

**AN EVALUATION OF THE SCHOOL ORAL HEALTH EDUCATION
PROGRAMME IN THAMAGA, BOTSWANA.**

BY:

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(BDS)**

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DECLARATION

I, Boikhutso Gladys Moreri declare that this dissertation “ An evaluation of the school oral health education programme in Thamaga, Botswana” is my own original work and has not been presented for any degree in another university.

Signed _____

Date _____

B.G.Moreri



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TO

My family, for their love and continued support.



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SUMMARY

The evaluation aimed to assess the effectiveness of the school oral health education (OHE) programme in Thamaga, a rural village about 40km west of the capital Gaborone. The Oral Health Division (Botswana) had introduced the programme in schools throughout the country in 1984. The school OHE programme in Thamaga was introduced less than five years previously but not all schools could be covered before the time of the study. The delivery of weekly dental services at the primary hospital in the area had been inconsistent.

The evaluation assessed the effectiveness of the programme in a cross-sectional study by comparing dental health knowledge, reported oral hygiene practices, DMFS scores and gingival bleeding index of randomly selected standard five schoolchildren, aged 10-16 years (n=135). Two schools in Thamaga were selected for the study, designated as programme (experimental) and non-programme (control) schools in this comparative study. The hypothesis proposed that children from the programme school will have better oral health (less dental caries and gingivitis), have better dental health knowledge and better oral hygiene practices than children from the non-programme school.

The effects of this school OHE programme were measured firstly by a clinical examination for dental caries using the WHO DMFS index and for gingivitis using a bleeding index derived from the WHO CPI. This was to compare the proportion of children with these dental diseases in the two schools. Secondly, a close-ended questionnaire was administered to the children to assess most importantly, their knowledge of dental diseases (dental caries and gum disease) and their reported OH practices.

The extent of correct dental health knowledge was minimal but about 88 percent of all the schoolchildren from both the programme and non-programme schools (n=135) reported their source of information as being the school. Generally, children from the non-programme school had higher average scores of correct responses on dental caries and gingivitis than those from the programme school. This difference in knowledge was not statistically significant ($p>0.05$). It was apparent from the results of the interview that the majority of the children have misinformation about disease-specific signs and symptoms, causes and prevention of dental disease, the use and benefits of fluorides and dental floss.

The majority of the children reported that they do self-examination of their teeth and gums daily and the commonly reported OH practices were the use of a toothbrush and toothpaste at least twice a day. However, these reported oral hygiene practices were not commensurate with the level of gingivitis

recorded. Out of all the study participants, only one child from the programme school reported using a chewing stick for cleaning teeth. The majority of the children were found to have poor periodontal health indicated by gingivitis. About 90 percent and 82 percent of the children from the programme and non-programme schools respectively had gingivitis. Only 10 percent (programme) and 18 percent (non-programme) of the children did not have any bleeding gingival sites (GBI=0). The poor oral hygiene found in children from the programme school might imply that the practical aspects of plaque control and oral hygiene were not intensive enough to motivate the children.

Most children were found to have minimal caries; mean DMFS scores of 0.14 (SD=0.49) and 0.12 (SD=0.45) for programme and non-programme schools respectively and 91 percent caries-free for each of the two schools. These differences were not statistically significant ($p>0.05$). The low prevalence of caries and the minimal difference between groups might be attributed to the following; the low prevalence of dental caries at baseline and the action of fluoride in drinking water.

The study indicates that the programme has had a minimal impact if any, in the programme school. The findings suggest a need to correct the prevailing basic misinformation about dental health and motivation of teachers and the dental team to be more involved in the programmes.

Keywords: Oral health education, prevention, programmes, schools, evaluation, effectiveness.

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CHAPTER 1 - INTRODUCTION

1.1 BACKGROUND- ORAL HEALTH EDUCATION

Dental caries and gingivitis are known to be the most prevalent dental/oral diseases worldwide. However, the trend of dental caries in developed countries is reported to be decreasing due to the use of fluorides, especially fluoridation of water supplies but also the increased use of fluoride toothpaste, tablets and fluoride rinsing programmes (1). In developing countries, the use of fluoride is minimal as evidenced by the sparse epidemiological information from African countries on the effect of fluoride on caries (2), except in areas where it occurs naturally and sometimes in high concentrations. In many countries, oral health education programmes have been widely accepted as a strategy for promoting oral health and preventing oral diseases (3, 4).

Health education programmes are planned opportunities for people to learn about health and to undertake voluntary behavioral change. Such programmes may include providing information, making health decisions and acquiring skills to enable behaviour change. This also involves promoting self-worth, self-empowerment of people to take action about their health (5).

Health education can take place at three levels; primary, secondary and tertiary. Primary health education is directed at healthy people and aims to prevent ill health arising. This is the level most commonly encountered in school health education programmes (5).

Health education can therefore be defined as the provision of health information to people in such a way that they can apply it in everyday life or as any combination of learning opportunities designed to facilitate voluntary adaptation of behaviour conducive to health (4). The objectives of oral health education are normally;

- To achieve and maintain oral cleanliness compatible with a functional, aesthetically acceptable natural dentition for all individuals throughout their lives (3).
- To maintain a healthy nutrition through diet counseling (5).
- To promote self care (5).
- To promote self- esteem and self-empowerment through OHE programmes (5).

Schools have traditionally provided excellent settings for oral health education programmes because they are permanent community structures and provide easy access for large groups of children (3).

1.2 BOTSWANA CONTEXT

Botswana is a developing country in Southern Africa (**Figure 1**) with a population of about 1,496,000 according to the 1996 population projections (6). Like other African countries, most of the population is in the younger age groups, 40.4 percent being under 15 years of age (6). This implies that planning and implementation of projects or programmes including oral health should be geared towards improving the health status of this group. The socio-economic status is very high when compared to other African countries, with the per capita income (GNP) of P13, 049 (about US \$2610) by 1997/98. The export earnings are mostly dependent on diamonds and beef.

The Oral Health Division under the Department of Primary Health Care has five oral health regions (seventeen dental clinics) (**Figure 2**) with about twenty dentists and sixty dental therapists in the public service to serve the whole population. This indicates a shortage of facilities and human resource. A public health dentist with supportive staff of a dentist (in some areas), dental therapists and dental surgery assistants head each oral health region. To compliment the provision of dental services, there are private and parastatal (mining and mission) dental clinics in the country with about 50 percent in Gaborone as indicated in **Table 1**.

Currently the Dentist: Population ratio is 1:33,000.

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Figure 1: Geographical location of Botswana in Southern Africa.



Table 1: Distribution of oral health workers (dentists and dental therapists) by oral health region.

OH region	Dentists		Dental Therapists
	Public Service	Private/Parastatal	
1. Southeast	13 (Gaborone)	17 (Gaborone)	16
2. Southwest	2	4	9
3. Central	1	6	15
4. Northeast	3	6	12
5. Northwest	2	1	7
TOTAL	21	34	59

1.2.1 The existing school oral health education programme

In 1978, the Government of Botswana (Ministry of Health) contracted a Norwegian Agency for Development (NORAD) consultancy to carry out a survey on dental health and dental health services in Botswana. The findings of the consultancy reported scarcity of dental services then, the high level of sugar consumption and poor oral hygiene performance in the areas surveyed. The consultancy further recommended development of a National Dental Health Plan, which would have an outline of a specific preventive programme (7). With this scenario, the National Dental Health Plan (1983-2000) was adopted in which the national oral health survey reported DMF (T) 0.8 for 15-19 year-olds in 1978 and 2.3 for 15-year-olds in 1983. The Oral Health Division therefore introduced the school and community oral health education programmes (SOHEP and COHEP) in 1984. The programmes were implemented as a recommendation of the NORAD consultancy. The main objective of the school oral health education (OHE) programme was to achieve self-care among school pupils aged 6-16 years identified as the priority group.

The school OHE programmes were first introduced in schools in areas where there were dental clinics. With the increase in the number of dental facilities and human resource, the programme extended gradually to cover primary schools in the country, carried out by dental

therapists under supervision by a public health dentist. The implementation of the school OHE programme was based on the PHC approach whose main components include most importantly, a focus on prevention and promotion, community participation and a multi-sectoral approach. Therefore, participation with distribution of responsibilities was sought from the schoolteachers and other health care workers as shown in appendix 2 (8). This was to increase coverage of the programmes. The Ministry of Health, Ministry of Education and Ministry of Local Government, Lands and Housing therefore endorsed the programmes. Unfortunately, the participation of other health care workers such as nurses and family welfare educators had some setbacks, which affected their cooperation in the OHE programmes. The major constraint being lack of remuneration for the “extra workload” of the OHE programmes especially for the few nurses who had been trained in dental emergency care and extraction. The Oral Health Division carried out the training for six weeks. To date, nurses and family welfare educators still do not participate in the OHE programmes as had been planned in the National Dental Health Plan (1983-2000).

The purpose of the programme was explained to the teachers in seminars and their cooperation sought.

In the study area, Thamaga (Figure 2), the programmes were introduced in 1995 but not all schools could be covered before the time of the study, the main constraints being shortage of resources (manpower and transport). The participation of family welfare educators and nurses in SOHEP and COHEP in the study area is non-existent.

The school OHE programme as outlined in the National Dental Health Plan (1983-2000) is divided into three components: education, prevention and treatment (8). The aims of these programme elements are outlined below.

A) Education component

The programme aims to provide group and/or individual information to schoolchildren and teachers respectively on topics like, dental caries with its causes especially related to diet, oral hygiene, periodontal diseases (causes and prevention) as summarized below (8, 9,10).

Dental caries

- a) Causes- sugary foods and drinks
- b) Prevention - reduce amount and frequent intake of sugar or sugar off between meals.
 - Eat sugar free snacks between meals
 - Use of fluoride toothpaste

Gum disease

- a) Causes- dental plaque (dirt)
- b) Signs and symptoms- bleeding gums, swollen gums, bad breath
- c) Prevention- daily thorough cleaning of teeth with a toothbrush or chewing stick.

To achieve this, the programme also needs to establish and maintain co-operation from teachers who teach and supervise schoolchildren. To this end, the oral health division has developed a manual entitled "Oral Health: A manual for teachers" based among others on the WHO manual (11). This serves as a guide for teachers to the oral health information to be taught in schools. The manual outlines general information on tooth anatomy, causes, signs and symptoms of dental disease, their treatment and prevention. It mentions the use and benefits of fluorides in drinking water and toothpaste. However, there is no mention of the use of dental floss for inter-dental cleaning and the use of fissure sealants (Revised Version unpublished).

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B) Prevention component

This involves demonstration of preventive measures such as tooth brushing and using a chewing stick that can be carried out by the children. Sometimes during the dental staff visit to the schools, the Oral Health Division provides toothbrushes and toothpaste to the children. These activities are to be followed up and supervised by the teachers.

C) Treatment component

Types of services.

After the clinical examination (screening) of groups of children, the necessary treatment is given for class I temporary fillings, scaling and polishing and extractions.

These school programmes are being delivered for standards 2, 4 and 6 only in Government primary schools.

Since the implementation of these programmes, there has not been any evaluation. The determination of the trends of dental caries in schoolchildren has not been done and most schoolchildren often present to the dental clinic with dental caries and gingivitis even from schools that have been exposed to the programmes. The absence of baseline data before the implementation of the OHE programme in the study area makes comparison impossible, hence the justification for this study. The only available baseline data is from the national oral health survey, which was carried out about 15 years ago, and the survey did not cover the present study area. The evaluation is important to assess the appropriateness of the programmes because these programmes are run at considerable expense in terms of manpower, resources and time.



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CHAPTER 2 - REVIEW OF THE LITERATURE

Bacterial plaque plays an important role as an aetiological factor in both dental caries and inflammatory periodontal disease (12). It has been established that the mechanical removal of plaque, especially regular tooth brushing with fluoride toothpaste can have a significant effect in the control of these oral diseases (13). Oral/dental health education programmes have been introduced in schools with the objective of dealing with these diseases.

Oral health education was traditionally based on look, listen and demonstrating knowledge, advising children to forego sweets, brush their teeth and see dentists every six months (14). This has been replaced by more comprehensive practical education methods. The latter are for example based on the social learning theory of visualization, active involvement and social support, which can involve discussing health topics in class (15).

This section will review literature on aspects of school-based oral health education programmes with special emphasis on their effect on knowledge and oral hygiene practices, oral hygiene and dental caries of the schoolchildren. The benefits that result from dental health education are variable and difficult to substantiate. Some studies have reported improved oral health of the participants and others have reported few if any positive results as will be discussed in the following sections.

2.1 KNOWLEDGE AND ORAL HYGIENE PRACTICES (BEHAVIOUR)

Many health education programmes are based on the provision of information to increase knowledge and produce significant changes in preventive health behaviour or attitudes. However, it has been realized that information and knowledge may not in themselves lead to recommended action if this conflicts with existing motives, attitudes and beliefs (13, 15). In addition to this, human behaviour to the acceptance and adoption of health recommended action can be explained by the Health Belief Model (16). This model affirms that readiness to take action and change behaviour is based on the individual's perception of the seriousness (severity) of the disease, susceptibility to the disease, benefits of treatment and the magnitude of barriers to the

health action (16).

Studies to assess the effect of oral health education programmes on knowledge have reported increase or improvement in the level of knowledge during the study period (3, 15,17-20) and change in behaviour (15, 19). The level of knowledge differed with respect to the amount, content and type of reinforcement that individuals received (15,17,19,), socio-economic status; higher for the middle class than working class (18), age; less knowledge in younger age groups (21) and by gender; more positive scores for girls than boys (15).

While these investigations varied with regard to age, groups surveyed and the types of knowledge assessed, the dental knowledge was found to be inadequate because there was a low level of knowledge of disease-specific prevention (dental caries and periodontal disease) and the use and benefits of fluorides (22).

2.2 ORAL HYGIENE

Some studies evaluating the effectiveness of the school health education programmes reported positive results but different outcomes with respect to plaque levels (3, 14,19). Some of these with significant differences by gender, with greater reduction in plaque levels in girls than in boys (14) and socio-economic status (18). The study periods monitored also varied a lot. The studies involved supervising tooth brushing at school. The varying impact of the programmes can be attributed to;

- Close supervision and intensity of tooth-brushing.
- Maturation of children. Studies with older children had better results.
- Duration of the intervention or follow up period
- Repetition and reinforcement. There is general agreement among studies that positive results can be achieved if teaching of plaque control is carried out on a multiple visit and closely supervised basis over the short-term (23).

In contrast, other studies reported no effect on the plaque level (13, 24).

2.3 DENTAL CARIES

Studies evaluating the effect of the dental health education programme on dental caries are limited. This is because any effects on the reduction of caries need to be assessed after a longer follow-up period of at least two years. Some studies have reported a decrease in the DMF (T) or DMF (S) scores of the experimental study population (13, 25,26) but this was attributed to the long-term use of additional preventive strategies such as fissure sealants and fluoride toothpaste or other fluoride supplements.

Generally studies assessing the effect on oral hygiene measured plaque scores. Variable results are reported as above and these were attributed also to the type of intervention and follow-up period. Although most of the studies reported improvements or decrease in plaque scores, these were observed over the short- term.

The most important information to be outlined in an oral health education programme therefore should include the following;

- Information on dental caries, its causes, signs and symptoms and disease-specific prevention, which should stress the use and benefits of fluoride, especially fluoride toothpaste.
- Causes, signs and symptoms and prevention of periodontal disease: mainly the role of plaque and tooth brushing and use of dental floss for prevention of periodontal disease.
- The importance of repetition and reinforcement and evaluation of the programmes.
- Positive teachers' and parental involvement because the behavior influencing dental health is largely modeled upon the example given by teachers, parents and carers (20). There is really a dearth of information reported on the role parents or schoolteachers have played in school OHE programmes. However, studies reported are clinical trials carried out within a set or limited period of time. In one study, parents were reported as sources of information for their children, but the children's knowledge level revealed some misinformation about dental disease (21). Studies on the role of teachers seem to have concentrated on their knowledge about dental diseases, skills, attitudes and beliefs about oral health. These have reported severe deficiencies especially in the teachers' knowledge (27).

The hypothesis tested in the present study was the premise that children from the programme

school had better oral health (less dental caries and gingivitis), had better knowledge about dental diseases and better oral hygiene practices than children from the non-programme school.

2.4 AIM

To assess the effectiveness of the oral health education programme in the programme school compared with the non-programme school

2.5 OBJECTIVES

- 1) To determine the proportion of schoolchildren with dental caries and gingivitis
- 2) To assess their knowledge about dental diseases
- 3) To determine their reported oral hygiene practices
- 4) To compare the above for programme and non-programme schools.



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CHAPTER 3 - METHODS AND MATERIALS

3.1 DEMOGRAPHY OF STUDY AREA

This study was carried out in Thamaga, some 40km west of the capital city Gaborone (**Figure 2**). Thamaga is a rural village with about 16,000 inhabitants according to the 1996 population projections (6) and seven primary schools. Almost all the children from the village go to these local schools and there might be a great deal of interaction in the community. Out of the seven schools in the village, two schools had not yet been exposed to the school OHE programme. Due to lack of a dental clinic, the village falls under the Gaborone (Southeast) oral health region and there are weekly visits to the primary hospital to provide dental services.

The study population (n=135) was the standard five schoolchildren in two schools in the village, designated programme and non-programme schools. Since the programme and non-programme schools are situated in the same geographical location and the children were of the same age group, the children were assumed to be matched for social class.

The programme school was taken to be one that had been exposed to the OHE programme carried out by dental therapists. This is reported to have been done by provision of oral health information on dental caries and gum disease in a health talk with demonstration of oral health activities, screening and treatment of pupils (where necessary). These schoolchildren had been exposed to the OHE programme the previous year when in standard four. The schoolchildren from the non-programme school had access to the dental services provided at the primary hospital in the area. These services are provided by dental therapists (sometimes with a dentist) and are mainly treatment in the form of extractions and relief of pain. During these visits, the children could be given some advice on oral health/hygiene.

The fluoride content of the drinking water in the study area is estimated to be 1.04 mg F/L.

3.2 STUDY DESIGN

In this cross-sectional study, children were randomly selected by picking every second name from the class registers in each school. Names were arranged in alphabetical order in the register.

Out of the 70 pupils selected from the programme school, one (1) didn't show up during the period of the examination and interview (n=69) due to illness, 66 pupils were examined and interviewed at the non-programme school. Expectation bias was reduced by conducting the study single blind, that is, the pupils had not been told about the actual date of their participation in the study. The schoolchildren were aged 10-16 years.

In the sample selection, there were no specific exclusion criteria; any standard five pupil was eligible for selection.

3.3 DATA COLLECTION

A pilot study had been done on ten schoolchildren in a different school who were not part of the study sample. This was to test the questionnaire's ease of understanding and recording and this led to the modification of the questions.

3.3.1 Clinical examination

3.3.1.1 Measurement of dental caries

One examiner (author) using a mirror and probe carried out the examinations during the study. The examinations were performed in a classroom under natural light at the respective schools assisted by a recorder.

The examination instruments were used once per child and not re-used. About 25 pupils were examined and interviewed per day. Caries was diagnosed using the DMF (S) index according to the WHO criteria (28). The probe was only used to confirm suspicious caries lesions. Any deciduous teeth present were not considered in the analysis.

The DMFS index was chosen over the DMFT because the former is more sensitive and can indicate minor changes in the occurrence of dental caries (29). In addition, the treatment component of the school OHE programme in Botswana involves class I fillings by dental therapists, therefore the DMFS index will give an indication of the extent of occlusal dental caries, treated or untreated especially in the programme school.

Although there were no fissure sealed teeth, the presence of any fissure sealant was not

considered in the DMFS index because the service (fissure sealing) is not offered either in the Government dental clinics or as part of the school programmes. → in Botswana.

The DMFS index scores used are outlined here,

- 0 Sound
- 1 Decayed
- 2 Filled, with decay
- 3 Filled, no decay
- 4 Missing, as a result of caries
- 5 Missing, any other reason
- 8 Unerupted
- T Trauma (when a surface is missing as a result of trauma and there is no evidence of caries)

3.3.1.2 Measurement of gingivitis

The gingival health was assessed using a gingival bleeding index (GBI) derived from the CPI (WHO) and scored "0" or "1" if bleeding absent or present on gentle probing of the gingival margin respectively. A WHO CPI probe with a 0.5mm ball-tip and a black band between 3.5 and 5.5mm was used. Gingival bleeding was assessed on the labial/buccal and palatal/lingual surfaces of six index teeth, 16, 11, 26, 36, 31 and 46, starting on the mesial to distal end of each buccal surface and followed by the lingual surface on each index tooth. For any missing index tooth, an adjacent tooth was examined for the recording.

The examiner communicated scores verbally to the recorder, but no explanation of the meaning of the scores was offered to the pupils.

The index teeth examined were,

16	11	26
46	31	36

0 = No bleeding on gentle probing, 1 = bleeding on probing

The plaque index was not used because of fear of biased clinical results if participants could clean

teeth just before the examination.

The children from both schools found to be in need of treatment were referred to the dental clinic. The treatment needed by most children was scaling, extractions and few restorations of decayed teeth.

3.3.2 Questionnaire

An assisting dental health worker administered a close-ended structured questionnaire translated into the local language to all the children. This was necessary because some of the children had difficulty with reading and writing. The questionnaire was divided into 4 subsections of oral hygiene practices (reported), dental health knowledge, dental visits and source of oral health information. Most of the responses except the “other category” were in a multiple-choice format and the interviewer would tick whichever response the pupil gave. The questionnaire also had sections with open-ended questions. The children were interviewed after the oral examination.

3.3.3 Recording and data analysis

The data for each participant was recorded on the WHO assessment form (Appendix 3) which also had demographic information such as name, sex and age of the pupil and the questionnaire (Appendix 4).

Data for each day was checked for recording omissions or discrepancies and any such errors were rectified the following day.

Data collected were processed and statistically analyzed on a computer using the Epi info programme (30). The tests for statistical analysis included the chi-squared test with associated p-value. The level of statistical significance chosen was $p < 0.05$ to reject the null hypothesis.

3.3.4 Examiner variability

Duplicate examinations were performed on about 20 percent of all children ($n=26$) to assess intra-examiner variability for both caries and gingival bleeding.

This sub-sample was selected by picking every 5th child examined. For the recording of gingival

bleeding, the pupil was asked to rinse the mouth before the repeat examination.

Cohen's kappa values were calculated for the duplicate measurements for scores on dental caries and gingival bleeding (28). For gingival bleeding only scores for the buccal surface of each tooth were used to calculate the kappa statistic (28). The values were 0.99 for dental caries and 0.98 for gingival bleeding. These values show that there was good agreement and high reproducibility and hence reliability of the clinical examination results.

The examiner had previously been pre-calibrated on mounted teeth for DMFT and on clinical examination of schoolchildren for CPI. The inter-examiner variability was 85 percent agreement and kappa value of 0.98 respectively.



CHAPTER 4 - RESULTS

A total of 135 children were examined and interviewed; 69 in the programme (experimental) school and 66 in the non-programme (control) school. The gender distribution was 37 males and 32 females in the programme school, 29 males and 37 females in the non-programme school (**Table 2**). All the children were aged 10-16 years with a mean age of 12 years.

Table 2: Gender distribution of study sample

School	Male	Female	Total
Programme	37	32	69
Non-programme	29	37	66
Total	66	69	135

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4.1 QUESTIONNAIRE

4.1.1 Knowledge

4.1.1.1 Dental caries

Table 3a shows the number and percent of respondents by school for each of the common responses related to dental caries. The majority of children, 59 percent (programme) and 77 percent (non-programme) thought that the most important sign/symptom of dental caries was a painful tooth. Very few pupils, 6 percent (programme) and 3.0 percent (non-programme) knew that fluoride in toothpaste prevents tooth decay. No statistically significant differences were found between groups ($p > 0.05$) for all items measured.

The open-ended question about “foods not good for teeth” (Q35) yielded variable and minimal

positive responses from both the programme and non-programme schoolchildren.

Both schoolchildren demonstrated a limited ability to differentiate among foods that could potentially affect dental health by giving correct and incorrect food items. Examples of these food items are shown in **Table 3b**. The difference in the ability to give the correct food item between groups was found to be statistically significant ($p=0.017, 0.038$) for the first and fourth food item listed.

4.1.1.2 Periodontal (gum) disease

Table 4 shows the number and percent of respondents by school for each of the common responses related to gum disease. The most frequently given response on the signs and symptoms of gum disease was painful gums. Only 4 percent of the children from the non-programme school answered correctly the question on dental plaque, but the majority of the children reported correctly that thorough cleaning of teeth could prevent gum disease. None of the children from both groups considered using dental floss the best way to clean between teeth. The most important reason for cleaning teeth was reported as to prevent tooth decay by 50 percent and 68 percent of children from the programme and non-programme schools respectively.

Generally, pupils from the non-programme school had higher average scores of correct responses on both dental caries and periodontal (gum) disease than the programme school, but the differences were not statistically significant ($p > 0.05$) for all items measured.

The open-ended questions on “what do you know about dental caries and what do you know about gum disease” that is Q43 and Q44 respectively yielded variable and minimal positive responses. Most responses given on dental caries were on causes of dental caries as related to sugar. Responses on gum disease focused more on the signs of disease such as bleeding and swollen gums and on prevention by brushing teeth three times daily. Other children answered, “don’t know” for both questions (analysis of data not shown).

Table 3a: Knowledge of dental caries: common responses: Number and percent by school

Questions/answers	Programme (N=69)		Non-programme (N=66)	
17. How would you know that a tooth is decayed or rotten? **				
	n	%	n	%
- Has a hole*	8	12	14	21
- Looks black*	17	25	20	30
- It is broken*	6	9	3	5
- It is painful	41	59	51	77
18. What causes tooth decay?				
- Eating sugary foods, sweets and sweet drinks*	49	71	50	76
- Not cleaning teeth	21	30	17	26
19. What does fluoride in toothpaste do to your teeth?				
- Makes teeth whiter	11	16	13	20
- Prevents tooth decay*	4	6	2	3
- Causes tooth decay	0	0	7	11
- Don't know	48	70	22	33

* Correct responses ** Multiple responses allowed p>0.05 for all items measured.

Table 3b: Foods not good for teeth reported by the children

Correct food items stated	Incorrect food items stated
Sugar, sweets, sugar cane, biscuits, cakes	Meat, beans, salt, porridge, carrots

Table 4: Knowledge of gum disease: common responses: Number and percent by school

Questions/Answers	Programme (N=69)		Non-programme (N=66)	
16. The best way to clean between teeth is to				
	n	%	n	%
- Use a toothbrush	35	51	28	42
- Use dental floss*	0	0	0	0
- Use wood-points	13	19	13	20
- Don't know	21	30	25	38
20. How can you tell if you have gum disease? **				
- Bleeding gums*	6	9	6	9
- Swollen gums*	18	26	26	39
- Painful gums	31	45	35	53
- Black gums	5	7	3	5
21. What causes gum disease?				
- Dirt in the mouth*	29	42	32	48
- Sugar	8	12	12	18
- Don't know	28	41	11	17
22. What is dental plaque? **				
- Dirt on surface of teeth*	0	0	3	5
- Germs on teeth*	0	0	0	0
- Dental disease	0	0	2	3
- Don't know	69	100	58	88
23. How can you prevent gum disease?				
- Visit a dentist/dental clinic regularly	9	13	7	11
- Avoid sweet foods	6	9	5	8
- Thorough cleaning of teeth*	34	49	44	67
24. What is the most important reason for cleaning teeth?				
- To prevent bad breath	14	20	8	12
- To prevent gum disease*	6	9	4	6
- To prevent tooth decay	35	51	45	68

* Correct response

** Multiple responses allowed

p>0.05 for all items measured.

4.1.2 Reported oral hygiene practices

The two groups were similar in their reported oral hygiene practices as shown in **Table 5**. Almost all the children reported brushing their teeth three times daily, having their own toothbrush and using toothpaste. The toothpaste reported by the children were Colgate, Aqua fresh and Close-up. However, 39 percent and 33 percent of children from the programme and non-programme schools respectively did not know the brand of the toothpaste they were using. The reasons given for choosing the type of toothpaste were variable and included family choice, taste and effectiveness of the toothpaste in cleaning teeth. None of the children reported using dental floss for inter-dental cleaning. It appears that most children believed that using a toothbrush to clean teeth could also effectively clean the inter-dental areas as well. This accounted for 74 percent and 77 percent of children from the programme and non-programme schools respectively. A statistically significant difference ($p < 0.05$) between the programme and non-programme schools was found for some of the reported oral hygiene practices as shown in **Table 5**.

Only one child from the programme school reported using a chewing stick for cleaning teeth but none from the non-programme school.

Table 5: Commonly reported OH practices: Number and percent responses by item and school

Reported OH practices	Programme (N=69)		Non-programme (N=66)		p- value
	n	%	n	%	
Check teeth and gums	64	93	53	80	0.03
Check teeth and gums daily	47	68	47	71	0.026
Use toothbrush to clean teeth	65	94	64	97	$p > 0.05$
Use toothpaste	64	93	60	91	0.042
Brush teeth 3x daily	34	49	44	67	$p > 0.05$
Use chewing stick	1	1.4	0	0	$p > 0.05$
Do clean between teeth	61	88	57	86	$p > 0.05$
- By using a toothbrush	51	74	51	77	
- By using wood-points	9	13	5	8	
- By using dental floss	0	0	0	0	

4.1.3 Dental visits

As can be seen in **Table 6**, the majority of the schoolchildren reported that they had never visited a health facility with a dental problem. This accounted for 78 percent and 79 percent from the programme and non-programme schools respectively. For those who had visited a health facility, the most reported services utilized were the dental clinic or general clinic. None reported visiting a private dentist, probably because there isn't any in the area. The commonest presented problem was a painful (decayed) tooth or rotten (not painful) tooth for which treatment in the form of tooth extraction was done, 19 percent programme and 17 percent non-programme schools.

Table 6: Children's dental visits to health facility: Number and percent by school

	Programme (N=69)		Non-programme (N=66)		p- value
	n	%	n	%	
Never visited health facility with a dental problem	54	78	52	79	p>0.05
Have visited health facility with a dental problem	15	22	14	21	p>0.05
Reason for visiting health facility					
= Painful tooth	12	17	8	12	p>0.05
= Rotten tooth (not painful)	1	1.4	1	2	
Treatment done for above problem					
= Extraction	13	19	11	17	p>0.05

4.1.4 Source of oral health information

Most children from the programme school (90 percent) and 62 percent from the non-programme school reported the school as their primary source of OH information. The percentage of schoolchildren who reported having been taught about oral health is shown in **Tables 7a** and **7b**. Some children reported both school and home as their source of information.

Table 7a: Teaching of OHE: Number and percent by school.

	Programme (N=69)		Non-programme (N=66)	
	n	%	n	%
Have been taught OH information at school				
- Yes	60	87	43	65
- No	9	13	23	35

Table 7b: Source of oral health information: Number and percent by school.

Source of information	Programme school (N=69)		Non-programme (N=66)	
	n	%	n	%
School	62	90	41	62
Home	6	9	17	26
Dentist/dental clinic	3	4	4	6
No source	1	1.4	7	11

4.2 ORAL EXAMINATION

4.2.1 Dental caries

From **Table 8**, it can be seen that the children had minimal caries with 91 percent caries - free for each of the two groups. The mean DMFS scores were also very low, being 0.14 and 0.12 for the programme and non-programme schools respectively. There were no statistically significant differences in the mean DMFS scores between the two groups ($p>0.05$).

In those children with decayed first molars, only one surface (occlusal) was decayed (**Table 9**).

Table 8: mean Decayed, Missing and Filled surfaces by school.

	Programme Mean score (SD)	Non-programme Mean score (SD)
D	0.10 (0.35)	0.14 (0.46)
M	0.04 (0.21)	0
F	0	0
DMFS	0.14 (0.49)	0.12 (0.45)
% Caries Free	91	91
D (1 st molars)	0.087 (0.33)	0.076 (0.32)

Table 9: Frequency distribution of decayed component of 1st molars:

Number and percent by school

Decayed Surface	Programme (N=69)		Non-programme (N=66)	
	n	%	n	%
0	64	93	62	94
1	5	7	4	6
TOTAL	69	100	66	100

4.2.2 Gingival condition

The results show that most of the children from both the programme and non-programme schools had gingivitis. Only 10 percent (programme) and 18 percent (non-programme) of children did not have any gingivitis (GBI=0) as shown in **Table 10a**.

The relationship between presence of gingivitis and gender is shown in **Table 10b**.

Table 10a: Presence of gingival bleeding sites: Number and percent by school

	Programme (N=69)		Non-programme (N=66)		p- value
	n	%	n	%	
Bleeding absent	7	10	12	18	p>0.05
Bleeding present	62	90	54	82	p>0.05

Table 10b: Presence of Gingival bleeding sites: Number and percent by school and gender

	Programme		Non-programme		p- value
	Male (n=37)	Female (n=32)	Male (n=29)	Female (n=37)	
	n (%)	n (%)	n (%)	n (%)	
Bleeding absent					
GBI=0	4 (11)	3 (9)	2 (7)	10 (27)	p>0.05
Bleeding present	33 (89)	29 (91)	27 (93)	27 (73)	p>0.05



CHAPTER 5 - DISCUSSION

This study provided an opportunity to assess the effectiveness of the school OHE programme in Botswana, which has been running for more than ten years without any evaluation. Of primary interest was whether the children's oral hygiene, oral hygiene practices and knowledge were consistent with the school OHE programme they had been exposed to in the programme school and the findings negate this statement.

Because the Oral Health Division provides no planned services with fissure sealants, knowledge on the use and benefits of sealants was not assessed in this study.

5.1 DENTAL CARIES

The study has shown that there is a very low prevalence of dental caries in this school population. The low mean DMFS scores of caries in this rural school population are in accordance with data recorded from previous studies in rural areas in some African countries of children in the same age range (2, 31-33). The DMFT scores in these studies were found to be 0.49, 0.13 and 0.2 in 12-year-olds in rural Zimbabwe, South Africa and Ghana respectively, as compared to the urban scores of 0.57, 0.3 and 0.7 respectively. This low caries prevalence has sometimes been attributed to the low consumption of refined carbohydrates in the rural area (33).

In this study, children from the programme school have been exposed to the OHE programme once, carried out by dental therapists. This OHE involved provision of OH information and where necessary dental treatment mainly being tooth extractions of schoolchildren carried out by dental therapists. With the single exposure to the OHE programme, it is difficult to conclude that the programme has had any effect on the reduction of caries.

The non-programme schoolchildren had the opportunity of visiting the local hospital where weekly dental services were provided. During their visits, the non-programme schoolchildren could be given treatment in the form of extractions and be given advice on oral hygiene/health. This implies that both groups might have had the same exposure and hence the similarities in the DMFS scores for the two groups.

The other reasons for this low prevalence of dental caries and minimal difference between groups could be that, firstly the children had (though not recorded) low caries prevalence at the beginning

of the school OH programme and any effect from the programme would be minimal if not negligible. Secondly, the low DMFS scores for both schools might also be attributed to the effect of fluoride in the drinking water (1.04-mg F/L), hence no difference between the two school populations. Although the plaque scores were not recorded in this study, it could be extrapolated from the high prevalence of gingivitis that there was plaque. This being the assumption, one other currently adopted assertion is that plaque acts as a fluoride reservoir (34). This provides a slow release mechanism for the fluoride, which prevents tooth decay. The source of fluoride from toothpaste in the prevention of dental caries cannot be substantiated in this study because the poor oral hygiene (high prevalence of gingivitis) for most of the children is not consistent with the commonly reported oral hygiene practices.

Although not recorded, the low sugar consumption in this rural school community might also explain the low prevalence of dental caries and little difference between the two groups.

This study has therefore demonstrated that there was no specific caries benefit from the school OHE programme for the programme school.

Some intervention studies aiming to reduce the caries levels also included additional preventive strategies such as fissure sealants and fluoride supplements or toothpaste (25, 26, 35). These studies did show a reduction in caries but it was not possible to separate the effects of the educational component from those of the clinical preventive components.



5.2 GINGIVITIS

The results show that most of the children from both the programme and non-programme schools had gingivitis with very little differences between the two school populations. The reasons might be that; firstly, the children from the programme school did not put into practice what they had learnt at school because they were not supported at home. Positive parental involvement has been reported as an important factor for the motivation of children (20, 36). This seems to be lacking in this study since very few children reported home as their main source of oral health information. This limited source of information reflects a disappointing reality of minimal parental awareness of and involvement in oral health matters. This finding contrasts with studies where parents were reported as the major source of information, although some misinformation about dental disease was still noted (21).

Secondly, the brushing instructions and demonstrations during the OHE programme were not detailed enough or suited to the particular school community.

Thirdly, since there was no reinforcement of the OHE programme in the programme school, the children might have forgotten the OH messages they were given because the younger the children, the more pronounced the loss of effect over time. Another important factor to note is that children are taught many subjects in school, which they should remember, so any casual delivery of oral health information would obviously not be absorbed.

Most children's reported oral hygiene practices were the use of toothbrush and toothpaste at least twice daily, but these were not commensurate with the level of gingivitis recorded. This may be so because firstly, the frequency of brushing does not necessarily guarantee effective removal of plaque. On the other hand, this may be a phenomenon of response acquiescence. This is a response generally associated with the need for being perceived as behaving in a socially desirable manner (37).

It is disappointing that although the OHE programme seems to teach the children about the use and benefits of the chewing stick, only one child reported using it. It would have been more logical to have many of this rural school population using a chewing stick since it is inexpensive (cheap), easily available and also effective in cleaning and removing plaque. A few studies have reported on the cleaning effectiveness of chewing sticks, although the findings are varied and somewhat contradictory. Studies among schoolchildren in Ethiopia and Tanzania reported the chewing stick as being effective as a toothbrush in removing dental plaque (38, 39). One other study reported the equal magnitude of effectiveness although the frequency of use of the chewing stick (5 times a day) was an important determinant of the effectiveness (40). However, other studies have reported inferior effects of the chewing stick when compared to the toothbrush (41, 42). Nonetheless, despite these somewhat contradictory conclusions, the use of the chewing stick should be recommended especially in rural communities where the possession of a toothbrush seems to be a luxury.

The other reason for the minimal difference between groups may be that the teachers and/or dental therapists did not impart the required skills needed for effective tooth brushing for plaque control. This may in turn be due to lack of competence or skill in giving health education or simply non-compliance of the teachers and/or dental therapists. Teachers' knowledge and skill can determine the quality of oral health education they give. Some studies have reported severe deficiencies in the teachers' oral health knowledge, skills and attitudes about oral health (37, 43, 44). However, these

deficiencies should not preclude teachers from being used as oral health educators but rather deficiencies may be an indication that adequate and/or formal training of teachers is important for them to teach and supervise children in OHE programmes.

Non-compliance by the teachers if any might be due to;

- Lack of collaboration of oral health workers with school teachers in the planning and implementation of the school OHE programmes therefore the teachers would not have a sense of ownership in the supervision of schoolchildren and OHE activities.
- Lack of regular contact between oral health workers and schoolteachers.

However, the findings from this study indicate that as most children reported the school as their primary source of oral health information, teachers may still be the most reliable and promising source of information if they are well equipped.

5.3 KNOWLEDGE

An analysis of the content of the OHE messages (see existing school OHE programmes) does not seem to give detailed and sufficient information on dental disease. This is indicated by the finding that 87 percent and 65 percent of children from the programme and non-programme schools respectively reported being taught but both groups show poor knowledge.

Some general observations could be made about the children's knowledge about dental disease.

These are,

- It seems most children equate the presence of dental disease with the presence of pain.
- Nearly all the children related the reason for tooth brushing to the prevention of tooth decay and not gum disease.
- Although the majority of the children realized that eating sugary foods would lead to tooth decay, they also noted that tooth decay was caused by not cleaning teeth. Some children from both the programme and non-programme schools still gave sugar-free food items as "foods not good for teeth". Assuming that the children associated these sugar-free foods with some dental disease or condition other than dental caries, for example dental fluorosis, there has not been any study reporting on the prevalence or public perceptions of dental fluorosis in the present study area. A survey carried out in 1978 (7) and a subsequent study in 1987 (unpublished report) reported a low prevalence of dental fluorosis in the areas

surveyed but highest in the Northwest oral health region (**Figure 2**) and accounting for 83 percent of the 5-9 year-olds in the study sample.

Knowledge about the use and benefits of dental floss and fluorides (in toothpaste) was poor in both school populations. There appears to be a contradiction between the poor knowledge of the use of dental floss and the reported use of wood-points for inter-dental cleaning by both groups. This highlights the possible bias in reported practices.

The poor knowledge might be attributed to the inadequate information provided or noncompliance of teachers and/or dental therapists.

Similar observations regarding the effect of the school OHE programme and the prevailing misinformation on causes and prevention of dental disease have been reported in other studies (22).

In contrast, other studies evaluating the effect of the school OHE programme reported increment in knowledge from baseline data (3,15, 17-20). However, the level of knowledge differed with respect to amount, content and type of reinforcement that the individual received (15,17,19).

The majority of the children in the present study could not answer correctly the question on dental plaque. The explanation for this could be that first, the children could not understand the question because "dental plaque" was not translated into the local language (no appropriate vernacular translation for dental plaque). Secondly, it could be that the school OHE programme does not emphasize the role of plaque in causation of disease.

One other reason why the non-programme school performed well in the study especially with regard to knowledge might be due to contamination because the study participants reside within the same geographical area and there is likely to be some sort of interaction especially with schoolchildren.

Analysis of the sources of information revealed that the school represented the children's primary source of information about oral health for both the programme and non-programme schools. This source could be through either the schoolteacher or a visiting dental health worker giving information especially in the programme school as part of the school OHE programme. This implies that both groups (programme and non-programme) have had access to education. This may be so because schoolteachers also play a role in teaching children about oral

hygiene/health guided by the oral health manual for teachers mentioned earlier in the text. However, the fact that not all the children on the programme report having had oral health education raises a question of compliance of teachers and/or dental therapists as OHE at the school was one component of the programme. Similarly, the fact that many non-programme schoolchildren report having received oral health education and the school as their source implies that OHE may be part of the school curriculum. Both programme and non-programme schoolchildren may therefore have been exposed to an oral health education programme, which may explain the similarities between the two groups.

Evidence from a systematic review of several studies on the effectiveness of the school-based OHE programmes reported variable conclusions (13). These conclusions were dependent on study design, the outcomes measured and follow-up period. The following conclusions were drawn from this systematic review;

- OHE aimed at improving oral hygiene has not been shown to be effective in the long term and there is a tendency of a relapse after a period of time.
- Oral health promotion that brings about the use of fluoride-containing agents is successful for reducing dental caries but the effects are evident over time.
- Oral health promotion is generally effective in increasing an individual's knowledge but whether this knowledge would translate into the recommended behaviour remains questionable.

A contributory factor to the variable conclusions regarding the effectiveness of the school-based OHE programmes is the poor quality of studies pertaining to oral health education such as the different outcome measures and failure to use randomized controlled trial (RCT) study designs or some design closer to RCT (35).

As stated earlier in the text, many OHE programmes are based on provision of information to increase knowledge and produce significant changes in preventive health behaviour. However, the Health Belief Model affirms that three conditions should be met for people to change their behaviour (45). Firstly, individuals may change if they feel they are susceptible to the disease, secondly, they perceive the disease is severe enough to interfere with their lives and thirdly, if they feel that the benefits of the preventive behaviour outweigh the costs of adopting to behaviour.

Although the children's perceptions and attitudes or beliefs on dental disease were not directly

measured in this study, these could be inferred from some of the responses on reported OH practices and dental visits. Most of the children reported that they clean their teeth daily and that the most important reason for cleaning teeth was to prevent dental caries. An inference can be made from these responses that the children believe they are susceptible to dental disease. On the other hand, they do not perceive the disease to be severe enough to interfere with their lives because awareness of the need for treatment and use of oral health care services in this present study is limited and seems to be strongly related to pain experiences.

It can be extrapolated from the pattern of treatment in the form of extractions as experienced by most children that there may not be any perceived benefits in adopting the preventive behaviour or being in the programme.

One other important factor to note from the children's dental visits is that although the school OHE programme should be a preventive programme, children are only exposed to extractions. If nothing is being done to change this behaviour (visits when in pain) and norms (extractions as a form of treatment), it is unlikely that the children will change their practices.

The study participants from each school constituted more than 50 percent of the total standard-five school population, hence the composition of the sample by age and gender provides motivation for the generalization of the data to the school population. However, the main limitations to the study are, firstly the exclusion of the teachers from the study who are most valuable in the continuation and sustenance of the school OHE programme since they have to supervise the children. Secondly, the lack of pre-programme information on the variables to be measured in the programmes. This will impair the drawing of definite conclusions.

The results of this evaluation contradict the hypothesis that the children from the programme school will have better oral health, better knowledge and better oral hygiene practices than the non-programme school. This is supported by the finding that, except for some of the reported oral hygiene practices, the association between the measured variables was not found to be statistically significant. Although the differences are minimal for these outcome measures, children from the non-programme had higher average positive scores of knowledge and less gingivitis.

CHAPTER 6 - CONCLUSION AND RECOMMENDATIONS

The research question had been set to establish whether the school OHE programmes have been effective in improving the oral hygiene, oral hygiene practices and increasing knowledge of children in the programme school. The results of this evaluation show that the school OHE programme has had minimal impact on the outcomes measured in the programme school. However, the results also indicate that both the programme and non-programme schools had been exposed to an OHE programme, apparently from different sources. This may account for the fact that there were minimal differences.

The minimal impact of the school OHE programmes evaluated in the present study is disappointing for two reasons. Firstly, many other schools have gone through an OHE programme run by the same oral health region (Southeast) and if the children from these schools had the same exposure as the schoolchildren in this study, then one wonders how much they might have gained from the programme. Secondly, these OHE programmes which have been running for many years in schools throughout the country at considerable expense in terms of manpower, resources and time appear to be ineffective.

The knowledge level of children from both schools was poor. This was indicated by the misinformation about the specific causes and methods of prevention appropriate for dental caries and gingivitis. This is also reflected by the high proportion of children in the programme school with gingivitis and yet they had also reported cleaning their teeth at least twice a day with a toothbrush and toothpaste.

The results of this evaluation therefore raise questions about the content of oral health education in schools in Botswana in general and in the Gaborone (South-east) oral health region in particular.

Among these questions are;

- What information is actually given to the children about disease-specific causes, signs and symptoms and prevention of dental disease?
- Is the information consistent with the latest scientific evidence?
- Who is responsible for preparing and/or teaching such information to the children in this setting, is it the dental health worker or the schoolteacher?
- What steps are taken to ensure that correct information has been delivered and utilized?

From this evaluation, the results therefore support that children who had not received OHE carried out by dental therapists had better knowledge about oral diseases, had better oral health and better oral hygiene practices than the children who had participated in the school OHE programme although there are minimal differences between the two groups. The results on the prevalence of dental caries are difficult to substantiate. However, statistically significant differences were found with regard to some of the reported oral hygiene practices.

The findings suggest a need to correct the prevailing basic misinformation about dental health and more emphasis on practical aspects of oral hygiene including the use of dental floss.

Based on the results of the study, the following recommendations are made for consideration in future planning of the programme.

- 1) There should be collaboration of all stakeholders such as teachers, health workers and parents (to some extent) in the planning, implementation and evaluation of the school OHE programmes.
- 2) Oral Health Services need to determine the oral health information in the school OHE programmes.
- 3) The oral health manual for schoolteachers should be evaluated.
- 4) Information on causes, signs and symptoms and prevention of caries and gingivitis should be clearly differentiated. The role of plaque in dental disease should be emphasized.

This information should be presented to teachers and dental health workers particularly those involved in the school OHE programmes.

For the prevention of dental caries, efforts to control the over-consumption of sugar although admirable may be unrealistic because of the over-advertised sugar-containing edibles. So the old adage of advising children to forego sweets and no sugar between meals may be outdated and not practical, although it is still worthwhile to teach children about healthy nutrition.

- 5) Practical aspects of oral hygiene should be emphasized as part of the OHE programme.

These should include tooth-brushing sessions at school with provision of toothbrushes and toothpaste initially. This can be reinforced by lessons on caries and gingivitis.

Teachers should also be informed about the implementation of the school-based programmes.

- 6) Positive parental involvement or support should be sought through the existing community oral health education programmes (COHEP). This is important because the attitudes and behaviour of the parents can be the reinforcing factors which could influence the child's behaviour.
- 7) Consistent outcome effects of the programme should be carried out in small scale to assess the effectiveness of the programme with regular feedback to stakeholders.
- 8) The results of this study should be communicated back to those involved in the programme.



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Distribution of roles and Responsibilities in the
Implementation of the National Dental Health Plan

<u>Who</u>	<u>What</u>	<u>When</u>
The individual) The Parents) The Household)	Performs a recommended oral hygiene practice. Adheres to a low caries diet. Consults the family welfare educator when in need of assistance	Daily
The ante-natal clinic and mother and child welfare clinic staff	Informs and motivates expectant and delivering mothers of the recommended oral hygiene practice and low caries diet. Inspects the performance of mothers and refers them for additional assistance to the family welfare educator or to the nearest health post or clinic and the nurse for necessary tooth extractions and/or scaling of teeth when calculus prevents performance of the recommended oral hygiene practice or the effectiveness of it.	Before and after deliveries
The family welfare educator	Provides information and motivation for the recommended oral hygiene practice and the low caries diet to the households. Particular emphasis and priority shall be given to households having children. Inspects the effectiveness of the performance of of the households. Provides additional information and motivation as required. Gives individual demonstration and instruction when found necessary. Refers household members to the nurse at the nearest health post or clinic for required extraction and/or scaling of teeth when calculus prevents performance of the recommended oral hygiene practice or the effectiveness of it.	During general health educational activities and household visits, preferably 2-3 times a year or as often as need and capacity permit.

School code/Record Number.

Name of pupil _____

--	--	--

Sex: M = 1, F = 2

--

Age (years)

--	--

Gingival bleeding index (GBI)

16		11		26	
Buccal	Palatal	Buccal	Palatal	Buccal	Palatal
46		31		36	
Buccal	Lingual	Buccal	Lingual	Buccal	Lingual

0 = No bleeding on gentle probing, 1 = bleeding on probing

DMFS

MAXILLA							MANDIBLE							
T	S						T	S						
O	T						O	T						
O	A						O	A						
T	T						T	T						
H	U						H	U						
	S	O	M	B	D	L	S	O	M	B	D	L		
17							37							
16							36							
15							35							
14							34							
13							33							
12							32							
11							31							
21							41							
22							42							
23							43							
24							44							
25							45							
26							46							
27							47							

Section A: Oral hygiene practices. Please tick the correct answer code in the boxes.

1) Do you ever check your teeth and gums?

Yes	1
No	2

If answer to Q1 is No, go to Q3

2) How often do you check your teeth and gums?

Daily	1
Weekly	2
When I have a problem	3
Other (specify)	4

3) In your opinion, would you say your gums are healthy?

Yes	1
No	2
Don't know	3



4) In your opinion, would you say your teeth are healthy?

Yes	1
No	2
Don't know	3

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5) Do you ever clean your teeth?

Yes	1
No	2

6) If answer to Q5 is No, why don't you clean your teeth? specify

If answer to Q5 is Yes, go to Q7

7) How often do you clean your teeth?

Once a day	1
Twice a day	2
More than twice a day	3
Other (specify)	4

8) What do you use to clean your teeth?

Chewing stick	1
Toothbrush	2
Charcoal	3
Other (specify)	4

9) Why do you choose that method of cleaning your teeth?

Cheap	1
Available	2
Effective	3
Other (specify)	4



If no toothbrush to Q8, go to Q14

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10) If answer to Q8 is toothbrush, do you use it with toothpaste?

Yes	1
No	2

11) Which toothpaste do you use?

Colgate	1
Aqua fresh	2
Close- up	3
Don't know	4

12) Why do you use this toothpaste?

13) Do you have your own toothbrush at home?

Yes	1
No	2

14) Do you ever clean between the teeth?

Yes	1
No	2

15) What do you use to clean between the teeth?

Toothbrush	1
Dental floss	2
Wood-points	3
Other (specify)	4

16) The best way to clean between teeth is to use

Toothbrush	1
Dental floss	2
Wood-points	3
Don't know	4

**Section B: Knowledge. You can have more than one correct answer.****17) How would you know that a tooth is decayed or rotten? ****

Has a hole in it*	1
Looks black*	2
It is broken*	3
It is painful	4
Don't know	5
Other (specify)	6

18) What causes tooth decay? *

Worms eating teeth

1

Eating sugary foods, sweets and sweet drinks*

2

Not cleaning teeth

3

Don't know

4

Other (specify)

5

19) What does fluoride in toothpaste do to your teeth?

Makes teeth whiter

1

Prevents tooth decay*

2

Don't know

3

Other (specify)

4

20) How can you tell if you have gum disease? **

Bleeding gums*

1

Swollen gums*

2

Bad breath

3

Painful gums

4

Don't know

5

Other (specify)

6

21) What causes gum disease?

Dirt in the mouth*

1

Sugar

2

Don't know

3

Other (specify)

4

22) What is dental plaque? **

Dirt on surface of teeth*	1
Germs on teeth*	2
Don't know	3
Other (specify)	4

23) How can you prevent gum disease?

Visit a dentist or dental clinic regularly	1
Avoid sweet foods	2
Thorough cleaning of teeth *	3
Don't know	4
Other (specify)	5

24) What is the most important reason for cleaning teeth?

To get teeth whiter	1
To prevent bad breath	2
To prevent gum disease*	3
To prevent tooth decay	4
Don't know	5
Other (specify)	6

25) Do you have any problems with your teeth now?

Yes	1
No	2

If answer to Q25 is No, go to Q27.

26) What problems do you have with your teeth now?

Painful tooth	1
Rotten tooth (not painful)	2
Broken tooth	3
Other (specify)	4

27) Do you have any problems with your gums now?

Yes	1
No	2

If answer to Q27 is No, go to Q29

28) What problems do you have with your gums now?

Bleeding gums	1
Painful gums	2
Swollen gums	3
Other (specify)	4

**29) Do you have any problems with the rest of your mouth?**

Yes	1
No	2

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If Yes, specify _____

30) What action have you taken to address your problem (s)?

Specify _____

31) If no action taken, why not?

Specify _____

32) Do you think you need treatment for your problem (s)?

Yes	1
No	2

33) If Yes, what treatment do you think you need?

Extraction	1
Filling	2
Cleaning of teeth	3
Don't know	4
Other (specify)	5

34) If answer to Q32 is No, why don't you need treatment for your problem (s)?

35) What foods are not good for teeth? Give four (4) food items.



Section C: Dental visits

36) Have you ever visited a health facility with a dental problem?

Yes	1
No	2

If No, go to section D

37) When did you last visit the health facility?

6 months ago	1
1 year ago	2
More than 1 year ago	3
Other (specify)	4

38) Where did you go?

Dental clinic	1
Private dentist	2
General clinic	3

39) For what problem did you visit the health facility?

Painful tooth	1
Rotten tooth (not painful)	2
Dirty teeth	3
Swollen jaw	4
Other (specify)	5



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40) What was done?

Examination only	1
Extraction	2
Filling	3
Cleaning of teeth	4
Given medication only	5
Other (specify)	6

Section D: Source of oral health information**41) Have ever been taught about oral health/ hygiene?**

Yes	1
No	2

42) Where do you get your information about caring for your teeth?

Home	1
School	2
Dentist/dental clinic	3
Other (specify)	4

43) What do you know about gum disease? Specify

44) What do you know about dental caries? Specify



* Correct responses

** Multiple responses allowed

University of the Western Cape
P/Bag X08
Mitchells Plain 7785
Cape Town.

The Principal

_____ Primary school

Thamaga.

Dear Sir/Madam,

RE: Permission for research in the school

I (Dr Moreri) am a Motswana master's student at the above named institution and would like to carry out a research project in the school as a partial requirement for the course.

The research would involve examining and interviewing the standard five schoolchildren.

The findings from this research will be used to evaluate the effectiveness of the on-going school oral health education programmes run by the Oral Health Division (Ministry of Health, Botswana).

Consent will also be sought from the parents.

Sincerely,

Dr MORERI BG



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SUPERVISOR: _____

Dr MYBURGH N.

University of the Western Cape
P/Bag X08
Mitchells Plain 7785
Cape Town.

_____ Primary School

Thamaga.

Dear Parent/Guardian,

RE: Permission to examine your child

I (Dr Moreri) am a Motswana student in Cape Town and hereby seek permission to interview and examine the teeth of your child at school for a university research project.

Permission has also been sought from the school principal from whom you can get more information.

Please fill in and sign the attached note whether you agree or disagree.

Thank you,

Dr MORERI BG.



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_____ Primary school

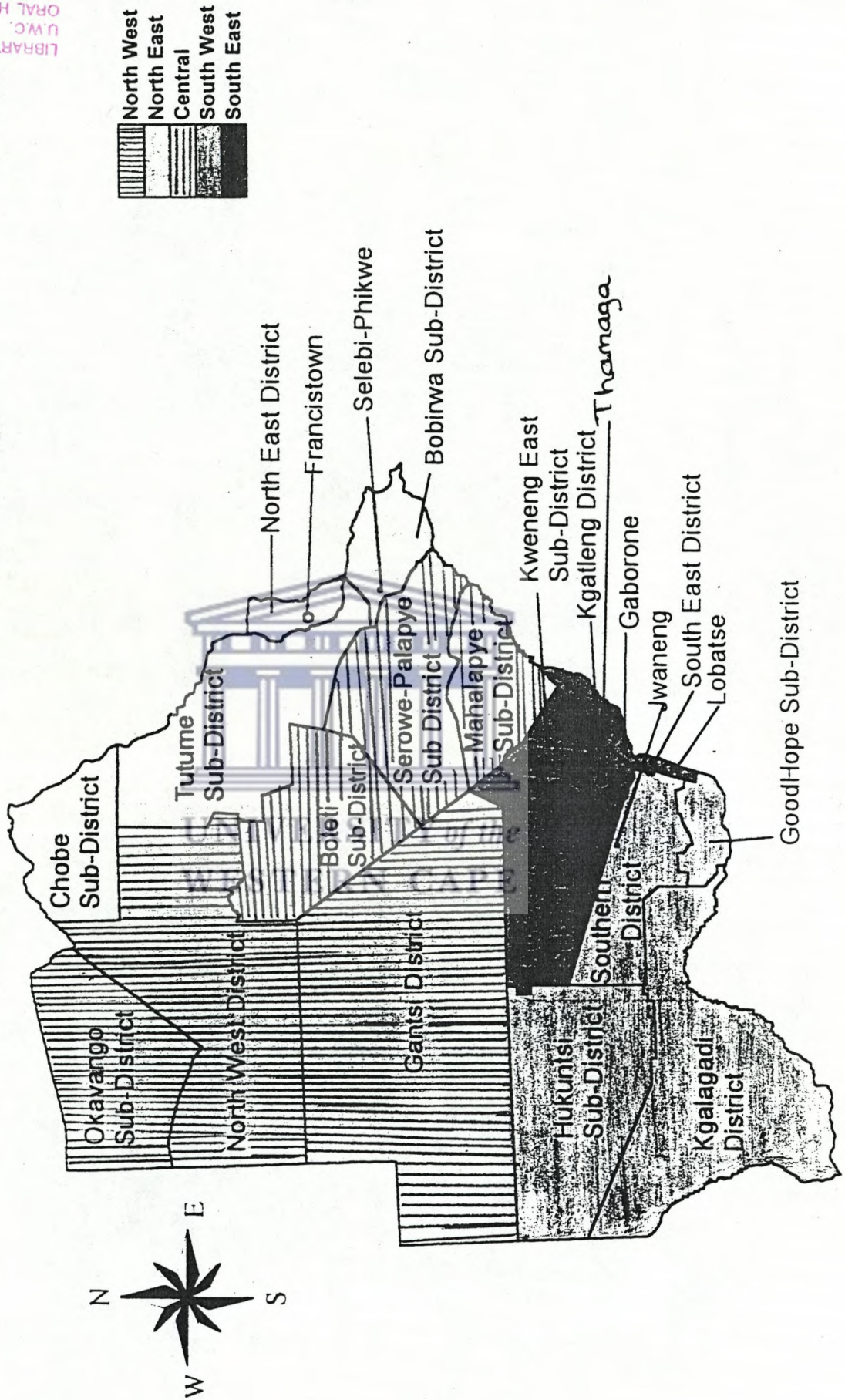
Date _____

I _____ parent/guardian of _____ (name of child) hereby
agree/disagree for an examination to done on my child at school.

Signature of parent/guardian

* Please indicate your response by underlining it.

Figure 2: The Republic of Botswana and Oral Health Regions -1999



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