

# Assessment of Dietary Pattern, Health Implication and the Nutritional Status of Clinical Medical Students of a Tertiary Institution in Southeast Nigeria

Ekwebene O.C<sup>1</sup>, Ogbuagu C.N<sup>2</sup>, Modebe I.A<sup>2</sup>, Ogbuagu E.N<sup>3</sup>, Igwemadu W.S<sup>1</sup>, Emelumadu O.F<sup>2</sup>

<sup>1</sup>Faculty of Medicine Nnamdi Azikiwe University, Nnewi Campus Anambra State Nigeria.

<sup>2</sup>Center for Community Medicine and Primary Health Care, Nnamdi Azikiwe University Teaching Hospital Neni Anambra State Nigeria.

<sup>3</sup>HIV Care Department, Nnamdi Azikiwe University Teaching Hospital Nnewi Anambra State Nigeria.

Corresponding Author: Ekwebene O.C

## ABSTRACT

The dietary pattern in any population is an indicator for the general well-being and the extent of their risks to have lifestyle disorders. These include diabetes mellitus, dyslipidaemia, hypertension and coronary heart disease, which are the main cause of death worldwide. Medical students; representing part of the young age population of the community, and as future doctors, for different reasons are prone to eating unhealthy foods and to have bad health habits during their college years which might affect their wellbeing and increase the risk of lifestyle disorders. The objective of this study is to determine the dietary pattern of clinical medical students of Nnamdi Azikiwe University (NAU), Nnewi campus Nigeria, and how it affects their nutritional status. This is a cross sectional study which involved 220 clinical medical students of NAU, Nnewi campus. A 220 objective self-administered questionnaire was used for data collection. In this study, the entire respondents, 98.6%, were aware of what a balanced diet is, yet majority of them have a poor dietary habit, as 50.9% eat twice daily, 37.7% 3 times daily, while 5.5% eat more than three times daily. Their diet was mainly fast foods, fries, snacks, and soft drinks. This, thus, affected their nutritional status, with 25.0% having poor dietary habit, 74.1% with moderate dietary habit and 0.9% with good dietary habit. 27.3% of the respondents being overweight, 6.4% class 1obesity, and 60.5% were of normal weight. This study showed that while the respondents were aware of what a balanced diet is, they rarely consumed a balanced meal. Thus, it is imperative to not only educate them, but also, formulate a strategy to ensure the implantation and practice of eating a balanced meal, so as to not only forestall lifestyle disorders, but also to be able to educate their patients in the future, creating a healthy community and nation at large. The usual lifestyle of food tickets and meal in the university should be resuscitated especially within the study population.

**Keywords:** Diets, health, nutrition, medical students, micro and macro nutrient.

## BACKGROUND

It is popularly known and documented that dietary habits and nutrition plays important role in maintaining health and preventing diseases. Nutrition is the organic process by which an organism assimilates food and uses it for growth and

maintenance<sup>1</sup>. Nutrition can also be the process by which food is assimilated and used for growth of body cells, development, synthesis of enzymes, production of energy, reproduction and source of energy required for optimal activities relating to maintenance of a sense of well-being<sup>2</sup>.

Adequate nutrient intake is not only critical for the normal growth and developmental processes but is also important to optimize the health, physical fitness and performance and is considered as an important element of any physical fitness program<sup>3</sup>. Nutrition, thus, is very vital for the optimal growth, development, general well-being and function of human<sup>1</sup>. Inadequate nutrition however, can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduce productivity.

A healthy human diet entails preparation of quality food and good storage system that preserve nutrients in the food from oxidation or leaching out and thereby reducing the risk of food borne illnesses<sup>2</sup>.

Unhealthy diets to humans can cause deficiency related diseases such as scurvy, blindness, anaemia, cretinism, or excessive health threatening nutrition conditions such as obesity and metabolic syndrome, and such common chronic systemic diseases which include cardiovascular diseases, diabetes and bone diseases. In 2005, the World Health Organization measured that 1.6 billion people were overweight and 400 million were obese. It estimates that by the year 2015, 2.3 billion people will be overweight and 700 million will be obese.

Childhood obesity was considered a problem of affluent countries. Today this problem is appearing even in developing countries and some call this trend the New World Syndrome.<sup>4</sup>

Under nutrition can lead to wasting in acute cases and the stunting in chronic cases of malnutrition<sup>2</sup>.

Healthy dietary habits among medical students are even more important as they are future physicians and the students who personally ignore adopting healthy lifestyle are more likely to fail to establish health promotion opportunities for their patients. Also, medical students have been shown to exhibit early risk factors for chronic diseases<sup>5</sup>. In other words, medical students represent a significant community

investment and promoting their health preserves this investment.

Nutrients are chemical compounds in food that are used by the body to function properly, grow and maintain health<sup>6</sup>. They are broadly classified into two viz; Macronutrient and Micro nutrient

Macronutrient refers to those nutrients which are required in relatively large amounts (grams or ounces). They are used primarily to generate energy or to incorporate into tissues for growth and repair<sup>7</sup>. They include the following; Carbohydrates, Proteins, Fat, Water

Micronutrient refers to those nutrients required by the body in small quantities (milligrams or micrograms) daily; they have subtle biochemical and physiological roles in cellular processes, like vascular functions or nerve conduction<sup>8</sup>. They include vitamins and minerals.

Vitamins: All vitamins are broadly divided into two groups according to solubility.

Water Soluble Vitamins: They are so called because they are soluble in water. They include Vitamin B1 or Thiamine, Vitamin B2 or Riboflavin, Vitamin B3 or Niacin, Vitamin B5 or Pantothenic acid, Vitamin B6 or Pyridoxine, Vitamin B7 or Biotin, Vitamin B9 or Folate, Vitamin B12 or Cobalamin.

Fat Soluble Vitamins: They are so called because they are soluble in fats. They include; Vitamins A, D, E and K

Minerals: They are a class of micronutrients required by the body for growth and development. They form part of the constituents of many body tissues, and hormones, and play important roles in numerous metabolic processes. They are divided into major elements or macrominerals, if their daily requirement is more than 100 mg, and minor/trace elements or microminerals, if their daily requirement is less than 100 mg<sup>9</sup>. The major minerals include; calcium, phosphorus, potassium, sodium, magnesium, chloride, and sulphur. The minor minerals include; iron, zinc, iodine, copper, manganese, molybdenum, selenium and fluoride.

Nutritional status is a requirement of health of a person convinced by the diet, the levels of nutrients containing in the body and the ability of those levels to maintain normal metabolic integrity. For adults, general adequacy is assessed by measuring weight and height; the result is commonly expressed as the body mass index, the ratio of weight (kg) to height<sup>2</sup> (m). Body fat may also be estimated, by measuring skin fold thickness and muscle diameter.

Status with respect to individual vitamins and minerals is normally determined by laboratory tests, either measuring the blood and urine concentrations of the nutrients and their metabolites, or by testing for specific metabolic responses<sup>10</sup>.

Dietary habits and nutrition plays important role in maintaining health and preventing diseases. Nutrition, thus, is very vital for the optimal growth, development, general well-being and function of human. Nutrition science also includes behaviours and social factors related to food choices. However, poor nutrition therefore, can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduce productivity.

## **MATERIALS AND METHODS**

The objective of this study is to determine the dietary habits, and its effects on the nutritional status amongst medical students of College of Health Sciences, Nnamdi Azikiwe University.

### **STUDY SETTING**

This study was carried out in Nnamdi Azikiwe University Nnewi Campus, College of Health Sciences, Nnewi, Nnewi North Local Government Area of Anambra State, South East Nigeria. Nnamdi Azikiwe University, Awka is a federal university in Nigeria. Its main campus is located in the south-eastern part of Nigeria in Anambra State's capital,

Awka, with two other campuses at Nnewi and Agulu<sup>11</sup>.

### **STUDY DEIGN**

A cross-sectional study among clinical medical student, of College of Health Sciences, Nnamdi Azikiwe University, Nnewi campus in Nnewi North Local Government Area of Anambra State, Nigeria.

### **SAMPLING TECHNIQUE AND SAMPLE SIZE CALCULATION**

The convenient sampling technique was used in this study, randomly selecting eligible participants from the various class who will be present within the sampling time and adequate sample size of 220 was calculated using the formula  $n = \frac{Z^2pq}{d^2}$

### **RESEARCH INSTRUMENTS**

A proforma was designed for the collection of participants' socio-demographic characteristics; family history of diabetes and hypertension, dietary knowledge, habits and frequency, weight and height measurements was collected using the following: Portable weighing scale and a stadiometer.

### **DATA COLLECTION AND ANALYSIS**

The data for this study were collected through self-administered questionnaire which was divided into the following sections: Socio-demographic characteristics, Dietary knowledge, habits and frequency, Weight and height readings. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 20.

### **ETHICAL CONSIDERATIONS**

Approval to carry out the study was obtained from the Scientific and Ethical Review Boards of Nnamdi Azikiwe University Teaching Hospital Nnewi, Anambra State, South East Nigeria. The nature, objectives and process of the study was explained to every respondent, after which a verbal consent was obtained. Confidentiality, privacy and anonymity of the information provided were assured to all respondents. Necessary steps such as avoiding asking for names and secured storage source of data was taken.

## RESULTS

**Table 1: Sociodemographic Characteristics**

	Frequency (n)	Percentage (%)	Mean	SD
<b>Age</b>			24.32	2.859
Young Adult (<= 25)	168	76.4		
Older adult (26+)	52	23.6		
<b>BMI</b>			24.09	3.9
underweight	9	4.1		
normal weight	133	60.5		
Overweight	60	27.3		
class I obesity	14	6.4		
class II Obesity	3	1.4		
class III Obesity	1	.5		
<b>Gender</b>			1.32	0.478
Female	150	68.2		
Male	69	31.4		
<b>Academic Level</b>			2.13	0.905
400	77	35		
500	37	16.8		
600	106	48.2		
<b>Marital Status</b>			1.05	0.228
Single	208	94.5		
Married	12	5.5		
<b>Ethnicity</b>			1.15	0.634
Igbo	207	94.1		
Yoruba	3	1.4		
Others	10	4.5		
<b>Family History of Diabetes</b>			0.29	0.453
No	157	71.4		
Yes	63	28.6		
<b>Family History of Hypertension</b>			0.42	0.495
No	127	57.7		
Yes	93	42.3		

Table 1 describes respondents' socio-demographic characteristic. Overall a total of 220 participant (150 male and 69 females) of mean age  $24.32 \pm 2.9$  yrs (18 – 36 years) and BMI  $24.01 \pm 3.9$  participated in this study. Essentially, almost all the participant are single (208; 94.5%) and of the Igbo race (207; 94.1%). The greater majority of the participants reported no family history of Diabetes (137; 71.4%) or hypertension (127; 57.7%).

Table 2 illustrates knowledge of respondents on diet. Almost all the participants (217; 98.6%) noted that at some point, they have heard of the phrase balanced diet. Regarding their sources of information, whereas more than half of the respondents reported books as their major source of information (159; 72.3%), about 50% (110) reported parents as their major information source. Interestingly, less than 40% of the respondents reported their major sources of information on balanced diet to include friends, the internet or the television.

Almost all the participant (>90%) rightly identified all true components of balanced diet. Whereas 71.8% (158) of the respondent have heard of the phrase organic food in the past, only about half of the participants were able to define it as food produced naturally (135, 61.4%) or as food produced without any artificial alterations (110; 50%).

Regarding genetically modified foods, 75.9% of (167) of the respondents noted that they have heard of such phrase as genetically modified foods. However, less than half of the respondents were able to rightly define that as food produced from organisms that have had their genes altered to produced traits that are not naturally produced (86; 39.1%) or as foods produced from or using genetically modified organism (95; 43.28). Again the majority of the respondents (>60%) could rightly identify various food processing methods.

Regarding respondents overall dietary knowledge, 48.2% (106) of the participants had excellent dietary knowledge while 48.6% (107) had moderate

knowledge. Only 3.2% (7) of the respondents had poor dietary knowledge.

**Table 2: Participants knowledge regarding dietary habits**

	Frequency (n)	Percentages (%)
<b>Have you ever heard of balanced diet?</b>	217	98.6
Yes		
<b>Sources of information</b>		
Parents	110	50.0
Friends	88	40.0
Teachers	6	
Books	159	72.3
Newspaper/magazine	79	35.9
Internet	92	41.8
Television/radio	60	27.3
Others	7	3.2
<b>What is / are the composition of balanced diet</b>		
Carbohydrate	197	89.5
Fats	218	99.1
Protein	217	98.6
Vitamins	219	99.5
Minerals	217	98.6
Water	218	99.1
Others	24	10.9
<b>Have you ever heard of organic foods</b>		
Yes	158	71.8
No	31	14.1
Foods produced naturally	135	61.4
foods produced without any artificial alteration	110	50.0
Foods that avoid the use of man-made fertilizers	56	25.5
foods that avoid the use of livestock feed additives	34	15.5
Foods produced without the use of chemical additives and pesticides	66	30.0
<b>Have you ever heard of genetically modified foods?</b>		
Yes	167	75.9
No	34	15.5
They are genetically engineered foods	148	67.3
foods produced from or using genetically modified organisms	95	43.2
Foods produces from organisms that have their genes altered to produce traits that are not naturally produced	86	39.1
foods that have been altered in some ways during preparation	166	75.5
foods that have been treated or preserved by a special method	64	29.1
<b>What method of food processing do you know?</b>		
Freezing	131	59.5
Canning	189	85.9
Baking	152	69.1
Drying	151	68.6
Others	28	12.7
<b>Overall Knowledge</b>		
Poor Knowledge	7	3.2
Moderate Knowledge	107	48.6
Excellent Knowledge	106	48.2

**Table 3: Dietary habits**

	Frequency (n)	Percentage (%)
<b>Do you eat regularly? i.e., breakfast, lunch and dinner</b>		
Yes	112	50.9
No	85	38.6
<b>Do you eat breakfast daily?</b>		
Yes	100	45.5
No	114	51.8
<b>How many times in a day do you eat?</b>		
Once	12	5.5
2 times	112	50.9
3 times	83	37.7
more than 3 times	12	5.5
<b>Have you ever skipped meal? If yes , what are your reasons?</b>		
Yes	194	88.2
No	13	5.9
weight control	77	35.0

lack of time	143	65.0
no appetite	99	45.0
nothing to eat	117	53.2
Others	35	15.9
How often do you skip meals?		
once a week	30	13.6
2 times a week	34	15.5
3 times a week	40	18.2
4 times or more a week	83	37.7
Which is your most skipped meal?		
Breakfast	114	51.8
Lunch	57	25.9
Dinner	25	11.4
Do you take snacks?		
Yes	190	86.4
No	19	8.6
If yes, how often do you do it?		
once a week	45	20.5
2 times a week	40	18.2
3 times a week	42	19.1
4 times or more a week	71	32.3
What do you use as snacks most of the time?		
Doughnut	75	34.1
Meatpie	122	55.5
Eggroll	99	45.0
puff puff	48	21.8
Cake	59	26.8
Others	30	13.6
Do you eat meat of fish?		
Yes	192	87.3
No	3	1.4
If yes, how many times in a week do you do that?		
Once	54	24.5
2 times	22	10.0
3 times	29	13.2
more than 3 times	105	47.7
Do you eat vegetables?		
Yes	181	82.3
No	16	7.3
bitter leaf	112	50.9
fluted pumpkin leaf	123	55.9
Cabbage	83	37.7
scent leaf	56	25.5
water leaf	54	24.5
Others	26	11.8
How many times in a week do you eat vegetables?		
Once	36	16.4
2 times	44	20.0
3 times	43	19.5
more than 3 times	62	28.2
Do you eat fruits?		
Yes	193	87.7
No	7	3.2
Banana	148	67.3
Apple	105	47.7
Orange	147	66.8
Pineapple	108	49.1
Watermelon	117	53.2
Others	29	13.2
How many times in a week do you eat fruits?		
Once	54	24.5
2 times	51	23.2
3 times	41	18.6
More than 3 times	46	20.9
Do you take diary products?		
Yes	181	82.3
No	16	7.3
Peak	127	57.7
Hollandia	81	36.8
Vitamilk	31	14.1
Nestle milo	49	22.3



Others	35	15.9
How many times in a week do you take diary products?		
Once	41	18.6
2 times	36	16.4
3 times	45	20.5
More than 3 times	71	32.3
Do you take fast foods?		
Yes	154	70.0
No	41	18.6
How many times in a week do you take fast foods?		
Once	69	31.4
2 times	42	19.1
3 times	32	14.5
More than 3 times	30	13.6
Do you consume fried foods?		
Yes	180	81.8
No	16	7.3
Fried plaintain	148	67.3
Fried yam	119	54.1
Fried potatoes	111	50.5
Bean cake (akara)	96	43.6
plantain chips	76	34.5
Others	41	18.6
How many times in a week do you take fried foods?		
Once	76	34.5
2 times	48	21.8
3 times	36	16.4
More than 3 times	28	12.7
Do you take soft drinks?		
Yes	181	82.3
No	24	10.9
coca-cola	147	66.8
Pepsi	90	40.9
Sprite	91	41.4
Fanta	113	51.4
Schweppes	38	17.3
Others	16	7.3
How many times in a week do you take soft drinks?		
Once	52	23.6
2 times	48	21.8
3 times	31	14.1
More than 3 times	55	25.0
Do you take coffee?		
Yes	143	65.0
No	52	23.6
If yes, how many times in a week do you do take coffee/ tea?		
Once	57	25.9
2 times	36	16.4
3 times	28	12.7
More than 3 times	40	18.2
What is the quantity of water you take?		
1 cup	12	5.5
2 cups	32	14.5
3 cups	61	27.7
4 cups or more	107	48.6
On an average, how long do you spend on eating a meal?		
less than 10 minutes	76	34.5
10-20 minutes	89	40.5
20-30 minutes	29	13.2
30-40 minutes	19	8.6
more than 40 minutes	2	.9
Overall dietary habits		
Poor dietary habits	55	25.0
Moderate dietary habits	163	74.1
Good dietary habits	2	.9

Table 3 describes the respondent's dietary habits. Whereas about half of the participants (112; 50.9%) reported regular

feeding habits, less than half of the participants reported that they eat breakfast regularly (100; 45.5%). About 37.7% (83)

of the respondents reported that they eat at least 3 times each day.

Almost all the participant noted that they skip meals (194; 88.2%). Prominent reasons for skipping meals involved weight control (143; 65%), lack of food (117; 53.2%), lack of time (643; 65%) and loss of appetite (99; 45%). Interestingly, less than 40% of the participant reported skipping meals up to 4 times per week, with breakfast as the most skipped meal (114; 54.8%).

About 86.6% (190) of the participants reported that they take snacks. However, only about 19.1% (42) of the respondents reported consuming snacks up to 3 times in a week.

Almost all the participants reported that they consume fruits (193; 87.7%) and vegetables (181; 82.3%). However, less than half of the participants acknowledged that they eat either fruits or vegetable up to 3 times in a week. Again almost all the participants reported that they eat fresh fish (192; 87.3%) and dairy products (181; 82.3%). However, less than half of the

respondents reported eating either fresh fish or dairy products more than 3 times a week.

The majority of the participant reported that they consume fast food (154; 70%). However only about 13.6% (30) of the participant reported eating fast food more than 3 times a week.

More than 80% (180) of the respondents noted that they consume both fried food and soft drinks. However, not more than 25% of the participant reported consumption beyond 3 times per week. Also 143 (65.0%) respondents reported that they consume coffee with less than 19% reporting consumption that is beyond 3 times per week. About 48% (107) of the participant reported consuming up to 4 cups of water daily. Also only 0.9% (2) of the participant spent up to 40 minutes while eating.

Overall only 2 (0.9%) respondents were judged to have good dietary habits. However, 74.1% (163) of the respondents were judged as having good dietary habits. While 25.0% (550) of the respondents were judged to have poor dietary habits.

**Table 4: Association between selected variables and overall dietary habits (Chi-Square test)**

	Poor Dietary Habit n (%)	Moderate Dietary Habit n (%)	Adequate Dietary Habit n (%)	X <sup>2</sup>	P Value
<b>Gender</b>					
Female	42 (28.0)	106 (70.7)	2 (1.3)	.468	0.01
Male	13 (18.8)	56 (81.2)	0 (0)		
<b>Level</b>					
400	18 (23.4)	59(76.6)	0(0)	0.49	0.34
500	7(18.9)	29(78.4)	1(2.7)		
600	30 (28.3)	75 (70.8)	1 (0.9)		
<b>Monthly Income</b>					
≤ 10,000	2(15.4)	11(84.6)	0(0)	0.03	0.05
11,000-15,000	2(4.2)	45(93.8)	1(2.1)		
16,000-20,000	41(31.5)	88(67.7)	1(0.8)		
21,000-25,000	8(33.3)	16(66.7)	1(0.8)		
≥ 25,000	2(40)	3(60)	0(0)		
Family History of Diabetes	36 (22.9)	119 (75.8)	2 (1.3)	0.376	0.57
Family History of Hypertension	27 (21.3)	98 (77.2)	2 (1.6)	0.171	0.85
<b>Knowledge about Dieting</b>					
Poor Knowledge	4 (57.1)	3 (42.9)	0(0)	0.320	0.06
Moderate Knowledge	23 (21.5)	83 (77.6)	1 (0.9)		
Adequate Knowledge	28 (26.4)	77 (72.6)	1 (0.9)		
<b>Father's Highest level of Education</b>					
No formal education	0(0)	8(100)	0(0)	0.373	0.07
Primary	8(30.8)	17(65.4)	1(3.8)		
Secondary	15 (26.3)	42 (73.7)	0 (0.0)		
Tertiary	32 (24.8)	96 (74.4)	1(0.8)		
<b>Mother's Highest level of Education</b>					
No formal education	0(0)	5(100)	0(0)	0.384	0.05
Primary	2(11.1)	16(88.9)	0(0)		
Secondary	9(20.5)	35(79.5)	0(0)		
Tertiary	44(28.9)	106(69.7)	2(1.3)		



Table 4 provides the association between selected variable (gender, level, family history of diabetes, family history of hypertension, and overall dietary knowledge) and respondents' dietary habits. Best report of moderate dietary habits was observed among females (81.2%) and students between 400 – 500 level.

There was a significant association between gender and dietary habit ( $X^2 = 0.428$ ;  $p = 0.01$ ) and academic level and dietary habits ( $X^2 = 0.601$ ;  $p = 0.02$ ). Surprisingly neither family history of diabetes and hypertension nor respondents knowledge of dieting showed a significant association with their overall dietary habits ( $P \leq 0.5$ ).

There is significant association between the level of monthly income of the student and their level of dietary habit ( $X^2=0.03$ ;  $p \leq 0.05$ ) this is because the higher the income the higher the dietary practice.

**Table 5: Correlation between participant's age and BMI with their overall feeding habits (Spearman's Correlation analysis)**

	Dietary Habit
<b>Age</b>	
r	.259
p value	<0.001
<b>BMI</b>	
r	.325
p value	<0.001

Table 5 illustrates the relationship between age and BMI and participants' overall dietary habit. There was a significantly weak and positive relationship between respondents' age and their dietary habit ( $r = 0.235$ ;  $p < 0.001$ ) and participant' BMI and their dietary habit ( $r = 0.325$ ;  $p < 0.01$ ).

## DISCUSSION

The dietary and health habits in any population might be a clue for the general well-being and the magnitude of their risks to have lifestyle disorders like diabetes mellitus, dyslipidaemia, hypertension and coronary heart disease, which are the main cause of death worldwide. Dietary habits, quality and quantity of food constitute majorly to the pathogenesis of the mentioned disorders. Medical students; representing part of the young age

population of the community, for different reasons are prone to eat unhealthy foods and to have bad health habits during their college years which might affect their wellbeing and increase the risk of obesity, diabetes and coronary heart disease like fast food consumption, lower vegetable and fruit intake in the face of less physical activities. Thus the poor dietary habits need to be checkmate to prevent the development of these disorders. It is worthy to note that their poor dietary habits also affect their performance in quizzes and exams, in other words low output, which is a great public health implication.

A total of 220 questionnaires were distributed, of which 220 were retrieved giving a response rate of 100%. This study showed that almost all the participants (217; 98.6%) noted that at some point, they have heard of the phrase balanced diet. Regarding their sources of information, whereas more than half of the respondents reported books as their major source of information (159; 72.3%), about 50% (110) reported parents as their major information source. Interestingly, less than 40% of the respondents reported their major sources of information on balanced diet to include friends, the internet or the television. Almost all the participant (>90%) rightly identified all true components of balanced diet. Regarding respondents overall dietary knowledge, 48.2% (106) of the participants had excellent dietary knowledge while 48.6% (107) had moderate knowledge. Only 3.2% (7) of the respondents had poor dietary knowledge ( $p$  value 0.06).

This findings agrees with the study on Nutrition and Healthy Lifestyle: Knowledge, Attitude and Practice in Medical Students of Yenepoya Medical College, Mengalore<sup>12</sup>; 262 students (of both genders) in the age group of 19-24 years, were evaluated separately (using a self-administered questionnaire) on important aspects of knowledge, attitude and practices. The knowledge scores were analyzed by the t-test and there was not much significant difference between the knowledge scores of

both males and female students. Overall both males and females had adequate knowledge about balanced diet and nutrition. 80% of the students answered correctly when asked about the composition of the balanced diet. Importance of vitamins and minerals in the diet was answered correctly by 70% of students. 90% knew how important fibre is for health. They had a fair knowledge about protein energy malnutrition and 68% wrote correctly about this condition.

While another study carried out on the knowledge, attitude and practice of dietary and lifestyle habits among medical students in King Abdulaziz University, Saudi Arabia<sup>13</sup> shows 75-94% of the students were aware of the composition of balanced diet, identification of the healthiest frying method, healthiest feeding behaviour, importance of vitamin and weaning of organic food. It's similar with this study in which 98.6% were aware of balanced diet, 88% knew of organic food which is in keeping with the study above done in Saudi Arabia<sup>13</sup>. Whereas 71.8% (158) of the respondent have heard of the phrase organic food in the past, only about half of the participants were able to define it as food produced naturally (135, 61.4%) or as food produced without any artificial alterations (110; 50%). Regarding genetically modified foods, 75.9% of (167) of the respondents noted that they have heard of such phrase as genetically modified foods. However, less than half of the respondents were able to rightly define that as food produced from organisms that have had their genes altered to produced traits that are not naturally produced (86; 39.1%) or as foods produced from or using genetically modified organism (95; 43.28). Again the majority of the respondents (>60%) could rightly identify various food processing methods. Also 71% of respondents knew about genetically processed/modified food which is in contrast with the study done in Saudi Arabia<sup>10</sup> in which 18%-39% of the medical students knew of genetically modified food and healthy cooking method. My findings

are logical and simple because the study was carried out among undergraduate clinical medical students who are well knowledgeable about the health conditions that come with unbalanced diet and poor dietary habit. The clinical implication of my findings is that it will tend to reduce health problems associated with poor dietary habit such as diabetes, hypertension, coronary artery disease etc with the participants because of their moderate knowledge about dietary habits.

Almost all the participant noted that they skip meals (194; 88.2%). Prominent reasons for skipping meals involved weight control (143; 65%), lack of food (117; 53.2%), lack of time (643; 65%) and loss of appetite (99; 45%). Interestingly, less than 40% of the participant reported skipping meals up to 4 times per week, with breakfast as the most skipped meal (114; 54.8%). About 86.6% (190) of the participants reported that they take snacks. However, only about 19.1% (42) of the respondents reported consuming snacks up to 3 times in a week. Almost all the participants reported that they consume fruits (193; 87.7%) and vegetables (181; 82.3%). However, less than half of the participants acknowledged that they eat either fruits or vegetable up to 3 times in a week. Again almost all the participants reported that they eat fresh fish (192; 87.3%) and dairy products (181; 82.3%). However, less than half of the respondents reported eating either fresh fish or dairy products more than 3 times a week. The majority of the participant reported that they consume fast food (154; 70%). However only about 13.6% (30) of the participant reported eating fast food more than 3 times a week. More than 80% (180) of the respondents noted that they consume both fried food and soft drinks. However, not more than 25% of the participant reported consumption beyond 3 times per week. Also 143 (65.0%) respondents reported that they consume coffee with less than 19% reporting consumption that is beyond 3 times per week. About 48% (107) of the participant reported consuming up to

4 cups of water daily. Also only 0.9% (2) of the participant spent up to 40 minutes while eating. Overall only 2 (0.9) respondents were judged to have good dietary habits. However, 74.1% (163) of the respondents were judged as having moderate dietary habits. While 25.0% (55 of the respondents) were judged to have poor dietary habits. While a descriptive cross sectional study among medical students at the University of Ghana medical school<sup>13</sup> showed about 71.92% of the students skipped breakfast attributing it more to early morning lectures, this is in conflict with this study where 88.2% of the respondents skip breakfast, 21% attributing it with weight loss probably because 68.2% of my respondents were females who will always want to put up a weight which is socially acceptable by everyone and having this mentality that been slim gives one a perfect shape and therefore being fat as shapeless.

Also worthy of note is that 32.3% of the students made use of dairy products more than 3 times a week, 23.2% took fruits 2 times in a week, 18.6% 3 times, 24.5% once a week and 20.9% for those who take fruits more than 3 times a week, which is in conflict to the study conducted in University of Dammam, Saudi Arabia<sup>14</sup>, where 65.15% made use of fruits and vegetables and 59.25% made use of dairy products. While in this study 19.5% took vegetables 3 times a week and 20.0% 2 times in a week. This is partly because of our mentality in this part of the world where we think that fruits and vegetables are only meant for the rich who can always afford it and not for a common man. The dairy products we use here are mostly imported and with the spike in dollar price this products are very expensive making it difficult for my respondents to purchase and take it regularly therefore bringing about the disparity.

The association between selected variable (gender, level, family history of diabetes, family history of hypertension, and overall dietary knowledge) and respondents' dietary habits was analyzed using chi square and best report of moderate dietary habits

was observed among females (81.2%) and students between 400 – 500 level. There was a significant association between gender and dietary habit ( $X^2 = 0.428$ ;  $p = 0.01$ ) and academic level and dietary habits ( $X^2 = 0.601$ ;  $p = 0.02$ ). Surprisingly they were a significant association between family history of diabetes and hypertension with respondent's knowledge of dieting showed a significant association with their overall dietary habits ( $P \geq 0.5$ ). This is because females are so sceptical of what goes into their mouth because there want to keep a nice shape and not regarded or associated with being fat unlike males. It is also logical given that as people grow they become more conscious of their lifestyle.

A cross sectional study conducted amongst medical students in Mangalore showed that 74.8% of the students had normal weight, 10.3% were overweight, 11.1% were underweight, and 3.1% were in obesity category and 0.4% were morbidly obese<sup>12</sup>, it is not in keeping with the findings of this study in which 60.5% were of normal weight, 4.1% underweight, 27.3% overweight and 6.4% were in obesity class 1, 1.4% obesity class 2 and 0.5% class 3.

In a study conducted on the eating habits among Lebanese University students<sup>15</sup>. The outcome indicated that 64.7% were of normal weights, which is a little above that seen in this study in which 60.5% were within the normal weight range.

The findings are logical given that when people age, it makes one become susceptible to some disease entity and therefore makes the individuals conscious of what he or she eats, however, adopting a good eating habit which is in line with body mass index. BMI greater than 28 can predispose one to some chronic illness such as diabetes, hypertension and obesity and this keeps an individual at his feet in order to modify his dietary habit and live a disease free life.

Future study should seek to find out if the current findings could also hold true in a larger population of growing adults.

There is significant association between the level of monthly income of the participants and their level of dietary habit ( $X^2=0.03$ ;  $p\leq 0.05$ ) this is because the higher the income the higher the good dietary practice. This study showed that a greater percentage of participants who had good dietary habit received more monthly income than others.

No previous study has been done to back up my result, therefore I advocate that further research study should include this objective but however in the study on nutrition, knowledge and dietary behavior of elementary school children in Seoul<sup>16</sup>. Dietary behavior of male subjects was positively correlated with parents' education levels, monthly household income and nutrition attitude. Dietary behavior of female subjects was positively correlated with monthly household income, nutrition knowledge and nutrition attitude.

There was a significant association between gender and dietary habit ( $X^2 = 0.428$ ;  $p = 0.01$ ) and academic level and dietary habits ( $X^2 = 0.601$ ;  $p = 0.02$ ). Surprisingly family history of diabetes and hypertension showed a significant association with their overall dietary habits ( $P\leq 0.5$ ).

However, Synergistic Effect of Family History of Diabetes (FHD) and Dietary Habits on the Risk of Type 2 Diabetes in Central China is in agreement with this index research stating that the risk of T2DM was synergistically affected by FHD and dietary habits. Nutrition educational intervention may decrease the prevalence of T2DM in the Chinese with FHD<sup>17</sup>.

Surprisingly, Association between family history of diabetes and cardiovascular disease and lifestyle risk factors in the United States population: The 2009–2012 National Health and Nutrition Examination Survey shows that there was no association between family history of diabetes and hypertension with dietary factors or physical activity<sup>18</sup>.

## CONCLUSION AND RECOMMENDATIONS

Nutrition is necessary for good growth, and development, optimal body function and general well-being of human, especially amongst student to enhance good state of health for school works. In the 1980's University students were given meal tickets and this translated to quality graduates. There is urgent need currently to replicate same gesture especially among the medical students with high mental and academic demands.

## RECOMMENDATIONS

- There is need to encourage all medical students on the need for taking breakfast regularly, because 88.2% of the skipped meal and 51.8% of the respondents skip their breakfast; educating them on its importance, as it allows one to function optimally during the day whilst considering the long overnight fast.
- This study also highlighted poor consumption of fruits and vegetables, with those taking fruits once a week having 24.5% (highest) and 28.2% for those who take vegetables 3 times a week, hence the need for adequate education on the importance of continuous and frequent intake of fruits and vegetables amongst medical students, who will become doctors, thus enabling them to experience their benefits on the nutritional status and subsequent ease in educating their patients in the future.
- There was also a significant association between family history of diabetes, hypertension and dietary habits ( $P\leq 0.5$ ), therefore the need to teach medical students the need to be mindful with their dietary habit which is a major risk factor of chronic illnesses such as diabetes and hypertension.
- Continuing educational workshops in Nutritional courses are necessary to improve the nutritional knowledge, attitudes and dietary practices of clinical medical students.



- Further research using large cohort is needed to address the student's performance relation to nutrition.
- Developing gender-specific programmes for promoting healthy lifestyle behaviours among students is recommended.
- Furthermore, public demand for health and nutritional information should be taken into consideration when implementing strategies aimed at improving the nutritional well-being of individuals.

### Competing Interests

The authors declared that they have no competing interests and no funding for this research work.

### Limitations of the Study

Part of the limitations to this study includes;

- There was no fund for this study because such study should be a prospective study which is capital intensive.
- Detailed psychomotor analysis involving intelligence quotient would have been paramount in this study.

It is therefore important that a detailed part of this work should be done.

### REFERENCES

1. Berthoud HR. The neurobiology of food intake in an obesogenic environment. The Proceedings of the Nutrition Society. 2012; 71(4):478–87.
2. Iloabanafor C. Knowledge and Attitude of Iron and Folic Acid Deficiency Amongst Pregnant Women Presenting in Nnamdi Azikiwe University Teaching Hospital Nnewi Anambra State Nigeria. 2017.
3. Rosenbloom, C.A., S.S. Jonnalagadda and R. Skinner, 2002. Nutrition collegiate athletic association institution. J. Am. Dietetic Assoc., 102: 418-420.
4. Kumar S, Mahabalaraju DK, Anuroopa MS. Prevalence of Obesity and Its Influencing Factor among Affluent School Children of Davangere City, Indian. Journal of Community Medicine 2007; 32:35.
5. Sakamaki R, Toyama K, Amamoto R, Liu CJ, Shinfuku N. Nutritional knowledge, food habits and health attitude of Chinese university students--a cross sectional study. Nutr J 2005; 4: 4.
6. MedlinePlus, Nutrition (Internet). c2019 (updated 2016 Dec 27; cited on Feb 26 2019). Available from: <https://medlineplus.gov/definitions/nutrition/definitions.html>
7. Wikipedia, Nutrition (Internet). c2019. No date (cited on Feb 26 2019). Available from: <https://en.m.wikipedia.org/wiki/nutrition>
8. Chatterjea M, Shinde R. Textbook of Medical Biochemistry; 8<sup>th</sup> edition; 2012; p. 162.
9. Vasudevan D, Sreekumari S, Vaidyanathan K. Textbook of Biochemistry for Medical Students; 6<sup>th</sup> edition; 2011; p. 411.
10. Encyclopedia, Nutritional Status (Internet). 2019 (updated 2015). Available from <https://www.encyclopedia.com/education/dictionaries-thesauruses-pictures-and-press-release/nutritional-status>.
11. Wikipedia, Nnewi (Internet). c2019. (updated 2018 Feb 28; cited on May 05 2019). Available from: <https://en.m.wikipedia.org/wiki/Nnewi>.
12. Ali S, Kotian G, Rao N. Nutrition and Healthy Lifestyle: Knowledge, Attitude and Practice in Medical Students of Yenepoya Medical College, Mangalore. A Questionnaire Based Study. International Journal of Pharmaceutical Sciences Review and Research. 2017; 45(2):99-103.
13. Alissa E, Alsawadi H, Zedan A, et al. Knowledge, Attitude and Practice of Dietary and Lifestyle Habits Among Medical Students in King Abdulaziz University, Saudi Arabia . International Journal of Nutrition and Food Sciences. 2015; 4(6):650-655.
14. Al-Qahtani M. Dietary Habits of Saudi Medical Students at University of Dammam. International Journal of Health Sciences, Qassim University. 2016; 10(3): 353-362.
15. Yahia N, Achkar A, Abdallah A, et al. Eating Habits and Obesity Among Lebanese University Students . Nutritional Journal. 2008; 7(32):1-6.
16. Eun-Suil Choi, Na-Ri Shin, Eun-Im Jung, Hae-Ryun Park, Hong-Mie Lee, and Kyung-Hee Song. A study on nutrition knowledge and dietary behavior of elementary school children in Seoul. Korean Journal of Community Nutrition. 2000;5: 586–597.

17. Yanyan Zhao, Chunhua Song, Xiaokun Ma, Xiaojun Ma, Qingzhu Wang, Hongfei Ji, Feng Guo, and Guijun Qin. Synergistic Effect of Family History of Diabetes and Dietary Habits on the Risk of Type 2 Diabetes in Central China International Journal of Endocrinology, Volume 2017.
18. Ebo selume Akhuemonkhan<sup>a</sup> Mariana Lazo<sup>b</sup>. Association between family history of diabetes and cardiovascular disease and lifestyle risk factors in the United States population: The 2009–2012 National Health and Nutrition Examination Survey. Journal of Diabetes Investigation, 2013.
- How to cite this article: Ekwebene OC, Ogbuagu CN, Modebe IA et.al. Assessment of dietary pattern, health implication and the nutritional status of clinical medical students of a tertiary institution in southeast Nigeria. Int J Health Sci Res. 2020; 10(9):346-359.

\*\*\*\*\*