

Original Research Article

PREVALENCE AND PATTERN OF NUTRITIONAL STATUS OF ADOLESCENTS ATTENDING PUBLIC SECONDARY SCHOOLS IN GOKANA, A RURAL COMMUNITY IN RIVERS STATE, NIGERIA

ABSTRACT

Aims: To evaluate the prevalence and pattern of malnutrition among adolescents in public secondary schools in a rural community.

Study design: School based cross-sectional descriptive study.

Place and duration of study: Public secondary schools in Gokana Local Government Area, Rivers State, Nigeria between August and October, 2016.

Methodology: A total of 300 adolescents aged between 10 and 18 years were recruited from students attending public secondary schools in Gokana Local Government Area of Rivers State using a two staged simple random sampling technique. Information from respondents was obtained using a pretested semi-structured interviewer administered questionnaire. The respondents' weights and heights were measured and used to calculate their body mass index (BMI). The BMI was used to classify them into stunted, underweight, normal and overweight/obese adolescents using the 2007 World Health Organisation's (WHO's) reference population. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 20.

Results: The prevalence of stunting, underweight and overweight/obesity in this study were 14.3%, 15.6% and 0.0% respectively. Male and older adolescents were more likely to be underweight and stunted compared to female and younger adolescents.

Conclusion: Acute and chronic under-nutrition is still a major problem among adolescents in rural communities in Rivers State unlike overweight /obesity. Our findings have implications for intensified nutrition programmes generally and specifically for adolescents at all levels of government.

Key words: *adolescents, malnutrition, public schools, rural, Rivers State*

1. INTRODUCTION

Until recently, childhood and adolescents overweight and obesity were mostly associated with affluence and the developed world ^(1,2). These conditions have however significantly increased in low and middle income countries (LMICs) over time ⁽³⁾. As of 2011, children overweight remained highest in high income countries (15%) but increasing rapidly in developing countries as shown by the estimated 7% and 5% prevalence in Africa and Asia respectively ⁽⁴⁾. Overweight and obesity in

34 children and adolescents now co-exist with underweight, stunting and wasting which historically were
35 associated with LMICs ⁽⁵⁾. The paradox of these two extremes often referred to as the “double burden
36 of malnutrition” ⁽⁶⁾ co-existing and largely attributable to nutrition transition in developing countries, is a
37 challenge to public health ⁽⁷⁾.

38 Although there is no consensus definition at its core, nutritional abnormality also referred to as
39 malnutrition is primarily (but not exclusively) a function of the in-balance between caloric intake and
40 expenditure but other factors can independently influence either the intake or expenditure of calories ⁽⁸⁾
41 and as such the spectrum of nutritional abnormality includes stunting, wasting, underweight and
42 obesity. The World Health Organisation definitions of childhood weight abnormality are as follows ⁽⁹⁾.

43 Stunting is defined as height for age < -2 standard deviation of the WHO Child Growth
44 Standards Median (CGSM)

45 Wasting is defined as weight for height < -2 standard deviation of the WHO CGSM

46 Underweight is defined as weight for age < -2 standard deviation of the WHO CGSM

47 Overweight/Obesity is defined as weight for height > +2 standard deviation of the WHO
48 CGSM

49 Given the negative health outcomes associated with the double burden of malnutrition, it is especially
50 important to fully understand its prevalence and pattern in school-aged adolescents. Besides the first
51 year of life, adolescence defined as the transition between childhood and adulthood (usually between
52 10 years to 18 years), is the single most critical period of physical growth ⁽¹⁰⁾.

53 In the last three decades, the focus of international nutritionists was on childhood under-nutrition and
54 the related problem of how to feed the world's burgeoning population especially the children and
55 adolescents ⁽¹¹⁾. Today, the World Health Organisation finds itself needing to deal with the new
56 pandemic of obesity and its accompanying non communicable diseases, while the challenge of
57 childhood malnutrition is still far from over ⁽¹¹⁾.

58 In 2009, WHO estimated 155 million or one in 10 school-aged (5 – 17 years old) children worldwide to
59 be either overweight or obese. In Africa, the estimated prevalence of childhood overweight increased
60 from 4% in 1990 to 7% in 2011 and is expected to reach 11% in 2025 ⁽⁴⁾, while underweight is
61 projected to increase albeit at a slower pace from 24% in 1990 to 26.8% by 2015 ⁽¹²⁾. Overall as of
62 2004, the prevalence of overweight (including obesity) was 8.4% while for obesity alone; the
63 prevalence was 1.9% ⁽¹³⁾.

64 Some workers (de Onis *et al*) did a systematic analysis in the year 2000, on nationally representative
65 data derived from surveys conducted in developing countries and found that nearly one-third of the
66 children in the developing world were either underweight or stunted and more than 30% of them
67 suffered from micronutrient deficiencies ⁽¹⁴⁾. The United Nations University in collaboration with
68 UNICEF in the year 2000 reported that more than 200 million school-age children are stunted and if
69 no action is taken, and at this rate, about one billion stunted school children will be growing up by
70 2020 with impaired physical and mental development ⁽¹⁵⁾. According to Wang and Lobstein in a study

71 conducted in 2006, the prevalence of overweight and obesity among school-age children is rising in
72 almost all industrialised countries with available research data, and in several lower-income countries
73 ⁽¹⁶⁾.

74 Together, under-nutrition-related diseases, infectious diseases and obesity-related diseases
75 contribute substantially to the burden of disease in low and middle income countries, of which Nigeria
76 is one ⁽¹⁷⁾. Impaired cognitive development and poorer educational achievement are the adverse
77 effects of under-nutrition in adolescents and can result in a high risk of obesity in adulthood ⁽¹⁸⁾. On
78 the other hand, adolescent obesity is associated with serious health problems in adolescence and
79 later adulthood, including a heightened risk of psychosocial morbidity, cardiovascular complications,
80 type 1 and type 2 diabetes, impaired social integration and premature death ⁽¹⁹⁾. Thus an increase in
81 the prevalence of under-nutrition and over-nutrition in adolescents will potentially result in increased
82 health cost in the next decade.

83 The neglect of the study of adolescent nutrition still persists in Nigeria and there are few studies
84 focusing on nutritional health during this period of increased nutritional need ⁽²⁰⁾. A rural based study in
85 south-west Nigeria on the relative height and weight of males and females aged 5 – 30 years found
86 that more than 60% of males aged 13 – 16 years were stunted and the prevalence of underweight
87 was highest during the adolescent periods in males aged 13 – 14 years (36.8%) and females aged 11
88 – 12 years (22.7%) ⁽²¹⁾.

89 This study therefore aimed at describing the prevalence and pattern of the nutritional status of
90 adolescents from Gokana Local Government Area, a rural dwelling in Rivers State, South Southern
91 Nigeria giving the peculiarities of the locality.

92 **2. METHODOLOGY**

93 **2.1 Study Location**

94 Gokana is one of the twenty three (23) local government areas (LGA) of Rivers State with
95 headquarters at Kpor. It has an area of 126 square kilometres and a population of 233,813 according
96 to the 2006 national population census ⁽²⁴⁾. Given a projected annual population growth rate of 3% in
97 this LGA, the estimated population for 2015 is 314,225 ⁽²⁴⁾. It lies on the coastal low land of the Niger
98 Delta in the South Eastern part of Rivers State. Gokana is about 54 kilometres by road from Port
99 Harcourt. The local government is made up of 18 communities and 17 electoral wards.

100 The LGA has a total of twelve (12) public secondary schools with an estimated nine thousand (9000)
101 pupils in both junior and senior public secondary schools ⁽²⁴⁾.

102 **2.1.1 Study Population and Design**

103 This was a school based cross-sectional study. The study population comprised adolescents aged
104 between 10 and 18 years attending public secondary schools in the study area.

2.1.1.1 Sample Size Estimation

The sample size for this study was determined using the formula for single proportion.

$$n = \frac{Z_{\alpha}^2 pq}{d^2}$$

A minimum sample size of 267 was arrived at using the above formula with assumption of 22.4% as the prevalence of malnutrition of school children and adolescents from a previous study⁽²⁵⁾ and at 5% tolerable margin of error at 95% confidence interval. Considering attrition rate of 10%, the calculated sample size was adjusted to 294. However, 300 adolescents participated in this study.

2.1.1.1.1 Sampling Technique

The sampling technique used for this study involved two stages of simple random sampling;

The first stage involved the selection of six public secondary schools out of the twelve public secondary schools in Gokana L.G.A by balloting.

The second stage involved random selection of 50 students from each school. A minimum of 8 adolescents were selected from each of the six class groups (Junior secondary 1 to senior secondary 3) using simple random sampling. The attendance register of each class was used as the sampling frame and table of random numbers were used to select the study participants.

2.1.1.1.1.1 Data Collection

The research was conducted through administration of a semi structured interviewer administered questionnaire from 1st to 31st August 2016. Six trained research assistants were involved. Information on sociodemographic, socioeconomic, physical activity and parental support index of respondents were obtained. The instruments for anthropometric measurements were a Seca[®] electronic bathroom weighing scale for weight and a stadiometre for height.

Participants wore only their school uniforms and were barefooted while their weights and heights were being measured. The height of each student was taken as the maximum vertical distance from the floor to the highest point on the skull (i.e. the vertex) when the head was held in the Frankfort plane. The students stood erect, barefooted, heels together, both heels touching the base of the stadiometre and arms hanging freely before height measurement was taken. Measurement of weight was to the nearest tenth of a gram while measurement of height was to the nearest tenth of a centimeter.

2.1.1.1.1.1.1 Data Analysis

Analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 20. Summary statistics were generated and presented using frequency tables. Inferential statistics to test for associations between variables was done using chi-square test. Level of statistical significance was set at 5%. The cut-off values of Body Mass Index (BMI) used for this study were the 2007 World Health Organization's reference for adolescent BMI.

3. RESULTS

3.1 Socio-demographic characteristics of respondents

Three hundred adolescents were randomly selected for this study comprising 175 males (58.3%) and 125 females (41.7%). Completed interviews were conducted with 294 giving an overall response rate of 98.0%. The response rate for the male and female adolescents were 97.7% (171 males) and 98.4% (123 females) respectively. Slightly more males (58.2%) than female (41.8%) participated in the study. All respondents were of Ogoni tribe. Higher proportions of the interviewed adolescents (53.1%) were from families with 5 or more children from the same mother. The mean age of the respondents was 14.59 ± 2.19 years. Fathers were mainly the head of households and most of the respondents were from a monogamous family setting (table 1).

Table 1: Sociodemographic characteristics of respondents

Variable	Frequency
	n = 294 (%)
Age group (years)	
10 – 14	135(45.9)
15 – 18	159(54.1)
Gender	
Male	171(58.2)
Female	123(41.8)
Class group	
J.S 1 – 3	161(54.8)

167	S.S 1 – 3	133(45.2)
168	Number of children in the family	
169	1 – 4	138(46.9)
170	5 and above	156(53.1)
171	Mean age $\pm$ SD	14.59 $\pm$ 2.19
172	Head of household	
173	Father	224(76.2)
174	Mother	56(19.0)
175	Uncle	14(4.8)
176	Family setting	
177	Monogamous	252(85.7)
178	Polygamous	42(14.3)

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182 3.1.1 Socioeconomic characteristics of respondents

183 The parents of the respondents were mainly semi-skilled (tailors, welders, mechanics etc.) and
 184 unskilled (petty trading, mason, bricklayers etc.) workers. A good proportion of the respondents (60.2)
 185 have television set in their homes while those who do not have a generator set at home (52.7%) were
 186 slightly in the majority compared to those who have. Air conditioners (6.5%) and cars (14.3%) were
 187 uncommon properties in the homes of majority of the adolescents interviewed (table 2).

188 **Table 2: Socioeconomic characteristics of respondents**

189	Variable	Frequency
190		n =294(%)
191	Fathers' occupation	
192	Unemployed	5(1.7)
193	Skilled worker	37(12.6)
194	Semi-skilled	191(65.0)
195	Unskilled	61(20.7)
196	Mothers' occupation	
197	Unemployed	47(16.0)

198	Skilled worker	5(1.7)
199	Semi-skilled	93(31.6)
200	Unskilled	149(50.7)
201	Own television set(s)	
202	Yes	177(60.2)
203	No	117(39.8)
204	Own generator set	
205	Yes	140(47.3)
206	No	154(52.7)
207	Own air conditioner	
208	Yes	19(6.5)
209	No	275(93.5)
210	Parents own car(s)	
211	Yes	42(14.3)
212	No	252(85.7)

213 3.1.1.1 Prevalence of the nutritional status of respondents

214 The prevalence of underweight and stunting in this study were 14.3% and 15.6% respectively. None
 215 of the respondents were overweight or obese. Mean BMI was $18.36 \pm 2.80 \text{ kg/m}^2$ and mean height
 216 was 1.55 ± 0.11 metres (table 3).

217 **Table 3: Prevalence of the nutritional status of the respondents**

218	Variable	Frequency**
219		
220	Normal weight	248(84.5)
221	Underweight	42(14.3)
222	Overweight/Obesity	0(0.0)
223	Stunted	46(15.6)
224	Mean BMI (kg/m^2)	18.38 ± 2.80
225	Mean Height (metres)	1.55 ± 0.11

226 ** Multiple Responses Applicable (MRA)

227 3.1.1.1.1 Pattern of nutritional status of respondents

Higher proportion of underweight (88.1%) and stunted (78.3%) adolescents were males. Also, older adolescents comprised majority of underweight and stunted respondents. Adolescents from homes with 4 children or less comprised higher proportion of underweight pupils while those from homes with 5 or more children comprised higher proportion of stunted respondents. Likewise, adolescents from monogamous setting suffered more stunting (58.7%) and underweight (88.1) just like those whose parents were semi-skilled or unskilled worker (table 4).

Table 4: Pattern of nutritional status of respondents

Variable	Normal n =248(%)	Underweight n = 42(%)	Stunting n = 46(%)
Gender			
Male	133(53.6)	37(88.1)	36(78.3)
Female	115(46.4)	5(11.9)	10(21.7)
Age grade			
10 – 14	115(46.4)	19(45.2)	14(30.4)
15 – 18	133(53.6)	23(54.8)	32(69.6)
Class group			
J.S 1 – 3	161(64.9)	28(66.7)	28(60.9)
S.S 1 – 3	87(35.1)	14(33.3)	18(39.1)
Number of children in the family			
1 – 4	106(42.7)	32(76.2)	16(34.8)
5 and above	142(57.3)	10(23.8)	30(65.2)
Family setting			
Monogamous	211(85.1)	37(88.1)	27(58.7)
Polygamous	37(14.9)	5(11.9)	19(41.3)
Head of household			
Father	187(75.4)	32(76.2)	27(58.7)
Mother	51(20.6)	4(9.5)	4(8.7)

262	Uncle	10(4.0)	6(14.3)	15(32.6)
263	Fathers' occupation			
264	Unemployed	6(2.4)	10(23.8)	3(6.5)
265	Skilled	24(9.7)	5(11.9)	6(13.0)
266	Semi-skilled	148(59.7)	12(28.6)	29(63.0)
267	Unskilled	70(28.2)	15(35.7)	8(17.5)
268	Mothers' occupation			
269	Unemployed	28(11.3)	6(14.3)	6(13.0)
270	Skilled	6(2.4)	3(7.1)	1(2.2)
271	Semi-skilled	81(32.7)	12(28.6)	7(15.2)
272	Unskilled	133(53.6)	21(50.0)	32(69.6)

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277 3.2 DISCUSSION

278 This study assessed the prevalence and pattern of malnutrition among adolescents attending public
279 secondary schools in a rural community in Rivers State, Nigeria. The prevalence of underweight and
280 stunting in this rural community based study was 14.3% and 15.6% respectively. This is similar to the
281 Rivers State's prevalence of 11.4% and 16.1% for underweight and stunting respectively according to
282 the 2013 Nigerian Demographic and Health Survey ²⁶ and the prevalence of 17.3% (underweight) as
283 observed by some authors in South Western Nigeria ²⁷. Other researchers have reported adolescents'
284 underweight prevalence as high as 70% in some rural communities in Nigeria ²⁸.

285 The trend of under-nutrition is not different in most African countries. A large scale survey on
286 adolescent malnutrition by Manyanga *et al* in seven African countries (Benin, Djibouti, Egypt, Ghana,
287 Malawi, Mauritania and Morocco) revealed that prevalence of under-nutrition ranged from 12.6% in
288 Egypt to as high as 31.9% in Djibouti ²⁹. As in most low and middle income countries (LMICs), the
289 prevalence of underweight and stunting is still considerably high in Asian countries. A study by Jafar
290 and his colleagues among school aged children in Pakistan reported a prevalence of 29.7% and
291 16.7% respectively for underweight and stunting ³⁰. In developed countries, the scenario is different.
292 A summary of international literature published since year 2000 and summarised by Van Niekerk *et al*
293 in 2014 revealed that under-nutrition in adolescents is not an issue in the developed countries of
294 North America and most European countries ³¹. Only in Turkey was prevalence of underweight
295 adolescents (12.8%) reported in this international summary ³².

It is instructive to note that no single case of overweight/obesity was reported in this study. This corroborates the findings of researchers who reported that the prevalence of childhood and adolescent overweight /obesity was low in rural communities in Nigeria³³. It is apparent from findings in this study and many others that childhood and adolescent under-nutrition is the major nutritional problem in many rural communities in Nigeria, though childhood/adolescent obesity seems to be on the rise in many urban communities²⁷.

As regards pattern of adolescents' malnutrition, male adolescents had higher prevalence of underweight and stunting in this study. This concurs with what has been reported by other workers in sub-Saharan Africa³³. Reasons for this difference could include cultural beliefs about body image and higher levels of physical activity including harder chores and manual labour among adolescent boys in low and medium income countries than girls³⁴. Also, the early exposure of some female adolescents to sexual relationship with its attendant monetary benefit could be a factor. This study also observed a higher prevalence of stunting and underweight among the older adolescents.

There is a relationship between family size, family setting and head of households with the nutritional status of adolescents in this study. This may not be difficult to understand as large families usually put a lot of strain on the family income and as such little will remain to ensure food security for the family. Adeomi *et al* had noted that even in communities where farming is the major occupation, heads of large families may be forced to sell most of the food they produce on the farm in order to take care of their large families²⁷. All these will result to limited food for the family with many children to take care of.

Adolescents from lower socioeconomic class had higher prevalence of underweight and stunting. This finding corroborates the report by previous researchers who have all highlighted the relationship between nutritional status and socioeconomic factors^{14, 20}.

4. CONCLUSION AND RECOMMENDATION

This study revealed that acute and chronic under-nutrition is a major problem among adolescents in Gokana Local Government Area, Rivers State, South South Nigeria and that overweight and obesity are not much of a concern in this part of the country. Also decades of crude oil spillage have had tremendous negative impact on the sociocultural and socioeconomic life of the inhabitants of the study area.

Based on above, we recommend creative and innovative programmes by state and local government authorities that will ensure that every child in public school get a good meal during school hours, this will help improve the nutritional status of these children. The federal government should also fast track the on-going oil spillage clean up exercise so as to boost farming and other economic activities in these rural communities.

CONSENT AND ETHICAL ISSUES

Ethical approval for the study was obtained from the University of Port Harcourt Ethical Review Committee. Permission for the study was also sought from the local government authorities, community leaders as well as authorities of the schools where the research was carried out. Informed consent was also obtained from the adolescents who participated in this study as well as their parents. Students and their parents were given health education on balanced diet based on available local food staples.

LIMITATIONS OF THE STUDY

One of the challenges encountered in the course of this study relates to the tense environment in which the study was carried out. The inhabitants of this area were very suspicious of strangers and tended to be aggressive due to several years of communal clashes. We were advised by some inhabitants of this area to steer clear of some very volatile communities such as Barako and Nwebiara and as such adolescents from these volatile communities were not part of this study.

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