NUTRITIONAL STATUS AND DIETARY PATTERN II: PRESCHOOL AGE CHILDREN IN AKINYELE LOCAL GOVERNMENT AREA OYO STATE

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Abstract: Healthy food habits have shown to have positive impact in preschool aged school in their formative age years and reduce their likely prone ability to intestinal and other nutritional diseases. The study investigated dietary pattern and nutritional status of preschool aged children in Akinyele Local Government Area, a sub-urban setting in Oyo State compared with FDN reference standards. The study made used of both anthropometric and dietary tests while frequency, mean and simple percentages were used for the analysis of the responses. A structured questionnaire was used to collect data from 246 preschool aged children of the study area. Mean weight, height and BMI of the respondents were determined using standiometer (model number: FM-S120) from aged $1 – 5$ years of age plus in the rural, semi-urban and urban areas of the study locations while inferential statistics of t-test at a significant level of $p<0.05$ was used to test the acceptance or rejection of the study hypotheses. Results obtained shows that parents can positively or otherwise influence their children eating pattern or habits and families in rural areas that have many children often do not take good care of their kids' nutritionally. The study result shows that 46 % of the respondents do eat their meal with their families/parents while others complement their food intake with their relatives, families' friends and or at cafeterias/food vendors. The study shows that preschool aged children in the urban area of the study locations had higher weight and height than their correspondent in the rural and semi-urban areas but invariably lower than that of FDN reference standards. BMI results revealed that age group $1 – 2$; $2 – 3$; $3 – 4$ years of age were within normal weight except aged group $1 – 2$ and $2 – 3$ years of age in rural areas that are on the borderling of excessive body weight (tissues and fats). Among the aged group $4 – 5$ years of age about 40.63 % of them especially in rural area fall below normal weight which mean that they are under weight. The study revealed that locations/environments have effect on healthy eating habits of preschool aged children, hence an adequate healthy eating policy and implementation needs to be put in place for preschool aged children especially in rural and semi-urban areas to prevent malnutrition and intestinal disorder and diseases which can have pronounce effect on their growth.

Keywords: Anthropometric, BMI, intestinal diseases, malnutrition, preschool aged children

Introduction

The healthy development of a person starts, before they are even born, with the health and nutrition of the mother and is a process that continues throughout their life. The part of this process that begins at birth and lasts until the age of compulsory education is called the "preschool education period". Majority of the world children are hungry and living in poverty because of inadequate total food intake or imbalanced food intake (UNICEF, 2009). Healthy diets may not only eliminate nutrient deficiencies in the preschool aged children but may also prevent or at least ameliorate ailment such as cardiovascular disorder, cancers and infections. Every living creature requires nutrients to build and retain body structure and supply necessary energy for subsistence.

Many of these nutrients are essential, if the body cannot make them or make enough of them to meet its needs can people to suffer health consequences in later years such as bone fractures from the disease's osteoporosis and iron deficiency anemia (Onyeozili *et al*., 2004).

The teaching and training of pregnant and nursing mothers could have a long-term impact on weaning practices and nutritional status of preschool aged children. Therefore, in an economy undergoing high inflation trends like Nigeria, malnutrition is bound to be prevalent which may be due to hunger, poverty and economic instability among others. The ravages of malnutrition on the health of children may be enormous ranging from growth retardation, low academic potentials, to disease conditions and even death. It

became apparent that the dietary pattern and nutritional status of children must first be determined before interventional measures can be taken. Therefore, the purpose of this study was to investigate the dietary pattern and nutritional status of preschool aged children in Akinyele Local Government Area, a sub-urban setting in Oyo State Nigeria as a case study to ascertain the adequacy or otherwise of their food consumption.

Research Questions

Three research questions were expected to be answered by the study:
   i.   What is the level of their daily nutrient intake compared with FAO/WHO requirements?
   ii. What is the level of malnutrition by age and gender of preschool age children in Akinyele Local Government Area, Oyo State, Nigeria?

Objectives of the study

The main objective of this study is to investigate the dietary pattern and nutritional status of preschool aged children in Akinyele Local Government Area, a sub-urban setting in Oyo State. The specific objectives of the study are to:
   — Assess the level of preschool age children intake of daily nutrient and compared it with Food and Nutrition, FDN (2014) reference standard.
   — Examine the level of malnutrition of preschool age children in the study area by weight, height and BMI.

Hypothesis

   i.   Ho: $\beta = \theta$ There is no significant difference ($p<0.05$) between the level of malnutrition of preschool age children in the study area in term of height and those of children sampled in FND (2014) reference standard.
   ii. Ho: $\beta = \theta$ There is no correlation relationship between the basal metabolic index, BMI of the preschool aged children in Akinyele Local Government Area and those of children sampled in FND (2014) reference standard.

Methodology
Area of the study

The study was carried out in Akinyele Local Government Area, a sub-urban setting in Oyo State. The local government is one of the thirty-three local governments that make Oyo State, Nigeria. Akinyele Local Government is blessed with both private and public primary and secondary schools, teachers, farmers, petty-traders, hunters, petty business centers, and "Okada" (motorcycle use for commercial purpose) riders. The town does not have any corporate industry, tertiary institution and vocational center, but has a lot of small/medium scale enterprises and popular markets that is being patronized every five days.

Population and sampling techniques

The target population for the study was randomly selected and embraced all preschool age children domicile in Akinyele Local Government Area. Preschool aged children, according to FAO/WHO (2002) that ranged from 1 – 6 yrs. There are 1496 buildings in the area that were identified and tagged for the study. Six hundred and ninety-two buildings were identified to have preschool age children during pilot study. Among these buildings, 126 buildings was randomly tagged and selected for the study. Two preschool age children were selected from each building; this gave a total of 246 respondents of 123 males and 123 females' respondents.

Data collection instrument

A structured questionnaire was designed and used for data collection. This consists of two sections (A and B). Section A elicit information on the respondents consisting of 7s (demographical profile) terms which have 24-items. Section B was a proforma to record 24-hours dietary recall and nutritional intake of the children. Age (based on sighting of birth certificate), height, and weight of the children were taken using standiometer (Model number: FM-S120). These anthropometric measurements were used to determine underweight and overweight of the respondents while dietary (laboratory) test was used to determine their daily nutrients intake and compared with FDN (2014) reference standard.

Validation and reliability

A pilot study that was conducted which gave an opportunity to iron out some problems that might have arisen in the main study. The pilot study helps to establish the validity and reliability of the structured questionnaire. Content and face validity was conducted on the test instrument involving the researcher and experts in the field. This help to discover how well the behavioural constructs that was to be covered by the measurement match those specified in the stated objectives. The reliability test for the instrument was conducted using test-retest method involving a sample of twenty-six respondents randomly selected from another local government (Odeda local government) area which is not part of the study area but within Oyo state landmass. The pre-test method of reliability test was conducted twice within an interval of four weeks. The total scores for each testing period was computed and Pearson Product Moment Correlation (PPMC) was

used to determine the agreement between the two scores. A reliability test "r" of 0.85 was accepted to make the structured questionnaire highly reliable and accepted for the study.

Procedure for data collection

The study utilized the help of two research assistants in the administration and collection of the questionnaire. Two hundred and forty six copies of the questionnaire were randomly distributed to the respondents in the study areas and all were collected which gave a total of 100 % returned questionnaire.

Data analysis

Data generated through the administration of the questionnaire was reported as mean, frequency count, and percentages while the hypothesis was analyzed using the test of difference between two proportions (t-test). The recorded anthropometric measurements (age, height, and weight) of the children were compared with those of FDN (2014) while a one-way analysis of variance and Duncan's test were used to establish the significance differences among the mean values at alpha 0.05. The statistical analyses were performed using SPSS software (Systat Statistical Program version 21 Inc., USA).

Results and discussions
Demographic information of the respondents

Table 1 showed that all the selected preschool aged children participated in the study. The finding revealed that both genders were equally represented as a base for genders equality in the study. This report corroborates earlier finding of Adesemowo and Adenuga (2018) and Teese et al. (2014) who used different age group but same genders as their respondents in their study but not in agreed with the work of Wan et al. (2015) who used different genders ration for their study. The table shows that majority (35 %) of the respondents is within the age of 4 – 5 years of age, followed by age group of 3 – 4 years of age with 27 % while age group of 2 – 3 years of age and 1 – 2 years of age are 22 and 16 %, respectively. The results showed that 8 % of the respondents are yet to start school with 19 % in pre-nursery, 21 % in nursery I while 24 % and 28 % were in nursery II and primary 1, respectively. In term of weight (kg), age group 4 – 5 years of age had the highest percentage of 39, followed by age group 2 – 3 years of age with 27 % while age group 3 – 4 years of age and 1 – 2 years of age has 22 and 12 %, respectively. However, the treads in mean height (cm) follows ascending order of increase in age; age group 1 – 2, 2 – 3, 3 – 4, and 4 – 5 years of age with 21, 24, 26, and 29 %, respectively. Table 1 showed that majority (58 %) of the respondents had more Childs in their family than other groups, followed by 1 – 2 childs per family with

22 % and 5 – 6 childs per family 14 % while those with more than 6 childs per family was 6 %, respectively. In term of family types of the respondents' household, the table showed that nucleus family had the highest number of 114 (47 %) households, followed by polygamous family 94 (38 %) households while those that practice extended family were 36 (15 %).

Children in preschool period are a crucial time for human growth, development and maturation in which changes occur in their body. The relationship of this period biological maturation cannot be over-emphasized. The study showed that an appreciable number of the randomly selected households/families for the study fully participated. Preschool aged children used in this study is according to FDN (2014) recommended age of 1 – 5 years of age with about 9 % of them not in school either in crèche or kindergarten while the remaining population (91 %) has started school. These group of preschool aged children according to Nekitsing et al. (2018) are position to a large extent be taught or modeled by their teachers about good healthy food and nutrition habits from what they are exposed to in their home and or community. Result revealed that larger portion of the preschool aged children families used for this study is from nucleus families while extended families lives or set-up had least of 10 %. Knowledge has shown that most children observed and follow their parents' exhibit behaviour including food and eating pattern. According to Draxten et al. (2014), who examined the connection between parents consumption of fruits and vegetables during mealtimes and children's fruits and vegetables consumption found out that 23 % of the children were receiving the recommended level of fruits and vegetables and those were children whose parents were most likely exhibit good eating habits of fruits and vegetables. This result shows that parents can positively or otherwise influence their children eating pattern or habits. Majority of the respondents (78 %) had more than two children per family which to some extent can affect their family food habits. However, researches have shown that school children do complement their food intake at school with their peers. According to Cuong et al. (2022), families that have many children often do not take good care of their kids' nutrition especially those in rural areas. They reported in their work that underweight kids who live in families which have more than three children had a risk and were 1.5 times higher than the families that have less than three children. Weight and height by age of the preschool aged children shows normal development compared with weight and height of Cuong et al. (2022) and FDN (2014) reference standard for children of same age. The age group 3 – 4 years of age and 4 – 5 years of age has faster growth than FDN (2014) reference standard.

However, among these group shows that some were underweight and few overweight.

Table 1: Demographic information of the respondents

Parameters	Variables	Frequency (n)	Percentage (%)	Alabata Town	Iroko Town	Sasa Town	Moniya Town	Orogun Town
Sex	Male	123	50	25	25	23	25	25
	Female	123	50	25	25	23	25	25
Age (yrs)	**01 ≤ 02**	**039**	**16**	**08**	**08**	**07**	**08**	**08**
	02 ≤ 03	054	22	11	11	10	11	11
	03 ≤ 04	067	27	14	13	13	14	13
	04 ≤ 05	086	35	17	17	18	17	17
Current	**Not-yet**	**022**	**09**	**05**	**04**	**04**	**04**	**05**
	Pre-Nursery	045	19	09	09	09	09	09
	Nursery I	052	21	11	10	10	11	10
	Nursery II	058	24	12	12	10	12	12
	Primary I	069	28	14	14	13	14	14
Mean Weight (kg)	**01 ≤ 02**	**029**	**12**	**06**	**06**	**05**	**06**	**06**
	02 ≤ 03	066	27	13	13	14	13	13
	03 ≤ 04	054	22	11	11	10	11	11
	04 ≤ 05	097	39	20	19	19	20	19
Mean Height (cm)	**01 ≤ 02**	**051**	**21**	**10**	**10**	**11**	**10**	**10**
	02 ≤ 03	059	24	12	12	11	12	12
	03 ≤ 04	064	26	13	13	12	13	13
	04 ≤ 05	072	29	15	14	14	15	14
Childs/Family	**01 – 02**	**054**	**22**	**11**	**11**	**10**	**11**	**11**
	03 – 04	143	58	29	28	29	29	28
	05 – 06	035	14	07	07	07	07	07
	Others (6+)	014	06	03	03	02	03	03
Family Types	**Nucleus**	**158**	**64**	**33**	**28**	**31**	**33**	**28**
	Polygamous	064	26	08	09	30	08	09
	Extended	024	10	02	02	04	08	08

Source: Field survey, 2023

24-hr Recall Nutrients Intake within last 24-hr

24-hr recall nutrients intake within the last 24 hours was as shown in Table 2. The table shows that 85 % of the respondents do have access to 3 square meals during the last 24 hours while 15 % did not have access to or taken 3 square meals during this period. Majority (46 %) of the respondents had their meals from parents, followed by those that bought (source) their meals from food vendors (25 %). 18 and 11 % of the respondents source or taken their meals from relatives and friends family, respectively. The table shows their breakfast time within last 24 hours ranged from 7.00 - 8.30 am, lunch time around 2.30 – 3.30 pm while dinner time ranged from 6.45 – 8.30 pm in the evening. Table 2shows that all the towns observed for the study do eat light and balance meal in the morning except Sasa and Moniya town where some of the households eat heavy/solid though balance meal like amala or eba (solid paste garrification paste) with fish or meal soup and vegetable/drawl soup. In the afternoon, all the towns ate heavy/solid balance meal with soups to go along. The table showed that dinner meals of all the towns depends on desire which ranged from light – medium – solid food i. e. pap/cooked rice – semolina/semolina/spaghetti – eba/pounded yam/ amala with fish or meat stew/soup and vegetable/drawl soup to go with it.

The importance of consuming healthy (balanced) diet for preschool age children to enhance their normal growth and development to prevent variety of nutrition related health problem cannot be under estimated. This has to be achieved with proper and scientific based nutrition education both at home and in the school at early age to have a positive impact on their nutritional knowledge and eating habits (Yardimci et al., 2015).

Results shows that majority (85 %) of the respondents had access to 3 square meals within the recall 24 hours food intake while 15 % of them do take at least 2 square meals within that period. However, their two meals taken were more than a portion/size for a child. The study result shows that only 46 % of the respondents do eat their meal with their families/parents. Others complement their food intake with their relatives, families' friends and cafeterias/food vendors. These groups were able to do this because they are in school which gives them access to these avenues to complement their family table menu. The table (Table 2) shows that their breakfast, lunch and dinner time ranged from 7.00 – 8.30 am; 2.00 – 3.30 pm and 6.45 – 8.30 pm, respectively. This time is typical meal time in Nigeria especially in the south-west of the country. The table revealed that their regular meals are taken with stew/soup and fish/meat/egg/soya meat analog to go with it. These show that their meals per meal time are rich in carbohydrates, proteins, fats/oils, dairy and poultry products and legumes plants. All the households/families for this study shows typical pattern of meals intake in southern part of the country.

Survey of fruits accessibilities within the last 24-hr recall meals

Table 3 showed that majority (65 %) of the respondents did not have access or taken fruits during the last 24 hours while 59 (24 %) of the households do have access or taken fruits during this period. However, 11 % had access to fruits in between meals once during the last 24 hours. Table 3shows the types of fruits taken during the last 24 hours. One hundred and seventy seven (72 %) household per family did not have access to or taken snacks between meals during this period while 28 5 that is 68 families of the study sample have access to or taken snacks between meals during this period. The table showed that most snacks taken during this period was wheat based snacks with few exceptions who took fruits (groundnut/tigernut/cashew fruit) as snacks. Table 3 showed that 226 (92 %) of the respondents do had or taken part in exercise during the last 24 hours while 19 (8 %) did not do any kind of exercise during this period. Nature wisdom is unquestionable. All the respondents do have access to fruits at least once in 24-hr recall period. According to Table 3, they have access to pawpaw, carrot, tigernut, coconut, groundnut, orange etc during this period.

Presence of fruits and vegetables may provide them with high quality vitamins, minerals, enzymes that will aids and fights for the children health and probably energy derives from the sweetness of the fruits which is a source of carbohydrate. Children's health is favourable conditions with daily intake/eating of fruits.

Table 2: 24-hr Recall nutrients intake within the last 24-hr

Responses	Period / Time	Alabata Town	Iroko Town	Sasa Town	Moniya Town	Orogun Town
Do you have access to 3-square meal during the last 24-hr	Yes 209 (85) No 036 (15)	48 (1.59) 08 (3.26)	27 (11.02) 05 (2.04)	57 (23.26) 10 (23.26)	36 (14.69) 07 (2.86)	41 (16.73) 06 (2.45)
Sources of your meals during the last 24-hr.	**Parents 112 (46)** Relatives 044 (18) Friends Family 027 (11) Cafes/Vendors 62 (25)	**15 (6.12)** 08 (3.26) 05 (2.04) 10 (4.08)	**20 (8.16)** 10 (4.08) 09 (3.67) 21 (8.57)	**18 (7.34)** 11 (4.49) 03 (1.22) 06 (2.45)	**31 (12.65)** 08 (3.26) 06 (2.45) 17 (6.94)	**28 (11.42)** 07 (2.86) 04 (1.63) 08 (3.26)
Meal time during the last 24-hr	**Breakfast** Lunch Dinner	**7.00–8.30 am** 2.30–3.30 pm 7.30–8.30 pm	**8.00–8.30 am** 2.30–3.30 pm 7.00–8.00 pm	**7.00–8.00 am** 2.00–3.30 pm 6.45–8.00 pm	**7.30–8.30 am** 2.00–3.00 pm 7.30–8.30 pm	**7.00–8.00 am** 2.30–3.30 pm 7.30–8.00 pm
24-hr Breakfast meal recall	**Breakfast** (7.30 – 8.30 am)	**Ewa, gari, moin-moin,** cooked rice pap, rices, fish stew.	**Boiled yam,** boiled rice, semo-vita, fish stew, jollofrice.	**Amala, eba, tuwo** cooked rice, fish soup, cooked beans.	**Tuwo, ogi,** boiled yam, cooked beans, stew.	**Moinmoin, ogi,** boiled rice, tuwo, porridge, fish soup.
24-hr Lunch meal recall	**Lunch** (2.30 – 3.30 pm)	**Rice, amala,** fufu, semolina, drawl-soup, fish or meat soup.	**Eba, amala,** pounded yam, draw-soup, fish or meat soup.	**Cooked rice,** tuwo, amala, semovita, fish or meat soup.	**Eba, amala,** semovita, yam porridge fish or meat soup.	**Jollofrice,** fried, rice, amala, semovita, fish or meat soup.
24-hr Dinner meal recall	**Dinner** (6.45 – 8.30 pm)	**Pap, eba,** yam, porridge, amala, draw-soup, fish or meat soup	**Semovita,** pounded yam, amala, okro soup, fish soup	**Eba, tuwo,** tuwo-rice, cooked rice, stew, meat of fish soup.	**Cooked rice,** spag, amala macaroni, stew, soup.	**Pap, Eba,** porridge, semo-vita, meat or fish soup.

Source: Field survey, 2023

Table 3: Survey of fruits accessibilities within last 24-hr recall meals

Responses	Variables (n / %)	Alabata (n / %)	Iroko (n / %)	Sasa (n / %)	Moniya (n / %)	Orogun (n / %)
Do you have access/taken to fruits during the last 24-hr.	Yes 059 (24) No 160 (65) In-between meal 026 (11)	12 (4.90) 28 (11.42) 04 (1.63)	11 (4.49) 21 (8.57) 03 (1.22)	13 (4.08) 39 (5.30) 08 (3.26)	12 (4.90) 34 (13.88) 05 (2.04)	11 (4.49) 38 (15.51) 06 (2.45)
Fruits taken before or after within last 24-hr	**Fruits**	**Pawpaw,** groundnut, tigernut	**Carrot,** orange, groundnut	**Tigernut,** groundnut, orange	**Coconut,** orange, carrot	**Pawpaw,** orange, tigernut, carrot
Access to snacks between meals during the last 24-hr.	**Yes 068 (28)** No 177 (72)	**17 (6.94)** 41 (16.73)	**06 (2.45)** 54 (22.04)	**21 (8.57)** 18 (7.34)	**10 (4.08)** 28 (11.42)	**14 (5.71)** 36 (14.69)
Snacks taken within last 24-hr	**Snacks**	**Chinchin,** puffpuff, groundnut	**Eggbuns,** buns, chinchin	**Buns,** puffpuff, chinchin	**Puffpuff,** chinchin, buns	**Groundnut,** chinchin, meatpie
Exercise during the last 24-hr.	**Yes 226 (92)** No 019 (8) With-who	**48 (19.59)** 04 (1.63) At school	**41 (16.73)** 03 (1.22) At school	**54 (22.04)** 05 (2.04) At school	**41 (16.73)** 04 (1.63) At school	**42 (17.14)** 03 (1.22) At school

Source: Field survey, 2023.

Snacks are important because of nutrients they provide; ideally snacks should provide proteins, carbohydrate, calories, vitamins, minerals and fibre. A few of the respondents have access to or taken snacks during the period under reviewed. These groups are those living in the rural and semi-urban areas, respectively. Most of their common snacks taken during this period are chin chins, buns, puff-puffs, groundnuts, tigernut while very few of them have access to or taken meat-pies within the last 24-hr in question. Anton-Paduraru et al. (2018) reported that consuming snacks in addition to 3 square meals provides children with calories and nutrients in adequate portion, daily. Exercise on the other hand, is an important part of healthy lifestyle by strengthens one's heart and blood circulation, increase food digestion, assimilation and usage for the body. It also make one's feel happier, healthy, more relaxed, improve mood and sleeping quality as well as reduces stress and depression. Table 3 shows that majority (92 %) of the respondents did exercise during this period under reviews but not at home rather in their various schools. The shows important of schooling in early childhood grow. The results of Despotović et al. (2013) pointed out the important of exercise in preschool aged children with the presence of the excessive body mass during the enrolment in the first grade of primary school as well as considerable of excessive body mass and obesity in this group of children which reduces considerably as result of exercise in the school.

Mean age and weight-height of the preschool children compared with WHO/FDN (21014) reference standard
Table 4 shows the mean age and weight of the preschool children of the study areas. Statistical differences were not observed within the rural, semi-rural and urban area within each age group observed. Age group 1 – 2 years of age had the least mean weight of 12.35 – 12.80 kg, followed by 13.87 – 15.23 kg; 16.69 – 17.19 kg and 17.03 – 18.56 kg for 2 – 3 years of age, 3 – 4 years of age and 4 – 5 years of age, respectively.. in term of mean height, same trends of mean weight was observed with age group 1 – 2 years of age having the least mean height of 81.27 – 87.02 cm; 88.87 – 93.55 cm (2 – 3 years of age), 101.23 – 103.46 cm (3 – 4 years of age) and 106.56 – 110.19 cm (4 – 5 years of age), respectively. The table showed that there were significant differences at alpha $p<0.05$ between rural, semi-rural and urban areas study in term of mean weight (kg) and height (cm) attained across all the age group. Tables 7 shows the age and mean weight-height of the preschool aged children in rural, semi-urban and urban areas of the study area compared with FDN (2014). The table shows that aged group 1 – 2 and 3 – 4 years of age had more weight than that of FDN (2014) reference standard (12.20 and 16.30, respectively) for this aged group while some in aged group 2 – 3 and 4 – 5 years of age weight fall below the reference standard of 14.30 and 17.90, respectively. The table also shows that the mean weight of the preschool aged children in semi-urban and urban areas and FDN (2014) reference standard were better than those in rural area of the study area especially in aged group 4 – 5 years of age. Same trends were observed in term of height of the preschool aged children of semi-urban, urban and reference standard compared to rural area preschool aged children. Aged group 2 – 3 years of age fall below the reference standard (95.10 cm) with the rural area preschool aged children of same group far lower (88.87 cm) than the reference standard. The table revealed that all the aged groups in urban area preschool aged children were higher than the reference standard.

This indicates that the preschool aged children were in urban area more exposed to adequate and healthy food than their counterpart in rural and semi-rural areas of the study area. This result agreed with the work of Ilo et al. (2014) and Nikolic (2013). They all reported that when comparing between urban and rural area preschool aged children, the children in urban areas have higher weight and height than those of their rural counterpart. They argued that this may be due to low socio-economic background of these children education, occupation and economic status of their parents which accounts for the differences. Moreover, rural area preschool aged children are more prone to intestinal parasites and nutritional diseases than their counterpart in urban areas. In term of basal metabolic index (BMI) which s also known as Quetelet index (Ihin et al., 2018) is a value derived in kg/m^2 from weight and height of an individual. The average body weight and height in this study for each aged group as well as their corresponding BMI values shows that age group 1 – 2; 2 – 3; 3 – 4 years of age were within normal weight except aged group 1 – 2 and 2 – 3 years of age in rural areas that are on the borderling of excessive body weight (tissues and fats). Among the aged group 4 – 5 years of age about 40.63 % of them especially in rural area fall below normal weight which mean that they are under weight. This result agreed with the work of Cuong et al. (2023) and Panova et al. (2015). BMI result gives and insight into the nutritional status and health risk of preschool aged children of rural area compared with the rural and urban areas of the study area.

Table 4: Age and mean weight-height of the preschool children compared with WHO/NCHS standard

Variables (Mean)	Group/ Mean	Frequency (n)	Mean weight of Rural Area		Mean weight of Semi-Urban	Mean weight of Urban Area		FDN Ref. Standard
			Alabata	Iroko	Sasa	Moniya	Orogun	
Age (yrs)	**01 – 02**	**039**	**16**		**07**	**16**		
	02 – 03	054	22		10	22		NA
	03 – 04	067	27		13	27		
	04 – 05	086	34		18	34		
Weight (kg)	**01 – 02**	**030**	**12.35 ± 0.23^a**		**12.41 ± 0.18^{ab}**	**12.80 ± 0.22^b**		**12.20 ± 0.00^a**
	02 – 03	066	13.87 ± 0.20^a		14.19 ± 0.11^{ab}	15.23 ± 0.13^c		14.30 ± 0.00^b
	03 – 04	054	16.69 ± 0.13^{ab}		16.88 ± 0.10^b	17.19 ± 0.15^{bc}		16.30 ± 0.00^a
	04 – 05	096	17.03 ± 0.08^a		18.05 ± 0.15^c	18.56 ± 0.09^d		17.90 ± 0.00^b
Height (m)	**01 – 02**	**051**	**81.27 ± 0.21^a**		**85.33 ± 0.03^b**	**87.02 ± 0.09^c**		**86.20 ± 0.00^{bc}**
	02 – 03	059	88.87 ± 0.09^a		92.41 ± 0.12^b	$93.55 \pm 0.1bc$		95.10 ± 0.00^c
	03 – 04	064	101.23 ± 0.14^a		102.15 ± 0.15^{ab}	103.46 ± 0.07^b		102.90 ± 0.00^{ab}
	04 – 05	072	107.56 ± 0.12^a		107.56 ± 0.06^a	110.19 ± 0.11^b		109.20 ± 0.00^{ab}
BMI (kg/m^2)	**01 – 02**	**030**	**18.82 ± 0.13^a**		**17.17 ± 0.11^{ab}**	**16.91 ± 0.13^b**		**16.50 ± 0.00^a**
	02 – 03	066	17.51 ± 0.12^a		16.76 ± 0.05^{ab}	17.24 ± 0.08^c		15.85 ± 0.00^b
	03 – 04	054	16.36 ± 0.08^{ab}		16.22 ± 0.11^b	15.89 ± 0.11^{bc}		15.36 ± 0.00^a
	04 – 05	096	14.84 ± 0.03^a		15.77 ± 0.10^c	15.34 ± 0.04^d		15.07 ± 0.00^b

All values are expressed as means ± SD of 3 replicate determinations while values with different superscript within the same row are significantly different @ p<0.05. SD: Standard deviation; BMI: Basal metabolic index; WHO: World health organization; FDN: Food and nutrition.

t-test correlation of mean weight-height and BMI of the preschool children based on their geographical location

Table 5 showed that the t-test correlation of mean weight, height and BMI among the study (rural, semi-urban and urban) area preschool aged children on their geographical location. In term of weight, rural area had a mean score of 14.99 with standard deviation of 0.32; semi-urban area had 15.38 with 0.19 standard deviation while urban area had mean score of 15.95, respectively. Applying the independent t-test, the value of t-calculated (t_{cal}) for rural area is 6.00 while its critical value (t_{cri}) is 3.18 at alpha 0.05. Likewise, the value of t- calculated (t_{cal}) for semi-urban area is 6.00 while its critical value (t_{cri}) is 3.18. The value of both t_{cal} is greater than their correspondent t_{cri} hence the null hypothesis was accepted for both areas and their alternative hypothesis rejected. Likewise, in term of height rural area had a mean score of 94.73 with 0.96 standard deviation while semi-urban area had mean score of 96.86 with 0.38 standard deviation, respectively. Using independent t-test to determine their correlation with urban area, t-calculated (t_{cal}) is 11.93 while its critical value (t_{cri}) is 3.18 at p<0.05. The value of t-calculated (t_{cal}) for semi-urban area is 8.90 while its correspondent critical value (t_{cri}) is 3.18. This result revealed that the values of both t-calculated (t_{cal}) are greater than its correspondent critical value (t_{cri}) hence, the null hypothesis was accepted for both areas and their alternative hypothesis rejected. In term of BMI rural area had a mean score of 16.88 with 0.63 standard deviation while semi-urban area had mean score of 16.48 with 0.13 standard deviation, respectively. Using independent t-test to determine their correlation with urban area, t-calculated (t_{cal}) for rural area is – 0.25 while its critical value (t_{cri}) is 3.18 at p<0.05. The value of t-calculated (t_{cal}) for semi-urban area is – 2.44 while its correspondent critical value (t_{cri}) is 3.18. This result revealed that the values of both t-calculated (t_{cal})for rural and semi-urban areas are lower than its correspondent critical value (t_{cri}) hence, the null hypothesis was rejected for both areas and their alternative hypothesis accepted.

Table 5: t-test correlation of mean weight and height of the preschool children based on geographical location

Variables (Mean)	Group	N	X	SD	Df	t-cal	t-cri	t_{cal} vs t_{cri}	Decision (p<0.05)
Weight (kg)	**Rural Area**	**4**	**14.99**	**0.32**	**3**	**6.00**	**3.18**	**6.00>3.18**	**Sig. difference**
	Semi-urban	4	15.38	**0.19**	3	6.00	3.18		Sig. difference
	Urban Area	4	15.95						
Height (cm)	**Rural Area**	**4**	**94.73**	**0.96**	**3**	**11.93**	**3.18**	**11.93>3.18**	**Sig. difference**
	Semi-urban	4	96.86	0.38	3	**8.90**	3.18		Sig. difference
	Urban Area	4	98.56						
BMI (kg/m^2)	**Rural Area**	**4**	**16.88**	**0.63**	**3**	**- 0.25**	**3.18**	**-2.09<3.18**	**Not Sig. difference**
	Semi-urban	4	16.48	**0.13**	3	**- 2.44**	3.18		Not Sig. difference
	Urban Area	4	16.35	**0.35**	3	**0.60**	3.18		Not Sig. difference

All values are expressed as means ± SD of 3 replicate determinations while values with different superscript within the same row are significantly different @ p<0.05. SD: Standard deviation; BMI: Basal metabolic index; X: Mean; Df: Degree of freedom.

Hypothesis I

Hypothesis I stated that there is no significant difference between nutritional statuses of preschool aged children in Akinyele local government area in term of height and those of children in FDN (2014). The result revealed that there is significant differences (p<0.05) between the two variables tested. The preschool aged children in urban area have higher height ration compared with their counterpart in rural and semi-urban area of the study area. The study revealed that most couples (families) in the urban area of the study locations are nucleus families with less than four children per family. This may have contributed to their ability and capability to give their children healthy foods which invariably leads to weight and height gain by their children compared to reference standard and rural area preschool aged children. It may also be deduced that education/elites status of people living in urban area which according to Wieczorek et al. (2018) and Adesemowo and Adenuga (2018) who early noted that educated (elite) parents who have been exposed to series of information about healthy foods were more concerned about their children food intake than the uneducated one's. The work of Ilo et al. (2014) and Nikolic (2013) were in line with the results of this study.

Hypothesis II

Hypothesis II stated that there is no correlation relationship between the BMI levels of preschool aged children in Akinyele local government area compared with those in rural, semi-urban and urban areas and the reference standard. The hypothesis result shows that there is no significant differences (p<0.05) in all the respondents observed compared with the reference standard except aged group 4 – 5 years of age where about 40.63 % are underweight

according to BMI derived from FDN (2014) and WHO (2006) reference standard used. The hypothesis showed that body tissue, fat and bone may not directly linked with healthy food intake according to BMI results obtained in this study. This result corroborate with the work of Ihim et al. (2018) and Nikolic, 2013who posits that BMI could not give accurate anthropometric figure of an individual except when used with other anthropometric measurement. Furthermore, the finding on BMI correlational study between the preschool aged children in urban area and their counterpart in rural and semi-urban areas revealed that there was no statistical differences (p<0.05) except in aged group 4 – 5 years of age. This implies that location of preschool aged children may not have bearing on their BMI status simply because preschool aged children in the rural and semi-urban areas may be consuming heavy starch or carbohydrate foods which may translate to body mass tissue and fats which BMI usually determined.

Conclusion

In conclusion, the shows that preschool aged children healthy eating habits could be shaped during this formative age years which will go on to impart their adult behaviour nutrition wise. This will have pronounced effect in preventing various likely nutritional diseases as they are growing and increase their immunity against outbreak of diseases. The study revealed that preschool aged children learn how to eat healthy foods and make right choices with the help of their parents and at schools. Preschool aged children in urban area are more exposed to healthy food eating habits than their counterpart in rural and semi-urban areas because of their parental socio-economic and education status which lead to giving more care to their children than those in the rural and semi-urban

areas of the study locations. Based on the study derived BMI results for preschool aged children using reference standards of FDN for height and weight as follows: a BMI from 15.0 - 16.9 kg/m^2 indicate normal weight; a BMI lower than 15.0 kg/m^2 while a BMI number from 17.0 – 19.9 kg/m^2 indicate overweight and a BMI number from 20.0 upward suggests the person is obese. The study results shows that BMI did not give adequate anthropometric result when use singly where the BMI of urban, semi-urban and rural areas shows no significant differences at alpha $p<0.05$. This result is opposite of mean weight and height of the same study areas where there is a significant difference ($p<0.05$) between the urban, semi-urban and rural areas preschool aged children observed and determined. The study shows that education status of their parents and nutrition education plays a vital role in their formative age years which can leads to adopting a healthy food lifestyle. In addition, nutrition education have shown to instruct preschool aged children on how to adopt an adequate and balanced diet, eliminate unhealthy eating habits, use food resources economically by improving with nutrition conditions and preserve the well being of the body. The results of this study show the status of preschool aged children nutrition in the study area and the needs to improve their nutritional status and household practices that may help their formative year's growth and development. Significantly, the findings from this study could provide baseline information on the level of malnutrition in Akinyele Local Government Area, Oyo State.

Recommendations

Based on study revelations, the following recommendations were made to foster healthy eating habits and lifestyle among preschool aged children as follows:

❖ Nutrition education should be inculcated into preschool aged children syllabus to foster positive attitudes towards healthy eating lifestyle.
❖ Government should development a specific national nutrition (healthy foods) guides/policy for preschool aged children that is easy to understand, adapt and apply by their parents, educators and caregivers especially in the rural and semi-urban areas.
❖ Parents, preschool aged children educators and caregivers to have knowledge of healthy food and provide anticipatory guidance on the importance of healthy feeding and eating practices.
❖ Unhealthy eating habits should be avoided for preschool aged children who affect their

growth (weight and height wise) and increase the risk of intestinal and nutritional diseases.
❖ Preschool aged children should eat various nutritious rich food daily and adequate fruits or snacks between meals.

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