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Original Research Article

Nutritional knowledge of in-school adolescents in Sokoto, North-Western Nigeria

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ABSTRACT

Background: Good nutrition knowledge is a modifiable determinant of dietary behaviours and contributes to strengthen the skills and abilities needed to resist the environmental influences leading to poor dietary habits among adolescents. Objectives were to assess the nutrition knowledge of in-school adolescents in Sokoto, Nigeria and associated factors.
Methods: A cross-sectional survey of adolescents selected through multistage random sampling. Data was obtained using pre-tested semi-structured interviewer administered questionnaire. Data was analyzed using IBM® SPSS version 25.
Results: A total of 389 subjects were recruited with a mean age of 15.46±1.67 SD and most of them 231 (59.4%) were females. Most 300 (77.1%) of the participants were Hausa, 350 (90%) were Muslims, 278 (71.5%) were from the senior class, and majority 360 (92.5%) resided in urban areas. A large proportion 312 (80.2%) of the participants had good knowledge about classes of food. Only 40 (10.3%) had good knowledge of energy rich food. Two hundred and ninety-eight (76.6%) and 89 (22.9%) had knowledge on high protein diet and good fat diet respectively. Only 107 (27.5%) had good knowledge on minerals and vitamins that are good for bone development. Majority 317 (81.5%) and 341 (87.7%) of the respondents knew eating balanced diet is important and could prevent diseases, respectively. Age category (p=0.007) was the only factor that predicted nutrition knowledge. The main source of nutrition information of the adolescents was teachers 336 (86.4%).
Conclusions: Respondents had good knowledge of classes of food. There is however, the need to emphasize on teaching adolescents in the study area about specific nutrient providing meals such as energy rich food, good fat, minerals and vitamins.

Keywords: Nutritional knowledge, Adolescents, Sokoto, Nigeria

INTRODUCTION

Nutrition is one of the most important factors influencing the quality of human life. It is the process of taking in food and using it for growth, metabolism, and repair. It consists of six various stages; ingestion, digestion, absorption, transport, assimilation and excretion.[1]

Nutritional knowledge refers to the knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations.[2] Good nutrition knowledge is one of the few modifiable determinants of dietary behaviours and contributes to strengthen the skills

and abilities needed to resist the environmental influences leading to poor dietary habits.[3] Increased nutrition knowledge has been associated with improved dietary habits and lower rates of obesity.[4]

Adolescence is the transition period between childhood and adulthood. Adolescents constitute 16% of the world's population with about 85% of them living in the developing countries.[5] Adolescents generally lack knowledge and awareness about what and when to eat, which food is good for health and even hardly check the hygiene before eating food from outdoors and realize the consequences due to consumption of contaminated food only after ending up with disease conditions such as cholera, typhoid, jaundice, etc.[6] The mechanism by which nutritional knowledge affect dietary behaviours is said to be complex and non-univocal. Food choices and nutritional intake are determined by the awareness of individuals about food and by the self-perception of the importance of balanced meals.[7] nutritional knowledge of adolescents have been reported to vary in different parts of Africa including Nigeria, with 12.5% to 57.1% of them having good nutritional knowledge.[8-11]

It is assumed that good nutritional knowledge will lead to an improvement of the diet by providing individuals the necessary information about choosing healthy foods, preparing and consuming these foods as recommended in dietary guidelines, and on the health consequences of eating unhealthy foods.[7] A study to assess nutrition knowledge of adolescents in the study area was conducted about a decade ago and the population was limited to only those attending public schools. Purposive sampling technique was employed thus increasing the chances of bias.[11]This study sought to assess the current nutrition knowledge of in- school adolescents in the study area, and to identify the gaps in nutrition knowledge as well as associated factors if any. It was hoped that the adolescents would become more knowledgeable and make deliberate efforts to improve their dietary choices as much as possible. The research findings were to be disseminated to the relevant stakeholders in the State's ministry of education to promote nutrition programs in schools and plan healthy menu for the students.

METHODS

The study was a cross-sectional survey comprising assenting apparently healthy in-school adolescents aged 10-20 years in Sokoto metropolis whose parents/guardians consented to the study. All adolescents in boarding schools were excluded from the study because their meal is usually pre-determined. The study was conducted in Sokoto metropolis from 08th June to 25th August 2023. Farming is the predominant occupation of people in the state. Rainfall usually ranges between 500mm and 1,300 mm and the immense Fadama land of the Sokoto-Rima River systems dissects the floodplain and provides the rich alluvial soil fit for assortment of crop cultivation in the state. Crops such as rice, maize, millet, guinea corn, ground nuts, beans, cassava and sweet potatoes are produced for subsistence while vegetables, wheat, cotton, and tobacco are produced as cash crops. Fish farming is also being engaged by individuals living around the river basin as another economic venture.[12-14] There are 47 (28 public and 19 private) secondary schools in the metropolis. The population of adolescents in Sokoto metropolis was 136,900 in 2006, projected at 226,274 for 2023.[15,16]

Sample size determination

The minimum sample size was determined using the following formula for cross-sectional studies[17]

$$n = \frac{Z^2pq}{d^2}$$

Where:

n=minimum sample size in population >10,000

Z=two-sided percentage point of the normal distribution corresponding to the required significance level (α=0.05)=1.96

p=prevalence of factor under study=55.8% (0.558)[10]

q=complementary probability of p=1-p=1-0.5=0.5

d=precision (or margin of error) of 5%=0.05

The level of significance was set at 5% (α=0.05)

$$n = \frac{(1.96)^2\ (0.558)\ (0.5)}{0.0025}$$

$$n = \frac{(3.8416)\ (0.558)\ (0.5)}{0.0025}$$

$$n = \frac{1.071}{0.0025} = 428$$

However, for a finite population of less than 10,000, the minimum sample size (n_f) is given as:

$$n_f = \frac{n}{1+\frac{n}{N}}$$

where: n_f= Minimum sample size in population <10,000,
n= Minimum sample size in population >10,000=428
N= estimate of the finite population=1800

Therefore, for finite population of 1800 in-school adolescents

$$n_f = \frac{428}{1+\frac{428}{1800}}$$

$$n_f = \frac{428}{1.238}$$

$$n_f = 345.1 \cong 345$$

Allowing for 90% response rate (i.e., 10% attrition rate), the minimum sample size (n_s) is given as:

$$n_{s=} \frac{n}{0.90} = \frac{345}{0.90} = 384.1 \cong 384$$

A sample size of 384 was obtained. However, 400 questionnaires were distributed to the participants.

Sampling technique

A multistage sampling technique was used to select respondents for the study. Three local government areas (LGAs) were selected out of the five LGAs in Sokoto metropolis through simple random sampling by balloting. They included Sokoto North, Sokoto South, and part of Wamakko LGAs. Two secondary schools were selected from each of the three selected LGAs using simple random sampling by balloting (therefore, 6 secondary schools were selected they included; Brilliant footsteps academy (Private), government day secondary School. Kofar Marke (Public), Blue Crescent school, Mabera, Sokoto (Private), government day secondary school Minannata (Public), government day secondary school Arkilla (Public) and Alheri school Sokoto (private). Proportionate allocation was done based on the number of students in each of the selected schools. It was also done based on the number of students in each class. Stratified sampling technique was done to select males and females in each class. Proportionate allocation of sample size based on number of males and female was done in each of the selected class. Simple random sampling was used to select study participants based on the number of sample allocated in each stratum.

Data collection technique

A structured interviewer-administered questionnaire adapted from a previous study was used to collect data from the study participants via open data kit (ODK) software installed on all data collectors' smart phones via Google play store to collect data on knowledge of nutrition.[9] It contained 12 questions on nutrition knowledge including questions on food groups, macro-nutrients, micro-nutrients, sources of recommended fat and oil, iron rich food, minerals, diet related diseases and a question on source(s) of nutrition information. Also contained in study instrument were questions on socio-demographic characteristics of respondents. Adolescence was defined as era of life from 10-20 years-old.[5]

Data management

Scoring and grading of nutrition knowledge of respondents: A total of 12 questions used to assess the knowledge of nutrition. Each question had three possible responses yes, no, I don't know. Point values for each question were assigned as follows: correct response=1, incorrect response=0. Scaled scores were computed by summing item responses. Scores on total knowledge scale had possible range of 0-10. Respondents' knowledge was graded into good and poor knowledge.

Those with score ≥50% of expected knowledge score were categorized into good knowledge and those with score of <50% of expected knowledge score were categorized into poor knowledge.

Indices of assessment of knowledge

The following formulae were used to calculate the different knowledge scores-

Overall nutritional knowledge score for each respondent (%) = (Total number of correct responses on @nutritional knowledge by a respondent/Total number of expected correct responses on @nutritional knowledge) ×100

Percentage of respondents with good knowledge of nutrition=(Number of respondents with nutritional knowledge score of ≥50%/Total number of respondents)×100

Percentage of respondents with poor knowledge of nutrition=(Number of respondents with nutritional knowledge score of <50%/Total number of respondents)×100

Mean knowledge score=(sum of correct nutritional knowledge responses among all respondents)/(Total number of respondents)

Data analysis

Data were cleaned from ODK by checking for completeness and errors. This was then followed by data export to IBM® SPSS version 25. Descriptive statistics of all variables was done to provide general characteristics of data. Quantitative data was explored to check for outliers. This was done by running frequencies, means and cross tabulation. Continuous variables expressed as frequencies and percentage are used, means, and SD.

Pearson's Chi-square and Fisher's exact tests were performed to assess for existence of association between categorical variables. Level of significance was set at α=0.05 (i.e., 95% confidence interval). Therefore, any statistical test with $p<0.05$ considered to be statistically significant.

Ethical consideration

Ethical approval was sought from Sokoto state ministry of health ethics committee. Permission was sought from the Sokoto State ministry for basic and secondary

education, permission to carry out the study was also sought from authorities in each of the selected secondary school, then written informed consent and assent was obtained from the selected students/parents/guardians respectively before proceeding with the study.

RESULTS

A total of 400 questionnaires were administered among in school adolescents, 389 fully completed and considered suitable for analysis. Response rate was therefore 97%.

Sociodemographic characteristics of the respondents

Majority of the respondents were within the age range of 10-15 years with a mean age of 15.46±1.67 SD, most of the respondents 231 (59.4%), were females. A large proportion 300 (77.1%) of the participants were Hausa with a significant proportion, 350 (90%) being Muslims. Two hundred and seventy-eight (71.5%) were from the senior class. The majority of the fathers 376 (96.4%) were the heads of the family, about a half of them 198 (50.9%), had tertiary education, 177 (44.7%) were civil servants. More than half 230 (59.1%) of the mothers had secondary school education and 233 (59.9%) were unemployed. One hundred and sixty-seven (42.9%) of the students had a family size of ≤4 while 163 (41.9%) had a 5-7 family size. Majority 360 (92.5%) resided in urban areas, 147 (37.8%) are of middle social class (Table 1).

Nutritional knowledge of in-school adolescents in Sokoto

Three hundred and twelve (80.2%) of the participants had good knowledge about classes of food. However, only 40 (10.3%) had good knowledge of energy rich food. Two hundred and ninety-eight (76.6%) and 89 (22.9%) had knowledge on high protein diet and good fat diet respectively. Only 107 (27.5%) had good knowledge on minerals and vitamins that are good for the bone development. Majority 317 (81.5%) and 341 (87.7%) of the respondents knew eating balanced diet is important and could prevent diseases, respectively (Table 2).

The overall nutrition knowledge of adolescents was good among majority 346 (88.9%) of respondents (Figure 1).

Sources of information on knowledge of nutrition

The main source of nutrition information of the adolescents was teachers 336 (86.4%), followed by family members 42 (10.8%), media; predominantly television 9 (2.3%), then peers 2 (0.5%).

Factors associated with respondents' nutritional knowledge

Age category (p=0.009) and social status (p=0.042) were significantly associated with nutritional knowledge of the subjects. On logistic regression analysis, age category (p=0.007) was the only factor that remained the predictor of nutrition knowledge. Age category ≥15 years were twice more likely than age category <15 years to have good nutritional knowledge (Tables 3 and 4).

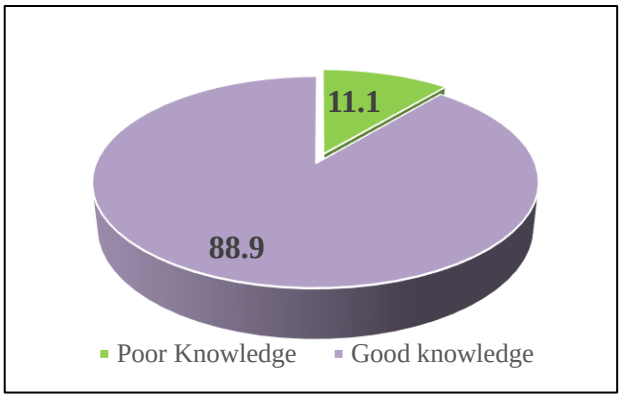

Figure 1: Overall nutrition knowledge of the in-school adolescents.

Table 1: Sociodemographic characteristics of the respondents, (n=389).

Variables	N	Percentages (%)
Age (in years)		
10-15	212	54.5
16-20	177	45.5
Mean age=15.46±1.67 SD		
Gender		
Female	231	59.4
Male	158	40.6
Tribe		
Hausa	300	77.1
Igbo	21	5.4
Yoruba	57	14.7
Others*	11	2.8
Religion		
Islam	350	90.0
Christianity	39	10.0

Continued.

Variables	N	Percentages (%)
Class in school		
Senior	278	71.5
Junior	111	28.5
Head of family		
Father	376	96.7
Mother	12	3.1
Other**	1	0.3
Household number		
≤4	167	42.9
5-7	163	41.9
≥8	59	15.2
Father's education		
None/Quranic	7	1.8
Primary certificate	12	3.1
Secondary certificate	172	44.2
Tertiary certificate	198	50.9
Mother's education		
None/ Quranic	21	5.4
Primary certificate	36	9.3
Secondary certificate	230	59.1
Tertiary certificate	102	26.2
Father's occupation		
Public servant	174	44.7
Intermediate grade professional	59	15.2
Junior school teachers	50	12.9
Petty trader	100	25.7
Unemployed	6	1.5
Mother's occupation		
Public servant	38	9.8
Intermediate grade professional	55	14.1
Junior school teachers	9	2.3
Petty trader	54	13.9
Unemployed/ housewife	233	59.9
Social status		
Upper	137	35.2
Middle	147	37.8
Lower	105	27.0
Place of residence		
Urban	360	92.5
Rural	27	6.9
Urban slum	2	0.5

*Igbira, Buzu, Dakarkari, Fulani, **Caregiver other than father/mother.

Table 2: Nutritional knowledge of in-school adolescents in Sokoto, (n=389).

Variables	Responses	
	N	Percentages (%)
Knowledge of classes of food		
Correct	312	80.2
Incorrect	77	19.8
Knowledge of energy-rich food		
Correct	40	10.3
Incorrect	349	89.7
Knowledge of high protein diet		
Correct	298	76.6
Incorrect	91	23.4

Continued.

Variables	Responses	
	N	Percentages (%)
Knowledge of good fat diet		
Correct	89	22.9
Incorrect	300	77.1
Minerals and vitamins good for bone development		
Correct	107	27.5
Incorrect	282	72.5
Knowledge of vitamins required for fat absorption		
Correct	81	20.8
Incorrect	308	79.2
Knowledge of food that cause heart diseases		
Correct	330	84.8
Incorrect	59	15.2
Eating a balanced diet is important		
Correct	317	81.5
Incorrect	72	18.5
Eating balanced diet maintains growth		
Correct	335	86.1
Incorrect	54	13.9
Eating balanced diet prevent diseases		
Correct	341	87.7
Incorrect	48	12.3
Eating balanced diet prevent anaemia		
Correct	54	13.9
Incorrect	335	86.1

Table 3: Association between socio-demographic factors and nutritional knowledge of the subjects, (n=389).

Variables	Nutritional knowledge (%)		Test statistic, p value
	Good	Poor	
Gender			
Male	136 (39.3)	22 (51.2)	Fishers' exact, p=0.142
Female	210 (60.7)	21 (48.8)	
Age category (in years)			
<15	198 (57.2)	15 (34.9)	Fishers' exact, p=0.009
≥15	148 (42.8)	28 (65.1)	
Tribe			
Hausa	262 (75.7)	38 (88.4)	χ^2=5.916, p=0.116
Igbo	21 (6.1)	0 (0.0)	
Yoruba	54 (15.6)	3 (6.9)	
Others*	9 (2.6)	2 (4.7)	
Class in school			
Junior secondary	98 (28.3)	13 (30.2)	Fishers' exact, p=0.858
Senior secondary	248 (71.7)	30 (69.8)	
Religion			
Islam	309 (89.3)	41 (95.3)	Fishers' exact, p=0.287
Christianity	37 (10.7)	2 (4.7)	
Setting			
Urban	319 (92.2)	41 (95.3)	χ^2=0.65, p=0.721
Semi-urban	2 (0.6)	0 (0.0)	
Rural	25 (7.2)	2 (4.7)	
Social class			
Upper	129 (37.3)	8 (18.6)	χ^2=9.337, p=0.042
Middle	122 (35.3)	25 (58.1)	
Lower	95 (27.4)	10 (23.3)	

*Igbira, Buzu, Dakarkari, Fulani

Table 4: Predictors of nutritional knowledge of the subjects.

Variables	aOR	95% CI		P value
		Lower	Upper	
Age category (<15 years vs ≥15 years *)	2.97	1.288	4.843	0.007
Socioeconomic class (upper class vs lower class*)	1.697	0.646	4.463	0.283
Socioeconomic class (middle class vs lower class*)	0.514	0.235	1.122	0.095

aOR=Adjusted odds ratio, CI=Confidence interval, *=Reference group.

DISCUSSION

This study was conducted among 389 in-school adolescents to determine their nutrition knowledge, in Sokoto Metropolis, Sokoto State North-Western Nigeria. Majority of the respondents falling within the age range of 10-15 years is similar to that of a previous study conducted among Adolescents in Sokoto where majority of the respondents, 66.7%, fell within the range of 10-13 years.[18] Residence in urban settings as found in the majority of subjects in this study has been attributed to early enrolment of children in schools by parents leading to higher number of early adolescents in secondary schools compared to their counterparts.[9] The respondents being predominantly Muslims, females, and Hausa by tribe are in agreement with similar study by Essien et al within the Sokoto metropolis.[11]

According to the findings, respondents had overall nutritional knowledge score of 88.9% which is nearly similar to what was found in China that 95% have good nutritional knowledge.[19] This is contrary to what was found by Essien et al in their study to assess nutritional knowledge and nutritional status among adolescents within Sokoto metropolis, where they reported 12% of the respondents as having good nutritional knowledge.[11] Reasons for increased nutrition knowledge in the current study could be attributed to the scale used to determine the level of nutrition knowledge which is in variance with that of the previous study.[11] In the present study, two-level knowledge scale was used, contrary to the scale used by Essien et al where five level knowledge scale was adopted.[11] The difference in the nutrition knowledge scores might also mean that perhaps, there had been some improvement in the nutrition education offered to secondary school students in the metropolis over-time.

Similar to a previous study the knowledge of the respondents on micronutrients such as minerals and vitamins considered necessary for bone development was poor in this study.[9] The implication of this finding lies in the possibility of subjects consuming nutrients that have little or no value in bone growth and development. Poor knowledge on good fat diet by the respondents in this study was in consonance with report from a study conducted in Australia where subjects demonstrated poor knowledge of fat content of food.[20] By implication, decisions concerning the consumption of healthy fat is likely to be hampered by their lack of knowledge thereby placing them at risk of obesity and related complications. The established association between age category and socio-economic status with the nutritional knowledge of subjects in this study did not corroborate with findings from a previous study where socio-economic and demographic characteristics of the subjects were not associated with the nutrition knowledge of the subjects.[9] In consonance with this study however, reports from other studies documented that increasing age was associated with nutritional knowledge of adolescents.[21,22] Older adolescents' age category as a predictor of nutrition knowledge in this study could be a reflection of increasing accessibility to nutrition education materials and information when compared to younger age group. Increasing age has been attributed to increased understanding and exposure to more training.[22]

In this study, the main source of nutrition information of adolescent learners was teachers (86.4%), followed by family members (10.8%). The finding in this study is contrary to the study by Thielemann et al where less than half (46.7%) of the college students indicated that their main source of nutrition information was the school, followed by family (24.0%).[23] It was also contrary to the report from a study among adolescents in Bangladesh where over half (52.4%) of the respondents quoted family as their source of nutrition information, a finding that was attributed to the complete dependence of adolescents on their families.[24] Perhaps, the finding of this study is an indication of the impact of nutrition lessons offered by the state's department of basic education in providing basic nutrition information to the respondents. It has been documented that school based educational lessons has the potential to increase knowledge about the healthy nutrition.[25]

Some information on nutritional knowledge of the respondents was based on dietary recall and therefore, recalls bias could not be completely ruled-out. Additionally, the study being a cross-sectional survey could not establish causal as well as the effect relationships.

CONCLUSION

In conclusion, the study revealed overall high level of nutritional knowledge among the respondents but low level of knowledge in terms of specific nutrient providing meals such as energy rich food, good fat, minerals and vitamins. There is need for educators to emphasize on teaching adolescents in the study area about specific nutrient providing meals such as energy rich food, good fat, minerals and vitamins.

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