ORAL HEALTH STATUS AND ORAL HEALTH CARE SEEKING BEHAVIOUR OF A RURAL COMMUNITY IN KENYA

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DECLARATION

I hereby declare that this thesis is my original work and has neither been published nor presented for examination in any other institution.

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ABBREVIATIONS/ACRONYMS

AMJH- American Journal of Public Health

BDJ- British Dental Journal

COHO- Community Oral Health Officer

dft-decayed, filled deciduous teeth

dmft-decayed, missing, filled deciduous teeth

DMFT-Decayed Filled, Missing Permanent Teeth

EAMJ-East African Medical Journal

J.of Clinical Perio- Journal of Clinical Periodontology

KNH- Kenyatta National Hospital

MoH- Ministry of Health

NGO-Non-Governmental Organization

ppm - parts per million

Soc.Sci.Med - Social Science and Medicine. An International Journal

TMJ -Temporo-Mandibular Jjoint

WHO - World Health Organization

OPERATIONAL DEFINITIONS

Demand for care: When a person perceives he/she has a need and wishes to receive care.

Gingivitis: Inflammation of the soft tissues surrounding the neck of the tooth.

Objective need: A condition which an expert defines as requiring some action.

Oral health care: Any action whose aim is to promote, restore and maintain oral health.

Oral health need: Exists when an individual has oral disease.

Oral health seeking behaviour: Any activity undertaken by individuals who perceive themselves to have an oral health problem for the purpose of finding an appropriate remedy.

Oral health status: State of teeth, supporting structures and surrounding parts of the oral cavity

Oral hygiene practices: Activities that cleanse the teeth, periodontal tissues and the mouth thereby contributing to a state of cleanliness of the oral cavity.

Periodontitis: Progression of gingivitis into the tooth supporting structures.

Subjective need: When an individual perceives he/she has a problem that requires some action.

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ABSTRACT

Oral health forms an integral part of general health. Oral health problems affect all age groups and are universal in prevalence. It is necessary to have current information that can be used in planning and implementing oral health care services so as to ensure the services are available to all citizens. The purpose of this study was to generate some of this information by determining the oral health status, oral hygiene practices and oral health care seeking behaviour of a rural community in Kenya.

This was a descriptive cross-sectional study carried out in 370 households in two locations of Kiambu district. Data were collected in the year 2000. Structured questionnaires and oral examinations were used to collect the required information.

Oral health status was determined by the need for professional oral health care. Households that had members in need of care were deemed to have poor oral health status. Only 29.7% households had all members with good oral health status and were not in need of oral health care. The remaining 70.3% households had at least one member in need of attention at an oral health care facility. Only 20.0% of the households had all household members practicing good oral hygiene habits. Dental plaque was recorded in over 60% of the households although tooth brushing was practiced daily in 99% of the households. Age was noted to be a significant factor in determining oral hygiene practices with children and the elderly household members more likely to have poor practices.

In 50% of the households, at least one member complained of having suffered from an oral health problem in the preceding year. The initial action taken in 61% of the households was self-treatment primarily for pain relief. In households with complaints, 45% of them had

members seek care at an oral health care facility. Toothache was the most common complaint accounting for almost 80% of the problems suffered and the most common procedure performed at the facilities were tooth extractions. In households where members had sought care, approximately 49% sought care at a private facility and 20% sought care at a government facility. Income, knowledge of oral health, age, oral hygiene practices, gender and education were not significant factors in seeking care.

This study recorded widespread poor oral health and poor oral hygiene practices among rural communities which implies there was a high demand for oral health care. Utilization of oral health care facilities was mainly for symptomatic relief.

There is need to promote public awareness of oral health, in particularly, preventive oral health measures with the aim of reducing the high levels of poor oral health status. Oral health stakeholders through the mass media, barazaas and door-to-door can implement this promotion. There is need for oral health care policy makers to strengthen collaboration between private and public oral health care providers to ensure oral health care services are accessible, affordable, and provide appropriate services.

CHAPTER ONE

INTRODUCTION

Oral health has been defined as the state of complete normality and functional efficiency of the teeth and supporting structures, the surrounding parts of the oral cavity, and the maxillo-facial complex[1]. The term 'oral' is more appropriate than the term 'dental' as it encompasses the teeth and their supporting structures as well as the maxillo-facial complex.

Oral diseases are important public health problems for several reasons. They are prevalent and affect all ages, they cause a lot of pain and discomfort thereby affecting one's quality of life, and a lot of time is spent seeking care. The resources required for treating these diseases such as trained health personnel, equipment and materials are expensive. Fortunately, most oral diseases are preventable and require relatively simple and cheap measures to prevent.

When prevention fails and a person perceives himself to have an oral health problem, there is a process he goes through in which he makes decisions on how to solve the problem. He may decide to do nothing about it, he may take self- medication, or medication provided by family members or friends, or he may seek care outside the home and family environment. The care sought may be at a health care facility, a traditional healer or other alternative medical source. These responses to the oral health problem are collectively referred to as oral health care seeking behaviour.

This study focuses on preventive oral health care behaviour of a rural community in Kenya and the activities undertaken when they perceive themselves or members of their households to be suffering from oral health problems. The study also focuses on the oral health status of the community so as to establish the oral health care needs. Output from this study can be used to

formulate recommendations that can be significant in implementation of the oral health policy and other oral health care strategies.

1.1 Background

1.1.1 Oral Health Care

The aim of oral health care is to maintain the natural dentition in a functional state throughout one's lifetime. Care comprises preventive, promotive, curative, and rehabilitative activities. Curative services include extraction of teeth, restorative and prosthetic treatment procedures, periodontal and oral-maxillofacial surgery. Preventive oral health care activities include application of sealants on teeth to prevent caries from developing in the pits and fissures of teeth. It also includes oral health education on dietary habits, and oral hygiene instructions on plaque removal. Incorporation of fluoride in water supplies, milk and dentifrices, and regular oral checkups are also preventive oral health practices. Promotive activities reinforce the effect of health education by creating an environment that supports the development of the attitudes and behaviour needed to improve health. These activities include promoting better nutrition to pregnant mothers and children so that teeth develop and are maintained in a healthy state. Promotive activities also include growing and distribution of traditional foods. These foods contain natural sugars that are less cariogenic than commercial preparations. Promotive activities also include getting politicians and administrators to allocate funds or draw legislation for preventive programmes. Rehabilitative activities include prostheses to cover defects caused by extensive surgery, and replacing lost teeth so as to reestablish aesthetics and functioning of the oral apparatus and correcting teeth that are malaligned.

1.1.2 Oral Health Care Service Provision

In Kenya, oral health care services are provided in both the public and private sectors. The Ministry of Health is in charge of providing oral health care services in the public sector. These services are located in several health centers, the district and provincial hospitals, at the referral hospitals namely Kenyatta National Hospital, and Moi Referral and Teaching Hospital, and at the University of Nairobi Dental Hospital. For Kenyans living in areas far from these facilities, oral health care is not easily accessible. Furthermore, the services offered in the provincial, district, and health centers are beset with problems. They are limited in the range of services provided which consists mainly of dental extractions, the management of minor injuries, and infections due to scarcity of materials and equipment. District Health Management Boards were formed during the health sector reforms in the country where health care services were decentralized to district level. The DHMBs oversee the planning, implementation, monitoring and to a lesser degree the financial management of health activities (including oral health) at district level.

In 1985, the government started training community oral health officers. These are auxiliaries trained to provide preventive and promotive oral health care. They are trained to provide oral health care education in schools and at *barazaas*, but their work is hampered by lack of educational material and transport. They also work in government hospitals and a few health centers, providing minimal oral health care in the form of simple extractions. However the impact of this cadre in service delivery has not been studied. Currently, the government is no longer employing them on completion of their studies.

Providers of oral health care services in the private sector include private hospitals and

privately owned clinics. These providers are not hampered by lack of resources and generally offer more comprehensive care than public facilities. However the services tend to be concentrated in urban areas leaving rural under-served. The high cost of the services provided renders them unaffordable to a large proportion of the public. Other providers of oral health care services include mission hospitals, organizations such as Crescent Medical Services and Social Services League. The services are subsidized and therefore less costly than those offered by private providers. Traditional healers and herbalists also treat oral health ailments but the extent of their contribution is not known.

Several other organizations provide oral health care in a variety of ways. Colgate Palmolive Limited and Unilever Kenya Limited who are involved in oral health care programmes as part of their corporate social responsibility. They provide oral health care education to primary schools in the form of posters and reading material and sponsoring oral health education programmes on radio school broadcasts. They also sponsor oral health check-ups and dental camps where free treatment is offered to patients. Kenya Dental Association in conjunction with various manufacturing and pharmaceutical companies have a dental action month each year in different parts of the country where oral health education is provided to the public together with free dental checkups and emergency treatment. The Aga Khan Health Services have been involved in oral health education programmes in Nairobi schools.

Several community-based oral health care projects have been initiated in Kenya but currently none of them are operational. They include projects in Meru and Machakos between 1986 and 1989 by Kenya Medical Research Institute, which sought to incorporate oral health care in Primary Health Care activities. A project in Coast Province between 1989 and 1991 sponsored

by the Belgian government provided mobile oral health care services to communities.

The Ministry of Health in collaboration with WHO carried out a pilot study in Kiambu district between 1996 and 1999 to find ways in which oral health could be incorporated into Primary Health Care activities.

1.1.3 Constraints in Oral Health Care Service Provision

Oral health care in developing countries is generally given low priority due to scarcity of financial resources and the presence of more severe communicable diseases. This is evidenced by the fact that only 14 African countries have national oral health policies and many of them have not implemented or evaluated them[2]. Kenya launched an oral health policy in 2002 and modalities of implementation and evaluation are currently in progress. In the 2002 /2003 financial year, the Ministry of Health allocated only 16 million out of a budget of 10.1 billion of the overall ministry recurrent expenditure budget to oral health care[3]. With a population of approximately 30 million Kenyans, this implies each citizen is allocated 53 cents per year for oral health care. This is totally inadequate for providing quality services. No funds from the development expenditure vote are allocated specifically for oral health[4]. To cater for oral health care services in public facilities, space is usually allocated by moving other services in the existing health care facilities. Usually this space is not big enough to operate optimally or expand the services. There is a major shortage of dental officers with some entire districts being served by only one dentist. The total number of dentists in the public sector in 2002 was only 147[5], moreover, they are inequitably distributed with rural areas greatly underserved. The dentist to population ratio in Nairobi is 1:28 000 yet in many provinces it is approximately 1:300 000[5]. Due to poor remuneration, some dentists engage in part-time private practice or

other income generating activities thus are unavailable at their work- stations which further aggravates the situation.

Prevalence studies of oral health conditions of public health importance namely dental caries, periodontal disease and dental fluorosis in Kenya were last carried out in the 1980s and early 1990s[6,7,8,9]. The studies noted low prevalence of caries but widespread periodontal disease. Dental fluorosis was noted to be endemic in large areas of the country. All the studies noted minimal oral health care intervention. It is imperative to know the current status of these problems for purposes of planning and implementing remedial measures.

There is little collaboration among the various sectors providing oral health care services in Kenya. The private and public providers work independently of each other. Needs assessment studies to rationalise location of services are rarely carried out. Oral health care education programmes are not coordinated to ensure countrywide coverage and dissemination of uniform information. Current epidemiological data on oral health care needs is not available.

This study was undertaken in light of these problems facing oral health care services provision in the country. It seeks to provide information on decisions household members make when they have oral health problems and the factors that determine these decisions. The study also determines the type of facility attended for care and the treatment procured. Oral health status of the community is determined by focusing on dental caries, periodontal disease, dental fluorosis and oral hygiene status. One of the objectives of the oral health policy is to ensure that district oral health services focus on community health needs. This study hopes to generate information on rural community oral health needs that can be useful in implementing

this objective.

CHAPTER TWO

LITERATURE REVIEW

The aim of this study is to determine the oral health needs of a rural community by establishing the prevalence of oral conditions of public health importance namely dental caries, periodontal disease and dental fluorosis. Secondly the study explores the behaviour pattern of those in the community who perceive themselves or members of their households to have an oral health problem. This literature review focuses on the prevalence of these oral problems and determinants impacting on attendance at oral health care facilities.

2.1 Oral Health Conditions

Dental caries and periodontal disease are among the most common dental conditions. They affect all age groups from newly erupted deciduous teeth to the teeth of elderly people and are of universal prevalence[10]. They are among the most common medical complaints in both children and adults living in rural areas of Kenya[11,12].

Dental caries simply means decay of the teeth. It is a preventable condition requiring relatively cheap preventive methods. Dental caries is generally believed to be increasing in the developing countries but decreasing in developed nations[13,14,15]. The main factors responsible for the increase in prevalence of caries in developing countries are changes in dietary habits from traditional foods to more 'Western' type refined foods accompanied by an increase in sugar consumption. Although 'Western' type foods are risk factors for dental caries, vigorous preventive measures such as increased use of fluoridated water and toothpastes, improved oral hygiene practices and healthy eating habits have contributed to the decrease noted in developed countries[16,17,18]. Once dental caries has progressed into the dentine, remineralization cannot

occur and treatment from a dentist who can manage the damage professionally must be sought.

Periodontal diseases are a group of diseases affecting the supporting structures of the teeth. The most common types are gingivitis and periodontitis. Gingivitis is an inflammatory lesion confined to the tissues of the marginal gingivae. It is characterised by inflammation and bleeding of the gums and occurs as a result of poor oral hygiene where plaque retained on teeth irritates the gums causing inflammation. Gingivitis is prevalent and affects 80% to 100% of children worldwide. All adults are affected by gingivitis at one time or another in their life time[19,20]. In Kenya, gingivitis prevalence rates of 55% to 75% have been recorded[21]. The implication is that those affected are not effectively removing plaque from their teeth. Reasons for the poor oral hygiene include poor toothbrushing techniques, the use of ineffective tools for brushing, brushing them infrequently or not brushing teeth at all. Periodontitis is the progression of an established gingivitis to an advanced lesion that affects the supporting structures. It is characterised by loss of gingival attachment resulting in gingival recession, pocket formation and mobility of teeth. Gingivitis may not necessitate a visit to an oral health care provider as it usually resolves when plaque is removed through improved oral hygiene measures. On the other hand, periodontitis requires professional intervention to prevent progression and subsequent loss of teeth.

As early as 1947, dental caries was recorded in 6.5% of the population living in Narok District in Kenya[22]. By 1960 the oral health status of indigenous Kenyans was noted to have 'deteriorated' especially among those living in urban areas[23]. It was postulated they were consuming more fermentable carbohydrates due to a 'western lifestyle'. This was supported by a study of school children in 1983 which recorded a caries prevalence rate of 44% in 5 year

olds, 12% in 12 year olds and 10% in 14 year olds[6]. The high percentage of 5 year olds with dental caries indicated deciduous teeth were more affected than permanent teeth. The study was carried out in an urban community. In 1988 in rural Nyeri and Kakamega districts, 87% of children aged 12 years were noted to be caries free[24]. However, a study in another rural community, the pastoral Somalis of northern Kenya, only 48% of children between the ages of 12 and 18 were noted to be caries free[9]. In 1997, a study of Nairobi nursery school children recorded a caries prevalence of 52% among 3year olds compared to 68% among 5year olds[25]. These findings suggest an increase in caries prevalence in Kenyan children over the years and urban communities having greater prevalence than rural communities. A reason for this increase could be an increase in sugar consumption contained in the snacks children carry to school. Another reason could be lack of practicing preventive measures such as good oral hygiene and dietary practices. In all these studies, the decayed component accounted for over 90% of dmft. Among an adult population in rural Kenya DMFT ranged from 3.0 in 25-34 years olds to 9.2 in 55-65 years olds[26]. Most of the teeth were either decayed or extracted due to caries with the filled component accounting for less than 0.01% in the 25-34 years age group and nobody in the 55-65 years age group had any restorations.

These studies suggest low oral health care service utilization and when services were sought the most common procedure performed were dental extractions with minimal restorative dentistry. Even in the studies carried out in Nairobi where the concentration of dental services is high, it was noted that there were more decayed teeth than filled or extracted teeth due to caries. These findings suggest physical accessibility was not a major barrier to utilization of services. Restoring carious teeth is more expensive and more time consuming than extractions and may explain why patients may opt for the cheaper option. This could be a plausible

explanation for the low percentage of restored teeth noted. Another explanation could be unavailability of conservative services at the facilities where treatment was sought.

Dental fluorosis is a public health problem in Kenya with up to 32.2% of the population country wide suffering from varying degrees of fluorosis[27]. Dental fluorosis occurs when drinking water containing fluoride ions above 1.2ppm is ingested during the period of tooth formation[28]. The result is mottled enamel and the severity of the mottling increases with increase in the fluoride concentration in the water. Fluorosis causes pitting and brownish staining and in severe cases the teeth appear corroded and the entire enamel may be lost. The staining gives fluorosed teeth an unattractive appearance and a breakdown of the enamel results in sensitivity and increased susceptibility to caries. Dental fluorosis affects both deciduous and permanent teeth. However the presence of 1ppm of fluoride ingested during tooth formation is beneficial and protects teeth from caries formation by up to 60%[29].

Dental fluorosis has been recorded in all the provinces of Kenya, ranging from a prevalence of 11.7% in Western Province to 56.5% in Central Province[27]. A survey of Nairobi school children in 1984 using Dean's index reported over 44% of the children suffered from dental fluorosis [6]. In 1987 a study using Thystrup and Fejerskov's index recorded 18% of 6-8year olds had fluorosis in the deciduous dentition and 76% of 13-15 year olds in Nairobi had fluorosis in the permanent dentition[7]. Children drinking borehole water had a higher prevalence of fluorosis and suffered more severe fluorosis than those who used the central supply.

These studies all document prevalence of dental fluorosis in Kenya. Studies on the social impact of dental fluorosis such as level of knowledge communities affected by fluorosis have

and treatment options for managing it have not been carried out.

2.2 Oral Hygiene Cleansing Tools

Various tools are used to cleanse teeth, periodontal tissues and the mouth. They include the commercial toothbrush, interdental brushes, dental floss, tongue scrappers and mouthwashes. The chewing stick, charcoal and ash are commonly used in rural communities[30,31]. The chewing stick has been found to be more effective in removing mild to moderate plaque than a worn out convectional toothbrush or a toothbrush that is improperly used[32]. The shrubs and trees from which chewing sticks are obtained are readily available in rural areas making the chewing stick accessible and affordable to rural communities. Urban populations cannot readily access chewing sticks and many of them may not be able to afford the conventional toothbrush. Where commercial toothbrushes are used, they may be worn out if the individuals using them cannot afford to replace them regularly and they thus become ineffective. This may explain why rural populations have been noted to have better oral hygiene than their urban counterparts[30].

2.3 Determinants of Utilization of Oral Health Care Services

Utilization of health services is a consequence of various factors. An individual must first perceive he/she has an oral health problem that requires him/her to present oneself at a health facility for care. Turning the perception into action depends on various factors. These factors can be divided into those concerning the individual, those concerning the environment and concerns of the health care provider.

Determinants affecting the individual include socio-demographic characteristics such as age,

sex, and economic status, attitudes toward and beliefs about doctors and health care in general, knowledge about health conditions and treatment of diseases, perceived (subjective) health status and objective need. Factors concerning the health care provider include economic and physical accessibility, availability of staff, materials and equipment. Environmental factors include cultural practices, beliefs and social norms[33,34,35,36]. Cultural practices include the removal of lower anterior teeth. In certain communities this is carried out as a rite of passage and in other communities it is carried out for health reasons. Removal of canine tooth buds in babies is practiced in some communities as a cure for diarrhoea. Culturally males are expected to engage in more physically dangerous activities that may result in injuries and therefore higher utilization rates. Socially females may be more predisposed to seek care than males because of the higher need to be taken care of[37]. Family and employment responsibilities influence utilization patterns. Women in formal employment have been noted to have significantly lower self-reported morbidity than housewives. The increase in responsibility deters admitting illness[38,39].

2.3.1 Age

Age affects utilization patterns of oral health services because different oral conditions are more prevalent in certain age groups. Rampant caries is a condition observed mainly in deciduous teeth. This is because newly erupted teeth are less resistant to demineralisation and when conditions are right, initiation and progression of caries can be very rapid. Children suffering from this condition require frequent visits to an oral health care provider to restore the teeth and prevent problems associated with premature extraction such as feeding problems and malocclusion when the permanent teeth erupt. A study in England reported up to 8% of

children between 1 and 4 years had rampant caries[14]. Utilization of oral health care services by children depends not only on the presence of oral health problems but is also influenced by the attendance patterns and health beliefs of their parents[40,41,42]. Mothers who attend oral health care services regularly tend to take their children to dentists more regularly than those who attend irregularly. The health beliefs of parents are also a factor in whether or not they take their children for oral health care. When parents perceive oral health problems are serious and require attention they are more likely to seek care. The number of adults in a household has also been shown to affect utilization[43]. Children in households with several adults have higher utilization rates than those with only one or two. This is because there are more caregivers likely to have the time to take the children for care.

Frequency of utilization of oral health care services in children from ten years of age through adolescence decreases. This is the period during which deciduous teeth are shed and permanent ones erupt so caries in these teeth has not had enough time to develop. Several studies have observed young adults dislike visiting dentists and do so only occasionally or when in acute pain[44,45].

Elderly people generally have poor oral health, and utilization of oral health care services is expected to be high. However utilization rates among the elderly are usually low[46,47]. The main reasons for this are consequences of old age such as physical immobility compounded by transport difficulties, and general ill health. High cost of treatment has a negative impact on utilization as the elderly generally have limited or no sources of income and may lack family support. Older people also tend to have fewer teeth because of extractions as a result of dental caries when they were younger and loss due to severe periodontitis when older. The lack of

teeth or fewer teeth requiring treatment has a negative effect on frequency of utilization of oral health care services[48].

2.3.2 Gender

Differences in use of health care services have been noted between males and females. Women tend to report more morbidity and visit facilities more often than males even after controlling for obstetric problems[37,39]. Various reasons have been postulated for this difference. Males and females differ in the way they perceive symptoms and evaluate severity. Due to gender role socialization, it is more socially acceptable for females to admit illness and seek care. Traditionally male expectations restrict them from giving in to illnesses or making use of health services[45]. Women also tend to be more concerned with health issues than males and therefore more likely to utilize health care services. However a study find no difference in frequency of utilization between the sexes[38].

The presence or absence of illness affects utilization rates. Females have been noted to have better oral health status than males[6,49]. The main reason for this difference is the different tooth brushing practices noted. Prevalence of tooth brushing twice a day for boys ranged from 13% in 12 year old to 25% in 18 year olds while for girls the prevalence of toothbrushing twice a day ranged from 32% in 12 year olds to 60% in 18 year olds[50]. In this study the number of girls brushing regularly was more than double that of boys of the same age and the difference between the two genders was wider in the older age group. Girls and women tend to have better grooming practices where clean teeth are regarded as part of good personal appearance. Regular tooth brushing has positive association with oral health status[51]. Consequently females may utilize oral health care facilities less frequently than males.

However no studies on differences between the genders on utilization of oral health care services in Kenya appear to have been carried out.

2.3.3 Socio-economic Status

Socio-economic status is associated with disparities in health outcomes including quality of life, incidence of disease and access to health care[52]. Income, education and occupation are the most widely used indicators of socio-economic status[33,53]. Income is considered to be a major factor in determining utilization of oral health care services with a positive relationship between income and utilization[54]. Lack of finances is an important barrier to utilization of health services. Low- income households often cite lack of money as a reason for not seeking care[45,46,55,56,57]. These households have been noted to delay seeking care and self- treatment with home remedies or over the counter drugs is a common practice among them[58,59]. There is also unequal distribution of spending money on health care in different income groups with high-income households spending up to six times more on oral health care than the lowest income households[60]. Patients from higher social groups tend to utilize oral health care services regularly and also request for more restorative and prosthetic services whereas patients from lower social groups tend to utilize oral health care services less frequently and therefore have more untreated dental caries[54,61]. When they finally seek dental care they invariably have tooth extractions rather than conservative treatment. However lack of money may not be a barrier to seeking care as illustrated by a study conducted in Syria. Even with available, cheap and subsidized payments for dental care, over 70% of the respondents sought care only when in pain[62]. The factors contributing to this behaviour were poor attitude towards oral health and the lack of pain.

Social-economic status of an individual has an impact on other aspects of oral health. Higher income implies availability of tooth cleansing devices such as commercial toothbrushes, dental floss, mouthwashes and toothpastes, which should result in better oral health practices. Tooth brushing frequency has been noted to increase as socio-economic status improves[63].

Education is one of the most widely used indicators of socio-economic status in health studies because unlike occupation and income it can be determined for all individuals[53]. There is a positive association between education and health. Well-educated people have low levels of morbidity, mortality and disability. Low educated people have high rates of infectious and chronic diseases, and shorter life expectancy[64]. One explanation for this finding is that high educational attainment results in higher economic status so health care becomes more accessible and affordable. Economic hardship may result in depression, feelings of hopelessness and a decrease in resistance. High education also results in the acquisition of positive social skills and information that lead to adoption of positive health attitudes and lifestyles. Education therefore indirectly impacts on utilization of health services. Education benefits the individual who in turn influences other household members. Mother's education had been noted to influence morbidity and mortality of young children[65]. The more educated the mother, the lower the mortality rates. Educated mothers are better able to understand health education messages and have better health related behaviours. A report on young adults concluded that the more educated people are, the more likely they are to visit a dentist for preventive services. It was noted that 31.6% of respondents with high educational status had visited a facility for symptomatic relief compared to 46% and 56.5% of respondents with middle educational status and low status respectively. Education status has also been noted to be a significant factor in seeking preventive services rather than curative services[33,66]. The

higher the educational attainment, the brighter future expectations are likely to be and this results in a positive attitude towards health care and consequently an increase in health promotion behaviour.

2.3.4 Knowledge of Oral Health

Knowledge of causes of oral health diseases and preventive measures should result in good oral health behaviour and studies have been shown to support this view[67,68]. Good oral health behaviours include good oral hygiene practices, healthy dietary habits, and regular dental check-ups. These behaviours consequently affect oral health status. Studies show periodontal disease and dental caries can be prevented or minimised by one's behaviour[69,70,71]. Oral health knowledge of pre-school children has been noted to be low[31]. It was suggested the children's parents had poor knowledge because they are the main source of knowledge to children in this age group. Among 9-15 year olds in Nairobi, the level of oral health knowledge was recorded as good but oral hygiene habits as poor[72]. The knowledge the children had was not being utilized to influence their oral health behaviour. Knowledge did not affect utilization of services among university students in Kenya[45]. However in Britain and China, knowledge of oral health was recorded as low in both children and adults[42,73,74].

2.3.5 Perception of Illness

An individual's perception of illness is an important predictor of health related behaviour. The health belief model is used to explain and predict preventive health behaviour. The model states individual perception is a strong predictor of health behaviour. The more susceptible a person feels they are to a disease and the more severe or life threatening a person perceives a disease

to be, the more likely they are to seek care[75]. Perceived benefits of taking action also influence health behaviour. Oral health conditions are usually insidious in nature and easy to ignore as long as there is no pain, discomfort or loss of function. In general, oral diseases do not appear to be life threatening or debilitating. Without pain or other evidence of illness, a visit to an oral health practitioner does not seem purposeful for many people[45, 76,77,78]. A survey of adults in Great Britain established 57% went to a dentist only when they had a problem with their teeth even though 91% agreed that regular visits to a dentist were important in keeping teeth healthy[79]. In Hong Kong, less than 20% of adults between the ages of 35 and 44 sought dental check-ups with the rest seeking attention only when they felt they had a dental problem[68].

2.3.6 Health Care Provision

The government is the major provider of oral health care services in Kenya employing 147 dental officers, and 97 Community Oral Health Officers[5]. As mentioned earlier financial resources are a major constraint in the provision of health care services. This has resulted in poor delivery of oral health care services. Government oral health care services are greatly limited in the range of services they offer due to lack of equipment and materials. A study of oral health care facilities in Kenya found that up to 82% of dentists in government employment cited lack of facilities and/ or materials as a reason for not carrying out certain dental procedures[80]. Lack of space within these health institutions for setting up dental facilities was also noted as a constraint in service delivery. Tooth extractions are the most common dental procedure performed in public oral health care facilities in Kenya and Tanzania[78,80,81]. An explanation for this could be the facilities do not offer other treatment options due to lack of equipment and materials for conservative treatment. Another reason could be health personnel

are overwhelmed by large number of patients attending the facilities. As observed earlier some districts in Kenya have only one dentist in the public sector serving the entire district. Extractions are simple to perform, take a relatively short time and provide immediate relief from pain. Patients may not be aware of other treatment options so do not request for them. Studies need to be carried out to establish why extractions are so commonly carried out in Kenya.

Availability of oral health care personnel at the facilities influences utilization patterns. Low remuneration of government employees has resulted in large numbers of dental personnel leaving public service to engage in private practice. To stem this flow the government allowed senior medical personnel at consultant level to engage in part time private practice after office hours[36]. However, this has been abused and doctors and dentists engage in private practice even during normal working hours. This has been noted to be one of the reasons resulting in unavailability of health personnel in facilities[82]. As a result, the services rendered to patients seeking care in government institutions are poor.

Due to these problems in the public sector, the private sector is an important provider of health care in developing countries. In some communities they are the first choice health providers by both high and low-income households[85]. Rural people have been significantly associated with seeking care from private health providers compared to their urban counterparts who sought care from public facilities[86]. Reasons for this were postulated to be long waiting time at public facilities and long distances covered to get to the facility. There was also a perception among rural folk that private facilities offered better quality services.

Accessibility to health care facilities is an important factor in the provision of services.

Distance is an indicator of access and has been noted as a critical determinant of utilization of health care[57,83]. This was reported in studies in the Philippines, a developing country and the United States of America a developed country. Distance affects frequency of utilisation as well as selection of a particular facility. The closer the facility is to the community the higher utilization rates are likely to be. The South African demographic and health survey of 1998 noted 36% of the study population had experienced oral health problems but less than 10% had utilized public oral health services. The main barriers to care were noted to be inaccessibility and limited resources[84]. It has also been noted that the longer the time spent travelling to a health care facility the lower the level of utilisation[81]. In Kenya where public oral health care services are mainly located in district and provincial hospitals, majority of the citizens have to travel long distances to access services.

This review of literature notes oral health problems are prevalent but no prevalence studies have been carried out in the recent past so information on the current oral health status of Kenyans is lacking. Several factors that influence health seeking behaviour have been identified as impacting positively or negatively on utilization of health care services in general and oral health care services in particular. However there appears to be no studies carried out to determine the factors that may influence oral health care seeking behaviour in Kenya and how they correlate with each other. Although studies have been carried out in Kenya on utilization of health care services for medical problems, there are very few studies on utilization of oral health care providers. There is scant information on knowledge of oral health particularly in adult population. This study hopes to provide information in these areas.

CONCEPTUAL FRAMEWORK

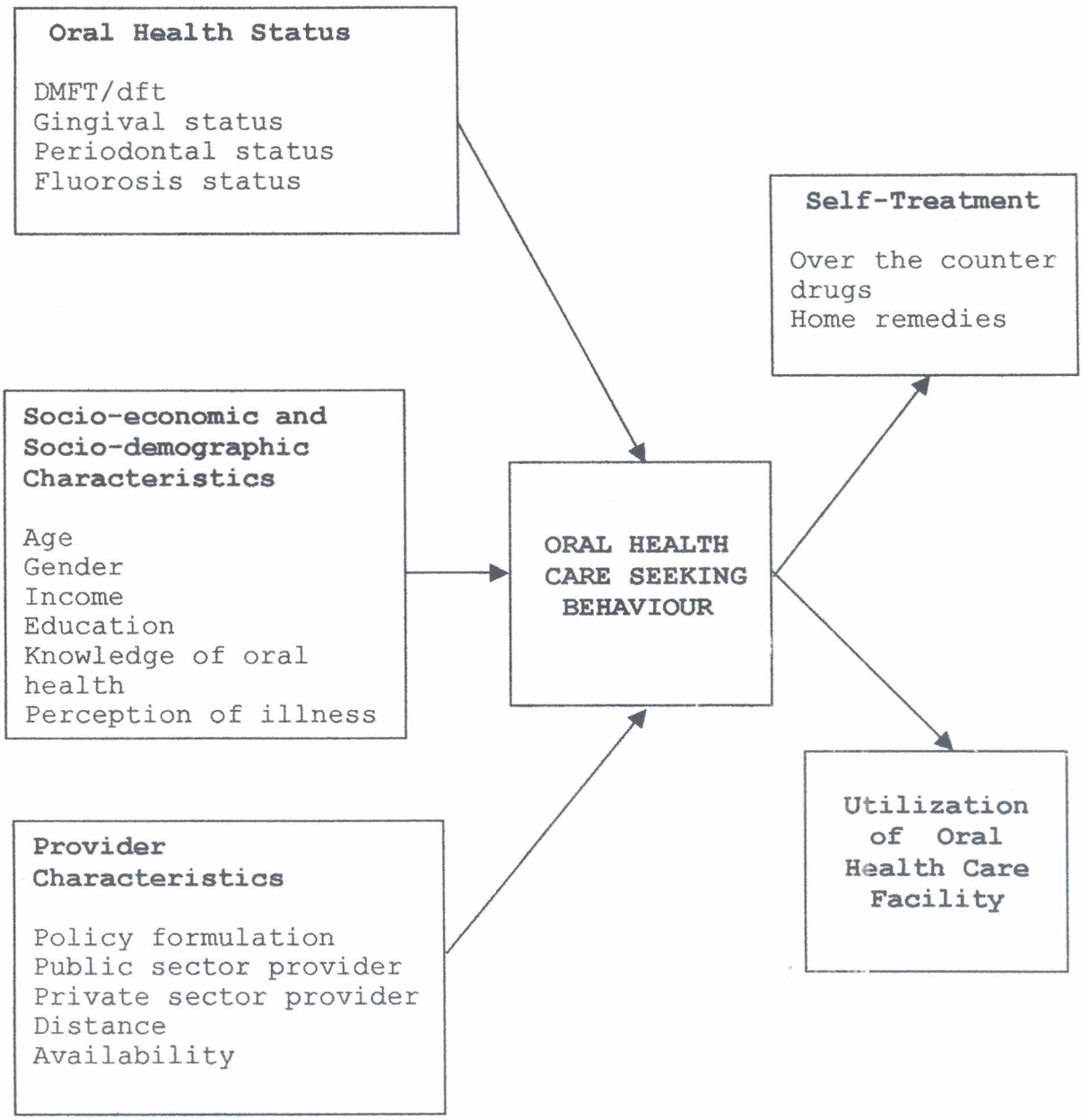

Fig. 1 Conceptual Framework

Fig. 1 summarises the conceptual framework on which this study is based. Factors that influence oral health care seeking behaviour can be categorized into those that relate to the

individual and those that relate to the oral health care provision system. Factors associated with the individual include the presence of disease, socio-economic and socio-demographic characteristics. A review of the literature noted a positive association between income, education, knowledge of and perception of illness and seeking treatment[45,46,63,66,67,74]. Studies demonstrating gender differences in seeking treatment at health facilities have not been consistent[37,38,39]. Factors associated with the service providers include distance to the facility, availability of services, type of service provider and policies affecting service provision[57,83,85,86]. These factors determine whether or not one perceives they have an oral health problem requiring treatment. The health seeking behaviour could be treatment at home by the individual, other family members or friends or it could be attending an oral health care facility.

This study investigates some of the factors noted to influence oral and general health seeking behaviour to determine their influence on oral health care seeking behaviour at household level and also explores the types of treatments sought.

CHAPTER THREE

STATEMENT OF THE RESEARCH PROBLEM

3.1 Problem Statement

The incidence of dental caries and periodontal disease are decreasing in the developed countries mainly due to vigorous preventive strategies[10,11,12]. However, they are increasing in developing countries mainly due to a change in dietary habits from traditional foods to 'western' type refined foods accompanied by an increase in consumption of processed sugars, and lack of effective preventive strategies[13,14,15].

Prevalence studies of oral health conditions in Kenya were last carried out in the 1980s and early 1990s. They showed low prevalence of dental caries compared to prevalence in developed countries and periodontal disease was widespread but not severe in nature. Dental fluorosis was noted to be endemic in large parts of the country. Current information on oral conditions of public health importance is lacking. Moreover, review of the literature showed that many of those suffering from oral health problems had not sought care. No subsequent follow-up studies were carried out to determine why utilization of oral health care services was so low despite oral health care services being available at the district, provincial, mission, and private institutions.

With the national dentist to population ratio of 1:48 000[87], and the inadequate budgetary allocation for oral health care, it is not possible to offer dental treatment to every citizen with oral health problems. It thus becomes necessary for oral health care planners to place more emphasis on preventive services than provision of curative services. A component of

preventive services is oral health education. Currently no information is available on the level of awareness of oral health in rural communities. This information is required in formulation of oral health care education programmes.

3.2 Justification

Dental caries and periodontal disease are universal and prevalent in both developed and developing nations. They affect children and adults alike, both genders and result in a lot of pain, discomfort, loss of teeth and time off from school or work seeking treatment. They also cause nutritional problems due to pain and loss of teeth especially in children and the elderly. Dental fluorosis is a problem in large parts of Kenya in areas where volcanic rock is found. Severe cases of fluorosis result in unacceptable social appearance and a higher susceptibility to dental caries when pitting occurs. It is imperative to establish the current status of these conditions in Kenya for purposes of planning and implementing remedial measures.

Due to the current economic constraints Kenya is facing, there has been a reduction in the health budgetary allocation from Ksh 12.9 billion in 1997/1998 to Ksh 10.5 billion in 1998/1999 to Ksh 10.1 billion in 1999/2000[88]. Of this, only 1.6% is allocated to oral health care[2]. In order to maximize the use of resources allocated for oral health care programmes, and ensure they are relevant, practical and cost effective, policies with clear objectives and goals need to be formulated based on empirical evidence.

Use of utilization records in facilities is a poor indicator of morbidity because it has been noted that only 12% of household members seek care from a facility when they perceived themselves to have a problem[55]. It is also true that information on the dynamics that lead to this utilization

cannot be obtained from these records but at community level from the people served by these facilities. This study focuses on the objective need for oral health care services by determining oral health status. It also determines behaviour patterns of those who perceive themselves to have an oral health care problem as an initial requirement in planning and implementation of the services at district level.

Fortunately most oral health problems are easily preventable at cheap cost. A major preventive component is oral health education. To be proficient in preparation of relevant oral health education programmes, it is imperative to determine the knowledge communities have on dental problems, their causes and management and any misconceptions they may have.

There are few studies on knowledge of causes and prevention of oral health conditions in Kenya and these studies have concentrated on information from students [32,44]. This study focuses on the prevalence of oral health problems of public health importance, knowledge about their causes and prevention and the behaviour patterns of those suffering from these problems

3.3 General Objectives

1. To determine the oral health status of the residents of Kiambu district;

2. To determine factors that influence oral health care seeking behaviour.

3.4 Specific Objectives

1. To determine the influence of socio-economic and demographic characteristics of the residents on attendance at oral health care facilities;

2. To establish the prevalence of dental caries, periodontitis, dental fluorosis, and oral

hygiene status;

3. To determine the factors that influence oral health status;
4. To describe the pattern of utilization of oral health care facilities;
5. To describe the oral hygiene practices of the residents;
6. To establish the level of oral health knowledge of the respondent and the influence of this knowledge on seeking treatment at oral health care facilities by the household members.

3.5 Hypothesis

1. There is no association between seeking treatment at oral health care facilities and socio-economic and demographic characteristics.
2. There is a positive association between level of knowledge of oral health and seeking treatment at an oral health care facility.
3. There is a negative association between oral hygiene practices and seeking treatment at an oral health care facility.
4. There is no association between oral health status and socio-economic and demographic characteristics.
5. There is a positive association between oral health status and knowledge of oral health.
6. There is a positive association between oral hygiene practices and oral health status.

3.6 Dependent Variables

1. Seeking treatment at an oral health care facility.
2. Oral health status: Plaque score, gingival score, fluorosis score, DMFT/dft score.

3.7 Independent Variables

1. Age

2. Gender

3. Educational status of respondent

4. Knowledge of oral health of respondent

5. Income level of household

6. Oral hygiene practices

7. Oral health care provider sought

3.8 Definition of Variables

Age - Age in years at last birthday

Educational status - the highest level of school attended

Income status of household - combined income from salary, business, sale of farm produce and or any other source of income.

Low income - earning less than Ksh.10 000 per month.

Middle income - earning between Ksh. 10 000-20 000.

High income - earning more than 20 000 per month.

Knowledge of oral health was confined to basic causation, prevention and management of dental caries, periodontal disease and dental fluorosis, and the ability to name one other dental condition. Maximum score was 13

A score of 0-4 correct answers was considered to be poor knowledge.

A score of 5-9 was considered to be fair knowledge.

A score of 10-13 was considered to be good knowledge.

Oral hygiene practices were confined to instrument used to clean teeth and frequency of cleaning.

Oral hygiene practice was considered to be good when either a commercial toothbrush or chewing stick was used for cleaning teeth and cleaning was carried out at least twice a day.

Oral hygiene practice was considered to be poor when neither a toothbrush nor chewing stick was used for cleaning teeth and cleaning was carried out less frequently than once a day.

Oral health status. This was defined as good if the respondent had no decayed teeth, good periodontal state and absent or mild dental fluorosis.

Good oral hygiene - having two or less than two sextants with visible plaque.

Poor oral hygiene - having three or more sextants with visible plaque

Good periodontal state -having two or less than two sextants with periodontitis.

Poor periodontal state - having three or more sextants with periodontitis.

3.9 Limitations of the Study

The results of this study should be treated with caution because the study area is unique in that it is readily accessible to both rural and urban oral health care facilities. This is not the case for most rural residents in Kenya.

3.10 Constraints of the Study

It was not possible to examine all the residents in each household as they were not all present when the households were visited.

CHAPTER FOUR

STUDY AREA

Kiambu district was purposely chosen as the study area because it has district health facilities offering services similar to those in other districts in the country. Due to its proximity to Nairobi and readily available transport, the residents have access to oral health facilities in the city. This makes it possible to study the use of both rural and urban oral health care providers

4.1 Physical Description

Kiambu District is located in Central Province and is the smallest district in the province. The district borders Nairobi City and Kajiado District to the south, Nakuru District to the west, Nyandarua District to the north-west and Thika district to the east. The total area of the district is 1458.3km^2.divided into 5 administrative divisions namely Kiambaa, Limuru, Githunguri, Kikuyu and Lari. It has a total of 35 locations and 112 sub-locations. Kiambaa division has an area of 191.7 km^2. It has nine locations and 26 sublocations[89].

4.2 Demographic Profile

Kiambu is a densely populated district. Population density is 562 persons per sq km with a population of 744 010 persons[90]. The population distribution in Kiambu District is uneven. Some divisions have more people than others because of better infrastructure and job opportunities, Kiambaa Division has 24% of the total population and the highest density of 711 persons per km. Average household size is 3.92.

Kiambu Town is located in this division and since it is the district headquarters it has some

influence on the division's total population. Kikuyu Division has 25% of the district's population, Limuru has 16% and Githunguri has 20%. Lari Division is the least populated with 15% of the total population. The male: female sex ratio for the district is 99:100[89].

4.3 Socio-economic Profile

Kiambu is predominantly an agricultural district with reliable rainfall. About 90% of the available arable land in the district is under smallholder subsistence farming while the remaining 10% is under large scale commercial farming. The cash crops grown are mostly coffee, tea, pyrethrum and cut flowers for export and most incomes are derived from these agricultural activities. The proximity to Nairobi has promoted and encouraged a cash economy where major commercial activities are found. Of the total labour force in the district, 40% is in unpaid family labour, which is mainly agricultural. This indicates that most of the labour force is not highly skilled. 20% of the labour force comprise of public or formal sector employees. Many people working in Nairobi reside in Kiambu because of the availability of cheaper rental houses.

Transport services in the district are reliable and public and private transport vehicles available. The district has a good road network with 55% being all weather, 20% gravel and 25% earth roads that are occasionally impassable during the rainy season.

The socio-economic profile shows a district with the monthly per capita income is estimated to be above Ksh. 30 000[89]. This is a fairly good socio-economic status and is a favourable predisposing factor in health seeking behaviour.

4.4 Health Services

Kiambu district has 5 hospitals, 19 health centres, 37 dispensaries and 55 clinics. The government is in charge of 2 hospitals, 14 health centres, 15 dispensaries and 2 clinics. The rest are run by religious organisations including the Catholic, Presbyterian Church of East Africa and African Inland Churches.

Dental services are available at Kiambu District hospital, Tigoni Sub-district Hospital, Nazareth Hospital and at Kijabe Medical Centre. Services at the district and sub-district hospitals are mainly dental extractions, management of infections and minor trauma, fabrication and repair of dentures. In addition to the services mentioned, Nazareth and Kijabe Medical Centre also offer conservative treatment, and scaling of teeth. In addition, Kijabe Medical Centre also offers histopathology and orthodontic services. Kiambaa division is served by two hospitals, four health centres, eight dispensaries and 13 clinics. Kiambu District Hospital is in this division and has four dental officers, one dental technologist and three COHOs. The main dental procedures performed are dental extractions, management of infections and intermaxillary fixation of fractured mandibles and prosthetics. The dentist:population ratio of Kiambaa is 1:178 562[90]. This indicates the dental personnel present is insufficient to cater adequately for the population.

4.5 Voluntary Agencies

There are several NGOs operating in the district rendering various services in different sectors of the economy. Christian missionaries operate hospitals such as Kijabe , Kikuyu and Nazareth.. Other NGOs include Child Welfare Society of Kenya and Family Planning

Association of Kenya. The Catholic, Anglican Church of Kenya, and Presbyterian Church of East Africa denominations undertake development activities such as education, health and provision of water. However they have not been actively involved in providing oral health services[89].

4.6 Educational Facilities

Kiambu district is well served with educational facilities. It has 223 primary and 90 secondary schools. Other institutions include a teachers training college, one farmers training centre, institutes of advanced technology and several youth polytechnics. There are also various commercial colleges found in urban centres. Literacy level in the 15 – 59 age group (labour force) is 92.9%. Kiambaa division has 37 primary schools, 15 secondary schools, one youth polytechnic and one college[89].

4.7 Water Facilities

The main water facilities in the district are piped water schemes, boreholes and dams. There are also shallow wells and roof catchments that are mostly individually owned but the number is not known as no survey of them has been carried out. Kiambaa division has one piped water scheme, 85 boreholes and one dam. The quality of water is generally good for domestic, industrial and agricultural use although some of the water in the rivers and shallow wells is polluted with industrial waste[89].

CHAPTER FIVE

METHODOLOGY

5.1 Study Population

The study population was defined as residents of Kiambu district. The household was the unit of sampling and analysis. A household refers to a person or group of related and unrelated persons who live together in the same dwelling unit(s) who acknowledge one adult male or female as the head, share the same housekeeping arrangements and are considered as one unit. Information was obtained from the head of the household or his spouse or where none of them was available, from a member of the household above 18 years of age with assistance in clarification from other family members where necessary. All household members above the age of four years were included in the oral examinations.

5.2 Study Design

This was a cross-sectional descriptive study using population based study group. Data was collected from 13th March to 29th May 2000 using a structured questionnaire and intra-oral examination forms. Information was obtained on household characteristics, oral health knowledge, oral hygiene practices, oral health status and on utilization of oral heath care services. Intra-oral examinations were carried out to determine the oral health status.

5.3 Sampling Frame

The sampling frame consisted of all the households in Kiambu District. Kiambu district had a population of 744 010 according to the 1999 population census with 189 706 households.

5.4 Sample Size Determination

The sample size was determined using the formula[91].

$$n = \frac{z^2 pq}{d^2}$$

where

n = desired sample size;

z = the standard normal deviate which in this study =1.96;

p = proportion in the target population estimated to have at least one dental condition requiring professional management, (estimated to be 40% of the population[92]);

q = 1.0 – p;

d = degree of accuracy required (in this case 95%);

computed from the above formula

$$n = \frac{(1.96)^2 (0.4).(0.6)}{(0.05)^2}$$

= 369 households

According to the 1999 population census, the average household size in Kiambu district is 3.92 so the total number of individuals expected to be included in the study is 1440.

5.5 Sampling Procedure

Multistage sampling procedure was used to select the households used in the study, and simple random sampling was applied at each stage to select the division, locations and sublocations.

Stage I. Kiambaa division was selected by writing the 5 divisions down on separate pieces of paper, folding them and picking one of the papers from the table with eyes closed.

Stage II. Two locations from the nine locations in the division were randomly selected using the same method. These were Riabai and Kihara locations.

Stage III. In each location one sublocation was randomly selected out of two and five sub-locations respectively. These were Riabai and Wangunyo sub-locations.

It was not possible to obtain a list of the households from the respective assistant chiefs so consecutive random sampling was used where every other household was included in the study. Where there was nobody at home who qualified to respond or the respondents were unwilling to participate in the study, the house was skipped and the next one included. To ensure households had an equal chance of inclusion in the study, a different direction was randomly chosen as the starting point each day starting from the site of the previous day's finishing point. There were 2 706 households in Riabai and 647 households in Wangunyo[59]. Using a ratio of 4:1, 296 households were drawn from Riabai and 74 households from Wangunyo.

5.6 Inclusion and Exclusion Criteria

1. Must have been resident in the area for the last six months;

2. Should not be suffering from any chronic medical condition or be physically or

mentally challenged as this may influence the variables under study.

5.7 Data Collection Instruments and Procedure

5.7.1 Interviews

Information was obtained using a structured questionnaire (Appendix 1) after obtaining informed consent (Appendix 3). Research assistants trained by the principle investigator administered the questionnaires. The interview took place within the compound of the homestead, and the head of the household alone answered questions pertaining to socio-demographic and oral health knowledge. When the head was not present, his spouse or the oldest member above 18 years of age was the main respondent. Information pertaining to oral health care seeking behaviour was obtained from the main respondent with assistance from other household members where necessary to enhance reliability.

5.7.2 Oral Examinations

The oral examinations were carried out on all members of the household present at the time of the interview above the age of four years who consented to be examined. These were carried out by the principal investigator and recorded by an assistant using an assessment form (Appendix 2). The following instruments were used: plain mouth mirrors, sickle-shaped explorer and periodontal probe. Oral health status was determined by examining for dental caries using the DMFT/dft index, (Appendix 10) oral hygiene status, gingivitis, and periodontal status were determined using WHO criteria 1977 (Appendix 5, 6, 7 respectively). The oral examinations were conducted under natural light.

5.8 Ethical Considerations

1. Permission to conduct the study was obtained from the Office of the President;
2. Permission to carry out oral examinations was obtained from the Medical Ethical Committee, Kenyatta National Hospital;
3. Informed consent was obtained from the respondents prior to conducting the interviews;
4. The respondents were assured of complete confidentiality of their responses;
5. Participation in the study was voluntary;
6. Referral to the nearest health facility providing oral health care was done for those noted to require treatment;
7. Oral hygiene instructions on toothbrushing were provided and queries related to oral health care were answered.

5.9 Minimising Errors, Confounders and Biases

Pre-testing of the questionnaire to ensure validity and reliability of the research tools was done in Kihara sublocation and necessary corrections done. Four research assistants were recruited; two from each sublocation. They knew the areas well having taken part in the just concluded national census and were form four school leavers of good character chosen by the respective chiefs. The respondents were more willing to respond after recognising them. They were also conversant in Kikuyu language.

Thorough training on the interviewing techniques was done for two days. Oral examinations were conducted only by the principal investigator to ensure reliability.

Logistic regression was used to control for confounding.

5.10 Data Analysis

Most of the questionnaire was pre-coded and post-coding was done for the questions that could not be coded prior to data collection. Data were entered and cleaning was carried out to ensure data were correctly entered and to reduce errors. Analysis was done using a personal computer and the Statistical Package for Social Sciences Programme. The household was used as the sampling unit and the unit of analysis. Descriptive statistics of the various variables were tabulated where necessary. Cross tabulation and Chi-square statistics were used to test for significant differences between the variables where necessary. Logistic regression was used to test for the relative importance of the dependent factors.

Ninety five percent (95%) confidence interval was used when testing for significance.

CHAPTER SIX

RESULTS

The results presented in this chapter were derived from data obtained from structured questionnaires and oral examinations. The general objectives of the study were to determine oral health status of the community and factors that determine or influence utilization of oral health care facilities. Univariate statistics were used to describe household characteristics and bivariate analysis using chi square statistics were used to measure associations between the relevant variables. Logistic regression analysis was used to test for associations while controlling for confounding factors.

6.1 Socio-demographic Characteristics

Information was collected from a total of 376 households, but six questionnaires were rejected due to incomplete information. Household heads or their spouses constituted 341(92.2%) of the main respondent. The rest were sons or daughters of the households. There were 138(37.3%) male respondents and 232(62.7%) female.

Christians of different denominations accounted for 365(98.6%) of the households. One household was Muslim, two were atheists and two belonged to traditional sects.

There were 1528 household members in these households ranging from age 4 to 104 years with a mean age of 28 years, median 24 years and mode 20 years. The most frequent age group was 20-29 years and 64% of the households had members within this age group.

Household heads or their representative who had never been to school accounted for 27(7.3%) of the respondents. Those who had completed primary level education were 150(40.5%),

164(44.3%) had secondary education and 29(7.8%) had tertiary level education. Only 58(15.5%) respondents were in formal employment earning a regular salary. 132(35%) were peasant farmers and 72(19.8%) were housewives. The remaining 108(29.2%) had irregular jobs or were in the informal sector.

Criteria used for income status:

Low income - earning less than Ksh.10 000 per month;

Middle income - earning between Ksh. 10 000-20 000 per month;

High income - earning more than Ksh. 20 000 per month;

Low-income status was recorded in 256(69.1%) households, 72(19.5%) households had middle income status and 42(11.4%) had high income status.

6.2 Oral Hygiene Practices

Information was obtained on frequency and instrument used for brushing teeth. There was no household in which all members did not brush their teeth. However there were three households in which all members brushed their teeth less frequently than once a day. Brushing teeth once a day was practiced by all members in 103 households and only 60 households had all members brushing twice a day. However slightly over half the households 200(54.1%) in the study had members practicing different brushing habits ranging from members who never brushed at all to members who brushed four times a day. The frequency of toothbrushing is shown in Figure 1.

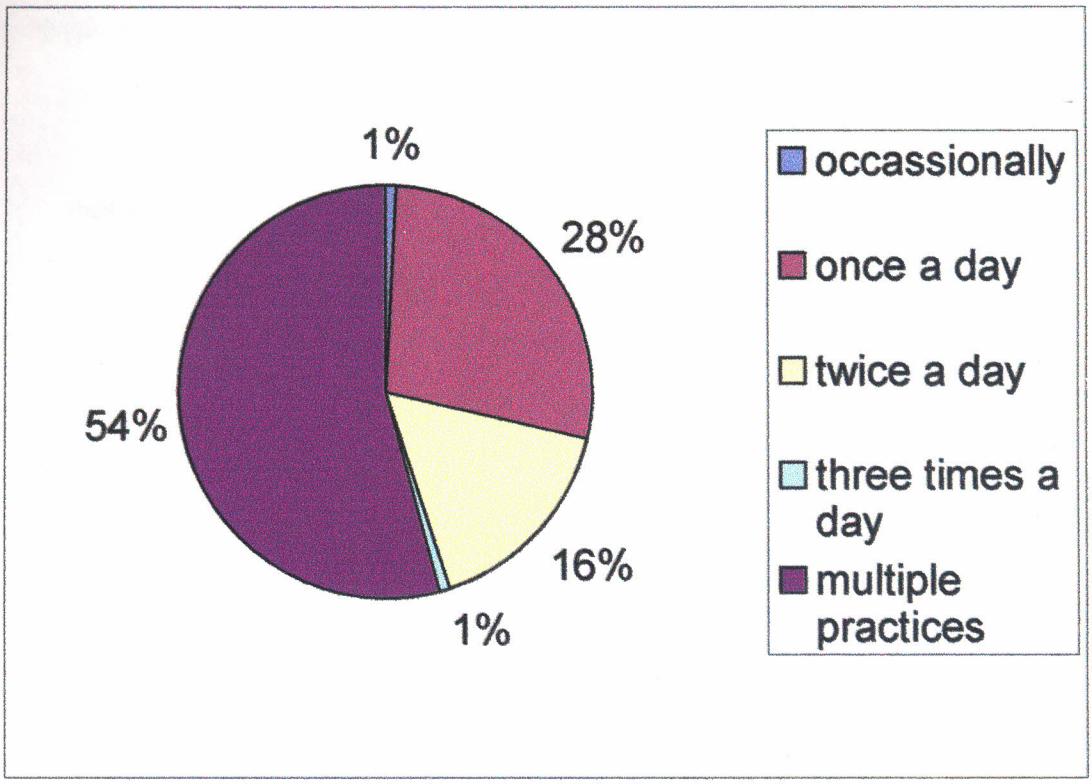

Fig 2: Tooth brushing frequency among household members with age greater than four years (n=370).

Figure 2 displays the toothbrushing habits practised in the households. Only 170(46.0%) households had toothbrushing habits that all members of the households practiced. In 200(54.1%) households there were different practices: There were 159 households with two different practices among the members, 38 households had three different practices among members and 3 households had four different practices among members that is some members never brushed at all, some brushed once a day, some twice a day, and others three times a day.

Table 1: Association between tooth brushing frequency and age (n=370).

Age group	Frequency of tooth brushing				
	Never	Occ	Once	Twice	Thrice
0-9	34(72.3)	19(37.3)	77(27.7)	23(11.2)	1(2.8)
10-19	9(19.1)	13(25.5)	126(45.3)	65(31.7)	12(33.3)
20-29	1(2.1)	10(19.6)	118(42.4)	127(62.0)	17(47.2)
30-39	0	6(11.8)	99(35.6)	71(34.6)	8(22.2)
40-49	0	5(9.8)	65(23.4)	50(24.4)	7(19.4)
50-59	5(10.6)	5(9.8)	59(21.2)	30(14.6)	3(8.3)
60+	7(14.9)	14(27.5)	45(16.2)	19(9.3)	1(2.8)
Total	**47(100.0)**	**51(100.0)**	**278(100.0)**	**205(100.0)**	**36(100.0)**

Table 1 displays the toothbrushing habits of the household members with regard to age. Since the household was used as the unit of analysis, the responses shown are the number of households in which the habits were present. There were multiple responses in the households because households had members in more than one age group. There were 47 households that had members who never brushed their teeth and in 34(72.3%) of them, the members were aged 0-9 years of age. Slightly over 12(25.5%) of these households had members above 50 years of age who never cleaned their teeth. There was no one in 30 to 49 years age groups who never cleaned their teeth. Age group 20-29 years had the highest percentage of members brushing twice a day (62.0%) and three times a day(47.2%). One household had a member in this age group who never cleaned at all. There were too many cells with values less than the expected minimum so chi square calculations could not be computed.

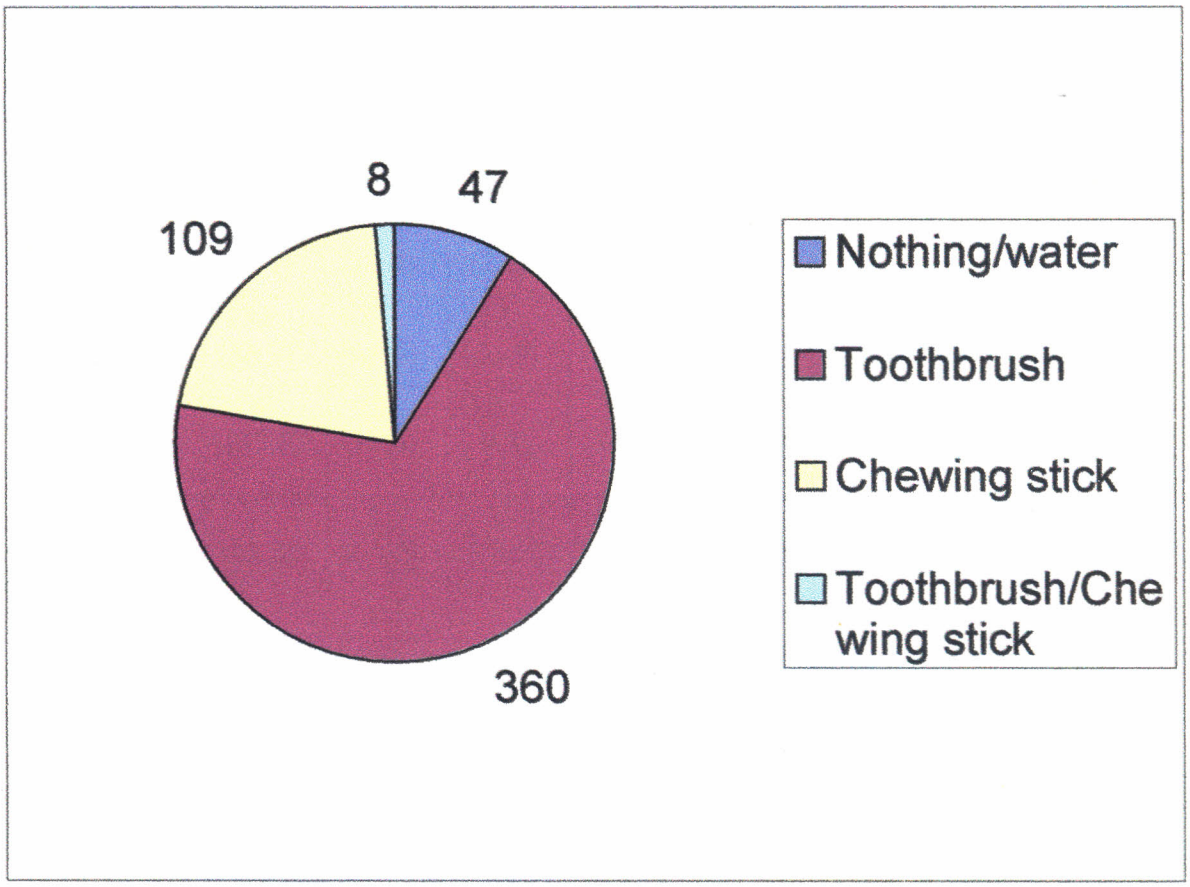

Fig. 3:Tools used in households for purposes of cleaning their teeth (n=370).

As shown in figure 3, the commercial toothbrush was the most common instrument used for cleaning teeth. There were 360(97.3%) households that had members using toothbrushes for cleaning their teeth. Households that had members who used chewing sticks for cleaning teeth were 109(29.5%) and 8(2.2%) households had members who alternated between the toothbrush and the chewing stick. The toothbrush and chewing sticks used were used with toothpaste, plain water or salty water. In 47(12.7%) households there were some members who made no attempt at all to clean their teeth or cleaned them with plain water alone.

Table 2: Association between tools used for cleaning teeth and age (n=370).

Instrument	0-9 (%)	10-19 (%)	20-29 (%)	30-39 (%)	40-49 (%)	50-59 (%)	60+ (%)	Total (%)
Nothing	38 (80.9)	6 (12.8)	1 (2.1)	0 (0.0)	0 (0.0)	5 (10.6)	7 (14.9)	47 (100.0)
Toothbrush	132 (36.7)	175 (48.6)	232 (64.4)	161 (44.7)	98 (27.2)	67 (18.6)	34 (9.4)	360 (100.0)
Chewing stick	14 (12.8)	12 (11.0)	10 (9.2)	17 (15.6)	27 (24.8)	25 (22.9)	43 (39.4)	109 (100.0)
Toothbrush/ chewingstick	1 (12.5)	0 (0.0)	3 (37.5)	0 (0.0)	1 (12.5)	1 (12.5)	2 (25.0)	8 (100.0)
Total	143	196	236	174	121	95	77	370

Table 2 shows the relationship between the tools used for cleaning teeth and age. Both the tooth brush and chewing stick were used by all ages. However there were differences among the ages. The 0-9 years age group had the highest percentage of members who used nothing to clean their teeth (80.9%). Households with members in the 20-29 years age group had the largest number using the commercial toothbrush (over 60%) and the least using the chewing stick (9.2%). The number of household members using the commercial toothbrush decreased with increase in age with only 9.4% of households with members above 60 years using the commercial toothbrush. However this age group had the highest number of members using the chewing stick (39.4%).

Toothbrushing frequency was categorised into poor practice when brushing was done once a day or less frequently and good practice when it was done two or three times a day. There were 74(20.0%) households where all the members had good oral hygiene practices. There were

152(41.1%) households where all the members had poor oral hygiene practices and 144(38.9%) households where some members had poor oral hygiene practices and some members had good practices. These latter households were considered to have poor practices in general. Practice was cross-tabulated with income, gender, age and education level.

Table 3: Association between oral hygiene practices, income, education and knowledge of oral health (n=370).

Household Characteristics	Oral hygiene practices		Total	Statistics
	Good(%) n=74(20.0)	Poor(%) n=296(80.0)	n=370	
Income				
Low	42(16.0)	221(84.0)	263(100.0)	χ^2=9.980
Middle	18(27.3)	48(72.7)	66(100.0)	df: 2
High	14(34.2)	27(65.8)	41(100.0)	p-value 0.007
Education				
None	4(14.9)	23(85.1)	27(100.0)	χ^2=8.733
Primary	21(14.0)	129(86.0)	150(100.0)	df:3
Secondary	39(23.9)	124(76.1)	163(100.0)	p-value:0.033
Tertiary	10(33.4)	20(66.6)	30(100.0)	
Knowledge				
Poor	9(16.1)	47(83.9)	56(100.0)	χ^2=5.916
Fair	55(23.8)	176(76.2)	231(100.0)	df:2
Good	10(12.0)	73(88.0)	83(100.0)	p-value:0.052

Table 3 shows the association between oral hygiene practices and household characteristics of income, knowledge of oral health and education of the head of the household. Overall, there were more households with poor oral hygiene practices than there were with good practices.

There were 84% households in the low income bracket that had poor oral hygiene practices compared to 16% who had good practices. Households in middle income bracket had a lower range between good and poor oral hygiene practices (27.3% and72.7% respectively) and this range decreased further for the high income households where 34.2% recorded good practices. Oral hygiene practices were noted to be statistically significantly associated with income (p-value 0.007).

Only 14% of households where the head of the household had no education or had primary level education, had good oral hygiene practices. There were 23.9% with good practices in secondary level educated heads and 33.4% in heads with tertiary level education. Education was found to be positively related to oral hygiene practices and the association was noted to be statistically significant (p-value 0.033).

Association between knowledge of oral health and oral hygiene practices was noted to be marginally significant (p-value 0.053). In households where there was fair knowledge of oral health, 23.8% had good practices compared to 16.1% and 12.0% in households where knowledge was poor or good respectively.

Table 4: Association between oral hygiene practices, age and gender (n=370).

Characteristic	Oral hygiene Practices		Total	Statistic
	Good(%) n=74(20.0)	Poor(%) n=296(80.0)	n=370	
Gender				
Male	68(19.7)	277(80.3)	345	χ^2=0.014
Female	72(19.8)	291(80.2)	363	df:1
				p-value:0.905
Age				
0-9	14(9.8)	129(90.2)	143	
10-19	35(17.9)	161(82.1)	196	
20-29	53(22.5)	183(77.5)	236	χ^2=66.543
30-39	28(16.1)	146(83.9)	174	df:6
40-49	29(24.0)	92(76.0)	121	p-value:0.000
50-59	19(20.0)	76(80.0)	95	
60+	12(15.6)	65(84.4)	77	

Table 4 shows the association between oral hygiene practices and gender and age. Both males and females had more respondents with poor oral hygiene practices than good. The percentages were similar and households with good practices had less than 20% from each gender. Gender was not a significant factor in oral hygiene practices (p-value 0.905).

For all the ages there were more households with poor practices than with good. The youngest age group had the least percentage with good practices(9.8%) followed by the oldest age group(15.6%). The 40-49 years age group had the highest percentage with good practices (24.0%) followed by the 20-29 years age group (22.5%). Age was noted to be

statistically significantly associated with oral hygiene practice (p-value:0.000).

6.3 Knowledge of Oral Health

Information on causation, prevention and treatment of dental caries, periodontal disease, and dental fluorosis was obtained from the respondents and this was used as the knowledge for the household as it was impractical to obtain this information from each household member. There were 357 (96.4%) respondents who had heard of tooth decay and gave the following answers as causes of tooth decay.

Table 5: Knowledge on causes of tooth decay according to respondents (n=357).

Causes of tooth decay	Frequency(%)
Not brushing teeth	96(26.9)
Using sugary foods	76(21.3)
Bacteria	23(6.4)
Combination of not brushing and using sugary foods	63(17.6)
Others	97(27.2)
Do not know	2(0.5)

Table 5 displays knowledge of respondents on causes of tooth decay. 13 respondents claimed to have never heard of tooth decay so were excluded from answering the questions relating to dental caries. "Not brushing teeth" was mentioned by 26.9% of the respondents as the cause of tooth decay, 21.3% mentioned sugary foods, and 6.4% said tooth decay was caused by bacterial infection. A combination of not brushing and eating sugary foods, was the answer provided by 17.6% of the respondents and 0.5% did not know what caused tooth decay. The remaining

27.2% gave answers like contaminated food and old age. Whereas 78.3% of the respondents said it was possible to prevent tooth decay, only 1% knew that prevention may be achieved by a combination of frequent tooth brushing, avoiding sugary foods and regular dental checkups.

Results of knowledge on signs of tooth decay was as follows. A total of 290(81.2%) respondents mentioned pain as a sign of tooth decay, 113(31.7%) mentioned cavities, 5(1.4%) mentioned dental checkups as a sign of determining the presence or absence of tooth decay. Tooth extraction as a form of treatment for tooth decay was mentioned by 319(89.4%) of the respondents and 173(48.5%) mentioned tooth fillings. Whereas two respondents mentioned root canal treatment, no respondents mentioned crowns and bridgework. There were 15(4.1%) respondents who did not know any form of treatment and the remaining 1.1% mentioned medication or frequent brushing as forms of treatment.

Whereas 226(60.4%) of the respondents had heard of gum disease, only 26(11.5%) and 40(17.7%) respectively mentioned not brushing teeth and germs as causes of gum disease. There were 115(50.9%) respondents who did not know any causes of gum disease and the remaining 41(18.1%) gave wrong reasons such as bad food, rough toothbrushes and fever. On signs of gum disease 96(41.9%) mentioned swelling of the gums, 70(30.6%) mentioned bleeding gums and 26(11.3%) knew other signs such as pus exudation and mobile teeth. Only 104(27.9%) respondents knew correctly that regular tooth brushing prevents gum disease.

Table 6: Knowledge on the causes of dental fluorosis according to respondents. n=370

Causes of dental fluorosis	Frequency(%)
Water	141(38.1%)
Not brushing properly	65(17.6%)
Water and not brushing properly	37(10.0%)
Inherited	16(4.3%)
Others	38(10.0%)
Do not know	73(19.7%)

As shown in Table 6, 141(38.1%) of the respondents mentioned fluorosis was caused by water, 65(7.6%) respondents thought the problem was caused by not brushing teeth properly and 37(10.0%) felt fluorosis was caused by a combination of water and not brushing teeth properly. Other reasons given as causes of fluorosis included eating chicken droppings by young children, and eating raw food such as sweet potatoes and bananas.

Only 19(5.1%) of the respondents mentioned correctly that dental flourosis can be prevented by using piped or rainwater. Over 176(40%) had some idea it was due to a contaminant in drinking water but thought it could be removed by boiling the water before use. There were a total of 119(31.8%) respondents who did not know how dental fluorosis could be prevented.

Responses to other oral health conditions or problems that caan occur in the oral cavity were as follows. There were 163(43.6%) respondents who mentioned mouth ulcers, 7(1.9%) mentioned cancer and 6(1.6%) mentioned swelling of the jaws. There were 178(47.6%)respondents who did not know of any other mouth lesions. Knowledge of oral health was scored based on correct answers provided using the following criteria:

Poor knowledge - score of 0-4 correct answers;

Fair knowledge - score of 5-9 correct answers;

Good knowledge - score of 10-13 correct answers.

There were 56(15.2%) respondents who had poor knowledge, 231(62.4%) had fair knowledge and 83(22.4%) respondents had good knowledge.

Table 7: Association between knowledge of oral health, age and education (n=370).

Characteristic	Knowledge			Total(%) n=370	Statistics
	Good (%) n=83(22.4)	Fair (%) n=231(62.4)	Poor (%) n=56(15.2)		
Age Group					
0-19	5(17.8)	22(78.6)	1(3.6)	28(100)	X^2=9.225
20-29	30(21.6)	89(64.0)	20(14.4)	139(100)	df:10
30-39	19(23.2)	48(58.5)	15(18.3)	82(100)	p-value:0.511
40-49	14(29.2)	25(52.1)	9(18.4)	48(100)	
50-59	8(18.6)	30(69.8)	5(11.6)	43(100)	
60+	7(23.3)	17(56.7)	6(20.0)	30(100)	
Education					
None	0(0.0)	21(75.0)	7(25.0)	28(100)	X^2=14.452
Primary	37(24.7)	86(57.3)	27(18.0)	150(100)	df:6
Secondary	38(23.5)	103(63.6)	21(13.0)	162(100)	p-value:0.025
Tertiary	8(26.7)	21(70.0)	1(3.3)	30(100)	

Association between knowledge of oral health and age and education is shown in Table 7. Knowledge of oral health was not influenced by age of the household head (p-value:9.225).

Age group 40-49 years had the highest percentage with good knowledge (29.2%) and above 60 years age group had the highest percentage with poor knowledge (20.0%). Across all age groups, most respondents had fair knowledge of oral health. The 0-19 years age group had the lowest percentage (3.6%).

There were no households in which respondents who had never been to school had good knowledge of oral health. Households with the highest percentage of respondents with good knowledge of oral health (26.7%), were those in which the respondent had tertiary level education. These households also recorded the lowest percentage with poor knowledge (3.3%). There was a positive association between knowledge of oral health and education and this was statistically significant (p-value: 0.025).

6.4 Results from Oral Examinations

All household members above the age of 4 years were eligible for oral examinations. All efforts were made to include as many household members as possible in the survey. However it was not possible to examine all the members because some were not physically present at the time the home was visited and some members who were present did not consent to the examinations. Overall oral examinations were carried out in 717 subjects from the 370 households. Those examined were deemed to indicate the presence or absence of oral health problems in the household. Members were examined for presence of plaque which indicated level of oral hygiene, presence of gingivitis and periodontitis which indicated the level of periodontal disease and records of the number of decayed missing and filled teeth of the household members were noted.

There were 119 children who had primary dentition. Of these children, 69(58%) were caries free and dft was 1.52. The decayed component accounted for 98.9%. There were 686 individuals with permanent teeth and 398(58%) were caries free. DMFT was 2.39 with the decayed component accounting for 45.3%, missing component accounting for 50.3% and filled component accounting for 4.3%. Prevalence of plaque, gingivitis and periodontitis was determined by the number of sextants in the mouth that had plaque, gingivitis and periodontitis respectively using the criteria shown in Appendix 5, 6, and 7. Status was considered to be good if two or less than two sextants were recorded as having the relevant problem. In 257(70.4%) households some members had good plaque score compared to 215(58.9%) households with members with poor plaque score. In 308(84.3%) households there were household members with good gingivitis scores compared to 136(37.3%) that had members with poor gingivitis scores. There were 307(84.1%) households with members with good periodontal scores compared to 31.8% households with members with poor periodontitis scores.

Table 8: Distribution of dental fluorosis in households (n = 370).

Fluorosis	Frequency (%)
None	140(37.8)
Mild	219(59.2)
Moderate	157(42.4)
Severe	26(7.0)

Table 8 displays the distribution of dental fluorosis among households. There were only 140(37.8%) households where no dental fluorosis was recorded. In 59.2% households there were members with mild fluorosis and only 7.0% households had members with severe fluorosis. There were multiple responses in 149 households, an indication that members within

households had different levels of fluorosis. Overall, oral health status was determined by the need for oral health treatment by a professional provider. Households in which at least one member recorded poor periodontal status and or had decayed teeth or severe forms of dental fluorosis were deemed to have poor oral health status. This is because these members were in need of professional care. In 110(29.7%) households, all members had good oral health status compared to 129(34.9%) households where all members had poor oral health status. Households in which both good and poor oral health status was recorded were 128(34.6%). These households were recorded as having poor status because they had unmet need.

Table 9: Association between oral health status and income, education, knowledge, and oral hygiene practices (n=370).

Characteristics	Oral health Status		Total	Statistics
	Good	Poor		
	n=110	n=260	n=370	
Income				
Low	80(30.4)	183(69.6)	263(100)	χ^2=1.382
Middle	21(31.8)	45(68.2)	66(100)	df:2
High	9(22.2)	32(77.8)	41(100)	p-value:0.500
Education				
None	5(18.5)	22(81.5)	27(100)	χ^2=2.652
Primary	48(32.0)	102(68.0)	150(100)	df:3
Secondary	50(30.7)	113(69.3)	163(100)	p-value:0.448
Tertiary	7(23.3)	23(76.7)	30(100)	
Knowledge				
Poor	10(17.9)	46(82.1)	56(100)	χ^2=4.645
Fair	72(31.2)	159(68.8)	231(100)	df:2
Good	28(33.7)	55(66.3)	83(100)	p-value:0.098
Oral hygiene practices				χ^2=0.323
Good	24(34.3)	50(65.7)	70(100)	df:1
Poor	86(29.1)	210(70.9)	296(100)	p-value:0.570

As displayed in Table 9, there was no statistically significant association between income and oral health status (p-value 0.500). Across all income levels there were more households with poor status than there were with good status. The widest range between good and poor status was in the high-income households where the range was 55.6% compared to 39.2% for low-

income households.

Only 18.5% of households where the respondent had no education had good oral health status. Those with primary level education had slightly more members with good status (32.0%) but this number decreased for both secondary and tertiary level education. There was no significant association between education and oral health status. (p-value 0.448). As knowledge of oral health improved there was improvement of oral health status. 17.9 % of households where there was poor knowledge had good oral health status compared to 33.7% of households that had good knowledge. However the association was not statistically significant (p-value 0.098). In 34.8% households with good oral hygiene practices, good oral health status were recorded compared to 29.1% households that had poor practices. There was no association between oral hygiene practices and oral health status (p- value 0.570)

Table 10: Association between oral health status and age (n=370).

Age group (years)	Oral health status		Total(%) n=370
	Good(%) n=110	Poor(%) n=260	
0-9	44(30.8)	99(69.2)	143(100)
10-19	57(29.1)	139(70.9)	196(100)
20-29	79(33.5)	157(66.5)	236(100)
30-39	50(28.7)	124(71.3)	174(100)
40-49	34(28.1)	86(71.9)	121(100)
50-59	26(27.4)	69(72.6)	95(100)
60+	11(14.3)	66(85.7)	77(100)

Chi square:27.828 df:2 p-value:0.006

;ross all the age groups there were more household with poor oral health status than those th good status (Table 10). The oldest age group had the highest percentage of members with ıor status (85.7%) and the 20-29 years age group had the highest percentage with good ıtus. From ages 30-59 years, the percentages with good status was similar (slightly less than)%) then there was a sharp decrease in the 60 and above age group. Age was a significant :terminant of oral health status (p-value-0.006)

6.5 Morbidity and Oral Health Care Seeking Behaviour

here were 185(50.0%) households in which at least one member had suffered from an oral ealth problem in the preceding one year. The most frequent complaint was toothache followed y mobile teeth. Although the preceding two-week duration is generally used as the recall eriod in health care studies, during the pretest it was noted that this time period was too short ɔ yield useful information hence a one-year period was used.

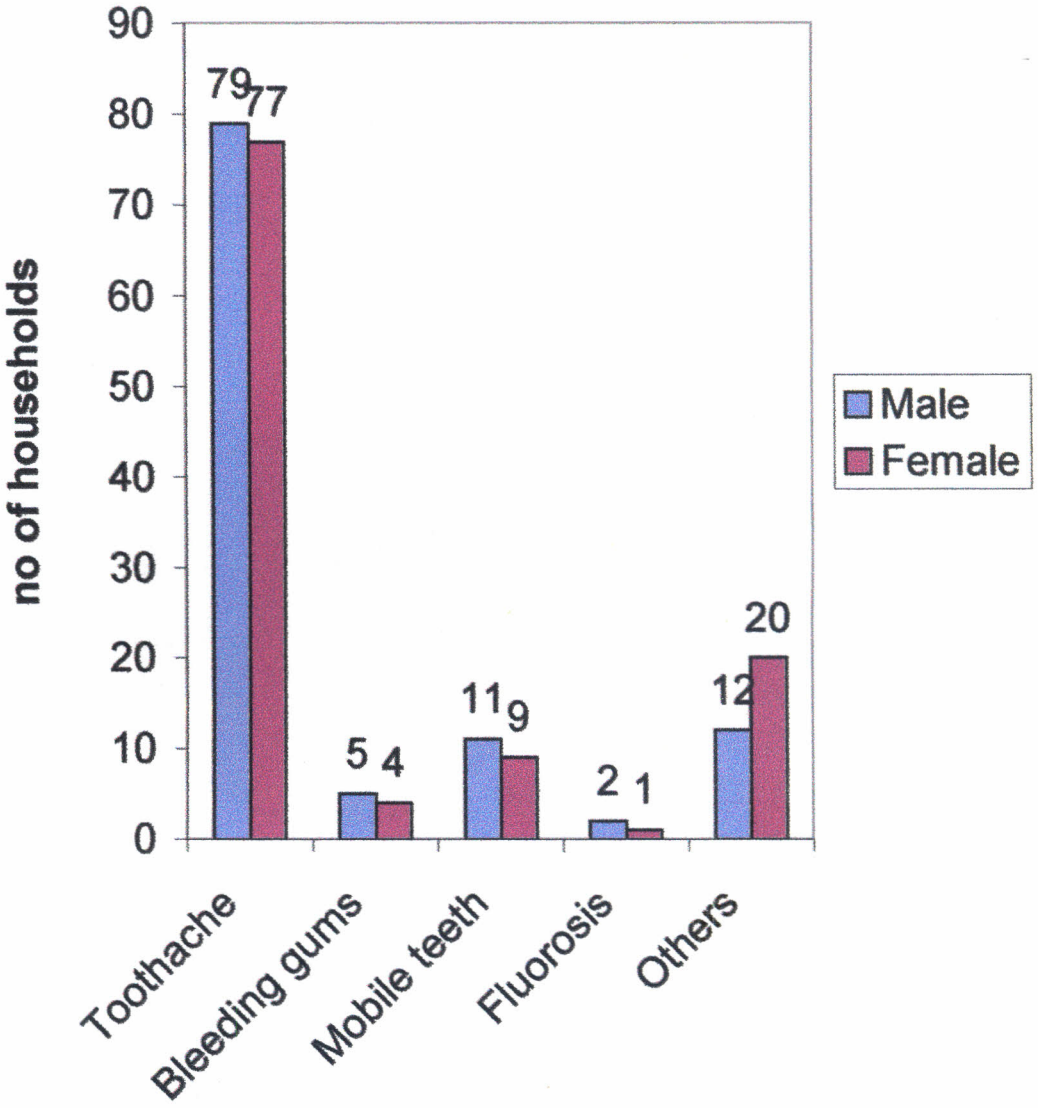

Fig. 4: Distribution of oral health problem suffered in households in the preceding year (n=185).

As displayed in figure 4, the most frequent complaint was toothache, experienced in 138(74.6%) of the households followed by mobile teeth experienced in 20(11%) of the households. Other oral health problems suffered included trauma, malaligned (crooked) teeth, and infections of the jaws or gums. Edentulousness (lack of teeth) was considered a problem in

four households. For toothache, bleeding gums, mobile teeth and dental fluorosis there were more male sufferers. There were households in which both males and females had suffered from toothache and there were more than one problem in some households.

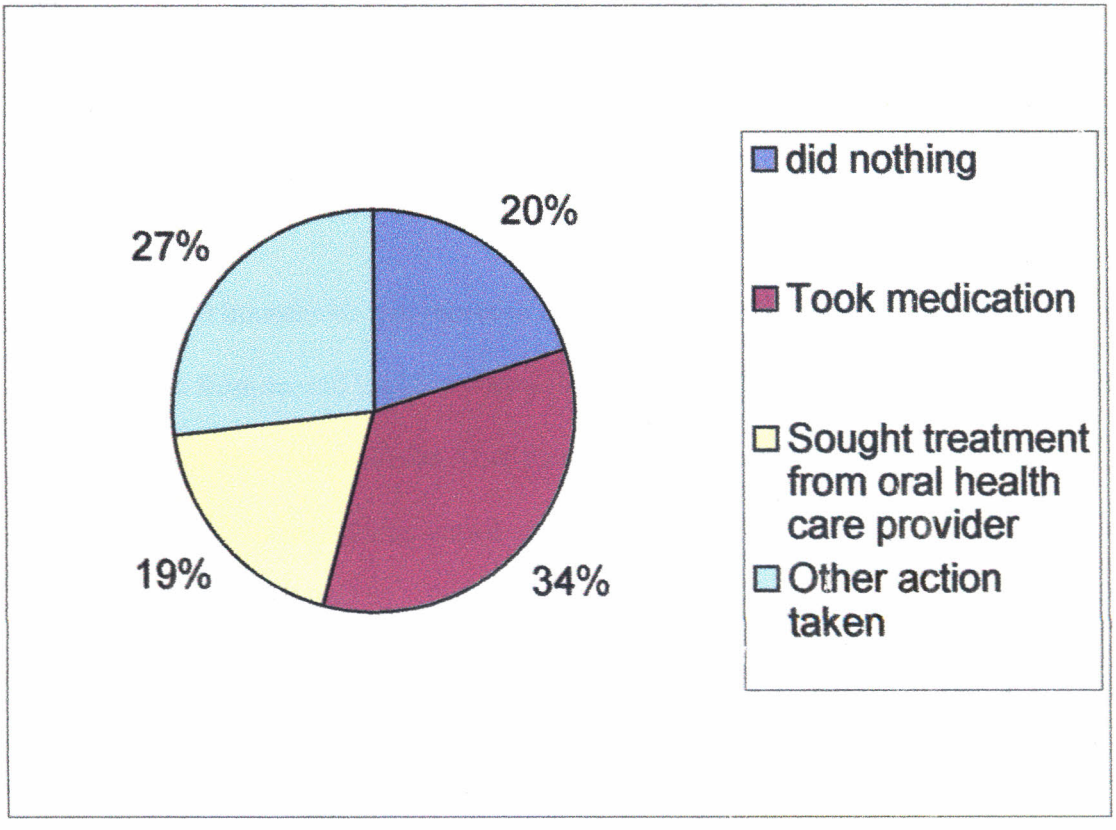

Fig.5: Initial action taken in households for oral health care problems suffered in the preceding year (n=185).

Figure 5 illustrates the initial action taken in households in which there were oral health care problems in the preceding year. In 20% of the households, no action was taken for members who perceived they had an oral health care problem. This was mainly because they did not feel the problem was serious enough to warrant any treatment. There were 34% households in which the initial action was taking medication. The medication taken was either already available in the home or was bought as an over the counter drug. One household sought care

from a medical health care provider. In 27% of the households, "other actions" included applying traditional herbs, paw-paw juice, or ginger at the site of pain, brushing the offending tooth with salty water or a chewing stick. Relief from pain was the most common reason provided for the abovementioned actions. Other reasons why oral health care was not sought when problem occurred included lack of money to seek treatment, problem was not considered to be serious, and in one household there was no time to seek care. Other reasons included not wanting an extraction done, afraid of feeling a lot of pain, and being pregnant.

There were 70 households that recorded attending an oral health care facility by members who had suffered from an oral health problem. There were 101 households in which members who had perceived they had suffered from an oral health problem in the preceding year had not sought care and 14 households with members who had sought care and others within the same households who had not.

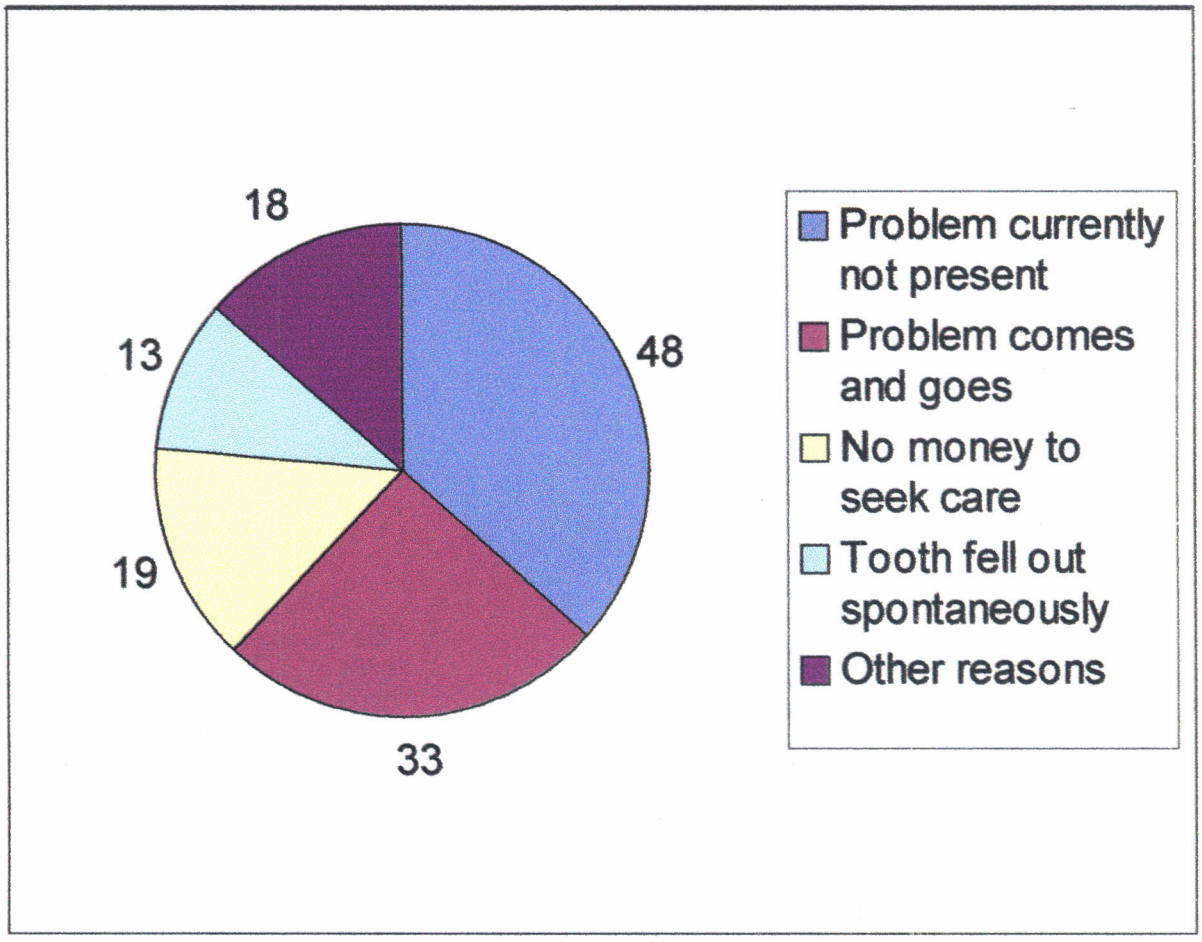

Fig. 6: Reasons provided for not seeking care at an oral health care facility for oral health problem suffered in the preceding year (n=101).

As displayed in figure 6, the main reason for not seeking treatment at a facility was the current lack of pain. Lack of money to seek treatment was provided as a reason for not seeking care by almost 20% of the households. Other reasons given were, "not wanting tooth to be extracted", and "no time to seek treatment", patient was too young to have an extraction.

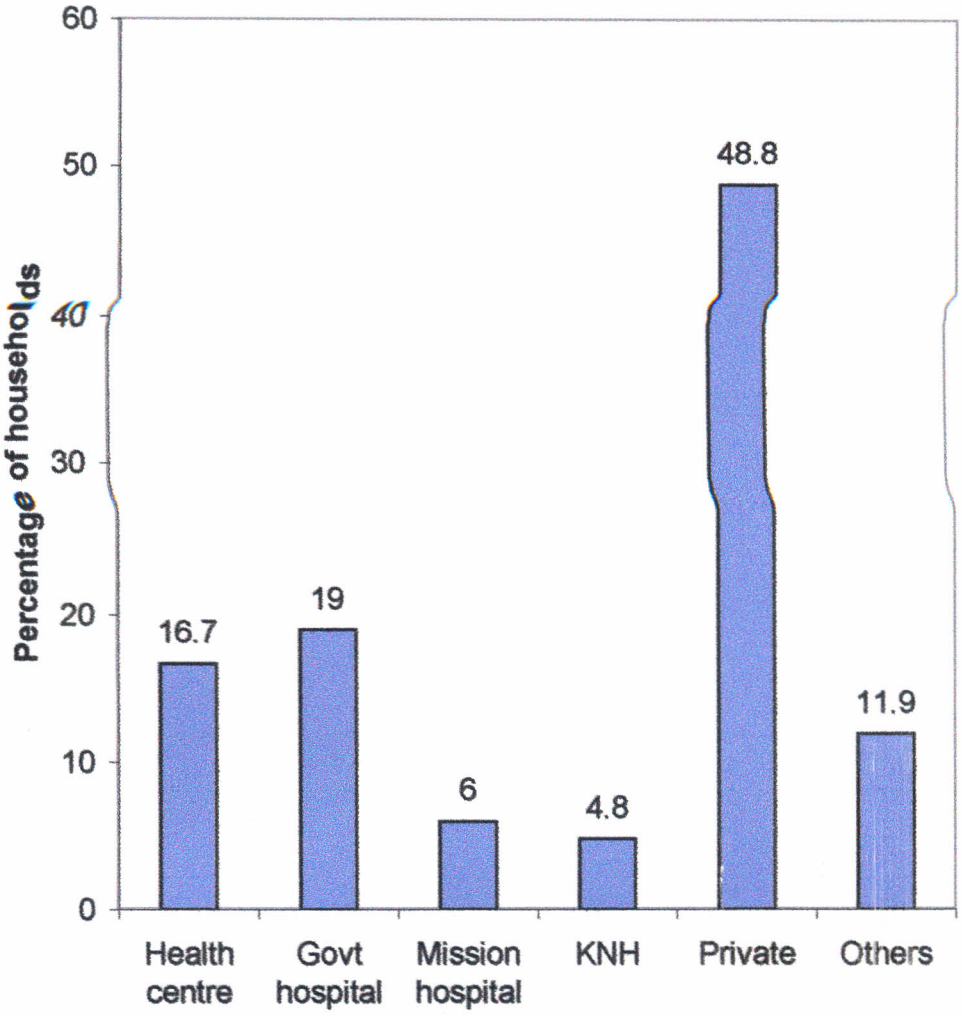

Fig 7: Type of oral health care provider sought for oral health problem suffered in the preceding year (n=84).

Figure 7 shows the oral health care provider sought by household members for treatment. Almost half the households (41) had sought care at a private facility. Treatment was sought at a health centre by 14 households, and 16 households had sought treatment at a government facility. Other facilities where households had sought treatment were at organisations like Social Service League, Crescent Medical Aid, Kenyatta National Hospital and at dental camps. The nearest mission hospital offering dental services was Nazareth hospital and 5 households

had sought care at this facility.

Table 11. Association between the oral health care provider attended and income (n=84).

Oral health care provider	Income status			Total(%)
	Low(%)	Middle(%)	High(%)	
Health Centre	12(22.6)	1(4.6)	1(6.7)	14(16.6)
Government hospital	14(26.4)	1(4.6)	1(6.7)	16(19.0)
Mission hospital	4(7.6)	0(0.0)	1(6.7)	5(6.0)
Private practitioner	19(35.8)	16(72.7)	6(40.0)	41(48.8)
Others	4(7.6)	4(18.1)	6(40.0)	14(16.6)
Total	**53(100.0)**	**22(100.0)**	**15(100.0)**	**84(100.0)**

Chi square:14.016 df:6 p-value:0.081

As displayed in Table 11, the government facility, health centres and misson hospitals were utilized mainly by households in low-income bracket. Private practitioners were the most utilized providers by all income levels with 35.8% of low-income households utilizing them and 72.7% and 40.0% of middle and high-income households respectively. However, Income was not a significant factor in choice of oral health care provider sought (p-value:0.081)

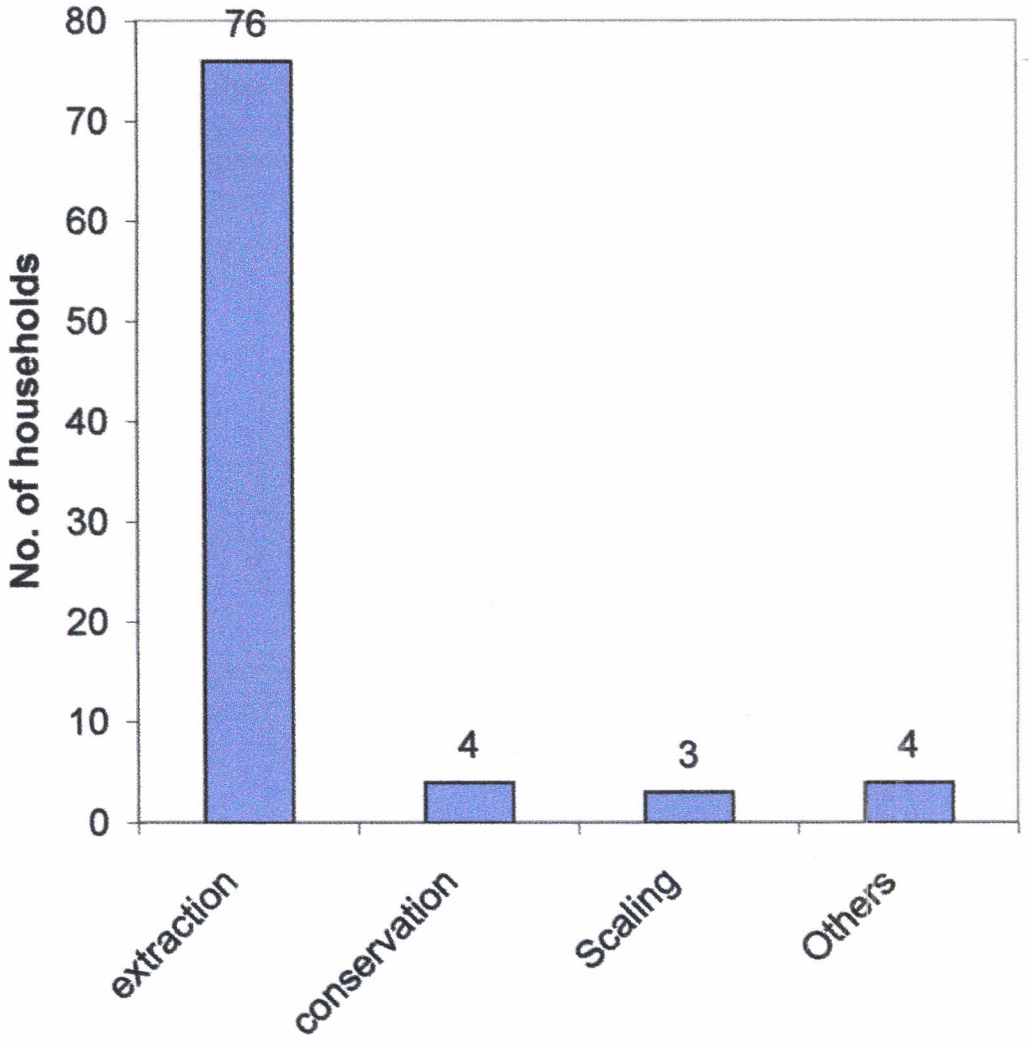

Fig. 8: Oral health treatment received at the oral health care facility by household members. (n=84).

Figure. 8 illustrates the distribution of oral health procedures performed at the facilities. Extractions were the most common procedure performed accounting for slightly over 90% of all the procedures carried out. The other procedures were more or less of equal frequency. Other forms of treatment received included management of trauma, orthodontic treatment and

prosthetic work to replace missing teeth.

Table 12: Association between seeking treatment at an oral health care facility and income, education, knowledge of oral health and oral hygiene practices. (n=185).

Characteristics	Attendance at facility		Total (%) n=185	Statistics
	Yes (%) n=84	No (%) n=101		
Income				
Low	50(39.7)	76(60.3)	126(100.0)	X^2=5.250
Middle	21(56.8)	16(43.2)	37(100.0)	df:2
High	13(59.1)	9(40.9)	22(100.0)	p-value:0.722
Education				
None	5(45.5)	6(54.5)	11(100.0)	X^2=6.325
Primary	27(35.1)	50(69.9)	77(100.0)	df:3
Secondary	43(55.1)	35(44.9)	78(100.0)	p-value:0.097
Tertiary	9(47.4)	10(52.6)	19(100.0)	
Knowledge				
Poor	9(36.0)	16(64.0)	25(100.0)	X^2=3.893
Fair	60(50.9)	58(49.1)	118(100.0)	df:2
High	15(35.7)	27(64.3)	42(100.0)	p-value:0.143
Oral hygiene practice				
Poor	16(45.7)	19(54.3)	35(100.0)	X^2=0.002
Good	68(45.3)	82(54.7)	150(100.0)	df:1
				p-value:0.967

Table 12 displays the association between seeking treatment from an oral health care facility and household characteristics such as income, education, and knowledge of oral health and oral

hygiene practices. Among low-income households, 50(39.7%) had sought treatment at a facility compared to 76(60.3%) who had not. Among both middle and high-income households, more than half had sought care 56.9% and 59.1% respectively, and the high-income households had the highest percentage who had sought care. Only 39.7% members of low income households had sought treatment compared to 56.8% members of middle income households and 59.1% members of high income households. Although there was a positive correlation between income and seeking care, it was not statistically significant (p-value 0.722)

For all educational levels there were more households that had not sought care compared to those that had, except in households where the head had secondary level education. At this level 43(55.1%) had sought care. Education was not statistically significantly associated with attendance (p-value:0.097).

Households with poor knowledge and those with high knowledge had the same utilization of 36%. Households with fair knowledge had almost equal numbers of those seeking care and those who did not. The association between knowledge and attendance for care was not statistically significant (p-value 0.143)

In households with good oral hygiene practices, 68(45.3%) had members seeking treatment compared to 16(45.7%) households with poor practices However frequency of brushing was not a statistically significant factor in attendance at a facility with a p-value of 0.854.

Table 13: Association between seeking treatment at an oral health care facility and age and gender (n=185).

Characteristic	Sought Treatment		Total	Statistic
	Yes (%) n=84(45.4)	No (%) n=101(54.6)	n=185	
Age group				
0-9	2(14.3)	12(85.7)	14(100.0)	
10-19	10(50.0)	10(55.0)	20(100.0)	
20-29	27(47.4)	30(52.6)	57(100.0)	χ^2= 7.039
30-39	23(45.1)	28(54.9)	51(100.0)	df:6
40-49	16(44.4)	20(55.5)	36(100.0)	p-value:0.425
50-59	12(48.0)	13(52.0)	25(100.0)	
60+	6(33.3)	12(66.7)	18(100.0)	
Gender				
Male	47(44.3)	58(54.7)	106(100.0)	χ^2=1.468
Female	55(51.9)	51(48.1)	105(100.0)	df:2
				p-value:0.226

As shown in Table 13, across all age groups there were more households that did not seek care compared to those that did. The youngest age group had the highest percentage of households that did not seek care followed by the oldest age. The 10-19 years age group had the highest percentage of those who sought care (50%) followed by the 40-49 years age group.

Females sought care at facilities more often than males with over 50% of those who perceived themselves to have a problem seeking care compared to 44% males. In households that had members who had sought care and others had not, there were no difference between males and females.

Binary logistic regression was carried out to control for confounding and to determine the effect of the independent variables on the dependent variables. The predictors used were income, education, knowledge of oral health and oral hygiene practices. Gender and age could not be used because of multiple responses within households

Table 14: Logistic regression analysis showing association between oral health status and household characteristics (n=370).

Variable	OR	p-value	95%CI	
			Lower	Upper
Income	1.176	0.385	0.815	1.698
Education	0.988	0.942	0.710	1.377
Knowledge	0.702	0.067	0.481	1.025
Oral hygiene practices	1.259	0.422	0.718	2.210

Table 14 regression model shows no evidence of association between the dependent variable oral health status and the independent variables income, education, knowledge of oral health and oral hygiene practices. However, knowledge of oral health was moderately significantly associated with oral health status (p-value 0.067).

Table 15: Logistic regression analysis showing the association between seeking treatment at an oral health care facility and household characteristics (n=185).

Variable	OR	p-value	95%CI	
			Lower	Upper
Income	0.670	0.093	0.420	1.069
Education	0.782	0.275	0.503	1.216
Knowledge	1.181	0.523	0.709	1.966
Oral hygiene practices	0.772	0.522	0.349	1.708

After controlling for confounding there was no association between attendance at a facility and income, education, knowledge of oral health and oral hygiene practices.

Perception of illness is a determinant of health seeking behaviour. To explore perception of oral health in the community, information was sought on the importance of teeth and frequency of dental checkups. There were 364(98.4%) respondents who felt that teeth were important because they were used to chew food. The remaining 6(1.6%) felt teeth were not important because loss of several teeth would not result in much suffering from the effects. Majority of the respondents 96.2% admitted they had never utilized a facility for a dental check-ups, 5(3%) said they attended oral health care facilities for checkups twice a year and 9(2.4%) said they attended for checkups once a year. When asked how often one should go for checkups, 48(13.0%) said never, 60(16.2%) said every six months, 26(7.0%) said once a year and 74(20.0%) had no idea. The remaining 162(43.8%)gave various answers such as every three months, three times a year, only when necessary.

CHAPTER 7

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

7.1 Discussion

This study set out to determine oral health care seeking behaviour by looking at factors that influence attendance at an oral health care facility for treatment. It also determined the oral health status of the community and examined factors that affect attendance and oral health status. The use of the household as the sampling unit and the unit of analysis was a deviation from previous studies on health seeking behaviour where the household was used as the sampling unit and the individual as the unit of analysis. Using the household for both sampling and analysis enabled the investigator to explore the effects of the different practices of the household heads or spouse on other household members and whether the education level of the head or his/her knowledge of oral health had any relationship with the practices of other household members. The difficulty encountered with using the household as the unit of analysis was in analysing the multiple responses per household obtained from different household members. This was overcome by using syntax commands for variables which could not be generalized for the whole household such as age and using one variable to represent the household where this was possible.

Prevalence of dental caries, periodontitis, dental fluorosis and plaque status were used in determining the oral health status of the community. Approximately half the children examined who had deciduous dentition were caries free and the decayed component accounted for over 90% in those with decayed or filled teeth. The dft index computed for the children examined

was 1.52. This infers every child had an average of one and half decayed or filled teeth. However over half these children were caries free implying those affected had several decayed or filled teeth. The missing component of teeth resulting from extractions due to caries was not included as it would have been difficult to ascertain whether a tooth missing due to natural exfoliation may also have had a carious lesion. The results of the current study showed lower caries experience than a study by Ngatia who recorded dft of 2.95[25] but was similar to a study by Nganga[93] who recorded 1.7. A plausible explanation for this difference could be the location of the study. The current study was in rural Kenya whereas the aforementioned studies were carried out in urban Nairobi where taking sugary snacks to school is a common practice. However in all these studies, the decayed component accounted for over 90% of the index inferring children rarely utilized oral health care facilities for treatment of dental caries. In general, children were noted to have poor oral hygiene practices and it was surprising that dft was relatively low. For dental caries to occur, sugar must also be present on the tooth surfaces. A plausible explanation for the low caries experience recorded is that frequent sugar consumption in the form of snacks is low in this community.

There were almost equal numbers of decayed and extracted teeth in the individuals with permanent dentition. The filled component accounted for only 4.3% of DMFT suggesting most of those who had decayed teeth had extractions rather than conservative treatment. This is consistent with the answer the respondents gave for seeking care. They did not consider having decayed teeth per se as a reason for seeking care. Care only became necessary when there was unbearable pain and the quickest and cheapest solution was to remove the offending tooth. Generally this distribution pattern was similar to a study by Manji[26] who recorded similar percentages for the decayed and extracted components and these were much higher than the

filled component.

More than two thirds of the households had members with good plaque status and a similar number had members with poor status. There were households with both good and poor plaque scores within the same household suggesting there were members with good toothbrushing techniques in the same households with members with poor brushing techniques and or poor toothbrushing practices. Over half the households had members with poor plaque status yet only 47 households had members who never cleaned their teeth. This suggests that toothbrushing is generally poorly done even in households where it is done regularly. Presence of plaque where there were reports of regular toothbrushing has been noted in past studies in Kenya[6,21]. Poor state of gingivitis was noted in slightly over one third of the households. This result differs sharply from other studies where 80-100% of the population have been noted to have gingivitis[7,19]. A possible explanation for this difference could be the criteria used for gingivitis. In this study, mild cases of gingivitis where minor changes in colour were evident was scored as not being present (appendix 6) and only severe cases were scored. Poor periodontal status was noted in slightly over one third of the households. Again only severe periodontitis was noted (appendix 7).

Fluorosis occurs as a result of excess fluoride being incorporated in enamel during tooth formation. Tooth formation starts in utero before birth to about 8 years of age. The present study noted slightly over 60% of the households had members with fluorosis and 7% had members suffering from severe fluorosis. This result is similar to a prevalence study of dental fluorosis in Kenya by Chibole who recorded a prevalence of 56% in Central province[27]. There were multiple responses of fluorosis levels within households with 149 households exhibiting

different levels of severity. It was expected that since households share the same water and food sources, levels of fluorosis would be similar within households. Drinking water supplies about 75% of daily fluoride intake[29]. One explanation for this finding of difference in fluoride levels within households is families may have resided in different parts of the country (containing different fluoride concentrations in the water) during the critical stages of tooth formation. There may also be biological variations among different household members.

Oral health status was noted to be good if there was no oral health care problem that required attention by an oral health care professional, and it was termed poor if carious teeth and or periodontitis or severe fluorosis was noted. 70.3% of the households had members with poor oral health status. The only factor noted to be significant in determining oral health status was age. In this regard, it is noted that in the present study 20-29 years age group had the best status while the eldest age group had the worst oral health status. This result was not surprising as age is a significant factor affecting oral health status. Young people tend to suffer more from dental caries than older people. Deciduous teeth are less mineralised than permanent teeth, and have a thinner enamel and therefore a shorter distance for caries to reach the softer dentine. This makes them more vulnerable to acid attack and caries formation. Newly erupted permanent teeth tend to have deep fissures that are difficult to keep clean and therefore become susceptible to decay. The occlusal surfaces of older people have shallower fissures due to attrition. Older people tend to suffer more from periodontal disease due in part to the natural aging process and partly due to having poor oral hygiene practices.

The current study noted no association between oral health status and income, education or knowledge of oral health conditions. These results are inconsistent with previous results that

show significant positive correlation between oral health status and income, education and knowledge[33,53]. The lack of significant association between oral health status and income, education and knowledge suggests rural communities need to be empowered to use the resources they already possess to influence their oral health. The results also suggest the education level of the head of the household and his/her knowledge of oral health had no influence on other family members.

The oral hygiene practices of the households were determined by toothbrushing frequency and the type of tools used to clean teeth. Use of a commercial toothbrush or a chewing stick to clean teeth and cleaning them two or more times a day was considered to be good oral hygiene practices. Information on oral hygiene practices such as interdental cleaning devices and mouthwashes were not obtained in this study. There was diversity within households with over half the households having multiple habits. There were no households in which all members did not brush their teeth but there were 47(12.7%) households in which some members recorded never cleaning teeth. These were mainly in either the youngest members or the elderly ones. Only the 30-49 years age group had no record of never brushing teeth. The 30-49 years age groups are the age groups consisting of family heads of young families and this finding suggests that although they take care of their own individual oral health they are not particularly attentive to the oral hygiene practices of their children. This could be because the main reason provided for cleaning teeth was for personal hygiene 'to prevent the mouth from smelling'. This result is similar to a study that noted tooth brushing was done mainly for grooming purposes rather than preventive reasons[50]. Where people placed importance on preventive behaviours there has been an increase in frequency of brushing[94]. Most of the households had poor toothbrushing

practices.

Instruments used for tooth brushing were either the commercial toothbrush or the traditional chewing stick. Other cleaning devices such as charcoal and ash were not used in this community but have been recorded as cleaning tools in other rural communities[31]. Majority of the households had members using toothbrushes with toothpaste, or plain or salty water. A few households had members who alternated between the chewing stick and the toothbrush. Chewing sticks were cut from particular shrubs or trees. They appeared to have some medicinal properties since some of the respondents claimed to brush using the chewing stick because the chewing stick relieved the pain. There were no significant differences between males and females in the frequency of tooth brushing. This result differs with other studies where females were noted to brushed more frequently than males because of having better grooming habits[6,21,30]. Females generally tend to have better grooming habits than males. This study was analysed using the household as the unit of analysis. Most households had both male and female members so it is likely that differences between the genders was lost in the multiple responses.

Income, and education were positively significantly associated with oral hygiene practices, (p-values of 0.007 and 0.033 respectively). Studies show these factors are associated with positive health attitudes and adoption of health promoting behaviours[53,94]. The results suggest the main respondent influences the oral hygiene practices of other household members and those with a higher education level exert a more positive influence than the less educated. A lower income may mean less money to buy recommended toothbrushes and toothpaste resulting in less motivation to have good oral hygiene practices.

However there was no association between oral hygiene practices and oral health status. Good oral hygiene practices have been positively associated with oral health status[51]. Regular toothbrushing is the simplest and cheapest preventive oral health measure. It removes plaque from teeth and presence of plaque is necessary for dental caries and periodontal disease to occur. There was no association between practices and oral health probably because of ineffective plaque removal due either to poor toothbrushing techniques or the use of tools rendered ineffective by prolonged use. Knowledge of oral health was considered to be good if a score of 10-13 correct answers was recorded out of a maximum of 13 correct answers. A score of 5-9 correct answers was deemed to be fair knowledge. In general, knowledge of oral health was noted to be fair. Majority of the respondents knew at least one cause and method of management of dental caries and periodontal disease. Knowledge of preventive measures was poor and less than one third of the respondents mentioned tooth brushing as a preventive measure for both dental caries and periodontitis.

Dental fluorosis was prevalent in this community with over 60% of the households having at least one member with the condition. However severe fluorosis was recorded in only 7% of the households. Knowledge of dental fluorosis was generally poor, implying fluorosis was not perceived as a problem in this community. This is further supported by the finding that among the 26 households noted to have members suffering from severe fluorosis, only three households had members seeking treatment for the problem.

Half the households included in the study had members who had suffered from an oral health problem in the preceding year and almost half these households had members who had sought care at a health facility. This figure differs markedly with that of other studies where only 12%

of those who perceived themselves to be suffering from a general medical problem attended a facility for treatment and only 10% of subjects suffering from an oral health problem had sought treatment[59,84]. In these previous studies, lack of finances and inaccessibility were noted as major barriers to seeking care. In this study lack of money was a reason for not seeking care by about one fifth of households but income was not a significant factor in seeking treatment. The main reason for not having sought care was the current lack of pain. Children and the elderly had the worst attendance record. A possible explanation for this could be that since these children have deciduous teeth that will be replaced by permanent teeth, parents did not consider restorative treatment for these teeth as necessary. Elderly people have various problems that may affect their oral health seeking behaviour. These include physical disability and having no one to take them for treatment[46,47]. They also tend to suffer more from periodontal problems and these usually cause less pain than that experienced from pulpitis due to tooth decay. Periodontitis may result in teeth falling off on their own (as recorded in this study) thus negating the need for care. Among all the different age groups, there were more households that had not sought care compared to those that had. This finding further supports the fact that care is sought only when pain becomes unbearable. The oral health knowledge and education level of the head of the household were not significant factors in members seeking care. This differs from other studies that showed education and knowledge were significant factors in utilization of health care services[67,68]. These studies were carried out in populations where a significant proportion of the population regularly utilized oral health care facilities for dental checkups. Preventive behaviours are positively correlated with education and knowledge[95], and dental checkups are part of preventive behaviour.

Females had sought treatment more often than males but the difference was not statistically

significant (p-value 0.226). This finding was similar to other studies where females have been noted to seek care more often. This is thought to be due to gender socialization where males are expected to complain less frequently about illnesses and seek care less often[38].

Self-treatment was the initial action taken in 68% of the households perceived to have suffered from an oral health problem. This result is comparable to studies where 60% in rural Vietnam and 53.2% in rural Kenya had bought drugs or used other remedies when ill[55,59]. In this study, self-treatment consisted of over the counter medication, drugs available in the home or herbal remedies such a pawpaw juice, ginger extract and traditional leaves chewed and placed at the site of the problem. All these measures were for pain relief. Only when self -treatment became ineffective was treatment sought.

The most common procedure performed at the facility was tooth extractions. Similar findings have been made in studies in Kenya and Tanzania[5,6,30,96]. An extraction relieves pain, is a relatively short procedure and is relatively cheap. Majority of the members were happy with the treatment they received. Most respondents went to a provider for symptomatic relief, which may explains the high number of extractions. Perceived degree of illness has been found to be an important determinant of utilisation of dental services[68,75]. In this study, slightly over half the households had members who had suffered from a dental problem in the preceding year but had not sought treatment mainly because they felt the problem was not serious or the symptoms had disappeared and there was no associated pain. Unfortunately dental caries and periodontal diseases rarely resolve spontaneously. Subjective need for oral health care was based on pain alleviation. Objective need for oral health care in this community was high with approximately half the households in need of attention. Gender, knowledge of oral health and education level

of the respondents were not found to be significant factors for attendance. This is unlike results of other studies where these factors had a positive effect on attendance[46,62]. This may be because most of the respondents went to a provider seeking symptomatic relief as opposed to routine check -ups or cosmetic reasons. This also explains why despite fluorosis being recorded in over 60% of the households, only three households had sought dental treatment for it. It appears that those with dental fluorosis did not know that something could be done to give their teeth a better appearance. It is also possible that treatment for cosmetic purposes is given low priority in the face of more serious health problems.

A private practitioner was considered to be any health care provider not offering services in the public sector. Private clinics providing oral health care services vary from those using modern dental technology operated by qualified dentists and specialists to those operated by community oral health officers, clinical officers, and nurses who provide medical services but also perform dental extractions. Since negligible treatment other than extractions were carried out and since knowledge of various treatment options was also poor, one can suspect that the majority of private practitioners frequented by this community were not necessarily qualified dentists. This study was not able to determine the qualifications of the private practitioners sought by this community.

Slightly less than half the households had sought care from private practitioners. Studies on utilization of health services in developing countries have noted private services are utilized more frequently than public facilities[55,86]. Several explanations have been suggested for this finding. Due to poor remuneration, public service oral health personnel may be absent from their work stations from time to time to engage in extra income-generating activities in private

clinics[82]. Patients tend to visit private clinics where they could be sure they would be attended to. Other explanations could be the perception that private practitioners offer better quality services. It is also a possibility that payment plans can be negotiated with private practitioners but in public facilities full payment is required before services are rendered (although there are provisions for exemptions or waivers for special cases). Another reason is the availability of lower cadres of health care providers in rural areas where dentists may be reluctant to work. Income was not a factor in choice of facility attended. This finding has been noted in other studies where both low and high-income households preferred utilizing private practitioners[85,86].

Very few households had members who went for dental check-ups. This was not surprising since check-ups are screening procedures carried out when a patient has no signs or symptoms of illness. Regular dental checkups help to prevent disease or detect it in the asymptomatic early stages when lesions are difficult to detect. At this time treatment is simpler, cheaper, less extensive and has better prognosis. This finding is consistent with studies from other countries where patients did not go for check-ups because there was no perceived need to do so[68,79,97]. The importance placed on an illness is a determinant in seeking care. Since oral health problems are not often considered to be serious, most people do not value dental checkups.

One difficulty encountered with using the household as the unit of analysis was the vast diversity within households resulting in multiple household responses. Another problem with the study was obtaining information from one main respondent although other members were encouraged to participate and verify information concerning them personally. It was important for those who had suffered from an oral health problem in the preceding year or had sought care to have been present to answer for themselves. Their absence may have resulted in under-

Knowledge of causes and treatment of oral health conditions was generally fair but knowledge of prevention measures was poor. There was no association between knowledge of oral health of the respondent and seeking treatment at an oral health care facility so the hypothesis "there is a positive association between knowledge of oral health and seeking treatment at an oral health care facilities" is not valid. There was no association between knowledge of oral health and oral health status so the hypothesis "there is a positive association between oral health status and knowledge of oral health" is not acceptable.

Oral health care facilities were frequently utilized but mainly for symptomatic relief when the pain became unbearable. Utilization of oral health care facilities for dental checkups was rare. Self-treatment was a common practice and when care was sought, dental extractions were the most common procedure performed. Care was rarely sought for other oral health problems such as periodontitis or fluorosis. Private practitioners were the most frequently utilized providers. Income, gender, age, knowledge and education level were not significant determinants of utilization of oral health care facilities so the hypothesis there is no association between attendance at oral health care facilities and socio- economic and demographic characteristics cannot be rejected.

It must be pointed out that the above findings and conclusions apply only to this study. In this study the household was used as the unit of sampling and as well as analysis. A differently designed study where the household is the unit of sampling but the individual is the unit of analysis may result in different conclusions. The main problem with using the household as the unit of analysis is the multiple responses obtainable from the individuals within the household. This may result in misrepresentation of some data. However the advantage of using the

household as the unit of analysis is the inclusion of all household members thereby eliminating the need for sampling individuals within the household and increasing validity of the results.

7.3 Recommendations

1. There is need to reduce prevalence of dental caries, and periodontal disease and improve oral hygiene practices in rural communities. This can be achieved by increasing oral health awareness and motivating communities to embrace preventive oral health behaviours. This can be implemented through the mass media, *barazaas*, and door to door by community oral health officers with resources from interested stakeholders namely the government, manufacturers and suppliers of dental materials and equipment.

2. Communities need to be motivated to seek oral health care treatment in the early stages of disease when there is minimal pain. They should also be encouraged to seek alternative treatment to extractions.

3. The District Health Management Boards need to monitor oral health care facilities in their respective districts and ensure the facilities have all the required equipment and materials necessary to carry out procedures other than extractions.

4. The role of private practitioners in provision of oral health care services to rural communities should be acknowledged and their contribution strengthened through collaboration with the public oral health sector delivery system.

5. Future studies on oral health seeking behaviour should be designed in such a way that they can analyse characteristics of the household members individually yet still be able to

analyse the impact of household characteristics on the members.

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Appendix 1 **STUDY QUESTIONNAIRE**

Socio-Demographic information

Name of interviewer _____

Date of interview _____

Name of sublocation _____

Household no. _____

Respondent. 1. Head of household

2. Spouse of head of household

3. Other_____

1. Name of respondent (surname first)_____

2. Sex of respondent 1.Male 2.Female

3. Age of respondent (yrs) _____

4. Occupation of respondent

1.Farmer

2.Business

3.Teacher

4.Other (specify) _____

5.Occupation of spouse

1. Farmer

2. Business

3. Teacher

4. Other (specify)_____

6.What was the highest level of school attained by respondent?

1. Has never attended school

2. Primary school

3. Secondary school

4. College/University

5.Other (specify)_____

7. What was the highest level of school attained by spouse?

1. Has never attended school

2. Primary school

3. Secondary school

4. College/University

5. Other (specify)_____

8. What religion do you belong to?

1.Catholic /Protestant (ACK, PCEA, AIC, PENTECOSTAL)

2.Muslim

3. Traditional (Tent of living God, Mungiki, Akorino)

3.Other (specify)_____

9.What is the average earning of all the members of the household per month? Ksh

1. Less than 5 000

2. 5 000-9 999

3. 10 000-14 999

4. 15 000- 19 999

5. More than 20 000

Dental health practices and knowledge of dental conditions.

10.Do you ever clean your teeth? 1.Yes 2. No

If no proceed to question 14

11. If yes how often you clean your teeth?

1. Before breakfast

2. After breakfast

3. After lunch

4. Before bedtime

5. Other (specify)_____

12.What you use for cleaning your teeth?

1. Regular toothbrush and water

2. Regular toothbrush and toothpaste

3. *Chew stick*

4. Water alone

5. Other (specify)_____

13. Why do you clean them?

1. To prevent dental problems
2. As part of my personal daily hygiene practices
3. Because other people do it
4. Other (specify) _____

14. If you do not clean your teeth, why not?

1. Do not see any reason for doing so
2. Do not have the time
3. Do not own a toothbrush
4. Brushing them causes bleeding
5. Other (specify)_____

15. Please provide the following information concerning cleaning of teeth for members of your family above 4 years of age

Name	Age(yrs)	Sex(M/F)	Frequency(times?day)	Instrument used

16. Have you ever heard of some one suffering from tooth decay that presents as holes in the teeth?

1. Yes 2. No

If no proceed to question no. 22

17. What causes tooth decay?

1. Not brushing teeth
2. Eating sugary foods
3. Other (specify) _____

4. I do not know

18. Is it possible to prevent teeth from decaying?

1.Yes 2.No 3.I do not know

19. If yes how can this be prevented?

1. Brushing frequently
2. Avoiding sugary foods
3. Going for regular dental check-ups
4. Other (specify)_____

20. How can one know that they have tooth decay?

1. The teeth become painful when eating
2. The teeth are painful all the time
3. You can see the holes in the teeth
4. Other (specify)_____
5. I do not know

21. What different types of treatment do you know for tooth decay?

1. Tooth extraction
2. Tooth filling
3. Root canal treatment
4. Other (specify)_____

22.Have you ever heard of gum disease?

1.Yes 2.No

If no proceed to question 26

23. What causes gum disease?

1. Eating wrong foods
2. Not brushing properly
3. It is caused by germs
4. Other (specify)_____
5. I do not know

24. What are some of the signs of gum disease?

1. Bleeding gums

2. Pus from the gums

3. Bad breath

4. Mobile (loose) teeth

5. Other (specify)_____

25. How can gum disease be prevented?

1. Brushing the teeth frequently

2. Avoiding sugary food

3. Regular dental check-ups

4. Others (specify)_____

5. I do not know

26. What causes teeth to become (fluorosed) brown?

1. Not brushing properly

2. Drinking water that contains a lot of fluoride

3. It is inherited

4. Other (specify)_____

5. I do not know

27. How can one prevent teeth from becoming fluorosed (brown)?

1. By brushing teeth regularly

2. By using rainwater for cooking and drinking

3. Other (specify)_____

4. I do not know

28. Do you know of any other conditions/diseases that can occur in the mouth?

1. Cancer

2. Crooked teeth

3. Swelling of the jaws

4. Others (specify) _____

5.I do not know of any

Information pertaining to oral health care facility use

29. Have you or any member of your family ever suffered from a dental problem?

1. Yes 2.No

If yes complete the following questions for each member above 4 yrs who has suffered from a dental problem in the past one year. Answer for the last episode of illness. If no proceed to question no. 49.

30. Name _____

31. Age (yrs)_____

32. Sex 1. Male 2. Female

33. What problem were you/he/she suffering from?

1. Tooth ache
2. Bleeding gums
3. Mobile (loose) teeth
4. Fluorosis (brown teeth)
5. Others (specify)_____

34. When the problem started what was the initial action

1. Took medicine bought in a shop
2. Took medicine kept at Home
3. Went to medical health care provider
4. Went to oral health care provider
5. Other (specify)_____

35. If answer is 1,2, or 3 why was this course of action taken? If answer is 4 proceed to question no 40

1. Illness was not serious
2. Problem went away on it's own
3. Health care provider is too far away
4. No money to seek treatment
5. No time to seek treatment
6. Did not know where to go

36. Was treatment by oral health care provider eventually sought?

1. Yes 2.No

if yes go to question 39

37. If no, why not?

1. The problem went away on its own
2. Went to traditional healer
3. Other (specify)_____

38. If yes why was treatment eventually sought?

1. The problem got worse
2. Money for treatment became available
3. Time to seek treatment became available
4. Medical personnel referred us
5. Others (specify)_____

39. If treated by health care provider which provider was sought? Give name of facility year seen

1. Health centre _____
2. Government hospital _____
3. Mission hospital _____
4. Private practitioner _____
5. KNH _____
6. Other (specify) _____

40. Why did you choose this particular health care provider?

1. Services are cheap
2. Treatment is good
3. It is near home
4. The facility has good equipment
5. Other (specify)_____

41. Which procedures were carried out?

1. Extraction
2. Filling
3. Scaling

4. Medication

5. Appointment

6. Other (specify)_____

42. Were you happy with the treatment given?

1. Yes 2. No

43. If yes what did you like most about the treatment?

1. The procedure was performed well
2. There has been no complication
3. The treatment was cheap
4. Other (specify_____

44. If no what did you dislike most?

1. The procedure was not performed well
2. The staff were rude and unfriendly
3. The treatment was very expensive
4. Other (specify)_____

45. What did you think about the cost of treatment received?

1. It was cheap
2. It was fair/reasonable
3. It was expensive

46. Would you go back to the same facility if you or any member of your family had another dental problem?

1. Yes 2. No

47. If yes why?

1. I liked the treatment that was given
2. It is the nearest dental facility
3. The time we spent there was short
4. Other (specify)_____

48. If no why?

1. I did not like the treatment given
2. The facility is too far away
3. The time spent there was too long

4.Other (specify)_____

Attitude towards oral health

49. Do you think teeth are important as part of general health?

1. Yes
2. No.
3. I don't know

50. How often do you go for dental check-ups?

1. Never
2. Every six months
3. Once a year
4. Other (specify)_____

51. How often should one go for dental check-ups

1. Never
2. Every six months
3. Once a year
4. Other (specify)_____

Appendix 2 Oral Health Status Assessment Form

Date of interview _____ **Household no.** _____

Name of sublocation _____

Name (Surname first) _____

Age (yrs) _____

Sex 1. Male 2. Female

Plaque score

0- no plaque visible
1- plaque visible

Gingival Index

0- No bleeding or change in colour
1- Bleeding on palpation and change in colour

Periodontal Index

0- Normal
1- A tooth is mobile
2- Intense gingivitis, or suppuration, or gingival recession exposing cementum

Caries status

Permanent Teeth 0- Sound. 1-Decayed. 2-Missing. 3-Filled.

Deciduous Teeth A- Sound B- Decayed C- Filled

			55	54	53	52	51	61	62	63	64	65		
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37
			85	84	83	82	81	71	72	73	74	75		

Appendix 3 Consent Form

I_____ hereby consent to take part in this study on oral health care. I understand all the information I give will be treated with strict confidentiality and will be used for research purposes only.

Signature_____

Date _____

Appendix 4 Referral Form

Name_____

The above named patient was examined in the course of a study and was found to be suffering from_____. I refer him/her for management.

Dr. Mary W. Mwacharo

*Sign*_____

*Date*_____

Appendix 5 Criteria for plaque index WHO System 1977

The mouth is divided into six sextants: 18-14,13-23,24-28,38-34,33-43,44-48. All surfaces of the teeth are examined. Each sextant is scored as one unit using the highest score.

0- No plaque or any soft deposits on any surface clearly visible to the naked eye

1- Plaque or soft deposit visible to the naked eye

Good plaque score -total score of two or less

Poor plaque score -total score of three or more

Appendix 6 Criteria for Gingival index WHO System 1977

The mouth is divided into six sextants and a score is given for each sextant

0 - no or minor alterations in gingival colour and no bleeding after digital palpation

1 - marked change in colour bleeding on firm digital palpation or marked general loss of stippling and tone

Good gingival score - total score of two or less

Poor gingival score - total score of three or more

Appendix 7 Criteria for periodontal index

The mouth is divided into six sextants and a score is given for each sextant

1-A tooth is mobile or

I - intense gingivitis

i - suppuration

iii - gingival recession with exposed cementum

0 - all above findings are negative

Good periodontal score - total score of two or less

Poor gingival score - total score of three or more.

Appendix 8 Criteria for Modified Dean's Index

0 - Enamel surface is smooth, glossy and usually a pale creamy-white colour

1-Mild. white opacities on enamel covering less than 50% of tooth surface

2 - Moderate. Enamel surfaces of the teeth show marked wear and brown stain is frequently a feature

3 - Severe. Enamel surfaces of the teeth are badly affected and hypoplasia is so marked, the general form of the tooth may be affected

Appendix 9 Criteria for Dental Caries Status (DMFT/dft)

0/A - Sound. No evidence of clinical caries

1/B - Decayed. When a lesion in a pit or fissure has an unmistakable cavity, undermined enamel or detectable softened floor or wall

2 - Missing. Extracted because of caries

3/C - Filled. A permanent restoration is present

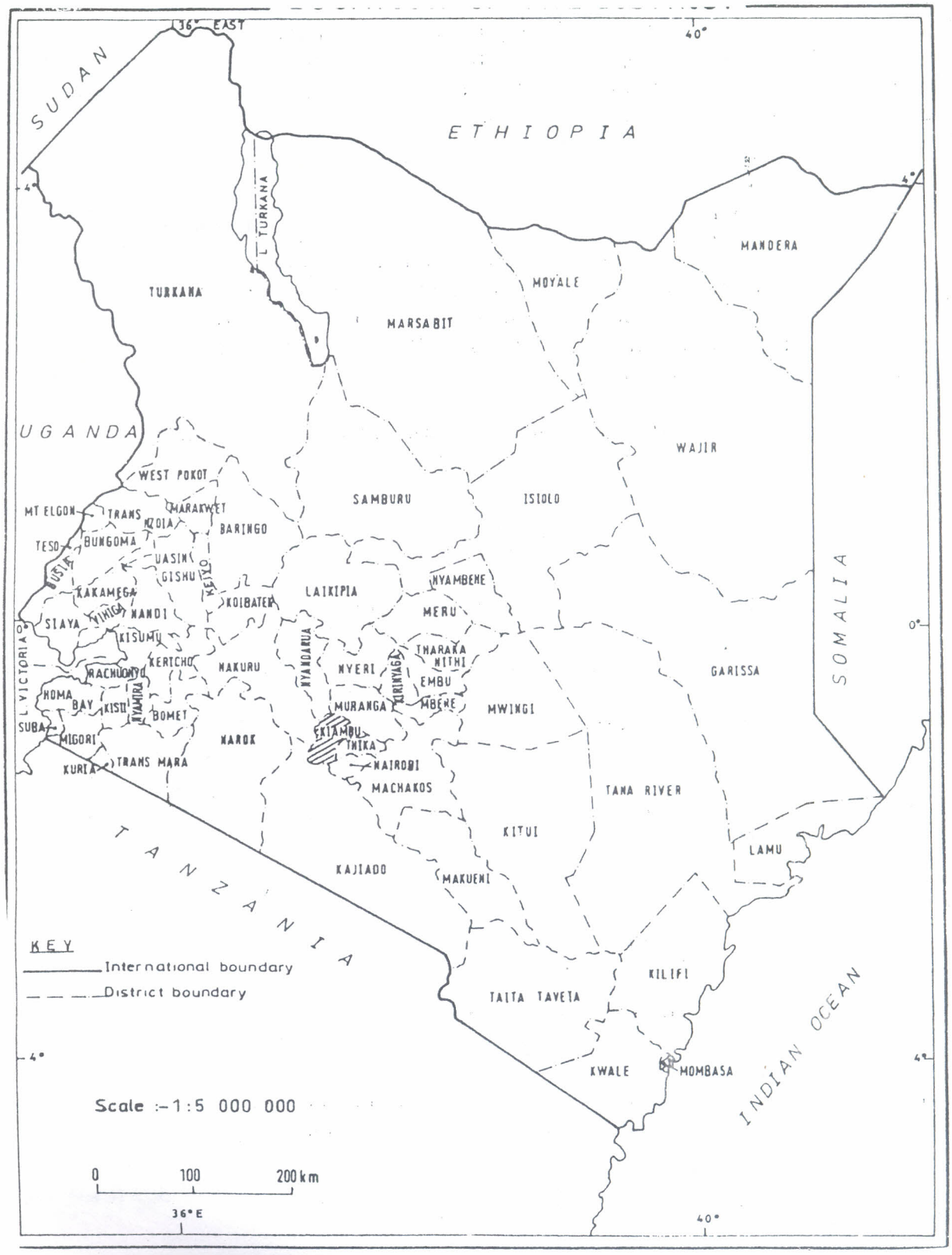

Fig 9: Location of Kiambu District

Reproduced from the Kiambu District Development Plan 1997-2001

Fig 10:Administrative Boundaries of Kiambu District

Reproduced from the Kiambu District Development Plan 1997-2001

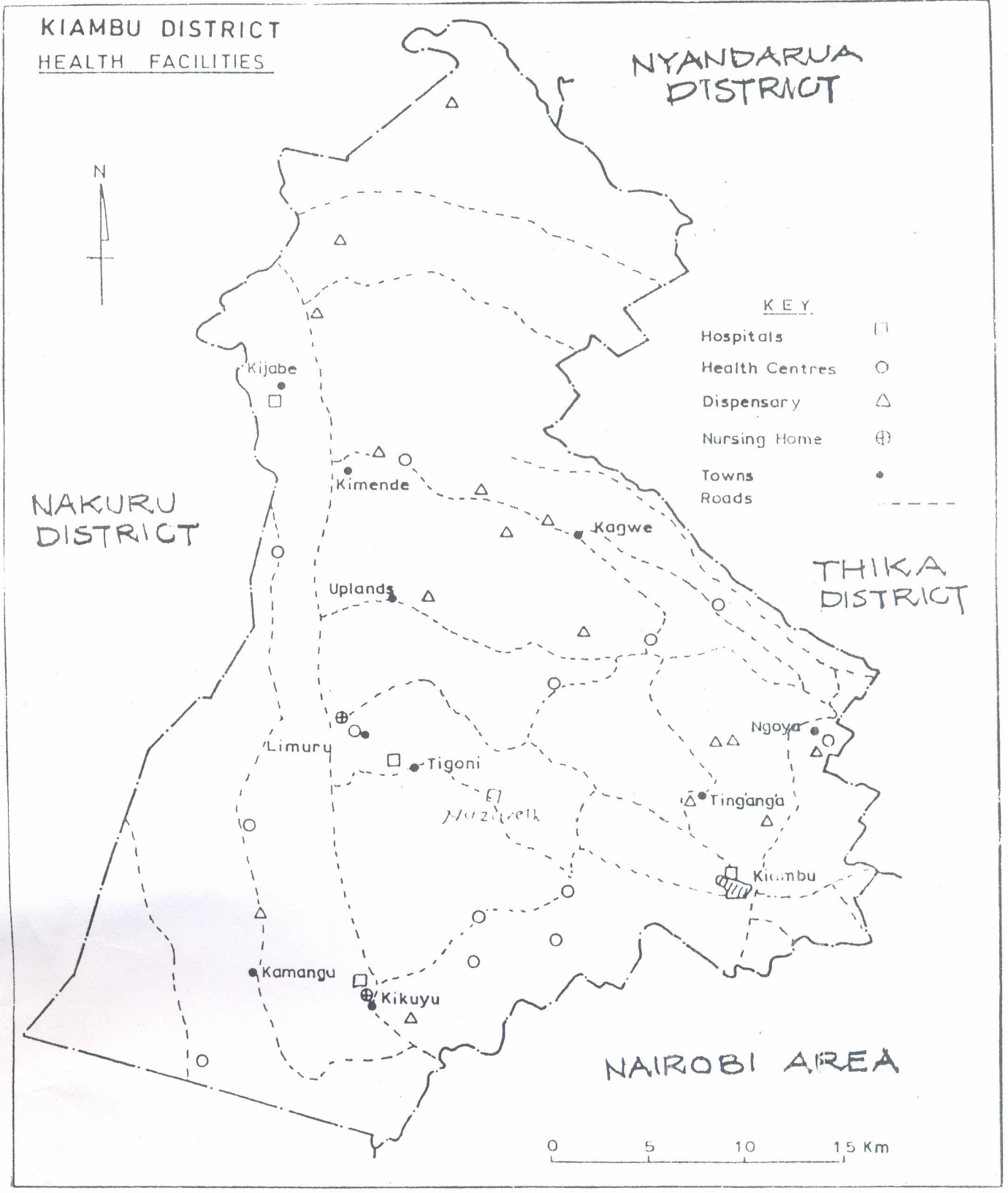

Fig 11: Kiambu District Health Facilities

Reproduced from the Kiambu District Development Plan 1997-2001