

# Knowledge and Attitudes of Knust Pre-Clinical Dental Students towards Orthodontic Treatment

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**How to cite this paper:** Ama, A.A., Ama, Y.B. and Sabbah, D. (2024) Knowledge and Attitudes of Knust Pre-Clinical Dental Students towards Orthodontic Treatment. *Open Journal of Stomatology*, 14, 1-13.  
<https://doi.org/10.4236/ojst.2024.141001>

**Received:** August 9, 2023

**Accepted:** January 13, 2024

**Published:** January 16, 2024

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## Abstract

**Background:** Orthodontics is a dental specialty focusing on correcting dental irregularities and malocclusion. Knowledge and attitudes towards orthodontic treatment are crucial for promoting oral health and overall well-being. Education and awareness play a vital role in ensuring optimal treatment outcomes and improving quality of life. **Aim:** This study aims to determine the knowledge and attitudes of Kwame Nkrumah University of Science and Technology (KNUST) pre-clinical dentistry students concerning orthodontic therapy. **Methodology:** This research is a quantitative descriptive cross-sectional study. The research used a non-random convenience sampling method to form the desired sample. For data collection, an interview-administered questionnaire was used over one month. The study set its sights on pre-clinical dental students in KNUST. A total of 150 questionnaires were printed to meet the sample size. **Results:** The results of the research showed that the knowledge level of KNUST pre-clinical students on orthodontic treatment and its nuances is quite limited. They however had a fair level of knowledge on the disease or ailment that orthodontic treatments solved (especially malocclusion). Their interest in orthodontic treatments on the other hand was quite significant, with a large number having interest in it. **Conclusion:** To conclude, KNUST pre-clinical students in Ghana although having a limited level of knowledge on orthodontic treatments have a keen interest in undergoing them regardless of the discomforts or the length of time.

## Keywords

Orthodontic Therapy, Pre-Clinical Dentistry Students, Quantitative Study, Convenience Sampling, Interview-Administered Questionnaire, Malocclusion

## 1. Background and Introduction

Orthodontics is a distinct branch of dentistry that specifically deals with the growth of the face, the formation of the bite, and the prevention and repair of abnormalities in the alignment of the teeth [1]. Malocclusion, a prevalent dental anomaly, poses a substantial issue in the field of orthodontics. It is linked to several periodontal diseases, including dental caries, fluorosis, and temporomandibular disorders. It can also cause problems with mandibular motions, mastication, swallowing, and speaking, and make individuals more prone to trauma or periodontal disorders. In developing countries, a significant number of young individuals, particularly students, have a limited understanding of the causes, prevention, and consequences of malocclusion. Acquiring knowledge and being conscious of it are crucial for advocating oral hygiene practices and maintaining good overall health [2]. It is essential to educate them about the repercussions of malocclusion and the advantages of orthodontic treatment. Orthodontic therapy can mitigate tissue damage, optimize physical function, increase aesthetics, and result in enhanced quality of life, self-assurance, and favourable lifestyle modifications.

To attain successful teaching, it is advisable to adopt an interdisciplinary method that includes general dentists and non-orthodontic experts as orthodontic health educators, as long as they possess sufficient expertise and a favourable attitude towards orthodontic treatment [3]. Hence, evaluating the extent of understanding regarding orthodontic therapy is crucial, as it greatly contributes to fostering a wholesome way of life among both individuals receiving treatment and those who are not. Orthodontic treatment utilizes fixed or removable appliances to realign and rearrange teeth. Removable appliances can be easily removed by the patient and are ideal for a specific range of malocclusions. Fixed appliances, consisting of brackets affixed to the teeth and arch wires or auxiliaries that exert forces to aid with tooth motions, are advised for intricate situations that involve rotations and translations. The user's text is empty.

For orthodontic treatment to be successful, patients need to comprehend the technical aspects and adhere to appliance maintenance [4]. Failure to receive orthodontic treatment when necessary, can lead to an unfavourable appearance, impaired ability to chew and speak, and a heightened susceptibility to tooth decay or injury due to challenges in maintaining oral hygiene with misaligned teeth.

## 2. Statement of Problem

Orthodontic conditions are prevalent among Ghanaians, but individuals often don't seek treatment due to various reasons such as inadequate knowledge, cost, and dental anxiety. Lack of orthodontic treatment can lead to poor aesthetics and reduced function. Educating students about orthodontic treatment can promote early intervention and long-lasting oral health. However, there is limited research on the awareness of orthodontic treatment among students [2] [4] [5] [6].

This study aims to assess the knowledge and attitudes of preclinical dental students at KNUST regarding orthodontic treatment.

### 3. Aim/Main Objective

The objective of this study is to ascertain the knowledge of KNUST pre-clinical dental students as well as their attitudes towards orthodontic treatment.

#### Objectives

- To determine the understanding of KNUST pre-clinical dental students on orthodontic treatment.
- To ascertain if KNUST pre-clinical dental students would be interested in having orthodontic treatment if required.
- To determine the attitudes of KNUST pre-clinical dental students towards orthodontic treatment.

#### Limitation

Limited access to orthodontic information also affected the study. Getting access to all pre-clinical dental students at a specific time was difficult.

### 4. Literature Review

#### 4.1. Understanding Orthodontic Treatment

Malocclusion, along with dental caries, periodontal diseases, and gingival disorders, is one of the most common dental conditions. It affects a significant portion of the Indian population, ranging from 20% to 43% [7]. Orthodontic therapy aims to correct dental malocclusion, which plays a crucial role in enhancing facial attractiveness. Aesthetic improvement and psychological factors are important considerations when deciding on orthodontic treatment [7]. Research has shown that youngsters often seek orthodontic treatment for cosmetic reasons, primarily due to tooth crowding and severe overbite. Dental appearance dissatisfaction, resulting from factors such as misaligned or missing teeth, can lead to negative psychosocial impacts in children and teenagers, including being mocked by classmates [8]. Parents also choose orthodontic treatment for their children to enhance their attractiveness and avoid being perceived as neglecting their parenting responsibilities [8]. Orthodontic treatment offers several benefits, including tissue damage prevention, improved physical function, and enhanced aesthetics. It also leads to improved quality of life, increased self-confidence, and positive psychological and social changes [3]. However, for patients to embrace orthodontic treatments, they must first understand their oral health conditions and the relevance of orthodontic treatment in improving their overall oral health [9].

The perceptions of patients towards orthodontic treatments are influenced by the information they receive from dental practitioners. Dental students, who have a high likelihood of becoming orthodontists, play a crucial role in disseminating oral health practices to patients [10]. To improve awareness and understanding of oral hygiene practices, it is recommended to incorporate oral health

programs involving health science students, healthcare professionals, and orthodontists [10]. Auxiliary healthcare professionals, including students and nurses, play an important role in preventive information and health promotion. Therefore, they should possess adequate knowledge of oral health and align their oral health behaviour with experts [11]. To ensure the effective dissemination of information and contribute to community development, it is essential to assess the knowledge and attitudes towards orthodontic treatment among dental practitioners and non-orthodontic specialists [3]. Furthermore, incorporating clinically oriented training in orthodontic treatment during undergraduate and graduate dental programs can enhance the knowledge and understanding of prospective dentists [3].

This study aims to assess the knowledge of preclinical dental students at KNUST regarding orthodontic treatments, contributing to a better understanding of the awareness and attitudes toward orthodontic treatment among dental practitioners and students.

#### **4.2. Interest and Attitude towards Orthodontic Treatment**

Orthodontic treatment is often sought for cosmetic reasons, as the desire for an improved dental appearance and enhanced facial attractiveness influences the decision to undergo orthodontic therapy. Malocclusion, defined as misaligned arches or abnormalities in tooth position, is one of the most common dental ailments, affecting a significant portion of the population. In India, the prevalence of malocclusion ranges from 20% to 43% [7]. The motivations behind seeking orthodontic treatment vary among individuals. Research has shown that children and teenagers primarily seek treatment for cosmetic reasons, such as tooth crowding and a severe overbite, which can impact their self-esteem and social interactions. They desire to improve their dental appearance and avoid being teased by peers [8]. Parents also play a role in deciding to pursue orthodontic treatment for their children, as they want them to appear attractive and fulfill their parenting responsibilities [8].

Orthodontic therapy offers several benefits beyond aesthetics. It can prevent tissue damage, improve physical function, and enhance quality of life. Patients experience increased self-confidence and see improvements in their physical, psychological, and social well-being [3]. However, before undergoing orthodontic treatment, it is crucial for patients to understand their oral health conditions and the importance of maintaining good oral hygiene to prevent dental issues like tooth decay and periodontal diseases [9]. The perceptions of patients towards orthodontic treatment are shaped by the information they receive from dental practitioners. Dental students, who often become future orthodontists, play a significant role in disseminating oral health practices to the public. However, studies have revealed misconceptions and gaps in oral hygiene knowledge among health science students, highlighting the need for comprehensive education programs involving oral health professionals and orthodontists [10].

A study conducted among dental students found that most of them were aware of their dental aesthetics, and a high percentage expressed dissatisfaction with their dental appearance. This dissatisfaction correlated with a positive attitude towards orthodontic treatment [12]. Similarly, Choi *et al.* research conducted among adolescents in Brazil showed that dissatisfaction with oral appearance, chewing difficulties, and malocclusion severity were factors influencing their desire for orthodontic treatment [6].

Adults seeking orthodontic treatment are motivated by various factors, including the desire to straighten their teeth, improve their smile, correct occlusion deviations, and achieve facial attractiveness. Their psychological characteristics, such as self-esteem and body image, are comparable to the general population [13]. However, managing the expectations of adult patients can be challenging, and it is crucial to address their concerns and educate them about the limitations and realistic outcomes of treatment [14]. Patient satisfaction and adherence to orthodontic treatment are influenced by psychological factors, such as the patient's perception of treatment benefits, discomfort during treatment, treatment duration, and cost. Pain, discomfort, and the inconvenience of regular orthodontist visits were among the reasons some patients refused orthodontic treatment (Khan *et al.*, 2017). The patient-orthodontist relationship, effective communication, and understanding of treatment goals contribute to patient motivation and collaboration [15].

## 5. Methodology

### 5.1. Study Design

This is a quantitative descriptive study. Opuke *et al.* define quantitative research as the process of quantifying and analyzing variables to get findings [16]. It entails the use and analysis of numerical data using certain statistical procedures to answer questions such as who, how much, what, where, when, how many, and how.

As a result, quantitative research collects data for information to be quantified and subjected to statistical scrutiny/analysis in order to accept or reject a hypothesis. According to Williams, quantitative research begins with the formulation of a problem, the development of a hypothesis or research question, the evaluation of related literature, and the quantitative analysis of data to reach a conclusion [17].

### 5.2. Sampling Technique

The sample for this study was selected using a non-random convenience sampling approach. Nonprobability sampling methods are used when randomization is not feasible, and subjective criteria are used to determine sample inclusion. Convenience sampling is a type of nonprobability sampling where individuals from the target population who meet certain practical criteria, such as easy accessibility or availability, are included in the study [18].

### 5.3. Study Area

Kwame Nkrumah Science and Technology University (KNUST) was the setting for this research located in Kumasi, the capital of the Ashanti region, it is the largest institution that the region can be proud of. The school was founded in 1952. The institution's current population is estimated to be 85,000. However, pre-clinical dental students at the KNUST School of Medicine and Dentistry were selected for the purpose of this study.

### 5.4. Study Population

All pre-clinical dentistry students at KNUST were included in the research. This includes all students in their first through third years of dental school.

### 5.5. Sample Size

The Cochran Formula was used to determine an appropriate sample size. The Cochran formula creates an appropriate sample size given a desired degree of precision, a desired level of confidence, and the predicted proportion of the characteristic in the population. Cochran's formula is thought to be especially useful in circumstances involving huge populations.

Using a confidence level of 95%, a 5% margin of error and a standard deviation of 0.5 and using Cochran Formula for Sample Size Calculation in Smaller Populations:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

were,

$n$  = sample size from a population with known size.

$n_0$  = Cochran's sample size recommendation = 385  $N$  = population size = 160.

$$n = \frac{385}{1 + \frac{385 - 1}{160}} = 113$$

$n \approx 113$ . Therefore, a sample size of 113 was to be used for this study.

### 5.6. Source of Data

The information obtained was divided into two categories: primary data and secondary data. Primary data is information gathered for the first time and is one-of-a-kind. Secondary data, on the other hand, refers to previously obtained and processed information.

### 5.7. Method of Data Collection

A questionnaire administered by the investigator was used to collect data. The structured questionnaire was used since it helped the researcher collect important information for the study. The researcher handed out the questionnaire to

responders. To avoid duplication, those who received the questionnaire were excluded from the sample frame.

### **5.8. Data Processing and Analysis**

The data was then inputted, cleaned, or processed, and analysed using Excel and SPSS 25.0. The findings were then presented using tables. To reduce entry mistakes, the data entry sheet was constructed and designed with the appropriate variable definitions and codes. The data was then thoroughly verified to detect any incorrect entries and to fill any gaps.

### **5.9. Ethical Consideration**

The committee on Human Research, Publications, and Ethics of KNUST and the School of Medicine and Dentistry provided ethical permission. Participants were asked for their permission, and all information received was kept secret.

### **5.10. Inclusion Criteria**

The study's inclusion criteria were individuals who were pre-clinical dentistry students at KNUST and granted their agreement to participate.

### **5.11. Exclusion Criteria**

With the exclusion criteria, all clinical students were exempted, students who did not consent to the study and students who do not attend KNUST.

## **6. Results and Data Analysis**

### **6.1. Demographics**

#### **6.1.1. Gender**

Within the 113 respondents selected for the study, 78 (69%) were females, and 31% (35) were males.

#### **6.1.2. Level in Dentistry**

The study focused on pre-clinical dental students, the sample size was from level 100 to 300. The level 100's was the large chunk of the sample size making approximately 50% of the sample size, the level 200's made up 30% of the sample and the level 300's made up 20%.

#### **6.1.3. Assessing the Knowledge on Mal-Alignment**

84% of respondents had heard of the term "tooth mal-alignment" or "malocclusion," while 16% had not. 80% had seen someone with crooked or misaligned teeth previously, 19% had not, and 1% couldn't even tell if someone had mal-aligned teeth or not. Thumb sucking, tongue pushing, and mouth breathing are thought to cause tooth misalignment by 42% of respondents, 21% do not believe it is feasible, and 37% are unsure. In reference to whether the teeth of the respondents were aligned, 70% said their teeth were aligned, 24% said their teeth were not aligned and 6 were not in the position to determine whether their teeth were

aligned or not.

86% of the respondents think aligned teeth are important for facial appearance, 6% think it is of no importance to facial appearance while 8% could not tell if it influenced facial appearance. 84% of the responses taught mal-aligned teeth had an overall effect on appearance, 6% taught the contrary while 10% did not know if it influenced overall appearance. On the question of mal-aligned teeth affecting chewing, 67% said it did, 21% said it did not and 12% did not know if it did or not.

With speech, 76% said mal-aligned teeth affected speech, 16% did not think so and 8% were not certain if it affected speech.

#### **6.1.4. Assessing the Knowledge on Orthodontics**

85% of the sampled pre-clinical dental students had heard of the term orthodontist while 15% had no idea as to what or who an orthodontist was, in relation, 82% of the respondents knew orthodontists aligned teeth while 18% had no idea they aligned teeth. 96% of the study's respondents had seen people who had ever worn braces while 4% hadn't seen a person wear braces before. On the knowledge of wearing retainers after braces, 54% of the students were aware of this, and 41% had no knowledge of this. 64% of the respondents concurred with the knowledge that braces take longer than other dental procedures, 25% disagreed with this notion and 145 were blank, that is they had no idea that braces had a longer treatment time than other dental procedures.

On the average cost of orthodontic treatment, 46% had an idea of the average cost of orthodontic treatment. 42% had no idea at all. 25% of the respondents thought malocclusion could cause dental caries, 15% did not agree to this and 60% had no idea at all. 87% of the study's respondents thought they would have a better smile if their teeth were better aligned, 6% thought otherwise and 7% could not really tell if a well-aligned teeth would affect their smile.

## **6.2. Attitude of Knust Pre-Clinical Students towards Orthodontic Treatments**

**Figure 1** is the graphical representation showing the proportion of visits of respondents to an orthodontist. 68% of the sample population had never visited an orthodontist before, and 32% on the other hand had never had the opportunity to visit an orthodontist.

**Figure 2** shows the distribution of responses to continuing treatment regardless of treatment discomforts. 63% of the respondents did not mind the discomforts that came with treatment if the misaligned teeth were corrected, 19% said they would not continue treatment with such discomforts while 18% were not quite certain if they would continue or stop treatment if they were to experience such discomfort.

**Figure 3** distributes the responses on whether pre-clinical dental students would be comfortable with extended treatment periods. 75% of the sample size had no issues with treatment if treatment duration lasted for 1 to 2 years, 14%



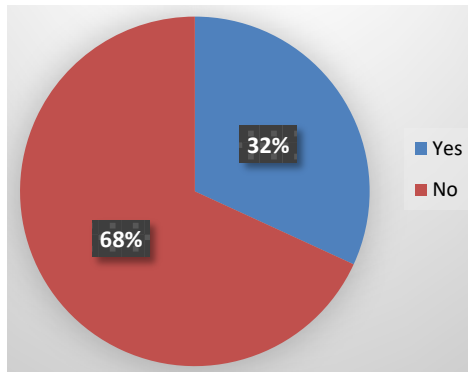


Figure 1. Visits to an orthodontist.

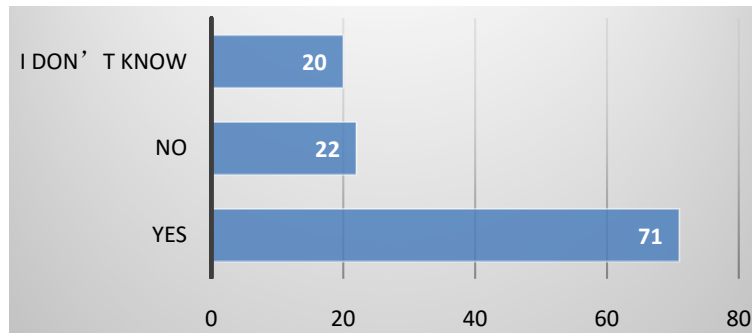


Figure 2. Response on discomforts on treatment of mal-alignment.

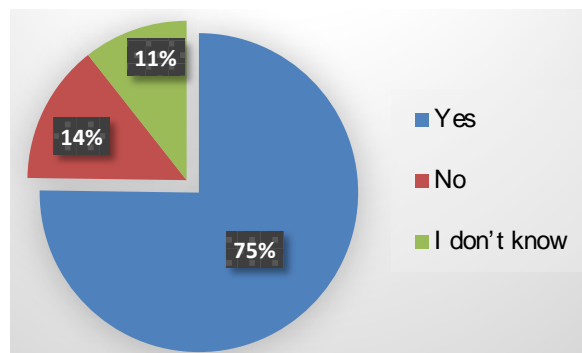
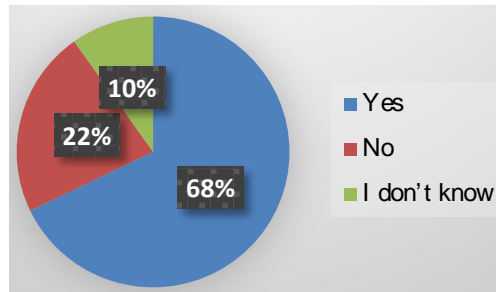


Figure 3. Comfortable with extended treatment period.

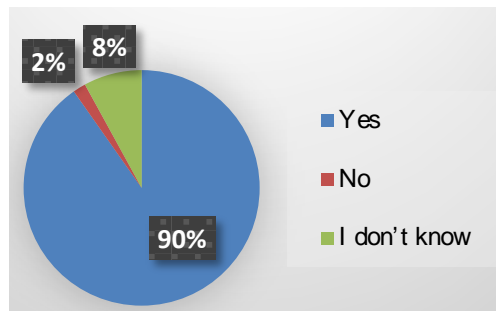
would not continue treatment at all and 11% could not decide if they would continue or not.

Figure 4 shows the percentage proportion of students who are ok with having their teeth extracted or removed in the course treatment if need be. 67% of the respondents had no objections if they were to lose some teeth during treatment, 23% said they would mind and would be uncomfortable if they were to lose teeth in the course of treatment and 10% were indecisive if they would mind or not.

Figure 5 shows a graphical representation of responses of the students on their willingness to undergo orthodontic treatments if they were to be suggested by a parent or dentist. 90% would readily agree to orthodontic treatment if a dentist or parent suggested it, 2% would decline and 8% were indecisive.



**Figure 4.** Response to extraction/removal of teeth in treatment course.



**Figure 5.** Responses for suggestions to orthodontic treatment.

## 7. Discussion

### Determining Their Understanding on Orthodontic Treatment

The objective of this study was to evaluate the comprehension of orthodontic treatment, particularly braces, and the level of knowledge on mal-alignment among pre-clinical dentistry students. The majority of the students exhibited knowledge of mal-alignment, since they were acquainted with the word and had encountered individuals with the disease. Furthermore, a study conducted by Agrawal among dental students yielded results that correspond with this research, demonstrating a notable level of awareness among dental students regarding mal-alignment and its possible causes [3]. Several students recognized causes such as thumb sucking, tongue pushing, and mouth breathing. However, there was uncertainty among some students on whether these habits were directly related to mal-alignment. Nevertheless, they acknowledged that these practices had an impact on their self-esteem. A study conducted by Shekar *et al.* [12] found that specific malocclusions, such as noticeable occlusal and space anomalies, can have a negative impact on body image and self-concept, not only during adolescence but also in adulthood. The significance of properly positioned teeth was acknowledged by a majority of the students, particularly females, with regard to its influence on facial aesthetics. This finding is consistent with previous research studies [13] [14] [15]. The students recognized that misalignment could impact the overall aesthetic as the face is a key characteristic. Approximately 84% of the students concurred that misaligned teeth have the potential to impact facial aesthetics. Mal-alignment was found to potentially affect speech. Malocclusion can impact the coordination of teeth, tongue, lips, and

cheeks during speech production, resulting in speech difficulties. The study found that the majority of pre-clinical students acknowledged the correlation between misaligned teeth and speech impairments. Clement's work provides further support for the notion that dental malocclusion is mostly impacted by environmental factors, particularly an individual's behaviors [19]. According to this study, 140 students, which accounts for 70% of the total, concurred that mal-alignment is caused by external habits such as thumb-sucking, tongue thrusting, and lip biting. However, 60 students, which accounts for 30% of the total, expressed disagreement with the same issue [19].

Orthodontic treatments are essential for optimizing dental functionality. The research aimed to determine the inclination of pre-clinical students towards orthodontic procedures. The findings revealed a variety of responses, with some students expressing a desire for such treatments while others expressed no interest whatsoever. Each group had their own distinct reasons that affected their respective conclusions. Our study found that those with a more advanced dental education showed greater awareness and prioritization of their oral health. However, this heightened knowledge did not necessarily result in improved adherence to oral health practices. This statement questions the belief that enhancing health literacy will lead to higher compliance, as evidenced in previous medical treatments [17].

Regardless of the financial implications or potential discomfort, 90% of students expressed their willingness to undertake orthodontic treatment if recommended by their parents or dentists, demonstrating a favourable disposition towards such therapy.

## **8. Conclusion**

To conclude, the study found that pre-clinical dental students have a limited understanding of orthodontic treatment, particularly in terms of their perception of their own teeth alignment. However, they show a keen interest in having orthodontic treatment, specifically braces, and have a positive attitude towards orthodontic treatments despite potential discomforts and complications.

## **Recommendations**

- Extensive education should be done at the pre-clinical level on mal-alignment of teeth and the various orthodontic treatments available in managing them.
- If possible lightweight practical demonstrations should be done to help deepen the level of understating of these orthodontic treatments.
- There should be a welcoming environment when it comes to orthodontic treatments and this will enable alleviate all forms of fear and hence encourage a positive attitude.

## **Funding Information**

This research did not receive any specific grant from funding agencies in the

public, commercial, or not-for-profit sectors.

## Conflicts of Interest

The authors declare no conflict of interest.

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