



# Effect of Eating Habits on Oral Health among Junior High Students in the Cape Coast Metropolis

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## Abstract

The effect of eating habits on the oral health of 200 students at University Junior High School was assessed using cross-sectional survey. 51.8% of the respondent perceived they have good oral health and 41.7% had never had any dental condition in the last 6 months. However, there was prevalence of 58.2% dental conditions among the respondents. 69.3% had no difficulty brushing the teeth and 56.8% had no difficulty in eating as a result of dental problem. As such, 77% of the respondents never visited the dentist in the past five years. The oral health practices among the respondents were good as 61.4% responded they brush their teeth at least twice a day. The participants generally had bad eating habits as 56.1%, 33.6% and 50%, respectively take fizzy drinks, eat sweets and biscuits with other pastries for more than 3 times in a week. 41.5% had a scores  $\leq 15.0$  on total eating habit indicating good eating habits and 52.0% had scores  $\geq 16.0$ , indicating bad eating habits. This accounted for 58.2% having various dental conditions. Therefore, there is the need for an oral health promotion programme to increase awareness of good oral health practices and good eating/snacking habits among the students.

**Keywords:** Oral Health, Eating Habits, Oral Hygiene, Health promotion.

## Introduction

Oral health is an essential part of general health and plays a major role in a child's life. According to the World Health Organization (WHO), oral health is the state of being free from mouth and facial pain, oral and throat neoplasms, oral infections, gum or periodontal diseases, tooth loss, tooth decay and other diseases. Dental problem in children may be the presence of one or more decayed, missing,

or filled tooth surfaces in any primary tooth in a child. Dental Problems impose significant threats to the psychological, physical and social well-being of the child as dental problem and subsequent tooth loss may result in difficulty in eating, speaking, sleeping and socializing<sup>[1]</sup>. Risk factors for oral diseases include unhealthy eating habits or diet, tobacco use, harmful alcohol use, and poor oral hygiene. The limited accessibility to oral health services has also been implicated in various regions of the world, particularly in

Africa. Data from The WHO Oral Health Programme suggests that the dentist to population ratio in Africa is approximately 1: 150000 as against about 1: 2000 in most industrialized countries<sup>[1,2]</sup>.

According to data from the Ghana Health Services published in 2012, as at 2011, oral health diseases, specifically dental caries placed 19th on the list of 20 top causes of outpatient morbidity<sup>[3]</sup>. Dental caries cases were recorded as 98,996 out of 25,441,412 outpatient cases representing 0.4%<sup>[2]</sup>. The report also indicated that there are 38 dental technicians/therapists in the Central region of Ghana (where this study took place) out of a total of 513 in the whole of Ghana representing about 7.4%. Considering the population of Ghana being around 30 million, the presence of 513 dental technicians/therapists represents a dentist to a population ratio of approximately 1:56500. It can also be observed that the presence of oral health services is concentrated in the urban areas.

A study on the oral health status of peri-urban schoolchildren in Accra, Ghana by Bruce et al<sup>[4,5,6,7]</sup> in 2002 indicated that plaque scores ranged from 78.9% in 4-5-year olds to a high of 97% in 6-year olds with older groups occupying intermediate levels. The proportion with calculus ranged with a low of 40% in the 4-5-year olds to a high of 67% in the 13-16-year olds<sup>[3]</sup>. Some children are unable to care for their teeth and therefore mostly depend on their parents<sup>[4]</sup>. Particularly, mothers are the role models for developing good oral health habit during the early years of child's life and he/she acquires the early childhood habits and routines from the mother. Hence, beginning with basic good oral health habits is vital to establish appropriate dental norms that would be part of the adult life. Mothers teach their children proper hygiene skills, dietary habits and healthy practices<sup>[5]</sup>. Literature reports that a child's oral health and oral health-related habits is mostly dependent on the mother's oral health awareness<sup>[8,9,10]</sup>. Analysing the trends of dental pathologies seen at the University of Cape Coast dental clinic and the subsequent results of the dental imaging thereof, it was imperative to study the eating habits of these cohort of children. Also, in the Central region of Ghana, to the best of our knowledge there has been no study exploring the effect of the eating habits on the oral health of school children. The University of Cape Coast junior high school was chosen as most of the pupils are predominantly children of lecturers and the middle class. That is to say children of relatively very educated parents. Therefore, this study seeks to determine the effect of the eating habits of these junior high school pupils (ages between 9-19 years) on their oral or dental health in general and make recommendations thereof.<sup>[11,12,13,14]</sup>

## Methodology

The aim of this study was to assess the effect of eating habits on oral health of school children in the University Junior High School in Cape Coast.

### Study Area

The Study was conducted on the University of Cape Coast campus specifically at the University Junior High School in Cape Coast, in the Central region of Ghana. The school has a population of about 400 students with staff strength of 60 teaching and non-teaching staff.

### Study Design

The study was a cross-sectional survey and was conducted from November 2018 to May 2019. Questionnaires were administered to

participants to assess their eating habits and their oral hygiene practices. Total eating habits scores, Total effect scores and Total oral hygiene practice scores were calculated to determine the effect of the eating habits and the oral hygiene practices on the oral health of the participants. With the help of a Dental Surgeon at the University Dental Clinic the oral health status was diligently analysed.

### Data Collection Technique and Tools

Modified World Health Organization oral health questionnaires were administered to participants to assess their eating habits, oral hygiene practices, and the frequency of dental visit. Modified WHO oral assessment forms were used to assess the oral health of participants and Total eating habits scores, Total effect scores and Total oral hygiene practice scores were calculated to assess the effect of the eating habits and the oral hygiene practices on the oral health of the participants.

### Study Variables

The study variables include the demographic features of the participants such as sex and age of participants. The variables also include the presence of dental caries, swollen/bleeding gums, and other dental conditions. Other variables are the diet and frequency of the diet of students, and oral hygiene practices.

### Sampling Technique and Sample Size

A simple random sampling of participants was employed and 200 schoolchildren in the University Junior High School were sampled out of a population of 400 students with 95% confidence level and a 0.05 margin of error.

### Data Analysis

The data obtained from the study was analysed using IBM Statistical Package for Social Sciences version 25 and the results presented in the form of bar charts, graphs and tables.

### Ethical Considerations

The study was conducted pursuant to the ethical clearance from the Institutional Review Board of the University of Cape Coast and the University Hospital (Dental Clinic). Written informed consent was sought and obtained from study participants and the school authorities. Thorough explanation and the objective of the study was given to each study participant. The participants were assured of confidentiality of their data. There were no measures to compel participants to participate in this study.

## Results

### Socio-demographic Characteristics

The total sample population was 200 which comprises of 90 (45%) males and 110 (55) females as shown in Fig. 1 with ages between 9 years and 19 years (see Fig. 2). The mean age of the sample was  $13.1 \pm 1.5$  years old and the modal age was 14.0 years old. The results showed that majority of the respondents' parents has higher tertiary education and as such, they are in better position to practice good oral health. 144 students representing 73.1% indicated that their fathers have higher University education as against 136 (69.7%) of mothers have higher tertiary education. The results also showed that 13(6.60%) students indicated that their fathers have had no formal education while 10 (5.13%) students indicated that their mothers have had no formal education (see Fig. 3).

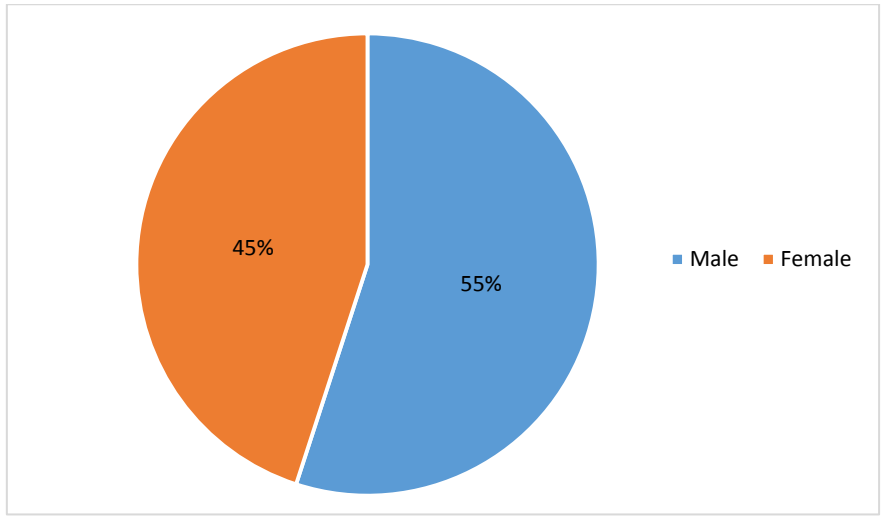


Figure 1: Gender Distribution of Participants

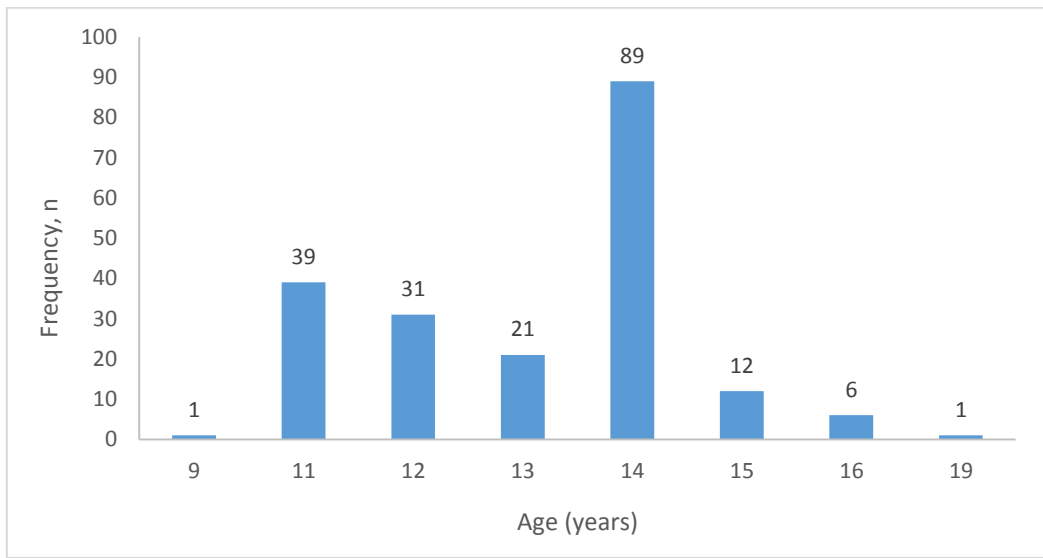


Figure 2: Age Distribution of Participants

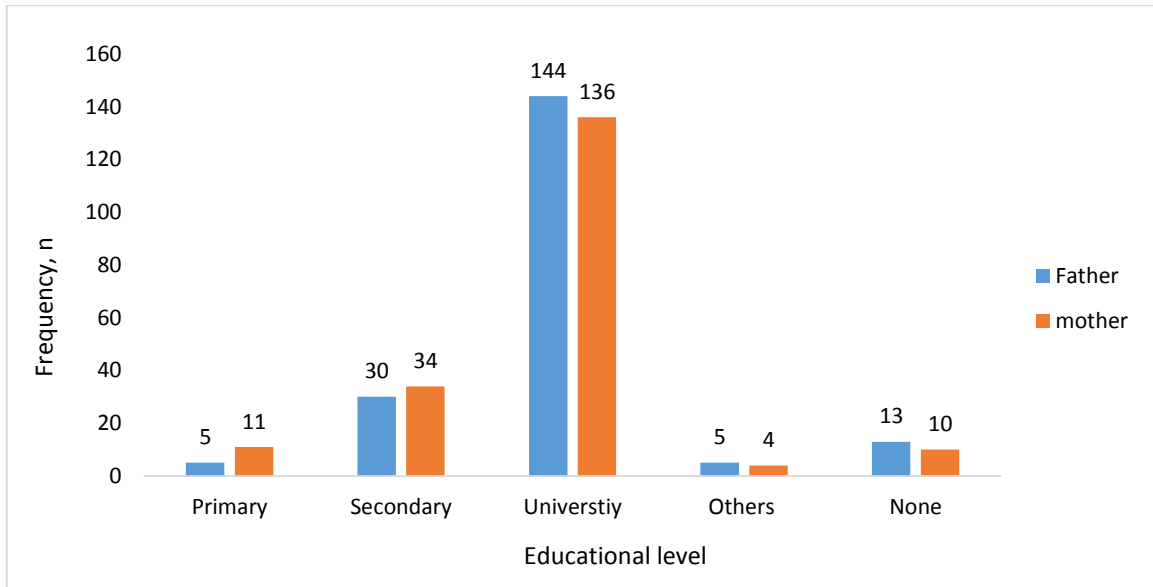


Figure 3: Education status of respondent's parents

**Dental Health Perception**

Respondents generally perceived their dental health to be good as shown in Table 1. 100 (50%) respondents perceived their dental health to be good, 57 (28.5%) perceived their dental health to be

very good whereas 9 (4.5%) perceived their dental health to be poor. 2 (1%) respondents perceived their dental health to be very poor and 4 (2%) students failed to provide a response

On whether the respondents had had any dental conditions in the last 6 months, 83 (41.7%) had no occurrence of dental conditions in the past months. 29 (14.6%) reported having a toothache in the last 6 months, while 7 (3.5%) reported that they had more than one dental conditions in the last 6 months.

With regards to the cleaning of their teeth, the respondents generally had very little or no difficulty cleaning their teeth and had no problems with their mouth or teeth. The results showed 137 (68.5%) respondents who claimed they have never had any difficulty cleaning their teeth due to problems with their mouth or teeth in the past 6 months, 52 (26.0%) respondents claimed they sometimes had difficulty cleaning their teeth due to problems with their mouth or teeth in the past 6 months.

Again, with regards to challenge with eating, 113 (56.8%) respondents claimed they have never had difficulty eating due to problems with their mouth or teeth and 79 (39.7%) reported of sometimes having difficulty eating due to problems with their mouth or teeth. The general response to how comfortable or otherwise in relaxing, 172 (86.4%) respondents claimed they have never had any difficulty relaxing (including sleeping) due to problems with their mouth or teeth and 22 (11.0%) respondents claimed they sometimes had difficulty relaxing (including sleeping) secondary to difficulties with their mouth or teeth. Only 2 respondents claimed of always having difficulty in relaxing or sleeping due to problems with their teeth.

**Table 1: Dental health perception of respondents**

STATEMENT	Frequency	Percentage
How would you describe the health of your teeth and gums?		
Very good	57	28.6
Good	100	51.8
Fair	28	14.1
Poor	9	4.5
Very poor	2	1.0
Have you had any dental conditions in the last 6 months?		
Toothache	29	14.6
Sensitive tooth	28	14.1
Swollen or bleeding gum	18	9.0
Broken tooth	16	8.0
Bad breath	17	8.5
Mouth ulcers	1	0.5
More than one	7	3.5
None	83	41.7
In the past 6 months, have you had difficulty cleaning your teeth due to problems in your mouth or with your teeth?		
Never	138	69.3
Sometimes	52	26.1
Often	7	3.5
Always	2	1.0
In the past 6 months, have you had difficulty in eating due to problems in mouth or with your teeth?		
Never	113	56.8
Sometimes	79	39.7
Often	3	1.5
Always	4	2.0
In the past 6 months, have you had		

difficulty in relaxing (including sleeping) due to problems in your teeth and mouth?		
Never	172	86.4
Sometimes	22	11.1
Often	2	1.0
Always	3	1.5

**Eating/Dietary Habits of Participants**

Table 2 shows the eating habits of respondents. We had 44 respondents out of 196 representing 22.4% claimed to eat cakes, biscuits and other pastries 6 or more times in a week. 60 respondents (30.6%) claimed to eat cakes, biscuits and other pastries 1-2 times a week, and 23 (11.7%) respondents reported that they rarely or never ate cakes, biscuits and other pastries.

On the average, majority (26.5%) reported of eating sweets (toffees) or chocolate 1 – 2 times a week while 32 (16.3%) respondents said they ate sweets (toffees) or chocolate 6 or more times a week while 40 (20.4%) respondents claimed they rarely or never ate sweets or chocolate in a week. 34 and 38 respondents ate sweets or chocolates 3 – 5 times a week and less than a week respectively. 4 students did not respond to the questions.

Generally, there was a high frequency of consumption of fizzy drinks as majority (31.6%) of the respondents said that on the average, they consumed fizzy or “soft” drinks 6 or more times in a week while 48 (24.5%) respondents claimed to consume fizzy drinks 3-5 times in a week as well as 46 (23.5) respondents reported of taking fizzy drinks 1 – 2 times a week. However, 10 (5.1%) respondents claimed they rarely or never consumed fizzy drinks. 4 students failed to respond to the question.

The consumption of fruits was also generally high among the respondents with the same 56 (28.3%) respondents each claimed they consumed fruits 6 or more times a week and 3 – 5 times a week respectively. A total of 51 (25.8%) claimed they consumed fruits 1 - 2 times a week while 16.2% respondents claimed they eat fruits less than once a week. However, only 3 respondents said they rarely or never consumed fruits in a week with 2 students failing to respond to the question.

**Table 2: Eating habits of respondents**

Statement	Frequency	Percentage
How often, on the average do you eat cakes, biscuits and other pastries?		
6 or more times a week	44	22.4
3 – 5 times a week	54	27.6
1 – 2 times a week	60	30.6
Less than once a week	15	7.7
Rarely or never	23	11.7
How often, on the average do you eat sweets (toffees) or chocolates?		
6 or more times a week	32	16.3
3 – 5 times a week	34	17.3
1 – 2 times a week	52	26.5
Less than once a week	38	19.4
Rarely or never	40	20.4
How often, on the average do you take fizzy drinks or soft drinks (Coke, Fanta, Malt, Kalyppe etc.)?		
6 or more times a week	62	31.6
3 – 5 times a week	48	24.5
1 – 2 times a week	46	23.5
Less than once a week	30	15.3
Rarely or never	10	5.1
How often, on the average do you eat fruits?		

6 or more times a week	56	28.3
3 – 5 times a week	56	28.3
1 – 2 times a week	51	25.8
Less than once a week	32	16.2
Rarely or never	3	1.5

**Oral Hygiene/Health Practices of Respondents**

Majority (151) of the respondents had never visited the dentist within the last 5 years (as shown in Table 3). However, 23 representing 11.7% had visited the dentist once in the last 5 years while 10 respondents reported of having visited the dentist 1 – 2 times in the last five years. A total of 6 (3,1%) students each claimed they had visited the dentist 3 – 5 times and 6 times or more respectively.

The results further showed that, a majority (61.4%) of students brush their teeth twice a day followed by 33.5% who brush their teeth once a day and 2.5% of the respondents said they brush their teeth 3 – 5 times in a day. Also 4 respondents stated they brushed their teeth 6 or more times in a day with only one respondent who claimed he/she has never brushed the teeth. We had 3 students failing to respond to the question.

Analysis of the material respondents used in cleaning their teeth showed 181 (91.4%) respondents use toothbrush and toothpaste with 3 (1.5%) respondents claiming they use charcoal in cleaning their teeth while a respondent each claimed to use dental gum and others respectively. Furthermore, 12 (6.1%) respondents said they use more than one of the materials provided. 2 students failed to respond to the question.

On the frequency of use of oral hygiene product, 78 (39.2%) respondents claimed they rarely or never use products such as mouth wash, 71 (35.7%) respondents claimed they sometimes use products such as mouth wash and 24 respondents claimed that they use products such as mouth wash two times a day with only 4% who use the product 3 times a day.

It was interesting to note that 51% of the respondents had never used dental floss before with only 3.6% who stated they always use dental floss in cleaning their teeth. A total of 70 respondents representing 35.7% said they sometimes use dental floss in cleaning their teeth.

Regarding the wash of the mouth after eating, we had 93 (46.5%) respondents who said they sometimes rinse their mouth with water after a meal as against 46 (23.1%) respondents who had never rinsed their mouth with water after meals and on the contrary, 32 (16.1%) respondents claimed they always rinse their mouths with water after a meal.

**Table 3: Oral health practice by respondents**

Statement	Frequency	Percentage
How often have you visited the dentist in the last 5 years?		
6 or more times	6	3.1
3 – 5 times	6	3.1
1 – 2 times	10	5.1
Once	23	11.7
Never	151	77.0
How often do you brush your teeth in a day?		
6 or more times	4	2.0
3 – 5 times	5	2.5
1 – 2 times	121	61.4
Once	66	33.5
Never	1	0.5
What do you use to clean your teeth?		
Charcoal	3	1.5
Toothbrush and toothpaste	181	91.4

Dental gum	1	0.5
Others	1	0.5
More than one	12	6.1
How often do you use other oral hygiene products such as mouth wash?		
3 times a day	8	4.0
2 times a day	24	12.1
Once a day	18	9.0
Sometimes	71	35.7
Rarely or never	78	39.2
How often do you use dental floss to clean your teeth?		
Never	100	51.0
Sometimes	70	35.7
Often	19	9.7
Always	7	3.6
Do you rinse your mouth with water after meals?		
Never	46	23.1
Sometimes	93	46.7
Often	28	14.1
Always	32	16.1

**Total Score for Eating Habits, Oral Hygiene Practice and Problems with the Teeth**

The total eating habit scores was computed from 5 variables including the frequency of eating cakes, biscuits and other pastries in a week, the frequency of eating toffees and chocolate, the frequency of consuming fizzy drinks, the frequency of consuming sugar with other beverages, and the frequency of eating Ice cream. The mean total eating habit score was 16.13 ± 4.09 and the modal score was 17. 4 participants representing 2% had a total score of 25, 1 participant representing 0.5% had a total score of 5, while 20 (10%) participants had a total score of 17. A scale of 5 – 25 was used in the scoring with scores of less than/equal to 15.0 (≤ 15.0) indicating good eating habits, while scores of greater than or equal to 16.0 (≥16.0) indicating bad eating habits. A total of 83 participants representing 41.5% had scores ≤ 15.0, thus indicating good eating habits and 104 participants representing 52.0% had scores ≥16.0, indicating bad eating habits. 13 participants did not respond.

Also, the total oral hygiene practice by the respondents was computed from 5 variables including frequency of visits to the dentist in the last 5 years, frequency of teeth brushing in a day, frequency of using oral hygiene products such as mouthwash, frequency of rinsing the mouth after a meal, and the frequency of flossing. The mean score was 17.89 ± 2.45 and the modal score was 19.0. We had 8 participants representing 4% had a total score of 22.0, 1 participant representing 0.5% had a total score of 9, while 36 participants representing 18.0% had a total score of 19.0. The total scores were on a scale of 9 – 22, with scores of less than/equal to 15.5 (≤ 15.5) indicating good oral health/hygiene practices, while scores of greater than or equal to 15.51 (≥15.51) indicating bad oral health/hygiene practices. A total of 28 participants representing 14.0% had scores ≤ 15.5, thus indicating good oral hygiene practices and 157 participants representing 78.5% had scores ≥15.51, indicating bad oral hygiene practices with 15 participants failing to respond.

Furthermore, the total effect (problems with the teeth) scores were computed from 3 variables including difficulty in cleaning the teeth due to problems with the teeth and mouth, difficulty in eating due to problems with the teeth and mouth, and difficulty in sleeping/relaxing due to problems with the teeth and mouth. The mean score was 4.02 ± 1.33 and the modal score was 3.0. We had 91 participants representing 45.5% who had a total score of 3, 1

participant representing 0.5% had a total score of 12, and 17 participants representing 8.5% had a total score of 6. The scores were on a scale of 3 – 12, with scores of less than/equal to 7.5 ( $\leq 7.5$ ) indicating low effect of the participant's oral health on their quality of life, while scores of greater than or equal to 7.51 ( $\geq 7.51$ ) indicating a high effect of the participant's oral health on their quality of life. A total of 193 participants representing 96.5% had scores  $\leq 7.5$ , thus indicating a low effect and 4 participants representing 2.0% had scores  $\geq 7.51$ , indicating a high effect. 3 participants did not respond.

#### **Spearman's correlations matrix of dental parameters in the study population**

The relationship between total effect scores and total oral health practice scores was studied using Spearman's correlation. There was a weak positive relationship between total effect scores and total oral health practice scores with  $\rho = 0.052$ ,  $N = 183$ ,  $p = 0.485$  with high scores on total oral health practices (bad oral practices) associated with high scores on total effect (High effect).

The relationship between total effect scores and total eating habits scores was also studied using Spearman's correlation. There was a weak positive relationship between total effect scores and total eating habit scores with  $\rho = 0.051$ ,  $N = 185$ ,  $p = 0.491$  with high scores on total eating habits (bad oral practices) associated with high scores on total effect (High effect).

## **Discussions**

The general perception of dental health in the population was good as 51.8% of the participants perceived that their dental health was good. This was confirmed by the finding that almost half of the participants (41.7%) had never had any dental condition including toothache, sensitive tooth, swollen gums, etc in the last 6 months.

The prevalence of dental conditions was 58.2% among the population, and this is consistent with the prevalence of oral health/dental conditions in Ghana as reported by a study in the Brong Ahafo Region of Ghana which showed a high prevalence of periodontal disease and a low prevalence of tooth decay<sup>[9]</sup>. The effect of these dental conditions on the quality of life of the participants was low/minimal as most of the participants (86.0%) had never had difficulty relaxing or sleeping due to oral health conditions. Also 56.5% of the participants had never had difficulty eating due to any dental conditions, and 68.5% of the participants had never experienced any problems with cleaning their teeth due to oral health conditions.

The consumption of cariogenic foods such as cakes, and biscuits was high, as 68.5% of the participants reported eating cakes and biscuits 1 – 6 times per week. 62% of the males reported eating cakes and biscuits 1 - 6 times per week, while 76.6% of the females reported eating cakes and biscuits 1 – 6 times per week. The consumption of sweets and chocolate was also high as 59% of the participants reported eating toffees and chocolate 1 - 6 times a week. The consumption of fizzy drinks was also high as 78% of participants reported consuming fizzy drinks 1 - 6 times a week. However, the consumption of cariogenic snacks is only significant in causing dental conditions when accompanied by poor oral hygiene practices.<sup>[15,16]</sup>

The population generally reported brushing their teeth twice in a day, as 61.4% of the participants reported brushing their teeth at least twice in a day. This is in contrast with a similar study among peri-urban school children in Accra where 42.0% of the participants brushed their teeth twice in a day<sup>[17,18]</sup>. The frequency of dental clinic attendance was very low in the population even

though the study site was close to a dental facility. 77% of the participants had never been to the dental clinic in the last 5 years which is in agreement with a similar study among peri-urban school children in Accra where 77.8% had not been to the dentist/dental clinic<sup>[19,20,21]</sup>. This could be as a result of the general phobia people have in visiting the Dentist. The use of dental floss among the respondents was fairly poor as 51% of the population had never used dental floss in cleaning their teeth, which is consistent with a similar study in peri-urban school children in Accra, where the floss use was very poor as 94% of the study population never used dental floss. The difference could be attributed to the location of the study site of the present study as it is located on a University campus, and most of the school children are from homes with literate parents as the results showed that majority of the respondents' parents had university degree and as such, they are in better position to practice good oral health albeit bad eating habit which is understandable since most of the children can afford and are provided with types of food they wish to eat. The awareness of the parents of the parents about the effects of these cariogenic foods may be low and therefore there is low conscious efforts to steer the children away from these foods. The general affinity for one food or the other can be cultivated and nurtured to affect eating habits.<sup>[22]</sup>

The scoring system that was generated for the total effect, total eating habits and total oral health practices showed that about 52% of the population had bad eating/snacking habits with majority consuming fizzy drinks, cakes and other cariogenic snacks on daily basis. Also, 78.5% had bad oral health practices which included not visiting the dentist, not using oral products such as mouthwash etc, although most of the participants brushed their teeth twice in a day. However, the effect of dental conditions on the quality of life of participants was low as 96.5% of the participants reported of a low effect on their quality of life such as cleaning their teeth, eating and relaxing or sleeping. This could account for why most of them had never been to the dental clinic. The trends can be reversed with conscious and targeted oral health education.

## **Conclusions and Recommendations**

The oral health of the participants in this study is fairly poor as most of them had had one or more dental conditions in recent times. Also, there is poor oral health practices among the study population as it is evident that there is low patronage of dental health services and the eating/snacking habits of the study population is poor. However, this seems to have very little effect on the quality of life of the participants. Hence, there should be oral health promotion programme by the Directorate of University Health Services in collaboration with junior high school authorities to educate the students on good oral health practices. Also, students should be sensitized on the effect of bad eating/snacking habits on their oral health and their general health, as the consumption of large amounts of snacks contributes to childhood obesity, predisposing them to non-communicable diseases in the future. Furthermore, students should be sensitized on the activities of the dental clinic, so alleviate the fear or negative perception they may have of the dental clinic in order to encourage them to patronize their services. The results of this study can also be shared with parents through the Parent Teacher Association of the school to bring awareness to parents and encouraging them to help promote healthy eating habits for their wards and the positive oral health thereof. Parents also to support their children and disabuse their phobia in the visitation to the dental clinic. Regular dental check-ups must therefore be encouraged.

## Limitations of Study

The study was unable to assess the effect of the socioeconomic differences on oral health practices as most of the participants were in the same socioeconomic class. The study was also unable to assess the oral health status using other indices such as Community Periodontal Index (CPI), Decayed Missing Filled Teeth (DMFT) scores, and Plaque scores.

## Data Availability

The data used to support the findings of this study may be released upon application to the Head of Dental unit, University Health Services of the University of Cape Coast.

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## Conflicts of Interest

The authors have no competing interests to declare.

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## Authors' contributions

PG: Conception, design and drafting of manuscript, revision of manuscript. JS: Data collection and critical revision of content of manuscript. OG: Conception, critical revision of intellectual content and data analysis. KD-T: Data analysis and proof reading. EE: Data Collection and review of manuscript. AP: Data collection and statistical analysis. RA: Data collection. All authors read and approved the final manuscript.

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