RELATIONSHIP BETWEEN KNOWLEDGE ON ORAL HEALTH AND ORAL HYGIENE STATUS AMONG SECONDARY SCHOOL STUDENTS IN MARAGUA DISTRICT.

INVESTIGATOR

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BDS LEVEL III

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YEAR OF STUDY: 2013
DECLARATION

I, Stephen Kinuthia Mwangi, declare that this research titled “Relationship between knowledge on oral health and oral hygiene status among secondary school students in Maragua district” is my original work and has never been done by any other person or presented to any other institution or otherwise stated.

Signature………

Date……………..
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DEDICATION
I dedicate this project to my family and friends and all those who support and encourage me in whatever I do.
ACKNOWLEDGEMENT
I would like to thank the almighty god for bringing me this far. I would also like to express my gratitude to my supervisor Dr.R. Mutave and Dr. T. Mulli for their guidance during the course of my work. I would like to appreciate my parents for their moral and financial support during my study. Finally I thank all those who contributed directly or indirectly to my research.
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LIST OF ABBREVIATIONS
BDS…………….Bachelor of dental surgery
CHS…………….College of health sciences
CI………………..Confidence interval
GI………………..Gingival index
Lon………………London
MClinDent…….Masters in clinical dentistry
MRES…………..Masters of Research
PS………………..Plaque score
SPSS…………….Statistical package for social science
UK……………….United Kingdom
UON…………….University of Nairobi
WHO…………..World health organization
KNH…………….Kenyatta National Hospital
Nbi……………..Nairobi
ABSTRACT

BACKGROUND Good oral hygiene is essential for the well-being of an individual. However lack of knowledge, negative attitude and poor oral hygiene practices may lead to poor oral hygiene and predispose one to oral related diseases. This study sought to determine whether practice and knowledge on oral health relate to the oral hygiene status.

OBJECTIVE The objective of the study was to assess the relationship between knowledge on oral hygiene awareness, practices and status among secondary school students.

STUDY DESIGN This was a descriptive cross sectional study.

STUDY AREA The study was carried out in three secondary schools in Muranga County.

STUDY POPULATION The study involved both male and female students sampled from form one to form four in three secondary schools.

METHODOLOGY Stratified sampling was used to select a sample of the students from the three schools. Qualitative data was collected using a mixed ended questionnaire and clinical data via oral examination of the students. Data was then be analyzed using SPSS version 13.0 and presented in form of tables charts and graphs.

RESULTS: Majority of the students had average level of knowledge on oral health. Most of them brushed once a day. There was a relationship between the level of the knowledge of the students and the oral hygiene practices and their oral status.

CONCLUSION: The level of knowledge on oral health affects oral hygiene practices and oral hygiene status.

RECOMMENDATION: There is need to intensify oral health awareness in our secondary schools as this will have a positive impact on oral hygiene practices and oral hygiene status.
CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

1.1 INTRODUCTION
World health organization (WHO) in 2012 defined oral health as the state of being free from mouth and facial pain oral and throat cancer, oral infection and sores, periodontal and gum diseases and disorders that limit an individual’s capacity of biting chewing smiling speaking and psychosocial well-being\(^{(1)}\). This definition shows that oral hygiene is important not only to prevent oral diseases but also to promote self-esteem of an individual.

Good oral hygiene has been shown to contribute greatly to prevention of oral related diseases. According to WHO report Of April 2012, the prevalence of dental caries was 60-90% in children and nearly 100% in adults, about 30% of those aged 65-70 years had lost their natural teeth while periodontal diseases accounted for 15-20% \(^{(1)}\). Dental caries was the major cause of premature tooth loss especially in the permanent dentition. Poor oral hygiene practices are the major cause of dental caries. According to this report, maintenance of good oral hygiene can help to prevent most of these diseases.

However, WHO noted that there is uneven distribution of the disease prevalence in the world. The prevalence is high in developing countries, rural areas and disadvantaged populations. This is due to low social economic status, inaccessibility to oral health care services, and low level of education among other factors. Developed countries spend 5-10% of their public revenue on treatment of oral related diseases \(^{(2)}\). This percentage is much lower in developing countries since little attention is given to oral health.

Due to challenges facing oral health worldwide, especially in the developing countries WHO has formulated policies to improve oral health. Some of these policies include formation of community based health projects to educate and promote oral health in rural areas.

It also works together with governments of various countries for full implementation of these policies. Africa being one of the developing regions records significant prevalence of oral diseases. Most of the countries are underdeveloped therefore not much attention is given to oral health. However there is marked improvement in the oral hygiene awareness as a result of the
collaboration between WHO and governments to ensure that the population is educated on the importance of oral hygiene.

In Kenya the prevalence of oral diseases is not different from the WHO report. In a report titled “Oral Health in Kenya” by Kaimenyi J (2004), the prevalence of periodontal diseases was 0-10% while that of dental caries varied according to age between a decayed, missing, filled teeth index (DMFT) of 0.8 (5-15 years) to 5.8 (15-59 years). (3)

Most of rural dwellers, low income earners and disadvantaged population are more prone to oral diseases (4). Dental health care services are more concentrated in urban areas than in rural areas (5). Oral hygiene habits and practices are also more common in urban areas than in the rural areas. Those in rural areas who have got education appreciate and observe oral hygiene practices. for example those in school.

Tooth brushing is the most commonly used method of maintaining good oral hygiene (6). Other methods include use of mouthwashes and chemicals which remove plaque. Bacterial plaque is the cause of most of oral diseases like dental caries, gingivitis and periodontitis (7, 8, 9). Its removal is therefore important in control of these diseases. Tooth brushing also eliminate sugar that stagnate in fissures and grooves of teeth reducing prevalence of caries. Tooth brushing frequency is more in urban than in rural areas. In urban areas commercial tooth brushes and tooth pastes are used. In rural areas beside the use of tooth brushes and tooth pastes, other traditional methods. e.g. use of charcoal and chewing sticks (10).

The main reason for tooth brushing among the young people seem to be cosmetic than preventive. Oral practices which predispose to oral diseases like sugar intake exist in both urban and rural areas though the percentage is more in urban areas (11, 12, and 13). This study aims at finding out whether the students in secondary school have adequate knowledge on oral hygiene and whether they practice them.
1.2 LITERATURE REVIEW

A study by Saedu of Ilorin Nigeria in the year 2012 on knowledge and practice of oral health among junior secondary schools in Ilorin west Nigeria\textsuperscript{(14)} showed that 46.6\% of the students changed their tooth brushes when they get frayed and few, 9.3\% did not engage in confectionaries. Majority, 83\% had never visited a dentist before. Almost all the students, 93\% said that brushing teeth was to prevent mouth diseases. All the respondents brushed their teeth at least once a day. 67.3\% of the students could not define oral health. 11\% of the students had no reason for brushing their teeth. About the source of oral health information 36.1\% said they heard from teachers, 34.7\% from TV, 12.9\% from relatives, 8.4\% from newspapers and 4.4\% from the radio. The study recommended that oral health hygiene needed to be intensified and also mothers needed to be educated so that they can educate their children. In this study no comparison was made between knowledge on oral health and oral hygiene practice. It also did not provide the reason for visit to the dentist given by the students.

A cross-sectional study by Yusuf, A, et al. in South Africa on principle motives of tooth brushing in a Pretoria population of adolescents\textsuperscript{(15)} showed that 27.2\% had never visited a dentist, while 28.9\% said their parents were unemployed. The principle motive of brushing among most adolescents, including those who frequent sugar intake was related to cosmetic (84.9\%) rather than preventive dental health. Motive for tooth brushing was not related to frequency of brushing. However socially disadvantaged current smokers and those who reported a past suicide attempt were significantly less likely to brush their teeth for cosmetic purposes. The study concluded that motives for tooth brushing among adolescents may reflect their psychosocial state rather than knowledge of the preventive effect of brushing. Again from this study the reason for visiting dentist was never stated. The oral hygiene status was not examined.

A study of oral health knowledge and practices of secondary schools in Tanga Tanzania by Carneiro and, MsafiriKabluwa in 2011 showed\textsuperscript{(16)} that 88.4\% of the students had adequate level of knowledge on causes, prevention and signs of dental caries. 79.1\% of had adequate practice of sugary consumption 72.4\% had acceptance frequency of tooth brushing 39.9\% went for dental check-ups. Majority of the students had adequate level of knowledge on oral health but low level of oral health and practice. No reason was given for those who did not visit dentist. The study also
did not indicate other diseases other than dental caries that the students mentioned. The level of knowledge related to practice was never shown.

On yet another study by D.H Lukuma on oral hygiene practices among secondary school students in Jos Nigeria (17) showed that 95.4% of the students brushed their teeth using tooth paste and toothbrush as the main material. Only 8.6% visited dentists for checkup.85.3% visited a dentist for the purpose of treatment. The level of oral health awareness was generally low. There was significant association between gender and frequency of teeth cleaning and dental visits. The study concluded that adequate knowledge was needed to the students. The study did not show what was used by those who did not use tooth brush and tooth paste.

On a cross-sectional study on oral health knowledge and oral hygiene practice among primary school children aged 5-17 years in rural areas of Uasin-Gishu Kenya by Okemwa (18), 92% claimed that they brushed their teeth, about 48% brushed at least twice a day. More students 59.1% reported using chewing sticks. Female students brushed more than their male counterparts. 39.9% of the students knew that the cause of tooth decay. 48.2% could state at least on method of prevention where 16.5% knew the importance of teeth use of toothpaste was reported by 38.9%of the students. The study showed that there was less knowledge on oral health causes of oral diseases and tooth decay.in this study no other method of brushing other than chewing stick and tooth paste was mentioned.it also did not show whether the students visited dentist to seek dental care

A study by Macgregor et al in 1991 of university of New Castle UK on self-esteem as a predictor of tooth brushing (19) showed that tooth brushing frequency increased significantly with increasing self-esteem in males and females, however there was no consistent variation with self-esteem in those brushing 3 or 4 times a day in either sex. There was significant variation in the main reasons given for mouth care and between sexes. More females 67% than males (57%) gave cleanliness or cosmetic effect as the principal reason for mouth care. In both sexes as self-esteem increases there was a consistent increase in the proportions of individual who brushed their teeth to make them feel clean. The study concluded that there may be a positive relationship between self-esteem and tooth brushing behavior and motivation for mouth care in adolescents. In this study only the comparison between self-esteem and mouth care was mentioned.
Finally a cross sectional study by ReleinieITof 1976 on effect of tooth brushing frequency on oral hygiene and gingival health in school children\(^{(20)}\) showed that 46% of the children claimed to brush twice daily and 40% once a day. The children who claimed to brush more frequently had lower mean OHI and GI score indicating less oral debris and gingivitis. Optimal levels of gingival condition were detected at brushing frequency of twice daily. Increasing brushing frequency beyond this level did not produce significant improvement of OHI and GI score. This study showed a positive correlation between gingival status and the frequency of tooth brushing.

This study sought to address the gaps identified in the previous studies.
CHAPTER 2: PROBLEM STATEMENT, JUSTIFICATION AND OBJECTIVES

2.1 PROBLEM STATEMENT
Poor oral hygiene predispose an individual to oral diseases like gingivitis, periodontitis, dental caries and others which eventually lead to premature tooth loss. This in turn affects one’s health, social, psychological status and self-esteem of an individual since it compromises with performance of oral functions like speech, mastication, smiling and social interactions. However by having enough knowledge on oral hygiene and proper practice of the same will help to prevent the diseases and improve the quality of life.

2.2 JUSTIFICATION OF THE STUDY
There was scarcity of information about practice of oral hygiene in rural areas in Kenya. By doing this research the level of oral hygiene awareness of the students would be known. This information was thereafter be used to plan oral health education in secondary schools to improve and motivate the students to observe good oral hygiene. It was also to be used to formulate and implement dental health policies.

2.3 OBJECTIVES

GENERAL OBJECTIVE
To assess the relationship between knowledge on oral health and practices and oral hygiene status of the students in Maragua.

SPECIFIC OBJECTIVES

1) To investigate the level of knowledge on gingival health among the students.

2) To determine the oral health practices of male and female students.

3) To determine the oral hygiene status of the students.

4) To determine gingival health status of the students.

5) To correlate the oral health knowledge and oral hygiene status and practices with oral health status of the students.
2.4 VARIABLES

SOCIAL DEMOGRAPHIC VARIABLES

Age

Gender

DEPENDENT VARIABLES

Gingival health status: plaque score and gingival score, tongue cleaning, visit to the dentist, frequency of tooth cleaning, interdental cleaning,

INDEPENDENT VARIABLES

Frequency of tooth brushing

Tools used to clean teeth

Level of knowledge on oral health

Attitude towards oral health

NULL HYPOTHESIS

Knowledge and practice on oral health have no effect on gingival health status.
CHAPTER 3: METHODOLOGY

3.1 STUDY AREA
The study will be conducted in three secondary schools in Maragua in Muranga County. These schools are: Ichagaki Boys High school, Nginda Girls High school and Ichagaki Mixed Secondary school. Ichagaki Boys is located 4km from Maragua town along Maragua – Iremburoad. Ichagaki Mixed Secondary is located 3km from Maragua along the same road. Nginda Girls Secondary school is about 5 km along Maragua-Mugoiri road. This area is rural with good climatic conditions. Majority of the residents are farmers with fairly low social economic status. Dental services are scarce and only found at public hospitals.

3.2 STUDY POPULATION
The study involved sampled students of between age 11 and 24 years. Both male and female students will take part in the study.

3.3 STUDY DESIGN
This was descriptive cross-sectional study.

3.4 SAMPLE SIZE
Prevalence of 50% was used in this study since the real prevalence was not known. A confidence interval of 95% was used. A Z value of 1.960 was applied. Therefore using Fischer’s formula:

\[ N = \frac{Z^2 P(1-P)}{C^2} \]

N=Size of the population

P=Prevalence

C=1-confidence interval

N=384
For a population less than 10000; nf=desired sample size of a population <10000

\[ N_f = \frac{n}{1+n/N} \]

\[ n = \text{study population} <10000 \text{ which is 1500 in this study} \]

\[ N = \text{Sample size of a population} >10000 \]

Hence \( N_f = 96 \)

3.5 SAMPLING METHOD
Stratified random sampling method was used. Respondents were stratified according to academic grade. 32 students were selected from each of the three schools. From the four academic grades in each school 8 students were randomly selected. Gender distribution was not considered during selection but was determined by chance. No comparison was made between different strata. The sampling method was used to capture the picture of the whole school. From each stratum the students were then be randomly selected and will be given questionnaires to fill.

3.6 INCLUSION AND EXCLUSION CRITERIA
The following students were included:

All selected students who were willing to participate and are 14-22 years old.

- Those that were willing to provide a written consent.

The exclusion criteria involved:

- Absent students on the day of administering the questionnaire.

- Those who were not willing to participate

- Those not within the mentioned age bracket.

3.7 DATA COLLECTION
A self-administered closed and open ended questionnaire was used. The questions were in English. Those questions where the respondent had more than one response, he/she was allowed to provide the responses. The respondent filled a consent letter. Thereafter the respondents were given a questionnaire which he/she filled anonymously. The questionnaires were collected.
at the end of the session. This was followed by an oral examination to assess the oral health status of the students. I examined the students for gingival inflammation and plaque accumulation. Plaque score and gingival score was recorded using Turesky modification of Quigley'score of 1970 for plaque and gingivitis index of Loe and Silness of 1963. The examination was conducted under natural light on a normal chair using gloves, disclosing tablets, tongue depressors and periodontal probes. Asepsis was highly observed. The examination was carried out during the day in a classroom. My assistant recorded my findings in the clinical examination form upon acquiring proper training on how to fill the form.

3.8 DATA ANALYSIS AND PRESENTATION
The data collected was analyzed using SPSS version 13.0 for windows. The presentation of data will be in form of tables, charts and graphs.

3.9 ETHICAL CONSIDERATION
This proposal was submitted to the Kenyatta National Hospital/University of Nairobi Ethical and Research Committee for approval. All information given by the participants was treated with utmost confidentiality. The students were free to participate or withdraw from the study at will. The examination equipment were sterilized using an autoclave.

3.10 RELIABILITY AND VALIDITY
Oral examination was done in the morning before the students went for lunch. Standard indices were used. The questions in the questionnaire were read and verified to ensure that they are simple, easy to understand and relevant to the research interest. The questionnaire was verified by pre-testing it. The respondents were randomly selected. Restriction to the respondents such that only those who meet the requirements participated. The universal indices also minimized the errors.

3.11 PROBLEMS ENCOUNTERED
-some students had difficulties in answering the questions.

-The data may be subjected to sampling and non-sampling errors like misunderstanding of the questions, poor judgments etc.

-Financial problem
CHAPTER FOUR: RESULTS

4.1 Social demographic information

A total of 96 students took part in the study. Of these 43 (44.8%) were males while 53 (55.2%) were females. The difference in number was not statistically significant (p=0.083). The mean age of the respondents was 16.38 years (±2.001SD). The age range was 11-24 years. Majority of the respondents’ age fell between 14-19 years. The figures below shows age distribution of the population. One of my respondents was 24 years.

Figure 4.1 Age distribution
4.2 Oral hygiene practices

All the respondents claimed to brush their teeth. Majority brushed once a day 37.5%, 31.3% brushed twice daily 24.0% brushed more than two times a day while 3.1% brushed once a week. A small percentage others said that they brushed after every meal.
Considering gender more females than males bushed more than twice a day and once a week while no male brushed after every meal.

**Table 4.1 Gender difference in frequency of teeth cleaning**

<table>
<thead>
<tr>
<th>Frequency of tooth cleaning</th>
<th>More than twice daily</th>
<th>Twice daily</th>
<th>Once a day</th>
<th>Once a week</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>16.3</td>
<td>34.9</td>
<td>41.9</td>
<td>7.0</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>30.2</td>
<td>28.3</td>
<td>34.0</td>
<td>-</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Most of the respondents used toothpaste 80.2% and tooth brush 94.8 to clean their teeth. However a number of them used salty water 15.6% others water only 1.0% as cleaning aid. Some respondents used chewing stick 4.2% to clean their teeth. None of the respondents used charcoal.
Almost all the respondents said that their colleagues appreciated their teeth after cleaning. 97.9%. 84.4 of the students claimed to practice interdental cleaning while 15.6% did.
not 89.6% of the students cleaned their tongue while 10.4% didn’t. Those who practiced interdental cleaning used various methods as shown below

**Table 4.2 Teeth cleaning aid**

<table>
<thead>
<tr>
<th>Cleaning aid</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental floss</td>
<td>21.9</td>
</tr>
<tr>
<td>Tooth pick</td>
<td>19.8</td>
</tr>
<tr>
<td>Thread of a cloth</td>
<td>26.0</td>
</tr>
<tr>
<td>Glass stick</td>
<td>9.4</td>
</tr>
<tr>
<td>other</td>
<td>22.9</td>
</tr>
</tbody>
</table>

54.2% of the students had not visited a dentist while 45.8% had visited one. For those who visited dentist 47.7% was due to toothache, 31.8% due to bleeding gums, 18.2% went for dental checkup while the others said due to headache.
For those who had not visited dentist they gave various reasons as shown in the figure below.

**Figure 4.8: Reason for visiting dentist**

**Figure 4.9: Reasons for not visiting dentist**
4.3 Level of knowledge of the population

4.3.1 Reason for cleaning teeth

Most of the students 70.8% said that they cleaned teeth to prevent mouth diseases, 22.9% to prevent bad odour, 5.2% to look good while 1.0% did not know why they brushed.

![Figure 4.10 Reason for cleaning teeth]

4.3.2 Diseases affecting mouth

Although majority of the students (33.3%) mentioned three diseases that affect the mouth almost an equal number mentioned two diseases and one disease. A very small percentage (2.1%) were able to mention 4 diseases while 1% did not know any mouth disease. 1% of the students were able to mention five diseases. Among the diseases mentioned dental caries was the most Common (92.5%) followed by gum bleeding (75.4%). Bad odour was also mentioned by a significant percentage. Fluorosis was mentioned by very few people.
By gender comparison males were slightly better than females.
4.3.3 Sources of information on oral health

Teachers were mostly the source of information to the students on oral health. 77.1% of the students got the information from parents and relatives, 4.2% heard it over the radio and 4.2% saw in TV.

![Figure 5.13: Sources of information on oral hygiene](image)

4.3.4 Dental visits for checkups

Only 8 (18.2%) of the students who visited dentist for dental checkups. Of these 37.5% were females while 62.5% were males. The table below shows gender distribution of the frequency for visiting the dentist. More males than females visited the dentist for dental checkups.
On the basis of the responses given by the students the level of knowledge was determined and the students were categorized into four categories as shown by the table below.

**Table 4.3: Level of knowledge**

<table>
<thead>
<tr>
<th>Level</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>20</td>
<td>20.8</td>
</tr>
<tr>
<td>Less than average</td>
<td>15</td>
<td>15.6</td>
</tr>
<tr>
<td>Average</td>
<td>53</td>
<td>55.2</td>
</tr>
<tr>
<td>Adequate</td>
<td>8</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Most of the students had average level of knowledge and a small percentage had adequate level. However a significant percentage had low level of knowledge on oral health.
4.4 Oral hygiene status of the students

The oral hygiene status of the students was determined by examining the gingival status of the students and the plaque accumulation. Generally most of the students had a gingival score of 0-1.0 53.2% had 1.1-2.0 while 1.0% had 2.0-3.0

Majority of the students had a plaque score of 1.1-2.0 the highest plaque score category was 3.1-4.0 which had 5.2% of the students.
### Table 4.4 Gingival and plaque score

<table>
<thead>
<tr>
<th>Gingival score</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1.0</td>
<td>53.1</td>
</tr>
<tr>
<td>1.1-2.0</td>
<td>45.8</td>
</tr>
<tr>
<td>2.1-3.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plaque score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1.1-2.0</td>
<td>64.6</td>
</tr>
<tr>
<td>2.1-3.0</td>
<td>29.2</td>
</tr>
<tr>
<td>3.1-4.0</td>
<td>5.2</td>
</tr>
</tbody>
</table>

By gender comparison females seemed to have a lower plaque score than males.

As far as the gingival score is concerned 2.3% of the males had severe gingivitis but none of the females had severe gingivitis. More females 54.7% than males 51.2% had mild gingivitis and moderate gingivitis males 46.5% females 48.3%.
4.5 Correlations between knowledge level on oral health, oral hygiene practices and oral hygiene status of the students

A one way a nova was used to compare the effects of the level of knowledge and gingival score plaque score frequency of brushing interdental cleaning and visit to the dentist. The results are summarized in the table below

**Table 4.5: correlations**

<table>
<thead>
<tr>
<th>Variable</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit to the dentist</td>
<td>7.017</td>
<td>0.000</td>
</tr>
<tr>
<td>Cleaning tongue</td>
<td>6.419</td>
<td>0.001</td>
</tr>
<tr>
<td>Frequency of teeth cleaning</td>
<td>4.529</td>
<td>0.005</td>
</tr>
<tr>
<td>Gingival score</td>
<td>4.733</td>
<td>0.004</td>
</tr>
<tr>
<td>Plaque score</td>
<td>3.649</td>
<td>0.015</td>
</tr>
<tr>
<td>Interdental cleaning</td>
<td>4.947</td>
<td>0.003</td>
</tr>
</tbody>
</table>
4.6 Discussion

The study was done in a similar setup as the other studies (5, 10, 11, and 13). Most of the students were in their teenage years as those studies. The number of female students was higher than that of the males. Generally the following findings were noted.

All the students cleaned their teeth. Majority of them used tooth brush (94.8%) and toothpaste (80.2%). This concurred with a study by Lukuma13 which showed that 95.4% used tooth brush. However there were some students who used chewing sticks (4.2%) and salty water (15.5%) to clean their teeth. Majority of the students brushed their teeth once a day (34.7%). These results concurred with a study by Lukuma (48%)13 and Raleni et al (46%)5 though the percentage was less. The number of those who brushed twice and more than three times a day was high especially in the boardingschools. Majority of the students brushed their tongue (89.6%). Less than half of the students visited a dentist (45.8%). This contrasted with the study by Yusuf et al (72.8%)11 and majority of those who visited the dentist did so for treatment purpose (79.5%). Similar to a study done by Lukuma (85.3%)13. The main reason for the students who did not visit dentist was lack of money (36.8%). However there was still a number that visited dentist for dental checkups (18.2%) as opposed to a study by Lukhama13 which showed only 8.3%. Most of the students claimed to do interdental cleaning (84.4%). Most of the students used tread of cloth (26.8%). Dental floss was also common (22%).

Majority of the students had average knowledge on oral hygiene (55.2%). However significant percentage scored below average (36.4%). Very few students had adequate level of knowledge on oral hygiene (8.3%). This differed from the study by Yusuf et al11 which showed that 88.4% had adequate level of knowledge on oral hygiene. The difference can be explained by the fact that different criteria could have been used to determine the level of knowledge.

Majority of the students got the information about oral hygiene from teachers (77.1%) and parents and relatives (22.9%) this was in concurrent with a study done by Saedu et al10 which showed that most of the students (36.1%) got the information from the teachers though then percentage was was less.
Generally most of the students had a plaque score ranging from 1.0- 3.0 (95.3%). This was despite the fact that a significant number of students claimed to brush their teeth more than two times a day and also two times a day. This could be attributed to poor brushing techniques. Severe plaque induced gingivitis was found in 1% of these students. All these were males. However more females than males had moderate plaque induced gingivitis (54.7% and 51.2%) and mild plaque induced gingivitis (48.0% and 46.5%)

The relationship between the level of knowledge of the student was significant with visit to the dentist (p=0.000), frequency of teeth cleaning (p=0.005), interdental cleaning (p=0.003) cleaning of the tongue (p=0.001), gingival score (p=0.004) and plaque score (p=0.015).

By using Pearson correlation there is a positive correlation between the level of knowledge and frequency of cleaning teeth (\(\rho=0.327\)), visit to the dentist (\(\rho=0.402\)), interdental cleaning (\(\rho=0.366\)), cleaning of the tongue (\(\rho=0.377\)). There was however a negative correlation between the level of knowledge and plaque score (\(\rho=-0.301\)) and gingival score (\(\rho=-0.353\)).

From the results obtained in this research null hypothesis knowledge and practice on oral health have no effect on gingival status is therefore rejected.

**4.7 Conclusion**

From the above results it’s clear that the level of knowledge and awareness on oral hygiene and oral health have a positive impact on the practices and the oral hygiene status of the students.
4.8 Recommendations

1) Oral hygiene awareness need to be intensified in secondary schools as this will improve their practices on oral hygiene practices and also their oral hygiene status.

2) There should be dental services set up in the rural areas to improve accessibility of the population to dental care. The government should also subsidize the services to make them available to those in low social economic status.

3) More research needs to be done on the influence of the level of knowledge on oral hygiene practices and status to ascertain my conclusion.
REFERENCES
1) WHO report on oral health of April 2012 media center fact sheet email: mediainquiries@who.int. www.who.com/oral health accessed on 04/05/2013.
5) Rareniel, T. Effect of tooth brushing frequency on oral hygiene and gingival health in School children by of 1976 36(1); 9-16
6) J pev. Knowledge, attitude and practice of oral hygiene among school going children in Ethiopia by med hygiene Journal 2010(2); 52-9
7) Nzioka, Nyaga, J.K, Wagaiyu E.G. Relationship between tooth brushing frequency and personal hygiene status in teenagers June. East Africa medical journal 1993 jul 70(7) 445-


APPENDICES

APPENDIX I: QUESTIONNAIRE.
ORAL HEALTH KNOWLEDGE AND ORAL HYGIENE STATUS AMONG SECONDARY SCHOOL STUDENTS IN MARAGUA DISTRICT

QUESTIONNAIRE

This questionnaire contain three sections A, B. Fill ALL the sections

NB: DO NOT WRITE YOUR NAME

SECTION A: BIODATA

a) Gender…………

b) Age……………

c) Form…………

SECTION B: ORAL HEALTH KNOWLEDGE, AWARENESS AND PRACTICES

1) Do you clean your teeth?

a) Yes………

b) No………..

2) If your answer is no why?

a) It is not necessary…………

b) I don’t have a tooth brush………..

c) I don’t have money to buy tooth-paste…………

(d) Others (specify)………………………….

3) If your answer is yes in 1 above why do you clean your teeth?
a) To look good............
b) To prevent mouth diseases.............
c) To prevent bad odor.............
d) I don’t know....................
(e) Others (specify).............

4) Do you note any difference after cleaning your teeth?
a) Yes ....................
b) No ....................

5) If your answer is yes what difference did you note?
a). ....................
b). ....................
c). ....................

6) Do your colleagues appreciate your teeth after cleaning them?
Yes ...............
No ....................

7) If your answer is yes, what do they say about your teeth?
a) They are white.............
b) They are clean.............
c) You have good smile..........
d) Your teeth are beautiful........
e) Other (specify).............

8) What do you use to clean your teeth?
a) Tooth brush.............
b) Chewing stick.............
c) Charcoal.............
d) Other (specify)………..

9) What do you use to aid your cleaning of your teeth?
   a) Tooth paste……………..
   b) Salty water………………
   c) Water only……………..
   d) Other (specify)……………

10) How often do you clean your teeth?
    a) More than two times a day……………
    b) Two times a day…………………..
    c) Once a day .........................
    d) Once a week.........................
    e) Other……………………………..

11) Do you clean the space between your teeth?
    a) Yes………………
    b) No…………………..

12) Do you clean your tongue?
    Yes ..............................
    No ..............................

13) If your answer is yes, what do you use to clean it?
    a) Dental floss………………
    b) Toothpick…………………
    c) Thread of cloth……………
    d) Grass stick………………
    e) Other…………………

14) Mention the diseases you know that affect the mouth and teeth
a)........................................
b)........................................
c)........................................
d)........................................
e)........................................

15) Who told you about the disease you mentioned above?

a) Teachers.........................
b) Heard over the radio..............
c) Saw in the TV.....................
d) Parents and relatives.............
e) Newspaper.........................
(f) Others (specify)...............   

16) Have you ever visited a dentist?

a) Yes....................
b) No.................

17) If yes why did you visit?

a) Toothache......................
b) Gum bleeding ..................
c) Dental checkup..................
d) Bad odor....................... 
e) Other (specify)............... 

18) How often do you visit the dentist?

a) Never....................... 
b) Once in a year..............
c) Once every 6-12 months........
d) Other (specify)………………

19) If no why?

a) I am scared……………………

b) I don’t have money……………

c) I don’t see the need……………

d) Other (specify)…………

APPENDIX II: CLINICAL EXAMINATION FORM

A) PLAQUE SCORE

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>L</td>
<td>46</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>F</td>
<td>46</td>
<td>31</td>
<td>36</td>
</tr>
</tbody>
</table>

Total………Mean………

B) GINGIVAL INDEX

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>F</td>
<td>46</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>L</td>
<td>46</td>
<td>31</td>
<td>36</td>
</tr>
</tbody>
</table>

Total………..Mean………..
APPENDIX III: ORAL HEALTH HYGIENE INDICES

a) PLAQUE SCORE: Tresky modification of Quigley and Hein index of 1970

<table>
<thead>
<tr>
<th>Scores</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No plaque</td>
</tr>
<tr>
<td>1</td>
<td>Separate flecks of plaque at the cervical margin of the tooth</td>
</tr>
<tr>
<td>2</td>
<td>A thin continuous band of plaque (up to one mm) at the cervical margin of the tooth</td>
</tr>
<tr>
<td>3</td>
<td>A band of plaque wider than one mm but covering less than one-third of the crown of the tooth</td>
</tr>
<tr>
<td>4</td>
<td>Plaque covering at least one-third but less than two-thirds of the crown of the tooth</td>
</tr>
<tr>
<td>5</td>
<td>Plaque covering two-thirds or more of the crown of the tooth</td>
</tr>
</tbody>
</table>

Oral hygiene = total score / no. of teeth surfaces examined

b) GINGIVAL INDEX: Gingival index of Loe and Silness of 1963

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>1</td>
<td>Mild inflammation, slight colour change, edema no bleeding on probing</td>
</tr>
<tr>
<td>2</td>
<td>Moderate inflammation, redness, edema and Bleeding on probing</td>
</tr>
<tr>
<td>3</td>
<td>Severe inflammation, marked redness &amp; edema, ulceration and spontaneous bleeding on probing</td>
</tr>
</tbody>
</table>

Oral hygiene = total score / no. of tooth surfaces examined

0=excellent

0.1-1.0=good
1.1-2.0=fair
2.1-3.0=poor
APPENDIX IV: BUDGET AND SCHEDULE OF ACTIVITIES

SCHEDULE OF ACTIVITIES

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal writing</td>
<td>March-May</td>
</tr>
<tr>
<td>Submission to ethical board</td>
<td>June</td>
</tr>
<tr>
<td>Data collection</td>
<td>July-August</td>
</tr>
<tr>
<td>Data analysis</td>
<td>August-September</td>
</tr>
<tr>
<td>Report writing</td>
<td>October</td>
</tr>
<tr>
<td>Data presentation</td>
<td>November</td>
</tr>
</tbody>
</table>

BUDGET

<table>
<thead>
<tr>
<th>PROPOSAL WRITING</th>
<th>TOTAL COST(Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>stationery</td>
<td>300</td>
</tr>
<tr>
<td>Printing</td>
<td>300</td>
</tr>
<tr>
<td>Binding</td>
<td>300</td>
</tr>
<tr>
<td>DATA COLLECTION</td>
<td></td>
</tr>
<tr>
<td>Questionnaire printing</td>
<td>1000</td>
</tr>
<tr>
<td>Tongue depressors</td>
<td>400</td>
</tr>
<tr>
<td>Gloves</td>
<td>700</td>
</tr>
<tr>
<td>Disclosing tablets</td>
<td>2000</td>
</tr>
<tr>
<td>Chlorohexidine solution</td>
<td>500</td>
</tr>
<tr>
<td>REPORT WRITING</td>
<td></td>
</tr>
<tr>
<td>Printing report</td>
<td>600</td>
</tr>
<tr>
<td>Binding</td>
<td>300</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>7400</td>
</tr>
</tbody>
</table>

Source; self-funds
APPENDIX V: ETHICAL APPROVAL LETTER

The Chairman,

KNH/UON Ethics and Research Committee,

Kenyatta National Hospital

Through,

Internal supervisor,

Dr. R. MUTAVE

Sign…………………………………………….date…………….

External supervisor

Dr. TONNIE.K. MULLI

Sign …………………………………………… date …………….

Dear sir/madam,

RE: Ethical approval for the project.

I hereby submit this proposal for the project on “Relationship between knowledge on oral health and oral hygiene status among secondary school students in Maragua District” for ethical approval. The research will involve administering questionnaires and clinical examination of the students in the sampled schools. I will complete the research on October 2013

Yours faithfully,

Mwangi S.K.


0707346269
APPENDIX VI: PERMISSION LETTER

MWANGI STEPHEN KINUTHIA,
SCHOOL OF DENTAL SCIENCES,
UNIVERSITY OF NAIROBI.
skinutia0@gmail.com

DATE……………..

TO THE PRINCIPAL:

SCHOOL: …………………………………………
P.O. BOX…………………………………………

DEAR SIR/MADAM,

RE PERMISSION TO CONDUCT MY RESEARCH IN YOUR SCHOOL

I hereby write to you in reference to the above named. I am a 3rd year student from the above named university perusing a course of bachelor of dental surgery. My research is titled “relationship between knowledge on oral health and oral hygiene status among secondary school students in Maragua District.

The study will involve random selection of 30-35 students from all forms. They will then respond to a questionnaire and thereafter oral examination will be done to them. Ethical considerations have been well addressed and will be strictly observed.

I’m looking forward to your consideration.

Yours faithfully:

0707346269
APPENDIX VIISTUDENT CONSENT FORM

Dear student

I Stephen Kinuthia Mwangi, a continuous undergraduate student in the University of Nairobi school of dental sciences. am doing a research on the relationship between knowledge on oral health and oral hygiene status among secondary school students in maragua district. This study will involve the student filling a questionnaire and there after they will be examined in their mouth using tongue depressors and periodontal probes. Asepsis will be highly observed. no benefit will be gained by participating. Participation is voluntary and you can withdraw by choice. I kindly request you to take part in this activity out of free will. I will appreciate your participation.

I…………………………………………………………………………………………………………………………as a student in ……………………high school do/do not consent to take part in this research activity. I have fully understood the conditions, benefits of the study from researchers elaborate explanation.my participation is my decision without fears of intimidation.

Signature of student…………………………………………………..date………………………………………….

Signature of investigator………………………………………………..date…………………………………….