Original Research Article

Diet, Physical Activity and Food Consumption Pattern of Adolescent Girls in Port Harcourt, Rivers State, Nigeria

ABSTRACT

The prevalence of overweight and obesity especially among adolescent girls has increased at an alarming rate in many parts of the world. This study was designed to assess the diet, physical activity and food consumption pattern of adolescent girls in Port Harcourt, Rivers State. A descriptive cross sectional survey carried out using a pre-tested self-administered structured questionnaire among 236 adolescent girls aged 10-16 years from randomly selected secondary schools in Port Harcourt. A self-administered questionnaire used to collect data on diet, physical activity and food consumption patterns of the respondents. The collected data analyzed using Statistical Package for Social Sciences (SPSS version 19.0). The frequency and descriptive analysis were included in the data analysis. The result revealed that a high percentage of girls (55.71%) skip their breakfast sometimes, consumed light meals (47.71%), had their meals thrice per day (61.43%) and eats occasionally from outside their homes (55.71%). The result also showed that rice (44.92%), yam (69.49%), sweet potatoes (47.88%), beans (33.90%), vegetables (47.88%), milk and milk products (36.86%) and energy dense beverages (38.14%) mostly consumed 1-2 times per week, while fish (51.27%), meat (51.27%), fruits (33.05%) and snacks (49.58%) were more consumed daily by the adolescent girls. The result also revealed that the girls were more active in dancing, walking for exercise and jogging/running. It was also found out that more than 60% or more of the adolescent girls were participating in some kind of regular physical activity on a weekly basis. The findings emphasize an urgent need for implementing an appropriate intervention for breakfast consumption, improving vegetable intake and daily milk consumption as this could assist in preventing the development of diseases associated with an inadequate intake of nutritious food.

Keywords: Diet, Adolescent, Girls, Consumption, Physical Activity

1. INTRODUCTION

Diet, nutrition and physical activity plays an important role in maintaining health and preventing diseases [1]. A good diet, proper nutrition and physical regular activity is essential due to an increased rate and high risks of cardiovascular diseases and metabolic disorder arising from poor diet and physical inactivity [2]. Physical inactivity has become a public health concern all over the world especially among adolescents. The World Health Organization reported that around 31% of adults aged 15 years and over were insufficiently active in 2008 (men 28% and women

34%). Insufficient physical activity was also reported by WHO to result in approximately 3.2 million deaths each year [3].

Adolescence is that period of life in which an adolescent learns healthy eating pattern which in future leads to healthy nutritional status of an adolescent [4]. According to world health organization, adolescents are a group of persons between the ages of 10 and 19 years [3]. They are considered to be a nutritionally vulnerable segment of the population because they are prone to unhealthy and nutritional compromises, physical inactivity and psychological stress which shape their personalities and lifestyle patterns [5]. As a result, their diet and physical activity plays a very critical role in growth and development during which the development of healthy eating habits and lifestyle is of supreme importance.

Peer group influence is one of the factors that influence the eating behavior of adolescents, and as a result, their food habits are usually dynamic and change with time [6]. Poor eating behavior among adolescents may predispose them to a greater risk of nutritional deficiencies and disorders [7, 8]. In addition, poor physical activity and a sedentary lifestyle is most common among adolescent especially girls. Numerous research findings have also reported adolescents with meal skipping particularly breakfast, wide use of fast food, snacking, low fruits and vegetables consumption, increasing soda consumption and these are attributed to food transition [9]. The food transition and rapid changing dietary consumption especially among adolescents have also contributed to an increase in health challenges.

The adolescence period is characterized with an increase in nutritional requirements due to accelerated growth and development, hormonal and physical changes. Inadequate diet during this period can result in delayed sexual maturation and slow down growth as well [10]. However, Paracha *et al*. [5] reported that the nutritional requirement of adolescents are often not met as a result of inappropriate food choices, unhealthy attitudes and life style practices which makes them more susceptible to nutritional deficiencies. Increase in the consumption of ultra-processed foods such as sweets, chocolates and bakery products and the rapid development in the economy amongst adolescents in Nigeria and especially in Port Harcourt has resulted in poor physical activity and food habits, which has significantly affected their nutritional status. Therefore, it is crucial to assess the diet, food consumption pattern and physical activity.

Adolescents' food consumption pattern tends to vary according to gender [11]. Onyiriuka *et al*. [6] investigated the eating habits of adolescent Nigerian urban secondary school girls and reported that meal skipping, consumption of fast food with soft drinks and low consumption of fruits and vegetables were the main eating habits displayed by adolescent urban school girls in Benin City, Nigeria. Pearson *et al*. [12] in their studies on patterns of adolescent physical activity and dietary behavior reported that boys were more active than girls and boys ate breakfast on more days per week than girls. Adolescent girls are a key group that needs to be engaged, for whom good nutrition and increased physical activity are associated with school success, improved mental health and prevention of adult chronic diseases such as obesity, diabetics and cardiovascular diseases [13]. They also have their unique physical and social needs, which call for the design of effective physical activity and nutrition interventions in order to meet their needs. In order to implement this, an understanding of their diet, food consumption pattern and physical activity is essential.

There is also paucity of information concerning the diet, physical activity and food consumption pattern of adolescent girls in Port Harcourt, Rivers State. Lack of data on adolescent's nutritional status, food consumption pattern and physical activities makes it difficult to draw the attention of government officials, program managers and policy makers to formulate and develop appropriate adolescent specific strategies for addressing their nutritional and socio-psychological needs. Therefore, the need to appraise the diet, physical activity and food consumption pattern of adolescent girls in Port Harcourt, Rivers State is very essential in order to tackle the emerging health situation and health challenges amongst adolescent girls. The aim of this study is to assess the diet, physical activity and food consumption pattern of adolescent girls in Port Harcourt, Rivers State.

2. METHODOLOGY

2.1. Research design

The study used a descriptive cross-sectional survey design. It identified the diet pattern, physical activity levels and food consumption pattern of adolescent girls in Port Harcourt, Rivers State.

2.2. Area of study

The study was carried out in Port Harcourt city, the capital of Rivers State, Nigeria. Port Harcourt is located between latitudes of 04^{o} 4'N and longitudes 07^{o} 10'E at the southern region of Nigeria in West Africa. Port Harcourt is the capital city of Rivers State, located along bonny river in Niger Delta with estimated population by 2006 census 1,383,592. The Port Harcourt metropolis is made up of Port Harcourt city and parts of the Obio/Akpor Local Government Areas. It is highly congested, as it is the only major city. The city is a major industrial centre as it has a large number of multinational firms as well as other industrial areas particularly related to petroleum industry. It is the chief oil refining city in Nigeria. The city is about 360 km, has lengthy and heavy rainy seasons and very short dry seasons. The natives are majority Ikwerre's and minority Okrika's.

2.3. Population of the Study

The study population comprised of adolescents girls aged 10-16 years from randomly selected secondary schools in Port Harcourt, namely: International secondary school (ISS), Uniport International Secondary School, Community Secondary school, Nkpolu and Model girls Secondary School, Rumueme.

2.4. Sample and Sampling Techniques

The sample size for this study was calculated using Cochrane formula according to Wordu and Wachukwu-Chikodi [14] for determining sample size in a research.

$$No=\frac{Z^2Pq}{d^2}$$

Where; No= Minimum sample size

z = Standard normal deviation 1.96 which corresponds to 95% confidence level

P = Prevalence = 19% or 0.19

d = desired level of precision 5% or 0.05

q = 1-P = (1-0.19) = 0.81 (q is a constant, a design effect for research that has not been conducted on the target population in sampled area).

Thus n= $\frac{1.96^2 \times 0.19 \times 0.81}{0.05^2}$

$=\frac{3.84 \times 0.19 \times 0.81}{0.0025}$

=236

The sample therefore comprised of 236 adolescent girls, which was selected randomly from the selected secondary schools in Port Harcourt.

2.5. Instrument for data collection

The instrument that was used by the researcher of this study to collect information about respondents in regard to this study was a questionnaire. The instrument was titled "diet, physical activity and food consumption pattern of adolescent girls in Port Harcourt, Rivers State.

The instrument comprised of four sections: A, B, C and D. Section A dealt with demographic variables of the respondents such as age, level of education and religion. Section B contained four items designed to measure the diet pattern of the adolescent girls. Section C was a food frequency questionnaire containing 11 food items seeking information on the frequency of consumption of these foods. Section C of this instrument was a physical activity questionnaire containing 10 items designed to measure the frequencies at which the respondents perform these activities.

2.6. Validity of the Instrument

The researcher after constructing the items for the questionnaire submitted it to the project supervisor and two other lecturers in the Department of Home Science and Management, Rivers State University, Port Harcourt for scrutiny and suggestions, correction and amendment. With all the corrections noted and affected, the questionnaire was considered valid for use.

2.7. Administration of the Instrument

The researcher administered the questionnaires to the respondents at their respective schools. The researcher read the items in the questionnaire to the respondents and asked them to tick the best option that shows their opinion. The researcher also checked the instrument on the printed copy base on the opinion of the respondents to ensure that the entire study area is fully answered. The researcher waited patiently to get the instrument back and this contributed to the 100% rate of return.

2.8. Method of Data Analysis

Data obtained was subjected to Social Package for Social Science (SPSS) version 22. Descriptive statistics was carried out on the data collected, and data was presented in frequencies and percentages. Food consumption patterns were also expressed in mean and percentage consumption per week.

3. RESULTS AND DISCUSSION

3.1. Demographic characteristics of the respondents

Table 1 shows the demographic characteristics of the respondents. The result showed that the number of adolescents from 10-13 years recorded 74 (31.43%), 14-16 years had 108 (45.71%) while 17-19 years had 54 (22.86%). The distribution of the study shows that the largest percentage of the respondents belongs to the age group "14-16 years". The result of the

respondents also showed that the 236 (100%) of the adolescent girls were of Christian background with secondary level of education

Table 1: Demographic characteristics of respondents

Variables	Frequency	Percentage (%)
Age		
10-13	74	31.43
14-16	108	45.71
17-19	54	22.86
Total	**236**	**100**
Religion		
Christian	236	100
Islam	0	0
Others	0	0
Total	**236**	**100**
Level of education		
Elementary	0	0
Secondary	236	100
Primary	0	0
None	0	0
Total	**236**	**100**

3.2. Diet pattern of the respondents

Table 2 shows the dietary pattern of the adolescent girls. The result showed that a higher percentage of the adolescent girls (55.71%) skipped breakfast sometimes while only 41.43% reported not to skip breakfast. This finding supports the report of Prochnik-Estima [15] whereby one quarter of the adolescents skipped breakfast. Nicklas *et al.* [16] also noted that prevalence at which many adolescents' girls missed breakfast was high. Onyiuruka *et al*. [6] in their study also reported that skipping of meals was a common eating habit among adolescent school girls. The skipping of meals represents an unhealthy eating habit among adolescent school girls from this study. This view is reinforced by studies, which indicated that skipping of breakfast significantly decreased daily energy, calcium and protein intakes [17]. Some studies have linked skipping of meals with occurrence of overweight and obesity [18]. Studies have also linked meal skipping behaviour, particularly breakfast skipping, to adverse adolescents' nutritional status, impaired cognitive performance and reduced quality of life [19]. Keski-Rahkonen *et al* [20] also stated that missing meals promotes the replacement of meals with snacks, which are energy dense and nutritionally inadequate, especially with regard to micronutrients.

A low percentage (4.29%) of the adolescent girls ate once per day, while 14.29% of the girls ate more than thrice per day. The evaluation of meal frequency from this study was satisfactory, seeing that a high percentage of the adolescent girls (61.43%) take meals thrice per day. In a study evaluating the diet patter of adolescents, Santos *et al*. [21] reported that adolescents had three or more meals per day. Meal structure of the adolescent girls was also satisfactory as there was a balance between light food and heavy food consumption. A high percentage of the

adolescent girls (47.14%) ate lighter meals as compared to 35.71% of the adolescent girls who ate heavy meals.

The study also revealed a relatively high consumption of fast food by adolescent school girls. A high percentage (55.71%) indicated they consumed fast food occasionally while 21.43% of the adolescent girls consumed fast foods frequently. A study among adolescent school girls in Benin City, Nigeria also reported a similar finding [6]. This finding is worrisome as the frequency of adolescent girls who consumed fast foods either occasionally or frequently is higher than those who never consume fast foods. Consistent with previous studies by Shannon *et al.* [22], the choice of fast food among adolescent school girls in the present study may be influenced by taste, convenience and cost. Again, most fast foods with the qualities of good taste, convenience and low cost usually have a high fat and sugar content and are refined foods, resulting in unhealthy eating practices. Fibre content of most fast foods is usually low. This type of dietary practice is considered to be obesity-promoting.

Table 2: Diet pattern of respondents

Variable	Frequency	Percentage (%)
Frequency of skipping Breakfast		
Yes	7	2.86
No	98	41.43
Sometimes	131	55.71
Frequency of taking meals per day		
Once	10	4.29
Twice	47	20.00
Thrice	145	61.43
More	34	14.29
Meal structure		
Frequent small meals	40	17.14
Light	111	47.14
Heavy	84	35.71
Frequency of eating fast food		
Never	54	22.86
Occasionally	131	55.71
Frequently	51	21.43

3.3. Food Consumption Pattern of the respondents

Table 3 shows the average number of times per week of foods consumed by the respondents. Data from the present study indicated that there was a low daily consumption of starchy foods, such as rice (16.10%), yam (1.27%) and sweet potatoes (8.90%) among the adolescent girls. These starchy foods were highly consumed 1-2 times by the adolescents. Among the 236 respondents, 31 (16.10%) consumed rice daily; 41 (17.37%) consumed 5 or more times; 51 (21.61%) consumed 1-2 times; 106 (44.92%) consumed 1-2 times and 0 (0%) never consumed rice per week. Yam was consumed 5 or more times by 17 (7.20%), 3-4 times by 31 (13.14%), 1-2 times by 164 (69.49%) while 21 (8.90%) of the adolescent girls never consumed yam. Sweet potatoes was consumed 5 or more times by 24 (10.17%), 3-4 times by 51 (21.61%), 1-2 times by

113 (47.88%) while 27 (11.44%) of the girls never consumed sweet potatoes in a week. The study on daily carbohydrate food consumption is satisfactory and well below the 33% suggested by Hogston and Simpson in their "tilted plate" concept [23]. A tilted plate shows the percentages of food groups that a healthy individual should aim to eat in a day and depicts the percentages of food groups needed for a balanced diet. This finding does not agree with the study of Onyiriuka *et al*. [6] who reported high (90%) daily consumption of starchy foods among adolescent school girls in Benin City, Nigeria.

Beans was consumed daily by 45 (19.07%) of the adolescent girls, 5 or more times 33 (10.17%), 3-4 times by 56 (23.73%), 1-2 times by 80 (33.90%) while 31 (13.14%) never consumed beans in a week. Bean consumption by the adolescent girls was satisfactory and this greatly increases their protein intake [24]. In this study, a higher percentage of the adolescent girls consumed fish (38.98%) and meat (51.27%) daily. Fish was consumed 5 or more times by 24 (13.98%), 3-4 times by 37 (15.68%), 1-2 times by 63 (26.69%), while 11 (4.66%) never consumed fish in a week. Meat was consumed 5 or more times by 35 (10.17%), 3-4 times by 49 (20.76%), 1-2 times by 42 (17.80%) while 0% of the adolescent girls never consumed fish in a week. Fish and meat are excellent sources of heme iron that are easily absorbed in the body.

Among 236 adolescent girls, the daily consumption of fruits was 78 (33.05%); 38 (14.83%) consumed 5 or more times; 46 (19.49%) consumed 3-4 times; 77 (32.63%) consumed fruits 1-2 times while 0% never consumed fruits per week. For vegetables consumption, daily consumption was 70 (29.66%); 21 (16.10%) consumed 5 or more times; 31 (13.14%) consumed 3-4 times; 90 (38.14%) consumed 1-2 times, while 7 (2.97%) never consumed vegetables in a week. The findings revealed that vegetables were mostly consumed 1-2 times by the adolescent girls, while fruits were consumed mostly 1-2 times and daily. This shows that fruits and vegetable consumption in the diet of the study group is inadequate. If this state remains unattended longer, the adolescent girls may be affected with nutritional deficiency diseases. A similar finding was also reported by Onyiriuka *et al*. [6] for adolescent urban secondary school girls in Benin City, Nigeria. A low consumption of fruits and vegetables has been associated with overweight and other long-term adverse effects on health that could not be shown in a cross-sectional study [25].

The study also indicated a high consumption in snacks daily among the adolescent girls. Half of the respondents 117 (49.58%) consumed snacks daily. Snacks was also consumed 5 or more times by 49 (8.90%), 3-4 times by 35 (14.83%), 1-2 times by 56 (23.73%) while 10 (2.97%) never consumed snacks in a week. The high daily snacks consumption observed in this study was also reported by Otemuyiwa and Adewusi [26] for adolescents in Southwestern Nigeria. Consumption of snacks has been reported to elicit poor consumption of normal meals ~~and~~ also lead to over-consumption when compared with other sensory-nutrient combinations because of characteristically high fat and sugar content. Thus, the deliberate consumption of energy rich snacks can lead to an excessive intake of fat in a single eating episode and can produce a short term positive energy balance [27].

Among the 236 adolescent girls, 35 (14.83%) did not drink milk and milk products daily; 34 (20.34%) drink 5 or more times; 56 (23.73%) drink 3-4 times, 87 (36.86%) drink 1-2 times while 10 (4.24%) never drink milk and milk products in a week. Adolescent girls growing body demand high calcium nevertheless this study found that a low percentage of the adolescent girls

(14.83%) did not drink milk and milk products daily, which is very alarming. This finding is also in agreement with the study of Ogunkunle and Oludele [28] who reported that two thirds of the adolescents in Illa Orangun, South-west Nigeria consumed milk and milk products (a significant source of calcium) infrequently. The present study also revealed a low consumption of energy dense beverages among the adolescent school girls. A high number of the adolescent girls 86 (38.14%) consumed these beverages 1-2 times in a week; 31 (16.95%) consumed 3-4 times, 34 (16.10%) consumed 5 or more times, 58 (16.53%) consumed daily while 27 (12.29%) never consumed energy dense beverages in a week. Some studies have linked high beverage consumption rate to poor intake of calcium, vitamin C and increased risk of bone fractures [29].

Table 3: Average number of times per week foods consumed by the respondents

Foods items consumed	Frequency of Consumption				
	Never	**1-2 times**	**3-4 times**	**5 or more times**	**Daily**
Rice	00 (0.00)	106 (44.92)	51 (21.61)	41 (17.37)	31 (16.10)
Yam	21(8.90)	164 (69.49)	31 (13.14)	17 (7.20)	3 (1.27)
Sweet potatoes	27 (11.44)	113 (47.88)	51 (21.61)	24 (10.17)	21 (8.90)
Beans	31 (13.14)	80 (33.90)	56 (23.73)	33 (10.17)	45 (19.07)
Fish	11 (4.66)	63 (26.69)	37 (15.68)	24 (13.98)	92 (38.98)
Meat	00 (0.00)	42 (17.80)	49(20.76)	35 (10.17)	121 (51.27)
Fruits	00 (0.00)	77 (32.63)	46 (19.49)	38 (14.83)	78 (33.05)
Vegetables	7 (2.97)	90 (38.14)	31 (13.14)	21 (16.10)	70 (29.66)
Snacks	10 (2.97)	56 (23.73)	35 (14.83)	48 (8.90)	117 (49.58)
Milk and Milk products	10 (4.24)	87 (36.86)	56 (23.73)	34 (20.34)	35 (14.83)
Energy-dense beverages	27 (12.29)	86 (38.14)	31 (16.95)	34 (16.10)	58 (16.53)

3.4. Physical Activity Level of the Respondents

Table 4 shows the frequency of weekly physical activities by the respondents. The result of this study showed that 33 (13.98%) of the adolescent girls involved in skipping for 5 or more times while a higher number 114 (48.31%) involved in skipping for 1-2 times. Walking for exercise was carried out 5 or more times by half of the respondents (50.42%) while 57 (24.15%) walked for exercise for 1-2 times per week. A higher percentage of the adolescent girls 118 (50.00%) never involved in bicycling, while 50 (21.21%) involved in bicycling 1-2 times in a week. The result also showed that jogging was carried out 5 3-4 times by 95 (40.32%) of the adolescent girls while 19 (8.06%) never involved in this activity.

The result, also revealed that the girls were more active in dancing, walking for exercise and jogging/running. Volley ball, aerobics and basketball were never carried out by a large number of the adolescent girls. Physical activity is an important component of a healthy life style, with implications for the prevention of chronic diseases and obesity. Participation in health-enhancing physical activity is a key determinant of energy expenditure in youths [30]. Adequate physical activity together with healthy dietary habits has also been shown to help prevent obesity and

other nutrition-related alterations common in adolescents, such as poor bone mineralization [31]. The American Heart Association recommends that "all healthy adolescents should get at least 60 minutes per day of moderate-to-vigorous physical activity, mostly aerobic also include vigorous-intensity activity such as cycling, dancing, running and swimming on at least 3 times per week [32]. In comparing this result of this study with the findings of some of the American colleges, it was found that more than 60% or more of the adolescent girls from this study were participating in some kind of regular physical activity on a weekly basis [35]. This suggests that more than half of the adolescent girls meet the minimum goal of at least 3 times vigorous-intensity activity as proposed by the American Heart Association.

Table 4: Frequency of weekly physical activities by the respondents

Items	Frequency of physical activity			
	Never	**1-2 times**	**3-4 times**	**5 or more times**
Skipping	50 (21.19)	114 (48.31)	39 (16.53)	33 (13.98)
Walking for exercise	18 (7.63)	57 (24.15)	42 (17.80)	119 (50.42)
Bicycling	118 (50.00)	50 (21.21)	32 (13.64)	36 (15.15)
Jogging/running	19 (8.06)	57 (24.19)	95 (40.32)	65 (27.42)
Swimming	87 (36.86)	89 (37.71)	46 (19.49)	14 (5.93)
Aerobics	109 (46.19)	89 (37.71)	23 (9.75)	15 (6.36)
Dancing	18 (7.81)	63 (26.56)	70 (29.69)	85 (35.94)
Football	89 (37.71)	57 (24.15)	22 (9.32)	68 (28.81)
Volleyball	155 (65.68)	52 (21.03)	15 (6.36)	14 (5.93)
Basketball	159 (67.37)	52 (21.03)	11 (4.66)	14 (5.93)

4. CONCLUSION

The study shows that a large proportion of the adolescent girls adhered to an inadequate meal pattern characterized by skipping breakfast sometimes and the occasional eating of fast food. However, they showed good diet pattern as more than half of the girls take their meals thrice per day with the consumption of lighter meals than heavy meals. A higher percentage of the girls consumed rice, yam, sweet potatoes, beans, vegetables, milk and energy dense beverages 1-2 times per week while fish and meat were consumed more daily by the adolescent girls. The study also indicated a high consumption in snacks daily by half of the adolescent girls, which could elicit poor consumption of normal meals. Thus, the deliberate consumption of energy rich snacks daily by the adolescent girls from this study represents an unhealthy habit as high snack consumption can lead to an excessive intake of fat in a single eating episode and can produce a short-term positive energy balance. It was found that more than 60% or more of the adolescent girls were participating in some kind of regular physical activity on a weekly basis. This result therefore showed that the girls were more active in dancing, walking for exercise and jogging/running, while volleyball, aerobics and basketball were never carried out by a large number of the adolescent girls.

5. RECOMMENDATIONS

The focus of education should be on encouraging breakfast consumption, improving the intake of daily milk consumption, vegetables, and consuming animal sources of protein, as well as making

healthy food choices. It is possible that, such programme might help to establish healthy eating habits early in life, and thus reduce the incidence of non-communicable diseases among adolescent girls in Port Harcourt.

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