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Nutritional Factors and Academic Performance of Primary School Children in an Urban City in Southern Nigeria

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Abstract
Background: Dietary habits and nutritional status of school children are essential for their growth, cognitive development and subsequent educational achievement. This study assessed the association between nutritional factors and academic performance of primary school children in Benin City. Methods: This cross-sectional study was conducted out among 636 primary school children selected by multistage sampling technique. Pretested, interviewer-administered questionnaire was the data collection tool and anthropometric measurements were taken. Data were analyzed using SPSS statistical package version 22.0 and level of significance was set at p < 0.05. Results: Mean age (± SD) was 8.8 (±2.3) years. Only 241 (37.7%) of the respondents ate the three main meals in the last one week preceding the study. Breakfast was skipped by 267 (41.8%) of the respondents. Majority (90.9%) of them had high dietary diversity (consumed > 6 food groups). Prevalence of stunting, underweight, thinness and overweight/obesity was 16.9%, 10.6%, 24.1% and 8.0%, respectively. Those who skipped breakfast (10.9%) had significantly higher proportion of low academic performance compared with those who did not (7.3%), p<0.001. Those with low dietary diversity score had significantly higher proportion of low academic performance compared with those who had high dietary diversity score (66.7% versus 7.4%), p=0.003. Conclusion: Breakfast skipping and low dietary diversity were significantly associated with poor academic performance of the study population. The government should strengthen its commitment to implementing the school feeding programme in the state and nutrition education of mothers on benefits of not skipping meals especially breakfast should be carried out.

Keywords: Academic Performance, Nutritional Status, Meal Pattern, School Children

INTRODUCTION

Adequate nutrition involves appropriate intake of nutrients which are essential for physical growth, development and good health of children. (Ochola & Masibo, 2014) The adequacy of nutrients in diets eaten is known to be directly related to dietary diversity. (Rathnayake, Madushani & Silva, 2012, Sealey-Potts & Potts, 2014) Dietary diversity which involves eating a variety of foods across and within food groups has long been recognized as a

key element of high-quality diets. (Sealey-Potts & Potts, 2014) Consuming foods from different groups improves nutrient adequacy and reduces the chance of a deficiency or excess of a single nutrient thus promotes good nutritional and health status. (Sealey-Potts & Potts, 2014) Nutrient-rich foods from diverse diets are important elements in child feeding and is essential for promoting their nutritional status. (Alamu, Gondwe, Eyinla & Maziya-Dixon, 2019) In Sub-Saharan African countries including Nigeria, diets of school children are predominantly based on starchy foods with little or no animal products and few fresh fruits and vegetables. (Bello, Ekekezie & Afolabi, 2016, Ndukwu, 2014) Unhealthy eating habits including poor dietary diversity, meal skipping (especially breakfast), poor intake of fruits and vegetables as well as snacking on foods of low nutritive values contribute significantly to malnutrition among primary school children. (Abiba, Naa, Grace & Kubreziga, 2012)

It is estimated that almost one-third of children in developing countries are malnourished. (Food and Agriculture Organization, 2014) In Nigeria, several studies have reported the high burden of malnutrition among primary school children, including undernutrition (underweight, stunting, thinness) (Bello, Ekekezie & Afolabi, 2016, Ndukwu, 2014, Asiegbu et al., 2017, Ene-Obong et al., 2012, Adedeji et al, 2018) and over-nutrition (overweight obesity). (Bello, Ekekezie & Afolabi, 2016, Asiegbu et al., 2017, Ene-Obong et al., 2012, Adedeji et al, 2018) Breakfast plays a critical role in energy balance and dietary regulation and it is important in meeting the day's nutritional needs. (Nicklas et al., 1993) Evidence from systematic reviews from studies among children and adolescents has shown that eating breakfast is associated with a reduced risk of becoming overweight or obese and a reduction in body mass index (BMI). (Szajewska & Ruszczyński, 2010, de la Hunty et al., 2013) Breakfast meals contribute to improving cognition among school age children, (Wesnes, Pincock & Scholey, 2012) in addition to improvements in tasks regarding memory function. (Wesnes, Pincock & Scholey, 2012, Wesnes et al., 2003) Consumption of fruits is associated with better diet quality and decreased risk of obesity in children. (O'Neil1, Nicklas TA & Fulgoni, 2015) A healthy, balanced diet not only determines the health status of a child (Praveen Kulkarni et al., 2014) but can improve brain capacity, maximize cognitive capabilities and improve academic performance in school age children. (Rausch, 2013) Nutritional status of school aged children imparts their health, cognition and subsequently their educational achievement. (Best, 2010)

Though studies have shown that it is more difficult for children to learn without adequate food and nutrition, about 66 million primary school-age children go to school hungry across the developing world, with 23 million in Africa alone. (World Bank, 2012) The nutritional and health benefits of school feeding programmes in terms of improvements in weight, height, school attendance, mathematics performance and improved concentration among school children have been reported. (Yendaw & Dayour, 2015, Jomaa et al., 2011) Consequently, school-feeding programmes have been established and implemented by governments across the globe to address hunger and its negative effect on the nutritional status and learning capacity of school-age children. (Drake et al., 2016) In Nigeria, the National Home Grown School Feeding Programme (NHGSFP) was launched in 2016 by the present (Buhari) administration and it aimed to curb hunger and malnutrition by feeding 5.5 million school pupils one meal a day for all public primary schools annually. (Federal Government of Nigeria, 2017) As at 2017, it was reported that 300 million meals have been served to more than 7.5 million pupils in 46,000 Public Primary Schools in 22 states. (Federal Government of Nigeria, 2017)

There is a dearth of research on the association between nutritional factors and academic performance of school children in the study area. Therefore, this study was carried out to assess the association between nutritional factors (breakfast skipping, dietary diversity and nutritional status) and academic performance of primary school children in Benin City. Findings from this study will provide baseline data with a view to making recommendations to appropriate authorities. Results from this study will also be used to evaluate the impact of the school feeding programme on the nutritional status and academic performance of primary school children in Benin City when fully implemented in the State.

METHODOLOGY

This school-based descriptive cross-sectional study was carried out between February and May 2018 in Benin City, the capital of Edo State, located in the South-South geopolitical zone of Nigeria. Benin City with a total population of 1,309,830 is made up of three (3) Local Government Areas (LGAs) namely, Egor, Oredo, and Ikpoba-Okha. These LGAs are made up of more than 90% urban areas. There are 505 registered primary schools

(262 public and 243 private) in Benin City. The study population included pupils in public and private primary schools in Benin City. All enrolled school aged children between the ages of 6-12 years present on the day of the study were eligible to participate in the study while those who were too ill were excluded. A minimum sample size of 610 was calculated using the Cochrane formula used for descriptive studies, (Cochrane, 1977) assuming a prevalence rate of 72.7% of regular consumption of breakfast among primary school children in a Ghanaian study (Intiful & Lartey, 2014) with a design effect of 2. However, 639 pupils participated in the study.

Multi-stage sampling technique involving four (4) stages was used for selecting participants. In the first stage, simple random sampling technique by balloting was used to select two (Egor and Oredo) out of the three LGAs in Benin City. In the second stage, two wards each were selected from the selected LGAs by simple random sampling technique (balloting). Ugbowo and Uselu-1 were selected from Egor LGA and Iyaro and Ikpema were selected from Oredo LGA. In the third stage, one public and one private primary school were selected from each of the selected wards using simple random sampling technique by computer generated random numbers, giving a total of eight schools (four public and four private). The fourth stage comprised selection of the pupils (participants). The total number of pupils to be selected in each school was determined by proportional to size allocation. Thereafter, in each school, participants were selected from each class arm by simple random sampling using the class attendance register for the day as the sampling frame.

The data collection tool was a structured pretested interviewer-administered questionnaire. Six research assistants who were 500 level medical students of the University of Benin were trained for two days on how to administer the questionnaire. The questionnaire was pretested among primary school pupils in Ovia North-east LGA (another LGA which was not part of the main study) and necessary amendment made before commencement of the actual study. The questionnaire sought information on the sociodemographic characteristics, meal pattern, dietary diversity, anthropometric measurement and academic performance of the participants.

Meal pattern was assessed by asking about frequency of eating breakfast, lunch, dinner as well as consumption of snacks and sugar sweetened beverages in the last one week preceding the study. Dietary diversity was determined by using 24-hour dietary intake recall. The pupils were asked to recall all foods items and beverages consumed both within and outside the home in the previous 24 hours prior to the interview. The ingredients used in preparation of mixed dishes were also noted. The food items were categorized into 12 food groups based on the Food and Agricultural Organization (FAO) guidelines for measuring individual dietary diversity. (Food and Agricultural Organization, 2011) The food groups included: Cereal, Vegetables, White tubers/roots, Fruits, Meat (flesh/organ meat), Eggs, Fish, Legumes/nuts/seeds, Milk/milk products, Oil & fats, Sweets and Beverages. Locally available foods consumed by the pupils were identified and incorporated into the appropriate food groups. Each food group was assigned a score of one and the dietary diversity scores (DDS) for participants were calculated by summing the number of food groups consumed by each respondent over the 24-hour recall period. The scores were then categorized as follows: High ($\geq$ 6 food groups), Medium (4-5 food groups) and Low ($\leq$ 3 food groups). (Food and Agricultural Organization, 2011)

Anthropometric (weight and height) measurements was carried out following the National Health and Nutrition Examination Survey (NHANES) protocol. (Centre for Disease Control and Prevention, 2011) Nutritional status of the children was determined using the World Health Organization (WHO) Anthro-plus® software to compute the anthropometric indices (weight-for-age, height-for-age and BMI-for-age z scores) of the participants. These indices were compared with z-score values of 2007 WHO growth reference standards for children and adolescents 5-19 years. (World Health Organization, 1999, World Health Organization, 2006) For weight-for-age, z-score values of < -2 was regarded as underweight, while values between -2 and +2 was regarded as normal and < -3 indicated severe wasting. For height-for-age, z-score values of < -2 was regarded as stunted, while values between -2 and +2 was regarded as normal and < -3 indicated severe stunting. For BMI-for-age, z-score values < -2 was regarded as thinness while values between -2 and +2 was regarded as normal. Values > +2 was regarded as overweight, and values > +3 was regarded as obese.

Academic performance of the participants was assessed using the last term's examination average score of two core subjects (Mathematics and English Language). These were graded as high (>75%), average (50-74%) and low (< 50%). (Nduagubam et al., 2017) Socioeconomic class for each child was assessed based on the father's

occupation and mother's educational attainment using a model in a previous study. (Olusanya, Okpere & Ezimokhai, 1985)

Approval was sought from the heads of the selected primary schools. Informed consent and assent were obtained from the parents/guardian and pupils, respectively. Names and addresses of respondents were omitted to ensure confidentiality. They were also informed that they had the right to withdraw from the interview at any time and that withdrawal poses no loss or harm. Data was analysed using IBM SPSS version 21.0 software. Univariate analysis was done to assess the distribution of the variables. Bivariate analysis was done to determine nutritional factors associated with academic performance of participants. Tests of association for categorical variables was done using Chi square test and Fisher's exact test. p-value of less than 0.05 was considered statistically significant.

RESULTS

Six hundred and thirty-nine pupils aged between 6 and 12 years participated in the study. Majority of them 439 (68.7%) fell within the age group 8-9 with mean age (± SD) of 8.8 (2.3) years. A higher proportion were males 338 (52.1%), 131 (20.5%) were in primary 5 and 435 (68.1%) were from household sizes ≤6. Three hundred and forty-one (53.4%) of the respondents were in the public schools and 315 (49.3%) of them belonged to low socio-economic class. **(Table 1)**

Table 1: Demographic and socio-economic characteristics of respondents

Variables	Frequency (n=639)	Percent
Age group (years)		
6-7	58	9.1
8-9	439	68.7
10-12	142	22.2
Sex		
Male	338	52.9
Female	301	47.1
School type		
Private	298	46. 6
Public	341	53.4
Class		
Primary 1	129	20.2
Primary 2	128	20.0
Primary 3	85	13,3
Primary 4	74	11.6
Primary 5	131	20.5
Primary 6	92	14.4
Religion		
Christianity	601	94.1
Islam	38	5.9
Mother's level of education		
Primary	181	28.3
Secondary	324	50.7
Tertiary	134	21.0
Household size		
≤ 6	435	68.1
> 6	204	31.9
Socio-economic status		
Upper	195	30.5
Middle	129	20.2
Lower	315	49.3

Mean age (± SD) = 8.8 (2.3) years

Table 2 shows the meal pattern of the respondents in the last one week preceding the study. Only 241 (37.7%) of the respondents ate the three main meals (breakfast, lunch and dinner) in the last one week preceding the study. Three hundred and seventy-two (58.2%), 356 (55.7%) and 424 (66.4%) of the respondents ate breakfast, lunch

and dinner, respectively every day in the last one week preceding the study. Daily intake of snacks and sweetened beverages was reported by 171 (26.8%) and 82 (12.8%) of the respondents, respectively.

Table 2: Meal pattern of respondents in the last one week

Variables	Frequency (n=639)	Percent
Three main meals in the last week		
Yes	241	37.7
No	398	63.3
Breakfast intake/week		
Daily	372	58.2
Sometimes	230	36.0
Never	37	5.8
Lunch intake/week		
Daily	356	55.7
Sometimes	276	43.2
Never	7	1.1
Dinner intake/week		
Daily	424	66.4
Sometimes	208	32.5
Never	7	1.1
Snack intake/week		
Daily	171	26.8
Sometimes	434	67.9
Never	34	5.3
Sweetened beverage intake/week		
Daily	82	12.8
Sometimes	479	75.0
Never	78	12.2

Food groups consumed in the last 24 hours by the respondents included oils and fats 639 (100%), cereals 567 (88.7%), beverages 561 (87.8%), fish 482 (75.4%), milk and milk products 480 (75.1%), and dark green vegetables 480 (75.1%). Majority of the respondents 581 (90.9%) had high dietary diversity (consumed ≥ 6 food groups) while 55 (8.6%) and 3 (0.5%) had medium (consumed 4-5 food groups) and low dietary diversity (consumed ≤ 3 food groups), respectively. **(Table 3)** One hundred and eight (16.9%) of the respondents were stunted, 68 (10.6%) were underweight while 154 (24.1%) and 51 (8.0%) were thin and overweight/obese, respectively. **(Table 4)**

Table 3: Food groups eaten by respondents (24 hours recall)

Variables	Frequency (n=639)	Percent
Food groups*		
Oils and fats	639	100.0
Cereals	567	88.7
Beverages	561	87.8
Fish/other sea foods	482	75.4
Milk and milk products	480	75.1
Vegetables	480	75.1
Sweets	478	74.8
White tubers and root	451	70.6
Fruits (Vitamin A rich fruits/other fruits	450	70.4
Meat (Flesh and organ meat)	411	64.3
Legumes nuts and seeds	379	59.3
Eggs	378	59.2
Dietary Diversity Scoring		
High	581	90.9
Medium	55	8.6
Low	3	0.5

*Multiple responses

Table 4: Nutritional status of respondents

Variables	Frequency (n=639)	Percent
Height-for-age		
Stunted	108	16.9
Normal	531	83.1
Weight-for-age		
Underweight	68	10.6
Normal	571	89.4
BMI-for-age		
Thin	154	24.1
Normal	434	67.9
Overweight/Obese	51	8.0

Those aged 10-12 years 40 (28.2%) had the highest prevalence of thinness compared to those who were 8-9 years 101 (23.0%) and 6-7 years 13 (22.4%) but this was not statistically significant, (p=0.100). Females had the highest proportion of thinness and overweight/obesity compared with the males (26.4% versus 21.3% and 10.3% and 8.6%, respectively) but this was not statistically significant, (p=0.186). Thinness was significantly higher among those in the public schools 98 (28.7%) than private schools 56 (18.8%) while overweight/obesity was higher among those in the private schools 35 (11.7%) than public schools 16 (4.7%), p<0.001. Thinness was higher among those in the primary 4-6, 75 (25.3%) than those in primary 1-3 79 (23.1%) while overweight/obesity was higher among those in primary 1-3, 28 (8.2%) than those in primary 4-6, 23 (7.7%), but association was not statistically significant, p=0.813. Thinness was significantly highest among those whose mothers had primary education 66 (36.5%) while overweight/obesity was highest among those whose mothers had tertiary education 16 (11.9%), p<0.001. Overweight/Obesity was highest among those from household size ≤ 6 than those from household size > 6, (9.0% versus 5.9%) but the association was not statistically significantly, p=0.406. Those in the lower socio-economic class had a significantly higher proportion of thinness than those in the upper socio-economic class (28.9 versus 14.4%), p<0.001. Conversely, those in the upper socio-economic class had a significantly higher proportion of overweight/obesity than those in the lower socio-economic class (9.2% versus 4.1%), p<0.001. **(Table 5)**

For Mathematic, 302 (47.3%) of the respondents had high scores while 246 (38.5%) and 91 (14.2%) had average and low scores, respectively. For English language, 296 (46.3%) of the respondents had high score while 299 (46.8%) and 44 (6.9%) had average and low scores, respectively. Overall, 276 (43.2%) of the respondents had high academic performance while 307 (48.0%) and 56 (8.8%) had average and low academic performance, respectively. **(Table 6)** The association between selected nutritional factors and overall academic performance of the participants is shown in **Table 7**. Those who did not skip breakfast 234 (62.9%) had a significantly higher proportion of high academic performance compared to those who skipped breakfast 42 (15.7%) daily in the last one week preceding the study, p<0.001. Conversely, those who skipped breakfast 29 (10.9%) had a significantly higher proportion of low academic performance compared with those who did not skip breakfast 27 (7.3%) daily in the last one week preceding the study, p<0.001. Those with high dietary diversity score 255 (43.9%) had the highest proportion of overall high academic performance while those with low dietary diversity score 2 (66.7%) had the highest proportion of overall low academic performance, p=0.003. Those who were thin had a higher proportion of low academic performance compared with those who were overweight/obese (7.8% versus 2.0%), but the association was not statistically significant, p=0.422

DISCUSSION

The study described the meal pattern, dietary diversity and nutritional status of primary school children in Benin City and their association with the academic performance of the study population. Only a little over one-third of the study population ate all three main meals (breakfast, lunch and dinner) in the last one week preceding the study indicating that meal skipping is prevalent among them. This is worrisome more so that about two-fifth of the study population reported skipping breakfast which is considered the most important meal of the day. [27] This is similar to what has been reported in other studies. (Ndukwu, 2014, Olusanya, 2010, Amini et al., 2014) Adequate breakfast consumption by school children ensures they meet their daily nutrient and energy intakes. A study in Ghana reported that breakfast meal contributed between 32-41% of the day's energy intake and 30-47% of micronutrient intake. (Intiful & Lartey, 2014)

Table 5: Sociodemographic characteristics and nutritional status (BMI-for-age) of respondents

Variables	Nutritional Status (BMI-for-age)			Test statistics	p-value
	Thin (n=154) n (%)	Normal (n=434) n (%)	Overweight (n=51) n (%)		
Age group (years)					
6-7	13 (22.4)	45 (77.6)	0 (0.0)		
8-9	101 (23.0)	300 (68.3)	38 (11.7)		
10-12	40 (28.2)	89 (62.7)	13 (9.1)	χ^2=7.770	0.100
Sex					
Male	72 (21.3)	237 (70.1)	29 (8.6)		
Female	82 (26.4)	197 (63.3)	32 (10.3)	χ^2=3.366	0.186
School type					
Private	56 (18.8)	207 (69.5)	35 (11.7)		
Public	98 (28.7)	227 (66.6)	16 (4.7)	χ^2=16.636	<0.001*
Class					
Primary 1-3	79 (23.1)	235 (68.7)	28 (8.2)		
Primary 4-6	75 (25.3)	199 (67.0)	23 (7.7)	χ^2=0.413	0.813*
Mother's education					
Primary	66 (36.5)	99 (54.7)	16 (8.8)		
Secondary	67 (20.7)	238 (73.4)	19 (5.9)		
Tertiary	21 (15.7)	97 (72.4)	16 (11.9)	χ^2=33.362	<0.001*
Household size					
≤ 6	104 (23.9)	292 (67.1)	39 (9.0)		
> 6	50 (24.5)	142 (69.6)	12 (5.9)	χ^2=1.801	0.406
Socio-economic class					
Upper	28 (14.4)	149 (76.4)	18 (9.2)		
Middle	35 (27.1)	74 (57.4)	20 (15.5)		
Lower	91 (28.9)	211 (67.0)	13 (4.1)	χ^2=30.785	<0.001*

*Statistically Significant

Table 6: Academic performance of respondents

Variables	Frequency (n=639)	Percent
Mathematic score		
High	302	47.3
Average	246	38.5
Low	91	14.2
English Language score		
High	296	46.3
Average	299	46.8
Low	44	6.9
Overall academic performance		
High	276	43.2
Average	307	48.0
Low	56	8.8

Table 7: Association between nutritional factors and overall academic performance of respondents

Variables	Overall academic performance			Test statistics	p-value
	High (n=276) n (%)	Average (n=307) n (%)	Low (n=56) n (%)		
Breakfast Skipping					
Yes	42 (15.7)	196 (73.4)	29 (10.9)		
No	234 (62.9)	111 (29.8)	27 (7.3)	χ^2=143.8	<0.001*
Dietary Diversity Scoring					
Low	0 (0.0)	1 (33.3)	2 (66.7)		
Medium	21 (38.2)	23 (41.8)	11 (20.0)		
High	255 (43.9)	283 (48.7)	43 (7.4)	χ^2=22.945	0.003*^
BMI-for-age					
Thin	68 (44.2)	74 (48.0)	12 (7.8)		
Normal	184 (42.4)	207 (47.7)	43 (9.9)		
Overweight/Obese	24 (47.0)	26 (51.0)	1 (2.0)	χ^2=3.883	0.422

*Statistically Significant ^Fishers

Breakfast skipping could be attributed to mothers' inability to prepare meals before their children go to school, usually because they work outside the home and have to leave for work very early Skipping breakfast affects subsequent meal intakes and overall nutritional and health status of children. (Ndukwu, 2014) Breakfast skipping may interfere with the child's level of attention in class and may have negative implications for the achievement of educational objectives and interfere with school enrolment, attendance and performance. (Ochola & Masibo, 2014, Wesnes et al., 2012) Furthermore, skipping breakfast is associated with risk of becoming overweight or obese (Szajewska & Ruszczyński, 2010, de la Hunty et al., 2013 as well as hypertension, diabetes mellitus and cardio-metabolic diseases. (Monzani et al., 2019, Smith et al., 2010) Majority of the respondents had high dietary diversity scoring with a higher proportion of them consuming more of fats/oils and plant-based diets of cereal, roots and tubers with limited foods of animal source. The high consumption of cereal-based foods is in agreement with similar studies in Nigeria (Alamu et al., 2019, Bello et al., 2016, Ndukwu, 2014, Nnebue et al., 2016, Okafor, Odo & Onodigbo, 2020) and other African countries (Abdul-Razak & Zakari, 2019, Alamgea et al., 2018, Nyathela & Oldewage-Theron, 2017, Grobbelaar, Napier & Oldwage-Theron, 2013) which is a reflection of foods that constitute the major staples in the study area. The implication of this is that these dietary pattern may not meet the up the nutritional needs of these children.

It is worth noting that more than one-third of them did not consume eggs, flesh and organ meat as reported in other studies. (Bello et al., 2016, Ndukwu, 2014, Okafor, Odo & Onodigbo, 2020) A possible explanation could be the cultural belief that foods such as eggs, flesh and organ meat are not meant for children but for the adult members of the households or inability to afford these animal sources of protein which are usually more expensive. Adequate protein of animal sources in the diet of growing children is essential for achieving optimal growth and development. We found the full spectrum of malnutrition (stunting, underweight, thinness and overweight/obesity) in our study which adds to the existing evidence of a coexistence of undernutrition and over-nutrition in school age children in developing countries including Nigeria. (Bello et al., 2016, Asiegbu et al., 2017, Ene-Obong et al., 2012, Nyathela & Oldewage-Theron, 2017) This double burden of malnutrition has been attributed to increasing globalization and westernization resulting in changes in dietary pattern from the traditional towards a western diet coupled with sedentary lifestyle and technological advancement. Undernutrition can inhibit growth and development in school children (Best et al., 2010) while over-nutrition will predispose to overweight and obesity which have been reported to be risk factors for the development several chronic non-communicable conditions later in adulthood. (Hainer & Aldhoon-Hainerova, 2013, Bloom et al., 2011)

Age group, sex and household size were not significantly associated with the nutritional status of the respondents. Attending public schools was significantly associated with higher proportion of thinness while private school attendance was significantly associated with higher proportion of overweight/obesity. This trend has been reported by other studies. (Asiegbu et al., 2017, Adedeji et al., 2018, Akor, Okolo S & Okolo A, 2010, Agbo, Envuladu & Zoakah, 2012, Opara, Ikpeme & Ekanem, 2010) Possibly, the difference in the socioeconomic class of children

attending public and private schools could have accounted for this. Parents who enroll their children in public schools are usually from low socioeconomic class and are more likely to provide monotonous diets due to their low purchasing power while those from the higher social class can afford more nutritious diets in addition to energy-dense sugar sweetened beverages, sweets, etc.

Maternal educational level was also significantly associated with nutritional status of the children. Similar findings have been reported by several studies. (Ndukwu, 2014, Adedeji et al., 2018, Sufiyan, Bashir & Umar, 2012, Senbanjo et al., 2011, Owoaje et al., 2014) Maternal education has been documented to be a significant determinant of healthy practices including healthier food choices as well as good health seeking behavior for their households. Mothers with low education are more likely to be ignorant about adequate dietary practices and they may also be less economically empowered which prevents them for purchasing nutritious foods for their households. In addition, mothers with higher education are likely to be employed and more economically empowered and able to afford more nutritious foods. This is corroborated by the finding in this study that the prevalence of thinness was highest among those in the lower socio-economic class while overweight/obesity was highest among those in the upper socio-economic class. This has also been reported elsewhere. (Asiegbu et al., 2017) It could also be that children in the upper socioeconomic class are likely to be less physically active, for example, they are more likely to ride in a car to school, be engaged in longer television viewing time and indoor games such as video games since their parents can afford these gadgets.

The highest proportion of the children had average academic performance which is similar to a previous study. (Okafor et al., 2020) Breakfast intake was significantly associated with high academic performance of the respondents. (Doku et al., 2013, Acham et al., 2012) Consumption of breakfast meals improves cognition among school age children with potential positive effects on their school performance. (Wesnes, Pincock & Scholey, 2012) Studies have shown that school children who took breakfast had higher mental arithmetic task performance, showed better creative thinking and improvements in tasks regarding memory function. (Wesnes, Pincock & Scholey, 2012, Wesnes et al., 2003) A low dietary diversity was significantly associated with poor academic performance of the respondents as has been reported in another study. (Okafor et al., 2020) Of note is that none of those who had low dietary diversity had excellent academic performance. Eating variety of foods from different food groups ensures that all the essential nutrients required for optimum physical growth and cognitive development of the child is available. Though our study did not find a significant association between nutritional status and academic performance, it is well documented that adequate nutritional status has a positive and direct impact on academic achievement. When children's basic nutritional and fitness needs are met, they have the cognitive energy to learn and achieve. There is evidence that healthy, well-nourished children are more prepared to learn, more likely to attend school and class, and able to take advantage of educational opportunities. (Ochola & Masibo, 2014) The limitations of our study include the fact that the dietary intake information collected from the respondents may have been subject to recall bias. In addition, the study utilized information based on self-report by the respondents which might be subject to under- or over-reporting. Though the method for assessment of academic performance of the school children in this study has been used previously (Nduagubam et al., 2017) variation between individual teachers may have affected the measure.

CONCLUSION

The study revealed that nutritional factors such as breakfast skipping and low dietary diversity were significantly associated with poor academic performance of primary school children in Benin City. We recommend that the government should remain committed to providing the resources need to scaled up and extend the implementation of the National Home Grown School Meal Program (NHSMP) to the state since at the time of this report, the programme has not commenced in the state. This will help to ensure that every child is sure of a breakfast meal on every school day. Nutrition education of mothers and household members on preparing diverse diet from locally available food and benefits of not skipping meals especially breakfast should be carried out. Continuous nutrition education of primary school children so they are made aware of healthy food choices and practices. Female education and economic empowerment programmes should be strengthened and scaled up by the Edo State government.

Conflict of Interest: The authors declare that they have no conflict of interest.

Authors' Contribution:

VOO: Conception/Design of the research; Data interpretation; Drafting the manuscript; Revising the manuscript for intellectual content and Final approval.

EOO: Design of the research; Data collection/analysis, Drafting the manuscript and Final approval

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