

**ORAL HEALTH KNOWLEDGE, ATTITUDES AND
PRACTICES AMONG 9 - 12 YEAR OLD CHILDREN
ATTENDING PRIMARY SCHOOLS IN WESTLANDS,
NAIROBI COUNTY, KENYA**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

Dedicated to my husband George, children: Joan, Jael and Juliet for their patience and support during the entire research and thesis write up period

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DEFINITION OF TERMS

Attitude	This is a way of thinking of some one that affects how that person behaves. In this study attitudes are considered as beliefs, feelings or thoughts people have in relation to dental health.
Cavitation	Process of destruction of a tooth surface by forming a hole on the tooth.
Dental caries	Localized destruction of calcified tissue initiated on the tooth surface by decalcification of the enamel of the tooth.
DMFT	The Decayed, Missing, Filled Tooth index is a key measure of caries experience in dental epidemiology. The index is applied to permanent dentition and is expressed as the total number of teeth or surfaces that are decayed, missing or filled in an individual due to caries. WHO has defined high caries prevalence as averages DMFT score greater than 3 for a given population.
Knowledge	Fact or experience known by a person. In this study it refers to facts and information people have about oral health care.
Malocclusion	Malocclusion means the teeth are not aligned properly due to difference between the size of the upper and lower jaws or between jaw and tooth size, resulting in overcrowding of teeth or in abnormal bite patterns

Periodontal disease Infections and inflammation of the gums and bone that surround and support the teeth

Practice How to behave or what they do regarding dental health.

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CDA	Commonwealth Dental Association
DMFT	Decayed, Missing and Filled Teeth
HIV	Human Immuno-deficiency Virus
MOH	Ministry of Health
MOMS	Ministry of Medical Services
NHSSP	National Health Sector Strategic Plan
NOHP	National Oral Health Policy
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

ABSTRACT

Oral health is not only the absence of disease but also the optimal functioning of the mouth and its tissues in a manner, which preserves the well-being of the oral cavity and the individual's highest level of self-esteem. It is a state that enables an individual to eat, speak and socialize with minimal discomfort or embarrassment. In Kenya, a large number of children suffer from poor oral health largely due to poor oral health knowledge, attitude and practices. Since poor oral health in childhood often continues into adulthood, investing in oral disease prevention and health promotion is more cost effective in the long term than focusing on treatment of oral diseases. In order to achieve successful prevention of oral diseases and tooth decay, preventive measures should be implemented in early life hence the need to target children. This study used a cross-sectional design to determine the oral health knowledge, attitudes and practices among primary school children aged between 9 and 12 years in Westland's, Nairobi County which houses high cost private schools, public middle class schools and low cost schools in the informal settlements. Data was analyzed in SPSS v17 using univariate (frequency tables and proportions), bivariate (chi-square tests) to show if there existed a statistically significant association between variables. A total of 16 schools and 436 pupils were interviewed: 248 (57%) girls and 188 (43%) boys representing the three school categories: A-low cost, B-public middle class and C-private high cost schools [186 (43%), 142 (32%) and 108 (25%) respectively]. The type of school the child attended and child's age had a significant statistical association with oral health knowledge ($\chi^2= 9.495$; $p = 0.009$; $\chi^2= 33.735$; $p = <0.001$). Respondents from Type C School had higher knowledge compared to those from other schools. In contrast, this knowledge did not translate to better oral health practices. The type of school a respondent attended had statistically significant association with oral health practices. Similarly, the age of respondents was significantly associated with oral health practices ($\chi^2=28.903$; $p= <0.001$) with children aged 12 years showing better practices. There was no statistically significant association between gender and oral health practices. Nearly half of the pupils aged 9-12 years attending schools in Westlands have low levels of oral health knowledge. Children who had an exposure to school dental health programs showed better knowledge. Similarly majority of the pupils had negative attitudes towards oral health. Attitudes and were not influenced by type of school, age or gender of the respondents. The practices were influenced by the level of knowledge respondents had, the age of child and the type of school a respondent attended. Oral health seeking behavior was low as majority of the pupils had not visited a dentist for routine preventive care. Since oral health knowledge influences practice as shown in this study, there is need to increase the oral health knowledge to pupils in Westlands through well planned school based oral health education programmes in primary schools. This study recommends inculcating routine preventive dental care among the children to improve oral health seeking behavior.

CHAPTER ONE: INTRODUCTION

1.1 Background information

Oral health is not only the absence of disease but also the optimal functioning of the mouth and its tissues in a manner, which preserves the well-being of the oral cavity and the individual's highest level of self-esteem (WHO, 1999). It describes a standard of health of oral and related tissues, which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contributes to general well-being. Commonwealth Dental Association (CDA) and the National Oral Health Policy and Strategic Plan (NOHP&SP, 2002); states that, "*good oral health is an essential and important component of general health and it is a birthright of every individual in the world*".

Overall, 90% of school going children worldwide and most adults have experienced oral health problems, most commonly dental caries, with the disease being most prevalent in Asian and Latin American countries (Petersen *et al.*, 2005). In Kenya, the Ministry of Health adopted the NOHP&SP that gave directions on improving the oral health of the population. Its general objective is to ensure Kenyans enjoyed improved levels of oral health and function by significantly lowering oral disease burden by 2012 (NOHP&SP, 2002). Despite the adoption of the NOHP&SP, Kenya still lacks data on the oral health status of its population since no documented national survey on oral health has ever been conducted since 1963. Furthermore, the country has no

safety nets or organized insurance schemes for subsidizing the high costs of oral health care. Kenya also experiences insufficient dental health practitioners to cater for the large population and therefore, the oral health needs of many Kenyans remain unmet, especially the urban poor (Siringi, 2002). Without such systems, the government cannot plan for oral health care and thus could not achieve its target by 2012. Previous studies have shown that Kenya is mainly faced by oral diseases such as dental caries, periodontal diseases, malocclusion, and oral cancer (Kaimenyi, 2004) which are reversible if detected and addressed early at onset. Unfortunately, only minimal oral health services are provided at public facilities (Siringi, 2002) and most of these diseases are only detected at advanced stages and thus difficult and costly to treat. In Kenya, estimates indicate that there is only one dentist per 50,000 persons of which more than 80% are located in the urban areas and serve less than 10% of the population (MOMS, 2011). In addition, many Kenyans are unaware of the causes of dental disease and half of the population is unaware of the preventive measures for dental diseases (Barber, 2010). Moreover, only a small proportion of the amount allocated to the Ministry of Health goes into the dental sector (Siringi, 2002).

The World Health Assembly of 2007 formulated key priority areas for oral health including promotion of oral health in schools, aiming at developing healthy lifestyles and self-care practices in children and young people (WHO, 2007). An integrated approach that combines school health policy, skills-based health education, a health-supportive school environment and school health

services can tackle major common risk factors and contribute to effective control of oral disease. As such, this study was designed to assess the level of knowledge, attitude and practice towards oral health among the pupils in Westlands, Nairobi and to determine the oral health seeking behaviours of these children.

1.2 Problem Statement

Oral diseases qualify as major public health problems afflicting children in Kenya with dental caries as one of the most common oral disease of public health concern in children (Petersen *et al.*, 2005). Studies done in China by Peterson *et al.* (1995); Petersen *et al.* (2002), and Zhu *et al.* (2003) showed that a considerable number of mothers and children had limited knowledge of the causes and prevention of the most common oral diseases. According to Rajab *et al.* (2002), schoolteachers' oral health knowledge in Jordan was similarly unsatisfactory. Studies in Tanzania showed that most children grow into adulthood with inadequate oral health care advice from their caretakers, schools or dentists (Petersen and Mzee, 1998).

Since poor oral health in childhood often continues into adulthood, investing in oral disease prevention and health promotion is the most cost effective tool in the long term than focusing on treatment of oral diseases (Truong, 2003). During childhood, children develop beliefs, attitudes and gain knowledge on vital health and social behaviour (WHO, 2000). They are easily influenced and therefore, proper oral health care habits can be established earlier in life for

longer lasting impact. Children also get equipped with personal skills to enable them make healthy decisions to adopt a healthy lifestyle (WHO, 1996). Successful prevention must begin as early as possible hence the need to target children (Okullo *et al.*, 2008). Barber (2010) documented that majority of Kenyans, children included were unaware of the causes of dental diseases and half of the population was unaware of the measures that could be taken to prevent dental diseases. Studies in Uganda reported that children of higher socio-economic status are most severely affected by dental caries (Okullo *et al.*, 2004). Westland's County has a mixture of persons of different economic standing with different oral health issues. An assessment of oral health knowledge, attitudes and practice is essential since no documentation of a similar study has been done particularly on children, which not only make this study relevant but also urgent.

1.3 Justification of the study

This study assessed the knowledge, attitude and practice of children between 9 and 12 years attending primary schools in Westlands, Nairobi County. Since there is scanty information in this area, understanding the pupils' oral health knowledge, attitudes, practices and oral health seeking behaviour will be very important in generating vital information that could assist in the planning policy formulation or program intervention. The findings of this study could assist policy makers in investing resources in schools for oral health to perpetuate improved oral health practices and self-care practices in children to

address one of the key priority actions as outlined by the World Health Organization (WHO, 2007).

1.4 Research questions

1. What are the levels of oral health knowledge among 9-12 year old primary school pupils in Westlands-Nairobi County?
2. What are the attitudes influencing oral health among 9-12 year old primary school pupils in Westlands-Nairobi County?
3. What are the oral health practices among 9-12 year old primary school pupils in Westlands-Nairobi County?
4. What are the oral health seeking behaviours among pupils age 9-12 years in Westlands-Nairobi County?

1.5 General Objective

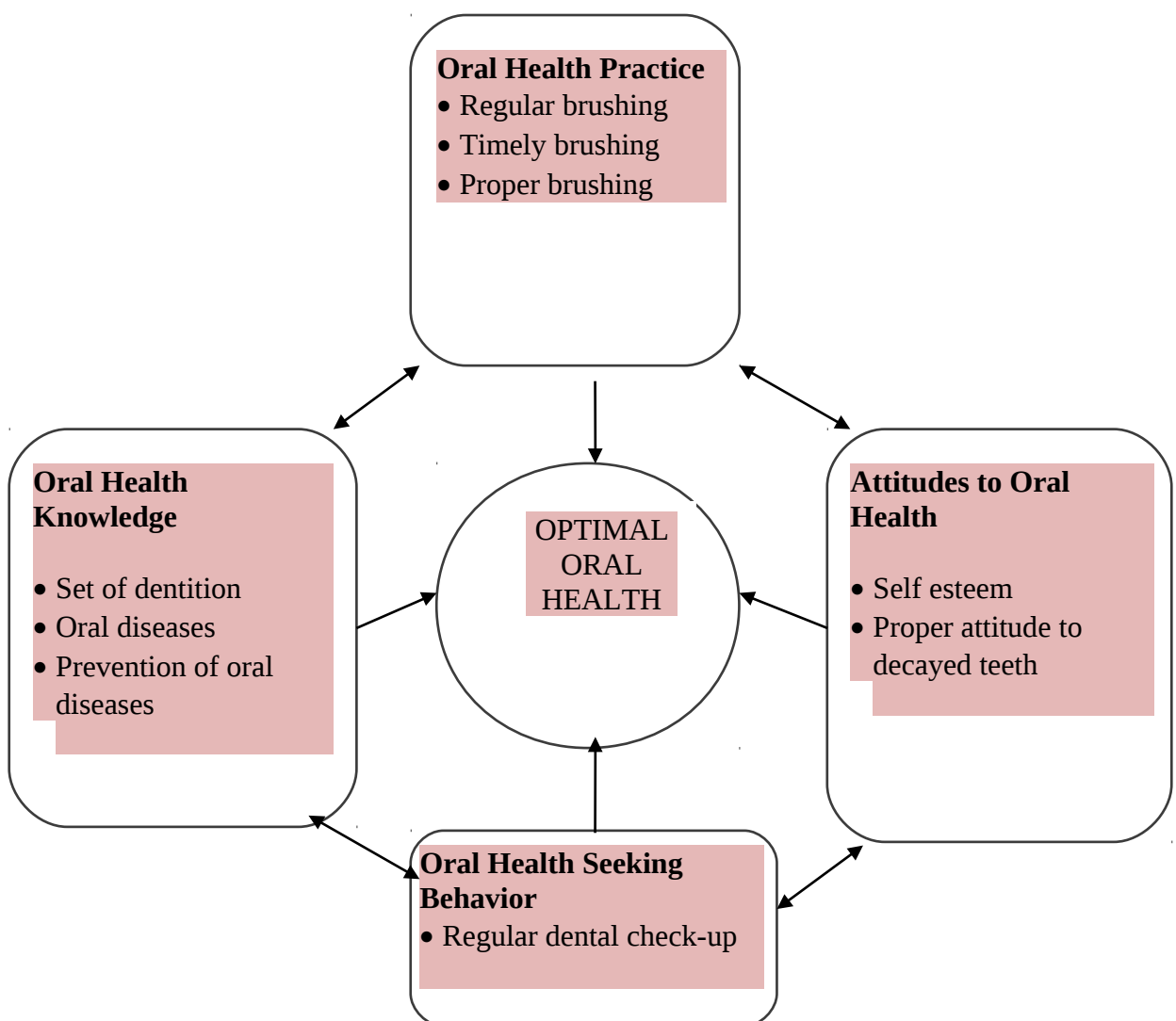
To determine the knowledge, attitudes, practices and health-seeking behaviours influencing oral health among 9-12 year old primary school pupils in Westlands, Nairobi County, Kenya

1.5.1 Specific Objectives

1. To determine the oral health knowledge among 9 - 12 year old primary school pupils in Westland's Nairobi County, Kenya
2. To determine the attitudes influencing oral health among 9 - 12 year old primary school pupils in Westland's Nairobi County, Kenya

3. To determine the oral health practices among pupils 9-12 year old in Westland's Nairobi County, Kenya
4. To determine the oral health seeking behaviours among pupils 9 -12 year old in Westland's, Nairobi County, Kenya

1.6 Study conceptual framework



Source: Developed by researcher

1.7 Limitations of the study

Time and financial resource limitations did not allow for a country wide study on all school children and therefore this study was restricted to Westlands, Nairobi County and targeted children in primary schools in Westlands. Further, the study relied on information provided by the pupils.

CHAPTER TWO: LITERATURE REVIEW

2.1. Definition of Oral Health

The World Health Organization (WHO) defines oral health as the "*absence of disease and the optimal functioning of the mouth and its tissues, in a manner that preserves the highest level of self-esteem*" (WHO, 1999).

2.2 Oral Health Conditions

Oral diseases or conditions such as dental caries, periodontal disease, tooth loss, oral mucosal lesions, oropharyngeal cancers, oral manifestations of HIV/AIDS, necrotizing ulcerative stomatitis (noma), halitosis (breath odour) and orodental trauma, is a major public-health problem worldwide (WHO, 2007). This has a negative impact on individuals and communities causing insurmountable pain and suffering, impairment of function and reduced quality of life. According to WHO (2001), while there have been improvements in dental health over the past decade there is not a single country that is free from oral diseases. While there is a significant decline in tooth decay in some developed countries during the past few decades, a large number of children worldwide are still suffering from the disease, much of which is active and untreated, leading to toothache and restricted activities (WHO 2003).

In studies done in the USA, dental caries was the most common chronic disease suffered by children five times more prevalent than asthma and seven times more prevalent than hay fever (Fos and Hutchison, 2003). At present the

distribution and severity of dental caries vary with an average Decayed, Missing and Filled Teeth (DMFT) scores for the 12 year-olds of 3.0, 2.6 and 1.7 in the American, European and African continents, respectively (Petersen *et al.*, 2005). It is estimated that more than 51 million school hours in the U.S are lost annually due to dental-related problems (Fos & Hutchison 2003,).

The WHO report (2000) attributes high risk of oral disease to socio-cultural determinants such as poor living conditions, low education, lack of traditions, beliefs and culture in support of oral health. Communities and countries with inappropriate exposure to fluorides, poor access to safe water or sanitary facilities or lifestyle behaviours that affect general health such as tobacco use, excessive alcohol consumption and poor dietary choices, affect oral and general health. According to Medina-Solis *et al.* (2006), low socio-economic status is also related to high prevalence of oral health problems. These studies was conducted on oral health status among 2939 Mexican children aged 6 to 12 years and were able to identify important relationships between dental caries and lower socio-economic conditions among the study group. According to an epidemiological study conducted by Kumar *et al.* (2005) among school going children aged 5 years and 12 years in Chennai city, India among 1200 randomly selected children, dental caries was the most prevalent disease, affecting permanent teeth more than primary teeth. The study indicated that the prevalence was higher in public schools compared to private schools thus implying that socio-economic status influenced oral hygiene among 12 year olds. However, in a study done in Uganda reported the opposite, that children

of higher socio-economic status are most severely affected by dental caries (Okullo *et al.*, 2004).

Further, the incidence of dental diseases is increasing in many developing countries in Africa, largely due to a growing consumption of sugars and inadequate exposure to fluorides (WHO, 2007). In Kenya, earlier studies indicated that the prevalence of periodontitis was 1-10% while the prevalence of ulcerative lesions was 0.12% with cleft lip and palate being the most common birth defects (Kaimenyi, 2004). According to Kaimenyi (2004), urban populations (more so in Nairobi) under 18-years of age have a mean DMTF of 0.2-1.8 with 12-15 year olds having a DMTF of 1.2-1.9 while the handicapped children aged between 5-15 years have an average DMTF of 0.8. The prevalence is also higher in females than in males.

The control of oral diseases depends on availability and accessibility of oral health systems. Clinical and public health research has shown that a number of individual, professional and community preventive measures are effective in preventing most oral diseases (WHO, 2000 and 2007). Good personal oral hygiene practices, including brushing and flossing are important in the control of gingivitis and advanced periodontal lesions (Norinah, 2002; Zhu *et al.*, 2003). According to WHO (2000), community water fluoridation is effective in preventing dental caries in both children and adults while salt and milk fluoridation schemes are shown to have similar effects when used in community preventive programmes. Individuals can take action for themselves and for persons under their care, to prevent disease and maintain health with

interventions including appropriate diet and nutrition, primary prevention of many oral, dental and craniofacial diseases (WHO, 2000).

2.3. Knowledge on Oral Health

Studies by Zhu, Petersen and Wang *et al.*, (2003) showed that a large number of children in many developing countries have limited knowledge on the causes and prevention of common oral diseases. Studies in Tanzania indicated low oral health knowledge among mothers and school teachers and that more than 50% of mothers had received oral health advice from a dentist (Petersen and Mzee (1998). Other studies indicated that Indian children had low level of oral health awareness and practice as compared to their western counterparts (Harikiran *et al.*, 2008). However, studies by Zhu, Petersen and Wang *et al* (2003) illustrated that only a small proportion of children, parents and school teachers were aware of the harmful effects of hidden sugars and sugary drinks. It is therefore important to improve the children awareness, attitudes and behaviour towards oral health.

2.4 Oral Health attitude

Attitude is an acquired characteristic of an individual. People demonstrate a wide variety of attitudes towards teeth, dental care and dentists. These attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs, and other life situations and they strongly influence the oral health behavior. Evidence has shown that people with more positive attitude towards oral health are influenced by better knowledge in taking care of their teeth (Smyth *et al.*,

2007). The change to healthy attitude and practice can be occurred by given adequate information, motivation and practice of the measures to the subjects. Positive attitude towards importance of tooth brushing for caries prevention was observed in a study in Burkina Faso by Varenne *et al.*, (2006) where majority of children in urban areas reported that tooth cleaning and regular dental visits may prevent oral diseases. According to new research published in the April 2010 Journal of Periodontology, women have a better understanding about what good oral health entails along with a more positive attitude toward visiting the dentist (2010 American Dental Association). Similarly, Vermaire *et al* (2010) in a study among parents in Amsterdam found less caries in children whose parents had a better attitude toward dentistry. In a study by Wyne *et al.*, (2004) Saudi school children had positive attitudes toward their dentists; nevertheless, they indicated that they feared dental treatment. However little is known about oral health attitudes and behavior of children from developing countries as comparison with developed countries thus the need to carry out this study (Harikiran *et al.*, 2008)

2.5 Oral Health Practices

As part of oral hygiene routine self-care, it is recommended by WHO (2003) that children should clean their teeth and gums twice a day. However, in many countries the proportion of children who brush their teeth every day is low (Petersen and Mzee, 1998). A large number of children do not clean their teeth (Zhu *et al.*, 2003). Some may not have access to a toothbrush (Mishra, 2003). The use of traditional cleaning aids such as ‘*Miswaki*’, a traditional chewing

stick, is common in some communities (Petersen and Mzee, 1998). Furthermore, the availability, affordability and quality of fluoride toothpaste remain a major problem in developing countries (Van, 2002). Only a small proportion of children use fluoridated toothpaste (Petersen, Wang and Zhu, *et al.*, 2003). In several countries, many households also do not have access to safe water for drinking, let alone for cleaning teeth (Petersen and Mzee, 1998). The relationship between diet and oral disease is also well established in WHO report on health behaviour in schoolchildren (WHO, 2003). According to the report, healthy dietary behaviours are essential to growth and development and to maintain good oral health. However, a high proportion of schoolchildren aged 11 to 17 years consume sugary snacks daily and over 50% of 15-year-old children drink at least one can of soft drink each day (WHO, 2003).

A study conducted by Mishra (2003) suggests that a large number of children have not visited a dentist by the time they start school. In some countries, a significant proportion of school children have never visited the dentist. For example, in Tanzania, over 75% of 12-year-old children have never been to the dentist (Petersen, Nyandindi and Kikwilu *et al.*, 2002). Consequently, few have preventive oral care. Many children go to see the dentist when in pain, an experience that may have a lasting effect through life and prove to be detrimental to oral health. Therefore, it is clear that a balanced and healthy diet, and proper knowledge and attitude towards oral health care is important in reducing the risk of getting oral diseases and other general health conditions.

2.6 Oral Health Seeking Behaviour

Studies in Burkina Faso showed that the knowledge, attitude and practices on oral health were low with only 36% of children and adults reported to have brushed their teeth (Verenne *et al.*, 2004). Globally, studies show association between poor oral hygiene and sugar intake (Petersen, 2009; WHO, 2007). Previous studies in Dodoma and Morogoro, Tanzania, on adults revealed that 95% of people in Dodoma and 85% in Morogoro sought treatment because of pain (Petersen *et al.*, 1991). Razak *et al.* (1987) in a study on the dental needs, demands and patterns of service utilization in a selected Malaysian urban population found that toothache accounted for the most frequent overall dental complaint. Kyale *et al.*, (2009), reported parents in Nairobi are the key main source of oral health motivation (96.7%) indicating that poor oral health practices by parents influences that of their children.

Selikowitz *et al.* (1986) in a study of Pakistani immigrants in Norway found a higher utilization of dental services among women than in men. Further, he cited cost as a major deterrent for seeking treatment which is one of the reasons why people do not consult a doctor when they are sick. A study in Hong Kong among two age groups 35-44 year olds and 65-74 year olds revealed a greater utilization of dental services with 43% utilization reported among the younger age group as opposed to the older age group by 23%. The majority in both groups who did not visit a dentist did not think they had a condition that required treatment (Verene *et al.*, 2006).

CHAPTER THREE: MATERIALS AND METHODS

3.1 Study Area

This study was conducted in Westlands, Nairobi County. Westlands is one of the eight districts in Nairobi County. It is located 3.1 kilometers North West of the Nairobi Central Business District and has six locations: Parklands, Kitisuru, Highridge, Kangemi, Kilimani and Lavington. It lies at coordinates $01^{\circ} 16' 12S$ and $36^{\circ} 48' 36E$ at an elevation of 1,700 meters above sea level. The total population of the district is 247,102 (CBS, 2010) while the population of the children 9 to 12 in school is estimated at 14,336 (MOE, 2011). The district covers an area with varied economic status; ranging from the economically endowed up-market area to the middle class and the informal settlement areas (slums). The schools in this district follow a similar pattern with high cost schools, the public schools and the very poor schools within the slum areas of Kihumbuini and Kangemi. The main health problems in the district are respiratory diseases, diarrhoea, malaria and injuries (MOH, 2010).

3.2 Study Design

The study employed a cross-sectional design which allowed a single point in time determination of factors affecting oral health in school children age 9 -12 years in Nairobi.

3.3 Study Population

The study population constituted pupils aged between 9 and 12 years, primarily in standard four to seven attending primary schools in Westlands, Nairobi

County. This age was significant as it reflects the status of mixed dentition and the progressive status of permanent dentition (Batwala *et al.*, 2007). Children at this age conduct oral hygiene on their own without parental supervision and only require gentle reminders

(<http://www.sandypointdental.com/kids.html> accessed on 13th March 2012).

3.4 Dependent and Independent Variables

Table 3.1 highlights the independent and dependent variables in this study.

Independent variables		Dependent variable
Oral health knowledge	By <ul style="list-style-type: none"> • Age • Gender • School type 	Optimal oral health
Oral health attitudes		
Oral health practices		
Oral health seeking behaviors		

3.5 Sample Size Determination

(i) Schools

The number of schools that participated in the study were determined using the formula:

$$n = \frac{N}{1 + N(e)^2} \quad (\text{Israel, 1992})$$

Where n - is the schools sample size

N - is the total population of the schools under consideration (48)

e – Power of the study, set at 80%

$$n = 48/1+48 (0.2)^2$$

$$n = 16 \text{ schools}$$

(ii) Pupils

Sample size was determined using the formula for Single Population-Proportion (Fisher *et al.*, 1983)

$$n = Z^2 [p (1-p)]/d^2$$

Where

n = the required sample size

z = critical value associated with significance set at 1.96 at 95% confidence level

p = proportion of the population estimated to have a particular characteristic being measured; proportion of children with dental caries was used which is estimated at 46% (NOHP, 2002-2012).

$$q = 1-p$$

d = precision (margin of error) set at 5%

$$\text{Thus } n = \frac{1.96^2 \times 0.46 \times 0.54}{0.05^2} = 381$$

$$0.05^2$$

Non-response rate of 10% anticipated.

New sample size = n1

$$n1 = n/1-R = 381/1-0.1 = 423$$

3.6 Sampling Methods

Westlands district was selected using purposive sampling method from the eight districts in Nairobi County due to having different economic strata: 1) very high cost primary schools where children of the well-to-do persons attend; 2) schools where the middle class children attend; and 3) very low cost schools in the informal settlements. Since the district has the three school categories, the schools were stratified in three strata: 1) C private high cost schools; 2) B public schools not in the informal settlement areas; and 3) A schools in the slum areas some of which are private but of very low cost. A sample size of 16 schools was used as shown in section 3.5 above and the number of schools in each stratum was allocated proportionate to the total number of primary schools in the strata - Table 3.2. Simple random sampling was employed to select the schools to participate in the study where the schools from each strata were listed on pieces of paper which were later folded and mixed thoroughly. The desired number of schools per strata was randomly picked. The sample size of the pupils to participate in the study in each school was divided proportionately according to the number of the pupils in the schools that meet the inclusion criteria. Simple random sampling was used to achieve the desired sample per school. Pupils 9-12 years were selected using systematic random sampling with the help of school authorities.

Table 3.2 Schools classified into 3 strata

Strata	Total Schools	No. selected	Sample size
A-Schools in informal areas	22	7	185
B-Public schools not in informal areas	15	5	132
C-Private high cost schools	11	4	106
TOTAL	48	16	423

3.7 Inclusion Criteria and Exclusion Criteria

The study included all pupils aged 9-12 years from the selected schools in Westlands district who assented to participate in the study and their parents granted consent. The study excluded pupils who did not meet above criteria.

3.8 Data Collection

Data was collected using a pre-tested questionnaires adopted from Petersen et al. (2000) which were administered to pupils at their schools. To ensure quality of data, research assistants were trained on the use of the research tools and were supervised closely by the researcher. Before interviewing the pupils, the school heads provided the list of pupils who met the inclusion criteria. Pupils were then randomly selected and provided with consent forms to take to their parents. Those who brought back signed consent forms by their parents/guardians and also assented to participate in the study were then interviewed. In each class, the research assistants then read out the questions and explained the responses to the pupils before asking each pupil to tick or

write the appropriate answer. Each pupil sat at their desk and responded alone (no group responses). Class teachers were always present during the interviewing process to help with any clarification that needed their intervention.

3.9 Data Management and Analysis

Data was checked for completeness and accuracy while still at the field. Recorded questionnaires were then stored safely after which they were entered into excel, cleaned and coded. Data was then exported into the statistical package for social sciences (SPSS version 17.0), to perform statistical analysis. Data was analyzed in SPSS version 17 using univariate (frequency tables and proportions), bivariate (chi-square tests). Chi-square tests were to generally show if there existed association or relationship of factors between variables which were statistically significant. All tests were two-tailed and $P < 0.05$ was used for statistical inferences.

3.10 Ethical Consideration

Research and ethical clearance to conduct study was obtained from the Kenyatta University ethics committee and research permit from, Ministry of Higher Education, Science and Technology, Ministry of Education. The legal guardian or parent of each pupil was contacted to give a written consent while each assenting pupil participated in the study voluntarily. Confidentiality was ensured throughout.

CHAPTER FOUR: RESULTS

4.1 Univariate Analysis

4.1.1 Demographics

A total of 436 pupils in 16 schools participated in this study. The schools were categorized into: Type A which are low cost schools in the informal settlements, Type B which are government schools and Type C which are the high cost private schools. Of the 436 pupils, 186 (43%), 142 (32%) and 108 (25%) were from school type A, B and C respectively and were 248 (57%) girls and 188 (43%) boys as shown in Figure 4.1 below. The range of the age of pupils who participated in the study was from 9 to 12 years with a mean of 10.6 years (S.D1.08).

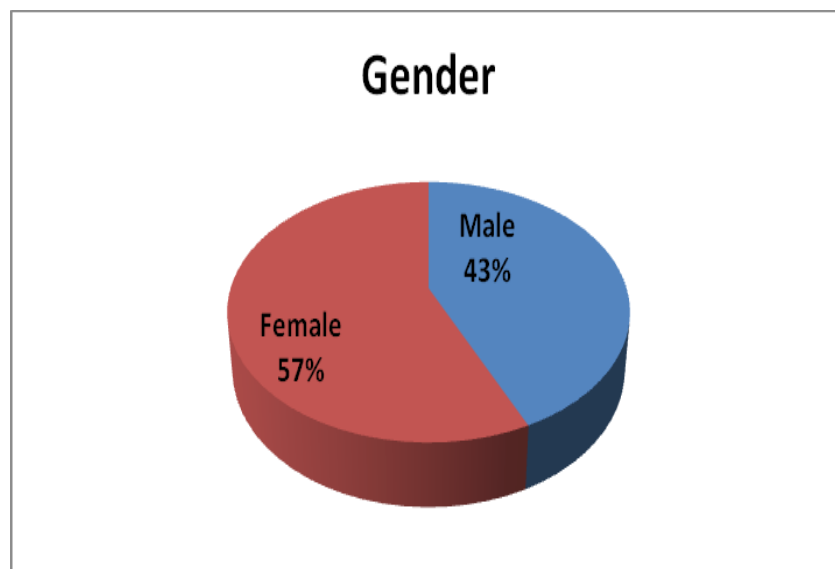


Figure 4.1 Gender distribution among the respondents

4.1.2 Oral Health Knowledge

Oral health knowledge was assessed using the WHO 2005 oral health standard which assesses knowledge in terms of causes and prevention. In this study, oral health knowledge was assessed based on knowledge on dentition, general knowledge on oral health, source of information on oral health, common dental conditions and prevention of dental decay. The results showed that almost half (44%) of the pupils correctly stated that they had 2 sets of teeth while 18% did not know how many sets of teeth one had. The other respondents said; 1 set (4.6%), 4 sets (20%) and 3 sets (13.5%) respectively. This implied that 56% of the children interviewed did not have the correct knowledge on their dentition. Approximately 6 of every 10 pupils interviewed said that there were 20 complete set of milk teeth (58%) which was correct. The other pupils said 10 (12%), 16 (13%), and 32 (6%) teeth respectively. Only 48 (11%) did not know how many milk teeth there were. Similarly, 58% of the pupils correctly stated that there were 32 complete set of permanent teeth. Those who stated 16, 20, 24 and don't know were 15%, 5%, 13% and 8% respectively meaning that 42% did not know how many permanent teeth an individual has. Table 4.1 below shows pupils general knowledge on general oral health issues.

Table 4.1 General knowledge of oral health issues

Questions	False (%)	True (%)
Sweets affect the tooth badly	31 (7)	405 (93)
Fizzy drinks like soda affect the teeth badly	174 (40)	262 (60)
It is important to brush teeth at least twice a day with a toothpaste and toothbrush	41 (9)	395 (91)
Brushing teeth prevents tooth decay	162 (37)	274 (63)
Using fluoride destroys teeth	305 (70)	131 (30)
Regular visits to the dentist is necessary	74 (17)	362 (83)

When asked about where they got most of their oral health information, the pupils responded thus: Radio 18 (4%), TV 95 (22%), Oral Health educators 276 (63%), Shopkeepers 1 (0.2%), Newspapers/Magazines 12 (3%), My parents/guardians 32 (7%) and Friends 2 (0.5%). Two pupils (0.4%) mentioned teachers as their greatest source of oral health information.

Two thirds (66.7%) of the pupils who participated in the study correctly indicated that one should change tooth brushes every 1 to 3 months. A further 66 (15%) said every 4 to 6 months with the remaining 26 (6%) and 19 (4%) reported every 7 to 12 months and over 12 months respectively. Seven percent (7.3%) did not know how often they should change their tooth brushes. This indicates that most of the pupils (90%) knew that changing toothbrushes regularly was vital with only 10% unaware of the importance of changing toothbrushes. When asked what plaque was, the pupils responded thus: soft deposit on teeth 68 (16%) which was correct; hard deposit on teeth 123 (28%); discoloration of teeth 72 (17%), gum inflammation 95 (22%) and 78 (18%) did not know what it was. These results show that 84% of the interviewed pupils

did not know what plaque is. A vast majority of the respondents (86%) related gum bleeding to gum disease or inflammation with 29 (6.7%), 12 (2.8%), and 20 (4.6%) associating it with calcium deficiency in the body, healthy gums and not knowing what it was respectively. Regular brushing of teeth with fluoridated tooth paste 157 (36%) and at least two regular visits to the dentist in a year 127 (29%) were cited as the main methods of preventing dental decay. Eating a balanced diet was cited by only 44 (10%) while 108 (25%) felt that all the three responses would prevent dental decay. The results clearly indicate that 75% of the children did not know how dental decay could be prevented as shown in Table 4.2

Table 4.2 Knowledge on prevention

	Frequency	Percent
Eating balanced diet	44	10.1
Regular brushing with fluoride tooth paste	157	36.0
Regular visit to dentist (twice a year)	127	29.1
All above	108	24.8
TOTAL	436	100

On table 4.2 above, 10.1%, 36%, 29.1% and 24.8% reported eating balanced diet, regular brushing of teeth with fluoride tooth paste and a combination of above as the ways they knew of preventing oral health diseases.

The overall level of oral health knowledge based on all variables above showed that nearly half of the pupils (51%) exhibited high oral health knowledge while 49% had low knowledge as shown in Table 4.3.

Table 4.3 Overall oral health knowledge

Level of knowledge	Frequency	Percent
Low knowledge	212	49
High knowledge	224	51
Total	436	100.0

4.2.0 Oral Health Attitude

Almost three quarters (73%) against 23% of the pupils felt that decayed teeth can affect the appearance of a person with only 4% saying they did not know whether it affected ones appearance or not.

Table 4.4 below shows how the pupils interviewed perceived the conditions of their teeth and gums. Two thirds (64%) of them felt that their teeth and gums were either in excellent or very good condition with only 5% and 4% perceiving their teeth and gums' condition as poor.

Table 4.4 Personal perception of condition of teeth and gums

Condition	Teeth (%)	Gums (%)
------------------	------------------	-----------------

Excellent /very good	278 (64)	280 (64)
Good/Average	134 (43)	129 (30)
Poor/very poor	20 (5)	18 (4)
Don't know	4 (1)	9 (2)

Majority (83%) of the pupils thought regular visits to the dentist are necessary. Two percent (2%) did not know whether it was necessary or not to have regular dental check-up while 15% did not find such visits necessary altogether. Equally, 83% of the interviewees did not think it important to replace missing natural teeth with artificial teeth whilst 15% thought otherwise and a paltry 2% did not know whether it was not necessary or not. A large proportion of respondents 297 (68%) and 120 (27%) of the pupils thought that it was important and not important respectively to seek treatment for toothaches just as other parts of the body. It is correct therefore to deduce that all the pupils who participated in the study had the right attitude to oral health.

Table 4.5 Oral health attitude

Issue	Yes (%)	No (%)	D.K. (%)
I am not satisfied with the appearance of my teeth	156 (36)	263 (60)	17 (4)
I often avoid smiling and laughing because of my teeth	93 (21)	332 (76)	11 (3)
Other children make fun of my teeth	86 (20)	338 (76)	12 (3)
Toothache or discomfort caused by my teeth forced me to miss classes at school or for whole days	105 (24)	318 (73)	13 (3)
I have difficulty biting hard foods	154 (35)	277 (64)	5 (1)
I have difficulty in chewing	85 (20)	342 (78)	9 (2)
I have difficulty taking cold or hot foods	161 (37)	266 (61)	9 (2)

Table 4.5 above shows that 36%, 21% and 20% of the study participants were not satisfied with the appearance of their teeth, avoided smiling because of their teeth and had been made fun of by other children respectively. Similarly, 35% of the respondents had difficulty in biting hard foods, 20% had difficulty in chewing and 37% had difficulty in taking cold or hot foods.

Overall, majority of the respondents (61.9%) had negative attitudes on oral health while 38.1% exhibited positive attitudes as shown in table 4.6. This was a composite measure of the entire attitude variable measured.

Table 4.6 Overall attitude towards oral health

Variable	Frequency	Percent
Positive attitude	166	38.1

Negative attitude	270	61.9
Total	436	100.0

4.3.0 Oral Health Practices

Most of the pupils recorded brushing their teeth once (14%) or twice (59%) a day with a fluoridated toothpaste and toothbrush. Even though none of the children said they had never brushed their teeth before the interview, several (4) cited that they did not brush at times because they could not afford tooth paste or tooth brush while others (4) cited brushing as unimportant and not liking it altogether as the reasons that made them not brush their teeth. Ten (10) pupils reported using a combination of toothbrush, wooden and plastic toothpicks as well as chew sticks to clean their teeth or gums; 13 had used a toothbrush, wooden and plastic toothpicks; 79 had used a toothbrush and wooden toothpicks and; 418 had used a toothbrush only. Only 10 pupils reported using salt to clean their gums and teeth.

Almost half (44%) of the pupils indicated that they brushed their teeth in the morning after breakfast and before going to bed. The other reported either not brushing their teeth or brushing before breakfast. Ninety two (92%) of the pupils who brushed their teeth reported cleaning their tongue whilst brushing. Other variable used to measure oral health practices were how often the respondents took certain foods or drinks that have a bearing on oral health. More than three quarters of the children reported to frequently take inappropriate feeds as sweets or candy (80.3%), while 84.4% reported to have

frequently taken cakes and sweetened drinks. It is recommended that one visits a dentist at-least twice a year. In this study, 128 (29.4%) had not visited a dentist in previous 12 months, 268 (61.4%) had visited a dentist once or more while 40 (9.2%) could not recall if they had visited a dentist. A composite measure of oral health practices measured above showed that 244 (56%) respondents had appropriate oral health practices while 192 (44%) had inappropriate practices as shown in Table 4.7.

Table 4.7 Composite oral health practices

Practice	Frequency	Percent
Appropriate oral health practices	244	56
Inappropriate oral health practices	192	44
Total	436	100

4.4.0 Oral Health-Seeking Behavior

Table 4.8 below shows that 24%, 35% , 20% and 37% had been forced to miss school due to a tooth discomfort, had difficulty biting hard foods, difficulty in chewing and difficulty in taking and cold/hot foods respectively.

Asked if in the last 12 months any of the respondents had had a toothache or felt any tooth discomfort, 39% reported never experiencing any, while 15%, 14% and 26% reported experiencing these symptoms often, occasionally and rarely respectively. Therefore 55% of the children had dental conditions needing attention. Only 6% did not know if they had experienced discomfort or

toothaches. A cumulative 61.4% of all pupils interviewed had had at least one visit to the dentist within the last 12 months.

Of those who had visited a dentist in the year prior to the interview, 166 (53%) had some sort of trouble with their teeth or gums while 33% cited follow-up treatment as the reason for visiting the dentist meaning 86% of the pupils have had dental diseases at one point or another. For those who had not visited a dentist in the last 12 months, 40% said that fear of painful treatment had made them not visit, a cumulative 17% cited distance and long waiting time at the dental clinic and 20% said treatment was too costly.

4.4.1 Reasons for not visiting dentist

Majority of the children (68%) cited fear as the main reason for not visiting a dentist with fear of pain being the main fear (40%), followed by fear of losing a tooth (14%) and fear of infection at 4%. A significant proportion (20%) cited high cost of treatment as the main reason as shown in Figure 4.2.

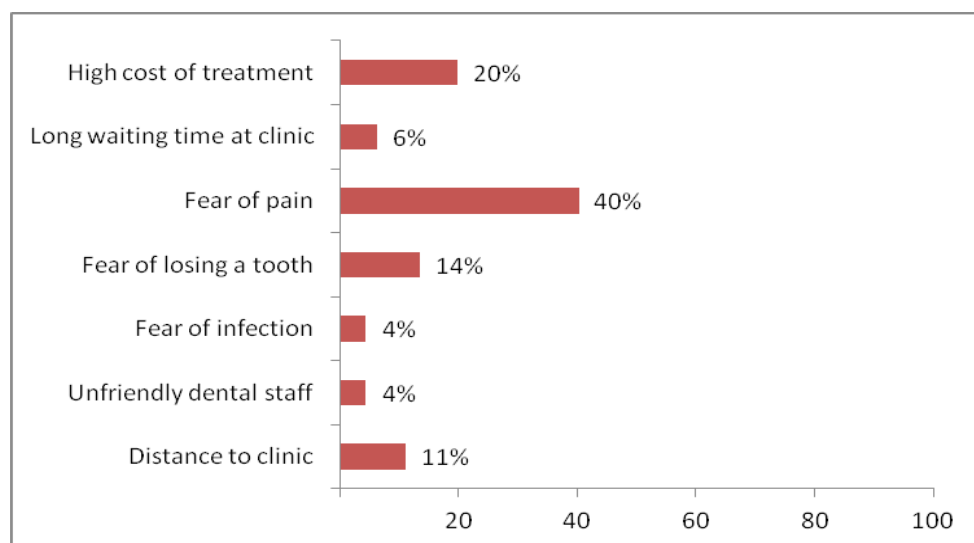


Figure 4.2 reasons for not visiting a dentist

4.5.0 Bivariate Analysis

4.5.1 Oral health knowledge

To measure the pupil's knowledge on oral health, they were asked specific questions relating to general dental formation and ailments. Specifically, they were asked how many sets of teeth they had; how many milk and permanent teeth they had and what plaque and gum bleeding meant and a composite measure of the variables done. The composite knowledge was compared with the type of school, age of child and child's gender as shown in Table 4.8.

Table 4.8 Oral health knowledge and type of school, age of child & gender

Variable		Dental health knowledge		χ^2	P value
		Low knowledge	High knowledge		
Type of school	A	103 (56%)	82 (44%)	9.495	0.009
	B	69 (43%)	111(78%)		
	C	40 (37%)	99 (92%)		
Age of child	9	16 (21%)	61 (79%)	33.735	<0.001
	10	63 (47%)	70 (53%)		
	11	65 (61%)	42 (39%)		
	12	68(57%)	51 (39%)		
Gender	F	117 (47%)	131 (53%)	0.482	0.488
	M	95 (50.5%)	93 (49.5%)		

From this table, the type of school the child attended and child's age had a significant statistical association with oral health knowledge ($\chi^2= 9.495$; $p = 0.009$; $\chi^2= 33.735$; $p = <0.001$). Respondents from Type C School had higher knowledge compared to those from other schools while the younger respondents had better oral health knowledge. Gender had no statistically significant association with oral health knowledge.

4.5.2 Oral health attitude

The association of the respondents' overall attitude towards oral health and age of child, gender and type of school attended was checked. The results are shown in Table 4.9.

Table 4.9 Composite attitude and type of school, age of child and gender

Variable		Composite attitude on oral health		χ^2	P value
		Positive attitude	Negative attitude		
Type of school	A	68 (37%)	117 (63%)	0.560	0.756
	B	58 (41%)	85 (59%)		
	C	40 (37%)	68 (63%)		
Age of child	9	27 (35%)	50 (65%)	5.681	0.128
	10	45 (34%)	88 (66%)		
	11	38 (36%)	69 (64%)		
	12	56 (47%)	63 (53%)		
Gender	F	76 (40%)	112 (60%)	0.776	0.379
	M	90 (36%)	158 (64%)		

From the results as shown in this table, there was no significant association between the respondent's overall attitude and the type of school attended, the respondent's age and gender with all p values greater than 0.05.

4.5.3 Oral Health Practice

The respondents' overall practices were compared with the age of child, gender and type of school attended. The results are shown in Table 4.10.

Table 4.10 Oral health practices and type of school, age and gender

Variable		Oral health practices		χ^2	
		Inappropriate oral health practices	Appropriate oral health practices		
Type of school	A	91 (49%)	94 (51%)	37.946	P=0.003
	B	78 (55%)	65 (45%)		
	C	75 (69%)	33 (31%)		
Age of child	9	56 (73%)	21 (27%)	28.903	P= <0.001
	10	89(67%)	44 (33%)		
	11	48 (48%)	59 (55%)		
	12	51 (43%)	68 (57%)		
Gender	F	142 (57%)	106 (43%)	0.0391	P=0. 532
	M	102 (54%)	86 (46%)		

The type of school a respondent attended had statistically significant association with oral health practices ($\chi^2=37.946$; $p= 0.003$). Respondents from Type C schools which are the high cost private schools portrayed more inappropriate oral health practices compared to those from other schools. Similarly, the age of respondents was significantly associated with oral health practices ($\chi^2=28.903$; $p= <0.001$) with children aged 12 years showing better practices. There was no statistically significant association between gender and oral health practices.

4.5.4 Knowledge and Oral health attitudes

Knowledge on oral health was compared with oral health practices to determine whether knowledge did influence attitudes. The results are shown in Table 4.11 below.

Table 4.11 Influence of Knowledge on oral health attitudes

		Composite attitude		χ^2	P - value
Dental health knowledge		Positive attitude	Negative attitude	0.536	0.955
	Low knowledge	26 (12%)	186 (88%)		
	High knowledge	140 (63%)	84 (37%)		

The results show that the respondents with higher knowledge also had more positive attitudes towards oral health and those who had low knowledge also had higher negative attitude, this association was not statistically significant ($\chi^2=0.536$; $p= <0.955$). The respondent's knowledge on oral health did not influence their attitudes.

4.5.5 Knowledge and Oral health practices

Knowledge could influence oral health practices. To check on the association between oral health knowledge and practices, the two were compared and results are in Table 4.12.

Table 4.12 Association between oral health knowledge and practices

		Oral Health practices	χ^2	P value

Oral health knowledge		Appropriate practices	Inappropriate practices	6.934	0.008
	Low knowledge	85 (40%)	127(60%)		
	High knowledge	159 (71%)	65 (29%)		

The table above shows that oral health knowledge does influence the oral health practices. Respondents with higher knowledge also had significantly higher appropriate oral health practices which was statistically significant ($\chi^2=6.934$; $p= <0.008$).

4.5.6 Oral health attitudes and Oral health practices

To check on the association between oral health attitudes and practices, the two were compared and results are in Table 4.13.

Table 4.13 Oral health attitudes and oral health practices

		Oral Health practices		χ^2	P value
Composite Oral health attitudes		Appropriate practices	Inappropriate practices	0.380	0.538
	Positive attitudes	96 (58%)	70 (42%)		
	Negative attitudes	148 (55%)	122 (45%)		

The table above shows that oral health attitude does not influence the oral health practices ($\chi^2=0.380$; $p= <0.538$).

4.5.7 Frequency of visiting a dentist

When asked whether the pupils had visited a dentist in the past 12 months, 64 (14.7%) had visited once, 59 (13.5%) twice while 145 (33.3%) visited the dentist more than three times. Those who had not visited a dentist in the 12 months prior to this study; or had never in their life visited a dentist or could not remember visiting a dentist were 57 (13.1%), 71 (16.3%) and 40 (9.1%) respectively. Dental problems were experienced by 236 (54.1%) of the pupils as shown in Table 4.14

Table 4.14: Dental problems versus visiting a dentist

		How often did you visit dentist in last 12 months						Total
		Once	Twice	Thrice or more	None in last 12 months	Never visited	Don't Know	
How many times in last 12 months did you have a dental problem	Often	11	11	23	8	5	6	64
	Occasionally	14	10	19	5	11	2	61
	Rare	20	18	40	11	12	10	111
	Never	19	17	58	26	38	14	172
	Not sure	0	3	5	7	5	8	28
Total		64	59	145	57	71	40	436

Of the 200 participants who reported to not have had a dental problem or those who were not sure, 98 (49%) had not visited a dentist. Similarly, of the 236 participants who had had a dental problem, 70 (29.7%) did not visit a dentist.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS & RECOMMENDATIONS

5.1 Discussion

This study assessed oral health knowledge, attitudes, practices and health seeking behaviours of 9-12 year-old pupils in Westland's area of Nairobi. Overall, there were varied levels of knowledge, attitude, practices and health seeking behavior across the ages and type of school and the gender of the respondents.

5.1.1 Oral health knowledge

Basic oral health knowledge amongst the pupils interviewed is varied with less than half of the pupils (44%) knowing the correct set of teeth an individual can have. However, the pupil's knowledge of the actual number of milk or permanent sets of teeth was approximately 3 (58%) of every 5 pupils interviewed. General knowledge of causes and practices that would lead to tooth decay was high with 93% of the pupils correctly attributing decay to Sugary foods. Similarly 91% and 83% acknowledging that brushing teeth twice a day and regular dental visit were necessary in prevention of oral health related problems. The findings differ with those by Barber, 2010 who reported that half of the population in Kenya was unaware of preventive measures for dental diseases. These figures are much higher compared to 75% and 49% of participants who thought that brushing teeth prevented teeth and gum diseases and sweets caused teeth decay respectively (Harikiran *et al.*, 2008).

These findings are similar to two studies conducted in India: Prasad *et al* (2010) where awareness of the importance of tooth brushing for caries prevention was 60% and Varenne *et al* (2006) at 89%. This study established

that 22% of the children drew their knowledge on oral health from the television, a much lower figure compared to 58.4% who received information regarding oral health mainly via the same media in the study conducted by Harikiran *et al* (2008). In this study, only 30% of the respondents knew that fluoride can destroy teeth compared to 36.3% from the study by Harikiran *et al* (2008) while only 60% were aware that fizzy drinks like soda had adverse effects on teeth. The study results show that there existed no significant differences in knowledge of the set of dentition an individual has amongst the pupils when segregated either by their age, type of school attended or gender. Overall, about half of the children (51%) exhibited high level of oral health knowledge which differs with results of a study by Humagain (2011) who reported very high level of knowledge.

However, there was a statistical association between the type of school the pupils attended and their overall oral health knowledge. Age was significantly associated with the pupils' oral health knowledge with pupils aged 9 and 10 years having much higher knowledge. The researcher found that there was an ongoing oral health program in schools in Nairobi targeting children ages 6-9 years. Since this started in 2011, it could explain why in 2012 children aged 9 and 10 had higher knowledge. These findings are similar to results in studies conducted by Al Omiri *et al* (2005) and Humagain (2011) which reported high levels of knowledge on various aspects of oral health knowledge.

5.1.2 Oral health attitude

A majority (72%) of the pupils felt that decayed teeth affected the appearance of a person. Similarly, when asked for self-evaluation, most respondents (64%) felt that their teeth and gums were either in excellent or very good condition while less than 5% perceived their teeth and gums condition as poor. Similar results were also recorded by Prasad *et al* (2010) and Harikiran *et al* (2008) where 2.1% and 7% of the study participants considered their oral health status as poor. With 36%, 35% and 37% of the study participants not satisfied with the appearance of their teeth, having difficulty biting hard and cold/hot foods respectively and a further 76% and 78% avoiding smiling because they had been made fun of by other children and had difficulty chewing respectively. It is very clear that oral health has a direct impact on the quality of life especially in growing and school going children. In their study, Harikiran *et al* (2008) 21.9% of study participants avoided smiling and laughing because of their teeth. Overall, majority of the children (61.9%) had negative attitude towards oral health while 38.1% had positive attitudes. These results are different from those by Vermaire *et al* (2010) who reported very positive oral health attitudes in a study conducted at Amsterdam.

5.1.3 Oral health practice

The study results show 59% participants brushing their teeth twice a day. Similar studies established comparable results: Okemwa *et al* (2010)-48%, Gathecha *et al* (2012) between 41%-60% in two study sites, Harikiran *et al*

(2008)-39%, and Al Omiri *et al* (2006)-69%. Ninety six (96%) of the pupils used a toothbrush in this study. This figure differs from other similar studies: Al Omiri *et al* (2006)-83%, Gathecha *et al* (2012)-77%. Almost half (44%) of the pupils indicated that they brushed their teeth in the morning after breakfast and before going to bed. Most of the other half; 21% and 24% brushed their teeth in the morning before and after breakfast respectively. Ninety two (92%) of the pupils reported cleaning their tongue whilst brushing.

Overall, 56% of the respondents had appropriate oral health practices while 44% had inappropriate practices. These results differ with those by Zhu who reported poor oral health practices (Zhu *et al.*, 2003). This study showed age was a factor influencing oral health practices. Older children (12 years) had better practices possibly because they are getting conscious of their oral health as they get into adolescence. Pupils from high cost schools had poorer oral health practices though they had better knowledge. This could be due to the fact that they have access to most unhealthy foods.

5.1.4 Oral health seeking behavior

The study found that 236 (54.1%) of the pupils interviewed had reported experiencing some form of ill oral health-related symptoms either often, occasionally or rarely. This is similar to results of a study by Harikiran *et al* (2008); in their study, 59.7% of participants had had a toothache /dental problem during the last 12 months prior to the study. A cumulative 61% of all pupils interviewed had had at least one visit to the dentist within the last 12

months. Of the 200 participants who reported not to have had a dental problem or those who were not sure, nearly a half 98 (49%) had not visited a dentist. Similarly, of the 236 participants who had had a dental problem, 70 (29.7%) did not visit a dentist. Overall, 38.5% of the children had not visited a dentist. The key barriers to dental care were fear (58%) and cost (20%). Fear is an indicator that they have not been well educated on dental health and that cost is an important factor to consider. Taking into consideration that all children needed to have had at least one visit to a dentist, this study found sub-optimal oral health seeking behavior. These results are similar to those by Harikiran *et al* (2008); in their study, 59.7% of participants had had a toothache during the last 12 months prior to the study and 35% of study participants have visited the dentist during last 12 months. They further reported that the main reason for the last visit was because their parents (51.2%) had made an appointment with the dentist and separately that during the last visit, 66.7% of study participants had undergone screening. This is in agreement with Barker and Horton (2008) in their study among the pre-school children in California which showed that parents played a major role in influencing their children's oral health and access to care. Dental visits were infrequent and mostly carried out for emergency care and tooth extraction. This could be as result of lack of knowledge on the importance of routine dental checkups for dental plaque control.

Low dental visits may probably be due to low awareness on the importance of oral health thus affecting the pupils' health seeking behavior.

5.1.5 Association between oral health knowledge, attitudes, practices

Oral health knowledge respondents did not significantly influence their attitudes on oral health. This differed with results by Smyth in 2007 who reported knowledge as an important influencer of attitudes (Smyth et al., 2007). Oral health knowledge was however significantly associated with oral health practices. Participants with higher knowledge also had better practices. These findings corroborate with those by Al-Ansan who reported that knowledge was considered prerequisite for health related practice (Al-Ansan et al., 2003). Oral health attitudes did not significantly influence oral health practices.

5.2 Conclusions

The oral health knowledge among 9-12 year old pupils attending schools in Westlands is low with nearly half of the pupils having low levels of knowledge. Children who had an exposure to school dental health programs showed better knowledge.

Majority of the pupils in schools in Westlands had negative attitudes towards oral health. Attitudes were not influenced by type of school, age or gender of the respondents.

Respondents in this study had unsatisfactory oral health practices. The practices were influenced by the level of knowledge respondents had, the age of child and the type of school a respondent attended. Practices were not

significantly associated with oral health attitudes and the gender of the respondent.

Majority of the pupils had not visited a dentist yet they reported experiencing some form of ill oral health-related symptoms indicating they had inadequate oral health-seeking behavior both for treatment and for routine preventive services.

5.3 Recommendations

Since oral health knowledge influences practice as shown in this study, there is need to increase the oral health knowledge to pupils in Westlands through well planned school based oral health education programmes in primary schools.

There is urgent need to address the problem of poor oral health practices by including oral health into the primary school curricula with the overall aim of improving oral health practices and attitudes.

This study recommends inculcating routine preventive dental care among the children to improve oral health seeking behavior.

5.4 Further research

The Ministry of Health, through its Public Health Department and/or in collaboration with other partners/stakeholders in oral health (e.g. Kenya Dental Association, Dental Schools, manufacturers of dentifrice) should consider

conducting a nationwide study to determine oral health knowledge, attitude and practice among this critical age group to help with the formulation of appropriate policies to address the current gaps and challenges.

5.5 Dissemination of Findings

The researcher will share the findings of this study with the schools that participated, relevant stakeholders in oral health (e.g. Kenya Dental Association, Dental Schools, Colgate-Palmolive), the Ministries of Health and Education. Further, as a partial requirement for the fulfillment of an MPH degree at Kenyatta University, the findings of this study shall be publicly presented to an examination panel for review and critique.

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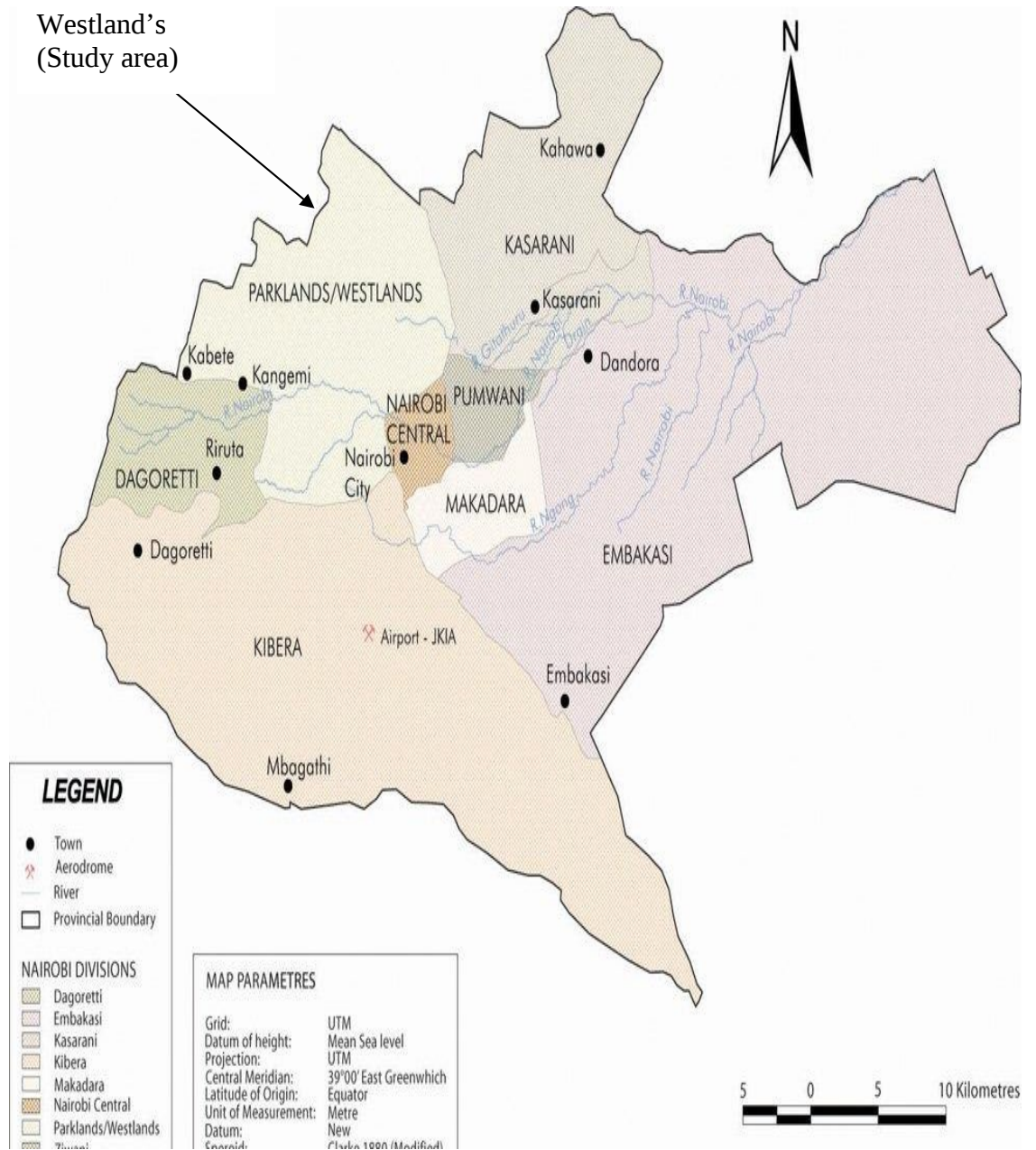
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Appendix 1: Map of the study area



Appendix 2: Consent form for individual parent/guardian

Dear Parent/Guardian

Your child is invited to participate in a survey which will investigate the factors that influence oral health in children between the age of 9 and 12 years. Participation in the study is entirely voluntary thus consent is sought from you. It is important that your child participates in the study; however, you may decline his/her participation without giving a reason and without any consequences. Should you need any clarifications, kindly contact the following:-

Researcher: Josca A. Ogola, P.O. Box 42950 – 00100, Nairobi. 0722813128.

Supervisors: Dr. Tom Were, P.O. Box 43844- 00100, Nairobi. 0720326127

Prof. Loise Gathece. P.O. Box 2631-00202, Nairobi.0722755590

Researcher's statement

I **Ms. Ogola Josca Achieng** will conduct an oral health survey on 9-12 year old children attending primary schools in Westland's district, Nairobi County. This survey will help generate information on the factors that determine oral health care and help in the promotion of good oral health among school children in Westland's, Nairobi County. The study will be conducted at your child's school where the child will be asked to complete a simple questionnaire.

1. Procedure

A research assistant, with consent from the school administration will introduce him/herself to your child and ask some questions pertaining to oral health and oral health care and record them in a questionnaire. When done he/she will be asked to go back to class. This will be done with assistance from the school authorities to ensure minimal disruption. No treatment will be offered; however, should the researcher come across a child with an oral health problem requiring immediate attention, the same shall be advised through the school management to seek help from a dentist.

2. Confidentiality

No material that could personally identify your child will be used in any reports on this study. To ensure privacy and confidentiality, all original documents will be numbered, and only this code number will identify all data collected from the children. Information collected from the survey will be analyzed locally and thereafter the records destroyed.

3. Voluntariness

Your child's participation is entirely voluntary (your choice). Your child will not be required to take part in this study, if you choose not to allow him. We will tell your child about the study and ask for their ascent. If you do not want your child to take part, you are free to withdraw participation.

4. Benefits

There will be no financial compensation for participating in this study. However this research will help us to find out more about the oral health needs of children which will help the policy makers address those needs better to achieve improved oral health.

5. Certificate of Consent: Parent/Guardian

I confirm that I have read and understood the information sheet. I understand my child's participation is voluntary and that I am free to deny consent without giving any reason.

I willingly provide consent for my child to take part in the above study.

Signed Date

I willingly deny consent for my child to take part in the above study.

Signed Date

Thank you

Appendix 3: Informed assent form for participants (Children)

Part I: Information Sheet

Dear Participant

My name is **Josca Achieng Ogola**, from Kenyatta University and am carrying out a study to understand the oral health knowledge, attitudes and practices of children aged between 9-12 years attending primary schools in Westland's, Nairobi County.

I am going to give you information and invite you to be part of this research study. You can choose whether or not you want to participate. We have discussed this research with your parent(s)/guardian and they know that we are also asking you for your agreement. If you are going to participate in the research, your parent(s)/guardian also have to agree. But if you do not wish to take part in the research, you do not have to, even if your parents have agreed.

Participation is voluntary

You don't have to be in this research if you don't want to be. If you decide not to be in the research, it's okay and nothing changes. Even if you say "yes" now, you can change your mind later and it's still okay.

Procedures:

A research assistant, with consent from the school administration will introduce him/herself to you and ask some questions concerning oral health and oral health care and record them in a questionnaire. When done he/she will ask you to go back to class. This will be done with assistance from the school authorities to ensure minimal disruption. No examination or treatment will be offered.

Risks

The study will not expose you to any risk and great caution will be taken to ensure privacy/confidentiality of information collected from you.

Benefits

There will be no financial compensation for participating in this study. All participants are expected to participate willingly and on a voluntary basis. However this research shall help us to find ways of helping you and other children have improved oral health.

Confidentiality

We will not tell other people that you are in this research and we won't share information about you to anyone who does not work in the research study. Information about you that will be collected from the research will be put away and no-one but the researchers will be able to see it. Any information about you will have a number and not your name.

PART 2: Certificate of Assent

I have read this information (or had the information read to me) I have had my questions answered and know that I can ask questions later if I have them.

I willingly agree to take part in this study.

Signed/initialed by child Date
.....

OR

I do not wish to take part in the research and I have not signed the assent below

Signed/initialed by child Date

Thank you.

Appendix 4: Questionnaire

(Adapted from WHO and modified)

1. Preliminaries

Questionnaire No _____

Interviewer code
Gender of child Boy Girl

Grade level/class

Consent granted Yes No

Type of school A B C

First I would like you to answer some questions concerning yourself and your teeth

1. How old are you today? _____
(Years)

Now some questions on dental knowledge

2. How many sets of dentition/teeth do we have?

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 F Don't know

3. How many milk teeth do we have?

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 Don't know

4. How many permanent teeth do we have?

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 Don't know

5. Please tell me whether the following statements are **true or false**.

- Sweets affect the teeth badly
- Fizzy drinks like soda affect the teeth badly
- It is important to brush teeth at least twice a day with a toothpaste and toothbrush
- Brushing teeth prevents tooth decay
- Using fluoride destroys teeth
- Regular visits to the dentist is necessary

6. Where do you mostly get information regarding oral health? **(tick one)**

- a) Radio
- b) TV
- c) Dentist
- d) Newspapers/Magazines
- e) Shopkeepers
- f) My parents/guardians
- g) Friends
- h) Others.....

7. How often should you change your tooth brush? **(tick one)**

- a) 1 – 3 months
- b) 4 – 6 months
- c) 7- 12 months
- d) More than 1 year
- e) Don't know

8. What does plaque mean? **(tick one)**

- Soft deposit on teeth
- Hard deposit on teeth
- Discoloration of teeth
- White patches on teeth
- Don't know

9. What does gum bleeding mean? **(tick one)**

- Healthy gum
- Calcium deficiency in body
- Gum disease(inflammation)
- Don't know

10. What are the methods to prevent dental decay? **(tick one)**

- Eating balanced diet
- Regular brushing with fluoridated tooth paste
- Regular visit to the dentist at least twice in a year
- All the above

Attitude

11. Do you think decayed teeth can affect the appearance of a person? (**tick one**)

Yes

No

Don't know

12. How would you describe the health of your teeth and gums?

	Teeth	Gums
Excellent.....	□ 1	□ 1
Very good.....	□ 2	□ 2
Good.....	□ 3	□ 3
Average.....	□ 4	□ 4
Poor.....	□ 5	□ 5
Very poor.....	□ 6	□ 6
Don't know.....	□ 9	□ 9

13. Do you think regular visit to a dentist is necessary? (**tick one**)

Yes

No

Don't know

14. Do you think immediate replacement of missing natural teeth by artificial teeth is necessary? (**tick one**)

Yes

No

Don't know

15. Do you think that treatment of toothache is important as any other organ in the body?

Yes

No

Don't know

16. Because of the state of your teeth, have you experienced any of the following problems during the past year?

	Yes	No	Don't know
	1	2	0
a) I am not satisfied with the appearance of my teeth....	□	□	□
b) I often avoid smiling and laughing because of my teeth.....	□	□	□

- c) Other children make fun of my teeth.....
- d) Toothache or discomfort caused by my teeth forced me to miss classes at school or for whole days.....
- e) I have difficulty biting hard foods.....
- f) I have difficulty in chewing.....
- g) I have difficulty taking cold or hot foods.....

Practices

17. How many times in a day do you brush your teeth? (**tick one**)

- Never
- Once
- Twice
- Thrice or more

18. If your answer above is **NEVER**, what makes you never to brush your teeth?

- a) I cannot afford a Tooth paste
- b) I cannot find a tooth brush
- c) Brushing is not important
- d) I don't like brushing my teeth

19. Do you use any of the following to clean your teeth or gums?

(Multiple answers allowed)

	Yes	No
	1	2
Toothbrush..... <input type="checkbox"/>		<input type="checkbox"/>
Wooden toothpicks..... <input type="checkbox"/>		<input type="checkbox"/>
Plastic toothpicks..... <input type="checkbox"/>		<input type="checkbox"/>
Thread (dental floss)..... <input type="checkbox"/>		<input type="checkbox"/>
Charcoal..... <input type="checkbox"/>		<input type="checkbox"/>
Chewstick/miswaki..... <input type="checkbox"/>		<input type="checkbox"/>
Other; specify.....		

20. When do you brush your teeth?

- In the morning before breakfast
- In morning after breakfast
- In the evening before going to bed
- In morning after breakfast, before going to bed

After taking sweet meals:

21. Do you clean your tongue?

Yes

No

22. How often do you eat or drink any of the following foods, even in small quantities?
(Read each item)

	Several times a day 6	Every day 5	Several times a week 4	Once a week 3	Several times a month 2	Never 1
Fresh fruit.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biscuits, cakes, cream cakes, sweet pies, buns etc.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lemonade, Coca Cola or other soft drinks.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jam/honey.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chewing gum containing sugar.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweets/candy.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk with sugar.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tea with sugar.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Oral Health –Seeking Behaviour

23. How often during the past 12 months did you have toothache or feel discomfort because of your teeth?

Often..... 1

Occasionally..... 2

Rarely..... 3

Never..... 4

Don't know..... 9

24. How often did you go to the dentist during the last 12 months?
(Including orthodontist) (Tick one alternative only)

Once..... 1

Twice..... 2

Three times..... 3

- Four times..... 4
- More than four times..... 5
- I had no visit to dentist during the last 12 months..... 6
- I have never received dental care/visited a dentist..... 7
- I don't know/don't remember..... 9

If you did not visit the dentist during the last 12 months, go on to question 26

25. What was the reason of your last visit to the dentist?
(Tick one alternative only)

- Something was wrong/pain or troubles with teeth or gums 1
- It was part of follow-up treatment 2
- It was part of follow-up treatment 3
- I don't know/don't remember 9

26. If you have not visited a dentist for the last one-year, what are the reasons?

- Distance from the dental clinic..... 1
- Presence of unfriendly dental workers..... 2
- Fear of getting infected with HIV..... 3
- Fear of losing a tooth..... 4
- Fear of painful Treatment..... 5
- Long waiting time at the clinic..... 6
- Treatment too costly..... 7
- Others; specify.....
-

That completes our questionnaire. Thank you very much for your cooperation

Research Authorization

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349
254-020-310571, 2213123, 2219420
Fax: 254-020-318245, 318249
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RCD/12A/012/79

Date: 31st May 2012

Josca Achieng Ogola
Kenyatta University
P.O.Box 43844-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Determinants of oral health among 9-12 year old children attending Primary Schools in Westlands, Nairobi County,*" I am pleased to inform you that you have been authorized to undertake research in Nairobi County for a period ending 31st August, 2012.

You are advised to report to the **Provincial Commissioner and the Provincial Director of Education, Nairobi Province** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

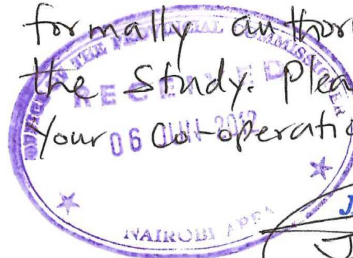

DR. M. K. RUGUTT, PhD HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The Provincial Commissioner
The Provincial Director of Education
Nairobi Province.

RESEARCH APPROVAL:

The Researcher is hereby formally authorized to conduct the study. Please accord her your cooperation in this regard



JAMIN M. WAMUCHA

JM Wamucha

**FOR: PROVINCIAL DIRECTOR OF EDUCATION
NAIROBI PROVINCE**



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844
Nairobi, 00100
Tel: 8710901/12
Tel: 8710901/12

Our Ref: KU/R/COMM/51/46-2

Date: August 21st 2012

Josca A. Ogola
School of Public Health
Kenyatta University
P.O. Box 43844, Nairobi.

Dear Ms. Ogola,

APPLICATION NUMBER PKU/033/I29 OF 2012 - 'DETERMINANTS OF ORAL HEALTH AMONG 9 – 12 YEAR OLD CHILDREN ATTENDING PRIMARY SCHOOLS IN WESTLAND, NAIROBI COUNTY'-VERSION 2.

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic - DETERMINANTS OF ORAL HEALTH AMONG 9 – 12 YEAR OLD CHILDREN ATTENDING PRIMARY SCHOOLS IN WESTLAND, NAIROBI COUNTY, KENYA – VERSION 2 - dated 16th August 2012.

2. APPLICANT

Josca A. Ogola
School of Public Health
Kenyatta University
P.O. Box 43844, Nairobi.

3. SITE

Westland Nairobi County, Kenya

4. DECISION REACHED

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines, and is of the view that against the following elements of review,

- (i) Scientific design and conduct of study,
- (ii) Recruitment of research participant,
- (iii) Care and protection of research participants,
- (iv) Protection of research participant's confidentiality,
- (v) Informed consent process,
- (vi) Community considerations.

AND APPROVED that the research may proceed for a period of ONE year from 21st August, 2012.

5. ADVISE/CONDITIONS

- i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
- ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
- iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.



PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I, TOSCA A. OGBURN..... accept the advice given and will fulfill the conditions therein.

Signature..... ATE J..... Dated this day of..... 21/8/1..... 2012.

cc. Vice-Chancellor
Director: Institute for Research Science and Technology