietary diversity was similar in both settings. The majority (83.7%) of the children aged 6-59 months did not meet the minimum dietary diversity in terms of food consumed on the day prior to the survey. Dietary diversity was not associated with, wealth index of caregiver, or maternal education - Table 4. In the rural setting, ANC provider (p=0.016), father's level of education (p=0.039), and maternal age (p=0.032) were significantly associated with dietary diversity. In addition, more males (20.3% in rural, 17.3% in urban) were fed with minimum dietary diversity compared to females (11.7% in rural and 15.5% in urban) (p=0.064). In both settings, having been couselled on child nutrition was associated with dietary diversity. Among children still receiving breast milk, 12/24 (50.0%) and 45/70 (64.3%) met the minimum daily meal frequency for children 6-8 months and 9-23 months, respectively.

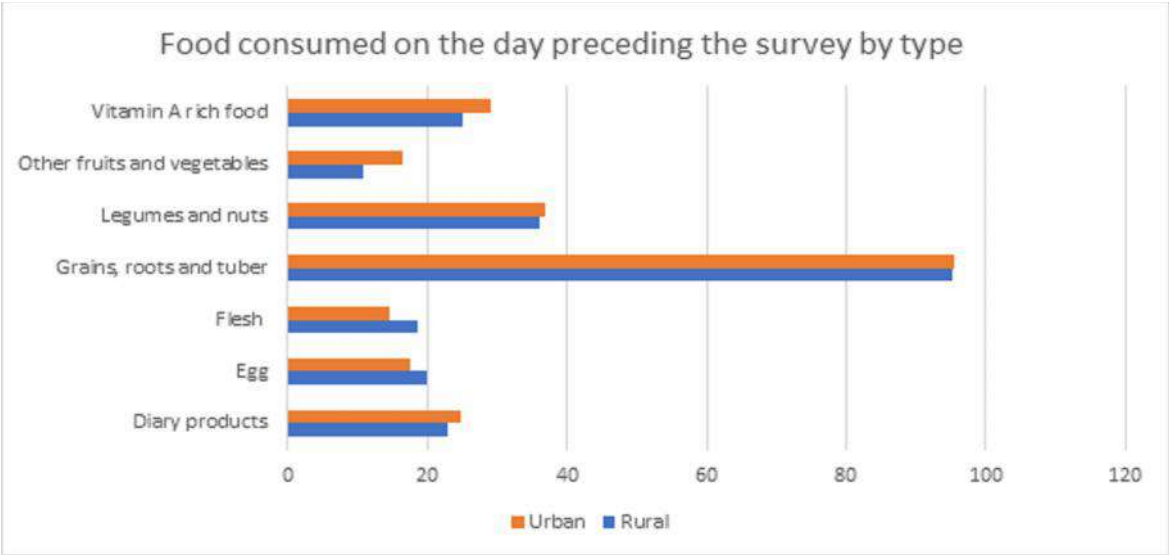

Figure 1: Food consumption (according to food groups) among children aged 6-59 months in Lagelu LGA, Ibadan, Oyo State, Nigeria (food consumed a day preceding the survey)

Table 3: Consumption of liquid foods for children aged 6-59 months in Lagelu LGA, Ibadan, Oyo State

Liquid foods	Rural N=262 Frequency (%)	Urban N= 248 Frequency (%)	Total N=510 Frequency (%)	P value
Plain water	244 (98.4)	254 (97.0)	498(97.7)	0.283
Infant formula	8(2.7)	27(8.5)	35(5.7)	**0.002**
Soya milk	3 (1.2)	10 (3.8)	13 (2.6)	0.056
Unfortified pap	47 (19.0)	55 (21.0)	102 (20.0)	0.451
Fortified pap	9 (3.6)	25(9.5)	34 (6.5)	**0.007**
Pito/Sobo drink	1 (0.4)	11 (4.2)	12 (2.4)	**0.004**
Beverages	58 (23.4)	68 (26.0)	126 (24.7)	0.575
Yogurt	6(2.4)	12 (4.6)	18 (3.5))	0.259
Soft drinks	28 (11.3)	43 (16.4)	71 (13.9)	0.095

Nutritional status of surveyed under-five children

Overall, 108 (22.3%) of children aged 6-59 months were wasted, 107 (21.9%) were underweight, 152 (30.6%) were stunted, and 34 (7.0%) were overweight. Of those who were wasted, 38.0% were severely wasted with no significant rural-urban disparity (p=0.135). A higher proportion of children in urban settings had severe acute malnutrition using weight-for-height indices (26/253, 10.3%) (p=0.013) and the mid-upper arm circumference (12/258, 4.7%) (p=0.002). In contrast, a higher proportion of the children in rural setting were stunted (p=0.002) (Table 5). In the rural settings, 37.2% and 28.0% compared to 24.4% and 16.3% of under-five children (6-59 months) in the urban setting were stunted and underweight respectively.

Greater proportions of children who met the minimum dietary diversity were not stunted, underweight, wasted or overweight, although this was not statistically significant (Table 5). No significant gender based differences in the nutritional status were seen, except underweight being more common among male children (0.007) and was also significant in rural setting (p=0.005) (Table 6). In the urban settings, wasting was more common among those whose mothers (p=0.018) and fathers (p=0.002) had tertiary level of education. Whereas, in the rural setting, overweight was more common among children whose mothers (p=0.031) and fathers (p=0.045) had below 228 tertiary level of education. Children whose caregiver had not been counselled on child nutrition were more likely to be wasted (p=0.003) in the urban setting, and in the rural area, they are more likely to have underweight (p=0.012).

Table 4: Minimum dietary diversity among children aged 6-59 months in Lagelu LGA, Ibadan Oyo and its associated factors[a]

Variables	Minimum dietary diversity		
	Rural (N=40)	Urban (N=43)	Total (N=83)
ANC provider			
Hospitals	16 (41.0)	21 (48.8)	37 (45.1)
PHCs	22 (56.4)	16 (37.2)	38 (46.3)
TBAs/Faith clinics	1 (2.56)	6 (14.0)	7 (8.5)
P-value	**0.016**	0.635	**0.047**
Maternal education			
Secondary and below	21 (48.8)	31 (79.5)	52 (63.4)
Tertiary	22 (51.2)	8 (20.5)	30 (36.6)
P value	0.164	0.853	0.219
Father education			
Secondary and below	24 (61.5)	17 (41.5)	41 (51.3)
Tertiary	15 (38.5)	24 (58.5)	39 (49.7)
P value	**0.039**	0.374	0.054
Maternal age			
< 35 years	21 (55.3)	33 (76.7)	54 (66.7)
>= 35 years	17 (44.7)	10 (23.3)	27 (33.3)
P value	**0.032**	0.784	0.091
Wealth index			
Poor	1 (2.9)	0 (0.0)	1 (1.5)
Middle	7 (20.0)	1 (3.2)	8 (12.1)
Wealthy	27 (77.1)	30 (96.8)	57 (86.4)
P value	1.000	1.000	0.938
Gender			
Female	14 (35.0)	19 (44.2)	33 (39.8)
Male	26 (65.0)	24 (55.8)	50 (60.2)
P value	0.064	0.692	0.116
Counselled on child nutrition			
No	9 (22.5)	21 (48.8)	30 (36.1)
Yes	31 (77.5)	22 (51.2)	53 (63.9)
P value	**0.001**	**0.002**	**<0.001**
Exclusive breastfed for 6			
No	9 (27.3)	14 (41.2)	23 (34.3)
Yes	24 (72.7)	20 (58.8)	44 (65.7)
P value	0.222	**0.001**	0.428
Stunting*			
No	24 (63.2)	35 (83.3)	59 (73.8)
Yes	14 (36.8)	7 (16.7)	21 (26.2)
P value	0.956	0.201	0.358
Underweight †			
No	26 (70.3)	37 (88.1)	63 (79.8)
Yes	11 (29.7)	5 (11.9)	16 (20.2)
P value	0.800	0.395	0.702
Wasting ‡			
No	31 (83.8)	36 (85.7)	67 (84.8)
Yes	6 (16.2)	6 (14.3)	12 (15.2)
P value	0.261	0.222	0.096
Overweight §			
No	36 (97.3)	41 (97.6)	77 (97.5)
Yes	1 (2.7)	1 (2.4)	2 (2.5)
P value	0.320	0.484	0.096

[a] *Minimum dietary diversity was defined as the child having a diet containing four or more food groups 24 hours prior to the survey. Overall, 83(16.3%) out of 510 children aged 6-59 months met the minimum dietary diversity requirement.*

** Height for age Z score <-2 SD;*

† Weight for Age Z score <-2 SD;

‡ Weight for Height Z score <-2 SD;

§ Weight for Height Z score >+2 SD

Table 5: Malnutrition indices among sampled children aged 6-59 months in Lagelu LGA, Ibadan Oyo State Nigeria

Indicators	Rural (n=248) Frequency (%)	Urban (n=262) Frequency (%)	Total (n=510) Frequency (%)	P value
Wasting (WHZ <-2) (n=484)	54/231(23.4)	54/253 (21.3)	108/484 (22.3)	0.592
Severe wasting (WHZ <-3)	15/231 (6.5)	26/253 (10.3)	41/484 (8.5)	0.135
Overweight (WHZ >2)	18/231 (7.8)	16/253 (6.3)	34/484 (7.0)``	0.528
Wasting (MUAC < 125mm)	11/239 (4.6)	15/258 (5.8)	26/497 (5.2)	0.544
Severe Acute Malnutrition (MUAC < 115mm)	2/239 (0.8)	12/258 (4.7)	14/497 (2.8)	**0.013**
Underweight (WAZ <-2)	65/232 (28.0)	42/257 (16.3)	107/489 (21.9)	**0.002**
Severe Underweight (WAZ <-3)	19/232 (8.2)	12/257 (4.7)	31/489 (6.3)	0.111
Stunting (HAZ <-2)	89/239 (37.2)	63/258 (24.4)	152/497 (30.6)	**0.002**
Severe Stunting (HAZ <-3)	44/239 (18.4)	29/258 (11.2)	73/497 (14.7)	**0.024**

WHZ, weight for height Z score; MUAC, Mid Upper Arm Circumference; WAZ, weight for age Z score; HAZ, height for age Z score

DISCUSSION

We assessed the breastfeeding practices, dietary intake and nutritional status of under-five children, with a focus on urban versus rural contexts given the increasing urbanization in low- and middle-income countries and the influence of contextual factors on child's nutrition[25,26] While many studies have been done on child nutrition in Nigeria,[27–30] few have recently focused on rural-urban differences.[31,32] Our study found that majority of the children (99.0%) were breastfed, but there were notable differences in breastfeeding practices between rural and urban settings. Dietary diversity among children under-five was similar for both settings; however, stunting prevalence was higher among children in the rural setting.

In this study, a higher proportion of children in urban settings were exclusively breastfed, but children in rural areas were breastfed for a longer period than their urban counterparts. These findings bear some similarities with studies conducted by Senbanjo *et al.* in Lagos and Lubala *et al.* in Congo.[31,33] Both studies reported that the total duration of breastfeeding was longer in the rural setting compared to urban setting, but in contrast to our study, exclusive breastfeeding rate reported by Senbanjo *et al.* in Lagos was lower compared to the finding from our study. The reasons for the difference may be because Lagos is more urbanized and has a higher wealth index than Ibadan, and it may be that the level of urbanization could explain some differences observed in our study.

Local contextual factors which could explain the findings in our study are discussed below. Firstly, mothers in our study recruited in the urban setting were more educated and many of them reported they had been counselled on child nutrition. This could be responsible for increased rates of exclusive breastfeeding up to the recommended 6-months among caregivers in the urban setting. Lubala *et al.* also reported higher exclusive breastfeeding practices among urban mothers when compared with rural mothers in southern Katanga communities of the Democratic Republic of Congo. The authors argued that knowledge of exclusive breastfeeding was poor among the rural mothers, hence they discontinued exclusive breastfeeding practice earlier with their children. In contrast to our findings, a study conducted in Indonesia reported lower exclusive breastfeeding practices among urban mothers despite better knowledge and perception of breastfeeding - a pointer that determinants of breastfeeding practices are complex and context-specific.[34] Job-related factors have been reported as constraints to breastfeeding practices in different settings, including Nigeria and could have been responsible for the shorter duration of breastfeeding among urban mothers in our study.[35–37] In other settings within and outside Nigeria, formula feeding among urban mothers have been reported to be higher compared to rural mothers.[33,38] The cultural practice of early introduction of water to quench thirst in babies being breastfed is well documented in Nigeria;[39–42] hence it is not surprising that exclusive breastfeeding rate was lower in the rural settings. However, this finding indicates possible influences of social norms, poor maternal literacy and low social power of women - which are more common in rural areas - on breastfeeding practices.[43] We therefore recommend future study on this.

We did not observe significant differences in dietary intake among children between settings, and this

Table 6: Factors associated with nutritional status of surveyed under-five children in Lagelu LGA, Ibadan

	Stunting*			Underweight †			Wasting ‡			Overweight §		
	Rural (n=89 Freq (%)	Urban (n=63) Freq (%)	Total (n=83) Freq (%)	Rural (n=65) Freq (%)	Urban (n=42) Freq (%)	Total (n=107) Freq (%)	Rural (n=54) Freq (%)	Urban (n=54) Freq (%)	Total (n=108) Freq (%)	Rural (n=18) Freq (%)	Urban (n=16) Freq (%)	Total (n=34) Freq (%)
ANC provider												
Hospitals	27 (31.7)	25 (41.7)	52 (35.9)	15 (24.2)	15 (38.5)	30 (29.7)	14 (26.4)	21 (41.2)	35 (33.6)	5 (29.4)	5 (31.3)	10 (30.3)
PHCs	44 (51.8)	28 (46.7)	72 (49.6)	37 (59.7)	18 (46.1)	55 (54.5)	31 (58.5)	22 (43.1)	53 (51.0)	9 (52.9)	6 (37.5)	15 (45.5)
TBAs/Faith clinics	14 (16.5)	7 (11.6)	21 (14.5)	10 (16.1)	6 (15.4)	16 (15.8)	8 (15.1)	8 (15.7)	16 (15.4)	3 (17.7)	5 (31.2)	8 (24.2)
P-value	0.374	0.289	0.833	0.775	0.658	0.321	0.978	0.888	0.0856	0.824	0.272	0.387
Maternal education												
Secondary and below	75 (85.2)	41 (65.1)	116(76.8)	57 (87.7)	23 (54.8)	80 (74.8)	44 (83.0)	24 (44.4)	68 (63.6)	11 (61.1)	9 (56.3)	20 (58.8)
Tertiary	13 (14.8)	22 (34.9)	35 (23.2)	8 (12.3)	19 (45.2)	27 (25.2)	9 (17.0)	30 (55.6)	39 (36.4)	7 (38.9)	7 (43.7)	14 (41.2)
P value	0.140	0.253	0.014	0.060	0.565	0.126	0.589	0.018	0.172	0.031	0.850	0.186
Father education												
Secondary and below	64 (77.1)	33 (53.2)	97 (66.9)	46 (70.8)	18 (42.9)	64 (59.8)	39 (79.6)	15(28.9)	54 (53.5)	10 (55.6)	8 (50.0)	18 (52.9)
Tertiary	19 (22.9)	29 (46.8)	48 (33.1)	19 (29.2)	24 (57.1)	43 (40.2)	10 (20.4)	37 (71.1)	47 (46.5)	8 (44.4)	8 (50.0)	16 (47.1)
P value	0.504	0.358	0.073	0.869	0.624	0.716	0.411	0.002	0.083	0.045	0.864	0.323
Maternal age												
< 35 years	57 (67.1)	50(83.3)	107(73.8)	43 (68.3)	33 (84.6)	76 (74.5)	37 (69.8)	40 (78.4)	77 (74.0)	15 (88.2)	11 (68.8)	26 (78.9)
>= 35 years	28 (32.9)	10 (16.7)	38 (26.2)	20 (31.7)	6 (15.4)	26 (25.5)	16 (30.2)	11 (21.6)	27 (26.0)	2 (11.76)	5 (31.2)	7 (21.2)
P value	0.603	0.282	0.973	0.799	0.295	0.913	0.936	0.985	0.997	0.079	0.335	0.517
Wealth index												
Poor	5 (5.8)	0	5 (3.5)	3 (4.9)	0 (0.0)	3 (2.9)	0(0.0)	0(0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Middle	21 (24.4)	3 (5.2)	24 (16.7)	11 (18.0)	2 (5.0)	13 (13.0)	11 (21.1)	2 (4.0)	13 (12.8)	4 (22.2)	1 (7.1)	5 (15.6)
Wealthy	60 (69.8)	55 (94.8)	115 (79.8)	47 (77.1)	38 (95.0)	85 (86.4)	41 (78.9)	48 (96.0)	89 (87.2)	14 (77.8)	13 (92.9)	27 (82.8)
P value	0.004	0.595	0.001	0.251	1.000	0.136	0.705	0.739		0.834	0.568	
Gender												
Female	38 (42.7)	28 (44.4)	66 (43.4)	21 (32.3)	17 (40.5)	38 (35.5)	26 (48.2)	21 (38.9)	47 (43.5)	12 (66.7)	9 (56.2)	21 (61.8)
Male	51 (57.3)	35 (55.6)	86 (56.6)	44 (67.7)	25 (59.5)	69 (64.5)	28 (51.8)	33 (61.1)	61 (56.5)	6 (33.3)	7 (43.8)	13 (38.2)
P value	0.233	0.555	0.206	0.005	0.348	0.007	0.814	0.176	0.424	0.078	0.445	0.072
Counselled on child nutrition												
No	45 (50.6)	45 (71.4)	90 (59.2)	36 (85.7)	35 (53.8)	71 (66.4)	27 (50.0)	46 (85.2)	73 (67.6)	5 (27.8)	11 (68.7)	16 (47.6)
Yes	44 (49.4)	18 (28.6)	62 (40.8)	6 (14.3)	30 (46.2)	36 (33.4)	27 (50.0)	8 (14.8)	35 (32.4)	13 (72.2)	5 (31.3)	18 (52.9)
P value	0.278	0.529	0.618	0.012	0.101	0.004	0.443	0.003	0.018	0.117	0.998	0.195
Exclusive breastfed for 6 months												
No	28(44.4)	9 (18.4)	37 (33.0)	20 (45.5)	5 (16.7)	25 (33.8)	13 (32.5)	7 (19.4)	20 (26.3)	6 (42.9)	2 (14.3)	8 (28.6)
Yes	35 (55.6)	40 (81.6)	75 (67.0)	24 (54.5)	25 (83.3)	49 (66.2)	27 (67.5)	29 (80.6)	56 (73.7)	8 (57.1)	12 (85.7)	20 (71.4)
P value	0.102	0.236	0.497	0.139	0.301	0.432	0.563	0.435	0.382	0.599	0.522r	0.827

** Height for age Z score <-2 SD;*
† Weight for Age Z score <-2 SD;
‡ Weight for Height Z score <-2 SD;
§ Weight for Height Z score >+2 SD

contradicts finding by Amugsi *et al.* in Ghana, which reported a significantly higher dietary diversity score among children in urban settings.[47] The contrasting findings may be due to different approaches used in both studies to determine dietary diversity or other contextual differences. Nevertheless, 16% of children meeting the minimum dietary diversity definition in our study is a call for concern. The study conducted by Foluke *et al.* in Lagos also found just 16% of the under-five children were fed with the minimum dietary diversity.[48] Changing this practice will likely require a holistic approach rather than focusing only on counsel for caregivers. For instance, reports have shown that the national school feeding programme established to close this gap is ineffectively implemented,[10,49] and household food security is threated due to the negative impact of COVID-19 pandemic.[50]

Our study found evidence of gendered differences in child nutrition within the rural context but was not as apparent in the urban setting. While this is not surprising given the typical male preference characteristic of a patriarchal system in countries like Nigeria,[51] being less pronounced in the urban setting points to a gradual shift in this cultural practice. Nevertheless, there is a need for feeding and nutrition programmes to apply a gendered lens if sustained behavioural interventions on child nutrition are to reach equitable outcomes.

The rural prevalence of stunting in our study (37.3%) is higher than the urban prevalence (24.4%). This rural-urban disparity in stunting prevalence is consistent with the national figures for stunting prevalence for rural (44.8%) and urban (26.8%) settings.[12] Other studies within and outside Nigeria have also shown increased prevalence of stunting in rural areas compared to urban areas.[30,31,52,53] Poorer socioeconomical status and maternal literacy level which are typical of rural settings may be responsible for the rural-urban disparity in stunting prevalence found in our study.[43 53] We identified marked differences in wasting prevalence using weight for height standard scores or cut off point with the mid-upper arm circumference. This discrepancy is well documented.[54–56] In our study, wasting prevalence is higher (22.3%) using WHZ compared to MUAC (5.2%). This is similar to findings in Mauritania which included over 12000 children aged 6-59 months. The study reported a wasting prevalence of 16.1% and 5.0% using WHZ and MUAC respectively.[55]

This study had two key limitations. Firstly, given it was a cross-sectional study, we cannot make any causal conclusions, or determine the direction of mechanisms between diets and nutritional status. Secondly, our assessment of dietary intake relied on caregivers' recall, which is subject to recall bias and would especially be an issue in reports around breastfeeding behaviours in older children. There may also be social desirability bias for caregivers who have been counselled on child nutrition to report idealized feeding practices.

CONCLUSION

Our study found that the feeding practices for under-five children are sub-optimal in this peri-urban setting in Ibadan and highlights key opportunities for improvement. This requires a holistic approach, with inclusiveness and a gender-focus. The government at all levels needs to promote and provide incentives and a safe environment for agricultural activities. Adoption and scale up of technological and economic strategies to improve food security will be needed. In addition, there is an urgent need for effective implementation of the existing social protection programmes such as the home-grown school feeding programme, as well as improved coordination, coverage, accountability and continuous monitoring and evaluation

REFERENCES

1. **Reynaldo Martorel.** The Role of Nutrition in Economic Development. *Nutr Rev.* 1996;54(4):1-6.
2. World Health Organization (WHO). Nutrition. https://www.who.int/health-topics/nutrition. Accessed January 13, 2022.
3. What is the Convention on the Rights of the Child? | UNICEF. https://www.unicef.org/child-rights-convention/what-is-the-convention. Accessed September 12, 2021.
4. **Brumana L,** Arroyo A, Schwalbe NR, *et al.* Maternal and child health services and an integrated, life-cycle approach to the prevention of non-communicable diseases. *BMJ Glob Health.* 2017;2(3). doi:10.1136/bmjgh-2017-000295.
5. **Kelishadi R,** Farajian S. The protective effects of breastfeeding on chronic non-communicable diseases in adulthood: A review of evidence. *Adv Biomed Res.* 2014;3(1):3. doi:10.4103/2277-9175.124629.
6. United Nations. *Transforming Our World: The 2030 Agenda for Sustainble Development.*; 2016.
7. WHO. Infant and young child feeding. https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding. Accessed October 31, 2020.
8. UNICEF, WHO, World Bank. UNICEF-WHO-World Bank Joint Child Malnutrition Estimates. *Geneva: WHO.* 2020;24(2):1-16.
9. Federal Ministry of Health. *National Policy on Infant and Young Child Feeding in Nigeria.* Abuja; 2010.
10. **Adepoju AB,** Johnson AT. Home Grown School Feeding Program in Nigeria: Its Nutritional Value and Anthropometry Assessment of School Age

Children in Ilaro, Ogun State. 2020. http://fepispas.com/spasjournalArticle. Accessed March 11, 2022.
11. Nutrition | UNICEF Nigeria. https://www.unicef.org/nigeria/nutrition. Accessed February 16, 2022.
12. National Population Commission (NPC) [Nigeria], ICF. *Nigeria Demographic Health Survey 2018*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.; 2019:748. https://dhsprogram.com/publications/publication-fr359-dhs-final-reports.cfm.
13. **Siddiqui F,** Salam RA, Lassi ZS, *et al.* The Intertwined Relationship Between Malnutrition and Poverty. *Front Public Health*. 2020;8(August):1-5. doi:10.3389/fpubh.2020.00453.
14. International Vaccine Access Center (IVAC), Johns Hopkins Bloomberg School of Public Health. *Pneumonia and Diarrhea Progress Report*.; 2022.
15. NPC, ICF. Nigeria Demographic and Health Survey 2013. *National Population Commission*. 2014:566.
16. **Idris SH,** Popoola-Zakariyya B, Sambo MN, *et al.* Nutritional Status and Pattern of Infant Feeding Practices among Children under Five in a Rural Community of Northwestern Nigeria: *http://dx.doi.org/102190/IQ331.g*. 2013;33(1):83-94. doi:10.2190/IQ.33.1.G.
17. **Tesfaw LM,** Fenta HM. Multivariate logistic regression analysis on the association between anthropometric indicators of under-five children in Nigeria: NDHS 2018. *BMC Pediatr*. 2021;21(1):1-13. doi:10.1186/S12887-021-02657-5/TABLES/8.
18. National Population Commission. Population Distribution by Sex,State,LGA&Senatorial District. 2010;III:1-64. http://www.population.gov.ng/images/Vol 03 Table DSx LGAPop by SDistrict-PDF.pdf.
19. Lagelu (Local Government Area, Nigeria) - Population Statistics, Charts, Map and Location. https://citypopulation.de/en/nigeria/admin/oyo/NGA031020__lagelu/. Accessed April 9, 2023.
20. Federal Ministry of Health. Nigeria Health Facility Registry. https://hfr.health.gov.ng/facilities/hospitals-search?_token=lyVv2YCUezMtVsCqloDe8sGmYCBFpUuvxBJjLA4C&state_id=130&lga_id=1651&facility_level_id=1&ownership_id=0& operational_status_ id=1&registration_status_id=0&license_status_id=0&geo_codes=0&service_type. Published 2019. Accessed February 22, 2021.
21. National Bureau of Statistics (NBS) and United Nations Childre's Fund (UNICEF). Multiple Indicator Cluster Survey 2016-17 Survey Finding Report. In: *Multiple Indicator Cluster Survey 2016-17, Survey Findings Report. Abuja, Nigeria: National Bureau of Statistics and United Nations Children's Fund.* Abuja, Nigeria; 2017.
22. ENA Software for SMART - SMART Methodology. https://smartmethodology.org/survey-planning-tools/smart-emergency-nutrition-assessment/?doing_wp_cron=1631388241.6847798824310302734375. Accessed September 11, 2021.
23. World Health Organization. *Interpretation Guide Nutrition Landscape Information System (NLIS)*. Geneva; 2011.
24. Nigeria - Equity Tool. https://www.equitytool.org/nigeria/. Accessed September 11, 2021.
25. **James ER,** Mombel Opiah MR. Socio-Cultural Factors Influencing Child Nutrition Among Mothers in Calabar Municipality, Cross River State Nigeria. *International Journal of Interdisciplinary Research Methods*. 2019;6(4):28-51.
26. **Amanya Mutuli L.** Socio-Cultural Practices and Beliefs Influencing Infant and Young Child Feeding in Lubao Sub-Location Kakamega County. *Journal of Nutritional Health & Food Engineering*. 2016;5(1):568-571. doi:10.15406/jnhfe.2016.05.00160.
27. **Yetunde T. Olasinde,** Olayinka R. Ibrahim, Ajibola Idowu, *et al.* Determinants of Exclusive Breastfeeding Practices Among Mothers of Infants Less than Six Months Attending an Immunization Clinic In Southwestern Nigeria.
28. **Esther Omotoye F,** Samuel Adesanmi RA. Infant and Young Child-Feeding Practices in Two Local Government Areas in Southwest, Nigeria. *J Food Sci Nutr Res*. 2019;02(02):136-145. doi:10.26502/jfsnr.2642-11000015.
29. **Mustapha RA,** Bolajoko OO. Growth Pattern And Nutritional Status Of Under Five Children In Owo Local Government Area Of Ondo State, Nigeria. Vol 5. www.iosrjournals.orgwww.iosrjournals.org. Accessed November 3, 2020.
30. **Olodu MD,** Adeyemi AG, Olowookere SA, *et al.* Nutritional status of under-five children born to teenage mothers in an urban setting, south-western Nigeria. *BMC Res Notes*. 2019;12(1):1-6. doi:10.1186/s13104-019-4147-x.
31. **Senbanjo I,** Olayiwola I, Afolabi Wasiu AO. Dietary practices and nutritional status of under-five children in rural and urban communities of Lagos State, Nigeria. *Nigerian Medical Journal*. 2016;57(6):307. doi:10.4103/0300-1652.193854.
32. **Adewuyi EO,** Zhao Y, Khanal V, *et al.* Rural-urban differences on the rates and factors associated with early initiation of breastfeeding in Nigeria: Further analysis of the Nigeria demographic and health survey, 2013. *Int Breastfeed*

J. 2017; 12(1):1-11. doi:10.1186/s13006-017-0141-x.

33. **Nina L,** Lubala KT, Mukuku O, et al. Infant feeding practices in urban and rural southern Katanga communities in Democratic Republic of Congo. *J Med Res*. 2016;2(3):65-70.
34. **Paramashanti BA,** Dibley MJ, Huda TM, *et al.* Breastfeeding perceptions and exclusive breastfeeding practices: A qualitative comparative study in rural and urban Central Java, Indonesia. *Appetite*. 2022;170. doi:10.1016/j.appet.2021.105907.
35. **Agunbiade OM,** Ogunleye OV. Constraints to exclusive breastfeeding practice among breastfeeding mothers in Southwest Nigeria: Implications for scaling up. *Int Breastfeed J*. 2012; 7(1):1-10.doi:10.1186/1746-4358-7-5/TABLES/5.
36. **Ella RE,** Ndep AO, Akpan MI. Factors Affecting Exclusive Breastfeeding Practice in Rural Communities of Cross River State, Nigeria. *International Journal of Humanities, Social Sciences and Education*. 2016;3(4):101-110. doi:10.20431/2349-0381.0304012.
37. **Nwachan Mirabelle B,** Ejoh Richard A. An assessment of the breastfeeding practices in Momo division, North West region of Cameroon. *Food Sci Nutr*. 2020;8(9):5086-5094. doi:10.1002/fsn3.1808.
38. **Balogun MR,** Okpalugo OA, Ogunyemi AO, *et al*. Knowledge, Attitude, and Practice of Breastfeeding: A Comparative Study of Mothers in Urban and Rural Communities of Lagos, Southwest Nigeria. *Niger Med J*. 2017;58(4):123. doi:10.4103/NMJ.NMJ_289_16.
39. **Ibe SNO,** Obasi O, Nwoke E, *et al.* Cultural Practices on Infant Feeding and Nursing-Mothers' Adoption of Exclusive Breastfeeding Practice in Imo State Nigeria. *MOJ Public Health*. 2017;5(5):155-161. doi:10.15406/mojph.2017.05.00141.
40. Alive & Thrive and UNICEF. *Factors Influencing the Practice of Exclusive Breastfeeding and Other Infant Feeding Practices in the First Six Months of Life in West and Central Africa*.; 2022.
41. **Coetzee B,** Tomlinson M, Osawe S, *et al.* Barriers to and facilitators of adherence to exclusive breastfeeding practices among HIV infected and non-infected women in Jos, Nigeria. *Matern Child Health J*. 2017;21(4):953. doi:10.1007/S10995-016-2253-0.
42. **Joseph FI,** Earland J. A qualitative exploration of the sociocultural determinants of exclusive breastfeeding practices among rural mothers, North West Nigeria. *Int Breastfeed J*. 2019;14(1). doi:10.1186/s13006-019-0231-z.
43. National Bureau of Statistics (NBS) and United Nations Children's Fund (UNICEF). *Multiple Indicator Cluster Survey 2021, Survey Findings Report*. Abuja; 2022.
44. **Nsiah-Asamoah C,** Doku DT, Agblorti S. Mothers' and Grandmothers' misconceptions and socio-cultural factors as barriers to exclusive breastfeeding: A qualitative study involving Health Workers in two rural districts of Ghana. *PLoS One*. 2020;15(9). doi:10.1371/JOURNAL.PONE.0239278.
45. **Nduna T,** Marais D, van Wyk B. An Explorative Qualitative Study of Experiences and Challenges to Exclusive Breastfeeding Among Mothers in Rural Zimbabwe. *Infant Child Adolesc Nutr*. 2015;7(2):69-76. doi:10.1177/1941406414568562.
46. **Alade O,** Titiloye MA, Oshiname FO, *et al.* Exclusive breastfeeding and related antecedent factors among lactating mothers in a rural community in Southwest Nigeria. *International Journal of Nursing and Midwifery*. 2013;5(7):132-138. doi:10.5897/IJNM2013.0111.
47. **Amugsi DA,** Mittelmark MB, Lartey A. Dietary Diversity is a Predictor of Acute Malnutrition in Rural but Not in Urban Settings/ : Evidence from Ghana. 2014;4(25):4310-4324.
48. **Foluke A,** Olatona JO, Adenihun M;, *et al.* Complementary Feeding Knowledge, Practices, and Dietary Diversity among Mothers of Under-Five Children in an Urban Community in Lagos State, Nigeria. *Int J MCH AIDS*. 2017;6(1):46-59. doi:10.21106/ijma.203.
49. **Azubuike OC,** Mbah PE. Challenges of Child Nutrition: An Analysis of School Feeding Programmes (SFP) in South Eastern Nigeria. *Savanna Journal of Basic and Applied Sciences*. 2019;1(1):104-110. http://www.sjbas.com. Accessed March 11, 2022.
50. **Ibukun CO,** Adebayo AA. Household food security and the COVID 19 pandemic in Nigeria. *African Development Review*. 2021;33(Suppl 1):S75. doi:10.1111/1467-8268.12515.
51. **Allanana G.** Patriarchy and Gender Inequality in Nigeria/: the Way Forward. *Eur Sci J*. 2013;9(17):115-144.
52. **Akram R,** Sultana M, Ali N, *et al.* Prevalence and Determinants of Stunting Among Preschool Children and Its Urban–Rural Disparities in Bangladesh. *Food Nutr Bull*. 2018;39(4):521-535. doi:10.1177/0379572118794770.
53. **Sserwanja Q,** Kamara K, Mutisya LM, *et al.* Rural and Urban Correlates of Stunting Among Under-Five Children in Sierra Leone: A 2019 Nationwide Cross-Sectional Survey. *Nutr Metab Insights*. 2021;14:117863882110470. doi:10.1177/1178638821104705 6.
54. **Tadesse AW,** Tadesse E, Berhane Y, *et al.* Comparison of mid-upper arm circumference

and weight-for-height to diagnose severe acute malnutrition: A study in Southern Ethiopia. *Nutrients*. 2017;9(3). doi:10.3390/nu9030267.

55. **Barro M,** Daouda Baro M, Cisse D, *et al*. Upper arm length along with mid-upper arm circumference to enhance wasting prevalence estimation and diagnosis: sensitivity and specificity in 6-59-months-old children. *Fam Med Com Health*. 2021;9:748. doi:10.1136/fmch-2020-000748.
56. **Laillou A,** Prak S, de Groot R, *et al*. Optimal screening of children with acute malnutrition requires a change in current WHO guidelines as MUAC and WHZ identify different patient groups. *PLoS One*. 2014;9(7):9-15. doi:10.1371/journal.pone.0101159.