

DENTAL CARIES EXPERIENCE AND ASSOCIATED RISK FACTORS AMONG 12-YEAR-OLD PRIMARY SCHOOL CHILDREN IN NJIRU DISTRICT, NAIROBI COUNTY

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DECLARATION

I, Kyale David Sumbi, declare that this is my original work and there are no previous submissions of a similar research project known to me.

Signed:

Date:

SUPERVISOR DECLARATION

I, supervisor of the above named student, have approved this research project report for submission.

PROF GATHECE L.W BDS., MPH., PhD. (NBI)

Signed:.....

Date:.....

DEDICATION

I dedicate this to my dear loving wife Mercy Sumbi Kanini who greatly supported and encouraged me during the writing of this report. I also dedicate this to my Mother and Father Mr and Mrs Kisumbi Kyale for their constant support which has enabled me to be the person I am today.

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ABBREVIATIONS

DMFT	Decayed Missing Filled Teeth
IBM	International Business Machine
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization
PGD-RM	Post Graduate Diploma in Biomedical Research Methodology
BDS	Bachelor of Dental Surgery
MPH	Master of Public Health
PhD	Doctor of Philosophy

ABSTRACT

Introduction: Despite great achievements in oral health of populations globally, problems still remain in many communities all over the world particularly among under-privileged groups in developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important global oral health burden. At present, the distribution and severity of oral diseases vary among different parts of the world and within the same country or region. In light of changing living conditions, however, it is expected that the incidence of dental caries will increase in many developing countries in Africa, particularly due to a growing consumption of sugars and inadequate exposure to fluorides.

Objective: To determine the dental caries experience and risk factors for dental caries of 12-year-old primary school going children in Njiru district.

Methodology: This was a descriptive cross-sectional study aimed at determining caries experience and risk factors for dental caries among 12-year-old children attending primary school in Njiru District, in Nairobi county in Kenya. A total of 219 children from 1 school were selected using random sampling technique. An interviewer administered questionnaire was used to gather information on caries risk factors. Clinical examination was done and caries experience was assessed using the DMFT index and recorded in a WHO clinical examination form.

Data Analysis: The data collected was analyzed using IBM SPSS version 20 and Microsoft Excel computer software. Frequencies and Cross tabulations were done and Chi-square tests performed for categorical variables. Tests for significance were set at 95% confidence level.

Results: A total of 219 children were interviewed and examined. All respondents were aged 12. 107(48.9%) were males and 112(50.7%) were females. Caries prevalence was 18.1%. DMFT was 0.25 SD(+0.633). In males DMFT was 0.35 SD (+0.73) and in females its was 0.16 SD (+0.51) $p=0.03$. Most children 180 (82.2%) were caries free. Almost all the parents of the children had been to school 213 (97.3%). About half the parents 106 (48.4%) had attained college/university education. There were less fathers who had attained primary school education 12 (6.1%) and secondary 44 (22.1%) compared to the mothers, primary 25(11.7%) and secondary 82 (38.3%). Overall a higher number of fathers had attained tertiary education 68.3% compared to the mothers 49.5%. Majority of the children brushed their teeth 180 (82.2%), only 37 (6.9%) did not brush their teeth. 174 (79.5%) children indicated they brush their teeth using a tooth brush and a tooth paste. Remarkably 169 (77.2%) did not know what dental flossing is. Only a minority of the respondents 14 (6.4%) indicated that they flossed once a day. 42.5% of the children ate sweets several times a week and a surprising 83 (38.2%) ate sweets at least once a day. Gender in relation to frequency of eating sweets was found to be statistically significant $p=0.031$. Majority of the children 142 (64.8%) had never visited a dentist while 56 (25.6%) only visited while there was pain.

Conclusion: The overall DMFT (0.25) observed in this study is lower than that reported in other studies conducted in Kenya, It's also lower than the global standard according to WHO classification²¹. The findings indicate that there is need for reduced intake of cariogenic diet even though this has not yet contributed to caries formation yet. The low frequency of dental visits and high intake of cariogenic diet could increase dental caries among Njiru district children in future. Preventive practices such as regular dental checkups, provision of oral health instructions

and education on harmful dietary should be advocated for in schools. This will protect the children from the risk factors of dental caries formation.

CHAPTER ONE

1.0 INTRODUCTION AND LITERATIVE REVIEW

The prevalence of dental caries has been reported to vary between 60-90% in industrialized countries. The disease is less common and less severe in African countries¹. Though a nationwide oral health survey has not been carried out in Kenya there have been a number of studies carried out. A study by Ng'ang'a et al. in 1993 among school going children reported that 52% had dental caries², while a study by Noor et al. 2006 reported a prevalence of 78.5% among females and 55.7% among males in an adult urban Somali community in Nairobi³. A recent study in Kenya among 9-12-and 15-year-olds showed a caries prevalence of 37.5% for an urban setting with a DMFT of 0.76, while a rural setting had a prevalence of 24% and a DMFT of 0.36⁴. Another Kenyan study among a rural population showed 43.3% caries prevalence and a DMFT of 3.4 in participants with age ranging from 18-65⁵.

Caries experience has been reported to be higher in developed countries than developing countries¹. At the same time caries experience in developed countries is comparable to urban settings in developing countries. Rural areas tend to have a lower caries prevalence compared to urban settings. The prevalence of dental caries and the DMFT were significantly higher in an urban setting 37.5% (DMFT 0.76) compared to rural 24.0% (DMFT 0.36) according to Gathecha et al. 2012⁴. In a study by Bajomo et al. 2004 in South Africa, rural 12-year-olds had a caries prevalence of 22% compared to 54% of the urban population⁶. Ayo-Yusuf et al. 2007 found caries prevalence in South African 12-year-olds to have been 40% with a DMFT of 1.19, showing a high disease burden despite low the DMFT⁷. While in suburban Nigeria Adekoya-Sofowora et al. 2006 showed caries experience of 12-year-olds was 13.9% and a mean DMFT of

0.14⁸. The prevalence of caries has been reported to vary from one country to another due to differences in socio-economic patterns and demographic factors. A national oral health survey in Portugal by Aalmeida et al. found the prevalence proportion rates of dental caries was 46.9% in 6-year-olds and 52.9% in 12-year-olds in 2003⁹. This serves as a good guide as to the caries prevalence in the 6-year-olds and 12-year-olds in a developed country, due to the number of participants recruited in the study and national coverage. 799 6-year-olds and 800 12-year-olds participated with gender and urbanization status being adequately represented. While in Australia prevalence of caries was found to have been 34% in 3-6-year-olds by Hallet et al. in 2002, with DMFT at 2.28¹⁰. In a national survey in 2003 in the United Kingdom²² 34% of 12 year olds and 49% of 15 year olds had obvious decay. WHO data shows developing countries to have a lower caries experience than developed countries¹.

Risk factors for dental caries include diet of refined carbohydrates, poor oral hygiene, use of non-fluoridated tooth paste, poor oral health seeking behaviour and tooth morphology among others. A study by Kyale et al in 2007 found that 97.8% of 12- year-old children brushed their teeth using a tooth brush and tooth paste²⁵. In the same study 77% of the children had visited a dentist, however, 48.4% of the children only visited a dentist when there was something wrong. As regards frequency of eating sweets, 60.4% ate sweets daily while 39.6% ate several times a week, this is a considerably high figure and puts these children at the risk of caries formation. Maserejian et al. did a prospective cohort study published in 2009. It followed up children aged 6-10 years who received comprehensive dental care for 5 years. The results showed that socio-demographic factors were not associated with higher caries experience. There was however a higher incidence of caries in children who brushed less than once a day compared to those who

brushed more than once a day¹¹. Another study by Ismail 1997 also showed that living in urban areas has implications for lifestyle, including dietary pattern and had been shown to be associated with an increased prevalence of dental caries¹². A recent study in India comparing Body Mass index and caries experience in 12-15-year-olds by Narang et al. found no significant correlation between the two factors¹³, Caries experience was 45% in boys and 47% in girls. Foyana et al. 2010 found that being an only child or the last born was associated with increased caries risk¹⁴. Visiting a dentist for a routine check up has been shown to be related to increased caries prevalence in a study done by David J et al 2005. By the time most children visit a dentist there is normally already a problem²³. Other regional studies have shown results different from this. Nureluda NM et al 2009 showed that children who had visited a dentist to have a lower caries prevalence²⁴.

CHAPTER TWO

2.0 RESEARCH QUESTION

What is the caries experience and what are the risk factors for dental caries in 12-year-old primary school going children in Njiru district?

2.1 JUSTIFICATION

Certain groups of children, including those in lower socioeconomic or minority race/ethnic groups are at high risk for developing dental caries. Treatment of dental disease is costly both in time, resources and school hours lost. Guardian work hours are also lost when seeking treatment for their children. Morbidity due to dental diseases is high and there is often a lot of pain and suffering associated with dental diseases. If left untreated some dental diseases are life threatening. Results from this study will provide information on disease burden as well as risk factors for dental caries that policy makers can use to reduce the disease burden of dental caries in school going children.

2.2 OBJECTIVES

1. To determine the caries experience of 12-year-old school going children in Njiru district.
2. To determine the risk factors for dental caries of 12-year-old school going children in Njiru district.

2.3 HYPOTHESIS

2.3.1 NULL HYPOTHESIS

There is no association between risk factors for dental caries and caries experience among 12-year-olds in Njiru district.

2.3.2 ALTERNATE HYPOTHESIS

There is an association between risk factors for dental caries and caries experience among 12-year-olds in Njiru district.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 STUDY DESIGN

This was a descriptive cross-sectional study

3.2 STUDY AREA AND STUDY SITES

Nairobi County is one of the 47 counties in Kenya. It is the capital and largest city of Kenya. The city and its surrounding area also forms the Nairobi County. The name "Nairobi" comes from the Maasai phrase Enkare Nairobi, which translates to "cool water," the Maasai name of the Nairobi river, which in turn lent its name to the city. However, it is popularly known as the "Green City in the Sun" and is surrounded by several expanding villa suburbs.

Founded by the British in 1899 as a simple rail depot on the railway linking Mombasa to Uganda, the town quickly grew to become the capital of British East Africa in 1907 and eventually the capital of a free Kenyan republic in 1963. During Kenya's colonial period, the city became a centre for the colony's coffee, tea and sisal industry. Nairobi is also the capital of the Nairobi Province and of the Nairobi District. The city lies on the Nairobi River, in the south of the nation, and has an elevation of 1795 m above sea-level.

Nairobi is the most populous city in East Africa, with a current estimated population of about 3 million. According to the 2009 Census, in the administrative area of Nairobi, 3,138,295 inhabitants lived within 696 km² (269 sq mi). Nairobi is currently the 12th largest city in Africa, including the population of its suburbs.

Nairobi is now also one of the most prominent cities in Africa politically and financially. Home to thousands of Kenyan businesses and over 100 major international companies and organisations, Nairobi is an established hub for business and culture.

Nairobi is divided into 17 parliamentary constituencies. This study was carried out in Njiru District which is in Embakasi north Parliamentary constituency. This constituency is among the low and lower income estates and is located on the far eastern side of Nairobi. Nairobi has enjoyed fast urbanisation but at the cost of poor planning which has seen sprouting of informal settlements. These informal settlements lack clean water, access roads, drainage, health and adequate educational services. It is in these low income areas that this study was conducted.

3.3 STUDY POPULATION

There are two types of schools in Nairobi, public schools run by Nairobi County and private schools funded privately. Children from wealthy families tend to go to private schools, while children from both wealthy and poorer families tend to go to public schools. Participants from study were drawn from a public primary school within Njiru district in Embakasi North constituency. All children had their last birthday as 12 years.

3.4 INCLUSION CRITERIA

All children with their last birthday at 12 years old and had a signed consent form were included in the study.

3.5 EXCLUSION CRITERIA

Children who did not assent to the study and twelve year old children who did not come to school on that day.

3.6 DATA COLLECTION PROCEDURE

Oral examinations were carried out under natural light next to a window using wooden spatulas. The children were seated upright on a school chair. The examination was performed by one trained examiner who was calibrated. The World oral health assessment form (1997) was used (appendix 3). In addition a Questionnaire was administered to collect information about risk factors for dental caries, information such as diet, socio-economic status, oral hygiene habits, gender and oral health seeking behaviour.

3.7 VARIABLES

The study variables are captured in Table 1.

Table 1: Study variables

Independent variable	Measure
Gender	Male / Female
Caries risk factors	Fermentable carbohydrate diet, Poor oral Hygiene
Dependent variable	
Caries experience	DMFT-Decayed Missing Filled Teeth,

3.8 SAMPLE SIZE

Caries prevalence from local studies and other parts of the world show a prevalence of about 50%². The study was designed with a confidence level set at 95%, Z value=1.96 to estimate the prevalence of dental caries plus or minus 5% and hence the formula:

Where:

n- Is the desired sample size

Z-is standard normal deviate at 95% confidence interval

P- Proportion of the target population estimated to have dental caries= 50%

C- is accuracy of measuring prevalence of dental caries = 5%

Hence

$$n = \frac{Z^2(p(1-p))}{C^2} \quad n = \frac{1.96 \times 1.96 \times 0.5(1-0.5)}{0.05^2} \quad n = 384$$

$$nf = \frac{n}{1 + \frac{n}{N}}$$

nf= sample size for a population less than 10,000

N= Actual number of sample population

$$nf = 384 / 1 + 384 / 250$$

$$nf = 384 / 1 + 2.54$$

$$nf = 152$$

Therefore the minimum sample size required was 152. However, during the data collection, this was adjusted to account for missing information on questionnaires to 219.

3.9 SAMPLING METHOD

There are 40 primary schools in Njiru district, James Gichuru primary school was selected by convenience sampling Method. All the children with their last birthday as 12 years according to the schools records were included in the study. A total of 219 children were included. All the children agreed to participate in the study.

3.10 ETHICAL CONSIDERATIONS

The authority to carry out the study was sought from the Kenyatta national hospital and university of Nairobi ethics and research committee. Informed Consent was sought from parents the day before through a letter and assent from the children on the day of the study. Permission was sought from the Head teacher of the schools to carry out the study. Participants were informed of their voluntary participation and that they were free to terminate their involvement without any punishment. No financial reward was given to participants. Children who needed dental treatment were referred to Dandora Health centre. Oral health education and advice was given. Information collected did not include identifiable details and was treated with utmost confidentiality.

3.11 DATA VALIDATION AND RELIABILITY

Pre-testing of the questionnaire was done to ensure clarity and practicability any terms that were prone to misunderstanding or were difficult were changed. The investigator first practiced the oral examination on a group of 20 patients with a wide range of disease conditions at Dandora Health centre. Two assistants were trained by the investigator to assist with data collection.

3.12 INFECTION CONTROL

Disposable wooden spatulas were used. Surgical masks and gloves were used while examining the children.

3.13 DATA MANAGEMENT

Data was checked before leaving the school for missing values and other errors. Double blind data entry technique using IBM SPSS version 20 was used.

3.14 DATA ANALYSIS AND PRESENTATION

Data analysis was done using Microsoft Excel and IBM SPSS version 20 computer software. Descriptive statistics including frequencies were done. Chi square was used to test significance of categorical variables. Confidence level of 95% was used.

3.15 STUDY LIMITATIONS

The study had several limitations. It involved school children who were twelve years old, thereby missing the small percentage of children not attending school. Therefore children in this study may not have been representative of the general population of the target children. It also involved one school reducing its generalisability. There was no way to verify the information reported on the questionnaire. It is possible that there was information bias, including over-reporting of socially accepted behaviour such as tooth brushing and under-reporting of less accepted behaviour such as consumption of cariogenic foods.

CHAPTER FOUR

4.0 RESULTS

A total of 219 children were interviewed and a response rate of 100% was realized. All respondents were aged 12, there were 107 (48.9%) males and 112 (50.7%) females. Sibling position in the family ranged from 1 to 10. Most children were the third born 51 (23.3%) and the mean of the sibling family position was 3.86 SD (± 2.082). Children who were in position greater than six were 13 (5.95%) whereas 6 (2.7%) did not respond to this question Table 2.

Table 2: Respondents position of birth in the family

Respondents Position of birth in the family	Frequency	Percentage
1	5	2.3%
2	48	21.9%
3	51	22.3%
4	45	20.5%
5	31	14.2%
6	20	9.15
7	7	3.2%
8	4	1.8%
10	1	0.5%
Did not indicate position	7	3.2%
Total	219	100%

Almost all the parents of the children had been to school 213 (97.3%), except one mother and seven fathers who the children indicated that they had not attended school. Among the mothers,

majority 106 (48.4%) had attained college/university education where as only 1 (0.5%) did not go to school Table 3.

Table 3: Distribution of the respondent’s mothers according to the level of education

Level of education attained by the respondents’ mothers	Number of Mothers	Percentage
Primary school	25	11.7%
Secondary School	82	38.3%
College/University	106	49.5%
Did Not Go to School	1	0.01%
No response	5	2.35
Total	219	100%

With regard to the father’s 136 (62.1%) had attained college/university level of education while 7 (3.2%) did not go to school Table 4. Notably, there were less fathers who had attained primary education 12 (6.1%) and secondary 44 (22.1%) compared to the mothers, primary 25 (11.7%) and secondary 82 (38.3). Overall a higher number of fathers had attained tertiary education 68.3 % compared to the mothers 49.5 %.

Table 4: Distribution of respondents' fathers according to the level of education

Level of education attained by the fathers	Frequency	Percentage
Primary School	12	6.1%
Secondary school	44	22.1%
College/University	136	68.3%
Did not go to school	7	3.5%
No response	19	8.7%
Total	219	100%

A sizeable number of children 142 (64.8%) had never visited a dentist with a small number, 56 (25.6%) having visited only when there was pain. Minority 20 (9.1%) visited more than once a year as presented on Table 5. Cross tabulation of frequency of dental visits and gender was carried out. There was no statistically significant difference using Pearson Chi-square test $p=0.702$.

Table 5: Respondents frequency of dental visits

Visit to the dentist	Number of children	Percentage
I have never visited a dentist	142	65.1%
Whenever there is pain	56	25.7%
Once in a Year	11	5.0%
Twice in a Year	9	4.1%
No response	1	0.5%
Total	219	100%

As regards oral hygiene habits majority of the children 180 (82.2%) brushed their teeth while 37 (6.9%) did not brush their teeth, 3 (1.4%) did not respond to the question. One seventy four (79.5%) of the children indicated that they brush their teeth using a tooth brush and tooth paste, three (1.3%) indicated they didn't brush their teeth at all. Twenty five children did not respond to the question (table 6).

Table 6: What the children used to brush their teeth

What the children brushed with	Number of children	Percentage
I don't brush my teeth	3	1.5%
I use a stick	4	2.1%
A tooth brush with no tooth paste	13	6.7%
A tooth brush with tooth paste	174	86.7%
No response	25	11.5%
Total	219	100%

With regard to inter dental cleaning aids, most of the children 169 (77.2%) did not know what dental flossing is, while 14 (6.4%) had never flossed their teeth. Minority of the respondents 14 (6.4%), indicated that they flossed once a day, 6 (2.7%) several times a week and 5 (2.3%) once a month. Four (1.8%) did not respond to this question (Table 7).

Table 7: Distribution of the respondents according to knowledge and frequency of flossing

Knowledge and use of dental floss by the children	Number of children	Percentage
I don't know what flossing is	169	77.2%
I have never flossed	14	6.4%
Every day	14	6.4%
Several times a week	6	2.7%
Once a week	7	3.2%
Once a month	5	2.3%
No response	4	1.8%
Total	219	100%

All the children indicated that they ate sweets while 2 (0.9%) did not respond to the question at all, with majority 93 (42.5%) indicating they ate sweets several times a week. There were 83 (38.2%) children who ate sweets at least once a day. Gender in relation to the frequency of eating sweets was found to be statistically significant ($p= 0.031$)

Table 8: Distribution of respondents according to frequency of eating sweets

Frequency of eating sweets	Number children	Percentage
Once a month	6	2.8%
Once a week	35	16.1% %
Several times a week	93	42.9%
Once a day	38	17.5%
Several times a day	45	20.7%
No response	2	0.9%
Total	219	100%

The prevalence of dental caries was 18.1% with a mean DMFT of 0.25 SD (+-0.63). The mean DMFT for males was higher 0.35 SD (+- 0.73) than females 0.16 SD (+- 0.51). The difference was statistically significant (t=2.22, p=0.03)

Table 9: DMFT level in relation to gender

Gender	DMFT Level
Male	0.35 (+-0.73 SD)
Female	0.16 (+-0.51 SD)
Overall DMFT	0.25 (+-0.63 SD)

Factors associated with Dental caries experience

Several potential risk factors were explored to understand if they were responsible for development of dental caries. Table 10 summarises the cross tabulation results and significance results at p=0.05. The significance tests used were T- test and ANOVA.

Gender in relation to DMFT was found to be statistically significant (p=0.03). Other factors such a gender, frequency of eating sweets, frequency of dental visits, level of education of father and mother did not have statistically significant association with consideration to the DMFT of the child.

Table 10: Risk factors for dental caries in relation with recorded DMFT

Factor	Description	DMFT	P=0.05
Gender	Male	0.35 (+-0.73 SD)	0.03*
	Female	0.16 (+-0.51 SD)	
Frequency of eating sweets	Once in a month	0.5 (+-0.84 SD)	0.614
	Once in a week	0.14 (+-0.49 SD)	
	Several times a week	0.31 (+-0.79 SD)	
	Once a day	0.24 (+-0.49 SD)	
	Several times a day	0.19 (+-0.39 SD)	
Frequency of Brushing	Once a month	0.25 (+-0.50 SD)	0.246
	Several times a month	0.36 (+-0.76 SD)	
	Once a week	0.18 (+-0.48 SD)	
	Several times a week	0.45 (+-0.93 SD)	
	Once a day	0.15 (+-0.40 SD)	
	More than once a day	0.18 (+-0.50 SD)	

Factor	Description	DMFT	P=0.05
What do you use to brush your teeth	I don't brush my teeth	0.00 (+-0.00 SD)	0.986
	I use a stick	0.25 (+-0.50 SD)	
	A tooth brush with no toothpaste	0.23 (+-0.60 SD)	
	A toothpaste brush with toothpaste	0.26 (+-0.63 SD)	
Do you brush your teeth	Yes	0.25 (+-0.63 SD)	0.784
	No	0.22 (+-0.63 SD)	
How frequently do you visit your dentist	I have never visited a dentist	0.19 (+-0.54 SD)	0.408
	Whenever there's pain	0.32 (+-0.83 SD)	
	Once in a year	0.45 (+-0.69 SD)	
	Twice in a year	0.44 (+-0.53 SD)	

* Significant finding at 95% confidence level

CHAPTER FIVE

5.0 DISCUSSION

Dental caries prevalence and DMFT has been shown to be higher in developed countries as compared to developing countries¹. Within developing countries urban areas are seen to have higher prevalence than rural areas¹². The rationale is that, a higher socio economic status and dietary patterns lead to easier access to cariogenic foods such as sweets, biscuits and chocolates. As developing countries see a rise in socio economic status and change in dietary patterns there is an increase in dental caries prevalence and DMFT. This affects more so the urban areas, but a growing concern is that rural areas may also be experiencing increasing prevalence of dental caries. This is a major concern given the lower number oral health care facilities and personnel in rural areas.

In the current study the prevalence of dental caries was found to be 18.1% while the mean DMFT was found to be 0.25 with a standard deviation of ± 0.633 . The findings in this study are lower than those reported in other studies conducted in Kenya, it is also lower than the global standard according to WHO classification²¹. The findings compare favourably with a study in rural Kenya^{8,18} and another in sub urban Nigeria where mean DMFT was 0.24 and 0.14 respectively, prevalence of dental caries was 10% and 13.9% respectively. The similarities could be due to similar dietary patterns and socio-economic status. Another study done in rural and urban Kenya⁴ found a DMFT of 0.36 and 0.76 respectively and prevalence of 24% and 37.5% respectively. The rural Kenyan studies match the current study despite the fact that it was done in an urban area, they could be closely matched because these are areas of low socio-economic status and have similar dietary patterns. The prevalence of this study is also lower than a study

done in Uganda¹⁵ where urban areas recorded a prevalence of 41%, while rural areas recorded 29%. In Tanzania urban caries prevalence was 41.5%¹⁶. While in Burkina Faso it was 21.2% for rural areas and 33.8% in urban¹⁷. Sixty five percent of the respondents reported that they have never visited a dentist, this closely matches 62% recorded in a study in Nairobi west, Kenya⁴, and also compares to 76% in Tanzania and 60% in India. These are all urban areas and it could be the reason that they are so closely matched. This differs sharply with another Nairobi primary school study on 12 year-olds that showed only 23.1% of the children had never visited a dentist²⁵, 77% had visited a dentist. Out of those that visited a dentist 65.9% only visited when something was wrong. Most of the children in the current study had never visited a dentist yet they had a lower DMFT, this contrasts to a Sudan study that showed children who have visited the dentist to have lower DMFT. The pattern is however similar to findings made in the Nairobi west, Kenya study⁴ where those who visited a dentist had a higher caries prevalence, it may be explained by the fact that children who visit a dentist do so when there is already a problem. Furthermore, the high proportion of children who have never visited a dentist could be explained by the fact that they were satisfied with the status of their teeth. The prevalence of dental caries males and females was almost equal, with males being slightly higher, this differs with a study done in rural Kenya, where the females had a higher prevalence than males¹⁹. Females are found to have higher caries prevalence it is thought that this is due to the early eruption patterns. The DMFT of males was however higher than that of females 0.35 compared to 0.16 and this was statistically significant $p=0.03$.

Eighty percent of the respondents reported to eating sweets more than several times a week. Gender in relation to frequency of eating sweets was found to be statistically significant ($p=0.031$). This was however a disproportionately high result, an urban cohort registered 43%

consumption of cakes/biscuits at a similar frequency⁴. A Nairobi urban study registered 60.4% consumption of sweets in a similar age group²⁵. The difference could be because this current study asked about sweets, while the other asked about cakes/ biscuits which are significantly more expensive. Nevertheless it is surprising that such a high frequency of consumption is accompanied by low caries prevalence. The poor dental visits and high intake of cariogenic diet could increase dental caries among Njiru district children in future. It is possible that the diet component of caries formation has increased recently and is yet to have its full effects of caries formation. The fact that 82% of the children brush daily with toothpaste is also a protective factor that may enable low caries prevalence despite the high frequency of cariogenic food consumption. This high frequency of tooth brushing is similar to local and regional studies^{4,8,20,25}. Data collected by questionnaires have limitation. Over reporting is common in desirable outcomes such as brushing teeth while under reporting occurs in undesirable outcomes such as eating sweets, hence it is difficult to completely rely on what the respondents reported.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The children had a high frequency of eating cariogenic diet, with most of the children ingesting sweets daily. The overall caries experience was low with DMFT (0.25) and the largest component was the decayed component. Almost all the children brushed their teeth using a tooth brush and tooth paste. Majority of the children had never visited a dentist. Very few of the children knew what flossing was and very few flossed their teeth. Majority of the fathers and mothers had attained college/tertiary level of education. Within the findings of this study, there was evidence of the children being at high risk of dental caries formation despite the low DMFT recorded.

6.2 RECOMMENDATIONS

- There is need to develop strategies aimed at educating the children on the effect of cariogenic diet on oral health.
- Further studies may be required to establish the caries prevalence of Njiru district as a whole including capturing non school going children.

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APPENDIX 1

QUESTIONNAIRE Tick as appropriate

Gender: Male (boy)..... Female (girl).....

1. How frequently do you eat sweets, biscuits, chocolates or chewing gum?

- Once in a month
- Once in a week
- Several times in a week
- Once a day
- Several times in a day

2. Do you brush your teeth?

- Yes
- No

If yes, answer question 3 if No skip to question 5

3. How many times do you brush your teeth?

- Once a month
- Several times in a month
- Once a week
- Several times in a week
- Once a day
- More than once a day

4. What do you use to brush your teeth?

- I don't brush my teeth
- I use a stick
- A tooth brush with no toothpaste
- A tooth brush with toothpaste

5. How often do you floss your teeth?

- Never
- Once a month
- Once a week
- Several times a week
- Everyday
- I don't know what flossing is.

6. How often do you visit a dentist?

- I have never visited a dentist
- Whenever there is pain
- Once in a year
- Twice in a year

7. What is the level of education of your mother?

- Primary school
- Secondary school
- College/university
- Did not go to school

8. What is the level the education of your father?

- Primary school
- Secondary school
- College/University
- Did not go to school

9. How many children are you in your family?

.....

The end, Thanks for your participation.

APPENDIX 2

WORLD HEALTH ORGANISATION ORAL HEALTH ASSESSMENT FORM

DENTITION STATUS

	<i>Crown</i>	<i>Crown/Root</i>	<i>Status</i>
A	0	0	Sound
B	1	1	Decayed
C	2	2	Filled, with decay
D	3	3	Filled, no decay
E	4	-	Missing, as a result of caries
-	5	-	Missing, any other reason

18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28

Permanent dentition

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

55 54 53 52 51 61 62 63 64 65

Deciduous dentition

48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38

Permanent dentition

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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85 84 83 82 81 71 72 73 74 75

Deciduous dentition

APPENDIX 3A

CONSENT EXPLANATION

Parents will be provided with a consent form explaining that an oral health examination using dental probes and mouth mirrors in natural daylight will be carried out with the children seated on a school chair. A questionnaire will be administered to evaluate the risk factors for dental caries. Questions will be on diet, socio-economic status, oral cleaning habits and oral health seeking behaviour. There is a risk of discomfort during oral examination, but no pain is anticipated. Oral health education will be provided to the children and emergencies handled where feasible. Participation will be voluntary. The study will take 8 months from November 2012 to August 2013. Objectives will be to determine the prevalence and risk factors for dental caries in 12 year old children in Njiru district school going children. The questionnaires and data collection forms will be numbered and stored under lock and key. No names will be used to provide confidentiality.

I..... Having read about a research study titled “ Dental caries experience and associated risk factors among 12-year-old Primary school children in Njiru District, Nairobi County”, do voluntarily allow my child to be a subject in the study. The benefits, and risks pertaining to the study have been explained to me in writing fully by the investigator, DAVID KYALE SUMBI, of University of Nairobi institute of Tropical Diseases.

Signature..... Date

APPENDIX 3B

CONSENT EXPLANATION IN KISWAHILI

Wazazi watapewa fomu ridhaa kueleza kuwa mtihani wa afya ya meno utafanywa kutumia vioo vya kinywa. Utafanywa mchana watoto wakiwa wameketi kwenye kiti cha shule. Dodoso ya kusimamiwa itafanywa. Itakuwa ya kutathmini mambo yanayofanya meno kuoza. Maswali yakiwa juu ya vyakula, hali ya kiuchumi na kijamii, wanavyosafisha meno na wanavyotafuta tiba wanapougua meno. Kuna hatari ya usumbufu wakati wa mitihani ya mdomo, lakini hakuna maumivu yanayotarajiwa. Elimu ya afya ya mdomo itatolewa kwa watoto na usaidizi kupewa kukitokea haja. Ushiriki ni wa hiari. Utafiti utachukua miezi 6 kutoka Novemba 2012 hadi Aprili 2013, malengo yake yatakuwa ni, kutathmini mambo yanayofanya meno kuoza na idadi ya watoto ambayo meno yao yameoza. Data ambayo itakusanywa itahifadhiwa kwenye kabati itakayofungwa kwa kufuli. Hakuna majina yatatumika kuhifadhi siri.

Mimi Baada ya kusoma kuhusu utafiti kwa jina "Dental caries experience and associated risk factors among 12-year-old Primary school children in Njiru District, Nairobi County ", nimearuhusu mtoto wangu kuwa somo katika utafiti huu. Faida na hatari zinazohusiana na utafiti nimeelezwa kikamilifu katika maandishi haya na mpelelezi, Daktari DAVID KYALE SUMBI, kutoka University of Nairobi Institute of Tropical Diseases.

Sahihi Tarehe

APPENDIX 4

ASSENT EXPLANATION

I am a dentist named Dr. Kyale David of University of Nairobi Institute of Tropical Diseases, who is doing a research as part of my university training, and I'm inviting you to participate in it. The research is about tooth decay in 12-year-old primary school children in Njiru district. The research results will be used to find ways of avoiding tooth decay in children in Nairobi this will help other children of your age.

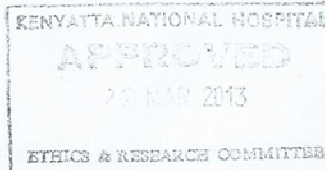
You can choose whether or not you want to participate, we have discussed this research with your parents and they know we are asking you for your agreement. If you are going to participate in this study, your parents also have to agree. But if you do not want to, you don't have to, even if your parents agree. You can think about it and discuss it with anyone including your parents before you decide. In case you do not understand anything ask for an explanation from me and I will answer. You do not have to be in this research, if you refuse, nothing will happen. Even if you agree and later refuse, nothing will happen to you.

During the research the dentist will look into your mouth using a small dental mirror to see if you have tooth decay or not. This will not be painful. You will be required to open your mouth. It will be done in class on a school chair. The dentist will then ask you questions about brushing your teeth and the foods that you eat, so as to know if you are likely to get dental decay.

We will not tell other people that you are in this research or share information about you with anyone not in the research study. The results and information about you will be put away and no one but the researchers will be able to see it.



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22nd March 2013

Dr. Kyale David Sumbi
UNITID
College of Health Sciences
University of Nairobi

Dear Dr. Kyale

Research proposal: Dental caries experience and associated risk factors among 12-year-old primary school children in Njiru District, Nairobi County (P542/10/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and approved your above revised proposal. The approval periods are 22nd March 2013 to 21st March 2014.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal.*)
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

"Protect to Discover"

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN

Yours sincerely



PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

- c.c. The Deputy Director CS, KNH
 The Principal, College of Health Sciences, UoN
 The Director, UNITID, UoN
 The HOD, Records, KNH
 Supervisor: Prof. Gathece L. W. School of Dental Sciences, UoN

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