



Nutritional status of in-school adolescents in Ekiti state, Nigeria

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ABSTRACT

Background

Globally, the prevalence of overweight and obesity which are indices of nutritional status with their health complications are on the increase, and obesity has been reported as a potential health problem in developing countries despite the prevailing poor socio-economic situation.

Objective

This study was designed to determine the prevalence of underweight, overweight and obesity among in-school adolescents in Ekiti State.

Methodology

A descriptive cross sectional study design involving a 4-stage sampling technique was used to select 2 Local Government Areas (LGAs) randomly from each of the 3 senatorial districts in Ekiti state. The LGAs selected were Ido/Osi, Oye, Ado, Ekiti west, Ikere and Ise/Orun, 2 wards from each LGA, 16 secondary schools and 789 students. Data on demographic, socio-economic characteristics and family composition were obtained using pre tested interviewer-administered semi-structured questionnaire. Dietary intake of respondents was assessed using 24-hour dietary recall. WHO Body Mass Index-for-age (BMI-for-age) chart was used to determine the BMI-for-age and adapted Total Diet Assessment (TDA) software was used to estimate nutrient intake of respondents. Descriptive statistics, ANOVA and Chi-square test were used for data analysis, and level of significance was set at 5.0%.

Results

Age, waist and hip circumference, waist-hip ratio, and BMI-for-age of the respondents were 14.4±1.9 years, 0.8±0.1m, 0.7±0.1m, 0.9±0.1, and 45.1percentile respectively. Prevalence of underweight, overweight and obesity were 11.7%, 8.7% and 4.9% respectively. Respondents at risk of abdominal obesity were 1.4% and 21.2% for males and females respectively. The energy, protein, carbohydrates and fat intakes of participants were 2004.73±1301.02kcal, 57.23±39.43, 328.21±165.39g and 16.06±13.33g respectively. Female respondents have higher mean dietary intakes compared with the male's respondents. Nutrient intake adequacy did not have significant influence on the BMI-for-age of the adolescents.

Conclusion

Underweight, overweight and obesity are problems of in-school adolescents in Ekiti state. Nutrition education will be needed to create awareness about healthy lifestyle, the predisposing factors and consequences of undernutrition and overnutrition.

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INTRODUCTION

Malnutrition, both under-nutrition and over-nutrition, refers to an impairment of health resulting from a deficiency or from an excess or imbalance of nutrients. It is of public health significance among adolescents across the world. The co-existence of overweight, obesity and underweight are common in developing countries despite the prevailing poor socio-economic status and are found to be increasing proportionally over time.¹ Globally, an estimated 10 percent of adolescents between 10 to 19 years of age are overweight or obese and around 43 million children under the age of five are overweight.² Childhood obesity has increased more than doubled in children and tripled in adolescents in the past 30 years. The percentage of children aged 6–11 years in the United States who were obese increased from 7% in 1980 to nearly 18% in 2010. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to 18% over the same period.^{3,4} In Ghana the prevalence of underweight and overweight/obesity among adolescents were found to be 29.8% and 17.4 % respectively⁵ and the prevalence of obesity among adolescents in Tunisia was reported to be 5.1%.⁶ Findings among Cameroonian adolescent showed that the proportion of overweight was three times higher in girls (14%) compared to boys (4%), stunting and underweight were more common among boys (15% and 6%) than girls (5% and 1%), the prevalence of stunting was two times higher among the urban adolescents with low social economic status (12%) compared to those with high social economic status (5%).⁷

A study to determine the nutritional status of children aged six to eighteen years in Ile-Ife shown that the prevalence of underweight, overweight and obesity were 0.3%, 2.8% and 77.8% respectively.⁸ It has been reported that among adolescents in Edo state 5.7% of the participant were overweight while 52.7% were at risks of overweight; also being overweight was significantly associated with consumption of snacks, soft drinks, physical inactivity and positive family history of obesity.⁹ Findings among adolescent's schools girls in Tarka, Nigeria indicated that the prevalence of underweight,

overweight and obesity were 9.9%, 12.5% and 7.5% respectively.¹⁰ The prevalence of obesity and overweight were 1.3% (0.4% for males and 2.5% for females) and 19.4% (17.1% for males and 22.3% for females) respectively among undergraduate students of the Micheal Okpara University of agriculture, Umudike, Abia state, Nigeria¹¹ while another study in same state documented the prevalence of obesity in Umahia to be 20% while the prevalence of overweight indicated that about 4% of boys and 2% of girls were at risks of becoming overweight.¹²

Information on absolute levels and on trends with respect to adolescent malnutrition are of relevance for designing, initiating or modifying intervention programs. World Health Organization data indicated that malnutrition indicators such as overweight and obesity are now dramatically on the rise in low and middle income countries.¹³ In view of dearth of information on the nutritional status of adolescents in Ekiti state, the study was designed to determine the nutritional status of in-school adolescents in Ekiti state using the prevalence of underweight, overweight and obesity as the indicators.

METHODOLOGY

The study was conducted in Ekiti State, Nigeria located between longitudes 40°51' and 50°451' East of the Greenwich meridian and latitudes 70°151' and 80°51' north of the Equator, Southwest Nigeria. Seven hundred and eight nine students, aged 10-19 years were selected through multistage sampling technique across the three senatorial district in Ekiti state two local government areas from each senatorial district and total of sixteen secondary schools were randomly selected. Data was collected between December 2014 to February 2015. Respondents were also randomly selected from the junior classes and the senior classes of the school. Data were collected using pre-tested, semi-structured, interviewer-administered questionnaires. Ethical approval was obtained from the University of Ibadan / University college Hospital ethical review board and individual inform consent was sought from prospective participants.



The questionnaires contained information on the socio-demographic characteristics of the respondents as well as anthropometric measurements of each respondent which included weight, height, hip and waist measurements and 24 hour dietary recall. The measurements were taken by trained personnel. Random checks were done to ensure accuracy of measurements and to correct for errors.

Body weights of the respondents were measured using a standard portable bathroom scale. The scale was checked for accuracy after every 10th person. Each respondent was weighed wearing light clothing. Weight was measured to the nearest 0.1 kg. Respondents were weighed before their mid-day lunch break. Respondents' heights were measured as the distance from the top of the head to the bottom of the feet with no shoes on using a fixed stadiometer to the nearest 0.1 cm. Waist circumference (in cm) was done with a flexible tape measuring midway between the lowest rib and the superior border of the iliac crest at the level of the umbilicus with the respondent standing and breathing normally. Hip circumference was done using a flexible tape to measure the widest diameter around the greater

trochanter. WHO anthroplus was used to determine the body mass index for age percentile of the respondent, adapted total dietary assessment (TDA) software was used to estimate the nutrient intake of the participants. The waist-hip ratio, WHR was calculated to the nearest 0.05.

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 20. Statistical significance was determined at the level of $P < 0.05$. Mean, standard deviation, chi square and ANOVA were performed.

RESULTS

A total of 789 adolescents participated in the study, out of these 360 (45.6%) were male and 429 (54.4%) were females. Percentages of participants in their early adolescence (10-14 years) and late adolescence stage (15 – 19 years) were 54.4% and 45.6% respectively. 539 (68.3%) adolescents were from rural areas and 250 (31.7%) were from urban areas. Majority of participants were Yoruba (93.8%), Igbo (1.8%), Hausa (0.5%) and other tribes (3.9%). Major religion of participants was Christianity (94.4%), 5.3% were Muslim and 0.4% were traditional worshippers. [Table-1].

Table 1 Demographic Characteristic of Participants

Variables	Component	N	%
Sex	Male	360	45.6
	Female	429	54.4
	Total	789	100.0
Age (years)	10-14	429	54.4
	15-19	360	45.6
	Total	789	100.0
Location	Urban	250	31.7
	Rural	539	68.3
	Total	789	100.0
Ethnicity	Yoruba	740	93.8
	Igbo	14	1.8
	Hausa	4	0.5
	Others	31	3.9
	Total	789	100.0
Religion	Christianity	744	94.4
	Islamic	42	5.3
	Traditional	3	0.4
	Total	789	100.0

Females participant have significant higher value of weight, waist and hip circumference, waist hip ratio, and body mass index for age as compared to their male counterparts while the male have a higher mean

height than the female, there was no significant difference in the mean height of the males when compared to the female participants [Table-2].

Table 2 Anthropometric Characteristic of Participants

Variables		N	Mean	SD	Minimum	Maximum	F	P value
Height (m)	Male	360	1.57	0.13	0.17	1.81	5.460	0.20
	Female	429	1.55	0.11	0.60	1.85		
	Total	789	1.56	0.12	0.17	1.85		
Weight (kg)	Male	360	46.73	10.50	25.00	95.00	6.543	0.011*
	Female	429	48.59	9.95	25.00	90.00		
	Total	789	47.74	10.25	25.00	95.00		
Waist circumference(m)	Male	360	0.67	0.51	0.55	0.95	12.92	0.00*
	Female	429	0.69	0.77	0.40	1.73		
	Total	789	0.68	0.67	0.40	1.73		
Hip circumference(m)	Male	360	0.79	0.64	0.62	1.15	52.81	0.00*
	Female	429	0.82	0.71	0.60	1.12		
	Total	789	0.81	0.70	0.60	1.15		
BMI(kg/m ²)	Male	360	18.69	3.19	11.11	48.08	28.314	0.00*
	Female	429	19.91	3.24	10.96	32.79		
	Total	789	19.35	3.28	10.96	48.08		
Waist-hip ratio	Male	360	0.86	0.04	0.70	1.03	12.55	0.00*
	Female	429	0.84	0.08	0.51	2.03		
	Total	789	0.85	0.06	0.51	2.03		
BMI for age	Male	360	36.99	28.8	0.00	100.0	48.0	0.000*
	Female	429	51.87	30.54	0.00	100.0		
	Total	789	45.08	30.68	0.00	100.0		

Note * value are significant.

According to WHO body mass index for age percentile standard, the prevalence of underweight,

overweight and obesity among the studied participants were 11.7%, 8.7% and 4.9% respectively.[Table-3]

Table 3 Nutritional Anthropometric Indices of Participants

BMI for age percentile	Classification	N	%
0.0 – 4.99	Underweight	92	11.7
5.00 – 84.99	Normal	589	74.7
85.00 – 94.99	Overweight	69	8.7
95.00 – 100.00	Obesity	39	4.9
Total		789	100.0

Prevalence of underweight was higher among the male participants (15.6%) compared with female participants (8.4%) while female participants have higher prevalence of overweight (12.6%) and obesity

(6.3%) compared with the prevalence of overweight (4.2%) and obesity (3.3%) among the male participants.[Table-4]

Table 4 Nutritional Anthropometric Indices of Participants

BMI-for-age	Sex				Total	
	Male		Female			
	N	%	N	%	N	%
Underweight	9	3.6	83	15.4	92	11.7
Normal	195	87.0	394	73.1	589	74.7
Overweight	33	13.2	36	6.7	69	8.7
Obese	13	5.2	26	4.8	39	4.9
Total	250	100.0	539	100.0	789	100.0

$X^2 = 28.423$ p value of 0.000 ($p < 0.05$)

The prevalence of underweight was higher among participants in the rural areas (15.4%) compared with prevalence of underweight among participants in the urban areas (3.6%) while the prevalence of overweight (13.2%) and obesity (5.2%) were higher

among participants from urban areas compared with the prevalence of overweight (6.7%) and obesity (4.8%) among participants in the rural areas.[Table-5]

Table 5 BMI for Age and Location of Participants

BMI-for-age	Location				Total	
	Urban		Rural			
	N	%	N	%	N	%
Underweight	56	15.6	36	8.4	92	11.7
Normal	277	76.9	312	72.7	589	74.7
Overweight	15	4.2	54	12.6	69	8.7
Obese	12	3.3	27	6.3	39	4.9
Total	360	100.0	429	100.0	789	100.0

$X^2 = 29.293$ p value of 0.000 ($p < 0.05$)

The prevalence of underweight was higher among participants in their late adolescence (14.2%) compared with the participants in their early adolescence (9.6%), while the prevalence of overweight (10.0%) and obesity (7.2%) were higher

among participants in their early adolescence compared with the prevalence of overweight (7.2%) and obesity (2.2%) among participants in their the late adolescence.[Table-6]

Table 6 BMI for Age and Age Group of Participants

BMI-for-age	Age Group (Years)				Total	
	10 – 14		15 – 19			
	N	%	N	%	N	%
Underweight	41	9.6	51	14.2	92	11.7
Normal	314	73.2	275	76.4	589	74.7
Overweight	43	10.0	26	7.2	69	8.7
Obese	31	7.2	8	2.2	39	4.9
Total	429	100.0	360	100.0	789	100.0

$X^2 = 15.506$ p value of 0.001 ($p < 0.05$)

The highest prevalence of underweight (21.4 %) was observed among participants from Ido/osi local

government area while the lowest prevalence of underweight was observed among participants from



Ado local government area (2.7%); participants from Ado local government area have the highest prevalence of overweight (13.3%) and obesity (8.7%) while the lowest prevalence of overweight was

observed among participants from Ido/osi local government area (2.8%) and none of the participants from Ikere local government area was obese ($p < 0.05$). [Table-7]

Table 7 BMI for Age and Local Government Areas (%)

BMI-for-age	Local government areas of participants						Total
	Ido/Osi (%)	Oye (%)	Ado (%)	Ise /orun (%)	Ikere (%)	Aramoko (%)	
Underweight	21.4	7.1	2.7	10.2	5.0	20.8	11.7
Normal	71.0	74.7	75.3	76.2	82.0	70.9	74.7
Overweight	4.8	11.1	13.3	5.4	13.0	6.8	8.7
Obese	2.8	7.1	8.7	8.2	0.0	2.0	4.9
Total	145	99	150	147	100	148	789

$X^2 = 77.009$, p value of 0.000 ($p < 0.05$)

There is a positive association between the socioeconomic status and the nutritional anthropometric indices of participants. [Table-8] Family type, family size, birth order, physical

exercise, nature of mothers work and time spent viewing television doesn't have significant influence on the adolescents body mass index percentile.

Table 8 BMI for Age and Socio-Economic Status of Participants (%)

BMI-for-Age	Socio-Economic Status						Total	
	Lower		Middle		Higher		N	%
	N	%	N	%	N	%		
Underweight	21	14.9	49	10.4	22	12.4	92	11.7
Normal	110	78.0	351	74.8	127	71.3	589	74.7
Overweight	5	3.5	46	9.8	18	10.1	69	8.7
Obese	5	3.5	23	4.9	11	6.2	39	4.9
Total	141	100.0	469	100.0	178	100.0	789	100.0

$X^2 = 17.839$, p value of 0.007 ($p < 0.05$)

Based on waist hip ratio classification the percentages of male and female participants that

were at the risk of abdominal obesity were 1.4% and 21.2% respectively. [Table-9]

Table 9 Waist-Hip Ratio of Participants

Waist-Hip Ratio	Male			Female			
	Classification	N	%	Waist-Hip Ratio	Classification	N	%
<0.85	Excellent	170	47.2	<0.75	Excellent	20	4.7
0.85 – 0.89	Good	147	40.8	0.75 – 0.79	Good	70	16.3
0.90 – 0.95	Average	38	10.6	0.80 – 0.86	Average	248	57.8
≥ 0.96	At Risk	5	1.4	≥ 0.87	At Risk	91	21.2
	Total	360	100.0		Total	429	100.0

$X^2 = 17.839$, p value of 0.007 ($p < 0.05$)

Females' participants have higher macronutrients and micronutrients mean intake compared with the male participants. Both the macronutrients and

micronutrients intakes of the participants doesn't have significant influence on the body mass index for age of the participants.[Table-10,11]

Table 10 Macro nutrient adequacy and BMI for age of participants

Nutrient	Adequacy	Underweight (%)	Normal (%)	Overweight (%)	Obese (%)	Total (%)
Energy	Inadequate	31.5	46.6	9.6	12.3	18.3
	Adequate	17.2	58.6	15.6	8.6	32.2
	Excess	21.3	49.7	19.3	9.6	49.5
Protein	Inadequate	19.0	57.1	15.6	8.2	36.9
	Adequate	27.8	41.8	21.5	8.9	19.8
	Excess	21.5	52.3	14.5	11.6	43.2
Carbohydrate	Inadequate	23.3	46.7	6.7	23.3	7.5
	Adequate	26.7	52.0	12.0	9.3	18.8
	Excess	20.5	52.6	18.4	8.5	73.6
Fat	Inadequate	23.0	52.7	15.4	9.0	89.7
	Adequate	10.7	46.4	28.6	14.3	7.0
	Excess	15.4	46.2	15.4	23.1	3.3

$p > 0.05$

Table 10 Macro nutrient adequacy and BMI for age of participants

Nutrient	Adequacy	Underweight (%)	Normal (%)	Overweight (%)	Obese (%)	Total (%)
Calcium	Inadequate	22.2	51.8	16.3	9.7	98.5
	Adequate	0.0	50.0	25.0	25.0	1.0
	Excess	0.0	100.0	0.0	0.0	0.5
Sodium	Inadequate	21.3	50.8	16.4	9.7	90.5
	Adequate	16.7	58.3	8.3	16.7	6.0
	Excess	0.0	71.4	28.6	0.0	3.5
Potassium	Inadequate	22.3	52.2	16.4	9.2	98.2
	Adequate	0.0	50.0	0.0	50.0	1.5
	Excess	0.0	0.0	100.0	0.0	0.3
Zinc	Inadequate	34.7	50.5	6.3	8.4	23.9
	Adequate	22.0	58.2	12.8	7.1	35.4
	Excess	14.2	47.5	25.3	13.0	40.7
Iron	Inadequate	36.8	52.6	5.3	5.3	4.8
	Adequate	28.1	50.0	10.9	10.9	79.1
	Excess	19.7	52.4	18.1	9.8	16.1
Magnesium	Inadequate	22.8	53.2	15.0	9.0	83.9
	Adequate	15.9	50.0	27.3	6.8	11.1
	Excess	20.0	35.0	15.0	30.0	5.0

$p > 0.05$

DISCUSSION

The mean body mass index of the respondents in this study was significantly higher among female respondents than their male counterparts. This is consistent with the findings of similar studies done in

Nigeria.^{12,14} This is inconsistent with the findings in which the BMI of males and females were almost identical.¹⁵ This difference in the BMI between sexes may be the result of increased fat mass in females in contrast to males who stabilize their fat mass and



enlarge their fat free mass. The fact that males are taller than females may also have contributed to their low BMI since height is a denominator in calculating BMI.

The prevalence of underweight in this study was higher compared with the studies among adolescents in port Harcourt¹⁶ and among adolescent school girls in Tarka, Nigeria.¹⁰ This prevalence of underweight was however lower compared with the studies conducted in ile-ife Osun state, Nigeria⁸ and among adolescents in Lagos.¹⁷ Males participants in this study had a significant higher prevalence of underweight compared with their females counterparts. This is similar to findings reported in Nigeria.¹⁸⁻²⁰ But this is different from report of study among adolescents in Delhi where females had higher prevalence of underweight compared to their males counterparts.²¹ This observed difference among gender in this study may be due to increased activity of the male participants as compared to their female counterpart and onset of puberty in the adolescent's girls.

The overall overweight prevalence in this study was greater than reports of previous studies in Nigeria^{16,18,19} while this prevalence of overweight was lower compared with findings of other studies documented in Nigeria;^{9, 11} also this prevalence of overweight is lower compared with prevalence of overweight among adolescents in Ghana.⁵ With respect to gender; females were more significantly overweight than their male counterparts, this is in agreement with findings in Nigeria^{16, 20} and in Ghana.⁵ However, this is different from report documented in Nigeria where the prevalence of overweight was lower in females than in males.¹² This difference may be due to the established fact that females are generally known to have higher subcutaneous fat and BMI than their male. And it has been suggested that this may be related to gender differences in the brain's response to hunger and satiety. Furthermore, factors acting during puberty have been shown to influence the risk of obesity in females.²²

The prevalence of obesity documented in this study is similar to the report among adolescents in Lagos

state Nigeria.¹⁷ This prevalence of obesity is higher compared with other studies earlier carried out in Nigeria among adolescents^{18, 19} and this prevalence of obesity was lower compared with the studies done in Osun state and Abia state Nigeria,^{8, 11} the prevalence of the obesity was higher than studies among adolescents in Tunisia and in Morocco.²³ Females in this study were significantly more obese than their males counterparts, this finding is in line with some findings in Nigeria^{16, 20} but contrast with the findings among adolescents in Benue State, Nigeria²⁴ where a higher prevalence of overweight and obesity among male adolescents compared with females was documented. The lower prevalence of obesity in males observed in this study may be the result of higher degree of physical activity among males, higher dietary intake among the females and the pubertal changes may be responsible for this difference also.

Another interesting point to note is that underweight status increase significantly among participants in their late adolescence stage compared with those in their early adolescences stage while overweight and obesity status increased significantly among participants in their early adolescences stage compared to those in their late adolescence stage. This is in agreement with studies among in-School Adolescents in Ile-Ife, Osun State, Nigeria²⁵ and among adolescents in Benue State, Nigeria,²⁴ but in disagreement with studies conducted among adolescents in Pakistan²⁶ and among Saudi adolescents.²⁷ This trend observed in current study may be due to the fact that older teenagers are less dependent of their parents for daily activities; as results they are free to do more activities outside their home or school. In addition, dietary habits of younger children are more dependent on parental control and parents are more likely to encourage younger children to eat more in order to gain weight and height this may be a likely explanation for the higher prevalence of over nutrition observed among the early adolescence compared with the late adolescences.

In respect to location underweight was significantly higher in the rural areas compared with urban areas while overweight and obesity were significantly



higher in the urban areas compared with rural areas. The study results are consistent with findings documented in Nigeria,^{19, 28} and in South Africa²³ that have shown that prevalence of overweight and obesity are relatively higher in urban areas compared with rural areas while prevalence of underweight are relatively higher in rural areas compared with urban areas, but the study results disagree with studies conducted in the United States and Russia where obesity was higher in rural areas.²⁹ Underweight was higher in the rural area than the urban area, probably owing to the low socioeconomic status of the rural area. This result is expected, as the issue of undernutrition is closely linked with low income, perhaps low level of education, and poverty while overnutrition was higher in the urban area probably owing to the high socioeconomic status of the urban area, access to fast foods and less involvement in the physical activities.

The prevalence of underweight in this study was significantly higher among respondents in the lower socio-economic status as compared to respondents in the higher socio-economic status, where overweight and obesity were found to be significantly higher among respondents in the higher socio-economic status as compared with respondents in the lower socio-economic status. Similar findings were reported in previous studies among adolescents in Nigeria.^{16, 18, 19} However this findings is contrast to studies in the developed countries where overweight and obesity are more common in people of the lower socioeconomic class.³⁰ The findings of current study is not surprising as there is growing evidence in developing countries that perhaps due to decreased physical activities, sedentary lifestyle, altered eating patterns and increased fat content of the diet the prevalence of overweight/obesity is higher in the higher socio-economic status .

The mean intake of participants in this study were lower than those reported in studies among adolescents in Owo municipal Ondo state and Kaduna state, Nigeria.^{31, 32} Female respondents in this study had higher mean intake than the male respondents. This is consistent with the findings reported among adolescents in Kaduna, Nigeria³² but contrast to findings among undergraduate

students in Abeokuta, Nigeria³³ and among adolescents in Malaysia³⁴ where it's been documented that male participants had higher mean intake compared with female participants. Likely explanation for this is that in the study environment female child are given more preference in food allocation and most of them (females) are involved in the preparation and serving of the meals which may give them access to a higher portion size as compared to their male counterparts and also in this study females tends to skip their breakfast which may later expose them to over eating during the day.

In this study overnutrition was more prevalent among participants that had excessive intake of energy and macronutrients (protein and carbohydrate) as compared to those that had adequate and inadequate intake of macronutrients while undernutrition was more prevalent among participants that had inadequate intake of macronutrients as compared to participants that had adequate and excessive intake of macronutrients, Though this study doesn't established a significant association between macronutrients adequacy and body mass index for age of participants, this findings is in agreement with reports of studies among adolescents in Kaduna , Nigeria.³² This proportion increase in body mass index for age and nutrient adequacy is expected, as high dietary intake has been linked with increase body mass index for age²² and couple with inactivity reported by the overweight and obese participants in this study.

CONCLUSION

In conclusion this study has revealed that majority of adolescents in Ekiti state falls between the normal nutritional status and the overall mean body mass index for age of females was significantly higher than that of males. A quarter of the female respondents were at risk of abdominal obesity. The prevalence of underweight, overweight and obesity were 11.7%, 8.7%, and 4.9% respectively. Socio-demographic characteristics have significant influence on the nutritional status of the adolescents while physical activities and nutrient intakes were not significantly influencing the body mass index for age of the adolescents in Ekiti state. Mean intake of energy and



macronutrients was higher among female compared with the male.

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