

# Assessment of Nutritional Knowledge, Dietary Habits and Oral Health Practices of Undergraduate Students in Lead City University Ibadan, Nigeria

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**Abstract:** Nutrition is an essential component of oral health. Dietary intake of high-cariogenic foods rich in sugar could impair oral health. However, adequate nutritional knowledge determines dietary behaviour and consequently overall oral health practices. The study assessed the nutritional knowledge, dietary habits, and oral health practices of undergraduate students attending Lead City University Ibadan. The study was a descriptive design. 314 undergraduate students from all the faculties in the school participated in the study using a random sampling technique. Nutritional knowledge and oral health practices were assessed using a structured questionnaire while dietary habit was assessed using a Food frequency questionnaire. The nutrition knowledge was scored on a Likert scale of 11 and categorized as good (7-11), fair (5-6), and poor (< 5). Oral health practice was also scored on a scale of 8 and categorized as good (5-8) and poor (0-4). Data were analyzed using SPSS version 22.0 for descriptive and inferential statistics at  $p \leq 0.05$ . The mean age was  $22.53 \pm 7.63$ , the majority were females (70%). Knowledge that sucrose is mostly caries prone was (35.7%), those that had no idea of anti-cariogenic food (37.6%), and oral diseases can be prevented through nutritional knowledge (74.2%). Few students (18.5%) had good nutritional knowledge while (45.5%) had good oral health practice, especially among females. Dietary intake was characterized by high cariogenic foods such as carbonated drinks (42.0%), biscuits (40.1%), and beverages (34.7%). The undergraduate students had inadequate nutritional knowledge of foods that could affect dental health which is reflected in their dietary habits and also influenced their oral health practice.

**Keywords:** Dietary Habits, Nutrition Knowledge, Oral Health Practice, Undergraduates

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## 1. Introduction

Nutrition and oral health are like two sides of a coin each one dependent on the other for optimal general health outcomes. Oral diseases are among the most common

diseases of humankind, yet they receive little attention in many countries with weak health care systems, despite the high social and economic burden from these diseases, thus, considered a neglected area of international health [1].

The World Health Organization (WHO) defines oral health

as “a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual’s capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing” [2]. Oral health is a human right, an integral part of general health, and essential for overall well-being [3]. It is governed by a multitude of factors, and of importance among these are diet and nutrition.

It’s imperative for people to be made aware of the effect of diet and nutrition on their oral health [4]. Due to the fact that oral tissues, like other tissues in the body, are reliant on nutrition, diet and nutrition have a local impact on the oral cavity. According to the American Dietetic Association (ADA), “nutrition is an integral component of oral health” [5]. In other words, oral health and nutrition have a synergistic relationship. Oral health defines the type of food consumed, taste perception, and ultimately the nutritional level [4] while diet has a significant impact on tooth development, that is, it can either strengthen or weaken the developing tooth. Poor nutrition and diet can interfere with the progress and integrity of the teeth and also contribute to the rapid progression of dental diseases [6]. Diet and nutrition may also interfere with the balance of tooth demineralization and re-mineralization [7]. Therefore, there may exist a vicious cycle where poor oral health affects nutrient intake, which in turn leads to flaws in the development and maturation of teeth structure or protective mechanism, thereby predisposing the teeth to dental diseases [8, 9]. Oftentimes, the presence of oral diseases may be due to nutrient deficiencies resulting from poor dietary practices. The global transition to the western diet has brought about a change in the food and market systems, which in turn has brought about the provision of a wide range of convenient foods as well as changes in the choice of foods and eating habits of individuals especially young adults [10]. This trend towards the consumption of a western-style diet, which is characterized by high levels of sugar and fat, has been linked to the widespread of non-communicable disorders including dental caries [10]. These conditions have previously been associated with the developed world but currently developing and less affluent nations are recording increasing cases as well [11]. Poor nutritional knowledge could be said to be one of the barriers to healthy dietary practices which is an essential prerequisite for good oral health practices [12]. Dental caries is an example of a dental disease. Its development occurs due to an interplay between four key factors; micro-flora (cariogenic/acidogenic bacteria), substrate (cariogenic diet), susceptible tooth surfaces, and time factor. Observations in humans, animals, and *in vitro* have shown clearly that frequent and prolonged oral exposures to certain carbohydrates are fundamental to caries activity [13]. Dietary carbohydrates such as glucose, sucrose, fructose, or cooked starch provide the substrate for cariogenic bacteria to produce organic acids which promote demineralization of the tooth structure [14]. Sucrose is the most important substrate for bacterial metabolism and caries

formation, especially refined fermentable carbohydrates [12]. Hence, diet plays a major role in the development of dental caries.

Recently, young individuals have access to and prefer empty caloric foods (food items that do not supply any other nutrients than energy), or those that are laid with saturated fats [15] to nutrient-dense foods. In addition to all of these unhealthy snacks, they are constantly exposed to convenience foods from fast food restaurants, which have low amounts of fiber and essential micronutrients, and high amounts of sugar, fat, calories, and sodium. Increased intake of these energy-dense and sugar-sweetened foods could predispose this group to nutritional disorders such as micronutrient deficiencies, eating disorders, obesity, dental diseases, and anorexia nervosa [15].

Nutritional knowledge and dietary habits play a fundamental role in good oral health by preventing common oral diseases, such as dental caries, dental erosion, and periodontal diseases. This knowledge and practices include healthy nutritional habits, and regular visits to dentists. Lack of nutrition knowledge may contribute to poor dietary practices. Poor nutritional knowledge has been reported as one of the barriers to healthy dietary practices among undergraduate students [16] and consequently affect overall oral health.

Hence, the study assessed the level of nutritional knowledge, dietary habits, and oral health practices of undergraduate students of Lead City University, Ibadan, Oyo State Nigeria.

## 2. Materials and Methods

### 2.1. Study Design

The study was a descriptive cross-sectional design.

### 2.2. Study Population

The study population were male and female undergraduate students of Lead City University Ibadan, Oyo State, Nigeria.

### 2.3. Sample Size Determination

Sample size was determined using the Leslie Fischer formula.

$$n = \frac{z^2 p (1-p)}{d^2}$$

Where:

n = the desired sample size of the population;

z = the standard normal deviate, it was set at 1.96, which corresponds to 95% confidence level;

p = prevalence of poor nutritional knowledge at 75%. This prevalence was derived from the prevalence of poor nutritional knowledge among undergraduates in Edo state [17];

q = proportion not expected to be having nutritional knowledge  $1 - p = (1 - 0.75 = 0.25)$ ;

d = degree of accuracy desired, which was set at 0.05.

$$n = \frac{(1.96^2)(0.75)(0.25)}{(0.05^2)} = 288$$

Considering a non-response rate of 10%, the total desired sample size = the obtained sample size/ (1- Non-response rate).

$$n = \frac{288}{(1-0.1)} = 320$$

In all, a total of 314 students were involved in the study.

#### 2.4. Sampling Technique

The study employed a random sampling technique. Students were randomly selected from four faculties out of the ten faculties within the school.

#### 2.5. Research Instrument

The research instrument used for the study was a semi-structured self-administered closed-ended questionnaire. Sections in the questionnaire include:

- Socio-demographic characteristics of respondents;
- Nutritional knowledge on oral health [18];
- Oral health practices;
- Dietary intake of common cariogenic and healthy foods in the preceding seven days was assessed using an adapted Food frequency questionnaire.

#### 2.6. Data Collection

The questionnaire was administered by the researcher and collected back immediately after the students were done filling in the required information on the same day of distribution.

#### 2.7. Data Analysis

Data were analyzed using IBM Statistical Package for Social Sciences (SPSS) software version 22.0. Data were analyzed for descriptive statistics such as mean, frequency, percentage, and standard deviation. Chi-square was used to test for associations at  $P \leq 0.05$  statistical significance. Results were presented in tables, graphs, and charts.

The nutrition knowledge was scored on a 7 points scale. Every correct response was scored as 1 while a wrong response was scored as 0. Level of Knowledge was graded as poor (0-4), fair (5-6), and good (>7).

The oral health practice was scored on an 8 points scale. Every correct response was scored as 1 while a wrong response was scored as 0. The practice was assessed as poor (0-4) and good (5-8).

Dietary habit was categorized based on the frequency of consumption of cariogenic foods, snacks, and fruits that strengthens the oral cavity and those which increases the risk of dental diseases. The consumption pattern was categorized as frequently and infrequently consumed. Daily and 4-6 times/week were reported as frequent consumption while 1-3 times/week and never were reported as infrequent consumption.

#### 2.8. Ethical Approval

Ethical approval was obtained from the ethical review

committee of Lead City University with ethical approval number: LCU-REC/22/050. The respondents were briefed about the purpose of the study and verbal consent was taken at the point of administration of the questionnaires.

## 3. Results and Discussion

### 3.1. Socio-Demographic Characteristics of Respondents

Table 1 showed the mean age of the students was  $22.53 \pm 7.63$ , majority were female (70%) and were in 200 and 300 levels (30.6% & 32.8%) respectively. The mean knowledge score was  $4.39 \pm 2.15$ .

Table 1. Socio-demographic characteristics of the students.

Variables	Male Freq. (%)	Female Freq. (%)	Total Freq. (%)
Gender	95 (30.0)	219 (70.0)	314 (100)
Age			
≤ 20	56 (31.1)	124 (68.9)	180 (57.3)
21-25	23 (28.0)	59 (72.0)	82 (26.1)
26-30	7 (36.8)	12 (63.2)	19 (6.1)
>30	9 (27.3)	24 (72.7)	33 (10.5)
Mean±SD	22.22± 7.16	22.68 ±7.84	22.53±7.63
Level			
100 L	36 (42.4)	49 (57.6)	85 (27.1)
200 L	29 (30.2)	67 (69.8)	96 (30.6)
300 L	22 (21.4)	81 (78.6)	103 (32.8)
400/500 L	8 (26.7)	22 (73.3)	30 (9.6)

### 3.2. Nutritional Knowledge and Oral Health Practices of the Respondents

Table 2 showed the level of nutritional knowledge and oral health practices of undergraduate students. About one-third, (35.7%) of the students have adequate knowledge of sugar that is most caries prone, (29.9%) were aware that saccharine is a sugar substitute that could reduce the risk of dental caries, and few (17.8%) knew that cheese is an example of anti-cariogenic foods. Less than half (43.9%) knew that firm and fibrous food helps to strengthen periodontium and prevent dental caries, and less than one-third (26.1%) had the knowledge that deficiency of vitamin C and B<sub>12</sub> manifests as oral diseases. More than one-third (38.9% & 36.3%) of the students were aware that Dental erosion is caused by sustained direct contact between tooth surfaces, and that calcium is an element present in trace amounts in food that can stop caries formation respectively. Majority (74.2% & 82.5%) of the students reported that oral diseases can be prevented through adequate nutritional knowledge and that consumption of too much sweet/sugary foods can cause tooth decay/caries. Almost half of the students (46.2%) were aware that Calcium and Vitamin D are essential for strong tooth and bone development. Few (22.0%) of the students knew that gagging wine could increase the onset of dental erosion. About half (50.0%) had poor knowledge scores while a few (18.5%) had good knowledge scores among the undergraduate students. There was a significant difference ( $p=0.03$ ) in the level of knowledge between male and female undergraduate students with a mean score of  $4.39 \pm 2$ .

About two-thirds of the students (66.6% and 62.7%) rinsed

their mouths after meals and brushed their teeth twice daily. Less than half (44.6% and 45.9%) used mouthwash as a substitute for brushing, and brushed their teeth before meals. Less than one-third (31.8%, 33.1% & 30.6%) visited the dental

clinic every year, rinsed their mouth after intake of sugary foods, and rinsed their mouth at least twice daily. About half (52.5%) of the students changed toothbrushes every three months while a few (25.2%) used dental floss to pick teeth.

**Table 2.** Nutritional knowledge of the undergraduate students.

Variables	Male Freq. (%)	Female Freq. (%)	Total Freq. (%)	p-value
Sucrose is the sugar that is most caries prone	28 (25.0)	84 (75.0)	112 (35.7)	0.209
Presence of calcium in food can stop dental caries	34 (29.8)	80 (70.2)	114 (36.3)	0.033*
Calcium and vitamin D are essential for tooth development	38 (26.2)	107 (73.8)	145 (46.2)	0.290
Consumption of sugary foods can cause tooth decay	68 (26.3)	191 (73.7)	259 (82.5)	0.002*
Firm & Fibrous food helps to strengthen the oral cavity	38 (27.5)	100 (72.5)	138 (43.9)	0.627
Gargling wine can cause dental disease	23 (33.3)	46 (66.7)	69 (22.0)	0.330
Presence of fluoride in food can stop caries formation	15 (22.4)	52 (77.6)	67 (21.3)	0.033
Xylitol is a sugar substitute that is not prone to dental caries	7 (14.6)	41 (85.4)	48 (15.3)	0.006*
Oral disease can be prevented through nutritional knowledge	62 (26.6)	171 (73.4)	233 (74.2)	0.105
Vitamin C & B <sub>12</sub> deficiencies manifest as oral disease	24 (29.3)	58 (70.7)	82 (26.1)	0.652
Milk helps to prevent dental caries	24 (40.7)	35 (59.3)	59 (18.8)	0.286
<b>Knowledge Score</b>				
Poor	52 (33.1)	105 (66.9)	157 (50.0%)	0.000*
Fair	32 (32.3)	67 (67.7)	99 (31.5%)	
Good	11 (19.0)	47 (81.0)	58 (18.5%)	
<b>Mean±SD</b>			4.39±2.15	

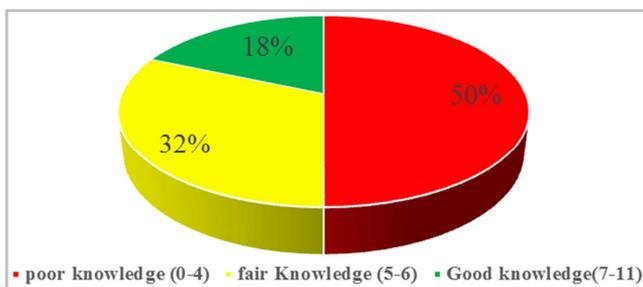
\*significance @p<0.05.

**3.3. Nutrition Knowledge Score of the Respondents**

Figure 1 shows the pie chart distribution of the nutrition knowledge score of the respondent. Half (50.0%) of the students had poor knowledge scores, about one-third (31.5%) had fair knowledge scores while few (18.5%) students had good knowledge scores.

**Table 3.** Oral Health Practice of the undergraduate students.

Variables	Male Freq. (%)	Female Freq. (%)	Total Freq. (%)	p-value
Rinsed mouth after meal	62 (29.7)	147 (70.3)	209 (66.6)	0.748
Brushed teeth twice a day	61 (31.0)	136 (69.0)	197 (62.7)	0.587
Use mouthwash as a substitute for brushing	48 (34.3)	92 (65.7)	140 (44.6)	0.200
Change toothbrush every 3 months	43 (26.1)	122 (73.9)	165 (52.5)	0.330
Visited the dental clinic in a year	29 (29.0)	71 (71.0)	100 (31.8)	0.235
Brushing/rinsing after sugary food intake	32 (30.8)	72 (69.2)	104 (33.1)	0.739
Use dental floss to pick teeth	24 (30.4)	55 (69.6)	79 (25.2)	0.968
Brush teeth before meals	41 (28.5)	103 (71.5)	144 (45.9)	0.863
Rinsed mouth twice daily	27 (28.1)	69 (71.9)	96 (30.6)	0.151
<b>Oral Health Practice Score</b>				
Poor	54 (31.6)	117 (68.4)	171 (54.5)	0.576
Good	41 (28.7)	102 (71.3)	143 (45.5)	

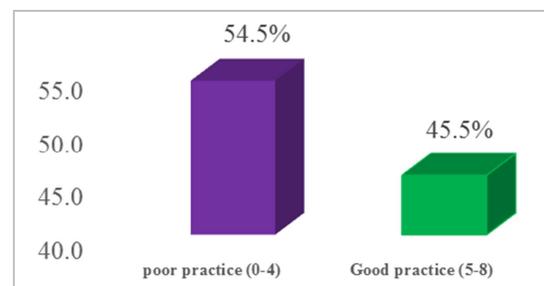


**Figure 1.** Nutrition Knowledge score of the respondents.

**3.4. Oral Health Practice Score of the Respondent**

Figure 2 showed the bar chart distribution of the oral health practice scores of the respondents. More than half of the students (54.5%) had poor practice, while others (45.5%)

had good oral practice.



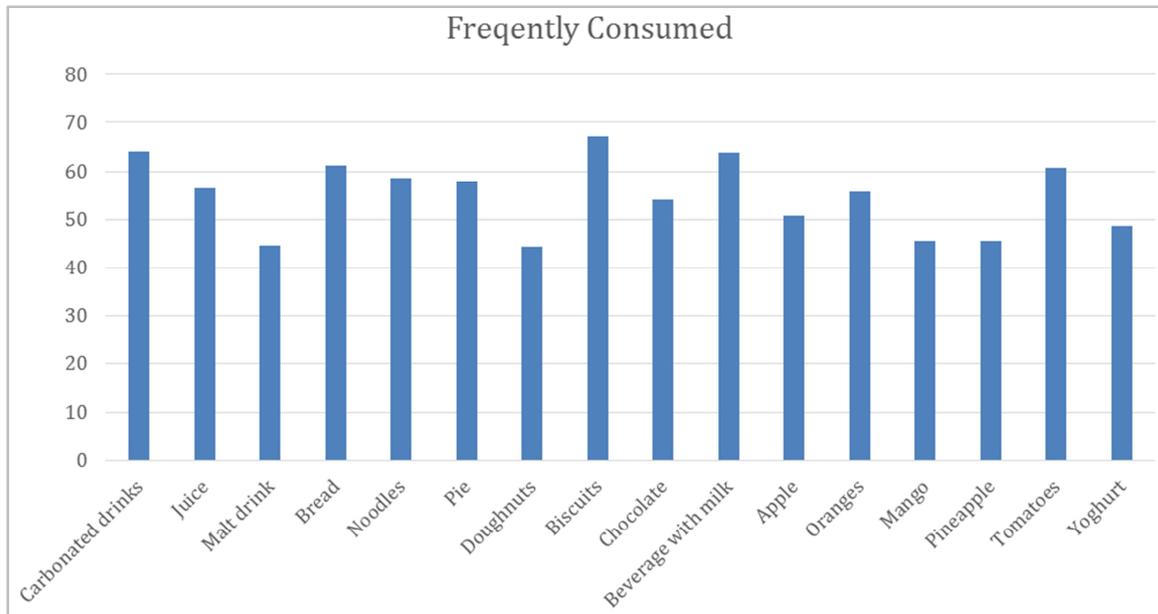
**Figure 2.** Oral Health Practice Score of the Respondent.

**3.5. Dietary Habits of the Respondent**

Figure 3 showed the bar chart distribution of consumption patterns of cariogenic and teeth-enhancing foods. The result

showed that more than half of the undergraduate students consumed high-cariogenic foods such as carbonated drinks (64.0%), juice (56.4%), bread (61.1%), noodles (58.6%), chocolate (54.1%), pie (57.9%), biscuits (67.2%), beverages

(63.7%) frequently except Malt drink (44.6%) and doughnut (44.3%). Apple (50.7%), Oranges (55.7%), Tomatoes (60.6%), Mango (45.9%), Pineapple, (45.5%), and Yoghurt (48.7%), were consumed frequently.



**Figure 3.** Dietary Habits of the undergraduate students.

## 4. Discussion

Globally, the current food system is inefficient. It favors quick, easy, and inexpensive meals over wholesome, sustainable foods. Oral health is an integral part of optimal health, which is fundamentally influenced by nutrition. Nutrients present in foods aid in strengthening the oral cavity, and poor nutrition could influence the onset of dental diseases. The presence of oral diseases could also result in inadequate food intake thereby leading to malnutrition, hence, diet and oral health have a synergetic relationship. It is impossible to underestimate the impact of a healthy diet and eating habits on young adults' dental health and quality of life. This study assessed nutritional knowledge, dietary habits, and oral health practices among undergraduate university students. Adequate nutrition knowledge is key in the selection of healthy food choices and consequently reduces the risk of diet-related dental disease. The overall findings from this study showed that the undergraduate students had inadequate nutritional knowledge associated with good oral care practices. This finding is similar to the result by [19] in India where the nutrition students had low dental-nutrition knowledge. The majority of the undergraduate students in this study were females and had more nutrition knowledge compared with the male students. This agrees with findings among college athletic students in Iran [20] and the USA [21] in which female college students had more nutritional knowledge than male students. A different result was observed in previous studies conducted in Edo state, Nigeria [17], and the Philippines [22] where more male

undergraduate students participated in the study and had a higher level of nutritional knowledge compared with the female students. This difference could be related to the fact that females are inherently more health-conscious and aware of their bodies than their male counterparts. Additionally, the larger percentage of female students in the university's overall student body probably informed the higher percentage of female students engaged in the study and may have contributed to the disparity in knowledge levels between the sexes seen in this study. Although, the majority of the undergraduate student knew that oral diseases can be prevented through adequate nutritional knowledge, however, few were aware that the presence of sucrose in foods increases the risk of dental caries. This result is similar to previous findings among nutrition students in India [19] but in contrast to another study among dental students in India [18] which revealed that the majority of the students reported sucrose as the most cariogenic sugar in the study. This difference in the level of knowledge reported could be attributed to the fact that the students were dental students who are expected to have some level of knowledge compared to the undergraduate students in our study.

Over the years sugar has been regarded as the causative factor for the development of dental caries along with other factors. The frequency of consumption of sugar is likely to increase the risk of dental caries in an individual [18].

Findings from this study showed that overall, the mean knowledge score was  $4.39 \pm 2.15$ . The level of nutritional knowledge of the undergraduate students was below average. This is also reflected in their oral health practice as more than half of the students had poor oral health practices and

unhealthy dietary habits. Nutrition knowledge greatly influences healthy living and dietary choices. The dietary habits of the undergraduate students showed increased intake of high cariogenic foods which predisposes them to risk of dental diseases. Sugar-sweetened beverages and snacks were consumed more frequently as compared with teeth-enhancing foods in this study.

Intake of sugars from processed foods and juices should be replaced with complex sugars from fresh fruits, vegetables, and starchy foods in order to lower the risk of dental caries, because chewing stimulates the flow of saliva, which has the effect of cleaning the teeth [23, 19]. Fruit juice, soft drinks, sports drinks, and tea have also been considered products of intermediate erosive potential [24]. Less than half of the students consumed yogurt frequently. The benefits of yogurt to oral health are far-reaching to overlook. Yogurt contains a considerable amount of calcium which helps in maintaining healthy teeth and gums, the probiotics found in yogurt also help to ward off gum disease, cavities, and halitosis (bad breath).

Diet plays a major role in promoting good health and preventing non-communicable diseases. Unhealthy food choices among young adults could be attributed to less concern given to diet by these age groups. Majority of adolescents and young adults believe that non-communicable diseases are diseases of the elderly and are not likely to occur until later stages of life [25].

## 5. Conclusion

This present study shows that the majority of the undergraduate students' dietary intake consist of cariogenic foods that could predispose to dental diseases. They also had inadequate nutritional knowledge of foods that affect dental health. The unhealthy dietary habits and oral health practices of the students is an indicator of their poor nutritional knowledge.

## 6. Recommendation

Findings from this study provided information on the nutritional knowledge, dietary habits, and oral health practice of undergraduate students in this specific region of Nigeria. An additional study that will assess nutrient intake and also carry out oral health examinations of young adults is recommended. Based on the results of this study, there is a need to include nutrition education in the course curriculum of undergraduate students.

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