

Nutritional Status of Day and Boarding Female Adolescent Secondary School Students in Warri South Local Government Area of Delta State

Kolawole Sunday Ekanah^{1,*}, Agofure Otowve², Edeta Rose²

¹Faculty of Health Sciences, National Open University, Benin Study Centre, Benin City, Nigeria

²Department of Public and Community Health, Novena University, Ogume, Nigeria

Email address:

kolasunde@gmail.com (S. E. Kolawole), agofureotowve@yahoo.com (O. Agofure), rosyedeta@yahoo.com (R. Edeta)

*Corresponding author

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Abstract: Nutrient intake during adolescence is of critical importance because this period is characterized by an exceptionally rapid rate of growth. The poor nutritional status of adolescents, especially girls, has important implications in terms of physical work capacity and adverse reproductive outcomes. Thus, a study on the nutritional patterns of adolescent girls is imperative to improve their growth rate and reproductive outcomes. Therefore, this study was designed to investigate the nutritional status of day and boarding students in public secondary schools in Warri South Local Government Area of Delta State. The study was a comparative cross sectional study which sampled a total of 326 students from secondary schools in Warri South L. G. A. of Delta State. A semi-structured questionnaire was self-administered to obtain information on respondents' socio-demographic characteristics, nutritional pattern and factors influencing adolescent nutrition. Descriptive statistics, Chi-square test and ANOVA were used to analyse the data with level of significance set at 0.05. The results show that the mean age of the respondents was 12.27 ± 1.79 years with majority in the age bracket of between 10-15 years of age and more as day students 58.90% than boarding students 41.10%. Assessment of the nutritional status of day and boarding students show that 11.20% of the boarding students were underweight as compared to 9.40% of the day students, 87.30% were of normal weight as compared to 80.70% of the day students. However, only 4.20% of the day students were overweight as compared to 1.50% of the boarding students and 5.70% of the day students were obese as compared to none among the boarding students. Factors that significantly influences the nutritional status of the students were mothers level of education and occupation, non-palatability of the food in the hostels and skipping of meals especially by the boarders ($P < 0.05$). Therefore, concerted efforts should be made by all stakeholders in the education ministry (Government, School Authorities and Parents) to improve the meal of the students residing in the hostels in secondary schools nationwide; while parents should continually make it a duty to improve the meals of their children at home especially the adolescent girls who are still growing in order to enhance their physical work capacity, reproductive and pregnancy outcomes and birth weight.

Keywords: Nutritional Pattern, Day and Boarding, Adolescent, Students, Female

1. Introduction

Human nutrition refers to the provision of essential nutrient necessary to support human life and health. Poor nutrition is a chronic problem that is synonymous to poverty and it occurs due to poor nutritional understanding and practice. Lack of proper nutrition contribute to lower

academic performance, low score, and eventually less successful students and a less productive and competitive economy [1]. A good nutritional status means that one have a healthy body composition without physical sign of nutritional deficiency, good blood working rate, adequate protein in store and other vital nutrients [2].

The World Health Organization define adolescent as any

person between the ages of 10 – 19 years [3]. Adolescent is a particular unique period in life because it is a time of intense physical, psychological, and cognitive development [4]. The foundation of good health and sound mind is laid during this period. This age is considered a dynamic period of growth and development [5]. Adolescent may represent a window of opportunity to prepare nutritionally for a healthy adult life [6].

Under nutrition among adolescent girls is a major public health problem leading to impaired growth [7]. For instance in Bangladesh a large number of adolescent girls suffered from various degrees of nutritional disorders [8]. Furthermore, previous study done in India found that majority of adolescent girls were under nourished [9] and nutritional difficulties have been shown to have consequences especially on adolescent girls [10]. Consequently, if the nutritional needs of adolescent girls are not met they are likely to give birth to undernourished children, thus transmitting undernourishment to future generation [11]. The nutritional status of adolescent girls, the future mothers, contributes to the nutritional status of the community [12].

The prevalence of malnutrition particularly among adolescents is an alarming global problem affecting about one third of the world population. Malnutrition in school girls remains a major public health and social problem in Nigeria [13] as mortality among Chronic Energy Deficiency (CED) individual in Nigeria who are mildly, moderately and severely underweight are 40, 140 and 150% greater, respectively than rates among non chronic energy deficiency individuals [14]. Students in boarding school may be at higher risk of developing nutrient deficiencies compared to those in non-boarding schools probably due to financial constraint in running boarding facilities and some may not like the food on the menu list of the school. Consequently, obtaining almost all their energy and major nutrients from snacks. This was further affirmed by a study in South-West Nigeria where boarding students showed lower nutritional intake than their day counterpart in Secondary schools in Owo Ondo State, South-Western Nigeria [15]. Current research to investigate the pattern of nutrition among day and boarding adolescent secondary school girls is therefore necessary to inform and drive efficient policies that would reduce the effect of malnutrition in Warri South Local Government Area of Delta State, Nigeria.

2. Material and Method

2.1. Study Design

The study design adopted in this study was a comparative cross sectional survey design.

2.2. Scope of the Study

The scope of this study focused on the nutritional status of adolescent girls in secondary schools (day and boarding) in Warri South Local Government Area Delta State.

2.3. Description of the Study Area

The research was carried out in Warri South Local Government Area. It's headquarter is in the city of Warri. The area is predominately riverine with large expanses of mangrove forest and has a land area of approximately, 1520 square meter. It has an area of 633km² and a population of 303,417 at the 2006 census the postal code of the area.

2.4. Inclusion Criteria

The inclusion criteria includes female adolescents, secondary schools both state and federal with a mixture of both boarding and day.

2.5. Exclusion Criteria

The exclusion criteria were male adolescents, private schools and schools with only day or boarding facilities.

2.6. Sample Procedure

A multistage sampling technique was employed. Three schools were selected from the twelve Government secondary Schools because they are the only schools with boarding and day facilities in Warri South Local Government Area.

Simple random sampling was used to select student from different arms in junior and senior secondary school. Anthropometric measurement was carried out using the standard technique; Height, Weight and Body Mass Index was calculated using the standard method [16].

2.7. Sample Size Determination

N-2994 (Population of the schools)

O-0.05 (Expected Frequency)

$$\text{Sample size} = \frac{N}{1 + N O^2}$$

$$\text{Sample Size} = \frac{2994}{1 + (2994 \times 0.05^2)}$$

$$\text{Sample Size} = \frac{2994}{1 + 7.485}$$

$$\text{Sample Size} = \frac{2994}{8.485}$$

$$\text{Sample Size} = 353$$

2.8. Instrument for Data Collection

A semi-structured questionnaire was used to obtain information from the respondents. The questionnaire obtained information on respondents' socio-demographic characteristics, Nutritional pattern of the students, Factors that influences adolescent nutrition and suggestion on how adolescent nutrition can be improved. In addition, Anthropometric measurement of height and weight were also done using standard calibrated instruments.

2.9. Method for Data Analysis

Data generated were analysed using SPSS (Statistical Product and Service Solution) version 15.0 manufactured by IBM incorporated. Descriptive statistics were used to evaluate frequency distribution, while Chi-Square test and ANOVA were used to determine associations between variables of interest with level of significance set at $P < 0.05$. Furthermore, Body Mass Index was calculated and used to determine the nutritional status of the respondents.

2.10. Ethical Issue

Ethical clearance for the study was obtained from the Department of Public and Community Health, Novena University. Also permission was obtained from the Chief Inspector of Education, Ministry of Basic and Secondary Education Warri South Local Government Area.

3. Results

As shown in table 1 below, more than half of the day students 174(53.40%) were between the ages 10-15 years while 117(35.90%) of the boarding students were between the ages 10-15 years. Similarly, almost half of the day students 161(49.40%) were in JSS class, while 91(27.90%) of the boarding students were in JSS class. Furthermore, 101(31.0%) of the day students and 66(20.20%) of the boarding students have been in the school for only a year, while 52(16.0%) of the day students and 35(10.70%) of the boarding students have been in the school for 2 years respectively. The overall mean age for both day and boarding students was 12.27 ± 1.79 years.

Table 1. Socio-demographic characteristics of the respondents.

Variable	Day		Boarding	
	F (192)	%	F (134)	%
Age				
10-15	174	53.40	117	35.90
16-20	18	5.50	17	5.20
Class of the respondents				
JSS	161	49.40	91	27.90
SSS	31	9.50	43	13.20
How long have you been in this school				
1	101	31.0	66	20.20
2	52	16.0	35	10.70
3	10	3.10	10	3.10
4	22	6.70	19	5.80
5	6	1.80	4	1.20
6	1	0.30	0	0.0
Religion				
Christian	188	57.7	132	40.50
Muslim	4	1.2	2	0.60
Tribe				

Variable	Day		Boarding	
	F (192)	%	F (134)	%
Urhobo	72	22.10	42	12.90
Itsekiri	41	12.60	12	3.70
Ijaw	19	5.80	8	2.50
Benin	19	5.80	23	7.10
Igbo	30	9.20	43	13.20
Efik/Ibibio	0	0.0	3	0.90
Yoruba	11	3.40	0	0.0
Isoko	0	0.0	3	0.90

Overall mean age of the students: 12.27 ± 1.79

According to figure 1 below, more than half of the respondents 58.90% were day students, while 41.10% were boarding students respectively.

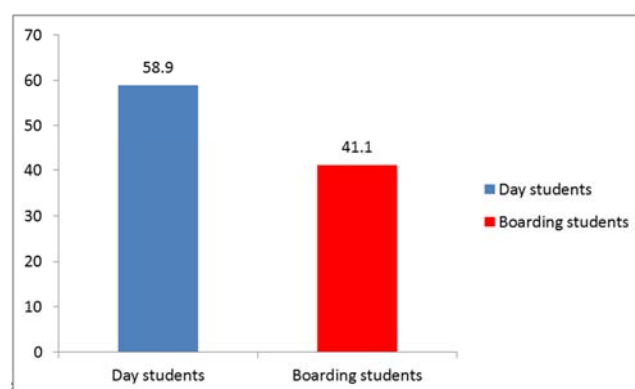


Figure 1. School status of the respondents.

The nutritional pattern of the respondents shows that 119 (36.50%) of the day students and 47 (14.40%) of the boarding students ate beans at least twice a week, while 21 (6.40%) of day students and 38 (11.70%) of boarding students ate beans more than 4 times a week respectively. Furthermore, more than half of the day students 180 (55.20%) and two third of the boarding students 108 (33.10%) affirmed that all their meals contain either meat/fish/egg, while 55 (16.90%), 45 (13.80%) and 42 (12.90%) of the day students said they take fruit 2 times, 3 times and daily respectively; and 21 (6.40%), 11 (3.40%) and 9 (2.80%) of the boarding students said they take fruit once, 2 times and 3 times respectively. In addition, majority of the boarding students 110 (82.10%) affirmed that their school meals adhered to what is written on the menu list, while 87 (64.90%) of the boarding students thinks the school kitchen staff should be in charge of sharing food and 128 (95.50%) said they were fed 3 times a day in the school (Table 2).

Table 2. Nutritional pattern of the students residing at home or hostel.

Variable	Day		Boarding	
	F (192)	%	F (134)	%
How many times do you eat beans in a week				
2 times	119	36.50	47	14.40
3 times	22	6.70	32	9.80
4 times	18	5.50	15	4.60
More than 4 times	21	6.40	38	11.70
Not at all	11	3.40	2	0.60
Once	1	0.30	0	0.0
Does all your meal contain either of the following meat/fish/egg				
Yes	180	55.20	108	33.10
No	12	3.70	26	8.0
Does your school adhere to what is written on the menu list				
Yes			110	82.10
No			24	17.90
How many times do you take fruit daily weekly				
Once	33	10.10	21	6.40
2 times	55	16.90	11	3.40
3 times	45	13.80	9	2.80
Daily	42	12.90	5	1.50
None of the above	17	5.20	88	27.0
How many times do you eat vegetable weekly				
Once	39	12.0	27	8.30
2 times	59	18.10	51	15.60
3 times	45	13.80	16	4.90
4 times and above	27	8.30	22	6.70
None of the above	22	6.70	18	5.50
Does your school/parent have garden				
Yes	70	21.50	66	20.20
No	122	37.40	68	20.90
Who do you think should in charge of sharing food				
Students			18	13.40
Kitchen			87	64.90
Dinning prefect			29	21.60
Are the meals delicious				
Yes			45	33.60
No			89	66.40
Are the meals adequate				
Yes			41	30.60
No			93	69.40
How many times are you fed in a day				
2 times			1	0.70
3 times			128	95.50
4 times			5	3.70
Are the meals served on time				
Yes			81	60.40
No			53	39.60
Are your meals balanced				
Yes			50	37.30
No			84	62.70

According to table 3 below, more of the day 127 (39.0%) and boarding 83 (25.50%) students had literate parents, while 65 (19.90%) of the day students and 83 (25.50%) of the boarding students mothers' were private/government employees respectively. In addition, 96 (29.40%) of the day students and 92 (28.20%) of the boarding had more than five persons residing in their various houses, while less than two third 81 (60.40%) of the boarding students says their boarding fee is not equal to the food they eat in a session and

the reasons given were that because the food they eat is not enough 52 (66.70%), the food is always watery and the food is not delicious 18 (23.10%) respectively. Furthermore, 108 (33.10%) of the day students says they have not suffered any illness in the past two weeks, while 92 (28.20%) of the boarding students affirmed to have suffered illness in the past two weeks. The type of illness respondents highlighted to have suffered in the past two weeks includes malaria, stomach ache and cough/catarrh.

Table 3. Factors that influence adolescent nutrition.

Variable	Day		Boarding	
	F (192)	%	F (134)	%
What is your father's level of education				
Can't read/write	55	16.90	33	24.60
Primary	0	0.0	5	3.70
Secondary	10	3.10	13	9.70
College/University	127	39.0	83	61.90
What is the level of education of your mother				
Can't read/write	48	14.70	29	21.60
Primary	2	0.60	2	19.40
Secondary	18	5.50	5	3.70
College/University	124	38.0	98	73.10
Occupation of mother				
Housewife	9	2.80	3	2.20
Trader	67	20.60	29	21.60
Private/Government employee	65	19.90	83	61.90
Jobless	4	1.20	1	0.70
Nurse	23	7.10	7	5.20
Businesswoman	13	4.0	4	3.0
Tailoring	3	0.90	2	1.50
Doctor	1	0.30	0	0.0
Teacher	7	2.10	5	3.70
How many are you in your house				
Less than five	96	29.40	38	28.40
More than 5	96	29.40	92	68.70
Exactly 5	0	0.0	4	3.0
Does the boarding fee equal to the food you eat in a session				
Yes			53	39.60
No			81	60.40
If no to question				
Because we do not eat enough food			52	66.70
Because the food is always watery			5	6.40
Because the food is not delicious			18	23.10
Because of the number of population, the food is always small			3	3.80
Any illness in the past two weeks				
Yes	84	25.80	92	68.70
No	108	33.10	42	31.30
If yes tick the condition				
Malaria	18	10.20	19	10.80
Stomach ache	12	6.80	30	17.0
Cough/Catarrh	54	30.70	30	17.0
Glaucoma	0	0.0	1	0.60
Body pain and sore throat	0	0.0	8	4.50
Typhoid fever	0	0.0	4	2.30
Do you skip meals				
Yes	80	24.50	80	41.70
No	112	34.40	54	58.30
If yes to question				
I don't eat much	3	1.80	4	2.40
Because I don't like the food	26	15.80	36	21.80
Because the food is not delicious & nutritious	0	0.0	14	8.50
Sometimes I might not be hungry	30	18.20	8	4.80
Because of extra lessons & other school activities	10	6.10	14	8.50
Because it keeps me fit	2	1.20	0	0.0
Whenever I am angry	4	2.40	0	0.0
If the food is delayed & not served on time	5	3.0	0	0.0
Sometimes before I get to the dining hall the food is finished	5	3.0	4	2.40
Do you know that skipping meals can make you fall sick				
Yes	180	55.20	121	37.10
No	12	3.70	13	4.0
Does your culture/religion forbid any food on the menu list				
Yes	6	1.80	0	0.0
No	186	57.10	134	41.10
If yes to question 30 why				
Because it makes me sick	6	100		

Table 4 show the suggestions made by both the day and boarding students on how the government can improve adolescent nutrition includes; assisting the schools by providing more farm produce, increasing the funds for nutrition of adolescents, improving the contents of the food and monitoring the kind of food been served in the school. Furthermore, suggestions on how the school can improve adolescent nutrition by both the day and boarding students includes; providing good and adequate food, ensuring

adequate supply of vegetables and fruits, forming partnership with the government and schools should judiciously make use of the students school fees to improve their nutrition. In addition, suggestions on how the family can improve adolescents nutrition by both the day and boarding students includes; providing food for their children, assisting the school and the government, making sure their children eat enough and providing variety of food for their children.

Table 4. Suggestion of how adolescent nutrition can be improved.

Variable	Day		Boarding	
	F (192)	%	F (134)	%
Suggest ways the government can improve adolescent nutrition				
By increasing the funds for the nutrition of adolescents	77	23.60	36	11.0
They should assist the schools by providing more farm produce	79	24.20	51	15.60
They should try to improve the contents of the food	18	5.50	4	1.20
By monitoring the kind of food been served in the school	7	2.10	23	7.10
Farm produce should be made cheaper in the market	3	0.90	15	4.60
They should provide free food	8	2.50	5	1.50
Suggest ways the school can improve adolescent nutrition				
By providing good & adequate food	62	19.0	33	10.10
They should ensure adequate supply of vegetables & fruits	50	15.30	43	13.20
They should form partnership with government and encourage them to always assist the school	31	9.50	31	9.50
By judiciously making use of the students school fees to improve their nutrition	14	4.30	17	5.20
By making sure that schools sell less of junk food	18	5.50	3	0.90
Students should be taught on the importance of balanced diet to their health	8	2.50	3	0.90
They should listen to the complaints of the students about the food been served	0	0.0	4	1.20
Schools should design & create a nutritious menu list that should be followed strictly	9	2.80	0	0.0
Suggest ways the family can improve adolescent nutrition				
By providing food for their children	68	20.90	39	12.0
By making sure their children eat enough	33	10.10	43	13.20
They should support the school and the government	54	16.60	21	6.40
They should provide variety of food for their children	21	6.40	22	6.70
There should be prompt payment of salaries so parents can provide adequately for the family	9	2.80	4	1.20
Families should make sure children do not skip meals	7	2.10	5	1.50

As shown in figure 2 below, 83.40% of the respondents had normal weight, while 10.10%, 3.40% and 3.10% of the respondents were underweight, obese and overweight respectively.

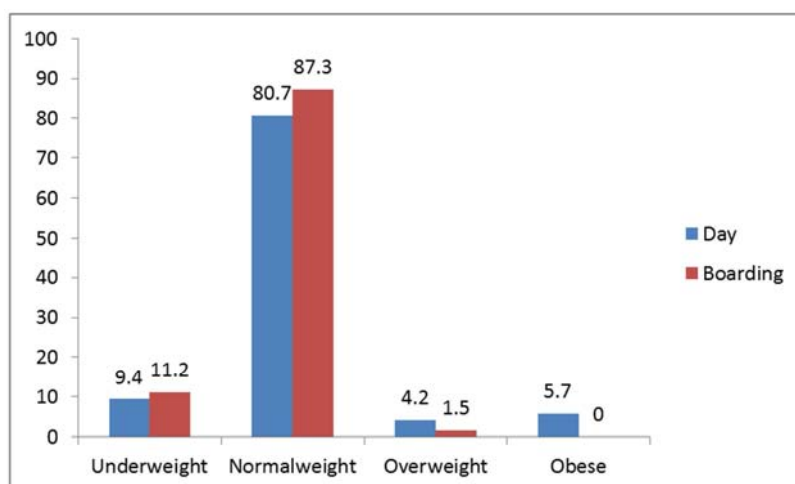


Figure 2. Nutritional status of the day and boarding students according to BMI.

The results from table 5, shows that majority of the female students who were day 155(47.50%) and boarding 117(35.90%) maintained a normal weight. It also shows a significant relationship between the students who were day and

boarding and their nutritional status according to BMI ($P < 0.05$). Therefore, we will reject the null hypothesis which says there is no significant difference between the students that were day or boarding and their nutritional status.

Table 5. Relationship between adolescent girls residing at home and the hostel and their nutritional status according to BMI.

BMI	Status of the students		X ²	df	P-value
	Day	Boarding			
Underweight	18 (5.50%)	15 (4.60%)	10.185	3	0.017
Normal weight	155 (47.50%)	117 (35.90%)			
Overweight	8 (2.50%)	2 (0.60%)			
Obesity	11 (3.40%)	0 (0.0%)			

In table 6 below, the F-value is 1.023 and the significance is 0.313; that is the probability of getting an F value of 1.023, if the hypothesis is true is 0.313. Since this probability is more than 0.05, we will therefore not reject the null hypothesis and conclude that the ages of the students did not have a significant influence on their nutritional status according to BMI.

Table 6. ANOVA table showing the relationship between the ages of the students and their nutritional status according to BMI.

	Sum of squares	df	Mean square	F	P-value
Between groups	20.424	1	20.424	1.023	0.313
Within groups	6467.306	324	19.961		
Total	6487.730	325			

4. Discussion

4.1. Socio-demographic Characteristics

According to the findings, the mean age of the respondents was 12.27±1.79 years with majority in the age bracket of between 10-15 years of age and more as day students 58.90% than boarding students 41.10%. This is similar to the study in Accra Ghana, where non-boarding students were more than boarding students [17]. Age has been shown to be an important determinant of the nutritional status of adolescents. However, the study did not show any significant relationship between the age of both the day and boarding students and their nutritional status according to their Body Mass Index (BMI) classification. This finding is similar to a previous study among female adolescents in Bedelle town in Ethiopia which did not find any significant difference between the ages of the girls and their nutritional status according to BMI classification [18].

4.2. Nutritional Pattern of Both Day and Boarding Students

The overall nutritional status shows that majority 83.40% of both day and boarding students were of normal weight, while 10.10% were underweight and few 3.40% were obese. This is different from the findings of the study in Bangladesh where more of the adolescent girls were underweight [19]; but similar to the study in Accra Ghana where most of the students had normal weight [17]. Furthermore, assessment of the nutritional status of both the day and boarding students show that 11.20% of the boarding students were underweight as compared to 9.40% of the day students, 87.30% were of normal weight as compared to 80.70% of the day students. However, only 4.20% of the day students were overweight as compared to 1.50% of the boarding students and 5.70% of the day students were obese as compared to none among the boarding students. The relationship between the day and boarding students and their nutritional status was statistically significant ($P=0.017$) with boarding students tending to be

more underweight and normal weight than their day counterpart residing at home that tend to be more overweight and obese.

The findings show that both the day and boarding students consumes some amount of protein such as beans, meat, fish and egg per week. This finding is different from the study in Bangladesh where adolescent girls did not consume much of proteinous food such as meat, egg and milk per week [20]. This consumption of protein reflected in their BMI classification with most of them showing normal weight. Also there was a significant difference between the number of times the day students ate beans and their nutritional status ($P=0.01$), while there was no significant difference between the number of times the boarding students ate beans and their nutritional status ($P=0.198$). Similarly, the day students understandably consumed more of fruit and vegetable than the boarding students. This is because they reside at home and they are expected to consume it more than the boarding students whose meal is more regimented. This finding was also different from the study in Bangladesh [20]. In the same vein there was a significant difference between the number of times both day and boarding students took fruit weekly and their nutritional status according to BMI classification ($P=0.000$).

In addition, most of the boarding students affirmed that their meals were not delicious, adequate and balanced, thus making some of them to skip meals which might affect their health and studies. However, most of the students asserted that they were fed three times daily which is similar to previous study in Ethiopia [18].

4.3. Factors That Influence Adolescent Nutrition

There was no significant difference between fathers level of education of both day and boarding students and their nutritional status respectively ($P=0.138$, $P=0.887$). However, there was a significant difference between mothers level of education of day students and their nutritional status according to BMI classification ($P=0.013$) and not with the boarding students ($P=0.096$). Furthermore, there was no

significant difference between mothers occupation of the boarding students and their BMI ($P=0.066$), but there was a significant difference between mothers occupation of the day students and their BMI ($P=0.000$). This result corroborates the role mothers play in the growth and development of their children at home. This finding is similar to previous studies in Bangladesh [21]. In the same vein family size had no significant difference with the nutritional status of both the day and boarding students ($P=0.111$). This finding was different from the study in Ethiopia where family size was significant with nutritional status of adolescent girls [18]. Some of the day and boarding students have suffered some form of illness such as malaria, stomach ache, cough/catarrh in the two weeks preceding the study. This is in line with the studies in Ethiopia and Bangladesh [18], [19]. Some of the boarding students skip meals more as compared to their day counterpart. This is not surprising as many complained of the food not been nutritious and delicious enough. This finding is also in line with the study in Ethiopia [18]. However, unlike the study in Bangladesh almost all the day and boarding students do not have taboo for any food [21].

5. Conclusion

The findings show that both the day and boarding students had normal weight. However, the boarding students tend to be more underweight, while the day students tend to be overweight and obese. In addition, the boarding students complained of their meal not being adequate and delicious and some of them do skip meals thus leading to common ailments among them. Therefore, concerted efforts should be made by all stakeholders in the education industry (Government, School Authorities and Parents) to improve the meal of the students residing in the hostels in secondary schools nationwide; while parents should continually make it a duty to improve the meals of their children at home especially the adolescent girls who are still growing in order to enhance their physical work capacity, reproductive and pregnancy outcomes and birth weight.

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