

## Research

# The Food Consumption Pattern of Adolescents in Ibadan

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Dietary behaviours of adolescents drive the development of chronic non-communicable diseases later in life. A semi-structured questionnaire was used to obtain information from 800 students at 9 schools in Ibadan, Nigeria and a 74-item food frequency questionnaire was used to assess the frequency of intake of specific foods. Roots and tubers and cereals and legumes were the most commonly consumed food groups. Daily intake of the most commonly consumed fruits was reported by 26.5% (tangerine), 28.0% (pawpaw) and 37.8% (orange). 40.9% reported daily consumption of tomato. 43.2% and 41.8% respectively consumed carbonated drinks and chocolate-flavoured drinks daily. There is a need for the promotion of healthier food choices in these schools.

## INTRODUCTION

Adolescence is an important growth period, with implications for future nutrition status and food consumption habits. Dietary behaviours that drive the major chronic degenerative diseases start or are reinforced during adolescence (Beal, Morris, and Tumilowicz 2019; Rathi, Riddell, and Worsley 2017; Lakshmi 2021).

Adolescent diets are typically characterized by low intakes of fruits and vegetables and high intakes of energy-dense foods. This makes them susceptible to the development of overweight/obesity and chronic non-communicable diseases later in life (Beal, Morris, and Tumilowicz 2019; Al-Jawaldeh, Taktouk, and Nasreddine 2020; Leal et al. 2010).

There is a paucity of data on the food consumption pattern of adolescents in Oyo State, Nigeria. The objective of this study was to describe the food consumption pattern of adolescents in schools in its largest city, Ibadan..

## METHODS

### STUDY DESIGN AND POPULATION

The study utilized a descriptive, cross-sectional design. The study respondents comprised adolescents between the ages of 10 and 19 years, from three selected local government areas (LGAs) in Ibadan, Nigeria.

### SAMPLE SIZE DETERMINATION

The minimum sample size was determined using Cochran's formula, where  $p$  is 21.56% (Nwosu et al. 2022). Hence,  $n =$

264 per LGA. However, eight hundred were willing to participate in the study, all of whom were recruited.

### INCLUSION CRITERIA

Adolescents between the ages of 10 - 19 years at the time of the study who gave their consent to participate in the study.

### SAMPLE SELECTION

A 3-stage sampling procedure was used to select the study respondents. The first stage involved the random selection of 3 Local Government Areas by balloting. The second stage involved the random selection of 9 schools by balloting. The third stage involved the random selection of the respondents from each of the selected schools. The class list was used as the sampling frame. The respondents were selected by systematic random sampling, using an appropriate sampling interval after the first number had been randomly selected.

### DATA COLLECTION

A semi-structured questionnaire was used to collect data on the respondents. A modified 74-item food frequency questionnaire was used to assess the dietary pattern. The frequency of intake of five food groups was assessed, namely: roots and tubers, cereals and legumes, fruits and vegetables, meat and meat products, and fats and oils. Each food item had a choice of 11 frequencies, namely: daily (1x), daily (2x), daily (3x), weekly (1x), weekly (2x), weekly (3x), monthly (1x), monthly (2x), monthly (3x), rarely and never. This was recategorized as daily ( $\geq 7/\text{wk}$ ), frequently (3 – 6/wk), occasionally (1 – 2wk), rarely and never ( $< 1/\text{wk}$ ). Foods that were consumed daily and frequently (3 – 6 times

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**Table 1. Weekly consumption of roots and tubers**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
<i>Gari</i>	47(5.9)	25(3.1)	106(13.2)	156(19.5)	439(54.9)
<i>Eba</i>	81(10.1)	39(4.9)	172(21.5)	199(24.9)	270(33.8)
<i>Fufu</i>	126(15.8)	49(6.1)	199(24.9)	175(21.9)	168(21.0)
<i>Lafun</i>	148(15.8)	62(7.8)	181(22.6)	138(17.2)	158(19.8)
<i>Yam</i>	47(5.9)	48(6.0)	183(22.9)	184(23.0)	209(26.1)
<i>Elubo</i>	85(10.6)	34(4.2)	171(21.4)	219(27.4)	197(24.6)
<i>Plantain</i>	57(7.1)	36(4.5)	157(19.6)	237(29.6)	186(23.2)
<i>Cocoyam</i>	166(20.8)	138(17.2)	118(14.2)	104(13.0)	111(13.9)
<i>Potato</i>	89(11.1)	77(9.6)	126(15.8)	235(29.4)	156(19.5)

  

Food item	Male		Female		χ <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
<i>Gari</i>	329(41.2)	54(1.4)	266(33.2)	77(9.5)	19.847	.006
<i>Eba</i>	252(31.6)	110(13.8)	217(27.1)	101(12.7)	8.437	.296
<i>Fufu</i>	193(24.1)	134(16.8)	150(18.8)	114(14.3)	11.598	.115
<i>Lafun</i>	163(20.4)	126(15.8)	133(16.7)	117(14.7)	5.854	.557
<i>Yam</i>	214(26.7)	111(13.9)	179(22.4)	120(15.0)	16.418	.022
<i>Elubo</i>	233(29.1)	92(11.5)	183(22.9)	113(14.2)	8.167	.318
<i>Plantain</i>	229(28.6)	93(11.6)	194(24.3)	100(12.5)	6.144	.523
<i>Cocoyam</i>	123(15.4)	142(17.7)	92(11.5)	114(14.2)	14.931	.037
<i>Potato</i>	197(24.7)	111(13.9)	194(24.3)	92(11.4)	3.401	.846

*Gari* (cassava flakes), *eba* (cooked cassava flakes), *lafun* (cassava flour), *fufu* (pounded cassava), *elubo* (yam flour)

a week) were categorized as frequently consumed, while foods consumed less than three times a week were categorized as infrequently consumed.

#### DATA ANALYSIS

The questionnaires were sorted and analysed using the Statistical Package for Social Sciences (SPSS, v.20). Descriptive and inferential statistical analysis at  $P < 0.05$  was carried out.

#### ETHICAL CONSIDERATIONS

Ethical approval was obtained from the UI/UCH Institutional Review Board, with number UI/EC/18/0179. Approval was also obtained from the school authorities and informed consent was sought from the respondents after they had been duly informed about the objectives of the study.

#### RESULTS

A total of 800 secondary school students participated in this cross-sectional study. About 52.4% of the respondents were male. The mean age, weight and height of the students were  $15.3 \pm 1.30$  years,  $49.1 \pm 14.22$ kg and  $1.6 \pm 0.17$ m, respectively. Some of the foods consumed in this study area include: *lafun* (cassava flour), *fufu* (pounded cassava), *elubo*

(yam flour), *ewedu* (jute), *akara* (bean balls) *gari* (cassava flakes) and *moi moi* (bean pudding).

From [Table 1](#), about 54.9% of the respondents consumed *gari* (cassava flakes) on a daily basis. As shown in [Tables 2](#) and [3](#), 74.8% of the respondents consumed rice on a daily basis, while beans was consumed by 44.8% on a daily basis. *Indomie* (noodles) and spaghetti, which are known delicacies with adolescent groups such as these, were consumed by 42% and 31.8% of the respondents daily, respectively. Less than 30% of the respondents consumed cereals and legumes about three times a week.

As shown in [Table 4](#), *efo* (green leafy vegetables) and tomato were consumed by 35.5% and 40.9% of the respondents on a daily basis. There was a significant difference in the consumption of fruits and vegetables by the male and female respondents, with the exception of pineapple and pawpaw.

About 60.2% and 72.6% of the respondents consumed beef and fish, respectively, on a daily basis. Egg was consumed by 45.4% of the respondents daily. There was no significant difference in the consumption of meat and meat products by the male and female respondents, except for turkey and snail which were consumed more by the female respondents ([Table 5](#)).

From [Table 6](#), 50% and 50.9% of the respondents consumed palm oil and vegetable oil, respectively, on a daily basis. In general, male respondents were more likely to

**Table 2. Weekly consumption of cereals**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
Rice	8(1.0)	9(1.1)	34(4.2)	14(15.5)	598(74.8)
Maize	13(1.6)	51(6.4)	148(18.5)	186(23.2)	219(27.4)
White bread	17(2.1)	78(9.8)	136(17.0)	190(23.8)	321(40.1)
Pap	59(7.4)	167(20.9)	123(15.4)	137(17.1)	197(24.6)
Indomie	17(2.1)	22(2.8)	140(17.5)	213(26.6)	336(42.0)
Spaghetti	16(2.0)	30(3.8)	237(29.6)	179(22.4)	254(31.8)

  

Food item	Male		Female		X <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
Rice	382(47.7)	19(2.3)	340(42.5)	24(3.0)	8.918	.349
Maize	222(27.8)	93(11.6)	183(22.9)	106(13.3)	15.090	.035
White bread	284(35.5)	105(13.2)	227(28.4)	109(13.6)	17.917	.012
Pap	175(21.9)	161(20.1)	159(19.9)	129(16.1)	20.233	.005
Indomie	285(35.7)	86(10.7)	264(32.8)	76(9.5)	10.600	.157
Spaghetti	224(28.0)	142(17.8)	209(26.2)	125(15.7)	5.168	.639

Indomie (noodle)

**Table 3. Weekly consumption of legumes**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
Beans	29(3.6)	21(2.6)	142(17.8)	208(26.0)	358(44.8)
Moimoi	12(1.5)	26(3.6)	232(29.0)	216(27.0)	200(25.0)
Akara	10(1.2)	34(4.2)	227(28.4)	202(25.2)	187(23.4)
Groundnut	19(2.4)	34(4.2)	230(28.8)	175(21.9)	239(29.9)
Soybean	78(9.8)	235(29.4)	88(11.0)	135(16.9)	120(15.0)

  

Food item	Male		Female		X <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
Beans	303(37.9)	82(10.3)	263(32.9)	81(10.1)	21.449	.003
Moimoi	241(30.2)	132(16.5)	175(21.8)	126(15.7)	24.115	.001
Akara	201(25.1)	140(17.5)	188(23.6)	121(15.2)	11.105	.196
Soybean	138(18.0)	179(22.3)	117(14.7)	144(18.0)	23.895	.001

Akara (bean balls); moi moi (bean pudding)

consume fats frequently. About 43.2% and 41.8% of the respondents consumed soft drinks and chocolate drinks, respectively, on a daily basis. There was no significant difference in the consumption of beverages by the male and female respondents (Table 7).

## DISCUSSION

In this study, roots and tubers and cereals and legumes, major staples, were the mostly consumed food groups (54.9% consumed gari, 33.8% consumed eba (cooked cassava flakes) and 74.8% consumed rice on a daily basis). While a traditional dietary pattern in this part of the world, high

consumption of these foods may also be partly due to the rising food prices. In Delta State, Nigeria, Agofure et al. (2021) found that 47.8% of the girls consumed roots and tubers daily. Onyiriuka, Umoru, and Ibeawuchi (2013), in a study carried out in Benin City, Nigeria, also carried among girls, reported that 89.6% consumed starchy foods daily. It was the most consumed food group. In India, Krishna, Mishra, and Singh (2012) reported a value of 97.8% for the daily consumption of rice. Ogunkunle and Oludele (2013) and Montazerifar, Karajibani, and Dashipour (2012) reported lower values of 58.9% and 53.8% for the daily consumption of cereals and legumes, Orangun, Nigeria and Iran, respectively.

**Table 4. Weekly consumption of fruits and vegetables by the respondents per week**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
<i>Efo</i>	17(2.1)	40(5.0)	200(25.0)	184(23.0)	284(35.5)
<i>Ewedu</i>	19(2.4)	22(2.8)	207(25.9)	221(27.6)	263(32.9)
<i>Okra</i>	57(7.1)	44(5.5)	221(27.6)	178(22.2)	223(27.9)
<i>Tomato</i>	15(1.9)	17(2.1)	169(21.1)	228(28.5)	327(40.9)
<i>Orange</i>	8(1.0)	32(4.0)	184(23.0)	190(23.8)	302(37.8)
<i>Apple</i>	11(1.4)	84(10.5)	112(14.0)	97(12.1)	250(31.2)
<i>Pineapple</i>	7(0.9)	132(16.5)	104(13.0)	115(14.4)	246(30.8)
<i>Tangerine</i>	18(2.2)	226(28.2)	91(11.4)	102(12.8)	212(26.5)
<i>Pawpaw</i>	20(2.5)	162(20.2)	95(11.9)	97(12.1)	224(28.0)
<i>Mango</i>	7(0.9)	176(22.0)	141(17.6)	90(11.2)	244(30.5)
<i>Banana</i>	7(0.9)	82(10.2)	161(20.1)	150(18.8)	254(31.8)

  

Food item	Male		Female		X <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
<i>Efo</i>	257(32.1)	120(15.0)	211(26.4)	120(15.0)	15.370	.032
<i>Ewedu</i>	256(32.0)	125(15.6)	228(28.5)	104(13.0)	15.382	.031
<i>Okra</i>	222(27.8)	131(16.3)	179(22.4)	134(16.7)	17.242	.016
<i>Tomato</i>	292(36.5)	110(13.8)	263(32.9)	76(9.6)	23.044	.002
<i>Orange</i>	248(31.0)	125(15.6)	244(30.6)	91(10.4)	21.340	.003
<i>Apple</i>	171(21.3)	122(15.2)	176(22)	90(9.2)	19.637	.006
<i>Pineapple</i>	179(22.4)	136(17.0)	182(22.8)	100(12.5)	13.423	.620
<i>Tangerine</i>	159(19.9)	176(22)	155(19.4)	141(17.6)	22.618	.002
<i>Pawpaw</i>	168(21.0)	143(17.9)	153(19.1)	114(14.3)	11.296	.126
<i>Mango</i>	169(21.1)	178(22.3)	165(20.6)	139(17.4)	16.399	.022
<i>Banana</i>	219(27.4)	126(15.7)	185(22.9)	117(14.6)	9.759	.203

*Efo* (green leafy vegetable); *ewedu* (jute leaves)

In this study, the daily intake of the commonly consumed fruits and vegetables ranged from 26.5% (tangerine) to 40.9% (tomato). Lower values for the daily intake of fruits and vegetables were reported by Sarkar et al. (2015) and Agofure et al. (2021). Lakshmi (2021) in a study involving adolescent girls in Chennai, India, reported a value of 94.47% for the consumption of vegetables. This wide difference may be due to the non-inclusion of some components of vegetables, which are widely consumed in Nigeria.

In the present study, 60.2% and 72.6% of the respondents respectively consumed beef and fish daily. A possible explanation for this is the global transition to diets high in fats, sugar and meat. A lower value (43.7%) was reported by Johnson and Adetula (2019), Ilaro, Nigeria. Lower values were also reported by Sarkar et al. (2015), Onyiriuka, Umoru, and Ibeawuchi (2013), Ogunkunle and Oludele (2013) and Wordu and Orisa (2021).

Daily consumption of palm oil and vegetable oil was 50% and 50.9%, respectively. Sarkar et al. (2015), in a study involving girls in India, reported a lower value of 12.7% for the daily consumption of fatty/fried foods. Montazerifar, Karajibani, and Dashipour (2012) reported a lower value of 39.6% for the daily consumption of fatty foods. A higher

value (87%) was reported by Isabirye et al. (2020) in Uganda.

The fact that carbonated drinks have a high glycaemic index and are energy-dense, makes their high consumption a cause for concern. 43.2% and 41.8% of the respondents consumed carbonated drinks and chocolate-flavoured drinks respectively daily. Lower values (39.2% and 20%) were reported in India by Kotecha et al. (2014) and Sarkar et al. (2015), while a higher value (75.4%) was reported by Montazerifar, Karajibani, and Dashipour (2012).

## CONCLUSION

These unhealthy dietary intakes may increase the risk of nutrient inadequacy and weight gain among adolescents. The tracking of food behaviours into adulthood is an indication of an urgent need to modify such behaviours during the pubertal phase (Doggui et al. 2021).

These suboptimal food consumption and dietary intake patterns represent a public health concern, given the double burden of malnutrition, which continues to plague most countries of Africa. There is a need for nutrition education actions and more effective public policies for promoting healthier food choices in adolescence in Ibadan, Nigeria.

**Table 5. Weekly consumption of meat and meat products**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
Beef	60(7.5)	31(3.9)	95(11.9)	106(13.2)	482(60.2)
Fish	9(1.1)	11(1.4)	60(7.5)	111(13.9)	581(72.6)
Chicken	12(1.5)	60(7.5)	137(17.1)	120(15.0)	235(29.4)
Turkey	23(2.9)	137(17.1)	118(14.8)	108(13.5)	177(22.1)
Pork	129(16.1)	266(33.2)	75(9.4)	66(8.2)	136(17.0)
Snail	82(10.2)	236(29.5)	75(9.4)	113(14.1)	162(20.2)
Egg	8(1.0)	60(7.5)	97(12.1)	219(27.4)	363(45.4)

  

Food item	Male		Female		X <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
Beef	313(39.1)	60(7.5)	275(34.4)	66(8.2)	10.039	.186
Fish	370(46.3)	31(3.9)	322(40.3)	40(5.0)	11.373	.123
Chicken	175(21.9)	106(13.3)	180(22.5)	91(11.4)	12.061	.099
Turkey	135(16.8)	142(17.7)	150(18.7)	113(14.1)	15.724	.026
Pork	112(14.0)	186(23.3)	90(11.2)	155(19.4)	8.105	.323
Snail	149(18.6)	175(21.8)	126(22.9)	136(17.0)	16.402	.022
Egg	308(38.5)	78(9.7)	274(34.3)	79(9.9)	4.350	.739

**Table 6. Weekly consumption of fats and oils**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
Margarine	84(10.5)	76(9.5)	169(21.1)	138(17.2)	246(30.8)
Palm oil	5(0.6)	14(1.8)	151(18.9)	198(24.8)	400(50.0)
Veg. Oil	13(1.6)	8(1.0)	124(15.5)	209(26.1)	407(50.9)
Mayonnaise	15(14.4)	164(20.5)	176(22.0)	76(9.5)	149(18.6)

  

Food item	Male		Female		X <sup>2</sup>	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
Margarine	210(26.2)	124(15.6)	174(21.8)	121(15.2)	16.648	.020
Palm oil	319(39.9)	84(10.5)	279(34.8)	81(10.2)	16.540	.021
Veg. Oil	328(41.0)	66(8.2)	288(36.0)	66(8.3)	9.874	.196
Mayon-Naise	133(16.6)	188(23.6)	92(11.5)	152(19.0)	28.957	.000

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**Table 7. Weekly consumption of beverages**

Food item	Never	Rarely <1x	Occasionally 1-2x	Frequently 3-6x	Daily 7x
Soft drinks	15(1.9)	23(2.9)	133(16.6)	209(26.1)	346(43.2)
Choc. Drinks	6(0.8)	33(4.1)	144(18.0)	216(27.0)	334(41.8)
Nescafe	66(8.2)	123(15.4)	87(10.9)	107(13.4)	191(23.9)
Milk drink	22(2.8)	137(17.1)	76(9.5)	89(11.1)	257(32.1)
Lacaserá	54(6.8)	166(20.8)	76(9.5)	71(8.9)	208(26.0)

  

Food item	Male		Female		$\chi^2$	P
	Frequent consumption	Infrequent consumption	Frequent consumption	Infrequent consumption		
Soft drinks	298(37.3)	73(9.1)	257(32.2)	83(10.4)	9.321	.230
Choc. Drinks	280(35.0)	99(12.3)	270(33.7)	78(9.8)	4.763	.689
Nescafe	168(21.0)	112(14.0)	130(16.3)	98(12.3)	17.730	.013
Milk drink	178(22.2)	116(14.5)	168(21.0)	91(12.1)	1.943	.963
Lacaserá	157(19.7)	124(15.5)	122(15.2)	118(14.8)	9.903	.194

*Lacaserá* (sweetened, carbonated apple juice)



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