

**ORAL HEALTH STATUS AND ORAL HEALTH-
RELATED QUALITY OF LIFE OF ADULT PATIENTS AT
MATHARI HOSPITAL DENTAL UNIT, NAIROBI CITY**

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DECLARATION

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

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DEDICATION

I dedicate this thesis to my mother, Joyce Owiti and my wife Margaret A. Alwanda, my sister, Anne Oloo, and children, Antony Odindo, Charles Ogone and Joyce Awino for their encouragement and patience during the course of my studies.

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LIST OF ABBREVIATIONS AND ACRONYMS

CCC	Comprehensive Care Clinic
CPITN	Community Periodontal Index of Treatment Needs
DMFT	Decayed-Missing-Filled-Teeth
GOHAI	Geriatric Oral Health Assessment Index
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HRQoL	Health-Related Quality of Life
HS	Health Status
KEMRI	Kenya Medical Research Institute
MCH	Maternal and Child Health Clinic
OH	Oral Health
OHIP	Oral Health Impact Profile
OHRQoL	Oral Health-Related Quality Of Life
PRO	Patient Reported Outcome
QoL	Quality Of Life
TB	Tuberculosis
TMJ	Temporo-mandibular Joint
VCT	Voluntary Counselling and Testing
WHO	World Health Organization

ABSTRACT

Oral diseases are the most prevalent non-communicable public health problems affecting about 3.58 billion people globally, with dental caries being the most prevalent condition (Oral Health - World Health Organization, 2016). There has also been an increasing burden of oral health conditions in Africa and the Middle East region for over ten years (Abdelatif et al, 2015). In Kenya, the 2015 national oral health survey report indicated that all adult respondents had at least one prevailing dental condition that required attention (Ministry of Health – Unit of Oral Health, 2015). The current oral health care approaches at Mathari Hospital and other public health care settings have emphasized curative oral health care over socio-environmental concerns of dental patients. This was a three months cross-sectional study at the dental unit of Mathari hospital, Nairobi City, Kenya. The broad objective was to assess the oral health conditions and oral health related quality of life (OHRQoL) of adult dental patients at Mathari Hospital dental unit and to investigate associations amongst the oral health attributes. The 1997 World Health Organization (WHO) adult oral health assessment form was used to collect data on oral health status while data on OHRQoL was collected by administering short version of Oral Health Impact Profile (OHIP-14). Descriptive statistics were computed. Chi-square test was conducted to test for associations between oral health status variables and attributes of OHRQoL ($\alpha = 0.05$). Multiple linear regression analysis was conducted to test the relationship between the individual and collective attributes of oral health status and OHRQoL. 249 adults were enrolled into the study translating to 101% response rate. 77 (31%) and 172 (69%) of the respondents were male and female respectively. There was a mean of 5.16 ± 3.56 decayed teeth per person. The mean of missing teeth due to decay per person was 3.56 ± 4.229 . The mean of filled teeth per person was 0.33 ± 0.85 . The mean decay, missing and filled teeth (DMFT) was 9.04 ± 5.995 . DMFT score was contributed to mainly by decayed and missing teeth at 57.02% and 39.34% respectively. Filled teeth contributed 4% to the DMFT score. From the OHIP-14 scale, 140 (56%) of the respondents experienced painful aching in the mouth and found it uncomfortable to eat any foods. 103 (41.4%) respondents experienced unsatisfactory diet, 87 (35.05%) reported psychological discomfort and 36.5% reported physical pain, fairly and very often. The Chi-square test produced a statistically significant association between DMFT and painful aching in the mouth ($\chi^2 = 16.12$, $p = 0.002$, 12 degrees of freedom (d.f). After carrying out multiple linear regression analysis the nine independent variables explained only 14.4% of the variations in oral health related quality of life. However, DMFT was found to be significant (p -value = 0.03). The mean decayed teeth per person of 5.16 ± 3.56 from this study was consistent with 78.2% for a study in Ethiopia on prevalence of dental caries was (Tafere, 2018). DMFT (9.04 ± 5.995) in the study may not have been a reflection of the actual occurrence of dental caries in the neighborhood community, although it shades some light on the oral health status of adults living around the hospital. 36.5% of the respondents in this study reported fairly and very often thresholds for physical pain dimension more than other dimensions in the OHIP-14 scale.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Oral diseases are the most prevalent non-communicable public health problems globally (Oral Health - World Health Organization, 2016). About 3.58 billion people worldwide were found to suffer from the most common oral diseases such as dental caries, periodontal diseases, oral cancers, oro-dental trauma and disfigurement amongst others. The most common oral health condition was notably dental caries. Rapid urbanization coupled with transformation in patterns of living conditions were found to have led to increasing burden of oral health conditions in majority of low-middle income countries (LMICs).

In Africa and Middle East region, there appeared to be an increasing burden of oral health problems and a high rate of untreated dental caries (Abdelatif Abid et al., 2015). The 2015 national oral health survey report in Kenya showed that 34.3% of adult respondents were detected to have dental caries. Moreover, oral mucosal lesions were present in 20.8% of the adults. Adult respondents reported that they had at least one prevailing dental condition that required attention (Ministry of Health – Unit of Oral Health, 2015). Most oral conditions were associated with pain, discomfort, disfigurement, speech problems, absenteeism from work and school amongst other social and functional disturbances. It has become necessary to explore how significant such an association is especially the negative impacts of oral diseases on quality of life that relates to oral health status.

In most low- and middle-income countries (LMICs), management of oral diseases has historically used approaches that put more emphasis on strengthening curative at the expense of promotive and preventive programs. This is despite the fact that nearly all dental diseases have been shown to be preventable. Governments therefore need to

review their respective oral health policies in order to meet the increasing oral health needs and demands of their people. At the same time, prevailing global economic recession and competing priorities are factors that have contributed to most governments being unable to make adequate budgetary provisions towards promotion and prevention of oral health and management of oral diseases or conditions. Other compounding factors include: high cost of curative oral health care, weak sustainable advocacy programs, emphasis on expensive technology for oral health care and inequitable distribution of available oral health infrastructure. These challenges have contributed to poor access to oral health care in low- and middle-income countries.

There has been a compelling need for an enhanced paradigm shift by oral health researchers towards the socio-environmental paradigm through use of patient reported outcomes (PROs) or subjective indicators in addition to clinical (objective) indicators because PROs are better understood and appreciated by health policy makers. Since oral health PRO results capture impacts of diseases on patients' OHRQoL, they are better in advocacy for oral health towards contribution to realization of social pillar of Kenya's vision 2030.

Oral health researchers and policy makers have recognized that disease indicators alone are limited in defining health status and leave socio-environmental context of peoples' lives unexplored (Baiju et al., 2017).

It is important to increase the understanding of how people perceive the impact of oral diseases on their quality of life. This is possible by use of reliable and valid oral health-related quality of life (OHRQoL) instruments. This study intended to establish the burden of oral diseases by using the WHO oral health assessment adult 2013 form in addition to measuring OHRQoL of adult patients at Mathari Hospital by using OHIP-14 questionnaire.

1.2 Problem statement

Existing oral health care approaches at the dental unit of Mathari Hospital and other public health settings have consistently emphasized on biomedical diagnosis and curative oral health care to a greater extent over the socio-environmental concerns of dental patients. As a result, promotive and preventive oral health care have not been adequately integrated into general health services at the hospital. Moreover, oral cavity has historically been dissociated from the rest of the body when considering general health status. Researchers agree that oral diseases have been found to negatively impact on an individual's social, emotional and psychological status that include interference with vital such as speaking, eating, swallowing, breathing, school, family interactions, self-esteem, self-image and catastrophic expenditures. Similarly, the training of dentists still emphasizes on how to recognize and treat oral diseases that relies more on applying objective measures. Such measures, reflect mainly the end-point of the disease processes with little indication of the effects or impact of the disease process on function, well-being or adequate insight into the effects or impact of oral disorders on quality of life.

1.3 Significance of the study

Oral health policy makers are likely to appreciate the effects of oral diseases such as dental caries when high decayed-missing-filled-teeth (DMFT) scores are interpreted in terms of impaired quality of life because of inability to eat or sleep and associated pain. As a result, the OHRQoL concept can be suitable for advocacy at the oral health policy level as well as for use to communicate with general health policy-makers, negotiate promotion of oral health care and access to care at Mathari Hospital dental unit. The results may have an obvious role in enhancing oral service providers' recognition that they do not treat the oral cavity, but the person and beyond.

The results may be significant for reference at the facility and community research level since the OHRQoL concerns, if reinforced well, may serve to motivate patients to adopt oral health-related behavior (Halvari, 2012). These include: practicing good oral

hygiene, having regular check-ups and spending more on oral health care. This owes to the fact that people are more likely to behave positively when they understand how oral diseases affect their general health and quality of life rather than simply the effect of such disease on their teeth or gums (Halvari, 2012).

1.4 Justification of the study

There has been an increasing need to assess oral health by applying both objective and subjective measures in order to obtain relevant data that could be easily understood by oral health policy makers in Kenya. Mathari Hospital dental unit has grown to be a busy center for oral health care. However, the dental unit has not received adequate infrastructure support to meet the ever-growing oral health needs and demands of the catchment population. Increased public funding for oral health treatment at Mathari Hospital may be justified if substantial improvement in oral health related quality of life can be demonstrated. Patients' self-assessment of their wellbeing is often very different from the opinion of oral health workers. Besides, dentists in Kenya have for a long time put more emphasis on assessment of oral health status without adequately looking into psychological and social contexts. This is despite the fact that better and high cost dental treatment alternatives have been developed while resources for oral health care are becoming inadequate in low- and middle-income countries (LMICs).

1.5 Broad objective

To assess the oral health conditions and oral health related quality of life of adult dental patients at Mathari Hospital dental unit and to investigate associations amongst the oral health attributes

1.6 Specific objectives

1. To establish the oral health conditions of adult dental patients at Mathari Hospital dental unit
2. To establish the effect of oral health conditions on quality of life of adult dental patients at Mathari Hospital dental unit in the past one year
3. To investigate associations between oral health conditions and oral health related quality of life of adult dental patients at Mathari Hospital dental unit

1.7 Conceptual model for variables in the study

Figure 1.1 shows the conceptual framework that presents a diagrammatic relationship between dependent and independent variables in this study (Baiju, 2017).

Quality of life Oral health status

(Dependent variable). (Independent variable).

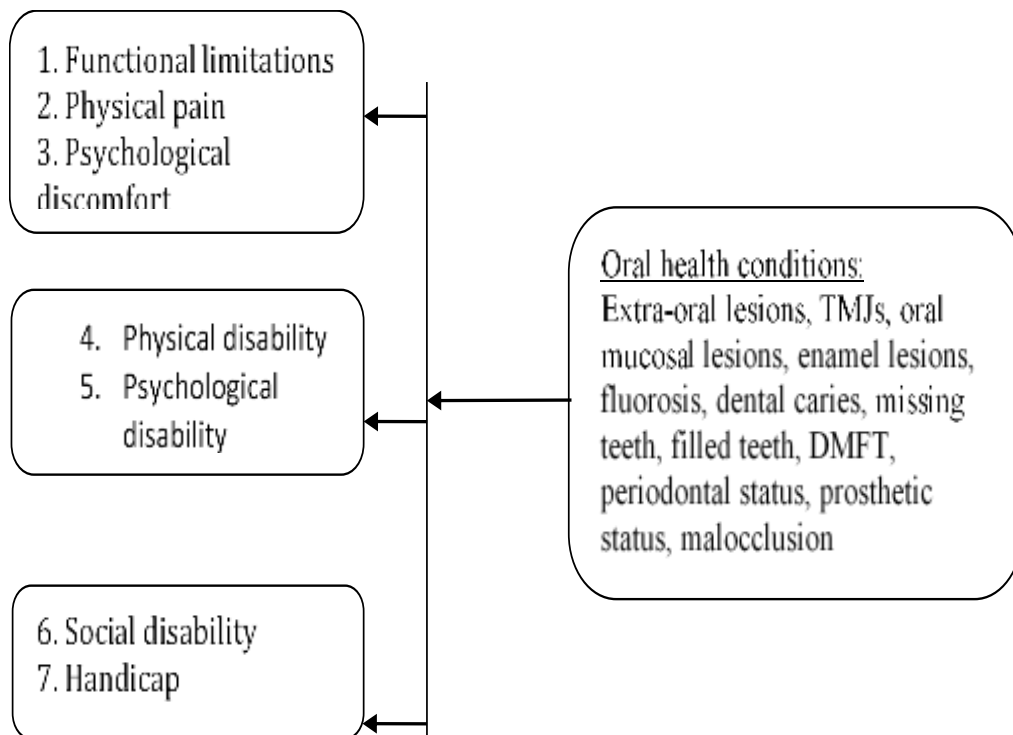


Figure 1.1: Conceptual framework for variables in the study

CHAPTER TWO

LITERATURE REVIEW

2.1 Definitions of oral health and oral health related quality of life

2.1.1 Oral health

Oral health was defined by World Health Organization in 2012 as a state of being free from oral diseases and other abnormal oro-facial conditions (Yap, 2017). Oral health conditions include dental diseases that adversely affect oral cavity and associated structures. A global report showed that oral disease, affects children, adults and families across the world every day, although they are nearly 100% preventable (Oral Health - World Health Organization, 2016). While oral diseases are significant, their relationship to overall general health is often overlooked. Oral disease is one of the most prevalent diseases in the world, causing considerable morbidity, particularly for disadvantaged populations and it has many risks common to other diseases affected by lifestyles (Oral Health - World Health Organization, 2016). The oral health concern of an individual is dependent on the attitude of a person (Bashiru & Omotola, 2016). These attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs, and other life situations and strongly influence the oral health behavior.

2.1.2 Oral health related quality of life

Quality of Life (QoL) is a multi-dimensional construct which is difficult to define with unanimity (Sischo & Broder, 2011). Health contributes to QoL, and the real impact of health and disease on QoL is known as health-related QoL. Health-related QoL is one dimension of a wider concept of QoL, and is defined in relation to optimum levels of mental, physical, role, and social functioning. Health related quality of life (HRQoL) is a multidimensional construct with three or more major components such as physical, psychological, and social functioning, that are affected by an individual's disease or treatment (Megari, 2013). Similarly, oral health related quality of life (OHRQoL) is a

multi-dimensional construct that can be defined as an individual's assessment of how functional factors, psychological factors, social factors, experience of pain or discomfort affect individuals' well-being in relation to their prevailing oral health conditions. The measurable outcomes of OHRQoL are presented in figure 2.2 (Bennadi & Reddy, 2013).

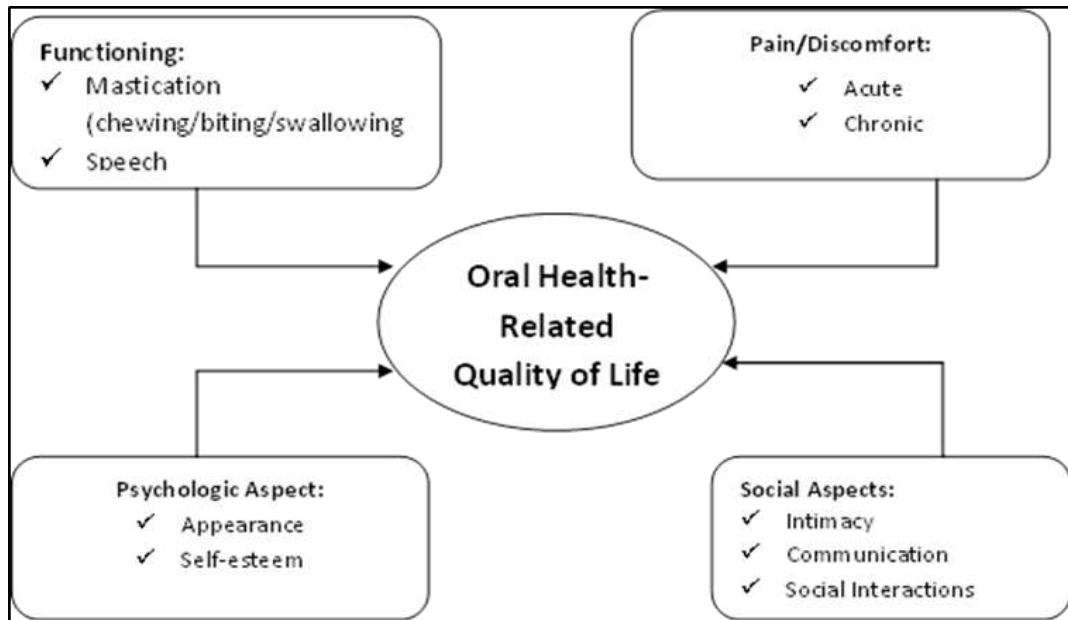


Figure 2.1: Outcomes of OHRQoL

Oral health related quality of life (OHRQoL), like HRQoL of QoL, is a patient reported outcome (PRO) and its subjective measures have been applied to establish the extent that oral health status or conditions disrupt social-role functioning and bring about major changes in behavior (Baiju et al., 2017).

2.2 Epidemiology of oral diseases and their risk factors

The 2016 global health report reported as follows: the prevalence of oral diseases was at least half of the world's population, dental caries in permanent teeth was the most prevalent condition, severe periodontal was estimated to be the eleventh most prevalent

disease globally and seven oral diseases and conditions (dental caries, periodontal diseases, oral cancers, oral manifestations of HIV, oro-dental trauma, cleft lip and palate) account for most of the oral disease burden (Oral Health - World Health Organization, 2016).

In Africa, it has been shown that the prevalence and severity of oral diseases appear to be on the increase (Abdelatif Abid et al, 2015). In Kenya, the recent oral health survey showed that 53.2% of the respondents had not experienced any toothache or discomfort from their teeth in the previous one year. On assessment of the oral health related quality of life, 99.1% of the respondents had at least one negative oral attribute. The prevalence of dental caries was 23.9% among the children. The overall prevalence of gingival bleeding among the children was 75.7%. The overall prevalence of dental fluorosis was 41.4%. Pain in the teeth or mouth was experienced by 57% of the respondents while 40% said they did not have any form of discomfort either in the teeth. Of all the respondents, 52.8% said that they experienced difficulty while chewing, 47.9% said they could not bite hard food while 27% said that they experienced sleep disruptions in the previous year (Ministry of Health – Unit of Oral Health., 2015). Risk factors for oral diseases such as an unhealthy diet, tobacco use and harmful alcohol use, are also common risk factors for the four leading chronic diseases namely cardiovascular diseases, cancer, chronic respiratory diseases and diabetes, thus oral diseases are often linked to chronic disease (Public Health England, 2017). Poor oral hygiene is also a risk factor for oral diseases. Oral health is integral to general health and should not be considered in isolation; hence prevention of oral disease needs to be integrated with that of chronic diseases on the basis of common risk factors (Chidzonga et al., 2015).

2.3 Conceptual models for HRQoL, OHRQoL and theoretical issues

A conceptual model is defined as a schematic representation of a theory that acts as a heuristic device (use of an artificial construct to assist in the exploration of social phenomena) to provide a better understanding of a phenomenon (Thalheim, 2012).

2.3.1 Models for health-related quality of life (HRQoL)

The concept of health was defined by World Health Organization and has been recognized to have the biomedical and socio-environmental paradigms (Bircher, & Kuruvilla, 2014). This concept has also been applied in dentistry in redefining oral health which is an integral component of health. The biomedical paradigm has its philosophical roots in the mind-body dualism in which mind and body are viewed as distinct entities by adoption of a metaphor in which the body is viewed as a machine (John, 2013). The resulting scenario is that the model isolates the body from the person such that patients' subjective experiences of health and illness are ignored. In applying dentistry to the medical model, there has been a tendency to treat the oral cavity as if it were an autonomous structure located within the body without any meaningful link to it and the person (Baker & Gibson, 2014). There was a paradigm shift towards inclusion of the socio-environmental paradigm. In this socio-environmental paradigm, oral health can be defined not only in terms of absence of oral disease but also in terms of optimal functioning, social and psychological wellbeing (Mariotti, . & Hefti, 2015). There is now a broader view of oral health which has been accompanied by two findings; the recognition of both the body and the person, hence giving rise to research agenda concerned with linking oral disorders to other diseases of the rest of the body, health outcomes and quality of life(Western Australia Department of Health, 2016). The most frequently used HRQoL models were designed by the World Health Organization and modified by Wilson and Cleary, Ferrans and colleagues proposed a conceptual model of health-related quality of life (HRQoL) that could be used to unify the biomedical and socio-environmental paradigms (Bakas et al., 2012). The model links five dimensions as illustrated in figure 2. The biomedical paradigm focuses on aetiologic agents, pathological processes, biological, physiological and clinical outcomes whereas the socio-environmental paradigm focuses on functioning and overall wellbeing through taking into account the patient, the social context in which he or she lives and the complementary system devised by society to deal with the disruptive effects of illness (World Health Organization, 2013). Ferrans and colleagues added individual and

environmental characteristics to the popular Wilson and Cleary model, to better explain HRQoL as shown in figure 2.2 (Bakas et al., 2012).

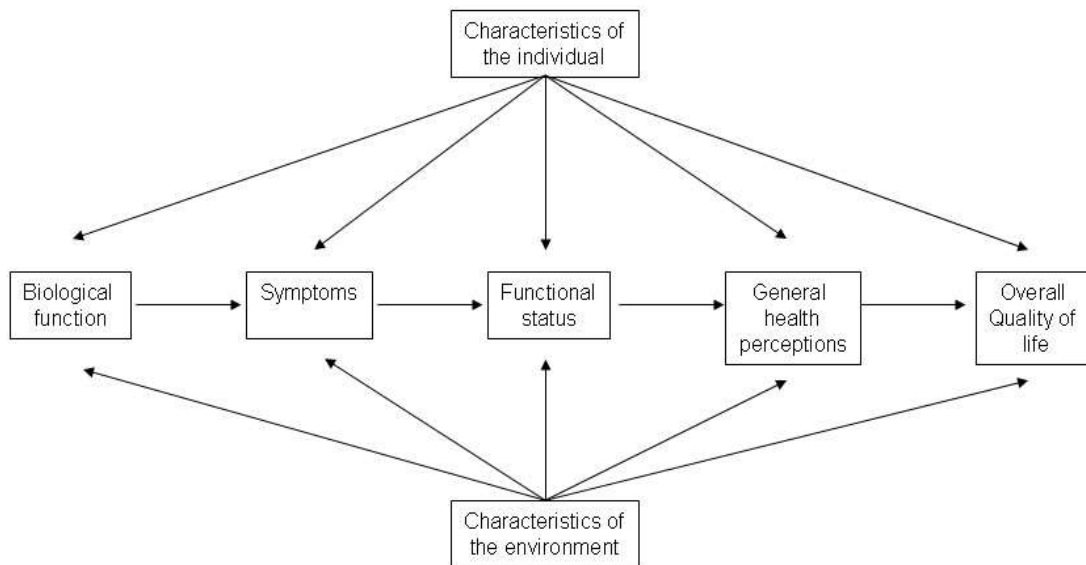


Figure 2.2: Revised Wilson and Cleary Model for Health-Related Quality Life, (Wilson & Cleary, 1995)

The arrows in figure 2.2 represent hypothesized linkages of the five illustrated dimensions as follows; physiological or biological variables are theorized to influence symptom status that influences functional health which in turn influences general health perceptions that influences overall quality of life. In the model, the physiological variables center on cells, organs and organ systems while the measurement of symptom status shifts to the organism as a whole and may include pain.

Functional health or status refers to the ability of the individual to perform certain tasks and functions as well as adapt to one’s environment (Elsawy et al., 2011). The functional status includes physical functioning, social functioning, emotional functioning and role functioning. The general health perceptions take into account satisfaction with health as well as how symptoms and functional abilities are valued. Characteristics of the individuals include demographic data such as age, gender, marital status, race, work

status and educational level. Existing conceptual models of health and HRQoL have generally been used to construct new models specific to OHRQoL.

2.3.2 Conceptual model for OHRQoL

The conceptual model for measuring oral health status that was developed by Locker, is shown in figure 2.3 and is based on the WHO classification of impairment, disability and handicap and attempts to capture all possible functional and psycho-social outcomes of oral disorders.



Figure 2.3: Conceptual model for measuring oral health by Locker

Locker, stated in this model that disease can lead to impairment which may lead to functional limitation and/or disability and finally handicap as the last consequence. Disability is more likely to occur when both discomfort and functional limitation exist, and handicap is more probable if all three have happened. By extension, people who lose teeth are impaired (i.e., have lost a body part). Other less well documented consequences of tooth loss include disability (lack of ability to perform tasks of daily living such as speaking and eating) and handicap (Emami, 2013).

2.3.3 Theoretical issues on OHRQoL measures

The OHRQoL measures are generic, intended to detect the outcomes of oral and oro-facial disorders in general (Sischo, & Broder, 2011). These OHRQoL instruments vary widely in terms of the number of questions (items), and format of questions and responses however they have been thoroughly tested to assess their psychometric properties such as reliability, validity and responsiveness (Bennadi & Reddy, 2013).

OHRQoL is a broader appreciation of the impact of oral health and can provide the basis for any oral health programme development. The World Oral Health report, 2016 listed the impact of oral health on the quality of life as an important element of the Global Oral Health Programme.

Evidence from literature indicates that the notion of OHRQoL appeared only in the early 1980s in contrast to the general HRQoL notion that started to emerge in the late 1960s (Javier de la Fuente et al., 2015). This delay in the development of OHRQoL could be explained by the poor perception of the impact of oral diseases on quality of life. The OHRQoL concept attempts to legitimize the patients' perspective, needs for and outcomes of treatment.

2.4 Empirical literature

Oral health attributes have been reported to be a common occurrence. A cross-sectional epidemiological study with secondary data obtained from the Oral Health Conditions Project- 2015 conducted in 163 municipalities in the state of São Paulo with the participation of 17,560 individuals aged between 35 and 44. The study concluded that sociodemographic characteristics, tooth pain, and presence of periodontal disease were associated with oral impact on daily performance of the adult population in the state of São Paulo, Brazil (Gouvea, 2018).

A single center observational study titled "Tooth loss, chewing ability and quality of life" was done on 171 random volunteers at the Dental School of Oeste de Santa Catarina University, Brazil whereby data were collected between June 2010 and June 2011 through the index of chewing ability and Oral Health Impact Profile (OHIP-14). The study concluded that the chewing disability produced a significant negative impact on oral-health related QoL and both, poor QoL and chewing disability are related with fewer number of natural teeth (Bortoluzzi et al., 2012).

A cross-sectional study was done on a sample of 300 elderly residents of Babol, Iran, to evaluate the effect of oral health on the QoL of the respondents. The OHIP-14 questionnaire (Persian version) was used for evaluating OHRQoL and the study showed that the effect of the oral health on the QoL of elderly is an important health-related factor, the respondents had undesirable OHRQoL, which might be attributed to their low educational status and treatment needs, and the elderly population of Babol had Edentulism and not wearing prosthetic appliances had a negative effect on their QoL (Motalebnejad et al., 2015).

In a study that was done at the University of Oslo, Norway to investigate associations between OHRQoL of life assessed with OHIP-14 and demographic factors, number of teeth present, dental visits, dental health behavior and self-rated oral health in a sample 3538 individuals aged 20 to 80 years; 35% of the respondents did not report any dental problem and the most frequently reported problems were: physical pain - 56%, psychological discomfort - 39% and psychological disability - 30% (Kari et al., 2011).

A random sample consisting of a total of 504 Greek adults aged 35-44 years were enrolled in a cross-sectional study to investigate the impact of oral health status on the quality of life of adults in different regions of Greece, using the OHIP-14. The respondents were from different urban and rural areas, and face-to-face interviews were conducted using the validated Greek language OHIP-14. The results showed that there were no significant differences was found for either rural or non-metropolitan areas when compared to urban or metropolitan regions, high scores of above were determined for functional limitation, physical pain, handicap, and the psychological discomfort scales and the education level of the subjects had a significant positive impact on the quality of life of the subjects. The study concluded that dental and oral health conditions are factors that do impact on the quality of life of individuals (Papaioannou, 2011).

In Indonesia, a pilot pathfinder study design evaluated the difference of oral health-related quality of life (OHRQoL) and to assess the main affected dimension between rural and urban areas in Kutai Kartanegara Regency. 214 adults aged 18 years and above

were randomly selected. 103 and 111 individuals were sampled from the rural and urban areas respectively. Oral Health Impacts Profile (OHIP-14) had been translated to Bahasa (Indonesia version). OHIP-14 was used to assess the subjects' oral health-related impact. The findings of mean OHIP scores in the urban and the rural areas were 25.4 and 28.8, respectively. The overall OHIP-14 score showed a significant statistical difference $P = 0,009$ ($P < 0.05$) between rural and urban respectively. This study indicated that OHRQoL was better in the urban area than rural area. However, physical pain dimension of the OHRQoL are the major oral problems associated with both rural and urban settings (Husain & Tatengkeng, 2017).

A cross-sectional study that involved 306 respondents who attended public health services in Feira de Santana-Bahia, Brazil, from December 2015 to February 2016 was conducted to determine the impact of the oral condition on the oral health-related quality of life (OHRQoL). The study also investigated the association between the combined exposure to dental caries and periodontitis and the impact on oral health-related quality of life. Oral clinical examination was performed to evaluate dental caries (decayed, missing, and filled teeth DMFT) and periodontal status including bleeding on probing, visible plaque index, probing depth, and clinical attachment level. The impact of oral health on quality of life was measured using the Brazilian version of the OHIP-14. The adjusted association measurement showed that in individuals exposed simultaneously to caries and periodontitis, the occurrence of the impact on quality of life was 63% greater than among those without the two dental conditions. The results showed that the combined presence of the two oral health conditions was associated with a significant impact on oral health-related quality of life when compared with absence of these oral diseases (Johelle et al., 2018).

In another cross-sectional study in Brazil, assessment was done on the factors associated with the impact of oral health on the quality of life in a sample of 504 Brazilian independent elderly, whereby data was collected by oral examinations and structured interviews. The findings of the study indicated that clinical, sociodemographic, and subjective factors had a negative impact on OHRQoL of the elderly people studied and

there was need to address all these factors when planning interventions on oral health for this population (Ulinski et al., 2013).

Results of a study conducted in India, showed that diseases that damage the mouth and face can disturb an individual's well-being and self-esteem. The study concluded that the concept of OHRQoL should be the basis for any oral health programme development. Moreover, research at the conceptual level is needed in countries where OHRQoL has not been previously assessed, including India (Bennadi & Reddy, 2013).

Oral diseases, like most diseases, are unevenly distributed, with the greatest burden falling on needy and poor populations. Moreover, there are also disparities in oral health between those from rural and urban areas of Africa (Ogunbodede et al., 2015). Likewise, a study done by Chidzonga, M. M. and others in 2015, presented that low- and middle-income countries had higher rates of caries and periodontal diseases than their higher SES counterparts. The same study concluded as follows: the main determinants of health in general are the social, economic, and environmental conditions; oral health policies must be developed that emphasize the role of social determinants in health and oral diseases; structural and proximal determinants of oral diseases are common to those affected by other non-communicable diseases (NCDs) and that oral diseases are also heavily affected by issues of politics, poor health behaviors, underdeveloped health systems, and low oral health literacy (Chidzonga et al., 2015). The conclusions of the study were as follows: oral health promotion and preventive oral health programs should therefore be integrated with those for general health and use the common risk factor approach (CRFA). Further, attempts should be made to improve the daily living conditions and reduce the incline of the social gradient. Besides, oral health practitioners should use the CRFA when dealing with determinants of oral diseases and in the design of preventive oral health programs. And that there should be both the individual and community involvement in order to mitigate the detrimental effects of the social determinants of health (Chidzonga et al., 2015).

The common risk factor approach (CRFA) has been highly influential in integrating oral health into general health improvement strategies (Watt, & Sheiham, 2012). However, oral health policy makers and promoters interpreted the CRFA too narrowly by focusing mainly on the common behavioral risks, rather than on the broader shared social determinants of chronic diseases (Watt, & Sheiham, 2012).

A quasi-experimental study was done in Kenya to evaluate the effect of health education on quality of life of persons living with human immunodeficiency virus (HIV) and results showed that 48.2% of the participants had at least one oral health related attribute, and a significant decrease in the prevalence of oral health related attributes among the cases but not the controls (Wang'ombe et al., 2016). The study concluded that oral health education is a viable strategy in reducing oral health related attribute, leading to improved oral health related quality of life.

The World Health Organization (WHO) oral health assessment form (OHA) for adults used in the study was borrowed from Oral health surveys: basic methods - 5th edition (World Health Organization, 2013). The WHO – OHA form provides a sound basis for assessing oral health status of a population and its future needs for oral health care. It enables researchers to collect data on oral health status and to conduct standardized oral health surveys that are comparable internationally.

The Oral Health Impact Profile (OHIP) was developed in Australia (1994) by Slade and Spencer in order to increase the capacity of dental clinicians and researchers to assess oral health and to advocate for dental care, by overcoming limitations in measurements of the levels of dysfunction, discomfort and disability associated with oral disorders (Alzoubi et al., 2017). The OHIP-49 contains 49 questions that capture seven conceptually formulated dimensions. It is based on Locker's theoretical model of oral health adapted from the WHO framework used to classify impairments, disabilities and handicap and has been used in testing oral disabilities. The model on which OHIP is based reflects the concept that impact moves from a biological basis through an impact

on the internal individual to aspects impacting on the social dimension of the individual (Alzoubi et al., 2017).

This study applied the modified model (as shown in Figure 2.6) based on the key concepts of level one (impairment), level two (functional limitations, pain, and discomfort) and level three (disability and handicap) as theorized by Locker in the following illustration:

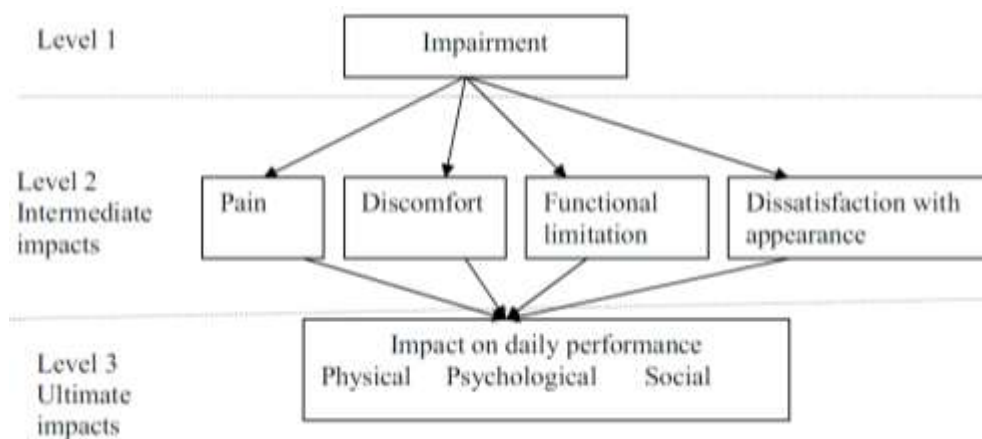


Figure 2.4: Modified theoretical framework of the consequences of oral impact

Level 1- Refers to the immediate biophysical outcomes of disease, commonly assessed by clinical indicators.

Level 2 - In addition to dissatisfaction with dental appearance, functional limitations, pain and discomfort (second level) refer to the experiential aspects of oral conditions in terms of symptoms assessed through self-report procedures. Any of the dimensions mentioned at the first and second levels may lead to the third level.

Level 3 - Refers to any difficulties in performing activities of daily living and to the broader social disadvantages, called ultimate impacts (third level), thus corresponding to the WHO's and Locker's concepts of disability and handicap.

Slade (1997) developed (a version of OHIP-49) the OHIP 14 which is efficient, sensitive, shorter, simpler and translated to many languages (Montero et al., 2011).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study design

This was a cross-sectional study. The design was chosen because the study considered several variables and made comparisons at one point in time.

3.2 Variables

Variables in the study were oral disease conditions (independent) and oral health related quality of life (dependent) as shown on table 3.1.

Table 3.1: Independent and dependent variables in the study

Oral health condition variables	Oral health related quality of life (OHRQoL) variables
Extra-oral disorder	Functional Limitations
Temporo-mandibular joint (TMJ) disorder	Physical pain
Oral mucosal disorder	Psychological discomfort
Enamel disorder	Physical disability
Dental fluorosis	Psychological disability
Periodontitis	Social disability
Decayed-missing-filled teeth (DMFT)	Handicap
Prosthetic need	
Malocclusion	

3.3 Study site

Nairobi City County is both the capital and largest city in Kenya. It is located in the south-central of Kenya at 140 kilometres south of the equator and occupies 696 square kilometres with a population of 4.3 million. The study was conducted at the dental unit of Mathari Hospital in Nairobi City County. The hospital is still the main public referral health facility with the core mandate of handling mental health conditions. Nonetheless, it has gradually re-branded and expanded to a center for with comprehensive out-patient services with dental care and other service units. The hospital neighborhoods include low, lower-middle and upper-middle income city residents.

3.4 Study population

Individuals aged 18 years and above, with dental conditions and attended the dental unit as out-patients. Only adults were considered because the study used the adult version of 2013 WHO oral health assessment form. The OHIP-14 was also piloted on individuals aged 18 years and above.

3.4.1 Inclusion criteria

- Individual aged 18 years and above
- An adult with dental problems
- An adult who was an out-patient at the dental unit
- An adult who gave consent
- An adult who was not a psychiatric patient

3.4.2 Exclusion criteria

- Individual under 18 years of age
- A psychiatric patient or an individual with memory loss
- Mentally incapacitated adults attending the dental clinic

3.5 Sampling

3.5.1 Sample size determination

The study used single proportion method for sample size determination as it estimates with a high level of precision (Ahmad, Mohd Amin, Aleng & Mohamed, 2012). The formula for sample size calculation was:

$$n = \left(\frac{z}{\Delta}\right)^2 p(1 - p)$$

Where n = sample size, z is the confidence level which is 95% for the study; Δ is the absolute precision; and, p is the expected proportion of individual in the sample with the characteristic of interest. In this case, according to the OHIP-14 instrument, the characteristic of interest is adults who have experienced oral health problems in the last one year. 80% of the adults in the pilot study had experienced oral health problems in the previous one year. Thus, p was 0.80 and from this, $n = (1.96/0.05)^2 \times 0.80(1 - 0.80) = 246$ adults.

3.5.2 Sampling technique

Systematic sampling was applied in the study. From the records in the Dental Unit of Mathari Hospital, the average number of dental patients that were attended to each quarter was 1722.

The study used the following formula to establish the system used in selecting the study subject:

$$k = \frac{N}{n}$$

Whereby n is the sample size, and N is the size of sample frame. Since the value of N is 1722 and the sample size n is 246, then $k = 1722/246$ is 7. The first patient was

randomly selected from those seeking dental intervention and thereafter every 7th patient was systematically selected.

3.6 Data Collection Instruments and Techniques

3.6.1 Data collection instruments

WHO-2013 adult oral health assessment form and Oral health impact profile with 14 questions (OHIP-14).

3.6.2 Data collection technique

World Health Oral (WHO) 2013 adult oral health assessment form (WHO-OHA 2013) was used to collect data on oral health conditions by clinical examination of each respondent. Data on oral health conditions/status was entered by using codes in the adult WHO-OHA 2013 form according to the criteria of the WHO for oral health surveys (World Health Organization, 2013). OHIP-14 was administered to collect data on oral health related quality of life. Responses for the OHIP-14 questionnaire were entered as per the codes indicated in its Likert scale. Prior to the main study, pilot data collection was done at a Mama Lucy Kibaki Hospital on the eastern side of the city in order to test for validity and reliability of the study instruments. This was conducted at a different site to avoid inclusion of same study subjects into the main study in order to minimize bias of final results. Table 3.2 presents a high Cronbach Alpha of 0.88 that signified satisfactory internal consistency in addition to scale reliability. The instruments were found to have sufficient face, construct and content validity.

Table 3.2: Reliability statistics from pretesting of OHIP-14

Cronbach's Alpha	Cronbach's Alpha based on standardized items	Number of items
0.880	0.878	14

3.7 Data Analysis

3.7.1 Computation of statistics

The data obtained was coded, programmed and entered into Statistical Package for Social Sciences (SPSS) software for analysis. Descriptive statistics such as frequencies and percentages were computed. Chi-square test was used to test associations between oral health conditions and oral health related quality of life. The tests were conducted at 95% confidence level ($\alpha = 0.05$). The results from the aforementioned analyses were presented in narrative, tabular, diagrammatic and graphical formats where applicable.

3.7.2 Multiple regression analysis

Multiple linear regressions were conducted to test the relationship between the individual and collective attributes of oral health and quality of life. The proposed multiple regression analysis formula was:

$$\text{OHRQoL} = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \varepsilon$$

Where OHRQoL represented quality of life attributes (social embarrassment, functional limitations and physical discomfort/pain); X_1 was extra-oral disorder; X_2 was temporomandibular joint (TMJ) disorder; X_3 was oral mucosal disorder; X_4 was enamel disorder; X_5 was dental fluorosis; X_6 was periodontitis; X_7 was decayed-missing-filled teeth (DMFT); X_8 was prosthetic condition; X_9 was malocclusion; β_0 was regression constant; β_1 to β_9 are regression coefficients; and, ε was error term from model significance. The regression analysis was evaluated at 5% level of significance. Principal component analysis (PCA) was done as a factor reduction mechanism. This was largely used for reduction of the dimensions of the OHIP-14 instrument so as to reduce and regroup the factors as appropriate.

3.8 Ethical Considerations

3.8.1 Ethical approval

A request for ethical approval of the study was submitted to The Kenya Medical Research Institute (KEMRI) Ethics Review Committee. The Ethics Review Committee (ERC) granted approval for implementation of the study.

3.8.2 Scientific approval

Scientific approval for the proposed study was sought from The KEMRI Scientific Steering Committee. The study received the formal scientific approval and was thereafter submitted to ERC.

3.8.3 Access to study site

Permission was sought and obtained from relevant government authorities and administrators of Mathari Hospital for the main study and Mama Lucy Kibaki Hospital for pilot study.

3.8.4 Informed consent

The informed consent document (English or Kiswahili version) was used as a guide whereby all information about the nature of the study was provided to the potential participants.

The information about the study and invitation extended to the potential study participants was given in an atmosphere that gave room for questions and answer sessions in order to ensure that each potential participant obtained adequate knowledge of the study before consenting by appending his/her signature or thumbprint in the presence of a witness.

3.8.5 Data and respondents' confidentiality

Provision was made for a lockable cabinet for securing research documents. Respondents' names were not used during data collection and instead, each was assigned a unique identification number so that their answers were linked to them in an anonymous way. Except for written answers if any, all others were in coded or number form.

It was ensured that only the Principal Investigator (PI), Supervisors and authorized representatives of KEMRI Scientific Steering and Ethical Review Committees had access to any information that could identify a participant's answers.

Respondents were debriefed after their participation in the study. The PI reviewed the purpose of the study, procedures used and offered to share the results with the respondents and other researchers when the results become available while maintaining confidentiality. Upon publishing the results of the study, it was done in a way that did not identify a participant.

The respondents' questionnaires and examination forms were secured and destroyed a year after the end of the study.

Respondents benefited by being made aware of their oral health status and treatment choices and knowing how dental conditions can affect their daily activities.

CHAPTER FOUR

RESULTS

4.1 Response rate

A total of 249 adults were enrolled into the study against a projected sample size of 246. The response rate was 101%.

4.2 Socio-Demographic Characteristics

Among the respondents 77(31%) were male and 172(69%) were female. 145(58%) were casual workers, followed by 74(30%) in business, students were 15(6%) and housewives were 15(6%). 231 (93%) respondents were from urban areas and 18(7%) were from peri-urban locations. The findings are as shown in table 4.1.

Table 4.1: Frequencies of socio-demographic characteristics

Socio-demographic characteristic		Frequency	Percentage
Gender	Male	77	31%
	Female	172	69%
Respondent's ethnicity	Kikuyu	147	59.1%
	Others	102	40.9%
Respondent's Occupation	Employed	74	30.2%
	Student	15	6%
	Business	15	6.8%
	Casual worker	145	57%
Geographic location	Urban	231	92.6%
	Peri-urban	18	7.4%

4.3 Oral health conditions

Data on oral health conditions were presented under the following sections.

4.3.1 Extra oral conditions

241 (97%) respondents did not have extra-oral conditions whereas 8(3%) presented with extra-oral ulcerations, sores, erosions and fissures (on the head, neck, cheek, chin, nose and vermilion border) as shown in table 4.2.

Table 4.2: Extra-oral conditions

Extra-oral condition	Frequency	Percentage
Normal extra-oral appearance	241	97%
Ulcerations, sores, erosions and fissures	8	3%
Total	249	100%

4.3.2 Temporo-mandibular joint (TMJ) symptoms and signs

All the 249 (100%) respondents did not present with TMJ symptoms as shown in table 4.3. 148 (59.4%) respondents presented with signs of the TMJ, and 101 (40.6%) did not have TMJ signs.

Table 4.3: Frequencies of TMJ symptoms and signs

	Symptoms		Signs	
	n	%	n	%
Yes	-	-	148	59.4
No	249	100	101	40.6
Total	249	100	249	100.0

4.3.3 Oral mucosal lesions and location

Table 4.4 shows that 131(52.6%) respondents presented with normal oral mucosa. 95 (38%) respondents presented with leukoplakia on their oral mucosa. 23(9%) had ulcerations, lichen planus and other oral mucosal lesions.

Table 4.4: Frequencies of oral mucosal conditions

Oral mucosa appearance	Frequency	Percentage
Normal oral mucosa	131	53%
Leukoplakia	95	38%
Ulceration, lichen planus and others	23	9%
Total	249	100%

Table 4.5 presents locations of oral mucosal lesions. Oral mucosa lesions were located predominantly on the buccal mucosa of 87(35%) respondents. 143 (57.4%) respondents had mucosal lesions on other areas of the mouth such as lip mucosa, hard and soft palate, vermilion border, gingiva and gingival ridges.

Table 4.5: Frequency distribution of oral mucosa lesions according to location

Location	Frequency	Percentage
Buccal mucosa	87	35%
Tongue	11	4.4%
Floor of mouth	8	3.2%
Others areas in the mouth	143	57.4%
Total	249	100%

4.3.4 Enamel opacities and hypoplasia

Table 4.6 shows that about 73% of the respondents presented with normal enamel. On the other hand, 8 to 10.4 percent of the respondents had nearly all the index teeth showing enamel opacities. The right premolar had enamel opacity in 3.2% of the respondents.

Table 4.6: Distribution of respondents' normal enamel, opacities and hypoplasia

Indexed Teeth	Normal enamel	Enamel opacity	Hypoplasia	Other defects
#14 Pre-molar (R)	72.3%	3.2%	2.4%	14.8%
#13 Canine (R)	73.1%	10.4%	2%	14.4%
#12 Lateral incisor (R)	73.1%	8.8%	2.8%	15.2%
#11 Central incisor	73.1%	8.8%	2.8%	15.2%
#21 Central incisor left (L)	73.9%	8%	2.4%	15.2%
#22 Lateral incisor (L)	74.3%	8.8%	1.6%	14.8%
#23 Canine (L)	73.5%	9.6%	2%	4.8%
#24 Pre-molar (L)	74.7%	8.8%	1.6%	14.8%

4.3.5 Dental fluorosis

Table 4.7 presents that 207(83.1%) respondents did not suffer from fluorosis in their dental enamel. 21 (8.4%) were observed with questionable fluorosis of the dental enamel. The rest 22(8.8%) had enamel fluorosis ranging from very mild to severe.

Table 4.7: Distribution of the respondents' levels of enamel fluorosis

Levels of enamel fluorosis	Frequency	Percentage
Normal enamel	207	83.1%
Questionable fluorosis	21	8.4%
Very mild	8	3.2%
Mild	3	1.2%
Moderate	6	2.4%
Severe	5	2.0%
Total	249	100%

4.3.6 Periodontal status

Table 4.8 shows that an average of 62.7% of the 249 respondents presented with healthy gums. However, an average 31.98% of the respondents presented with calculus on their indexed teeth.

Table 4.8: Distribution of respondents having indexed teeth with periodontal conditions

Indexed teeth	Healthy gums	Bleeding gums	Calculus	4-5mm periodontal pockets
#17/16	65.9%	5.2%	28.1%	0.4%
#11	79.5%	4.8%	15.7%	0%
#26/27	64.7%	6%	28.9%	0%
#47/46	62.7%	6%	31.3%	0%
#31	42.2%	4%	53.8%	0%
#36/37	61%	4.8%	34.1%	0%
Average	62.7%	5.13%	31.98%	0.04%

4.3.7 Dental caries

36(14.5%) out of 249 respondents did not have any decayed tooth. 213(85.5%) respondents presented with dental decay of various number of teeth per respondent as presented on table 4.9. The total number of decayed teeth amongst the 213 respondents was 1284. Of the 249 respondents the mean number of decayed teeth per person was 5.16 (sd =3.56).

Table 4.9: Frequencies with corresponding number of decayed teeth

Number of respondents with decayed teeth	Number of decayed teeth per respondent	Number of decayed teeth in each category
9	14	126
12	11	132
14	10	140
18	8	144
29	7	203
25	6	150
36	6	216
33	3	99
24	2	48
13	2	26
Total number of decayed teeth		1284

4.3.8 Missing teeth due to dental caries

Of the 249 respondents, 59(23.7%) had their full set of teeth or were missing a tooth or more due to other reasons other than caries. 190(76.3%) of the respondents had at least one tooth missing or were missing a total of 876 teeth due to decay. The mean number of missing teeth due to decay per person was $3.56 \pm 4.229(sd)$. The findings are shown on figure 4.1.

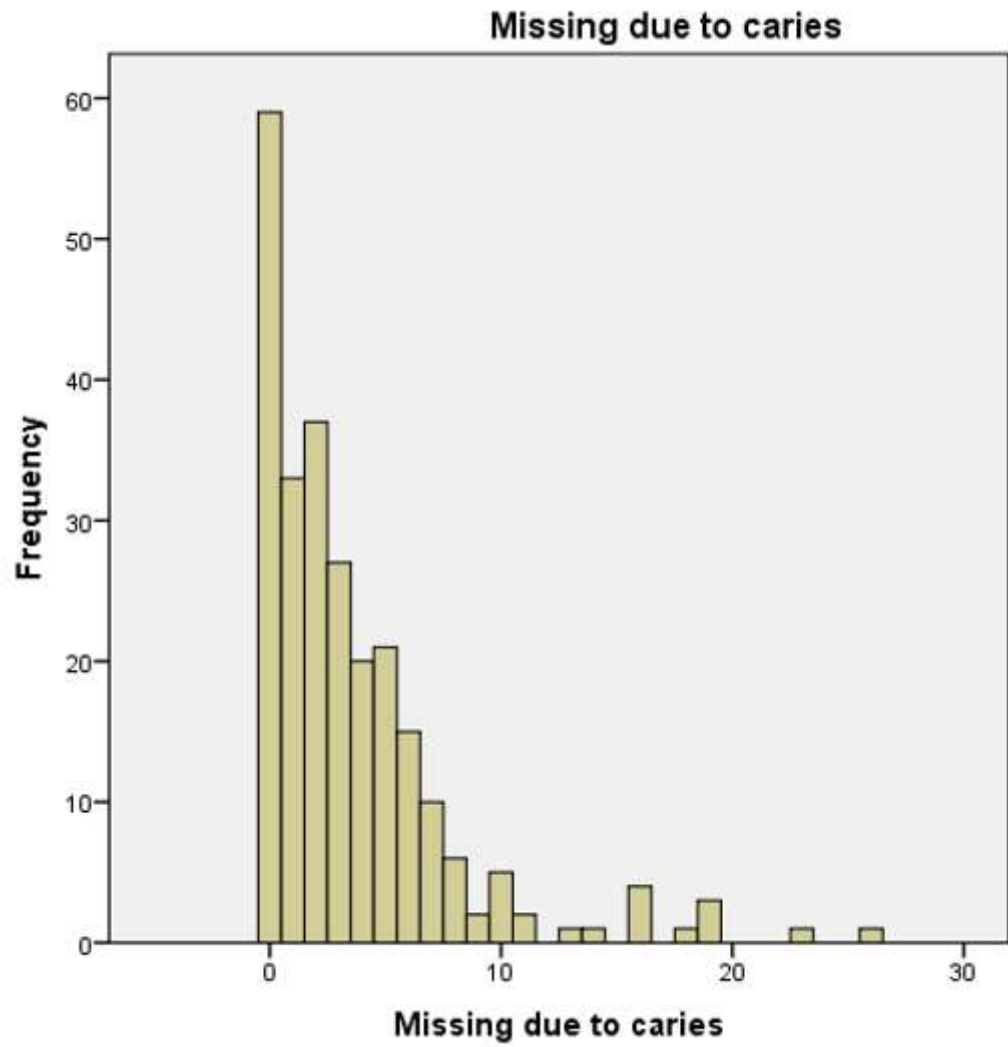


Figure 4.1: Frequencies corresponding to number of missing teeth due to caries

4.3.9 Filled teeth

In figure 4.2, it is shown that 201(80.7%) of the respondents did not have any dental filling at the time of examination. 48(19.3%) of the respondents had at least one dental filling and all had a total of 82 filled teeth. The mean number of filled teeth (for the 249 respondents) per person was 0.33 (sd =0.85).

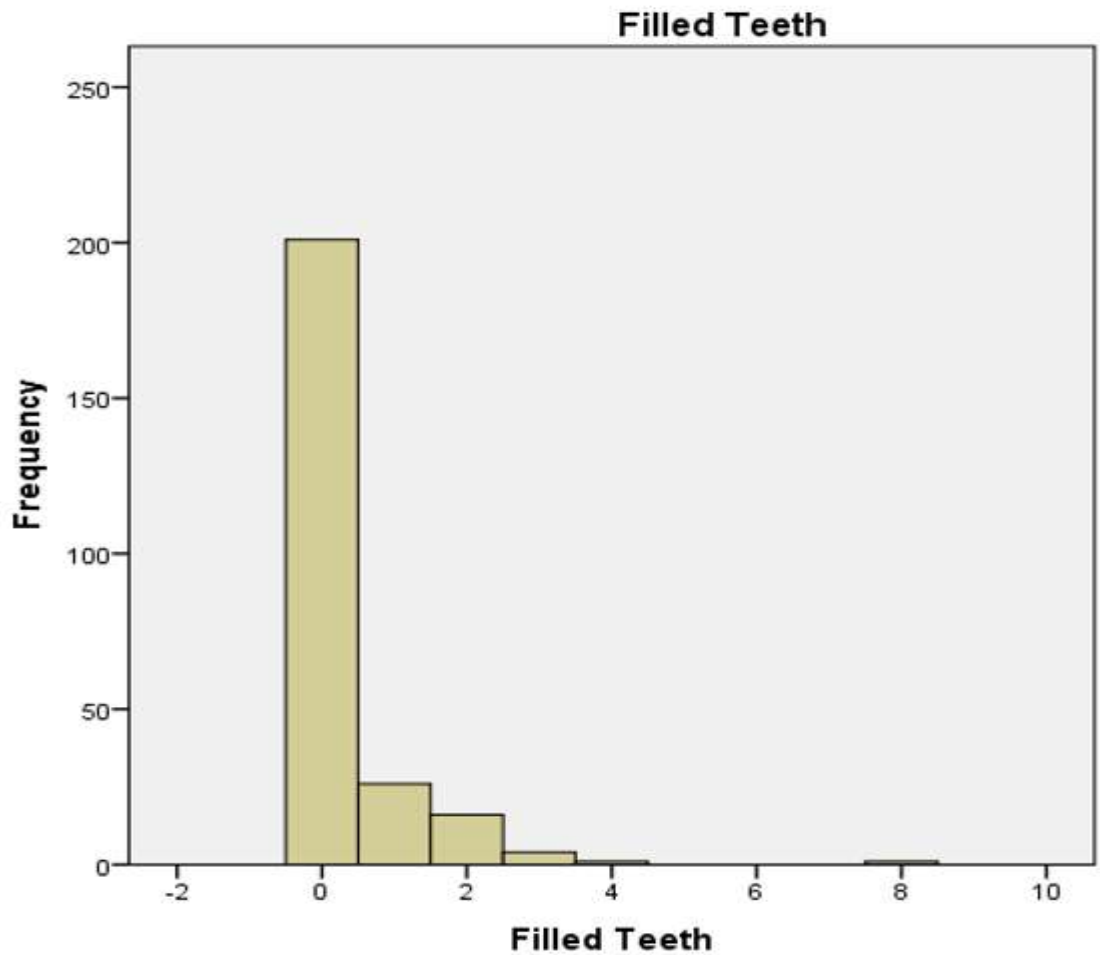


Figure 4.2: Frequencies corresponding to number of filled teeth

The total number respondents' teeth that were affected by decay, missing due to decay and had fillings, were 2242 (1284 decayed plus 876 missing plus 82 filled). The mean DMFT was 9.04 ± 5.995 (*SD*) as shown in figure 4.3.

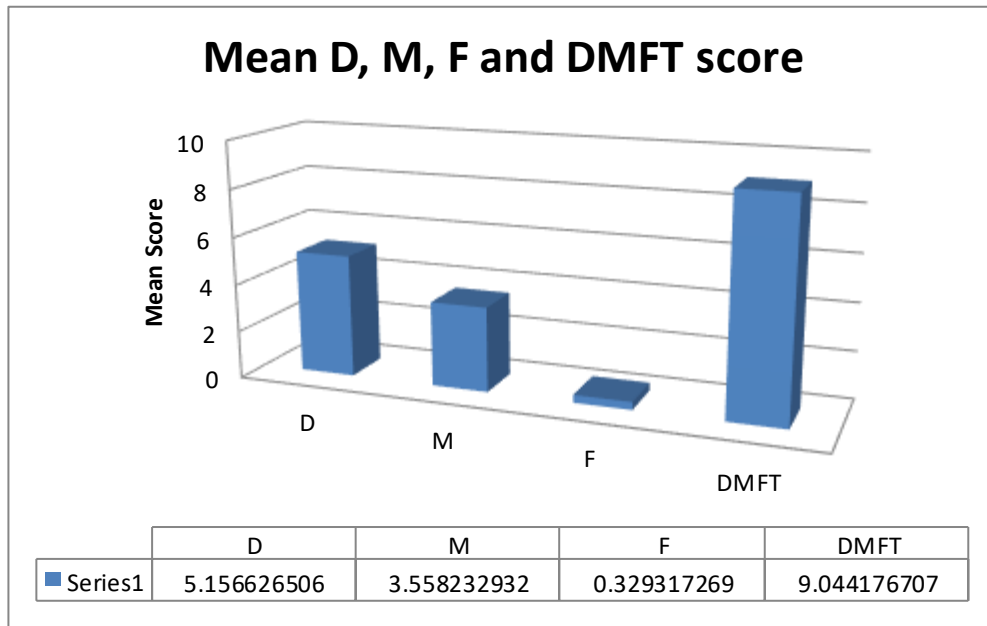


Figure 4.3: Mean D, M, F and DMFT scores

Figure 4.4 shows that DMFT score was contributed to mainly by decayed and missing teeth at 57.02% and 39.34% respectively. Filled teeth contributed 4% to the DMFT score.

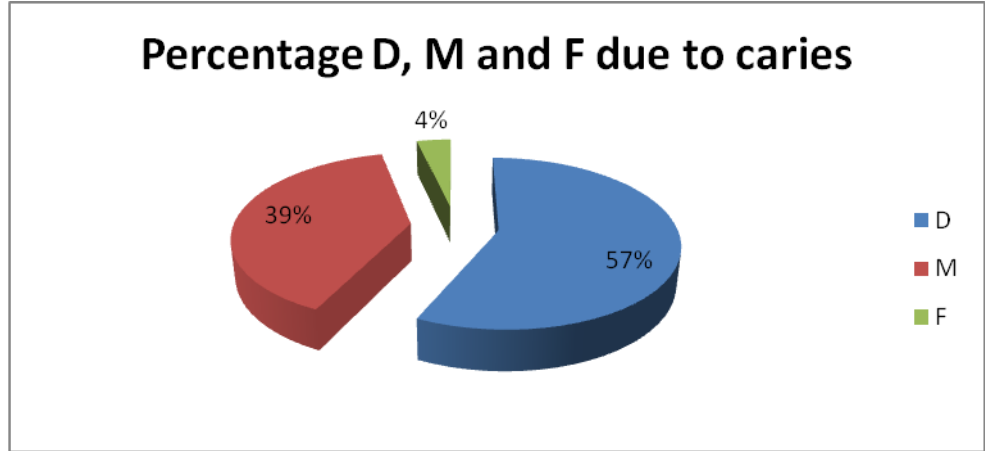


Figure 4.4: Percentage M, D and F scores

4.3.10 Prosthetic need

Table 4.10 showed that of the 249 respondents, 165 (66.3%) did not need any prosthesis. However, 84 (33.7%) the respondents needed at least one form of prosthesis.

Table 4.10: Distribution of prosthetic need

Prosthetic need	Frequency	Percentage
None	165	65.9
Need for one -unit prosthesis	23	9.2
Need for multi -unit prosthesis	35	14.1
Need for a combination of one and/or multi -unit prosthesis	18	7.2
Need for full prosthesis (replacement of all teeth)	8	3.2
Total	249	100

4.4 Oral health related quality of life (OHRQoL)

Table 4.11 shows that, of the 249 respondents, 140(56%) had experienced painful aching in the mouth and found it uncomfortable to eat any foods because of problems with their teeth, mouth or dentures. 103(41.4%) respondents experienced unsatisfactory diet and had to interrupt meals because of problems with their teeth, mouth or dentures. 87 (35.05%) respondents reported for the psychological discomfort dimension. The key to rank scores of OHIP-14 is shown on table 4.13.

Table 4.11: Distribution of patient reported outcomes

Questions to respondents for self-reporting	Rank of scores and distribution in percentage						Average Frequency/percentage
	0	1	2	3	4	(2+3+4)	
1a. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	78.2	7.7	4.4	2.8	6.9	14.1	42 (16.8%)
1b. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?	71.1	9.5	10.3	2.1	7	19.4	
2a. Have you had any painful aching in your mouth?	17.7	24.7	21.8	12.8	23	57.6	
2b. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	28.2	16.7	18	9.4	27.8	55.2	140 (56%)
3a. Have you felt self-conscious because of problems with your teeth, mouth or dentures?	54.3	13.6	11.9	6.6	13.6	32.1	87 (35%)
3b. Have you felt tense because of problems with your teeth, mouth or dentures?	43.6	18.4	14.5	6.8	16.7	38	
4a. Have your diet been unsatisfactory because of problems with your teeth, mouth or dentures?	48.8	14.2	13.4	7.3	16.3	37	103 (41.4%)
4b. Have you had to interrupt meals because of problems with your teeth, mouth or dentures?	33.1	20.8	17.6	9.8	18.8	46.2	

Table 4.12 presents that 91 (36.5%) respondents reported psychological disability for corresponding oral health-related outcomes. Social disability and handicap were reported by 69 (27.7%) and 60 (24.1%) respondents respectively.

Table 4.12: Distribution of patient reported outcomes

Questions to respondents for self-reporting	Rank of scores and distribution in percentage						Average Frequency/percentage
	0	1	2	3	4	(2+3+4)	
5a. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?	37.1	23.3	15.9	9.8	13.9	39.6	91 (36.5%)
5b. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?	52.9	13.2	11.6	5.4	16.9	33.9	
6a. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	68.6	11.8	8.2	3.3	8.2	19.7	69 (27.7%)
6b. Have you had difficulty doing your usual job because of problems with your teeth, mouth or dentures?	48.4	45.9	16.7	6.1	13	35.8	
7a. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	55.7	14.3	9.4	6.6	13.9	29.9	60 (24.1%)
7b. Have been totally	67.6	13.8	6.9	6.9	4.9	18.7	

**unable to function
because of problems with
your teeth, mouth or
dentures?**

Table 4.13: Key to scoring OHIP-14

Rank	Threshold of responses
0	Never in the last one year
1	Hardly ever or rarely (once in the last one year)
2	Occasionally or sometimes (twice in the last one year)
3	Fairly often or usually (thrice in the last one year)
4	Very often - always (more than three times or all the time in the last one year)

Table 4.14 displays the average frequency distribution of respondents by threshold scores or ranks for the seven OHIP-14 dimensions. In the physical pain dimension, the sum of scores for thresholds fairly and very often were reported by 36.5% of the respondents. Similarly, 26.1% and 23% of the respondents reported for physical disability and psychological disability dimensions respectively. Psychological discomfort was reported fairly and very often combined by 21.85% of the respondents.

Table 4.14: Distribution of threshold scores by percentages

OHIP-14 Dimensions	Threshold scores (%)				
	Never	Hardly ever	Occasionally	Fairly often	Very often
Functional Limitations	74.65	8.6	7.35	2.45	6.95
Physical pain	22.95	20.7	19.9	11.1	25.4
Psychological discomfort	48.95	16	13.2	6.7	15.15
Physical disability	40.95	17.5	15.5	8.55	17.55
Psychological disability	45	18.25	13.75	7.6	15.4
Social disability	58.5	28.85	12.45	4.7	10.6
Handicap	61.65	14.05	8.15	6.75	9.4

4.5 Associations between oral health conditions and oral health-related quality of life

This section presents results of cross-tabulation of oral health conditions and their self-reported outcomes.

4.5.1 Relationship between decayed-missing-filled teeth (DMFT) and painful aching in the mouth

192 (77%) of the 249 respondents had a DMFT index ≥ 5 . Of the 192 respondents, 116 (60.4%) reported ‘ranking scores’ ranging from ‘occasionally’ to ‘very often’ in OHIP-14 scale. Eight (3.2%) of 249 respondents had zero DMFT with only one (12.5%) having reported ‘occasionally’. These findings are presented in table 4.15.

Table 4.15: Frequency of cross-tabulation of DMFT and painful aching in the mouth

	Never	Hardly ever	Occasionally	Fairly often	Very often	Total
0 DMF teeth	3	4	1	0	0	8
1-2 DMF teeth	3	3	3	3	2	14
3-4 DMF teeth	7	14	2	4	8	35
≥ 5DMF teeth	35	40	47	24	46	192
Total	48	61	53	31	56	249

The Chi-square test of association tested at 5% significance level produced a statistically significant association between DMFT and painful aching in the mouth ($\chi^2=16.12$, p-value = 0.002 with 12 degrees of freedom (d.f)).

4.5.2 Relationship between dental caries and painful aching in the mouth

Table 4.16 shows the results of cross tabulation of decayed teeth and painful aching. 23 (9.2%) of 249 respondents reported having experienced painful aching ranging from

‘occasionally’ to ‘very often’. 77 (30.92%) of the respondents reported having experienced painful aching ranging from ‘occasionally’ to ‘very often’.

Table 4.16: Frequency of cross tabulation of decayed teeth and painful aching

Number of decayed teeth	Never	Hardly ever	Occasionally	Fairly often	Very often	‘Occasionally plus Fairly often plus Very often’
0 decayed tooth	9	4	3	1	1	5 (2%)
1-2 decayed teeth	6	8	11	6	6	23 (9.2%)
3-4 decayed teeth	11	23	9	8	18	35 (14%)
≥ 5 decayed teeth	22	26	30	16	31	77 (31%)
Total	48 (19.3%)	61 (24.5%)	53 (21.3%)	31(12.5%)	56(22.5)	

Chi-square tested at 5% significance level showed a statistically significant relationship between tooth decay and painful aching in the mouth (p-value=0.011, 12 d.f).

4.5.3 Relationship between prosthetic need and trouble pronouncing any words

Table 4.17 shows that one (4.35%) of 23 respondents who needed one-unit prosthesis reported very often in response to trouble pronouncing any words. Similarly, 4 (22.22%) of 12 respondents who needed one or multi-unit prostheses reported very often in response to trouble pronouncing words. The Chi square tested at 5% significance level indicated a significant relationship (p-value = 0.03, 16 d.f) between prosthetic need and trouble pronouncing any words because of problems with the respondents’ teeth, mouth or dentures.

Table 4.17: Frequency based on cross tabulation between prosthetic need and trouble pronouncing any words

Prosthetic need for	Never	Hardly ever	Occasionally	Fairly often	Very often	Total
No prosthesis needed	133	12	8	5	7	165
One-unit prosthesis	20	2	0	0	1	23
Multi-unit prosthesis	27	3	2	1	2	35
One/multi-unit prosthesis	12	1	1	0	4	18
Full Prosthesis	4	0	0	1	3	8
Total	196	18	11	7	17	249

4.5.4 Multiple Linear Regression

Table 4.18 presents outputs of regression analysis between oral health status and oral health related quality of life (OHRQoL). After carrying out multiple linear regression analysis the nine variables explained only 14.4% of the variations in oral health related quality of life. Only DMFT was found to be significant (p-value=0.03).

Table 4.18: Output of regression analysis between oral health status and oral health related quality of life

Variable	Coefficient (std error)	p-value
Intercept	0.57	0.13
Extra-oral disorders	-1.33	0.19
Temporo-mandibular (TMJ) joint disorders	-0.89	0.21
Oral mucosal disorders	-2.01	0.18
Enamel disorders	1.16	0.23
Dental fluorosis	-1.09	0.08
Periodontitis	-1.51	0.61
DMFT	-2.04	0.03
Prosthetic need	0.10	0.11
Malocclusion	1.77	0.09

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

The study registered a total of 249 respondents, hence 101% response rate. The gender composition was 172 (69%) female and 77 (31%) male. The finding may be attributed to better health-seeking behavior of females or because of frequent contacts with health facility for health services. This was consistent with a study on oral health trends and service utilization at an outreach dental clinic, Udo, Southern Nigeria where there were more females seeking oral health care than male at the center (Okeigbemen et al., 2015). There were 231 (93%) respondents from urban areas and 18 (7%) from peri-urban locations which could be explained by ease of physical access due to shorter distances travelled by individuals from urban areas compared to those who came from peri-urban sides. Majority of the respondents were casual workers 145 (57%) followed by those in formal employment 74 (30.2%), which is an indication of high un-employment rate among the catchment population of Mathari Hospital.

Temporomandibular joint (TMJ) signs were present in 148 (59.4%) respondents which nearly agrees with data of a prevalence study in Brazil that reported presence of TMJ disorder in 61% of the sample (Camacho J. G. D. D. et al, 2014).

The prevalence of leukoplakia on the oral mucosa was 38%. Besides, majority of oral mucosal lesions (35%) were located on the buccal mucosa followed by tongue (11%) and floor of mouth (8%). Similarly, this compares well to findings of a clinical study in India on potentially malignant disorders of the oral cavity that reported buccal mucosa as the commonest site of all potentially malignant lesions of the oral cavity and with high prevalence of leukoplakia (Shukla, 2014). The presence of most oral mucosal lesions on buccal mucosa may have been a sequelae of previous exposure to risk factors such as

tobacco, alcohol and poor diet. On periodontal status, an average 31.98% of the respondents presented with calculus on their indexed teeth.

There was high prevalence (85.5%) of dental decay in the study with the mean of decayed teeth per person being 5.16 ± 3.56 . The high prevalence of dental caries might be due to the fact that since it is an institution-based study, there might be higher patient flow to hospital compared to the community level. The finding is consistent with an Ethiopian institution-based study where prevalence of dental caries was 78.2% (Tafere, 2018). Another study on Brazilian adults revealed high dental caries severity in adults (DMFT was 8.4 ± 3.9 in the control group and 20.1 ± 4.5 in the case group) and greater prevalence of high caries severity was found among those who frequently visited the dentist (Costa et al., 2013). The factors known to be associated with prevalence of dental caries include knowledge about prevention and causes of dental caries, oral hygiene status, socio-economic status, place of resident, educational status.

A total of 190 (76.3%) of the respondents had at least one tooth missing due to decay. The mean missing teeth due to decay per person was 3.56 ± 4.229 . Moreover, 48 (19.3%) of the respondents had at least one dental filling, and mean filled teeth per person was 0.33 ± 0.85 . The mean DMFT of the sample was 9.04 ± 5.995 that translated to mean decayed (D) component of 5.16 ± 3.56 , while mean missing (M) component was 3.56 ± 4.229 and for filled (F) component being 0.33 ± 0.85 . The observed DMFT is probably much higher than the general population average around Mathari Hospital since this study recruited a group of adult patients, who attended the dental clinic, and therefore did not reflect actual occurrence of dental caries in the community. However, the high DMFT of this study shades some light on the oral health status of adults living within the catchment population of Mathari Hospital, and thus laying a foundation for the health policy makers and administrators to re-design oral health promotion, prevention and treatment programs. The programs could partly entail necessary efforts of ensuring constant and timely supply of required dental materials to the hospital, in order to improve oral health standards of the surrounding community through quality dental services. Further, urbanization could have increased access to sugar- containing

foods and drinks that are prime risk factors for dental caries. A study carried out in Tanzania produced different results as follows mean DMFT being 4.67 ± 0.19 . The mean of D-component was 3.01 ± 0.12 , while that of M-component was 1.57 ± 0.12 and for F-component being 0.1 ± 0.03 (Singh S. K., 2014). It was cited in the same study that dental caries in adult populations affects 5 to 10 teeth per individual, being the most significant cause of tooth loss among adults. The major reason for tooth loss in the present study was decayed teeth with mean of 5.16 ± 3.56 and bore similarity to the major cause of tooth loss in the Tanzanian study with the mean of D-component being 3.01 ± 0.12 .

The prevalence of the need for at least one form of dental prosthesis in the study sample was 84 (33.7%). This was evidently on the lower side compared to another study in Sudan where a need for prosthetic replacement was 57% (Nadia et al., 2012). However, both studies indicated that replacement of missing teeth was hardly ever done which reflected difficulties in access to this type of dental service.

The respondents gave a number of responses in regard to how oral health conditions affected their daily living activities. 140 (56%) had experienced painful aching in the mouth and found it uncomfortable to eat any foods. Within the same physical pain dimension, 103(41.4%) respondents had experienced unsatisfactory diet and had to interrupt. Another 87 (35.05%) respondents reported for the psychological discomfort dimension. 91 (36.5%) respondents reported psychological disability. Social disability and handicap were reported by 69 (27.7%) and 60 (24.1%) respondents respectively. These findings on OHRQoL are consistent with a study done on Greek adults, which found that functional limitation, handicap, physical pain, and psychological discomfort were the primary dimensions being reported about the QoL of the study participants (Papaioannou, 2011).

Of the 249 respondents at Mathari Hospital dental unit, 36.5% reported for thresholds fairly and very often in physical pain dimension. Similarly, 26.1% and 23% of the respondents reported for physical disability and psychological disability dimensions

respectively. Psychological discomfort was reported fairly and very often by 21.85% of the respondents. Another study in Indonesia found that physical pain components of the OHRQoL were the major oral problems associated with both urban and rural areas (Husain, 2017). Other findings from a study done on factors related to oral health-related quality of life of Independent Brazilian Elderly reported that most study subjects were concerned about their oral health and were uncomfortable to eat. Further, when considering the dimensions of OHIP-14, the highest means were registered for physical pain and psychological discomfort (Ulinski et al., 2013). The concurrent findings by Ulinski et al and this study may corroborate that physical pain and psychological discomfort could have exerted a direct influence on the search for dental services. Consequently, pain or curative needs may have been the main reason related to the respondents' dental appointment. This reinforces the idea that oral healthcare at Mathari Hospital dental clinic was based mainly on a curative approach. A study done on adult patients who visited a dental clinic in Serbian revealed that the most severe oral impacts were recorded in psychological discomfort, physical pain and psychological disability subscales, while the least severe impacts were in the functional limitation subscale and while 50.56% of the subjects reported occasional painful aching in the mouth (Maja et al., 2017). These findings tend to be consistent with results of the present study.

The Chi-square test at 5% significance level produced a statistically significant association between DMFT and painful aching in the mouth ($\chi^2=16.12$, $p = 0.002$, 12 d.f). Chi-square test showed a statistically significant relationship between tooth decay and painful aching in the mouth (p -value = 0.011, 12 d.f). The findings were comparable to results obtained in other similar study on elderly population in Port Harcourt, Nigeria, where participants with at least one carious tooth were likely to experience negative impact of oral health on quality of life approximately 5 times more than the participants with no carious lesion (Brimoh et al., 2019). Another study in Brazil revealed that combined occurrence of dental caries and periodontitis was associated with a significant impact on oral health-related quality of life when compared with absence of these oral diseases (Johelle et al., 2018). The Chi square test indicated a significant relationship (p

= 0.03, 16 d.f) between prosthetic need and trouble pronouncing any words. A study on evaluation of oral health-related factors on the quality of life of the elderly in Babol, Iran showed that participants wearing prosthetic dental appliances had lower OHIP-14 scores compared to non-wearers of dental prosthesis and the OHIP-14 scores were lower in the dentate individuals compared to the edentulous individuals (Motallebnejad et al., 2015). This finding is in agreement with the fact that prosthetic need can have negative impacts on OHRQoL, hence dental prosthesis would lead to better pronunciation of words. Outputs of multiple regression analysis between nine variables of oral health status and oral health related quality of life (OHRQoL) attributes, explained only 14.4% of the variations in oral health related quality of life in this study. However, DMFT was found to be significant (p -value = 0.03). This finding alludes to a significant association between the dental caries and OHRQoL of the respondents in the study. The reason for this could be because dental caries progression to advanced stages may cause severe pain and draw attention of the individuals. Periodontal disease did not show significant association with OHRQoL in the study. However, a study done on Sri Lankan adults revealed that oral health-related quality of life deteriorates with the increase in severity of chronic periodontitis (Wellapuli et al., 2016). Similarly, another study in Brazil found that periodontal disease severity was inversely associated with quality of life among Brazilian adults (Meusel et al., 2015). These two studies indicate that like dental caries, periodontal disease could also impact negatively on oral health related quality of life, despite the absence of the test for association between periodontal disease and OHRQoL in the present study.

5.2 Conclusion

On utilization of oral health services, female adults (69%) were more users than the male (31%) respondents in this study. Majority of the respondents were residents of urban area as compared to peri-urban, suggesting better access for the former. The bulk of the burden of oral disease in the study was dental caries with a high DMFT being 9.04 ± 5.995 which is consistent other studies. Periodontal disease and prosthetic need status were important prevalent conditions in the study

140 (56%) of the respondents had experienced painful aching in the mouth and found it uncomfortable to eat any foods and 103(41.4%) had experienced unsatisfactory diet and had to interrupt meals as established by the OHIP-14 instrument within the physical pain dimension. The thresh-hold scores for fairly and very often on OHIP-14 instrument dimensions in the following descending order of frequencies physical pain, physical disability, psychological disability and psychological discomfort.

Chi-square tests (at 5% significance level) realized a statistically significant relationship between tooth decay and painful aching in the mouth (p -value=0.011, 12 d.f). The association between DMFT and painful aching in the mouth was also statistically significant ($p = 0.002$, 12 d.f). The association between prosthetic need and trouble pronouncing any words because of problems with the respondents' teeth, mouth or dentures, was also found to be statistically significant ($p = 0.03$, 16 d.f). These findings imply that oral diseases and disorders have negative associations with oral health related quality of life and can create substantial pain, suffering, disability as well as functional limitations to the study sample. The perception created by the findings is that majority of the respondents attended the dental clinic to seek relief from pain or discomfort that affected their ability to speak, to eat and involvement in daily activities. The fact that the study focused on patients seeking oral health care may limit the generalizability of the findings to adults from the peri-urban and urban communities served by Mathari Hospital dental clinic.

5.3 Recommendation

Create awareness of risk factors for dental caries, oral mucosal lesions, periodontitis at the dental clinic. Strengthen oral health data collection for planning, monitoring and evaluation and integration of oral health within health promotion and prevention programs of the hospital.

Involve community health workers to support oral health activities through raising awareness of the importance of good oral health among the public and how early detection and treatment can improve oral health related quality of life.

Disseminate findings to key stakeholders and health policy makers for improved strategies and provision of relevant oral health services. Encourage academicians and oral health service providers to carry out prospective cohort studies to find out meaningful relationships between specific oral health status and oral health related quality of life.

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<p>Loss of attachment</p> <p>Severity</p> <p>0 = 0–3 mm 1 = 4–5 mm Cemento-enamel junction (CEJ) within black band 2 = 6–8 mm CEJ between upper limit of black band and 8.5 mm ring 3 = 9–11 mm CEJ between 8.5 mm and 11.5 mm ring 4 = 12 mm or more CEJ beyond 11.5 mm ring X = Excluded sextant 9 = Not recorded</p> <p>* Not recorded under 15 years of age</p>	<p style="text-align: center;">Index teeth</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">17/16</td> <td style="text-align: center;">11</td> <td style="text-align: center;">26/27</td> <td></td> </tr> <tr> <td style="text-align: right;">(173)</td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="text-align: left;">(175)</td> </tr> <tr> <td style="text-align: right;">(176)</td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="border: 1px solid black; width: 30px; height: 30px;"></td> <td style="text-align: left;">(178)</td> </tr> <tr> <td></td> <td style="text-align: center;">47/46</td> <td style="text-align: center;">31</td> <td style="text-align: center;">36/37</td> <td></td> </tr> </table>		17/16	11	26/27		(173)				(175)	(176)				(178)		47/46	31	36/37		<p>Enamel fluorosis <input style="width: 30px; height: 20px;" type="text"/> (179)</p> <p>Severity</p> <p>0 = Normal 1 = Questionable 2 = Very mild 3 = Mild 4 = Moderate 5 = Severe 8 = Excluded (crown, restoration, "bracket") 9 = Not recorded (unerupted tooth)</p>
	17/16	11	26/27																			
(173)				(175)																		
(176)				(178)																		
	47/46	31	36/37																			
<p>Dental erosion</p> <p>Severity <input style="width: 30px; height: 20px;" type="text"/> (180)</p> <p>0 = No sign of erosion 1 = Enamel lesion 2 = Dentinal lesion 3 = Pulp involvement</p> <p>Number of teeth affected</p> <p>(181) <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> (182)</p>	<p>Dental trauma</p> <p>Status <input style="width: 30px; height: 20px;" type="text"/> (183)</p> <p>0 = No sign of injury 1 = Treated injury 2 = Enamel fracture only 3 = Enamel and dentine fracture 4 = Pulp involvement 5 = Missing tooth due to trauma 6 = Other damage 9 = Excluded tooth</p> <p>Number of teeth affected</p> <p>(184) <input style="width: 30px; height: 20px;" type="text"/> <input style="width: 30px; height: 20px;" type="text"/> (185)</p>																					
<p>Oral mucosal lesions</p> <table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <input style="width: 30px; height: 20px;" type="text"/> (186) <input style="width: 30px; height: 20px;" type="text"/> (187) <input style="width: 30px; height: 20px;" type="text"/> (188) </td> <td style="width: 50%; vertical-align: top;"> <input style="width: 30px; height: 20px;" type="text"/> (189) <input style="width: 30px; height: 20px;" type="text"/> (190) <input style="width: 30px; height: 20px;" type="text"/> (191) </td> </tr> </table> <p>Condition</p> <p>0 = No abnormal condition 1 = Malignant tumour (oral cancer) 2 = Leukoplakia 3 = Lichen planus 4 = Ulceration (aphthous, herpetic, traumatic) 5 = Acute necrotizing ulcerative gingivitis (ANUG) 6 = Candidiasis 7 = Abscess 8 = Other condition (specify if possible) 9 = Not recorded</p> <p>Location</p> <p>0 = Vermillion border 1 = Commissures 2 = Lips 3 = Sulci 4 = Buccal mucosa 5 = Floor of the mouth 6 = Tongue 7 = Hard and/or soft palate 8 = Alveolar ridges/gingiva 9 = Not recorded</p>	<input style="width: 30px; height: 20px;" type="text"/> (186) <input style="width: 30px; height: 20px;" type="text"/> (187) <input style="width: 30px; height: 20px;" type="text"/> (188)	<input style="width: 30px; height: 20px;" type="text"/> (189) <input style="width: 30px; height: 20px;" type="text"/> (190) <input style="width: 30px; height: 20px;" type="text"/> (191)	<p>Denture(s)</p> <p style="text-align: center;">Upper Lower</p> <p style="text-align: center;"><input style="width: 30px; height: 20px;" type="text"/> (192) <input style="width: 30px; height: 20px;" type="text"/> (193)</p> <p>Status</p> <p>0 = No denture 1 = Partial denture 2 = Complete denture 9 = Not recorded</p>																			
<input style="width: 30px; height: 20px;" type="text"/> (186) <input style="width: 30px; height: 20px;" type="text"/> (187) <input style="width: 30px; height: 20px;" type="text"/> (188)	<input style="width: 30px; height: 20px;" type="text"/> (189) <input style="width: 30px; height: 20px;" type="text"/> (190) <input style="width: 30px; height: 20px;" type="text"/> (191)																					
<p>Intervention urgency <input style="width: 30px; height: 20px;" type="text"/> (194)</p> <p>0 = No treatment needed 1 = Preventive or routine treatment needed 2 = Prompt treatment (including scaling) needed 3 = Immediate (urgent) treatment needed due to pain or infection of dental and/or oral origin 4 = Referred for comprehensive evaluation or medical/dental treatment (systemic condition)</p>																						

Appendix II: Oral Health Impact Profile (OHIP-14) Questionnaire

Country.....

Leave blank				Year		Month		Day		Identification number				Examiner	Original/duplicate						
(1)				(4)	(5)				(8)	(9)		(10)	(11)				(14)		(15)		(16)

Distribution of OHIP items, ranging from 0 (Never), 1 (Hardly ever), 2 (Occasionally), 3 (Fairly often) to 4 (Very often)						
DESCRIPTION OF ITEM		RESPONSES				
Item	How often in the last year have you had problems with your teeth, mouth or dentures	0	1	2	3	4
OH1	Have you had trouble <u>pronouncing any words</u> because of problems with your teeth, mouth or dentures?					
OH2	Have you felt that your <u>sense of taste</u> has worsened because of problems with your teeth, mouth or dentures?					
OH3	Have you had <u>painful aching</u> in your mouth?					
OH4	Have you found it <u>uncomfortable to eat any foods</u> because of problems with your teeth, mouth or dentures?					
OH5	Have you felt <u>self conscious</u> because of problems with your teeth, mouth or dentures?					
OH6	Have you <u>felt tense</u> because of problems with your teeth, mouth or dentures?					
OH7	Has your <u>diet been unsatisfactory</u> because of problems with your teeth, mouth or dentures?					
OH8	Have you had to <u>interrupt meals</u> because of problems with your teeth, mouth or dentures?					
OH9	Have you found it <u>difficult to relax</u> because of problems with your teeth, mouth or dentures?					
OH10	Have you been a bit <u>embarrassed</u> because of problems with your teeth, mouth or dentures?					
OH11	Have you been a bit <u>irritable with other people</u> because of problems with your teeth, mouth or dentures?					
OH12	Have you had <u>difficulty doing your usual jobs</u> because of problems with your teeth, mouth or dentures?					
OH13	Have you felt that life in general was <u>less satisfying</u> because of problems with your teeth, mouth or dentures?					
OH14	Have you been totally <u>unable to function</u> because of problems with your teeth, mouth or dentures?					

Use the following key: **Never** = 0 (never in the last one year); **Hardly Ever** = 1 or rarely (once in the last one year); **Occasionally** = 2 or sometimes (twice in the last one year); **Fairly Often** = 3 or usually (thrice in the last one year); and, **Very Often** = 4 or always (more than three times or all the time in the last one year).

* **Key Terminologies:**

Pronouncing – saying or making sound of a word/sentence or part of it in the correct way

Sense of taste – being able to distinguish sweet, sour, bitter, and salty things in the mouth

Painful aching – hurting

Uncomfortable eating any foods – slight pain/unpleasant or uneasy (disturbing or hard to use, teeth or denture)

Feeling self-conscious – shy or embarrassed (nervous or anxious)

Felt tense – to feel irritable or restricted

Unsatisfactory – not good enough or poor (deficient)

Interrupt - break off, suspend

Relax – rest, calm down

Embarrassed –disturbed or upset (cause mental discomfort)

Irritable - having or showing a tendency to be easily annoyed or made angry

Appendix III: Informed Consent Form

PART A:

Title of the Research Study: Oral Health Status and Oral Health Related Quality of Life of Adult Dental Patients at Mathari Hospital Dental Unit.

Principal Investigator (PI):

1. Dr. Alfred O. Owiti, dentist, Ministry of Health-Kenya.

Supervisors:

2. Dr. Peter Wanzala, a researcher at KEMRI.
3. Prof. Loice Gathece, the Dean of the Faculty of Dental Sciences at University of Nairobi.
4. Mr. Daniel Nyamongo, a lecturer at the Institute of Tropical Medicine and Infectious Diseases (ITROMID) at JKUAT, (JUJA).

Introduction:

My name is Dr. Alfred O. Owiti, a dentist working for Ministry of Health, Kenya. I am also studying for a degree of Masters of Science in International Health at the Jomo Kenyatta University of Agriculture and Technology (JKUAT).

We are going to do an academic research on dental/oral diseases, which are very common in this country. I am going to give you information and invite you to be part of this research. Before you decide, you can talk to anyone you feel comfortable with about the research.

There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me, research assistant or my supervisors.

Should you agree to take part in the study, you will be asked to answer questions in two questionnaires and have your mouth examined as well.

Study location:

The main study site will be Mathari Hospital Dental Unit. The hospital was chosen for this study because it has a busy dental unit where dental patients from various parts of our communities come to seek many types of available treatments. It is important to realize that this hospital currently offers integrated medical and dental services of a wider scope to all members of the public.

Purpose of the Research:

The purpose of this study is to find out the dental diseases/conditions that affect adult patients attending Mathari Hospital Dental Unit and if activities of daily living such as; working, resting or relaxing, shyness, pronouncing words, tasting things, sleeping, speaking, smiling, eating, happiness, friendships, social relations can be affected by dental diseases/conditions.

The results will be used to increase awareness about dental problems at the hospital and to communicate the importance of increasing support to oral health to health managers, politicians, community and other health workers.

Participant selection:

The PI will make an introduction about the study to patients in attendance and randomly select the first potential participant from the attendance register of patients lining up for treatment and thereafter, every seventh adult patient will be asked to participate. This method of participant selection will be used so that every adult patient in attendance has a fair chance of being a participant in the study.

Research Procedure:

The PI will educate the selected potential participants about the study and give them a chance to ask questions that will be answered fully. The potential participants will be reminded of the importance of understanding the information as explained in this informed consent so that they are fully aware of its content before signing it.

If you agree and consent to participate, the PI will take time to introduce to you the two sets of questionnaires and address issues that are not clear to you. Thereafter the PI will use the questionnaires to interview you and record your own answers as you respond.

After the interview, the PI will carry out a check-up or examination of your mouth on the outside and inside to see which conditions are present in different parts of the mouth. The examination will be according to methods and standards as recommended by the World Health Organization (WHO).

The time set for both interview and examination of the mouth is approximately one hour per participant. By the end of the study, we expect to have interviewed and examined the mouth of 309 participants in a period of three months.

Compensation:

Each participant will receive two hundred Kenya shillings (Ksh. 200/=), out of which one hundred Kenya shillings (Ksh. 100/=) will be a refund for hospital registration/consultation fee and the other one hundred Kenya shillings (Ksh. 100/=) for transport. The PI will arrange with the management of the hospital's dental unit to ensure that you do not line up again when you are referred back to the treatment room after your participation in the research.

Risks:

There will be no known harm or risk to you in this study. The nature of questions to be asked will not hurt your feelings and the dental examination will not cause harm to your mouth. You will however, be inconvenienced by longer waiting period of approximately one hour's participation in the research.

Potential benefits:

This research is purely academic and there are no direct benefits to you, however we shall make you aware of diseases found in your mouth and treatment choices before referral back to the hospital's treatment room.

The research results will show dental problems that patients at the dental unit suffer from, so that better planning for increased awareness, prevention and treatment can be realised.

The results may also show that dental conditions can affect daily activities of people to justify for increased support to better dental health and as reference for future studies.

Confidentiality:

A room with lockable cabinet will be set aside during the study for your privacy and security of research materials. We shall not use your names, as you will be assigned a unique identification number so that your answers are linked to you in anonymous way. Except for written answers, all others will be coded or in number form. Only the PI, Supervisors and authorized representatives of KEMRI Scientific Steering and Ethical Review Committees will have access to any information that can identify your answers.

When we publish any results from this study, we will do so in a way that does not identify you unless we get your specific permission to do so. We may also share the data with other researchers so that they can check the accuracy of our conclusions but will only do so if we are confident that your confidentiality is protected.

The questionnaires and examination forms will be secured and destroyed a year after the end of the study.

Voluntary Participation/Right to withdrawal from Study:

Your participation in this study is completely voluntary. You are free to refuse to participate, to end participation at any time for any reason, or to refuse to answer any individual question without penalty or loss of compensation. In other words, you are free to make your own choice about being in this study or not, and may quit at any time without penalty.

Contacts:

If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask questions later, please feel free to contact the following:

1. The Secretary, KEMRI Ethics Committee, P.O. Box 54840-00200; Telephone 2722541/2713349/072220590; Email: erc@kemri.org
2. The Director, Institute of Tropical Medicine and Infectious Diseases, Jomo Kenyatta University of Agriculture and Technology, P. O. Box 62200-00200, Nairobi; Telephone 067-52711; Email: itromid@kemri.org
3. Dr. Peter Wanzala, Supervisor – Cell phone number: 0721624374; Email: wanzap2003@yahoo.com
4. Prof. Loice Gathece, Supervisor – Cell phone number: 0722755590; Email: gathece@uonbi.ac.ke

5. Mr. Daniel Nyamongo – Cell phone number 0734808829; Email: danielsagwe@yahoo.com
6. Dr. Alfred O. Owiti, Principal Investigator – Cell phone number: 0722797266; Email: aowiti@yahoo.com

PART B:

If you agree to participate in the study, please put your signature or thumbprint below, confirming that you have read and understood the nature of the study, your responsibilities as a study participant, the inconveniences associated with voluntary participation in the study and that all your questions and concerns concerning the study have been answered satisfactorily.

You will receive a copy of this signed consent form to take away with you.

Participant’s Statement:

I do hereby give consent to participate in this study that is aimed at finding out the dental diseases/conditions that affect adult patients attending Mathari Hospital Dental Unit and if activities of daily living can be affected by dental diseases/conditions. I have read or have been taken through the information in this informed consent as well as having all my queries answered and I fully understand my role as a participant. I also understand that withdrawal from the study at any point is voluntary and not subject to penalty. I understand that I will be interviewed and have my mouth/teeth examined and thereafter the results of the study will be published without reference to my identity.

Signature of Study Participant and Date
and Date

Thumbprint of Study Participant

Signature of Person Obtaining Consent and Date

Signature of Witness and Date

Appendix IV: Swahili Consent (Ridhaa/Mapatano)

SEHEMU A:

Kichwa cha Utafiti: Hali ya Afya ya Mdomo na Changamoto zake katika Ubora wa Maisha ya Wagonjwa Wazima wanaohudhuria Hospitali ya Mathari.

Mpelelezi Mkuu:

1. Dkt. Alfred O. Owiti, daktari wa meno, Wizara ya Afya-Kenya.

Wasimamizi:

2. Dkt. Peter Wanzala, mtafiti, KEMRI.
3. Prof. Loice Gathece, Mkuu wa Kitivo cha Sayansi ya Meno, Chuo Kikuu cha Nairobi.
4. Bw. Daniel Nyamongo, mhadhiri, Institute of Tropical Medicine and Infectious Diseases (ITROMID) katika Chuo Kikuu cha Jomo Kenyatta, Cha Kilimo na Teknolojia (JKUAT), Juja.

Dibaji/Mwanzo:

Jina langu ni Dkt. Alfred O. Owiti. Mimi ni daktari wa meno chini ya Wizara ya Afya, Kenya. Mimi pia ni mwanafunzi katika chuo kikuu cha Jomo Kenyatta (JKUAT), na nasomea bwana Shahada ya Sayansi katika Afya ya Kimataifa.

Pamoja na wenzangu, tungependa kufanya utafiti wa kitaaluma juu ya magonjwa ya meno, ambayo ni ya kawaida sana katika nchi hii yetu. Nina nia ya kukualika uwe sehemu katika utafiti huu na nitakupatia habari kuihusu.

Kabla ya kuamua kushiriki au hata baada ya kuamua, kuwa huru kuzungumza na msaidizi wangu yeyote wa kitaaluma unayejisikia vizuri, kuwauliza maswali nyeti ama hata mambo usiyoyafahamu kuhusu utafiti huu. Kwa sababu utafiti huu unaangazia

magonjwa ya mdomo/meno, ikiwa utakubali kushiriki, utaulizwa maswali kuhusu hali yako ya afya mdomoni na kama imedhuru maisha yako ya kawaida na pia utaweza kuchunguzwa hali yako ya mdomo.

Eneo la Utafiti:

Utafiti utafanyika katika hospitali ya Mathari, kitengo cha meno. Hospitali hii ilichaguliwa kwa ajili ya utafiti huu kwa sababu ina wagonjwa wengi wa meno kutoka sehemu mbalimbali za jamii wanaokuja kutafuta aina nyingi ya matibabu yanayopatikana hapa. Ni muhimu kutambua kwamba hospitali hii kwa sasa inatoa huduma jumuishi ya matibabu kwa kila mtu katika jamii. Hata hivyo, bado hospitali hii ni kituo kikuu cha rufaa ya huduma maalumu kwa watu wenye shida ya kiakili ambao hawatakuwa katika sampuli ya utafiti hii.

Lengo la utafiti:

Lengo kuu la utafiti huu ni kuchunguza magonjwa ya mdomo/meno yanayowaathiri wagonjwa wazima wanaohudhuria hospitali ya Mathari, kitengo cha meno. Pia utafiti una nia ya kuchunguza kama shughuli za maisha ya kila siku kama vile; kazi, kupumzika au kufurahi, aibu, kutamka maneno, kuonja au kula, kulala, kuzungumza, kutabasamu, furaha, urafiki, mahusiano ya kijamii zinaweza kuathiriwa na magonjwa ya mdomo/meno.

Matokeo yatatumika kuongeza ufahamu kuhusu matatizo ya meno katika hospitali nakupendekeza umuhimu wa kuongeza msaada kwa afya ya mdomo kwa mameneja wa afya, wanasiasa, jamii na wafanyakazi wengine wa afya.

Kuchagua Washiriki:

Mpelelezi mkuu atawajulisha wagonjwa wa meno katika mahudhurio kuhusu utafiti, na hatimae kuchagua mshiriki wa kwanza kwa njia ya nasibu kutoka kwenye orodha ya

mahudhurio ya wagonjwa wazima waliojitokeza na kujiandikisha kwa ajili ya matibabu. Baada ya hapo, kila mgonjwa wa saba kwenye orodha ataulizwa kushiriki.

Utaratibu wa Utafiti:

Mpelelezi atamjuzi kila atakayechaguliwa kuhusu ridhaa hii na umuhimu wa kutia sahihi yake kuonyesha kuwa amekubali kushiriki kwa hiari yake.

Kama utachaguliwa na ikiwa utatoa idhini ya kushiriki, mpelelezi atachukua muda kukufahamisha kuhusu seti mbili za maswali na pia kukufafanulia matatizo yoyote ulionayo au mambo usioyafahamu. Baada ya hapo mpelelezi atatumia dodoso (questionnaire) kukuhoji na kurekodi majibu yako mwenyewe kwa kila swali.

Mahojiano yatakapokamilika, mpelelezi atachunguza mdomo/meno yako, nje na ndani, ili kuona hali katika maeneo mbalimbali ya mdomo. Uchunguzi utafanywa kulingana na mbinu na viwango kama vilivyopendekezwa na Shirika la Afya Duniani (WHO).

Wakati uliowekwa kwa ajili ya mahojiano na uchunguzi wa mdomo/meno ni takriban saa moja kwa kila mshiriki. Tunatarajia kuwahojina kuchunguza mdomo/meno washiriki 309 katika kipindi cha miezi mitatu.

Fidia:

Kila mshiriki atapata shilingi mia mbili (Ksh. 200/=). Kati ya hizo, shilingi mia moja (Ksh. 100/=) itakuwa fidia yake ya ada ya usajili aliyolipa hospitali na shilingi mia moja (Ksh. 100/=) iliyobaki iwe malipo ya usafiri. Mpelelezi atapanga na usimamizi wa kitengo cha meno cha hospitali ili kuhakikisha kwamba hujajipanga tena ili kupokea matibabu baada ya kushiriki katika utafiti.

Madhara ya Utafiti:

Utafiti huu hautakuwa na madhara yoyote yanayojulikana au kuwa na hatari kwako. Asili ya maswali utakayoulizwa si ya kuumiza hisia yako na ukaguzi wa meno

hautasababisha madhara kwa mdomo wako. Hata hivyo, utaulizwa kusubiri takriban kipindi cha saa moja ili kushiriki katika utafiti.

Faida za Utafiti:

Utafiti huu ni wa kitaaluma na hauna faida ya moja kwa moja kwako kama mshiriki, hata hivyo, utakufahamisha kuhusu magonjwa yanayopatikana katika mdomo wako na maamuzi ya matibabu kabla ya rufaa katika chumba cha matibabu ya hospitali hii.

Matokeo ya utafiti pia yataonyesha matatizo ya meno yanayokumba wagonjwa, ili mipango bora ya kufahamisha jamii kuongezeka na kuweka matibabu barabara. Matokeo pia yataweza kuonyesha kwamba hali ya afya ya mdomo/meno inaweza kuathiri shughuli za kila siku za watu, na ni vyema kuhalalisha ongezeko ya msaada kwa afya bora ya mdomo/meno.

Usiri:

Chumba mwafaka cha mahojiano kitaandaliwa na wakati kutengewa ili kujifunza kuhusu umuhimu wa kuhakikisha siri yako imelindwa na usalama wa vifaa vya utafiti vitakavyotumika vimefungiwa katika kabati na kutiwa kufuli. Hatutatumia majina yako, bali utapewa namba au kitambulisho cha kipekee ili majibu yako yahusishwe na wewe bila kutumia majina. Watakaopewa kibali ya kutambua majibu yako kwa matumizi ya utafiti huu ni mpelelezi mkuu, wasimamizi na wawakilishi wa mamlaka ya Kisayansi na Kamati za Maadili katika KEMRI, na si mtu yeyote mwengine.

Wakati wakuchapisha matokeo ya utafiti huu, tutafanya hivyo kwa njia ambayo haitakutambua wewe kama mshiriki, isipokuwa tukipata ruhusa yako maalumu kufanya hivyo. Tunaweza pia kushirikina watafiti wengine ili waweze kudhibitisha usahihi wa matokeo yetu, lakini tutafanya hivyo tu ikiwa tuna hakika kwamba usiri wako ni salama. Dodoso (questionnaires) zote na fomu ya uchunguzi zitalindwa vyema na kuharibiwa mwaka moja baada ya mwisho wa utafiti.

Hiari ya Kushiriki/Kujiondoa kutoka Utafiti:

Ushiriki wako katika utafiti huu ni hiari yako kabisa. Uko huru kukataa kushiriki, kumaliza ushiriki wakati wowote na kwa sababu yoyote ile, au kukataa kujibu swali lolote bila ya adhabu au hasara ya fidia. Kwa ufupi, uko huru kuwa katika utafiti huu au kukataa kushiriki, na unaweza kujiondoa wakati wowote bila adhabu.

Mawasiliano:

Kama una maswali yoyote, unaweza kuuliza hivi sasa au baadaye, hata baada ya utafiti kuanza. Ikiwa utakuwa na maswali baadaye, tafadhali jisikie huru kuwasiliana na wafwatao:

1. Katibu Mkuu, Kamati ya Maadili, KEMRI, S.L.P. 54840-00200, Nairobi; Simu 2722541/2713349/072220590; Barua pepe: erc@kemri.org
2. Mkurugenzi, ITROMID, Chuo Kikuu cha Jomo Kenyatta, S.L.P. 62200-00200, Nairobi; Simu 067-52711; Barua pepe: itromid@kemri.org
3. Dkt. Peter Wanzala, Msimamizi – Simu ya mkono/Rununu: 0721624374; Barua pepe: wanzap2003@yahoo.com
4. Prof. Loice Gathece, Msimamizi – Simu ya mkono/Rununu: 0722755590; Barua pepe: gathece@uonbi.ac.ke
5. Bw. Daniel Nyamongo – Simu ya mkono/Rununu: 0734808829; Barua pepe: danielsagwe@yahoo.com
6. Dkt. Alfred O. Owiti, Mpelelezi Mkuu – Simu ya mkono/Rununu: 0722797266; Barua pepe: aowiti@yahoo.com

SEHEMU B:

Ikiwa umekubali kushiriki katika utafiti huu, tafadhali weka sahihi yako au kidole-gumba mahali palipotengewa, kuthibitisha ya kwamba umesoma au kusomewa na kuelewa asili ya utafiti huu, majukumu yako kama mshiriki wa utafiti, kuwa

umejihusisha kwa hiari yako mwenyewe na ya kwamba maswali yote na wasiwasi yako yote kuhusu utafiti imejibiwa kwa njia ya kuridhisha.

Utapewa nakala ya ridhaa hii baadaya ya kutia sahihi kuchukua na wewe.

Kauli ya Mshiriki:

Mimi, natoa idhini ya kushiriki katika utafiti huu yenye lengo la kuchunguza magonjwa ya mdomo/meno yanayowaathiri wagonjwa wazima wanaohudhuria hospitali ya Mathari, kitengo cha meno, na kama shughuli za maisha ya kila siku zinaweza kuathiriwa na magonjwa ya mdomo/meno. Nimesoma au kusomewa na kuelewa habari katika ridhaa hii na ya kwamba maswali yangu kuhusu utafiti yamejibiwa kwa njia ya kuridhisha. Pia nimeelewa kikamilifu nafasi yangu kama mshiriki, na kwamba niko huru kujiondoa kutoka utafiti huu bila ya adhabu. Nimekubali kuhojiwa na mdomo na meno yangu kuchunguzwa na baada ya hapo matokeo ya utafiti yatachapishwa bila kushauriana na utambulisho wangu.

Sahihi ya Mshiriki na Tarehe
Tarehe

Kidole Gumba cha Mshiriki na

Sahihi ya Mpatanishi na Tarehe

Sahihi ya Shahidi na Tarehe.

Appendix V: Letter Granting Access to Mathari Hospital Dental Unit



MINISTRY OF HEALTH

Telegraphic Address:
"MEDICAL", Nairobi
Telephone Nairobi
2654814/2337694

When replying please quote:

Ref No. ADMIN/MEDSUP/3/402

Mathari National Teaching and
Referral Hospital
P. O. Box 40663-00100
NAIROBI
Email: matharireferral@gmail.com

Date: 20th June, 2014

To
Dr. Alfred O. Owiti,
P.O. Box 34349-00100,
NAIROBI

RE: PERMISSION TO MATHARI HOSPITAL DENTAL UNIT AS A STUDY SITE.

This is to inform you that you have been granted permission to carry out the research "ORAL HEALTH STATUS AND ORAL HEALTH RELATED QUALITY OF LIFE OF ADULT PATIENTS" at the hospital's dental unit.

You are allowed to do the study between June, 2014 and December 2014. The hospital expects to obtain a feedback on your findings upon completion of your thesis.

Best of luck.

Dr. Kisivuli A.J.,
MEDICAL SUPERINTENDENT.



Appendix VI: Letter of Ethical Approval by KEMRI Ethics Review Committee



KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel: (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org, info@kemri.org, Website: www.kemri.org

KEMRI/RES/7/3/1 **February 25, 2014**

**TO: DR. ALFRED O. OWITI
PRINCIPAL INVESTIGATOR**

**THROUGH: DR. CHARLES MBAKAYA,
ACTING DIRECTOR, CPHR,
NAIROBI**

*Forwarded to
[Signature] 4/3/2014*

Dear Sir,

**RE: SSC PROTOCOL NO: 2655 (RESUBMISSION): ORAL HEALTH AND ORAL
HEALTH-RELATED QUALITY OF LIFE OF ADULT PATIENTS AT MATHARI
HOSPITAL DENTAL UNIT, NAIROBI (VERSION 1.0 DATED 13TH FEBRUARY
2014)**

Reference is made to your letter dated 13th February, 2014. The ERC Secretariat acknowledges receipt of the revised study protocol on February 19, 2014.

This is to inform you that the Ethics Review Committee (ERC) reviewed the documents submitted and is satisfied that the issues raised at the 223rd meeting held on 21st January 2014 have been adequately addressed.

The study is granted approval for implementation effective this **February 25, 2014**. Please note that authorization to conduct this study will automatically expire on **February 24, 2015**. If you plan to continue with data collection or analysis beyond this date, please submit an application for continuing approval to the ERC Secretariat by **January 13, 2015**.

Any unanticipated problems resulting from the implementation of this protocol should be brought to the attention of the ERC. You are also required to submit any proposed changes to this protocol to the SSC and ERC prior to initiation and advise the ERC when the study is completed or discontinued.

You may embark on the study.

Yours faithfully,


**DR. ELIZABETH BUKUSI,
ACTING SECRETARY,
KEMRI ETHICS REVIEW COMMITTEE**

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Appendix VII: Letter of Scientific Approval by KEMRI Scientific Steering Committee

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel: (254) (020) 2722941, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website: www.kemri.org

KEMRI/SSC/102352 4th December, 2013

Alfred Owiti

Thro' *Forwarded*
Director, CPHR *9th Dec 2013*
NAIROBI

REF: SSC No. 2655 (Revised) – Oral health and Oral health -
related quality of life of adult patients at Mathari Hospital
Dental Unit Nairobi

Thank you for your letter dated 26th November, 2013 responding to
the comments raised by the KEMRI SSC.

I am pleased to inform you that your protocol now has formal
scientific approval from SSC.

The SSC however, advises that work on the proposed study can
only start after ERC approval.

Sammy Njenga

FOR: Sammy Njenga, PhD
SECRETARY, SSC

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