KHAT CHEWING PRACTICES AND KNOWLEDGE OF ORAL HEALTH EFFECTS AMONG STUDENTS IN TWO BOYS’ SECONDARY SCHOOLS IN MERU COUNTY.

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LEVEL 3 BDS

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2013
DECLARATION

I, Emma Mwari Kaluai, declare that this research project report is my original work and that it has not been submitted by any other individual for research purpose, degree or any other purpose.

Signature........................................................................ Date........................................................................
SUPERVISORS’ APPROVAL

This research project report has been for examination with our approval as University of Nairobi Supervisors.

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DEDICATION

I dedicate this research project to my father, Mr. Joel Kaluai, my mum Mrs. Hellen Kaluai and my two sisters Faith Kathure and Grace Muthoni for their unending support, love, constant encouragement and for making me who I am today.
ACKNOWLEDGEMENT

Above all, my gratitude goes to God for granting me strength to carry out this study.

My sincere gratitude to my supervisors Prof F.G Macigo and Dr. E.A.O Dimba for their supervision and assistance throughout this process.

I thank Mr. Fred Lithumai and Mr. Kinyua for assisting me with the collection of data and making this whole process much easier.

I am very grateful to my family members for being a source of encouragement and my friend Sandra Kasiva for helping me in her own special ways.
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## ABBREVIATIONS

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<tr>
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<th>Full Form</th>
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<tr>
<td>BDS</td>
<td>Bachelor of Dental Surgery.</td>
</tr>
<tr>
<td>UON</td>
<td>University of Nairobi.</td>
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<tr>
<td>KNH</td>
<td>Kenyatta National Hospital.</td>
</tr>
<tr>
<td>MPH</td>
<td>Masters in Public Health.</td>
</tr>
<tr>
<td>PGI-STI</td>
<td>Postgraduate diploma in Sexually Transmitted Infections.</td>
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<td>Nbi</td>
<td>Nairobi.</td>
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<td>Fig.</td>
<td>Figure</td>
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<td>SD</td>
<td>Standard Deviation</td>
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<tr>
<td>NACADA</td>
<td>National Authority for Campaign against Alcohol and Drug Abuse</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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ABSTRACT

Background
The habit of khat chewing has been practiced for centuries in the Middle East and the Horn of Africa. With time, this habit is becoming more widespread. The youth are now known to have adopted this habit despite its harmful health effects. Reports indicate the prevalence of khat chewing among secondary school students is high, being more than 60% in some student communities. There is inadequate information regarding their khat chewing practices and knowledge on oral health effects in Kenya.

Objective
To describe the khat chewing practices and knowledge of oral health effects among students of two boys’ secondary schools in Meru County.

Study design
This was a descriptive cross-sectional study using secondary student population based study groups.

Setting and study population
The study was conducted in Tigania East constituency, Meru County in two secondary schools: Nchui and Antuanduru secondary schools. The sample population consisted of form one, form two, form three and forms four students of these schools.

Materials and Method
Two hundred and one (201) willing students were selected from the two schools to participate in this study. A stratified random sampling method was used in selection of the study subjects from the study population. A self-administered semi-structured questionnaire was administered and filled by the students. Among the variables to be tested was khat chewing practices, knowledge on oral health effects and factors influencing khat chewing practices.

Data analysis
Collected data was analyzed using SPSS version 20.0. Quantitative data was analysed using frequency tables and percentages. Means, standard deviation for selected variables were computed. Data presentation was in form of tables, pie charts and bar graphs.
Results
The results showed that the khat chewing prevalence was at 58% (116) with majority 32.3% (65) reporting to have been chewing khat for more than five years now. The most common time for chewing was noted to be in the evening 46.9% (53) with 28.9% (58) citing increased concentration as a benefit of this habit. 53.2% (107) of the respondents reported that khat has no harmful effects to the teeth and 62.7% (126) thought that it has no harmful effect to the oral mucosa. 70% (142) said that khat has no harmful effects to the systemic health. Majority of the respondents’ parents cultivate khat 79.1% (159) and a greater proportion 84.6% (170) disagreed to the ban on the cultivation, sale and consumption of khat.

Conclusion
This study concluded that there is a general low level of knowledge with regards to the harmful oral and systemic health effects of khat chewing

Recommendation
Formulation of intervention programmes within the school to educate the students on khat and discourage its consumption among students.
CHAPTER 1 : INTRODUCTION

Khat is a stimulant drug derived from a shrub (Catha edulis). It contains a monoamine alkaloid known as cathinone, an amphetamine like stimulant. It is known by a variety of names depending on the location; qat and gat in Yemen, qaat or jaad in Somali, chat in Ethiopia, jimma by the Oromo people and miraa by the Kenyan people.

Historically, the origin of khat is quite obscure. There is a general agreement that its use was prevalent in Ethiopia, from where the practice spread around the 15th century to the Arabian peninsula\(^1\). A famous legend in Ethiopia claims that the first human to use khat was a Yemeni herder who noticed the effects of the leaves on his goats and tried them himself\(^2\). This legend refers to mastication of the leaves as the main method of khat use. The earliest scientific report presented to a Western country was in the 18th century when Peter Forskal, a botanist, identified the plant in Yemen and called it Catha edulis\(^3\).

The largest commercial growing areas are found to be in the Haare province of Ethiopia, on the hill sides of Jebel Sabr Mountains in Yemen and in the Nyambene area of Meru County in Kenya. It is also cultivated to a lesser extent in many mountainous parts of East Africa, including South Africa, Uganda, Tanzania, Zimbabwe and Rwanda. In Ethiopia 85-90% of the khat produced is exported contributing significantly to the country’s foreign exchange earnings\(^4\).

It has been estimated that about 10 million people globally use khat on a daily basis\(^5\). Research has come to show that Yemenis spend about 14.6 million person-hours per day chewing khat. In addition, families spend about 17% of their income on khat purchase\(^6\).

A study was done among secondary students of Kisii County in Kenya which suggested that it is worthwhile for drug interventions to focus more on the boys. The findings revealed that 84% of the males, compared to 16% of the females had engaged in drug use. Boys comprised at least two-thirds of the hard drug users. Khat was listed as a member of the hard drugs category\(^7\).

Khat has been used for quite a long time for various reasons such as keeping one awake and alert especially among drivers and students. Some Kenyan students in Isiolo county, Eastern province do not bother attending classes throughout the academic year and would then borrow notes from the diligent students when exams are around the corner, to read while intensely chewing khat\(^8\). Besides keeping one awake, khat is used as a socializing drug during parties or functions. In the Ameru community in Kenya, khat forms part of a
daughter’s bride price. The men usually chew it during informal meetings and discussions. In addition, khat is used to counter the effects of a hangover, following intoxication with alcohol the previous day or night. Many enjoy chewing it because of the state of euphoria it creates.

Khat chewing according to research has many detrimental effects to the oral health. One study concluded that khat chewing resulted in chronic recurrent subluxation and dislocation of the temporomandibular joint. A study done in the Yemeni population came to a conclusion that khat chewing causes gingival recession and teeth loss on the chewing side of the khat chewer. In another study, it was reported that 50% of khat chewers develop oral mucosal keratosis. Besides having oral health effects, khat chewing affects other organs of the human body. Systemic effects of chronic khat chewing include: oesophagitis, gastritis, constipation, insomnia, spermatorrhoea and impotence. In addition, it is a known risk factor for ischaemic heart disease and increases the incidence of acute myocardial infarction.

To date, there are no studies which have demonstrated the level of knowledge on oral health effects of khat chewing among students in Africa. One study however, sought to investigate the knowledge on khat among medical students in Yemen. The students demonstrated knowledge on the health effects of khat chewing and believed it was unacceptable for health professionals to chew it. However, they believed it was not in the health givers’ place to inquire about khat chewing habits or to advise against chewing it. Health professionals should have a role to play in educating users about potential harms arising from using the drug to minimize khat’s negative health effects for the individual and for the community.

The main aim of this study is to establish the level of knowledge regarding oral health effects of khat chewing among students in Meru County since no documented research has been done in this region. Most of the studies have been carried out in other countries but the data is scant on Kenya. According to the National Authority for Campaign against Alcohol and Drug Abuse (NACADA) strategic plan 2009-2014, the use of miraa is widely spread in Kenya. In addition, alcohol and drug abuse is estimated to be highest among young adults of ages 15-29 and lowest among adults of ages 65 and older. Secondary school children fall into this bracket with higher rate of drug abuse. Those particularly born and brought up in the khat growing regions such as Meru are at risk of developing oral mucosa lesions and losing their teeth at a youthful age among many other consequences of chewing khat.
The information gathered could be used for planning programmes for educating the students, their parents and the school’s management on the need to stop khat chewing practices.
CHAPTER 2: LITERATURE REVIEW

Khat commonly known as *miraa* in Kenya comes from the *Celastraceae* scientific family and genus *Catha* according to taxonomic classification\(^6\).

Meru is the prime *miraa* growing area in Kenya. It is an important commercial and cultural crop among the Igembe and Tigania communities. The main growing area is mainly on the slopes of Nyambene Hills. Harvesting is normally done before 5am during which the twigs are plucked and tied into bundles. These are taken to the markets by 6am and others are further bundled to be transported to Nairobi. The bundles are neatly packed into cartons and driven to the International Airport where they are flown to Netherlands and London mainly. Residents of Meru call the *miraa* tree a miracle tree. It is associated with a saying that: money grows on trees as one harvests a part of the tree for sale, by the next day the tree miraculously grows back to its original height ready for the next harvest. It enables them make money everyday\(^17\).

The position of the European countries with regards to khat use is not uniform\(^18\). It is prohibited in France, Switzerland and Sweden due to its amphetamine content while it is tolerated in the United Kingdom (UK) and in Netherlands\(^19\). In Islamic countries like Yemen and Somalia as among the Muslims of Ethiopia and Kenya, khat chewing is common and not prohibited, for unlike alcohol; it does not violate any teachings of the Koran. It is however banned on religious grounds in some Middle Eastern countries such as Saudi Arabia\(^20\) where the penalties are equivalent to those of cannabis and opium to anyone who possesses or uses it. In the United States, cathinone is listed as a Schedule I drug under the Controlled Substance Act, with heroin and cocaine. However, during the maturation and decomposition of khat, cathinone is converted to cathine, which is a Schedule IV substance and therefore legal.\(^21\)

Recently, the Netherlands government banned the sale of *miraa* following in the footsteps of many European countries and the US and Canada. The Dutch government said the khat chewers were a nuisance. Netherlands was the distribution hub for *miraa* to other European countries and the ban has led to hundreds of packers, transporters and farmers being rendered jobless. Before the ban, Kenya exported 18-20 tonnes of khat to Netherlands weekly.\(^22\) There are no laws which ban the cultivation, sale and use of khat in Kenya.

The north eastern and eastern regions of Kenya are where khat chewing is most prevalent. A study carried out in Ijara district, north eastern Kenya showed that 80% of the respondents were khat chewers and the majority (80%) had family members who engaged in the khat habit. There was a general lack of education on the negative effects of khat chewing. Only 40% of the persons interviewed admitted that the drug affected work performance negatively. The khat habit was associated with strain on family relationships, anti-social behavior and health effects such as insomnia.\(^23\)
A cross-sectional study was done in Agaro secondary school, south western Ethiopia regarding khat chewing. It was concluded that the khat chewing prevalence among 248 students of Agaro secondary school was 64.9%. These students were aged from 15-22 years old. This is a demonstration of how widespread khat chewing is among secondary school students.\textsuperscript{24}

Khat chewing has an overwhelming impact on the students’ psychology and social life. It has been related to decline in academic performance. The media unearthed the impact khat chewing has on the students education. An educational officer reported that in Gikiiro Secondary school, in Mbeere, Meru County, there are more girls than boys as the latter drop out due to khat chewing. This report stated that in form four there are 26 students out of which only 4 are boys. Since the school started in the year 2000, none of its students has been admitted to the university.\textsuperscript{25}

Various points of views have been projected regarding the oral health effects of khat chewing. Leukoplakia was associated with khat chewing in one study, where it was found out that 22.4% of khat chewers had oral keratotic white lesions at the site of khat chewing, while only 0.6% of non-chewers had white lesions in the oral cavity\textsuperscript{26}. In a survey that reviewed cancer patients for the past two years in Asir, Saudi Arabia, 10 patients out of 28 head and neck cancer patients presented with a history of khat chewing. All were non-smoking chewers and had used khat for 25 years or longer. 8 out of the 10 khat chewers presented with oral cancer\textsuperscript{27}. An important finding was that most of oral squamous cell carcinomas were located in the buccal mucosa and lateral sides of tongue which habitually come into contact with the khat chewing among study patients\textsuperscript{28}.

Controversial studies have come to conclusions that khat is not so harmful to the oral health and tissues. These have created conflict in the understanding of khat chewing and its effects. Khat chewers are likely to rely on this information and console themselves, hence carry on with their chewing habits oblivious of the fact that other studies have established negative health effects to the use of khat. One study found no evidence to suggest that khat chewing has particularly detrimental oral or dental effects.\textsuperscript{29} A study done in Yemen showed that there was no role of khat chewing and suggested bad oral hygiene as a factor in periodontal disease\textsuperscript{30}. Khat chewing has been found to have beneficial effects on the periodontium as it may have a mechanical cleansing effect on the dental biofilm\textsuperscript{31}. A similar conclusion was arrived at, that khat chewing does not increase the colonization of gingival plaque but instead might induce a microbial profile compatible with health\textsuperscript{32}. In a Kenyan study, no significant association was found between khat chewing and oral leukoplakia\textsuperscript{33}. 
Information with regards to khat chewing practices and knowledge on oral health effects among students in Kenya is minimal. The purpose of this study is to describe the khat chewing practices and knowledge on oral health effects among students. Besides educating the students, this study will form a stepping stone for other interventions and studies regarding khat chewing among students.
CHAPTER 3: STATEMENT OF PROBLEM, JUSTIFICATION AND OBJECTIVES

3.1 Problem statement
Khat chewing is of public health interest because some of the victims are school going children, most of whom are ignorant of khat as a drug, which can potentially cause harm to their oral health. Khat has been shown to have a negative impact on quality of life as a whole. It is known to cause severe adverse health effects amongst the addicts. Due to the million dollar khat exporting industry, nobody speaks ill of it in Meru for fear of creating enemies. Politicians themselves ignore the subject for fear of being hated and losing the support of the people. Parents are equally suffering as their children are obsessed with making money from selling *miraa* instead of studying, to the extent of dropping out of school. It would be of great importance to establish whether the youth are aware of this or not.

3.2 Justification
Miraa could be seen as the most abused drug in Meru County, considering this is where it is mainly grown. There is evidence of a rise in the prevalence of khat chewing among secondary school students. Research also shows a direct link of khat chewing to oral mucosa lesions and tooth loss among others. Currently, scant information is available on khat chewing practices and knowledge of oral health effects among students. Human research involving khat is limited; thus whether khat chewing is harmful, addictive or a lifestyle that lacks long term oral health effects for the user remains a controversial issue.

The results obtained from this study will be used to sensitize students on the need of abstaining from chewing *miraa*. There is need to design evidence based intervention programmes against khat chewing among secondary school students.
3.3 General Objective To describe the khat chewing practices and knowledge of oral health effects among students of two boys’ secondary schools in Meru county.

3.4 Specific Objectives
1. To determine the prevalence of khat chewing among the students.
2. To describe khat chewing practices among the students.
3. To describe the factors that influence the initiation of khat chewing among the students.
4. To assess the students’ knowledge of the oral health effects of khat chewing.
5. To assess the students’ knowledge of the systemic health effects of khat chewing.

3.5 Hypothesis
1. The prevalence of khat chewing among the students is 65%
2. 50% of khat chewing students are not aware of the oral health effects of the practice.
3. 60% of the khat chewing students initiated the practice due to influence by peers.

3.6 Variables
Variable
Social-demographic variables
Age
Year of study

Dependent variables
Khat chewing practices
- Frequency of chewing
- Duration of chewing
- Place/timing of chewing
- Quantity of khat chewed

Independent variables
Knowledge on oral health effects
Knowledge on systemic health effects
Factors influencing khat chewing practices
- Peer influence
- Influence by siblings
- Influence from parents
- Influence from media
CHAPTER 4: MATERIALS AND METHODS

4.1 Study areas
The study was conducted at Nchui secondary school and Antuanduru secondary school. Both of the schools are located in Tigania East constituency, Muthaara location in Meru county. Meru town is located 225 kilometers north east of Nairobi. Tigania East is an additional 25 kilometers away from Meru town. Nchui secondary school has a total of 150 students with one stream per form and 35 students per class. Antuanduru secondary school has a total of 200 students. It has two streams per form and 25 students per class.

4.2 Study population
The study population included all students who have been attending class in the two schools in the last six months. Student groups were selected from form one, form two, form three and form four classes.

4.3 Study design
This was a descriptive cross-sectional study using secondary student population based study groups.

4.4 Sample size determination
The prevalence was estimated to be 65%, based on the study from Agaro secondary school (page 5, reference 22) which found a prevalence of 64.9%

\[ N = \frac{Z^2 P q}{C^2} \]

Where:
N=Sample size
Z=z-value, which is equal to 1.96
P=Prevalence of khat chewing among students, which is estimated to be 65%
q=1-P
C=1-Confidence level, 1-0.95=0.05

Computed from the above formula:-

\[ N = \frac{(1.96)^2 \times (0.65) \times (0.35)}{(0.05)^2} \]
= \frac{3.8416 \times 0.2275}{0.0025} = 350

Since the study population is less than 10,000 the following formula was used

\[ nf = \frac{n}{1 + \left(\frac{n}{N}\right)} \]

\[ = \frac{350}{1 + 350/500} = 206 \]

4.5 Sampling Method

Meru County was chosen because this is the prime growing area of khat in Kenya. For purposes of convenience, Tigania East constituency was picked from the other eight constituencies. The two schools are located near the researcher’s home, which saved on transport cost too.

A stratified random sampling method was used to select the students. 206 was divided between the two schools in an equal manner, resulting to 103 students per school. This was then divided among the four forms resulting to 22 students from form one, 22 students from form two and 22 students from form four per school. Nchui secondary has one stream in each form, and Antuanduru secondary school has two streams with 25 students per class.

The subjects were picked randomly. At the class level, each participant was given a number written on a piece of paper which was placed in a container. The students were instructed to pick any number at random. The subjects corresponding to the numbers picked were included in the sample.

4.6 Inclusion criteria

a) Students of Nchui and Antuanduru secondary schools.
b) Students in form 1, 2, 3 and form 4 level of study.
c) Students who consented to participate in the study.
d) Students present in the school during the research period
4.7 Exclusion criteria
a) Individuals not attending Nchui and Antuanduru secondary schools.
b) All students who did not consent to the study.
c) New students and those recently transferred to the school.
d) Students absent during the research period.
e) Teaching and non-teaching staff.

4.8 Data collection methods and techniques
A self-administered semi-structured questionnaire (Appendix I) was administered to collect the data on khat chewing practices and knowledge on oral health effects. The questionnaire was pre-tested by the investigator before the actual data is collected. The questionnaires were distributed to the selected respondents by the investigator and the respondents advised to seek help on clarity issues. The variables tested included khat chewing practices, knowledge on oral health effects and factors influencing khat chewing practice. The questionnaires were collected from the respondents for inspection to ensure completeness and legibility.

4.9 Minimizing errors
a) Questionnaires were pretested.
b) Participants were provided with an opportunity to seek clarification.
c) Participants were monitored so that exchanging of information does not take place.
d) Teaching and non-teaching staff did not participate in the data collection process.

4.10 Data analysis and presentation
Data analysis was computer aided by use of Statistical Package for Social Sciences (SPSS) version 17.0. Quantitative data was analyzed using frequency tables and percentages then presented in pie charts and bar graphs. Dummy tables (Appendix IV) were used to illustrate the data analysis.

4.11 Ethical considerations
a) The research proposal was submitted to the Kenyatta National Hospital and University of Nairobi Research, Ethics and Standards committee for approval.
b) Permission to conduct the research was sought from the respective school authorities.
c) Voluntary consent was obtained from the participants (Appendix II- Consent form).
d) Purpose of the study, its benefits and risks were clearly explained to the participants.
e) Each person meeting inclusion criteria and randomly selected was interviewed.
f) Confidentiality of all information gathered was guaranteed, and was used only for the stated research purposes. No names were written on the questionnaires.
g) Data collected will be used for planning programmes for educating the students, their parents and the school’s management on the need to eliminate khat chewing practices.
4.12 Study benefits
a) The results will aid in the designation of intervention programmes against khat chewing among secondary school students.
b) The Research report will be submitted in partial fulfillment of the Bachelor of Dental Surgery (BDS) degree of The University of Nairobi.

4.13 Problems and Limitations
a) Students from Karama Boys’ secondary went on strike the night before the study. Antuanduru Secondary school; which is in the same area was selected to replace Karama Secondary school.
b) Time and financial constraints. Travelling to Meru from Nairobi took about 4 hours or slightly more. This resulted to a total of 8 hours or more spent on the road only. Being a self sponsored project, the researcher had to budget for these transport and printing expenses besides others.
c) The number of students present was less than the expected target. This forced the researcher to include Form 1 students in the study.
d) Only 201 out of the expected 210 respondents were interviewed.
e) Some students withheld information due to the current khat ban debate going on in the country.
CHAPTER 5: RESULTS
Socio demographic characteristics

A total of 201 participants were included in the study. They were all male students. 107 (53.2%) were from Nchui Secondary school while 94 (46.8%) were from Antuanduru Secondary school. Their ages ranged between 13 to 28 years (Fig 1) with a mean age of 17.08. 68 of the participants were from Form 3 (33.8%), 50 from Form 4 (24.9%), 48 from Form 2 (23.9%) and 35 from Form 1 (17.4%).

Fig 1 – Distribution of participants by age.

Prevalence of khat chewing

116 (58%) of the students admitted that they are current khat chewers while 46 (23%) agreed that they used to chew and then stopped (Fig 2). The remaining 39 (19%) never chewed khat in their whole life.

Fig 2 – Prevalence of khat chewing among the participants
The khat chewers were distributed unevenly among the participants with the majority being aged 17 -18 years and the least 23 – 28 years (Table 1). There was an increase in chewers from 14 years up to 18 years after which the chewers decreased.

Table 1. Distribution of khat chewers among the various ages. (n=116)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>23</th>
<th>24</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of chewers</td>
<td>3</td>
<td>16</td>
<td>24</td>
<td>26</td>
<td>26</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Percentage % of chewers</td>
<td>2.6</td>
<td>13.8</td>
<td>20.7</td>
<td>22.4</td>
<td>22.4</td>
<td>7.8</td>
<td>6</td>
<td>1.7</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
</tbody>
</table>

**Frequency of chewing khat**

Of the respondents who agreed that they chew khat, 36 (31.3%) claimed they chew daily, 45 (39.1%) twice a week, 13 (11.3%) thrice a week, 20 (17.4%) monthly and 1 (0.9%) yearly (Fig 3).
Timing of chewing khat

Majority of the khat chewers, 53 (46.9%) said they chew in the evening, 42 (37.2%) at night, 7 (6.2%) in the afternoon, 2 (1.8%) in the morning before school and 9 (8%) agreed to chewing during all these periods (Fig 4).

![Pie chart showing timing of chewing khat among the khat chewers.](attachment:image)

Fig 4 – Timing of khat chewing among the khat chewers

Place of chewing

None of the khat chewers agreed to chewing in school only. 99 (86.1%) said that they chew khat at home and 7 (6.1%) both at home and in school. 9 students (7.8%) specified that they chew at the market place (Fig 5).

![Pie chart showing place of chewing khat among the khat chewers.](attachment:image)

Fig. 5 – Place of chewing khat among the khat chewers
Access of khat during school hours

Among the khat chewers, 77.8% obtain the khat from farms, 22.2% obtain it from markets nearby.

Quantity chewed daily

Most of the khat chewers, 46 (41.1%), chew one bundle of khat daily. 43 (38.4%) a few twigs, 8 (7.1%) two bundles, 11 (9.8%) three bundles, 4 (3.6%) more than three bundles (Fig 6).

![Graph showing quantity of khat chewed]

Fig. 6 – Quantity of khat chewed

Duration of chewing khat

53 (26.4%) of the respondents did not respond to this question. 31 (15.4%) reported to have been chewing khat for a few months to one year, 16 (8%) two years, 17 (8.5%) for three years, 11 (5.5%) for four years, 8 (4%) for five years and 65 (32.3%) for more than five years (Fig7).

![Graph showing duration of chewing]

Fig. 7 – Distribution of khat chewers according to duration of khat chewing
Factors influencing khat chewing practices

Most of the respondents, 92 (82.9%) admitted to having no influence from other sources, but their own initiative. 9 (8.1%) were influenced to start chewing khat by their friends who also chew, 1 (0.9%) by siblings who also chew khat, 1 (0.9%) by the media and 8 (7.2%) were influenced by their parents who also chew khat (Fig 8).

Fig. 8 – Distribution of khat chewers according to the factors influencing the practice

Reasons for quitting chewing of khat

Of the respondents who stopped chewing khat, 10 (21%) made this decision due to costs, 16 (34.8%) due to religious beliefs, 15 (32.6%) due to health reasons, 5 (10.9%) due to objection from parents and none based their decision on bad taste of khat (Fig 9).

Fig. 9 – Distribution of participants based on reasons for quitting the chewing of khat
Reasons for never chewing khat

Among most of the respondents who have never chewed miraa, 20 (42.6%) based their decision on health reasons, 7 (14.9%) on religious belief, 6 (12.8%) on peer influence, 6 (12.8%) on the costs of miraa, and 8 (17%) on objection from parents (Fig 10).

![Fig. 10 Distribution of participants according to reasons for never chewing khat](image1)

Perceived benefits of chewing khat

Majority of the students, 107 (53.2%) did not respond to this question. 58 respondents (28.9%) said that khat gives them concentration, 16 (8%) a source of entertainment, 5 (2.5%) said it gives them good health and 15 (7.5%) relief from stress (Fig 11).

![Fig. 11 – Perceived benefits of chewing khat](image2)
Knowledge on oral health effects

Harmful effects on the teeth: 107 (53.2%) of the respondents said that khat has no harmful effects on the teeth, 76 (37.8%) said that it has harmful effects on the teeth. 18 participants (9%) did not respond.

Harmful effects on the oral mucosa: 126 (62.7%) said it had no harmful effects here, 55 (27.4%) said it had harmful effects, 20 (10%) did not respond.

Knowledge on systemic health effects

142 respondents (70.6%) thought that khat has no harmful systemic effects, 42 (20.9%) thought that it has harmful systemic effects and 17 (8.5%) did not answer.

Cultivation of khat by parents

17 respondents (8.5%) did not answer this question, while 159 (79.1%) agreed that their parents cultivate khat. 25 (12.4%) said their parents did not cultivate khat.

Ban of cultivation, sale and chewing of khat

12 respondents (6%) failed to answer this question while 14 (7%) said that it should be banned. 170 of the respondents (84.6%) said it should not be banned while 5 (2.5%) of the respondents did not know whether it should be banned or not.
CHAPTER 6: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1 DISCUSSION
The main objectives of this study was to describe the khat chewing practices and knowledge of oral health effects among students of two boys’ secondary schools in Meru county.

Khat chewing practices and knowledge of oral health effects was assessed among 201 students. This study focused on the male students as there were reports of boys dropping out of secondary school to sell and chew khat.

Prevalence of khat chewing
The prevalence of khat chewing was 58%, slightly lower than the estimated prevalence which was 65%. This compared to the study done by Adugna F. and Jira C in Ethiopia where the prevalence was 64.9%\textsuperscript{24}, is a slightly reduced prevalence rate probably because the latter study had a greater sample size of 248 students. Another secondary school study from Butajira, Ethiopia showed 55.7% prevalence rate.\textsuperscript{34} University level studies show similar trends. About 22.3% of the medical students in Gonder University chewed khat.\textsuperscript{35} 24.8% of Jimma University students were regular chewers.\textsuperscript{36} Both of these universities are in Ethiopia.

The greatest numbers of miraa chewers were aged 17 and 18 years old, with a total of 26 (22.4%) chewers from each category (Table 1). The number of chewers increased as their ages increased, up to 18 years, probably because these younger students have not been influenced or indulged into this habit yet. From 18 years, the number of chewers decreased, probably because of more exposure and knowledge on health effects of khat.

Form 3 group had the largest number of chewers, 45 (38.8%) and the least was from Form 1 with 13 (11.2%). A similar study established that abuse of drugs cuts across Form 1 to Form 4, but that it increases with age where the least involved were between 14 -16 years (mostly in Forms 1 and 2); and the majority between 20 - 22 years (Forms 3, 4 and above). This is an indication that a significant number of students have initiated use of drugs by age 14.\textsuperscript{37} A study by the Great Lakes University, Kisumu interviewed 458 students from 9 secondary schools in Kisumu and noted that by 15 years of age some students had already started using drugs and by the time they were 19 years 33% of males and females had already become drug abusers. 32% of the respondents had consumed khat.\textsuperscript{38}
23% (46) of the respondents reported to have been chewing and then later stopped, a greater proportion of them, 34.8% (16) stopped chewing due to religious reasons, and 32.6% (15) due to health reasons. Only 10.9% (5) quit chewing due to objection from their parents (Fig. 9). Parents have played the least role in encouraging their children to quit chewing khat. These are the people we expect to shape and discipline the children but their effort is relatively wanting. It has been noted that parental monitoring of children’s behavior and strong parent–child relationships are positively correlated with drug use and abuse among students.39

On inquiry of the perceived benefits of this habit, 28.9% (58) of the chewers said that khat gives them concentration in their studies, 2.5% (5) cited good health as a benefit and 7.5% (15) a relief from stress. It can be noted that these students are relying on myths and wrong information, using them as excuses to indulge in this habit. Kiiru argues that peer pressure influences youth to use substances under the false impression that some drugs stimulate appetite for food, increase strength, give wisdom as well as courage to face life.40 On the contrary, Hirst has labeled khat as an adaptogen, a herb which appears to increase the body’s ability to adapt to stress and changing situations. This gives it favorable traits such as: non-toxic in any reasonable amount, benefits the body as a whole and restores natural homeostasis.41

Generally, the availability of khat in this region could be implicated in the prevalence of its consumption. According to Kaguthi (director of NACADA in 2001) ready availability of most drugs appears to be the most important cause of prevalence of substance use and abuse amongst Kenyan youth. Khat and bhang are the most widely used substances which are grown in the country.42

**Khat chewing practices**

On the duration of khat chewing, 32.3% (65) of the chewers reported to have been chewing for over five years. This is an alarming result as this implies that some of them began chewing when they were 12 years old or younger, given that most of them were aged 17 years old.

A greater number of respondents 46.9% (53) said that they chew khat in the evening, 37.2% (42) reported they chew during the night. 6.2% (7) in the afternoon, 1.8% (2) in the morning before school and 8% (9) chew miraa during all these times. The students who chew miraa during the night and evening could be doing so to hide their khat chewing habits from the school administration and parents. Another reason could be to achieve concentration for studies. Young people studying for examinations have previously reported the use of central nervous system stimulants to keep them awake and alert; which may lead to dependence on these substances.43
86.1% (99) of the chewers reported to be chewing at home, 6.1% (7) do this both at home and in school. Lack of clear school policies on drug abuse may contribute to drug abuse among students. Karechio argues that students often buy and take drugs on school property. None of the chewers reported to have been chewing in school only, probably because of the strict rules and regulations in school.

In a study which investigated khat use among Somalis in four English cities, the average frequency of current khat use in England was three days a week, although 10% percent of those who had used khat in the past month were using it on a daily basis at the time of interview. Out of those who had ever used khat, 47% said they had used it daily, at some time, for a period of at least a month. Respondents reported an average quantity of 2.5 ‘bundles’ being used in a typical session (range: one to six bundles). Khat chewing sessions were described as lasting an average of six hours but could last from one to twenty hours. This community generally spends more time chewing khat than the Ameru community with an increased quantity of khat consumption too. In the same study, analysis showed that whilst consuming khat, some respondents would drink tea, soft drinks or water. Thirty-one people mentioned smoking cigarettes at the same time, and one person said they smoked ‘shisha’ (tobacco in a pipe)

Factors Influencing khat chewing practices

This was a measure of which people in their lives influenced them to begin chewing khat. Shoemaker argues that drug abuse is caused by a combination of environmental, biological and psychological factors. Environmental factors include family, peer association, school performance and social class memberships. A greater majority of students, 82.9% (92) reported that nobody influenced them but it was their own initiative. This could be as a result of the way people perceive miraa chewing in the area. People have come to accept it and it is now viewed as a norm.

7.2% (8) of the chewers reported their parents who also chew miraa influenced them into this habit. Again, parents are contributing to the practice of this behavior by their children by encouraging them to start chewing khat instead of shunning it. This could be attributed to the fact that 79.1% (159) of the students’ parents cultivate the drug. A survey report released by NACADA in Kenya 2004 says that, young people aged between 10 and 24 years whose parents use or sell alcohol and other drugs are likely to abuse these substances.

Contrary to my hypothesis, only 8.1% (9) reported that their friends who chew khat initiated them into this behavior. My expectations were that 50% of the chewers had been influenced by their peers into this habit because these are the people with whom they spend a great part of the day with. A study conducted in Nairobi Secondary schools indicated that the majority of drug users had friends who used drugs who have a greater influence on this habit.
In the study carried out in four English cities, Initial access to khat was most commonly through friends (n=115; 49%). A smaller number bought the khat for themselves (n=54); had it provided by a sibling (n=22); by a member of the extended family (n=20); by parents/grandparents (n=12); and by their partner/spouse (n=6).\textsuperscript{45}

According to the UN drug users seek approval for their behavior from peers whom they attempt to convince to join them in their habit as a way of seeking acceptance.\textsuperscript{49} This could be the reason as to why some of the chewers attributed this habit to their friends.

**Knowledge on oral health effects**

This was assessed in two different parts. One section dealt with the teeth and the other the oral mucosa. 53.2\% (107) of the respondents thought that miraa has no harmful effects on the teeth, 37.8\% (76) thought it had harmful effects on the teeth. This is in line with my hypothesis which estimated 50\%. It shows a gap in the knowledge with regards to the harmful effects of khat. Programmes should aim not only at increasing knowledge and awareness about the effects of khat chewing but should also aim at changing the students’ values, beliefs and attitudes which ultimately influence their behavior.

62.7\% (126) of the respondents thought that miraa had no harmful effect on the oral mucosa while 27.4\% (55) thought that miraa had harmful effects on the oral mucosa. A greater number of respondents do not know the potential implications of khat chewing. This could be because of ignorance on the part of the students and lack of enlightenment from the scientists. In a case-control study that investigated the oral manifestations of habitual khat chewing among 47 Yemenite individuals, it was noted that there was increased gingival recession on the khat-chewing side and discoloration of the teeth adjacent to the site of chewing. Oral dryness occurring 30 minutes after initiating the khat-chewing session was also reported by the khat users.\textsuperscript{50}
Knowledge on systemic health effects

70.6% (142) of the respondents thought that miraa has no harmful effects on the body, 20.9% (42) said that it has harmful effects. Based on these results we observe that there is a general lack of knowledge on the harmful health effects of khat chewing on the human body.

In a study carried out among Ethiopians, different views were expressed with regards to the impact of khat chewing to the human health. A greater proportion of the respondents, 46% disagreed that during khat chewing time, the brain activity slows down. 54% agreed that khat chewing weakens the physical stamina and kills motivation while 33% disputed this and 12% had no opinion. 62.4% of the respondents agreed that khat chewing leads to high alcohol consumption which in turn increases the exposure to HIV and AIDS. 66.7% said that frequent khat chewing causes mental and physical diseases while 10.3% disputed this.\textsuperscript{51}

6.2 CONCLUSION

a) Khat chewing among male students in secondary schools studied is common with 58% being current chewers while 23% were former consumers. Only 19% of the students have never chewed khat.

b) Most of the chewers in these schools were aged between 17 and 18 years. The number of chewers increased from students aged 14 years upto 18 years and then decreased upto 28 years.

c) A variety of factors contribute to the chewing of khat with majority of the students citing increased concentration and entertainment as the benefits to this habit.

d) Majority of the students from these schools were not aware of the harmful oral and systemic health effects of chewing khat.
6.3 RECOMMENDATIONS

1. Educational programmes within the school should aim at increasing the knowledge and awareness of khat, its contents, and its effects to the human body.

2. Parental counseling on the harmful effects of khat chewing to the body should be encouraged. They have a crucial role in preventing this habit among the students in early ages through their role as parents.

3. The Ministry of Health in conjunction with the Ministry of Education should train those involved in counseling the students during the educational programmes. Factual information should be provided from previous evidence based studies.
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19. Dhamash AMA. Autecological study on Catha edulis in Yemen. MSc Thesis Sana’a University. Sana’a, Yemen. 1996; page 134
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41. Kiru, D. Youth in Peril: Alcohol and Drug Abuse in Kenya. 200a
45. Patel S.L, Wright S, Gammampila A. Khat use among Somalis in four English cities. Home Office Online Report 47/05
APPENDICES

APPENDIX I: QUESTIONNAIRE

KHAT CHEWING PRACTICES AND KNOWLEDGE OF ORAL HEALTH EFFECTS AMONG STUDENTS IN TWO BOYS’ SECONDARY SCHOOLS IN MERU COUNTY.

The following are questions that have been formulated to assess the khat chewing practices and knowledge on oral health effects among secondary school students. Participation in this study is voluntary and information filled here will be treated with utmost confidentiality. Your identity is not required. (Please answer the questions to the best of your ability; tick where appropriate or fill in the blank spaces). Thank you in advance.

Date……………………………

Section 1: Social-demographic factors

Name of school.................................................................................................................................................
Age (years).............................
Form.................................

Section 2

1. Do you chew miraa?
   a) Yes ( )
   b) No, I used to chew it and then stopped ( )
   c) No, I have never chewed it before in my whole life ( )
If yes, go to question to question 2
If b) go to question 8
If c) go to question 9

2. How often do you chew miraa?
   a) Daily                                      d) Once a month
   b) Twice a week                               e) Once a year
   c) Thrice a week

3. For how long have you been chewing miraa?
   a) A few months to one year
   b) Two years
   c) Three years
   d) Four years
   e) Five years
   f) More than five years
4. When do you chew the miraa?
   a) In the morning, before school
   b) In the afternoon hours
   c) In the evening
   d) At night
   e) All the above
   f) If other, please specify

5. Where do you chew miraa?
   a) In school
   b) At home
   c) Both
   d) If other, please specify

6. How do you access miraa during school hours?

7. In each day that you chew miraa, how much do you chew?
   a) A few twigs
   b) One bundle
   c) Two bundles
   d) Three bundles
   e) More than three bundles

8. Who influenced you to start chewing miraa?
   a) My friends who also chew miraa
   b) My brothers/sisters who also chew miraa
   c) The media (television, newspapers or radio)
   d) My parents, who also chew miraa
   e) Nobody, it was my own initiative
   f) If other, please specify

9. Why did you stop chewing miraa?
   a) Costs
   b) Religion
   c) Bad taste
   d) Health reasons
   e) Objection from parents

   (skip Question 10 and go to Question 11)

10. Why have you never chewed miraa?
    a) Religion
    b) Peer influence
    c) Cost
    d) Health reasons
    e) Objection from my parents
11. What are the benefits of chewing miraa?

………………………………………………………………………………………………………………………………
………………………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………………..

12. Does miraa have any harmful health effects on the teeth?
   a) Yes ( )  b) No ( )

If yes, name some

…………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………
………………………………………………………………………………………………...

13. Does miraa have any harmful effects on the lining of the mouth and gums?
   a) Yes ( )  b) No ( )

If yes, name some

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…………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………

14. Does miraa have any harmful effects on the rest of the body?
   a) Yes ( )  b) No ( )

If yes, name some

…………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………

15. Do your parents cultivate miraa?
   a) Yes ( )  b) No ( )

16. Should the cultivation, sale and chewing of miraa be banned?
   a) Yes ( )

   b) No ( )

   c) I don’t know ( )
I, Emma Mwari Kaluai, a third year dental student at the University of Nairobi, is conducting a research on “KHAT CHEWING PRACTICES AND KNOWLEDGE OF ORAL HEALTH EFFECTS AMONG STUDENTS IN TWO BOYS’ SECONDARY SCHOOLS IN MERU COUNTY”. I wish to request you to participate in this study that will form part of my degree course. The study will be conducted through a self administered semi-structured questionnaire. The contents will be kept confidential. You are not required to write your name on the questionnaire. Information acquired will be used to assess the khat chewing practices and knowledge on oral health effects among students and to provide health education to them. Participation is voluntary and the participant has the right to ask questions or terminate his/her participation without any consequences. There is no risk associated with participating in this study.

Your participation is highly appreciated.

I participant confirm that I have understood the relevant parts of this study and do hereby give consent to participate wholly.

Signature: ___________________________  Date: ___________________________

Investigator

Signature: ___________________________  Date: ___________________________
The Chairman,
KNH/UON Research Ethics, and Standards Committee,
Kenyatta National Hospital.

Through,
The Supervisors,
PROF. F.G MACIGO

Signature…………………………. Date…………………………

DR. E.A.O DIMBA

Signature…………………………. Date…………………………

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT MY RESEARCH

I hereby request you to grant me permission to carry out my research project. It is entitled “Khat chewing practices and knowledge on oral health effects among students in two boys’ secondary schools in Meru County.”

The research project report will be submitted in partial fulfillment for the Bachelor of Dental Surgery of the University of Nairobi. It will be supervised by university lecturers at all the stages and will be carried out in Nchu and Karama boys’ secondary schools in Meru County. Find an attached copy of my research proposal.

Yours faithfully,

KALUAI EMMA MWARI
Registration number: V28/35863/2010
Cc : Chairman, Deptartment of Periodontology, Community and Preventive Dentistry.
## APPENDIX IV: DUMMY TABLES

### 1. Khat chewing practices

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<tr>
<th>Frequency of chewing</th>
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<th>Percentage (%)</th>
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<tr>
<td>Twice a week</td>
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<tr>
<td>Thrice a week</td>
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<tr>
<td>Once a month</td>
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<td>Once a year</td>
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<table>
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<tr>
<th>Place of chewing</th>
<th>Number of students</th>
<th>Percentage (%)</th>
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<tr>
<td>At home</td>
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<th>Timing of chewing</th>
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<th>Percentage (%)</th>
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<td>Afternoon hours</td>
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<td>In the evening</td>
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<td>At night</td>
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<th>Duration of chewing</th>
<th>Number of students</th>
<th>Percentage (%)</th>
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<td>5 years</td>
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<td>More than 5 Years</td>
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### 2. Knowledge on oral health effects

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<th>Knowledge on oral health effects</th>
<th>Number of students</th>
<th>Percentage (%)</th>
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### 3. Knowledge on systemic health effects

<table>
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<th>Percentage (%)</th>
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### 4. Factors influencing khat chewing practices

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<th>Factors</th>
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<td></td>
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<td>Media</td>
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<tr>
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<tr>
<td>Own initiative</td>
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