SNACK AND BEVERAGE CONSUMPTION PATTERNS AMONG UNDERGRADUATES AT A PRIVATE NIGERIAN UNIVERSITY

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ABSTRACT

Dietary habits which influence health are generally developed over a period of time. The high rates of snacking and the consumption pattern of snacks and beverages in adolescence and young adulthood have been associated with the risk of malnutrition. This study was designed to assess the consumption pattern of snacks and beverages of undergraduate students at Bowen University, Iwo Osun State, Nigeria.

Selected (170 females and 146 males) undergraduate students participated in a descriptive cross-sectional study using a structured self-administered questionnaire to obtain information on the socio-demographic characteristics, lifestyle practices, dietary habits, and factors influencing choice of snacks and beverages. A snack and beverage consumption frequency questionnaire was used to collect data. Body mass indices were obtained and descriptive and inferential statistical analysis at $p<0.05$ was carried out.

Results showed that 53.2% of the respondents spent between ₦100-₦300 ($0.3 - $1) on snacks and beverages daily, 7.9% spend less while the remaining 38.9% spend more than N300 ($1) on snacks and beverages daily. Drink and snack options that were high in calories such as sugary carbonated drinks, cookies, cakes and pastries were consumed more sometimes than fruits and fruit juice. Preference, availability, quality, distance from hall of residence and price were major factors influencing the choices of snacks and beverages. Very few respondents consumed fruits (16.1%) and vegetables (10.1%) daily. About half of the respondents (46.5%) did not engage in any form of physical exercise except from school and domestic activities. Most of the adolescent respondents (94.9%) and 67.3% of the young adult respondents were of normal body weight. However, 2.5% of the young adult respondents were underweight while 25.2% were overweight and 5.0% were obese.

There was no significant difference between snack and beverage consumption frequency of male and female respondents, and there was no association between the body mass index of respondents and their snack and beverage consumption frequency except for biscuits and pastries, frequency of consumption of which was associated with higher BMI. Further studies could be done to explore the lack of association for other snacks and beverages.

Key words: Snacks consumption, Beverages, Adolescence, Young Adult

INTRODUCTION

Adolescence is a period for catch-up growth (Golden, 1994; Dewey and Begum, 2011; Thurman, 2013; Prentice *et al*., 2013;) and marks the last window of opportunity to reverse stunting (The Save the Children Fund, 2015). The periods of adolescence and young adulthood are characterized by rapid biological and socio-emotional changes (GAIN, 2018), which is second only to the first year after birth (The Save the Children Fund, 2015). This rapid growth causes an increase in the nutritional requirements and increases the risk of malnutrition. While there are differences in defining snacks, several studies indicate high rates of snacking in young people (Mithra *et al*., 2018). Snacking behaviours may result in skipping of regular meals, especially with high-frequency, increasing the risk of malnutrition (Nickols-Richardson *et al*., 2014; American Dietetic Association Foundation Survey, 2014). Malnutrition in any of its forms (overweight, undernutrition and or micronutrient deficiency) during adolescence can have permanent consequences on health. Adolescence is an important intervention period in the life cycle, as lifelong dietary and lifestyle habits are established then.

While several studies have revealed that there is an association between frequent snacking and higher total caloric intake (USDA, 2006; Sebastian *et al*., 2008; Keast *et al*., 2010), some studies have reported no relationship between snacking behaviour and weight status, while others have found that young people who consume more snacks are more likely to be overweight (Larson and Story, 2013). Obtaining reliable data on snack and beverage consumption is a necessary tool in health promotion and prediction of disease risk, particularly for cardiovascular diseases.
Although some research has been done on snacking patterns in adolescents in Nigeria, there is no recent data on the consumption pattern of snacks and beverages of private university undergraduates. Hence this study aimed at assessing the consumption pattern of snacks and beverages and possible effects on the nutritional status of undergraduate students of Bowen University, Iwo, Osun State, Nigeria.

METHODS

Study Design and population

This study was a descriptive cross-sectional study design and target population of this study was male and female undergraduate students of Bowen University in Iwo, Osun State, Nigeria. Data were collected over the period of one month between April and May, 2019.

Sample Size Determination

The sample size was determined by using the formula for determining the sample size for a cross sectional study. The Fisher *et al*. (1991) method of sample size determination for unknown population size was used with 10% percentage error hence n = 423. However, only three hundred and sixteen (316) which represented about 10% of the undergraduate population, were willing to participate in the study during the study period.

Inclusion criteria

The study sample included only apparently healthy undergraduate adolescent and young adult students of Bowen University with ages ranging from 15-25 years.

Sample Selection

Representative samples were selected using a multi stage sampling technique. First Stage: There are six (6) Faculties in the University, four Departments each from the faculties were selected by balloting. Second stage: From the selected Departments, proportions were selected by stratified random sampling technique depending on the number of students in each department and the ratio of males to females.

Data collection

Structured self-administered questionnaires were used to collect data on socio-demographic characteristics of respondents, health status of respondents, lifestyle practices, dietary habits, factors influencing choice of snacks and beverages and snack and beverage consumption frequency. A portable bathroom scale, height meter, and non-stretchable tape rule were used for taking anthropometric measurements.

Heights were measured (in cm) using the stadiometer, while weights were measured using a sensitive bathroom scale. Each subject was made to stand erect on the scale with light clothing and without shoes. The readings were taken in 0.1 kg. The scale reading was always checked to return to zero before the next subject was asked to stand on it. Individual heights and weights were then used to calculate Body Mass Index (BMI = Weight/Height^2) in kg/m^2.

Data Analysis

The WHO AnthroPlus software was used to analyse the height and weight measurements of the adolescents (15-19 years) while the WHO BMI classification was used for young adults (20- 25 years). Statistical data were analysed by using statistical package for social sciences (SPSS) version 21.0. The associations between body mass index and snack and beverage consumption frequency as well as the associations between body mass index and nutrient intake from snack and beverage consumption were examined using Chi-square test at a level of 95% CI.

Ethical Consideration

Ethical approval and permission were obtained from the university management and informed consent was obtained from the participants after the detailed explanation of the objectives of the study.

RESULTS AND DISCUSSION

A majority of respondents (72%) received between ₦20,000-₦40,000 ($55-$110) monthly allowance and 79% spent between ₦100-₦500 ($0.3-$1.50) on snacks and beverages daily (Table 1). It is expected that a student will need more than N1000 per day to thrive well in a campus like Bowen University where the students are not allowed to cook but have to buy all their meals. This suggests that the socioeconomic status (specifically the income) of a majority of the respondents was somewhat low. Low socioeconomic status has been associated with inadequate dietary intake and malnutrition in several studies (Joshi *et al*., 2014).

Studies have reported mixed results in the association between gender and snacking frequencies (Mithra, *et al*., 2018). In this study, there was no significant association between snack and beverage consumption frequency and gender (Tables 2 and 3). This is contrary to the findings of Jahns *et al*. (2001) and de Bruijn *et al*. (2005) that frequent snacking is more common in boys than it is in girls. This may be because all the students have access to the same types of snacks and meals, and the students are restricted to the snacks, beverages and meals sold on the University campus, as they are not allowed to go off campus except during their vacation period.

The factors influencing choice of snack and beverages consumed frequently (Table 4) by a majority of the respondents were preference, availability, quality, distance from hall of residence and price. Poor dietary habits (Table 5) practiced by the respondents included skipping meals, replacement of meals with snacks and frequent consumption of calorie-high snacks and beverages. Drink and snack options that are high in calories such as sugary carbonated drinks, cookies, cakes and pastries were consumed more sometimes than fruits and fruit juice. The frequent consumption of snacks and beverages which are high in calories has been associated with energy imbalance and increased body mass index (Duffey and Popkin, 2011; Duffey and Popkin, 2013). Fruits and vegetables provide good sources of minerals and vitamins which are essential in the prevention of diseases. Very few respondents consumed fruits and vegetables daily.

Most of the respondents drank water daily and fewer respondents skipped a whole day without eating. Several studies have reported higher frequencies of meal skipping in male respondents than in female respondents (Shaw, 1998; Keski-Rahonen *et al*., 2003), but Mithra *et al*. (2018) found that females were more likely to skip meals. In the present study, however, there was no significant association between skipping of meals and gender. This may also be as a result of the fact that all the students have access to the same types of snacks and meals, the males and females have good cafeterias close to their halls of residence and in the classroom areas.

Physical exercise is any planned physical activity that results in energy expenditure with the aim of improving or maintaining physical fitness (Boreham and Murphy, 2005). The results of this study show that there were poor exercise practices among the respondents (Table 6). A large percentage of respondents did not engage in any form of physical exercise apart from school and home activities. This is similar to the findings of Musaiger and Kalam (2014). However, even though many of them reported not engaging in any planned physical activity, their activity level seems to be moderately high, as so many of them have to do a lot of walking within the university campus.

A majority of the adolescent and young adult respondents were of normal body mass index for age and body mass index respectively (Tables 7a and 7b). However, 31.2% of the adolescent respondents were overweight or obese and 27.7% of the young adults were overweight while 5% were obese. A few young adults (1.8%) were underweight. This indicates that a majority of the respondents were at low risk of obesity related diseases, but the overweight and obese population need to work on their weight through physical activity and consumption of appropriate diets.

We found no significant association between BMI and gender, and there was no association between BMI and socioeconomic status except for between ethnicity and gender. This is contrary to the findings of Joshi *et al*. (2014) who carried out a study to determine the relationship between

Table 1 Socioeconomic and Demographic characteristics of female vs male respondents (n=316)

Variable	Female n(%)	Male n(%)	Total n(%)
Age			
15-18yrs	57(33.7)	39(26.5)	96(30.4)
19-25yrs	112(66.3)	108(73.5)	220(69.6)
Religion			
Christianity	153(90.5)	130(88.4)	283(89.6)
Islam	14(8.3)	12(8.2)	26(8.2)
Others	2(1.2)	5(3.4)	7(2.2)
Ethnicity			
Hausa	13(7.7)	8(5.4)	21(6.6)
Igbo	17(10.1)	19(12.9)	36(11.4)
Yoruba	118(69.8)	95(64.6)	213(67.4)
Others	21(12.4)	25(17.0)	46(14.6)
Sponsor's occupation			
Farmer	10(5.9)	13(8.8)	23(7.3)
Civil servant	49(29.0)	39(26.5)	88(27.8)
Petty trader	0(0.0)	1(0.7)	1(0.3)
Big businessman/woman	61(36.1)	56(38.1)	117(37.0)
Artisan	9(5.3)	6(4.1)	15(4.7)
Others	40(23.7)	32(21.8)	72(22.8)
Monthly allowance (₦)			
<20,000	25(14.8)	12(8.2)	37(11.7)
20,000-30,000	82(48.5)	58(39.5)	140(44.3)
30,000-40,000	38(22.5)	50(34.0)	88(27.8)
>40,000	24(14.2)	27(18.4)	51(16.1)
Daily spending on snacks/beverages (₦) (n=314)			
0	9(5.3)	2(1.4)	11(3.5)
<100	6(3.6)	8(5.4)	14(4.4)
100-300	104(61.5)	64(43.5)	168(53.2)
300-500	37(21.9)	44(29.9)	81(25.6)
500-700	3(1.8)	6(4.1)	9(2.8)
700-900	3(1.8)	7(4.8)	10(3.2)
>900	5(3.0)	16(10.9)	21(6.6)

Table 2 Gender differences in frequency of snack consumption and gender differences (n=316)

Variable	Female n (%)	Male n (%)	Total n (%)	$X2$	p-value
Pastries (such as doughnut, puff-puff, Buns)					
Never	17(10.0)	15(10.3)	32(10.1)	12.897	0.045*
1x daily	45(26.5)	49(33.6)	94(29.7)		
2x daily	6(3.5)	2(1.4)	8(2.5)		
3x daily	3(1.8)	3(2.1)	6(1.9)		
Rarely	52(30.6)	24(16.4)	76(24.1)		
Occasionally	21(12.4)	17(11.6)	38(12.0)		
Sometimes	26(15.3)	36(24.7)	62(19.6)		
Biscuits					
Never	28(16.5)	19(13.0)	47(14.9)	6.249	0.396
1x daily	14(8.2)	18(12.7)	32(10.1)		
2x daily	8(4.7)	4(2.7)	12(3.8)		
3x daily	1(0.6)	4(2.7)	5(1.6)		
Rarely	50(29.4)	45(30.8)	95(30.1)		
Occasionally	33(19.4)	32(21.9)	65(20.6)		
Sometimes	36(21.2)	24(16.4)	60(19.0)		
Cakes (n=315)					
Never	17(10.0)	23(15.8)	40(12.7)	7.033	0.318
1x daily	5(2.9)	8(5.5)	13(4.1)		
2x daily	0(0.0)	1(0.7)	1(0.3)		
3x daily	3(1.8)	3(2.1)	6(1.9)		
Rarely	85(50.0)	56(38.4)	141(44.6)		
Occasionally	44(25.9)	41(28.1)	85(26.9)		
Sometimes	16(9.4)	13(8.9)	29(9.2)		
Cookies					
Never	16(9.4)	23(15.8)	39(12.3)	3.993	0.550
1x daily	13(7.6)	12(8.2)	25(7.9)		
2x daily	3(1.8)	3(2.1)	6(1.9)		
3x daily	0(0.0)	0(0.0)	0(0.0)		
Rarely	76(44.7)	54(37.0)	130(41.1)		
Occasionally	36(21.2)	29(19.9)	65(20.6)		
Sometimes	26(15.3)	25(17.1)	51(16.1)		
Chips					
Never	15(8.8)	14(9.6)	29(9.2)	8.716	0.121
1x daily	11(6.5)	14(9.6)	25(7.9)		
2x daily	4(2.4)	3(2.1)	7(2.2)		
3x daily	0(0.0)	0(0.0)	0(0.0)		
Rarely	79(46.5)	45(30.8)	81(39.2)		
Occasionally	38(22.4)	43(29.5)	124(25.6)		
Sometimes	23(13.5)	27(18.5)	50(15.8)		

Cheese balls					
Never	37(21.8)	43(29.5)	80(25.3)	6.649	0.355
1x daily	8(4.7)	9(6.2)	17(5.4)		
2x daily	1(0.6)	2(1.4)	3(0.9)		
3x daily	1(0.6)	1(0.7)	2(0.6)		
Rarely	84(49.4)	52(35.6)	136(43.0)		
Occasionally	28(16.5)	27(18.5)	55(17.4)		
Sometimes	11(6.5)	12(8.2)	23(7.3)		
Chin-chin (n=312)					
Never	36(21.2)	32(22.1)	68(21.5)	8.705	0.191
1x daily	4(2.4)	13(9.0)	17(5.4)		
2x daily	1(0.6)	0(0.0)	1(0.3)		
3x daily	2(1.2)	2(1.4)	4(1.3)		
Rarely	71(42.5)	58(40.0)	129(40.8)		
Occasionally	31(18.6)	19(13.1)	50(15.8)		
Sometimes	22(13.2)	21(14.5)	43(13.6)		
Fruits					
Never	12(7.1)	22(15.1)	34(10.8)		
1x daily	19(11.2)	15(10.3)	34(10.8)	6.240	0.284
2x daily	7(4.1)	4(2.7)	11(3.5)		
3x daily	0(0.0)	0(0.0)	0(0.0)		
Rarely	57(33.5)	47(32.2)	104(32.9)		
Occasionally	39(22.9)	26(17.8)	65(20.6)		
Sometimes	36(21.2)	32(21.9)	68(21.5)		

Rarely: consumption 1-2 times weekly; Occasionally: consumption 2-4 times weekly
Sometimes: consumption 4-6 times weekly
*: significantly associated with gender ($p<0.05$)

socioeconomic status and the nutritional status of adolescent girls. The nutritional status of adolescents in low-income families was observed to be low. The results of the association between body mass index and socioeconomic status of respondents in this study are also contrary to the findings of Venkaiah, *et al*., (2002), Choudhary *et al*., (2009) and Akhter and Sondhya (2013). This may be because the socioeconomic status of the students is not fully expressed on the campus due to their confinement. They all live in the hostels and are not allowed to go out except during their holidays. Hence, they are limited to the choices of foods, snacks and beverages available to them on campus.

Limitations of this study include the use of simple equipment for anthropometric measurements and the lack of taking into account the weight of clothing the students were wearing at the time. Socioeconomic status of the students' families was not known, only their monthly stipends.

Table 3. Gender differences in frequency of beverage consumption (n=316)

Variable	Female n (%)	Male n (%)	Total n (%)	*X*2	p-value
Sugary carbonated drinks (Fanta, Coca-Cola, Pepsi, *Smoov*)	17(10.0)	18(12.3)	35(11.1)		
Never	43(25.3)	49(33.6)	92(29.1)	9.896	0.129
1x daily	14(8.2)	8(5.5)	22(7.0)		
2x daily	10(5.9)	13(8.9)	23(7.3)		
3x daily	27(15.9)	12(8.2)	39(12.3)		
Rarely	27(15.9)	15(10.3)	42(13.3)		
Occasionally	32(18.8)	31(21.2)	63(19.9)		
Sometimes					
Fruit juice					
Never	17(10.0)	17(11.6)	34(10.8)	1.494	0.914
1x daily	15(8.8)	15(10.3)	30(9.5)		
2x daily	0(0.0)	0(0.0)	12(3.8)		
3x daily	5 (2.9)	7 (4.8)	0(0.00)		
Rarely	64 (37.6)	54 (37.0)	118(37.3)		
Occasionally	44 (25.9)	33 (22.6)	77(24.4)		
Sometimes	25 (14.7)	20 (13.7)	45(14.2)		
Sugary chocolate beverages (like milo, ovaltine) (n=312)					
Never	16(9.5)	16(11.1)	32(10.2)	3.905	0.690
1x daily	21(12.5)	22(15.3)	43(13.6)		
2x daily	2(1.2)	4(2.8)	6(1.9)		
3x daily	5(3.0)	6(4.2)	11(3.5)		
Rarely	40(23.8)	38(26.4)	78(24.7)		
Occasionally	35(20.8)	26(18.1)	61(19.3)		
Sometimes	49(29.2)	32(22.2)	81(25.6)		
Tea (with sugar)					
Never	35(20.6)	36(24.7)	71(22.5)	3.620	0.605
1x daily	13(7.6)	11(7.5)	24(7.6)		
2x daily	2(1.2)	2(1.4)	4(1.2)		
3x daily	0(0.0)	0(0.0)	0(0.0)		
Rarely	54(31.8)	47(32.2)	101(32.0)		
Occasionally	27(15.9)	28(19.2)	55(17.4)		
Sometimes	39(22.9)	22(15.1)	61(19.3)		
***Zobo* drink**					
Never	20(11.8)	27(18.5)	47(14.9)	6.290	0.179
1x daily	34(20.0)	18(12.3)	52(16.5)		
2x daily	0(0.0)	0(0.0)	0(0.0)		
3x daily	0(0.0)	0(0.0)	0(0.0)		
Rarely	59(34.7)	56(38.4)	115(36.4)		

Occasionally	39(22.9)	34(23.3)	73(23.1)		
Sometimes	18(10.6)	11(7.5)	29(9.2)		
Yogurt					
Never	21(12.4)	20(13.7)	41(13.0)	1.240	0.941
1x daily	23(13.5)	25(17.1)	48(15.2)		
2x daily	0(0.0)	0(0.0)	0(0.0)		
3x daily	7(4.1)	5(3.4)	12(3.8)		
Rarely	67(39.4)	56(38.4)	123(38.9)		
Occasionally	30(17.6)	22(15.1)	52(16.5)		
Sometimes	22(12.9)	18(12.3)	40(12.7)		
Water (n=315)					
Never	0(0.0)	0(0.0)	0(0.0)	2.202	0.699
1x daily	14(8.2)	8(5.5)	22(7.0)		
2x daily	31(18.2)	22(15.1)	53(16.8)		
3x daily	115(67.6)	105(71.9)	220(69.8)		
Rarely	0(0.0)	0(0.0)	0(0.0)		
Occasionally	2(1.2)	2(1.4)	4(1.3)		
Sometimes	7(4.1)	9(6.2)	16(5.1)		

Rarely: consumption 1-2 times weekly; occasionally: consumption 2-4 times weekly
Sometimes: consumption 4-6 times weekly.

Zobo is a locally made drink from the dried leaves of roselle

CONCLUSIONS

Generally, the students of Bowen University consumed high calorie snacks and beverages sometimes. There was however no significant difference in snack and beverage consumption frequency of male and female respondents. Factors influencing the choices of snacks and beverages among respondents included price, availability, distance from hall of residence, quality and preference. The results of this study showed that there was little significant association between the body mass index of respondents and snack and beverage consumption frequency.
Further studies with other adolescents and young adults in a similar private unit context is recommended for proper comparison of results.

Table 4 Gender differences in factors influencing choice of snacks/beverage (n=316)

Variable	Female n (%)	Male n (%)	Total n (%)	$X2$	P-value
Price					
Yes	96(56.8)	75(51.0)	171(54.1)	1.285	0.257
No	73(43.2)	72(49.0)	145(45.9)		
Availability					
Yes	112(66.3)	87(59.2)	199(63.0)	1.334	0.248
No	57(33.7)	60(40.8)	117(37.0)		
Distance from hall of residence					
Yes	93(55.0)	90(61.2)	183(57.9)	1.551	0.213
No	76(45.0)	57(38.8)	133(42.1)		
Quality					
Yes	92(54.5)	92(62.6)	184(58.2)	2.556	0.110
No	78(45.5)	54(37.4)	132(41.8)		
Cultural beliefs					
Yes	15(8.9)	14(9.5)	29(9.2)	0.055	0.814
No	154(91.1)	133(90.5)	287(90.8)		
Preference					
Yes	115(68.0)	107(72.8)	222(70.3)	1.196	0.274
No	54(32.0)	40(27.2)	94(29.7)		
Peer pressure					
Yes	50(29.6)	35(23.8)	85(26.9)	1.182	0.277
No	119(70.4)	112(76.2)	231(73.1)		

*: significantly associated with gender ($p<0.05$)

Table 5. Gender differences in dietary habits of respondents (n=316)

Variable	Female n (%)	Male n (%)	Total n (%)	$X2$	p-value
Eat fruits everyday					
Yes	30(17.8)	21(14.3)	51(16.1)		
No	139(82.2)	126(85.7)	265(83.9)	0.618	0.432
Eat fruits <3x a week					
Yes	84(49.7)	89(60.5)	173(54.7)		
No	85(50.3)	58(39.5)	143(45.3)	4.227	0.040*
Eat vegetables everyday					
Yes	18(10.7)	14(9.5)	32(10.1)		
No	151(89.3)	133(90.5)	284(89.9)	0.086	0.769
Eat vegetables <3x a week					
Yes	84(49.7)	79(53.7)	163(51.6)	0.694	0.405
No	85(50.3)	68(46.3)	153(48.4)		
Rely on snacks/beverages due to insufficient funds					
Yes	49(29.0)	54(36.7)	103(32.6)	2.382	0.123
No	120(71.0)	93(63.3)	213(67.4)		
Take at least 3 or more sachets of water					
Yes	145(85.8)	127(86.4)	272(86.1)		
No	24(14.2)	20(13.6)	44(13.9)	0.012	0.915
Skip meals due to insufficient funds					
Yes	87(51.5)	63(42.9)	150(47.5)		
No	82(48.5)	84(57.1)	166(52.5)	2.724	0.099
Skip a whole day without eating					
Yes	56(33.1)	39(26.5)	95(30.1)		
No	113(66.9)	108(73.5)	221(69.9)	2.102	0.147

*: significantly associated with gender ($p<0.05$)

Table 6. Gender differences in lifestyle practices of respondents (n=316)

Variable	Female n (%)	Male n (%)	Total n (%)	$X2$	p-value
Engage in physical exercise >3x/ week					
Yes	54(31.9)	68(46.5)	122(38.6)		
No	115(68.1)	79(53.5)	194(61.4)	-0.152	0.007*
Engage in physical exercise <3x/week					
Yes	46(27.2)	39(26.5)	85(26.9)		
No	123(72.8)	108(73.5)	231(73.1)	0.004	0.945
No physical exercise					
Yes					
No	88(52.1)	60(40.8)	147(46.5)		
	81(47.9)	87(59.2)	169(53.5)	0.113	0.004*
Nutrient supplement use					
Yes	59(34.9)	58(39.5)	117(37.0)		
No	110(65.1)	89(60.5)	199(63.0)	-0.052	0.357
Easily stressed					
Yes	108(63.9)	91(61.9)	199(63.0)		
No	61(36.1)	56(38.1)	117(37.0)	0.012	0.826

*: significantly associated with gender ($p<0.05$)

Table 7a. Gender differences in body mass index for age Z score of adolescent respondents (n=96)

Variable	Female n (%)	Male n (%)	Total n (%)	$X2$	p-value
Overweight (> +2 SD)	15(26.3)	15(38.6)	30(31.2)	0.881	0.460
Adequately nourished (< +2S.D to> -2SD)	39(68.4)	24(61.4)	63(65.6)		
Moderately undernourished (<-2 SD)	3(5.3)	0(0.0)	3(3.2)		
Severely undernourished (<-3 SD)	0(0.0)	0(0.0)	0(0.0)		
Total	57	39	96		

Table 7b. Gender differences in body mass index of young adult respondents (n=220)

Variable	Female n (%)	Male n (%)	Total n (%)	*X*2	p-value
Underweight <18.5	2(1.8)	2(1.9)	4(1.8)	0.142	0.358
Normal weight 18.5-24.9	67(59.8)	77(71.3)	144(65.5)		
Overweight 25-29.9	36(32.1)	25(23.1)	61(27.7)		
Obese 30-39.9	7(6.3)	4(3.7)	11(5.0)		
Very obese >40	0(0.0)	0(0.0)	0(0.0)		
Total	112 (100)	108(100)	220(100)		

Table 8. Association between, age, gender, snack and beverage consumption frequency, and body mass index of respondents

Variable	*X*2	p-value
Age	32.059	0.365
Gender	1.817	0.637
Sponsor's occupation	14.658	0.476
Ethnicity	17.473	0.042*
Monthly allowance	2.120	0.989
Daily spending on snack	18.239	0.440
Pastries (such as doughnut, puff-puff, Buns)	13.114	0.785
Biscuits	11.812	0.857
Cakes (n=315)	11.581	0.868
Cookies	12.924	0.608
Chips	26.937	0.029*
Cheese balls	11.434	0.936
Chin-chin (n=312)	14.661	0.685
Fruits	6.312	0.974
Carbonated drinks (such as Fanta, Coca-Cola, Pepsi, Smoov)	14.685	0.683
Fruit juice	11.218	0.737
Chocolate beverage (like milo, ovaltine) (n=312)	16.491	0.924
Tea	10.382	0.795
***Zobo* drink**	10.298	0.590
Yogurt	16.224	0.367
Water (n=315)	16.639	0.164

*: significantly associated with body mass index ($p<0.05$)
Zobo is a locally made drink from the dried leaves of roselle

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