

**THE FEASIBILITY OF THE USE OF SEWING THREAD IN
THE CONTROL OF INTERDENTAL PLAQUE IN A RURAL
COMMUNITY IN UGANDA**

BY

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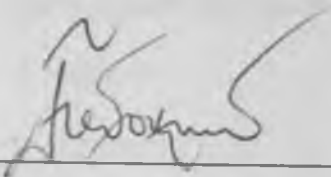
**A THESIS SUBMITTED IN PART FULFILMENT
FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC
HEALTH OF THE UNIVERSITY OF NAIROBI, 1999.**

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DECLARATION

I, Isaac Okullo, hereby declare that this thesis is my original work and has not been presented for a degree in any other University.

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APPROVAL

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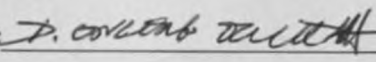
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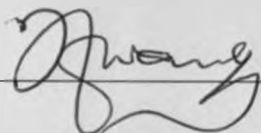
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DEDICATION

This thesis is dedicated to my dear wife Anna and sons Derrick and Haggai for their patience and understanding during my long absence from home.

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LIST OF ABBREVIATIONS

- | | | |
|-----|-------|---|
| 1. | CHW | Community Health Worker |
| 2. | OHI | Oral Hygiene Instructions |
| 3. | PHDA | Public Health Dental Assistants |
| 4. | WHO | World Health Organisation |
| 5. | ANOVA | Analysis Of Variance |
| 6. | PI | Plaque Index |
| 7. | GI | Gingival Index |
| 8. | SG | Study Group |
| 9. | CI | Confidence Interval |
| 10. | SPSS | Statistical Package for Social Scientists |
| 11. | PHC | Primary Health Care |
| 12. | TBA | Traditional Birth Attendant |

ABSTRACT

A study was carried out to establishing the feasibility of using sewing thread for inter-dental plaque control in rural school children. This was achieved by assessing whether the awareness of the pupils on dental health care could be raised and the skills of inter-dental cleaning using sewing thread imparted to them through dental health education and oral hygiene instructions by trained Community Health Workers (CHWs). The efficacy of sewing thread in the control of inter-dental plaque was also determined.

Three village schools were randomly selected and randomly assigned as clusters into the three study groups. Each study group comprised 51 pupils aged 12-15 years randomly selected from each of the three schools, making a total of 153 subjects. The respondents were interviewed to determine their knowledge and practice in oral health using structured questionnaires. This was done before and after receiving oral health education from the CHWs. The CHWs gave oral hygiene instructions (OHI) to pupils in their respective schools.

To determine the efficacy of sewing thread in plaque control, one group used sewing thread, the second group used dental floss and the third group, the control group, used neither floss nor thread for inter-dental cleaning. Tooth brushing was used in all the study groups to eliminate it as a confounder. The effectiveness of the measures was determined by evaluating the plaque score using plaque index according to Greene and Vermillion. The gingival score was determined using the gingival index according to Loe and Silness. Both the plaque and gingival indices were determined before and after the intervention. T - test and Analysis of Variance (ANOVA) were

performed on the mean plaque and gingival scores.

Using a pre determined criteria for determination of knowledge and practice, the level of knowledge of the respondents was found to be raised by about 19% following oral health education. Over 90% of the subjects who used sewing thread for inter-dental cleaning in this study expressed a liking for it. There was no statistically significant difference in the plaque and gingival scores between those who used thread and those who used floss for inter-dental plaque cleaning ($p > 0.05$). This indicated that thread was as effective as floss in the cleaning of inter-proximal areas. There was however a statistically significant difference in the scores between thread users and the control, and between floss users and the control ($p < 0.05$) indicating that both thread and floss were effective in the control of inter-dental plaque. The use of sewing thread resulted in the reduction of plaque and gingival index by 20% and 12% respectively while those who used floss had a reduction of 23% and 16% in the plaque and gingival index respectively.

It was concluded that it is possible to successfully use sewing thread for inter-dental plaque control in a rural setting. Therefore it is hereby recommended that thread be used for inter-dental cleaning in the absence of floss. CHWs should also be trained in preventive oral health care to enable them serve not only school children but also the wider communities.

1.0. INTRODUCTION AND BACKGROUND

Predominant among dental problems, which demand most attention, are two chronic diseases; dental caries and periodontal disease (1). The high incidence of these two diseases ensures that few individuals escape their effects. They are together responsible for an enormous amount of pain and suffering and are the major causes of tooth mortality (2). The periodontal diseases under reference here are gingivitis and periodontitis. The major cause of inflammatory periodontitis is bacteria and bacterial products held on the tooth surfaces in form of plaque. Many other etiologic factors have been studied e.g. trauma, endocrine dysfunction, nutrition and diet, drugs and metallic poisoning, but the association between dental plaque and periodontal diseases is so strong and consistent in populations studied that it overshadows association with other variables (3). Periodontal disease is a social disease and age, gender, ethnicity, social class and educational status affect its prevalence. These factors, which influence oral hygiene practices, affect the accumulation and retention of dental plaque.

Gingivitis is an inflammation of the marginal gingiva. Clinically it is recognised by the well-known signs of inflammation redness, swelling, bleeding, pus exudation and pain. Periodontitis is an inflammatory disease of the gingiva and the investing tissues of the teeth. Periodontitis is preceded and accompanied by gingivitis. However gingivitis may persist without progressing to periodontitis. Periodontitis involves destruction of gingival and periodontal fibres, resorption of crestal bone leading to tooth mobility.(4)

These diseases are largely preventable and yet community awareness about their causes, prevention and treatment is so low that response is only initiated because of pain, foul breath or difficulties in eating. The dental professionals are more often called upon to provide relief by extraction and restoration without actively involving the community who should share the responsibility of protecting their dental health. "Prevention, not therapy is therefore today's problem and hopefully tomorrow's answer" (5).

Previous studies have shown that most dental diseases can be controlled and prevented through a comprehensive preventive program and an effective dental health education program for the public (6). This dental education program should concentrate not only on increasing knowledge and skills but should also be directed towards changing of attitudes. In addition, instead of over valuing the effectiveness and efficiency of dental treatment of established diseases, there is need to concentrate on environmental, social and economic factors contributing to the rise in the incidence of periodontal diseases with a view of preventing them (7). Community based approach offers a greater hope of improvement in dental health than a total commitment to individual health care, which can at best benefit only a small proportion of the population (8). This can be achieved through the involvement of CHWs who are constantly in contact with the community in which they serve.

The best way of controlling plaque is through appropriate oral hygiene measures. However it is apparent that the awareness of the community, especially rural communities, of this fact is low. Many of them have different explanations concerning the rampant dental diseases. A common belief in northern Uganda is that dental disease, especially caries is caused by a worm which keeps

on migrating from one tooth to another. It is believed that once it has attacked a person there is no way of getting rid of it until all the teeth are destroyed or, if you are lucky, a tooth may be extracted with the destructive worm in it thus saving the rest of the teeth (personal experience). Some believe in witchcraft (superstition) as the cause. Matters are even worsened by the claim that some people brush their teeth and yet still get the disease.

A combined home and professional care may be required for the best personal oral hygiene practices. However dental professionals in most cases deal mainly with secondary and tertiary prevention, primary prevention being mainly the concern of the individual. This has been mainly in the form of tooth brushing. The failure rate in those who brush regularly could be due to several factors such as improper methods of brushing, use of improper materials for cleaning and the fact that brushing alone is inadequate.

Dental floss has been used to supplement tooth brushing in the cleaning of inter-proximal spaces with good results. Dental floss is a piece of nylon/silk thread that can be squeezed in between two adjacent teeth. A scraping motion with floss against the tooth cleans off foreign materials attached to the tooth. However flossing is not routinely practised in many of our communities, particularly rural communities. This is mainly because of lack of awareness of its usefulness and the fact that dental floss is very expensive, considering our poor rural economic backgrounds. There is therefore need for a cheaper and yet easily available material as an alternative.

Progress can be made through community action so that all citizens have a reasonable opportunity for dental health. A more sustainable approach is through community action initiated by trained

community-health workers who permanently stay with the community. CHWs in Uganda have been functional since the PHC strategy was introduced, carrying out various health related activities. They are chosen by the local communities and subjected to training by the Ministry of Health through the District Medical Office before they perform their duties. In Uganda they are mainly involved in the field of health education and mother care. However, they contribute significantly in the mobilisation of the community for preventive activities such as immunisation and sanitation. There are also a few community pharmacies operated by the CHWs in Uganda. The scope of work of the CHWs are still limited to health education and rural deliveries by TBAs. Their performance in these fields have been satisfactory and there was reason therefore to believe that through them, oral health care can also be introduced to the community.

Dental health services in Uganda are largely concerned with curative and rehabilitative services. Even the Public Health Dental Assistants (PHDA) whose training was initially intended to tackle dental and oral diseases from the preventive point of view have at times deviated to curative aspects possibly because of monetary gains. Further more, their number is still low and cannot therefore adequately cover all the communities (9).

The Uganda Dental Association was formed to promote professionalism among the dental workers and to promote good oral health among the general community. However, although the Uganda Dental Association organises a dental awareness week yearly during which dental health related activities are actively carried in some localities many other areas, especially remote rural ones, are uncovered. Even in the areas where they are carried out, these activities are not sustained once the awareness week is over.

There is need to initiate oral health programmes in our communities, especially in schools as special attention to children is justified on many grounds. From the point of view of economics, preventive services for children are susceptible to realistic control both by way of numbers involved and the kinds of services that constitute comprehensive care to them. The target group in this study was school pupils aged 12 to 15 years old. These are young adolescents who are more easily influenced to comply with instructions given to them and are in a position to understand what the good or bad habits related to their dental health are. There is also complete transition from mixed to permanent dentition in this age group.

There are apparently no reported conflicts regarding the effectiveness of dental floss. However, the use of sewing thread seems not to have been investigated before. CHWs have been active in many of our rural communities especially on other health-related issues but the dental field is clearly under stressed. The successful use of sewing thread for inter-dental cleaning in the present study is therefore expected to make significant contributions towards improving oral hygiene considering the fact that dental floss is inaccessible and unaffordable for the majority of members of our communities.

2.0. LITERATURE REVIEW

Statistics on the incidence and prevalence of periodontal diseases indicate the magnitude of the problems that face the community and the dental profession today. In 1979-80, the prevalence of gingival inflammation in a study of U.S school children aged 5-17 was found to be 95%. Only 4.4% of the children had no gingival inflammation (10). From a survey of three groups of New Zealand adults aged 15-19, 25-29 and 35-44 years. Cutress et al found that less than 4% of the population were free of gingivitis (11). In their survey in 1973 based on a statistical sample of individuals aged 3-70 years in Sweden, Hugoson et al found that 4.8% of 3 year olds had gingival inflammation. At 10 years the percentage affected had increased to 26.3% and at 20 years a further increase was noted (12).

In the developing countries, on the other hand, the prevalence and severity of periodontal disease has been reported to be high. Littleton reported that 97% of Ethiopians aged 5-84 years had periodontal disease and Greene found that 97% of Indian males had the disease. In Tanzania, Lembariti found a high prevalence (97%) of periodontal disease in adults (13). In Uganda, a survey of 35-44 year olds showed that 87% had visible plaque and almost every individual had one or more sites with loss of attachment i.e. breakdown of the gum tissue (14). The severity of the disease is generally reported to be higher in people from developing than from industrialised countries.

Gingivitis is a widespread disease that affects approximately half of the child and almost the total adult world population (15). Gingivitis usually starts at the tip of the inter-dental papilla,

subsequently involves the gingival margin and may progress to periodontitis (16). Several studies have shown that periodontal disease is most extensive in the inter-dental areas where the use of toothbrush alone leads to incomplete plaque removal (17,18). It has been shown by a study in the U.S that dental floss is more effective in removing plaque on proximal tooth surfaces than woodsticks(19). Its use however is more time consuming. The use of dental floss has been widely advocated by Mehta et al (20). However, some authors have stressed that damage can occur through the improper use of dental floss (21,22), thus careful instruction of patients is important and it is essential to monitor the patient at regular intervals.

A study conducted in California - USA to determine whether flossing, as an adjunct to tooth brushing performed in a school based program, could contribute significantly to a reduction in gingivitis revealed that the finger floss group improved gingivitis scores most over time (23). Following an intensive period of patient education of school children aged 12-16 years in the United States, and daily supervision to remove stained deposits of plaque from their teeth with dental floss and toothbrushes, it was found that after three and a half months, there were clinically and statistically significant reductions in the mean plaque and gingival scores. This contrasted with plaque and gingival scores which increased in children not deplaqueing daily in a nearby control school (24). The relative effectiveness of three types of dental floss; waxed dental floss, dental tape and superfloss as proximal plaque removal aids compared in a crossover study showed significant improvement in inter-proximal plaque scores with all the three types compared to baseline scores(25).

In another study in California to assess the comparative effectiveness of three types of dental floss and tooth brushing in reducing inter-proximal bleeding sites it was found that tooth brushing only group achieved a 35% reduction in bleeding sites while the three flossing groups all demonstrated dramatic reductions of about 67%. The three varieties of dental flosses were about equally effective in reducing inter-proximal bleeding and doubly effective as tooth brushing alone (26). The inter-proximal plaque removing effect of three different materials; classic dental floss, raffia floss and Indian floss tested in a two week study in Brazil, showed that all the materials had the same efficacy in removing the bacterial plaque, with significant reduction in inter-proximal plaque index (27).

In Wales, a survey done revealed that about half of all children had periodontal inflammation rising from 19% among 5 year olds to 50% of the 9 year olds and the older age groups. Using the WHO 621 probe, 48% of 15 year olds were found to have gingivitis (identified by bleeding following probing) (28). It is clear that greater emphasis needs to be directed to this area of dental care. All these studies indicate efforts made, especially in the developed world, to control inter-dental plaque. In most of these studies dental floss was investigated and found to be largely effective. Minor shortcomings found in the use of floss, such as damage to the tissues due to improper use, may not override its usefulness. The major shortcoming concerning floss at community level, especially in developing countries is availability and affordability.

For any inter-dental cleaning method to succeed in the community, the knowledge, attitude and practices of the community towards their oral health have to be taken into account. It has been observed that dental health knowledge is no longer sufficient for instructors and teachers of dental

health. Motivational psychology, public and personal relationship and a comprehensive knowledge of community and national dental health problems should round out the informational background of those who would teach dental health (29). This indicates the need for wider approach to the dissemination of dental health knowledge. The best way seems to be through dental health education, whose objectives among others include provision of a foundation of knowledge about problems of dental health; indicate the significance of dental health to the total health; provide background knowledge concerning community dental health programme; evaluate preventive measures that may be applied to the individual and to the community to ensure better dental health for the nation and to suggest activities, materials and learning opportunities for use in dental health instructions.

The limitation of facility based approach was recognised many years ago. A modification of this led to the emergence of community oriented approach, where the health workers are expected to go out to the people instead of waiting for the people to come to them. The community based approach envisages a situation in which the health system and the community are partners. Its greatest potential is in health promotion and disease prevention, since these touch on the behaviour of the people and it is the changing of behaviour that would change the health picture in a community (30). This cannot be achieved without community participation. The best link between the health system and the community in terms of personnel is the CHW. These are people selected from within the community and carry out health care functions in the community with respect to health promotion activities, disease prevention and curative services (31). The CHW carries out these functions through home visiting, individual discussions and group meetings; in this way the CHW facilitates community participation at the very local level.

While society may provide many safeguards and services for dental health, in the final analysis it is the acquired knowledge and motivation of the individual toward good dental habit formation that makes the critical difference. Health education is the result of the efforts on the part of an organised society to help people learn to live healthfully. This education may take place in the home, school or in the community. It may be a gross simplification and generalisation to say that by age of 12-15 years the future dental treatment needs of a patient are largely determined, but this may often be the case. Studies published indicate that health knowledge rises with increased education and health behaviour is based on knowledge, attitudes and practices (32).

A field experiment done to evaluate the short term effects of a series of classroom preventive dentistry presentations on dental health knowledge, attitudes and reported behaviour of adolescents showed a significant increase in knowledge for the experimental group as compared with the control group (33). Although the educational intervention resulted in no differences between the two groups with regard to attitude, there was a significant positive change in attitude within the experimental group from pre to post-test. In addition there was a significant increase in the frequency with which the girls in the experimental group reportedly used the toothbrush and the dental floss (34). This is suggestive of sexual differences in oral care attitudes.

Oral hygiene instructions should aim at achieving effective removal of dental plaque and also at educating the individual so that the nature of periodontal disease is understood. This is a goal which will only be achieved by those who are motivated and who are mentally and physically capable, but if oral hygiene instruction is begun in the young age groups the individuals concerned will be conditioned to receiving and comprehending more advanced preventive materials as they

grow (35). Sewing thread has apparently not been tried before for inter-dental cleaning since there is no literature available on it. The purpose of this study was therefore to test the possibility of using it for plaque control.

3.0. STATEMENT OF THE RESEARCH PROBLEM.

3.1. RESEARCH PROBLEM.

Despite claims of tooth brushing by many people, dental plaque deposition still occurs at a rate capable of accounting for the high prevalence of periodontal diseases in our communities. The focus of this plaque is most likely from the inter-proximal spaces that cannot be easily reached by toothbrush bristles. Dental floss, in addition to tooth brushing, has been successfully used for inter-dental plaque control but is unavailable and unaffordable to the rural communities who are poor. There is therefore need for a cheaper and easily available material. Sewing thread as a flossing material is cheap and readily available yet its efficacy and effectiveness has not been proven. In addition there is lack of awareness on the use of the technique and flossing in general. There is also lack of awareness on dental health in general due to shortage of trained health personnel. CHWs have been used to raise awareness and impart health skills to communities on various health interventions. There was therefore the question of whether CHWs could be trained to raise dental health awareness and also impart flossing skills to school children in the use of sewing thread for the control of inter-dental plaque. The other question is whether the initiative could have any impact on dental health.

3.2. JUSTIFICATION

Periodontal diseases are highly prevalent in our communities and in most cases people seek treatment when the disease is advanced, yet treatment is expensive and the majority cannot afford. Primary prevention by the most effective method(s) is therefore important. The community is in a position to carry out effective preventive measures if the skills are imparted to them. Raising the awareness of the community and teaching them additional oral hygiene measure of inter-dental space cleaning would reduce the inter-proximal focus of dental plaque. Dental floss is both expensive and unavailable to the majority of our communities. Sewing thread is a cheaper and easily available material that has not been tried for the purposes cleaning proximal tooth surfaces. The shortage of trained dental professionals with a bias in dental public health calls for the training of community health workers who stay with the community to fill the gap. They would help to raise the awareness on dental health and in the practical use of sewing thread for clearing inter-dental plaque. CHWs have been used in the past to carry out a variety of health related activities in the community. It was envisaged that the use of trained CHWs could lead to improved community oral health.

This study aimed at testing the possibility of using sewing thread in plaque control and the promotion of its use through CHWs.

3.3. OBJECTIVES

3.3.1. General Objective

To establish the feasibility of using sewing thread in the control of inter-dental plaque following dental health education and oral hygiene instructions on its use by trained Community Health Workers in a rural community.

3.3.2. Specific Objectives

1. To determine the effectiveness of trained community health workers in raising oral health awareness of school children aged 12-15 years.
2. To determine the impact of OHI given by trained CHWs on inter-dental plaque control using sewing thread.
3. To determine the efficacy of sewing thread as compared to dental floss in the control of inter-dental plaque.

3.4. HYPOTHESES

1. Training CHWs on basic dental health can improve the dental health awareness of the community.
2. The use of sewing thread on the instructions of trained CHWs has significant effect in the control of inter-dental plaque.
3. Using sewing thread is as effective as using dental floss in the control of inter-proximal dental plaque.

4.0. METHODOLOGY

4.1. STUDY AREA

The study covered three villages in Bata, a sub-county in Dokolo County of Lira district in the northern region of the Republic of Uganda. It is situated about 13 kms from Dokolo town centre on the Lira - Soroti highway and 70 kms from Lira Town, the headquarters of Lira district, which lies some 330 kms from Kampala, the capital city of Uganda. The sub-county consists of six parishes i.e. Aderolongo, Abalang, Akwanga, Atabu, Abyenek and Alapata, all of which are well connected by murrum and feeder roads. This study was done in the parishes of Atabu, Alapata and Aderolongo. The only health facility, a dispensary, is situated about eight kms away from the study area. This does not have dental health facilities or dental health manpower and people have to travel either to Lira town or Soroti, about 70 Kms away, for dental services or risk the local traditional healers who use crude methods and instruments for extractions.

The population in Bata sub-county was estimated at approximately 16077 (1991 population and housing census report). 51% of the population are females and 49% males. The population growth rate is about 3% per annum with children under 15 years constituting about 50% of the population. The population is predominantly the Lango tribe whose traditional culture with respect to disease and health, though still practised, is gradually changing due to the influence of western and other cultures in Uganda. However communal practices are still very strong especially in farming, hunting and grazing animals. Developmental activities tend to be undertaken on self help basis. The majority largely depends on subsistence farming for food and income to meet the socio-

economic needs of their families. The health situation of the population is still very poor due to lack of health care facilities and poverty. The 12 CHWs in the area carry out other community health programmes but had not received any dental training before. The area is however becoming more organised socio-economically through Atabu Development Association formed specifically to steer development in the area. Among the achievements of the association are restocking of cattle in the area which were rustled by the Karamojong tribe, putting up a grinding mill and protecting spring wells for clean water. The villages are governed by local councils who are accountable to a higher level of local council based at the sub-county and county headquarters. The leaders usually mobilise people in developmental and health related activities, such as clearing roads, building toilets e.t.c.

4.2. STUDY POPULATION

The study population consisted of all the pupils in the three selected schools who were 12 to 15 years of age and in class 5, 6 or 7. This consisted of 112 pupils from Abakuli Primary School, 93 from Atabu Primary School and 135 pupils from Alapata Primary School. The pupils were from different family backgrounds but were all Luo speakers

4.3. STUDY DESIGN

This was an experimental study. The raising of awareness of the subjects on oral health following health education and OHI by CHWs was compared to a baseline level of awareness considered here as a control. Two experimental groups i.e. thread and floss users, were compared against a control group to determine their efficacy

4.4. SAMPLE SIZE AND SAMPLING

4.4.1. SAMPLE SIZE DETERMINATION.

The following equation for comparison of population means was used to determine the sample size taking 95% CI (significance level = 0.05) and a power of 90% to detect real differences between the experimental and control groups (36).

$$n = \frac{2 (Z_{\alpha} - Z_{\beta})^2 \sigma^2}{\delta^2}$$

n = Sample size

σ = SD of individual measurements for gingivitis (0.20 from Garcia - Godoy et al (37))

Z_{α} = Standard normal deviate for $\alpha = 1.96$ when $\alpha = 0.05$ (one tailed)

Z_{β} = Standard normal deviate for $\beta = -1.28$ when $\beta = 0.10$ (one tailed)

δ = Effect size or the difference regarded as scientifically or clinically important = 15%.

Calculation:

$$n = \frac{2 (1.96 + 1.28)^2 0.20^2}{0.15^2}$$

$$n = 37$$

Adjustment for an expected drop out was provided by the following formula(38)

$$n_d = \frac{n}{(1 - R)^2}$$

Where n_d = sample size required with drop out

n = sample size calculated assuming no drop out

R = Expected drop out rate estimate = 15%

Calculation:

$$n_d = \frac{37}{(1 - 0.15)^2}$$

$n_d = 51$ per study group

There were 3 study groups with a total sample size of $51 \times 3 = 153$

4.4.2. SAMPLING PROCEDURE.

Multistage sampling procedure was used to obtain the sample units. Villages not bordering one another were purposely selected considering the relative distances between them. This was to minimise overflow among the study subjects from the three study groups once they were out of school. The selected villages were Atabu parish, which had one school, Alapata parish with two schools and Akwanga with three schools. Alapata is approximately six kilometres from Akwanga

and approximately eight kilometres from Atabu. From Atabu to Akwanga is a distance of approximately eleven kilometres. One school was randomly selected from Alapata where Alapata Primary School was selected and one from Akwanga where Abakuli Primary School was selected. Atabu primary school was not sampled as it was the only school in the parish. A list of the pupils' names with corresponding ages were then obtained from the authorities of the selected schools. Pupils aged 12 - 15 years from classes 5, 6, and 7 from each of the selected schools were assigned identification numbers. A table of random numbers was used to generate the required sample units using simple random sampling procedure. A set of three digit numbers were used with all generated random numbers greater than the sample frame rejected and numbers that lead to the selection of the same unit a second time also rejected. A list of the 12 CHWs was stratified according to the three villages and two randomly selected from each village using simple random sampling technique.

4.5. TRAINING OF CHWs

To facilitate the transfer of skills to the local communities, the selected CHWs from the three villages were trained for seven days on elementary dental health education and oral hygiene instructions which included proper tooth brushing methods, the use of floss and sewing thread for inter-dental cleaning. The training was in form of lectures and practical demonstrations. (The course content is detailed in Appendix 1). The trained CHWs were then deployed to impart dental health knowledge and also give oral hygiene instructions on brushing and inter-dental cleaning to the study subjects

4.6. VARIABLES

The independent variables in the study included oral hygiene instructions (OHI) by trained CHWs, No OHI by trained CHWs (referring to the base line status), sewing thread used, floss used, no thread/no floss used. The dependent variables included level of knowledge, plaque score and gingival score.

4.7. DATA COLLECTION

A baseline study to determine the level of knowledge and practices on dental health of the pupils from the three schools, using a pre-determined criteria (Appendix 6), was carried out by use of structured questionnaire (Appendix 2). The structured questionnaire was pre-coded to facilitate analysis. The plaque and gingival scores of the study subjects were determined using standard plaque and gingival indices. The plaque score was determined using Greene & Vermillion plaque index (Appendix 3) while the gingival status was measured according to Loe & Silness gingival index (Appendix 4). Disclosing tablets was used to detect plaque. Similar method of tooth brushing using conventional toothbrush was taught and used in all the study groups. The pupils used these procedures once a day while in school and under the supervision of the CHWs for a period of two months.

Mouth mirrors were used to retract the cheek and for indirect vision and reflection of light in inaccessible areas. The teeth examined included the lingual aspects of the lower first molars, the buccal aspects of the upper first molars and the labial aspects of upper right and lower left central

incisors. Information on the plaque score and the gingival status were recorded on the clinical examination forms (Appendix 5). The scores in the plaque and gingival indices were used as codes for data entry. For ease of data entry, the schools were coded as follows; Abakuli, which used sewing thread of a quarter a millimetre in diameter (flying wheel brand, 100% polyester) = code 1 (Study Group 1). Alapata, which used dental floss = code 2 (Study Group 2) and Atabu, the control group used neither floss nor thread for inter-dental cleaning = code 3 (Study Group 3). At the end of the two months the level of knowledge and practices on dental health of the pupils were re-evaluated using the same structured questionnaire. The plaque and gingival status were also re-evaluated using the same indices. The study was not designed for progressive evaluation because of logistical reason. A research assistant was trained in the administration of the questionnaires and collection of data. The principal investigator, assisted by the research assistant, conducted the oral examination.

4.8. DATA PROCESSING & ANALYSIS

The coded data was processed and analysed using the SPSS/PC statistical package. The level of knowledge, the mean plaque and gingival scores of the study subjects from the three schools after intervention was compared to the baseline levels determined before. Cross tabulations were done to determine the relationships between the independent and dependent variables. Pair-wise t tests were done for plaque and gingival scores taking each study group as independent group sample. Significant differences in the PI and GI were determined at 95% CI. Analysis of Variance (ANOVA) using 5% level of significance was performed to determine whether there were any significant differences in the mean plaque and gingival scores before and after intervention in the

three study groups.

Presentation was made in the form of distribution tables. Graphical presentations included line diagrams. Data was summarised in the form of measures of central tendency, especially mean.

4.9. MINIMIZATION OF ERRORS AND BIASES

Errors and biases were minimised by proper training of the research assistants following a standardised procedure. CHWs were evaluated after training through an assessment test to ensure uniformity and were continuously monitored and supervised by the research assistants. The study subjects were randomly selected and the three study groups were also randomly assigned to the experimental procedures. The questionnaire used was pre-tested and interpreted into the local language during pre-testing. Data entry was double-checked. However there was no supervision of the study subjects by the investigator through out the period the study subjects were using the cleaning procedures, this was done by the CHWs and the research assistant. This would probably affect the accuracy of instructions and implementation.

4.10. ETHICAL CONSIDERATIONS

Permission to undertake the study was obtained from the Ministry of Health Entebbe, District Resident Commissioner Lira, District Medical Officer Lira and the village local council chief Bata. Consent was sought from the parents and/or guardians of the study subjects using consent forms (Appendix 7). Emergency treatment was provided for the study subjects and cases that needed further management were referred to the relevant health facilities (Appendix 8). Clearance from the medical ethical review committee was also obtained.

4.11. DISSEMINATION OF RESULTS

The results of this study will be compiled into a report and copies disseminated to the Bata community, University of Nairobi, Makerere University and Ministry of Health Uganda. Other interest groups such as administrators, health workers in governmental and non-governmental agencies and other researchers may also have copies circulated to them.

Any information that is found to be of particular importance will be compiled for publication into medical and dental journals. Any additional information requested from this study will be given through organised workshops or conferences depending on the availability of facilities

.5.0. RESULTS

5.1. GENERAL AND SOCIO-DEMOGRAPHIC CHARACTERISTICS.

A total of 153 pupils were examined during the baseline survey comprising of 106(69.3%) boys and 47(30.7%) girls. (The sex distribution according to the study groups can be found in Appendix 9). At the second examination, there was a total of 140 study subjects, 94(67.1%) boys and 46(32.9%) girls indicating a drop out of (8.5%). This consisted of 11.3% drop out for boys and 2.1% for girls. The drop out rates for the 3 study groups were: SG 1 = 5.9%, SG 2 = 3.9%, SG 3 = 13.7%. The distribution of the respondents by age according to the study groups is presented in table 1. The mean age was 13.3 years.

Table 1 Age distribution according to study groups.

Age in years	SG1	Sg2	SG3	Total Number	%
12	9	21	13	43	28.1
13	12	14	13	39	25.5
14	24	13	10	47	30.7
15	6	3	15	24	15.7
TOTAL	51	51	51	153	100

All the study subjects fell within the predetermined age range of 12-15 years. The study subjects were sampled from classes 5, 6 and 7, with classes 6 and 7 contributing equal numbers of 54 pupils each and the remaining 45 coming from class 5. The lower contribution from class 5 could have been due to the majority failing to attain the lower age limit of 12 years necessary for recruitment. The class distribution of the respondents according to SG is in Appendix 10.

5.2. ORAL HYGIENE CARE KNOWLEDGE AND PRACTICES

Before intervention, more than 97% of respondents said they brush their teeth, 91% of them saying they do so in order to prevent diseases. More than 51% of those who brushed their teeth brushed once a day while 46% brushed twice a day. Toothbrush was used by 64% of the respondents while the remaining 36% used chewing sticks for brushing. As high as 17% had used dental floss for cleaning their teeth with 71% of them saying they liked using it. More than 68% of the respondents were aware of the causes of tooth decay and gum bleeding while 75% of them knew

how these diseases could be prevented. Only 32% of the respondents had gone for dental treatment, 89% of the treatment received was in form of tooth extraction. 49% of these extractions were done in dispensaries and 21% by traditional healer. Only 17% and 13% of the respondents sought treatment in public hospitals and private clinics respectively. More than 69% of the respondents had knowledge of foods harmful to teeth. 75% of them said they would see dental health personnel if in problems while 12% said they would seek the help of a local traditional medicine man.

After intervention however, more than 99% of respondents said they brush their teeth with 92% of those saying they do so in order to prevent dental diseases. 29% of the respondents brushed once a day while more than 70% brushed twice a day. Toothbrush was used by more than 98% while less than 2% of the respondents preferred chewing sticks for brushing. More than 72% had used dental floss and sewing thread for cleaning their teeth with over 93% of them saying they liked using it. More than 85% of the respondents were aware of the causes of tooth decay and gum bleeding and more than 96% of them knew how these diseases could be prevented. Only 24% of them had gone for dental treatment. More than 94% of the treatment received was in form of tooth extraction, 37% of these extractions were done in dispensaries while 21% of them were done by traditional healers. 24% and 18% of the respondents went to hospital and private clinics respectively. More than 89% of the respondents had knowledge of foods harmful to teeth and more than 89% of those said they would see dental health personnel if in problem while 4.0% said they would seek the help of a local traditional medicine man.

A summary of the determination of the level of knowledge before and after intervention based on the predetermined criteria are presented in table 6.

Table 2 Percent fulfilling the criteria for knowledge.

CRITERIA	% BEFORE INTERVENTION	% AFTER INTERVENTION
Brush their teeth	97.4	99.3
Know reasons for brushing	91.3	92.0
Brush twice a day	46.4	70.7
Used dental floss / sewing thread before	17.1	72.4
Know causes of gum disease	68.0	85.3
Know how gum disease is prevented	75.2	96.0
Been treated for dental problem	31.8	24.7
Know foods harmful to teeth	69.2	89.8
Know where to go when with dental problem	74.8	89.3

5.3 PLAQUE STATUS

Table 3 shows the comparison of the mean plaque index before and after intervention for each of the three study groups.

Table 3 Mean plaque index before and after intervention

Study Group	Before Intervention	After Intervention
SG1 (sewing thread)	1.96	0.47
SG2 (dental floss)	1.96	0.41
SG3 (control)	2.04	0.88

The mean PI before intervention in all the three study groups were quite comparable, the inter-group mean of mean PI being 1.99. This indicates the similarity in plaque status among the study subjects in the three study groups before intervention was instituted. The mean PI were again comparable between study groups 1 & 2 after intervention but almost twice as high in SG3. There was a reduction in the PI in all the three study groups following intervention. SG1, which used thread, had a 76% reduction. The group using floss had the most reduction of 79%. The control group had the least improvement with a 57% reduction in PI. There was therefore a net reduction in the PI of 20% and 23% over and above the control that can be directly attributed to thread and floss respectively.

Figure 1 is a comparison of the plaque index distribution before and after intervention. It can be seen that following intervention there were negligible number of subjects beyond score 1. The

modal score was 0.33. This contrasts with results before intervention where there was almost uniform distribution of the indices to a maximum of 3.

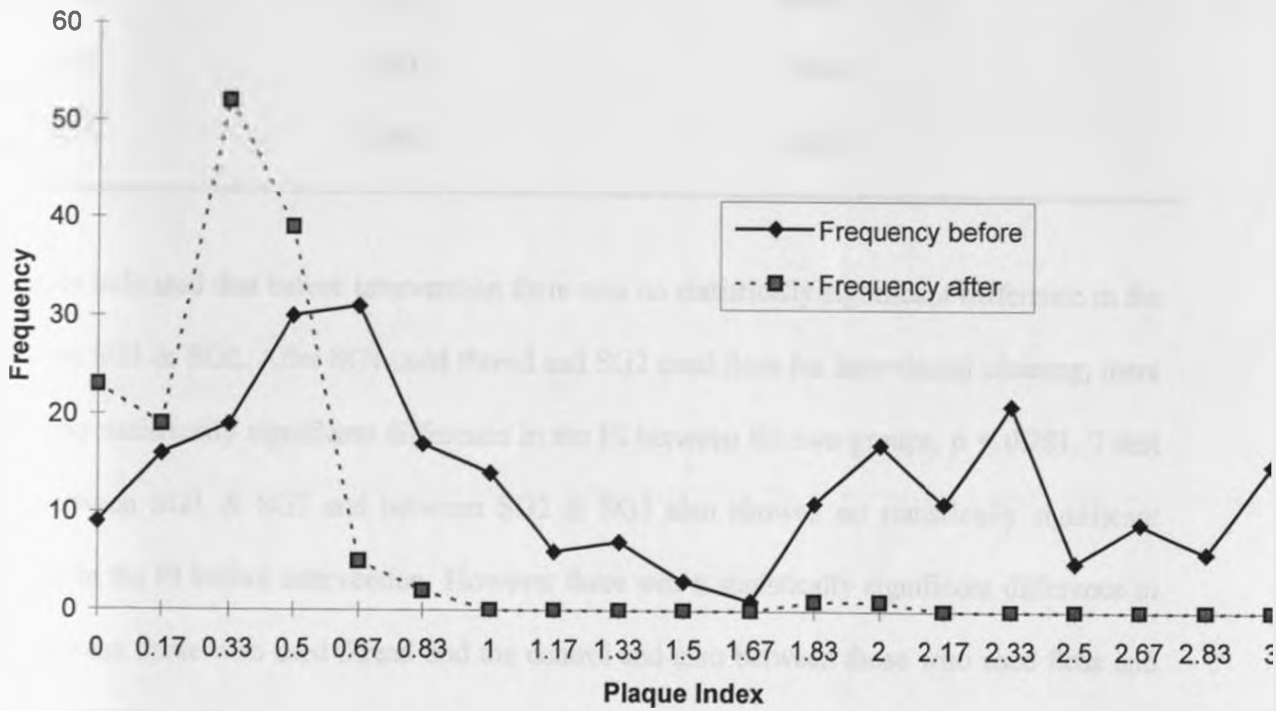


Figure 1 Distribution of plaque index before and after intervention

Pair-wise t test was run for plaque index taking each of the 3 SGs as independent group samples.

Results obtained before and after intervention are shown in table 4.

Table 4 Grouped t-test for PI before and after intervention.

Groups compared	P value before intervention	P value after intervention
SG1 & SG2	0.957	0.281
SG1 & SG3	0.492	0.000
SG2 & SG3	0.492	0.000

The results indicated that before intervention there was no statistically significant difference in the PI between SG1 & SG2. After SG1 used thread and SG2 used floss for inter-dental cleaning, there was still no statistically significant difference in the PI between the two groups, $p = 0.281$. T-test results between SG1 & SG3 and between SG2 & SG3 also showed no statistically significant difference in the PI before intervention. However there was a statistically significant difference in the PI between those who used thread and the control and also between those who used floss and the control after intervention.

The graphical presentation of the plaque scores among the three study groups before intervention is shown in figure 2. It can be seen that the distribution pattern is basically similar through the scores for each of the three study groups. The pattern in figure 3, which is the distribution following intervention is also similar except for noticeable peak differences for the study groups.

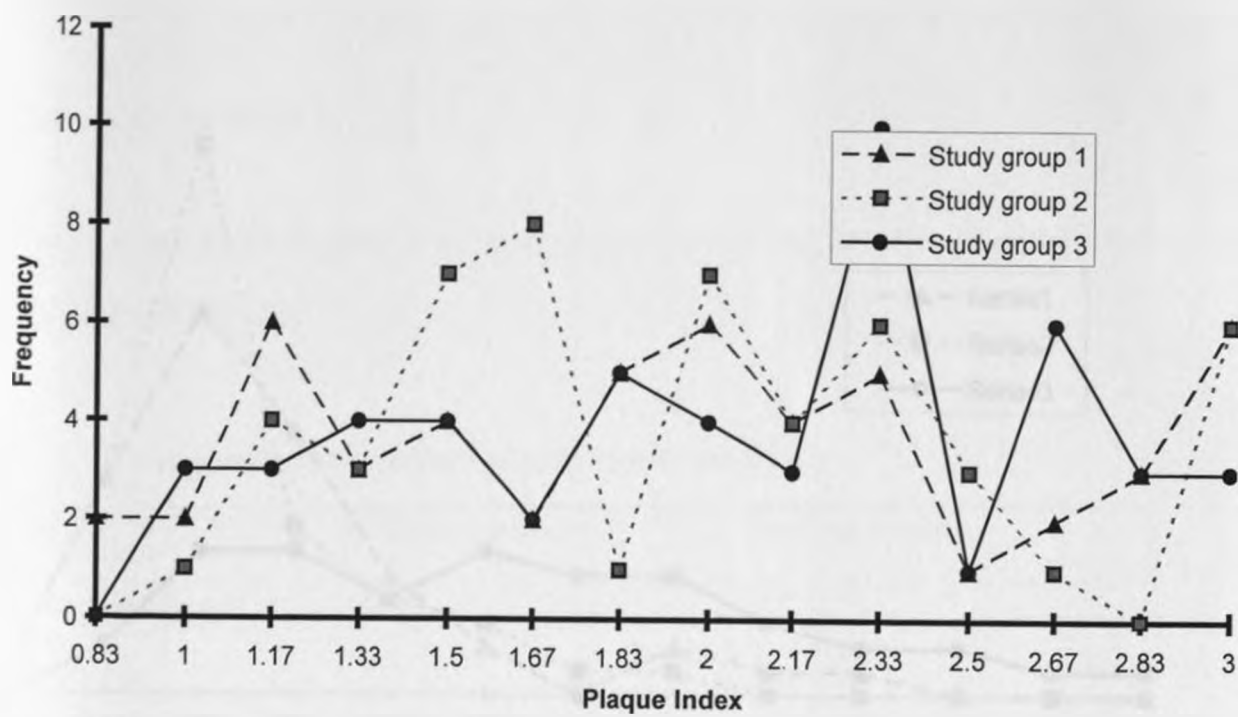


Figure 2 Distribution of plaque index by study groups before intervention

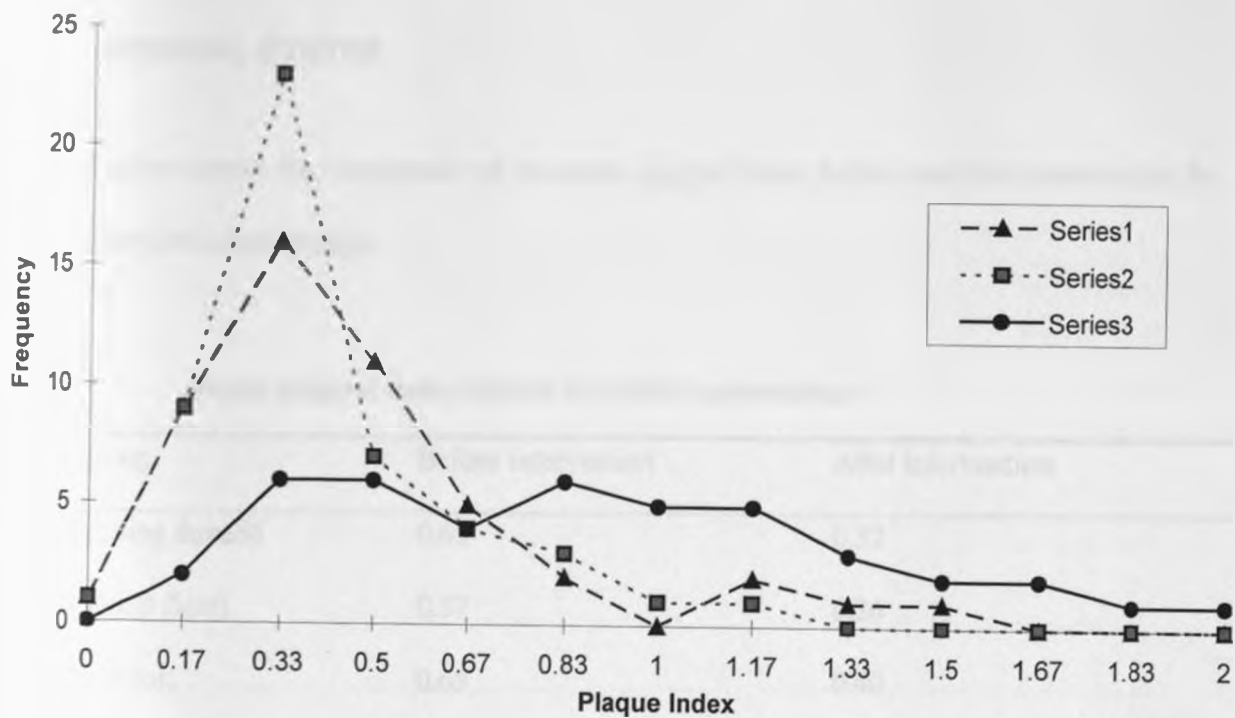


Figure 3 Distribution of plaque index by study groups after intervention .

Analysis of variance (ANOVA) was computed for plaque index to test for any statistically significant difference in them among the three SGs. The results showed no statistical significance before intervention, p value = 0.731 but was statistical significance after intervention, p value = 0.000.

5.4 GINGIVAL STATUS

Table 5 below shows the comparison of the mean gingival index before and after intervention for each of the three study groups.

Table 5 Mean gingival index before and after intervention

Study group	Before intervention	After intervention
SG1 (sewing thread)	0.65	0.32
SG2 (dental floss)	0.57	0.26
SG3 (control)	0.65	0.40

The mean GI of the study groups before intervention are comparable with an inter-group mean of 0.62. This indicates the similarity in gingival status among the study subjects in the three study groups before intervention was instituted. However the inter-group mean GI was reduced to 0.33 after intervention. Those who used thread had a reduction in the GI of 51%. The floss group still had the most reduction of 54%, while the control group scored least reduction in GI of 38%. There was therefore a net reduction in the GI of 12% and 16% over and above the control that can be directly attributed to thread and floss respectively.

Figure 4 compares the mean gingival index before and after intervention. The distribution patterns are similar with a mode of 0.33 and no subjects beyond score 1 following intervention. Before intervention however, the maximum score recorded was 1.67 with a mode of 0.67

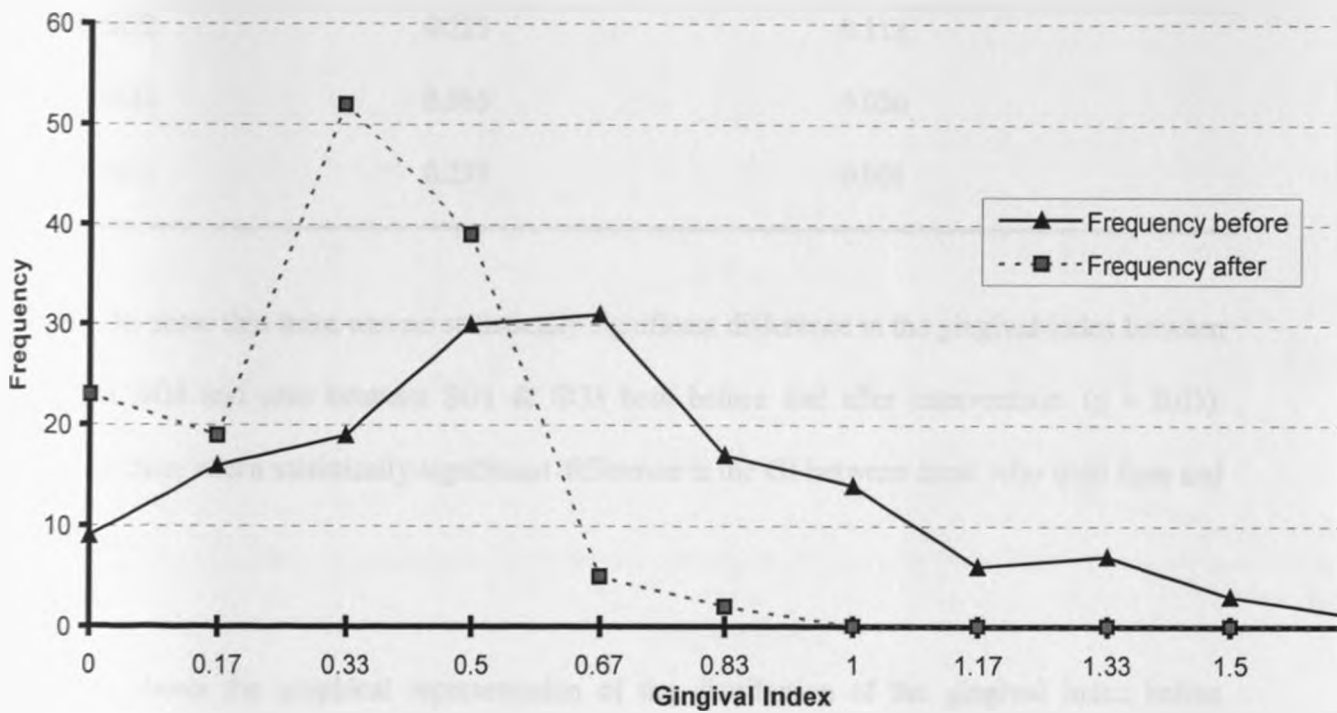


Figure 4 Distribution of gingival index before and after intervention

The statistical analysis results before and after intervention for gingival index using grouped t-test are presented in table 6.

Table 6 **Grouped t-test for GI before and after intervention.**

Groups compared	P value before intervention	P value after intervention
SG1 & SG2	0.223	0.118
SG1 & SG3	0.965	0.056
SG2 & SG3	0.239	0.001

The results show that there was no statistically significant difference in the gingival index between SG1 and SG2 and also between SG1 & SG3 both before and after intervention. ($p > 0.05$). However there was a statistically significant difference in the GI between those who used floss and the control.

Figure 5 shows the graphical representation of the distribution of the gingival index before intervention. There is the characteristic rise and fall in the distribution with a peak at score 0.67. The maximum value recorded was 1.67. Figure 6 is the distribution following intervention. The maximum score recorded was 0.83 with a modal score of 0.33. The general pattern is however maintained.

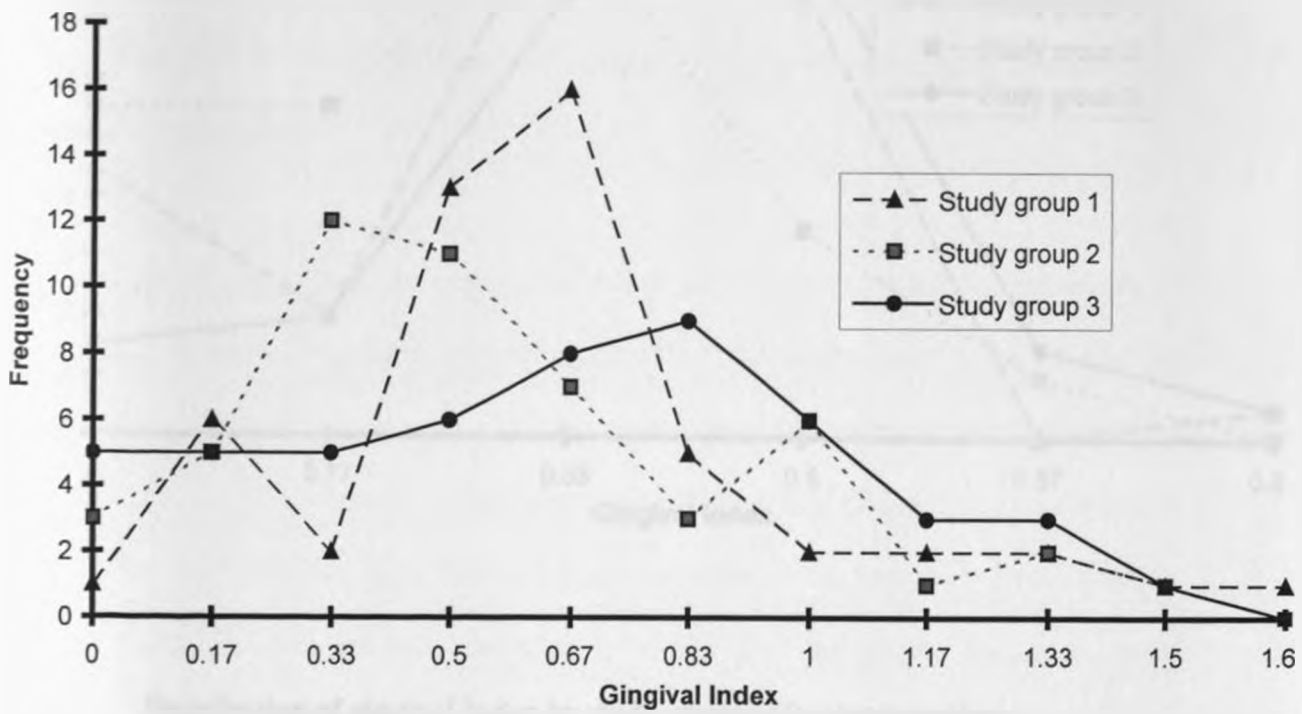


Figure 5 Distribution of gingival index by study groups before intervention

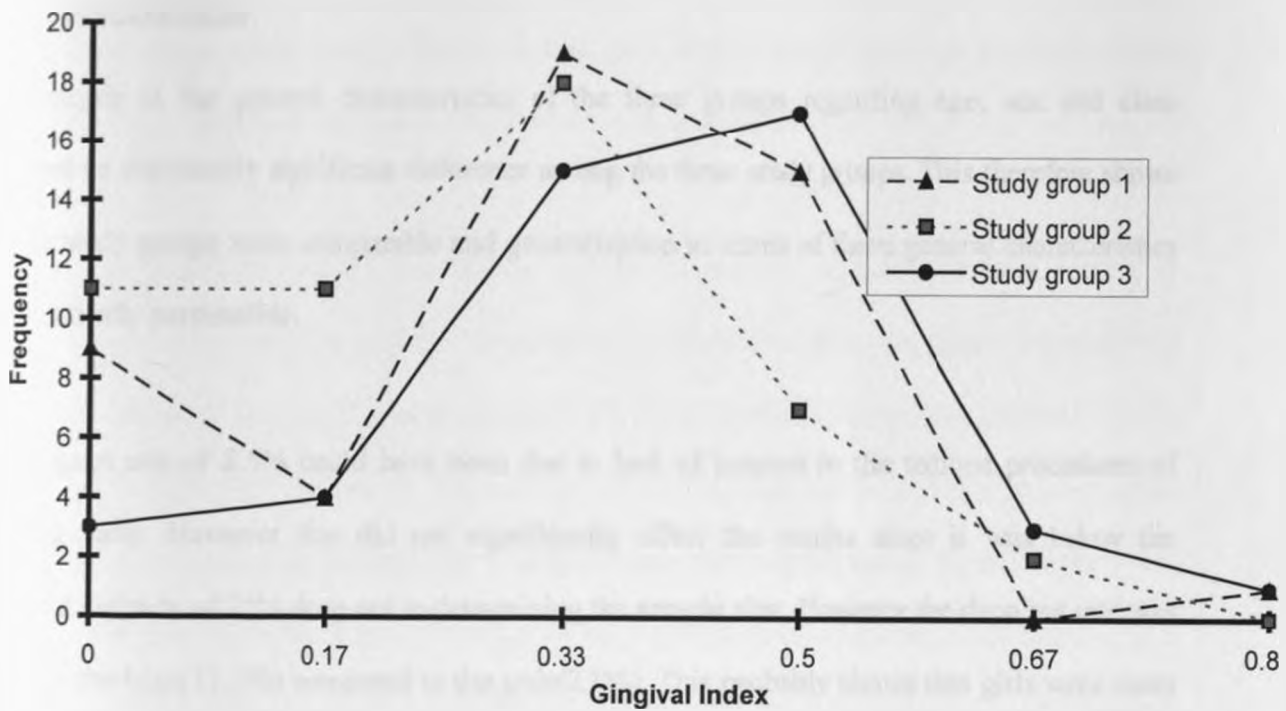


Figure 6 Distribution of gingival index by study groups after intervention.

Analysis of variance (ANOVA) computed for gingival index showed no statistical significance among the three study groups before intervention, p value = 0.388 but was statistical significant after intervention, p value = 0.003.

6.0. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1 DISCUSSION

The analysis of the general characteristics of the three groups regarding age, sex and class indicated no statistically significant difference among the three study groups. This therefore shows that the study groups were comparable and generalisation in terms of these general characteristics are statistically permissible.

The dropout rate of 8.5% could have been due to lack of interest in the tedious procedures of brushing daily. However this did not significantly affect the results since it was below the statistical estimate of 15% drop out in determining the sample size. However the drop out rate was higher in the boys(11.3%) compared to the girls(2.1%). This probably shows that girls were more interested in the activities concerning their oral health compared to the boys. The drop out rate in the control group (13.7%) was also considerably higher than that in the first and second experimental groups (5.9% & 3.9% respectively). This could indicate that the additional exercise of flossing made it more interesting for the experimental subjects compared to usual tooth brushing exclusively used by the control group. One might surmise that the subjects were coerced into compliance leading to the low drop out rates in the experimental groups. However this could not have been the case since the same coercion, if any, must have applied to the control group as well.

The respondents had fair knowledge and practices as far as oral health was concerned. Results before they received oral health education from the CHWs showed that 97.4% were brushing their

teeth and 91.3% were aware that brushing helps prevent oral diseases. However, only 68% knew about the causes of gum disease while 75.2% knew how gum diseases could be prevented. These relatively high percentages could probably be associated with the teachings they get from school considering that they come from the higher classes. Some pupils could have attended dental clinics before where they may have received some dental health education.

Following oral health education however there was improvement in both knowledge and practices of the respondents towards oral health. The percentage of the respondent who responded positively as per the criteria set increased by an average of 19%. There was an average improvement of 27% in their oral health practices and an improvement of 15% in oral health knowledge. This could have been due to the fact that the majority of respondents knew well what they should have done to achieve good oral health but were not practising them until they received more information from the CHWs. Up-to 96% of all the respondents became aware of how to prevent gum diseases. Studies have shown that knowledge rises with increased education and that health behaviour is based on knowledge, attitudes and practices (Frances 1977). It should also be noted that the number of respondents who went for dental treatment decreased by 7%. This indicates that whatever the CHWs did had an impact in the improvement of the oral health of the respondents. The emergency treatment of the subjects by the investigator could have also contributed to this decrease.

Before intervention 17% of the respondents had used dental floss before and 71% reportedly liked it. Considering that these were rural based respondents the percentage of 17% of respondents practising flossing before the study is apparently high. Reasons for this cannot be readily deduced.

Following intervention however 72% had used the flossing technique, this included both the thread and the floss users. This percentage is higher than the actual percentage (67%) of those who actually used the flossing technique in this study. The additional 5% could have been due to incorrect answering or due to overflow of information on the flossing technique to the control group who were not expected to use it. It is important to note that of the 72% of the respondents who used the flossing technique following intervention, 93% reported that they liked it. 50% of these actually used sewing thread and the other 50% used floss. This was an indication that flossing using sewing thread was acceptable to the population sampled. It is however not possible to draw conclusions as to whether it would be acceptable to the wider community. This can however be achieved in the long run through persistent health education with specific aim of raising the community's awareness and motivational psychology. It is possible to achieve this over some period of time through trained CHWs who are from time to time reinforced by professional health workers.

The acceptability and possible use of sewing thread for inter-dental cleaning would be meaningless if the thread itself is not effective in the removal of dental plaque. The investigation on the plaque and gingival status of the study subjects showed that the mean plaque and gingival scores in all the three study groups were all comparable at the baseline with no statistically significant difference in them ($P > 0.05$). This is confirmed by pair-wise T-tests performed between SGs 1 & 2, 1 & 3 and 2 & 3. This showed that before intervention was instituted in the three SGs there were no differences in the study subjects regarding plaque and gingival scores, an indication that they were similar in diversity and can be taken as homogenous groups. This picture however changed drastically following intervention with the use of thread and floss for inter-dental cleaning. The overall plaque

score was lowered from an average of 1.99 before intervention to 0.59 after intervention while that of gingival score was lowered from an average of 0.62 before to 0.33 after intervention. This showed that the intervention helped to reduce the general plaque and gingival scores by 70% and 47% respectively. This is consistent with the findings of Graves R C et al, 1989 who found that the use of dental floss in the control of inter-proximal bleeding reduced the bleeding sites by 67% compared to tooth brushing only which achieved a reduction of only 35%. The marked improvement in the PI in all the three study groups could be attributed to the supervised brushing which was carried out. The additional improvement of 20% in those who used thread and 23% in those who used floss, as compared to the control group, can logically be attributed to their use.

The ANOVA results showed that after intervention the plaque and gingival scores in at least one of the study groups was significantly different from the others ($P < 0.05$) indicating effectiveness of the plaque control measures. The pair-wise t-test between study groups 1 & 2, 1 & 3 and 2 & 3 then helped to identify which group was significantly different from the other regarding plaque and gingival scores. Thread and floss users had no significant difference in plaque scores ($P > 0.05$). This shows that the use of thread and floss in the control of plaque are both equally effective.

Other materials such as rafia floss and Indian floss tried in comparison to the classic dental floss showed the same efficacy in removing dental plaque (Campos Junior et al, 1990). It can be concluded therefore that thread is comparable to dental floss in removing inter-dental plaque. Statistically significant results were recorded for plaque and gingival scores between floss users and the control showing the effectiveness of floss for inter-dental cleaning in those who used it compared to those who did not. Similarly subjects who used thread compared to the control had a statistically significant difference in their plaque scores ($P < 0.05$) indicating the effectiveness of

thread in controlling inter-dental plaque.

This study showed a lowering of plaque index by the use of thread. The use of thread is therefore expected to be effective in the prevention of gingivitis. However the difference in the gingival index between SG1 and SG3 was not statistically significant, p value = 0.056. It would therefore appear like sewing thread was not very effective in the control of gingival bleeding. However, there was a reduction in the mean GI of 12% following the use of sewing thread. Further more, there was no statistically significant difference in the mean GI between thread users and floss users while at the same time floss was found to be effective in the control of gingival bleeding. One can then conclude that sewing thread was as effective in the control of gingival bleeding. The discrepancy in the p value of GI between thread users and the control could be attributed to several factors. There were complaints of thread breaking more easily than floss during use and this could have led to incomplete or improper cleaning of the inter-proximal spaces. This could probably account for the higher gingival index in those who used thread compared to those who used floss. Secondly, it is probable that the thread users were injuring their gums even though they were doubling the thread. This is because of the thin nature of thread and the fact that they were not very used to flossing, thus leading to gum trauma

The use of CHWs in conducting health related activities, in this case oral health education and oral hygiene instructions, had several advantages. Firstly they are easily available to the communities in which they serve. They are also many in number compared to government health workers, especially in rural areas and therefore can be in contact with a large section of the community. Last but not least, they work mainly on voluntary basis making a lot of economic sense, compared to

oral health personnel who would not work for meagre pay let alone no pay at all. The concept of CHWs was developed so as to ensure basic health services delivery close to the people. The involvement of CHWs in services such as organic farming, home deliveries, immunisation and community pharmacies have been commendable. This study has shown that the CHWs contributed positively in the improvement of dental health knowledge and practices of the school children studied and through them a reduction in the plaque index of the same study subjects. If only they could get more involved in oral health care, the oral hygiene status of the rural community would definitely improve. Needless to say, a healthy community means better production hence economic and social growth.

6.2. CONCLUSION.

The findings in this experimental study showed that young children can be helped to improve on their oral health status by educating them and instituting simple and easily available intervention methods for the control of dental plaque. The improvement of the oral health status and awareness of the pupils in this study was achieved through the intervention of the CHWs who trained and supervised them in good oral health habits through appropriate oral hygiene instructions. This was after they themselves were trained so as to enable them impart the relevant knowledge and skills. Any training programme for CHWs in oral health would therefore be welcomed as this would arm them with the necessary skills to spread the message and technique of good oral health care to the population, especially the disadvantaged rural population in which they permanently reside.

Sewing thread was successfully used in the control of inter-dental plaque. This was comparable to

the results in the dental floss users. Over 90% of the subjects who used sewing thread in this study expressed a liking for it. In the event that dental floss is not available one could therefore use sewing thread with comparable results. Considering that floss is relatively expensive and not easily available, especially in the rural community, inter-dental plaque can be controlled by the use of sewing thread that is cheap and easily available.

A follow up study could be done stretching over a longer period to determine whether inappropriate use of the sewing thread due to lack of experience was a contributory factor in the discrepancy noticed in the statistical analysis of the mean gingival index amongst the thread users. The possibility of using some local material to wax the thread could also be explored.

6.3. RECOMMENDATIONS.

It is hereby recommended that sewing thread, which is cheap, affordable, effective and easily available be promoted for the control of inter-dental plaque in conjunction with or as an alternative to dental floss. This is to be used in conjunction with the regular tooth brushing. There is however need for thorough training in its application so as to achieve optimum benefits in terms of gingival status.

The improvement in knowledge and oral health status was made possible by the involvement of CHWs who gave the instructions. Although this could have been achieved by any other person, CHWs are better placed due to their dedication and willingness to work with the rural communities for no pay. CHWs are also constantly available to the community in which they serve and any

training programme organised within their locality would be cost effective. This puts CHWs in the forefront in rural health education programs considering that professional dental health workers are usually not willing to stay and serve in the rural areas. Therefore it is recommended here that CHWs be trained and used to promote oral health. There is also need for integration of oral health care in line with other primary health care activities. This definitely has not yet taken root in Uganda

7.0 LIMITATION

The training of CHWs was conducted within a period of one week only. This could have contributed to incomplete comprehension of the training contents, hence incorrect dissemination of knowledge and technique to the study subjects. The study mainly concentrated on plaque and gingival status without considering other factors, which could have interfered with the cleaning procedures, used. For instance the presence of dental caries or malocclusion could have resulted into difficulty in brushing and flossing due to pain. Since no inclusion or exclusion criteria was used, there was a possibility of contamination of the participants leading to undesirable exchange of information and therefore a compromise in the limitation of the different procedures to the different study groups. The sample was restricted to the school children only. It may therefore be difficult to generalise the results in this study to the entire rural community.

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9.0. APPENDICES

Appendix 1 COURSE CONTENTS USED IN THE TRAINING OF CHWs

ORAL HEALTH

Why is Oral Health important?

Teeth are important parts of the human body, just like fingers and toes, and both their function and appearance are significant. The mouth is the first stage through which the food we eat enters the body. The food is broken into pieces in the mouth by using the teeth while the tongue helps in mixing it with saliva. Apart from being the grinding instruments of the food, healthy teeth contribute to good facial appearance and help in speech. Consequently, dental health is part of general health.

ADVANTAGES OF HEALTHY TEETH

1. No foul breathe.
2. No pain or discomfort in the mouth.
3. Healthy teeth are important for proper speech.
4. Healthy teeth contribute to nice appearance.
5. Food is easily and properly chewed.
6. The perception of healthy teeth contributes to the feeling of soundness of well being throughout life.

TASKS FOR COMMUNITY HEALTH WORKERS (CHWs)

The CHWs should:

1. Make sure that the pupils understand the importance of caring for their teeth.
2. Make sure that pupils realise the significance of clean teeth and the disadvantages of eating sugary foods.
3. Make sure the pupils know the types of foods that are harmful to the teeth and those that are beneficial.
4. Make sure the pupils know how to brush their teeth and are able to do it.
5. Make sure that the pupils know how to floss their teeth and are able to do it.

DENTAL DISEASES - CAUSES AND DEVELOPMENT

What is Dental Plaque?

Dental plaque is involved in the development of gum disease as well as tooth decay. Plaque is the soft, white or yellow substance that sticks to the teeth. Plaque consists mainly of bacteria and bacterial products. The mouth is full of millions of bacteria, and some settle on the teeth, where they multiply if they are not removed. That is why plaque can grow and continue growing even if the person does not eat.

What harm does plaque do?

Gum disease

When bacteria collect close to the gums, some of them produce toxic substances that cause diseases of the gum. If the plaque is removed the gums will become healthy again. But if the plaque is allowed to remain the toxic substances from the bacteria will attack the deeper part of the gums and

the anchoring fibres. Now the teeth will become loose and eventually they fall out and this is the main reason why old people lose their teeth. Obviously it is very important to remove all plaque from the teeth every day.

Dental caries.

The bacteria in plaque can act on food remnants in your mouth, especially sugars, to produce acid. This acid can weaken the tooth substance and eventually lead to decay.

PREVENTION OF DENTAL DISEASES

Significance of Oral Hygiene

As regards the causes of the two widespread diseases, gum disease and tooth decay, it is obvious that the regular removal of the bacterial plaque is essential for the prevention of these diseases. Effective oral hygiene habits is therefore essential. The most important aid for cleaning the teeth is the toothbrush or chewing stick. The problem is that if people do not use it effectively, bacterial plaque often remains close to the gums and between the teeth. However, the proper use can certainly be learned.

Brushing thoroughly once a day seems to be sufficient to prevent gum disease, whereas the prevention of tooth decay needs brushing immediately after the eating of sugary food. It is sufficient to brush the teeth properly 1-2 times a day. Brushing should start as soon as the child gets its first teeth, partly to initiate a good habit and partly because the dental diseases attack primary teeth as well as the permanent ones. Flossing in order to clean between the teeth should be encouraged as early as possible.

The child should be encouraged to chew as soon as he or she is able, to adequately develop the muscles of his jaw and strengthen the attachment of the teeth of the jawbones. Proper development of the permanent teeth is closely related to the integrity of the milk or primary teeth. Parents must desist from giving children, particularly between meals, highly processed sugary foods and sticky soft sugars which tend to stick to the teeth. African apples, sugar canes, pineapples and other fruits should be eaten after meals because they have a cleansing effect on the teeth. Three rules are crucial to follow in order to prevent decay.

1. Avoid sugar-containing foods and drinks especially between meals
2. Restrict sticky foods.
3. Eat coarse foods.

Coarse, non-sweetened foods like fresh fruits, vegetables, milk, eggs, groundnuts, cashewnuts, bread, boiled or roasted maize, rice, meat and fish, are good for the teeth. It is these dietary habits we should try to retain, but because of foreign influences it might not be easy.

Cleaning of the mouth

It is important that both children and adults learn the correct method of cleaning the mouth. Tooth brushing should be organised to ensure that no area of the mouth is neglected. The internal and the biting surfaces of both the upper and lower sets of teeth must be thoroughly cleaned. The teeth must be cleaned with toothbrush slanted at 45 degrees to the teeth so that toothbrush bristles can enter and clean between the teeth and the gum. The gums and the tongue should also be cleaned and the mouth rinsed with clean water to ensure that the debris is washed away.

TRADITIONAL CULTURAL AND RITUAL PRACTICES

Tooth mutilation

Include:

- Non therapeutic tooth extraction
- Breaking off tooth crowns
- Alteration of crown shape by filling or chipping

Basic reasons include initiation, identification and aesthetics e.g.

- Tribal identification
- Initiation rite
- Sign of manhood or courage
- To signify marriage status
- Therapeutic purposes etc

The "nylon teeth" or "false teeth" belief - parents take their children suffering from fever diarrhoea and vomiting to local "doctors" who advise the removal of the tooth germs. The reason given is that the symptoms are due to a new type of tooth (false tooth) which grows in children jaws and if not removed would cause death.

Mutilation of soft tissues

Tattooing of soft tissues e.g. lips and gum are occasionally seen especially in North Africa and the Middle East. This is said to be therapeutic or signifies marriage. Tattooing of the face is common in Africa as tribal marks or as a ritual for warding off the evil eye.

Others:

- Piercing of lips and the insertion of materials such as wood, ivory or metal.
- Uvulectomy
- Facial scarring
- Temporary piercing of oral and facial soft tissue for ceremonial purposes.

Other habits:

- Tobacco smoking
- Tobacco chewing
- Tobacco snuffing

Effects of tobacco habits

- Associated with oral cancers
- Bad breath
- Brown -black staining
- Abnormal tooth wear patterns (pipe smoking)
- Gum recession in chewers and sniffers
- Increased susceptibility to periodontal disease

Other smoking habits

- Marijuana
- Opium

ACTIVITY 1: LETS LOOK AT OUR TEETH

Aim

To make pupils realise the importance of healthy teeth, get familiar with types of teeth and the primary and permanent sets of teeth.

Instructions

- Ask why they think that healthy teeth are important
- Count how many teeth they have
- Explain that children have a set of teeth called primary/milk or deciduous teeth
- look at each other's mouth and compare the different types of teeth.

ACTIVITY 2: HOW DOES DENTAL DECAY DEVELOP

Aim

To make pupils understand the reasons why dental decay develops and recognise the disease in their mouths.

Instructions

- Ask who has got a tooth decay
- Let everybody look at a decayed tooth

- Factors responsible for tooth decay
- How bacteria in plaque turn sugar into acids which eat away the tooth
- How can you prevent tooth decay

ACTIVITY 3: HOW DOES GUM DISEASE DEVELOP

Aim

To make pupils understand the reasons why gum disease develops and to recognise the disease in their mouths.

Instructions

- Let everybody look at each others mouths
- Check the colour and appearance of the gums
- Can they identify reddish, swollen, glossy soft or even bleeding parts of the gum.
- If identified, how does it come about in terms of bacterial plaque.
- What factors favour gum disease formation
- How can gum disease be prevented

ACTIVITY 4: HOW DOES TOOTH MUTILATIONS HARM THE TEETH

Aim

To make the pupils realise the harmful effects on the teeth of some cultural customs so that they can consequently stop performing them.

Instructions:

- Begin with their experiences about the issue
- Have they heard of false teeth
- What are the consequences of their removal
- Stress that mutilations are unnecessary and explain the damage they case to the teeth.

ACTIVITY 5:HOW DO WE IDENTIFY DENTAL PLAQUE

Aim

To enable pupils recognise the plaque

Instructions

- Warning that plague is difficult to recognise
- Scrape plaque from the tooth using a small stick
- Demonstrate plaque using disclosed tablet.

ACTIVITY 6:HOW DO WE BRUSH OUR TEETH

Aim

To enable pupils learn the proper way of brushing their teeth

Instructions

- Pupils show how and with what they brush their teeth
- how many times a week do they brush
- use models to demonstrate how to brush

- frequency of brushing - once a day
- method of brushing - modified stillman
- Type of tooth brush - nice tooth brush
- use minimal amount of toothpaste
- sequence of brushing - pupil to brush systematically
- Starting posteriorly and moving progressively towards the anterior and then returning to the posterior region on the opposite side of the same arch.
- Length of brushing time - 5 min
- Point out any errors in technique & correct them.

ACTIVITY 7:HOW DO WE FLOSS OUR TEETH

Aim

To enable pupils learn how to use floss for cleaning their teeth.

Instruction

- Use mouth models for demonstration
- Demonstrate how to use floss using your own teeth
- Emphasise that floss can remove plague in areas where the toothbrush is inefficient
- Draw 18-inch length of dental floss
- Twist the floss 3 times around the middle fingers of both hands leaving a space of 3 inch between the hands
- Work the floss gently through the contact points to avoid damaging the gingiva margin of the papilla

- Once the floss is in the sulcus wrap it firmly against the tooth and move it towards the contact points.

Appendix 2 QUESTIONNAIRE

Name of Interviewer _____

Name of respondent _____ Study No _____

Sex: 1. Male _____ Age _____

2. Female _____

School(name) _____ Location(name) _____

Class _____ Date _____

Which of the following answers do you feel is the best. Please tick only ONE.

1. What is the colour of your teeth ?

1. Black
2. White
3. Brown
4. Others (specify)-----

2. How important are your teeth ?

1. Very important
2. Important
3. Not important
4. Not very important
5. Others (specify)-----

3. What are the uses of your teeth?

1. For eating
2. For laughing
3. Not very useful
4. I don't know
5. Others (specify)-----

4. Do you brush your teeth?
 1. Yes
 2. No

5. If answer to number 4 is yes, why?
 1. To keep them white
 2. To prevent diseases
 3. Because the teacher says so
 4. I don't know
 5. Others (specify)-----

6. If answer to number 4 is no, Why don't you brush your teeth?

7. How often do you brush your teeth?
 1. Once a day
 2. Twice a day
 3. Once in a while
 4. I don't brush
 5. Others (specify)-----

8. What do you use for brushing?
 1. Toothbrush
 2. Chewing stick
 3. Fingers
 4. Nothing
 5. Others (specify)-----

9. Which of the following do you apply on your brush when brushing your teeth?
 1. Sand
 2. Toothpaste
 3. Charcoal
 4. Nothing
 5. Others (specify)

10. Have you ever used dental floss for cleaning your teeth?
 1. Yes
 2. No
11. If yes to number 10, do you like it?
 1. Yes
 - 2.No

12. If no to number 10, why have you not used it?

13. Have you ever used toothpick for cleaning your teeth?

1. Yes
2. No

14. If yes to number 13, do you like it?

1. Yes
2. No

15. If no to number 13, why have you not used it?

16. Have you ever suffered some pain from your teeth?

1. Yes
2. No

17. Do your gums bleed easily when you brush?

1. Yes
2. No

18. What do you think causes tooth decay?

1. Bad water
2. Poor oral hygiene
3. Eating hard foods
4. Witchcraft
5. I don't know
6. Others (specify)

19. What causes gum disease?

1. Sweets
2. Bad water
3. Germs only
4. I don't know
5. Others (specify)

20. How can gum diseases be prevented?

1. Regular brushing
2. Rinsing the mouth with water
3. Not eating sugary foods
4. don't know
5. Others (specify)

21. Have you ever gone for a dental treatment?

1. Yes
2. No

22. If yes to number 21, what treatment did you get?

1. Extraction
2. Filling
3. Cleaning
4. Other (specify)

23. If answer to number 21 is yes, where did you go?

1. Hospital
2. Dispensary
3. Private clinic
4. Traditional healer
5. Others (specify)

24. If no to number 21, why have you not sought dental care?

1. Don't have dental problem
2. Fear dental treatment
3. It's not necessary
4. No money
5. Others (specify)

25. What do you most commonly take for breakfast ?

26. What do you most commonly take for lunch ?

27. What do you most commonly take for supper ?

28. Are there any foodstuffs you regularly consume between meals?

1. Yes
2. No

29. If answer to number 22 is yes, specify the foodstuffs

30. Can any of the following be harmful to your teeth when consumed?

ITEM	YES 1	NO 2	DON'T KNOW 3
Sugar			
Posho			
Sweets			
Porridge without sugar			
Biscuits			
Soda			
Cassava			
Milk			
Chocolate			

31. In relation to meals, when is it advisable to brush teeth?

1. Before meals
2. After meals
3. I don't know
4. Others (specify)

32. Which of the following do you think is good for the health of your teeth?

1. Smoking
2. Sweet foods
3. Alcohol
4. Frequent brushing
5. Non of these

33. Have you ever been taught how to care for your teeth?

1. Yes
2. No

34. Who has ever told you a bout how to prevent dental diseases?

1. My parents
2. My friends
3. My teachers
4. The health workers
5. No body
6. Others (specify)

35. Who do you see when you have a tooth problem?

1. Local traditional medicine man
2. Dental health personnel
3. Other medical personnel
4. I don't see anybody
5. Others (specify)

36. DO you wish to say anything else in connection with health? If yes what is it?

Appendix 3 PLAQUE INDEX ACCORDING TO GREENE AND VERMILLION

Score 0 - No plaque on the tooth surface

Score 1 - Plaque covering less than 1/3 of the cervical crown

Score 2 - Plaque covering more than 1/3 but less than 2/3 of the cervical crown

Score 3 - Plaque covering more than 2/3 of the tooth crown

Appendix 4 GINGIVAL INDEX

Gingival status measured according to Loe & Silness gingival index uses the gingival bleeding as criteria. Bleeding on probing is a reliable sign for detection of a deviation from health.

Score 0 - No bleeding on gentle probing

Score 1 - spotting on gentle probing

Score 2 - Frank bleeding on gentle probing

Appendix 5 EXAMINATION CARD

Name _____ Study No _____

Sex 1. Male _____ Age _____
 2. Female _____

School _____ Location _____

Class _____ Date _____

PLAQUE INDEX

- Score 0: No plaque
- Score 1: Plaque covering < 1/3
- Score 2: Plaque covering > 1/3 but < 2/3
- Score 3: Plaque covering > 2/3

GINGIVAL INDEX

- Score 0: No bleeding
- Score 1: Spotting
- Score 2: Frank bleeding

REFERRED FOR

- 1. Extraction
- 2. Conservation
- 3. Scaling
- 4. Orthodontics
- 5. Other (specify)

Appendix 6 CRITERA FOR DETERMINATION OF LEVEL OF KNOWLEDGE

1. Whether they brush their teeth or not
2. Reasons for brushing teeth
3. How often one brushes his teeth
4. What they use for brushing
5. Whether they have ever used dental floss
6. Whether they know the causes of tooth decay
7. Whether they know the causes of gum bleeding
8. How to prevent tooth decay and gum disease
9. Whether they have gone for dental treatment
10. Where to go when with dental problem
11. Knowledge of foods harmful to teeth
12. The person to see when with dental problem

Appendix 7 CONSENT TO PARTICIPATE IN THE STUDY

Name _____ Study No _____

Sex: 1. Male _____ Age _____
2. Female _____

School _____ Location _____

I understand that the purpose of this study is to find out the effect of other methods of cleaning the teeth in addition to tooth brushing. I am told my child will stand to benefit from these measures if he/she is encouraged to use it regularly. I have been explained that my child will receive free dental check up and emergency dental treatment from the dentist. All information will be confidentially used for the research purposes only.

I _____ (Parent/Guardian) therefore give consent for my son/daughter _____ to participate in the study. I however reserve the right to withdraw my child from the study if I so wish.

Signature _____

Date _____

Appendix 8 REFERRAL FORM

To: _____

Name _____ Study No _____

Sex: 1. Male _____ Age _____
2. Female _____

School _____ Location _____

This patient was examined in the course of a study and was found to be in need of the following treatment. Please do assist.

1. EXTRACTION
2. CONSERVATION
3. SCALING
4. ORTHODONTICS
5. OTHER (SPECIFY)

Referral authorised by: Dr. Isaac Okullo (Principal Investigator)

Date _____

Appendix 9 SEX DISTRIBUTION OF RESPONDENT BY STUDY GROUPS

Sex	SG1	SG2	SG3	Total
Male	34	38	34	106
Female	17	13	17	47
Total	51	51	51	153

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Appendix 10 CLASS DISTRIBUTION OF RESPONDENT BY STUDY GROUPS

Study Group	Class 5	Class 6	Class 7	Total
1	17	18	16	51
2	10	22	19	51
3	18	14	19	51
Total	45	54	54	153