Assessing The Oral Health Related Quality Of Life Among Dental Care Seeking Adults In Thiruvananthapuram

Dr MANJU RENJIT DARWIN

Dissertation submitted in partial fulfillment of the requirement for the award of the degree of Masters of Public Health

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology

Thiruvananthapuram

Kerala (India)

June 2004

Certificate

This is to certify that the dissertation titled **"ASSESSING THE ORAL HEALTH RELATED QUALITY OF LIFE AMONG DENTAL CARE SEEKING ADULTS IN THIRUVANANTHAPURAM"** submitted by **Dr Manju Renjit Darwin** of Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram is a bonafide work carried out by her.

Co-Guide

Dr K. Nandakumar

Professor and Head of Department
Dept. of Periodontics
Govt. Dental College
Thiruvananthapuram

Guide

Dr T.K.Sundari Ravindran

Honorary Professor
Achutha Menon Centre for
Health Science Studies
Sree Chitra Tirunal Institute
for Medical Sciences and
Technology, Thiruvananthapuram

DECLARATION

I hereby certify that the dissertation titled **"ASSESSING THE ORAL HEALTH RELATED QUALITY OF LIFE AMONG DENTAL CARE SEEKING ADULTS IN THIRUVANANTHAPURAM"** is the result of original research and has not been submitted for any degree in any other university or institution.

Thiruvananthapuram

Date: **Dr Manju Renjit Darwin**

Acknowledgments

Foremost I thank God Almighty for his goodness in giving me strength and for sending helpers to help me each day of my life so that I am able to do what I could not have otherwise done.

I would like to express my sincere gratitude to my guide Dr T.K Sundari Ravindran for her valuable guidance and inspiration. I am grateful to Dr K Nandakumar for being my co-guide, and for the help rendered to me.

I wish to thank the entire faculty at AMCHSS, for their help. I wish to thank my classmates who provided valuable insights to solve many of the difficulties that I encountered during my study I wish to thank Mr L Sam who worked hard to translate the Questionnaire.

Words would not suffice to express my heartfelt thanks to my parents for giving the opportunities in life to become who I am today. I am forever indebted to my husband Renjit Darwin for his encouragement and support and to my children Nayana and Namitha for the sheer joy they bring to my life, for being the best that they only can be, when I spent hour's together working on this project.

I wish to thank my teachers and staff at Dental College, Thiruvananthapuram, especially Dr Anita Balan, Prof. & HOD, Oral Medicine & Radiology, staff of General Hospital, Thiruvananthapuram and Dr Joji Thomas of Cosmopolitan Hospital for all the help given to me.

Last but not least I would like to express my sincere gratitude to all the participants of my study who in the midst of their pain and need, took time to take part in the study.

Assessing Oral Health related quality of life among dental care seeking adults in Thiruvananthapuram

Abstract

Objectives-To find out how oral health status, knowledge, attitudes and practices are with regard to oral health, socio-demographic factors and general health that affect the oral health related Quality of Life

Methods-The oral health impact profile (OHIP) was translated into Malayalam and used to assess the oral health related quality of life. 354 cases from the age of 18 and above participated in the study done in three clinical settings. A dentist using calibrated probes and WHO1997 oral health assessment format clinically examined all the participants. They were interviewed to collect details about self-perceptions of oral health, dental care seeking patterns, dietary patterns, oral hygiene practices, knowledge, habits, and socio-demographic background.

Results-98.8% of the dentate cases was affected in one or more ways because of their oral health problems. Physical pain, functional limitation and psychological discomfort were found to be the highest affected dimensions. The oral health related quality of life as measured by the OHIP was predicted by oral disease; felt but unmet needs, self rated general health and occupation groups. Educational status and self-perceptions about oral health was also significantly associated with the OHIP.

Conclusion-OHIP demonstrated good validity in our setting in capturing the psychosocial and functional limitations of oral disease, and in discriminating between people with and without oral disease. Oral diseases have considerable effect on the daily life of the participants and therefore, it affects the overall well being of the individual. Episodes of pain and infection are felt, but unmet needs are high in this group. There is a need to meet the basic oral care needs and to promote preventive strategies.

Contents

Chapter Page No

1 Background and Introduction

1.1 Introduction 1

1.2 Rationale 3

2 Literature review

2.1 Oral Health Measures 5

2.2 Oral Health Impact Profile 9

2.3 Impact of Oral Disorders 11

2.3.1 Functional Limitation

2.3.2 Physical Pain

2.3.3 Psychological Discomfort

2.3.4 Psychological Disability

2.3.5 Physical Disability

2.3.6 Social Disability

2.3.7 Handicap

2.4 Factors affecting subjective assessment of oral health related quality of life 16

2.4.1 Oral Health Status

2.4.2 Perceptions About Oral Health

2.4.3 Dental Care seeking patterns and attitudes

2.4.4 Dietary patterns

2.4.5 Oral hygiene

2.4.6 General Health

2.4.7 Socio-demographic

3 Objectives and Research Methodology
3.1 Objectives 20
3.1.1 Specific Objectives
3.2 Methodology 20
3.2.1 Study design
3.2.2 Study location
3.2.3 Study population
3.2.4 Study period
3.2.5 Research tools
3.2.5a) Oral Health Impact Profile
3.2.5b) Interview
3.2.5c) Clinical examination
3.2.6 Variables
3.2.7 Data Collection
3.2.8 Data analysis
4 Results
4.1 Socio demographic 27
4.2 Location 30
4.3 Oral Health Impact Profile (OHIP) 30
4.4 OHIP subscales-functional, physical and psychosocial consequences of oral disorders 33
4.5 Loss of working days due to oral health problem 39
4.6 Clinical examination 39
4.7 Self perceptions about oral health status 40
4.8 Dental care seeking patterns 40

4.9 Dietary Patterns and knowledge 42

4.10 Oral Hygiene habits 43

4.11 General Health 44

5 Analysis of results

5.1 Oral health Impact Profile (OHIP) 46

5.2 Oral disease and OHIP 47

5.3 Oral health Rating and OHIP 48

5.4 Dental care seeking patterns and OHIP 48

5.5 Dietary and oral hygiene factors 49

5.6 Self perceptions General Health and OHIP 49

5.7 Socio demographic factors and OHIP 49

5.8 Locations and OHIP 50

5.9 Oral Health status and OHIP subscales 51

5.9.1 Functional Limitation

5.9.2 Physical pain

5.9.3 Psychological Discomfort

5.9.4 Physical Disability

5.9.5 Psychological Disability

5.9.6 Social disability

5.9.7 Handicap

5.10 Analysis of factors affecting OHIP 53

6 Discussion

6.1 Discussion 55

6.2 Limitations of the study 61

6.3 Strengths of the study 62

7 Conclusions & Recommendations

7.1 Conclusions 63

7.2 Recommendations 64

References

Appendix

1.1 English version of OHIP 49-Questions and weights

1.2 English version of OHIP 49

1.3 English version of interview schedule used for the study

1.4 Questionnaire in Malayalam that was used for the study

Malayalam Version of OHIP 49

Interview schedule

Oral Health Assessment Form

1.5 Abbreviations & Glossary of terms

Chapter 1

Background and Introduction

1.1 Introduction

Oral Health status of an individual plays a significant role in an individual's well being good oral health is more than having good teeth. Teeth and orofacial structures play an important role in a person's social life from very early age. Oral disorders cause considerable physical pain and suffering, impairment of function and reduced quality of life [1].

Toothache has been described as one of the worst kinds of excruciating pain. Pain and other oral disorders such as tooth decay, periodontitis, dentofacial anomalies, affect every sphere of a life, restricts activity, disrupts sleep, the ability to eat and enjoy foods, ability to interact and enjoy company of family and friends. Hence, oral health is a determinant of an individual's quality of life.

Dental decay or tooth decay and periodontal disease, (diseases of gum and supporting structures of teeth) are the most common oral diseases. As a consequence of untreated tooth decay and periodontal disease, infections, pain and tooth loss occurs. This causes impairment of function and associated impacts on the individual, which affects the person's daily living. Severe periodontal infection, which may result in tooth loss, is found in 5-15% of most populations around the world [1]. This is an irreversible condition and the percentages are high when compared to most human diseases. World wide in past 20 years it has been considered a success that 50% of children aged 5-12 years has never experienced dental caries [2]. It is rather difficult to imagine another disease where 50% of population still suffers a particular disease [2]. Oral Diseases because of their high prevalence are a major public health problem. In 1996, dental caries, complete tooth loss

and periodontal disease featured among the five most prevalent conditions in Australian Population [3].

In India, it has been estimated that eight out of ten persons suffer from Oral Diseases [4]. In India, dental caries has increased from a point prevalence of 40-50% with an average DMFT (Caries Index) of 1.5 in 1940-50, for sixteen years, to 5 in urban areas and to 4 in rural areas during 1980-1990. [4] Among adults aged 30 to 35 years, 71% are affected by dental caries. [4] A study among rural women aged 15 and above in Pondicherry, India reports a prevalence of 40.5% for dental caries, 27.3% missing teeth due to caries and 13.2% missing tooth from other causes .The prevalence of deep periodontal pockets was 25.6%. 20.6% had shallow pockets and 20.1% had calculus [5]. These diseases are rarely life threatening but dental decay, gum disease and tooth loss have subtle impacts on the well being of the individual, but because of their high prevalence they cause considerable effect and are a cause for concern.

Oral disease measures have been used in epidemiology and clinical research since 1920's.These are known as indices and they measured the pathological process or damage to the tissues and body system. DMFT index is used for measuring tooth decay and several indices such as Gingival index by Loe and Silness index, Russels index and CPITN have been used to measure periodontal disease. Indices such as Simplified Oral Hygiene Index by Green and Vermillion measure the oral hygiene status .In recent years the limitation of using these indices alone has been recognized. These indices tell us about the clinical picture and are extremely useful in assessing normative treatment needs. They however, fail to tell us how the disease affects the functioning and well being of the individual. The concept of a healthy individual concept that evolved as a consequence of the WHO definition of health in 1948 involves all dimensions, physical, mental and social well being and not merely absence of disease. The need for going

beyond a 'disease' paradigm and understanding the consequence of disease on the individual's quality of life became increasingly important. As a result of this change from a strictly biomedical model various factors that are deleterious to health and health promotion were investigated to understand disease in this broader perspective. Quality of life assessment is increasingly being regarded as an essential component for assessing outcomes of health care, including outcome for public health programs [6.] Oral health is defined as a standard of health of the oral tissues which enables individuals to eat, speak and socialize without active disease, discomfort or embarrassment and which contribute to general well being·The way the disease affects the people's lives is as relevant as measuring the prevalence or incidence of the disease [7]. In keeping with this paradigm shift, development of socio-dental indicators were advocated to capture non–clinical aspects of oral disease in 1976 [8]

1.2 Rationale

The central council of Health and Family Welfare drafted a National Oral Health Policy in the year 1995. Kerala is one of the pilot states for piloting the National Oral Health Program. However, the program has not been implemented so far. In Kerala traditionally the Government allocated considerable resources to health in the budget and this is an indication of the government's commitment to health provision [9] Kerala is the state with the highest literacy rate in India. Health achievements of Kerala are comparable to those of well-established market economies in the world [10]. Kerala has good overall health indicators and is well ahead of most Indian states [11]. In spite of all these commendable achievements in health, oral disease prevalence is high and oral health is a low priority area. In Thiruvananthapuram, India, 33% of adults in the age group of 35-40 years had deep periodontal pockets indicating severe periodontal disease. 86% of those in

the age group of 15-19 years had bleeding gums and calculus, 80% of the 25-29-years age group had shallow periodontal pockets indicating mild to moderate form of the disease [12]. Some prevalence studies based on epidemiological indices have been done in Kerala, but the consequences of oral disorders on the well being have not been explored. Effect of oral health on the individual's life as proposed by this study could provide about the oral disease burden from the community perspective. In this context it was decided to explore the effect of oral disorders in this population. Its therefore important to understand the perceptions, attitudes, practices about oral health and consequences of oral disorders as perceived by the people This study provides valuable insights into the impact of oral health, the daily activities that are affected by these oral disorders and the factors influencing the impact of oral disorders and the needs as perceived by the subjects. This measurement of consequences of oral diseases is important for a better scientific understanding of the implications of oral disorders. This can contribute to rational decision making with regard to oral health goals, setting priorities, oral healthcare planning, allocating healthcare resources.

Chapter 2

Literature review

2.1 Oral Health Measures

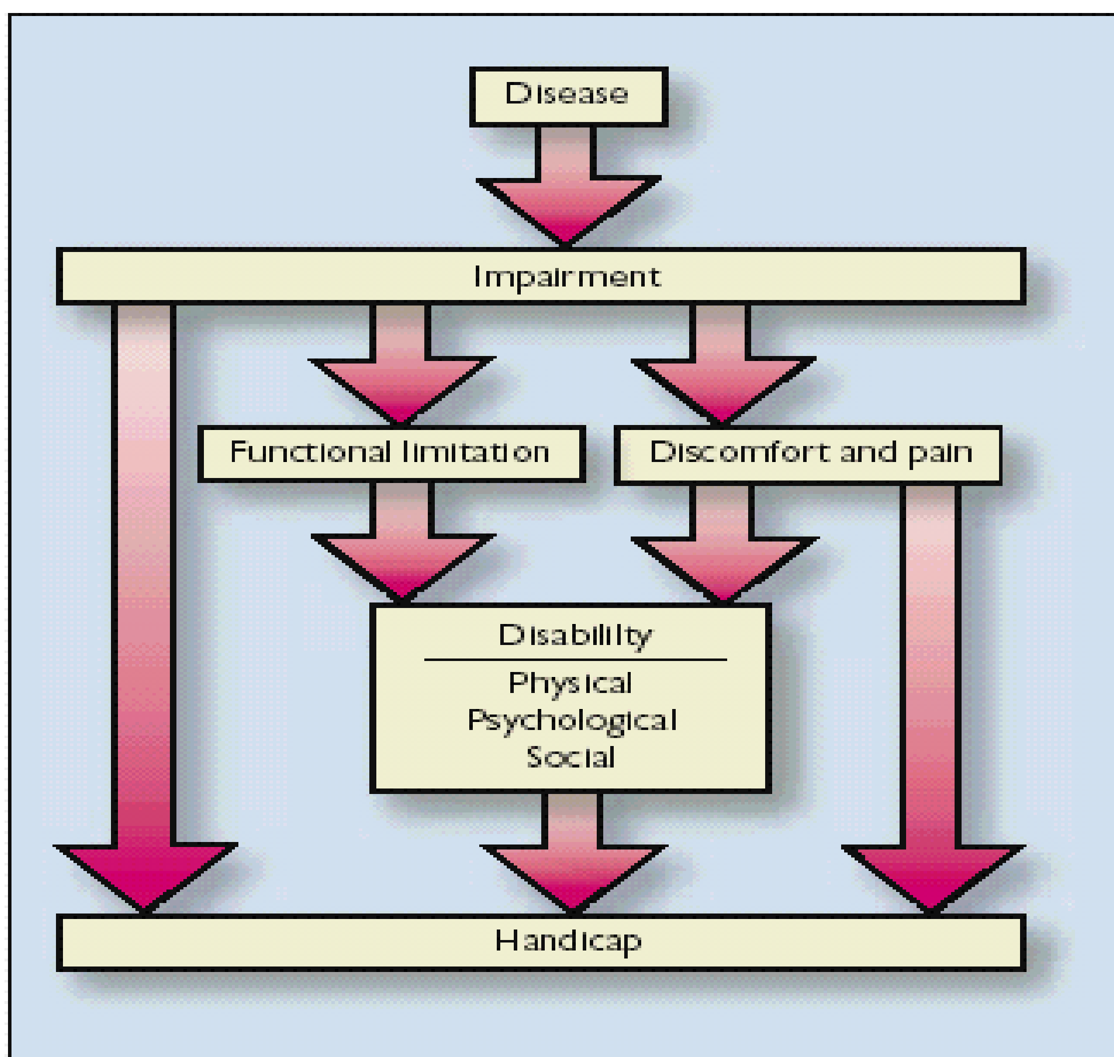
The International Classification of Impairment, Disability and Handicap (ICIDH, WHO 1980) brought forth a revolution in conceptual basis and empirical methods for evaluating oral health. Locker in 1988 applied the ICIDH framework and developed a model for oral health [13] Locker's Model postulates that disease impairs and limit function at the level of organs (See Fig 2.1). In turn, the individual may die or be disabled and or may be disadvantaged in society. Locker’s framework for measuring oral health went beyond the clinical parameters and pathological classifications The conceptual framework for measuring oral health status described by Locker, is based on WHO classification of impairment, disability and handicap and attempts to capture all possible functional and psychosocial outcomes of oral disorders [13]. He included certain feeling states like pain, psychological discomfort, and also subcategories of disability – physical, psychological, and social disabilities. Later these concepts were also included in International Classification of Function (ICF). Seven body functions related to oral cavity are mentioned in the ICF classification WHO 2001. The mouth and face are involved directly in six forms of activities and participations [3].

The following are the definitions of impairment, disability, and handicap and are based on the works of Nagi, World Health Organization, Locker and Pope and Tarlov [2,13,14,15].

- **Impairment** is loss or abnormality of mental, physical or biochemical function either present at birth or arising out of disease or injury such as edentulousness (absence of teeth), periodontium loss (loss of structures supporting tooth) or malocclusion.
- **Functional Limitation** is restriction in function customarily expected of the body or its component organ or system, such as limitation of jaw mobility.
- **Discomfort** involves non-observable feeling states, which can be experienced even in the absence of an underlying clinical condition.
- **Disability** is any limitation in or lack of ability to carry out socially defined tasks and roles that individuals generally expect to be able to do.
- **Handicap** is concerned with broader social effects and is defined as the disadvantage experienced by impaired and disabled people because they do not or cannot conform to the expectations of society.

Following these theoretical developments across the world, various authors have developed oral health status measurements. These measures try to capture the influence of oral health on function or psychosocial well being [13,16]. They measure the extent to which oral conditions disrupt normal role functioning [17]. 0ral Health Quality of life instruments fulfill different uses such as increasing our understanding of oral health by adding a subjective component to it and demonstrating that oral disorders have significant social, psychological and economic consequences on the quality of life of individuals. A patient based assessment of health status is essential for the measurement of health, as it is markedly different from that of the health professional [13].

Fig NO 2.1 Slade's Formulation Of Lockers conceptual Model of Oral Health



CourtesyBDJVol190, No3, Feb10, 2001

Table 2.1 Questionnaires measuring Subjective Oral Health Status

Name of measure	Author	Dimensions	No of questions
Sociodental Scale	Cushing etal 1986	Chewing, talking, smiling laughing, pain, appearance	14
RAND Dental Health Index	Dolan et al 1991	Pain, worry, conversation	3
General Oral Health Assessment Index (GOHAI)	Atchison & Dolan 1990	Chewing, eating, social contacts, appearance, pain, worry, self consciousness	12
Dental Impact Profile	Struass and Hunt 1993	Appearance, eating, speech, confidence, happiness, social life, relationships	25
Oral Health Impact Profile	Slade and Spencer 1994	Function, pain, physical disability, psychological disability, handicap	49
Subjective Oral Health Status	Locker and Miller 1994	Chewing, speaking, symptoms, eating, communication, social relations	42
Oral Health Quality of Life Inventory	Cornell et al 1997	Oral health, nutrition, self rated oral health, overall quality of life	56
Dental Impact on Daily Living	Lea& Sheiham 1996	Comfort, appearance, pain, daily activities, eating	36
Oral Health – Related Quality of Life	Kressin et al 1996	Daily activities, social activities, conversation	3
Oral Impacts on Daily Performances	Adulyanon etal 1996	Performance in eating, appearance, speech, oral hygiene, sleeping, appearance, emotion	9
UK Oral Health Related Quality of Life	Mc Grath and Bedi 2001	Eating, appearance, speech, breath odor, social life, romantic relationship, confidence, sleep, mood	16

There are several oral health measures that are developed across by various researchers namely, Social Impacts of Dental Diseases, Geriatric Oral Health Assessment Index (GOHAI), Dental Impact Profile (DIP), Subjective Oral Health Status Indicators (SOHSI), UK Oral Health related Quality of Life, Dental Impact on Daily Living (DIDL), and Oral Impacts on daily Performances (OIDP) [2,3,16]. Various Oral health measures and their dimensions are given in the Table 2.1.

2.2 Oral Health Impact Profile (OHIP)

OHIP is based on a model of oral health adapted for dentistry by Locker from World Health Organization for general Health. OHIP measure is a formal and standardized way of inquiring into the dental health of a person.

The 49 questions in the OHIP are based on seven conceptually formulated dimensions from Lockers theoretical model of Oral Health [18]. The seven dimensions are functional limitation, Physical Pain, Psychological Discomfort, Physical Disability, Psychological Disability, Social Disability, and Handicap. (18). OHIP aims to capture adverse outcomes of oral disorders [18].

The 49 unique questions in the OHIP describing the consequences of oral disorders that were derived from 535 statements obtained in interviews with 64 dental patients in Adelaide Austaralia[18, 19]. This is also considered to be one of the major advantages of this instrument as it increases the possibility of measuring those social consequences considered more important by patients and hence, it is therefore considered to be the most sophisticated measure of oral Health [16, 21]. Oral Health Impact Profile has a total score as well as seven subscale scores based on the seven dimensions described earlier. Total OHIP scores are calculated by adding by the individual item scores. A simple impact method is also used to calculate scores. An impact is recorded if an item has scored above threshold value Simple Impact scores are calculated by counting the number of items that have scored above the threshold value.

Three hundred and twenty eight people used the Thurstone’s method of paired comparisons to assess the relative importance of statements within each of seven conceptual subscales to generate weights for these statements. Weights ranged from 0.747 to 2.555. Some variation was observed when weights were computed among subgroups. However, when the weighing procedure was repeated in Canada it was found that ranking

of OHIP items made by South Australians were broadly similar to rankings made by English speaking people in Ontario and French speaking people in Quebec[18, 22]. Reliability of the instrument was first done in Australia and subsequently; the instrument was used for various studies and has been translated and validated in many languages [18,22,23,24].

It has been suggested that the weighing of a measure consisting of more than forty items does not improve its performance [25]. It was found that the discriminate predictive and concurrent validity of OHIP was only moderately improved by weights as shown by studies using weights. It is found that they only increase the complexity of use [22,26,27]. Many researchers have questioned the contribution of weights to the performance of health status measures [25,28,29].

Weighted and un-weighted scores were highly correlated and were equally able to distinguish between patient subpopulations in the Nottingham Health Profile [29]. In studies using OHIP, similar observations were made by researchers [26,27].

The Oral Health Impact Profile offers a reliable and valid instrument for detailed measurement of the social impact of oral disorders, and has potential benefits for clinical decision-making and research [2,19,20]. The OHIP - 49 and subscale scores increased as the subject's perceived oral health status changed from healthy to unhealthy. Also, those who had a perceived dental treatment need had higher mean OHIP and subscale scores compared to those who did not[19, 20].

A short form containing 14 questions was derived from the long form[20]. The soundness and number of teeth present were markedly related to experiencing an OHIP 14 problem. The short form was used in the UK Adult Dental Survey of 1998. Those who reported a problem had more decayed tooth and less number of teeth than those who did not [7].

2.3 Impact Of Oral Disorders

Measuring health related quality of life allows assessment of " the tradeoff between how long and how well people live" [30]. Oral disorders can a disturb self-image, self-esteem and overall well being. Orofacial pain and impairment such as tooth loss, limits food choices and pleasures of eating, restricts social life and inhibits intimacy [31].

Over half (51%) of dentate adults in UK Dental Survey 1998 reported that an oral problem of some sort had affected them occasionally or more frequently in the 12 months preceding the survey [7, 32]. In a study among adults aged 18 and older in North York, 53.7% reported having one or more other oral symptoms [33]. 51% reported to be affected on at least one daily performance by oral problems in a study among students aged 19-45 years old in the University of Dar es Salaam, Tanzania in1999 [35]. More than 50 % of respondents among elderly in North Carolina study in1991 felt that teeth influenced appearance to others, facial appearance to self, eating in general, enjoyment of eating, chewing, biting and comfort. 38% thought that teeth influenced general health [36]. Using a short form of the OHIP 88.2% prevalence of impacts was observed in Dental Care Facility based on a study in UK [27]. 62% of students attending secondary schools in Uganda experienced at least one impact in preceding six months in a study using the Oral Impacts on Daily Performance indicator [37]. In a UK study among adults aged 16 and over, 75% believed that their oral health either enhanced or reduced their Quality of Life. Younger people reported that their oral health status reduced and enhanced Quality of Life more than older adults [38].

In a two-year follow up study in Florida it was noted that toothache and chewing difficulty were the strongest factors in causing oral disadvantage. 47% in the study experienced at least one oral disadvantage during the two-year period (1993-1994) in Florida[39]. Oral Health is related to well being and quality of life as measures along

functional, psychosocial and economic dimensions [31.] In a study that used clinical, functional, experiential, and psychosocial impact measures to document the oral health, status and burden of oral disorders in a population of adults aged 50 years, it was 30.8% that were dissatisfied with some aspect of their oral health status [36].

2.3.1 Functional Limitation

Most studies have reported that limitation of function is one of the most frequently reported consequences of oral disorders among community dwelling South Australians aged 60 and above in 1991-92. 6% of those who had one or more teeth missing reported that they experienced discomfort while eating [3]. In subjectively reported oral health status of an adult population aged 18 years in York, it was found that on all measures except ability to chew, younger subjects were as likely to be compromised by oral conditions as older subjects[33]. 13.2% reported inability to chew one or more of indicator food and 9.9% had difficulty in speaking due to oral problems. 24.4% reported bad breath, 21.9% had unpleasant taste in the study among adults in North York [33]. The largest percentage of 41 % was reported for functional limitation in a 2-year study in Florida [390]. In a study among adults aged 18-45 years in France using geriatric Oral Health assessment index in 2000, 38% had problems chewing foods such as firm meat or apples, 42.8% had discomfort while eating [40]. Many studies have reported that these functional limitations are linked to a poor diet which is low in nutrition and fiber content [31]. Under nutrition was observed in 50% of geriatric residents in a US long-term care facility and in many cases it was linked to eating and swallowing [41]. In a study that used adults aged 50 years it was found that 24.1 % were edentulous, 30.5% were unable to chew one or more foods [36].

2.3.2 Physical Pain

Sixteenth century French surgeon Ambroise Pare remarked that toothache was the greatest and most eternal of all pains, the fiery torture of the damned in hell [31]. The UK

1998 survey reports that in 40% of dentate adults the most frequently experienced problem during 12 months was oral pain and 3% had experienced pain very often during this period [7,32.] In subjectively reported Oral health status in a community study one third of subjects reported having one or more of nine oral pain symptoms in four weeks preceding the study, toothache was reported by5.4% and sensitivity by 20.8% [33]. In a study among subjects aged 50 and over 37.2% reported oral or facial pain in the previous four weeks and 67.5% experienced one or more other oral symptoms [42]. 735 of the subjects reported that they had sensitivity in their teeth and 46% took medications to relieve oral pain in past three months in a study conducted in France in 2000 [40]. 36 % reported toothache in past one year in a study among Brazilian population using Oral Health quality of life instrument in1999 [43].

2.3.3 Psychological Discomfort

The second most frequently experienced problems reported in UK 1998 Adult dental survey stemming from oral conditions were psychological in nature – self-consciousness, feeling tense, difficulty relaxing or embarrassment [7]. 8% of dentate adults reported being severely affected by their oral health [7] in a study to determine whether the British public perceived oral health is important to quality of life (QOL). 75% perceived that their oral health was important to their quality of life, overall oral health's impact on physical aspects were more frequently cited as important to life quality than social or psychological [38]. In a study among persons 50 years and above 24% reported being self conscious about their appearance at least occasionally because of problems with their mouth or dentures, 22% reported feeling uncomfortable at least occasionally [31]. In a Canadian study that used of adults aged 50 years, 18.7% worried a great deal about their oral health and 30.8% were dissatisfied with some aspect of their oral health status, 50.5% reported that they were worried about the health and 40.6% about the appearance

of teeth and gums [42]. 13 to 15% of elderly in a North Carolina study in1991 felt that their facial appearance was negatively affected by teeth.[34.] In a study in France in 2000, 52.8% were worried or concerned about their oral health, 42.9% were nervous or self-conscious because of oral problems in a study conducted [40].

2.3.4 Psychological Disability

Sleeping problems associated with oral conditions are related to pain. In a survey of elderly Floridians it was found that 3% of population reported trouble sleeping because of pain or discomfort from dental problems [30]. In a Canadian study it was reported that 14.2% of those with acute or chronic orofacial pain experienced sleep disturbances related to pain [30]. 13.4% reported that they had trouble sleeping in a study carried out in North York [32]. In a study done in Brazil in the year 1999 15.5% reported that oral health had very bad to bad effect on sleeping [42].

2.3.5 Physical Disability

In a study among persons 50 years and above, 13% reported that they avoided smiling [30].Many edentulous persons alter their food selection because they have difficulty chewing some foods [31]. In a North Carolina study in 1991, 10.45 of blacks reported that they avoided smiling and 10.2% had difficulty in brushing their teeth [44].

2.3.6 Social Disability

Teeth play an important role in communication, personality and self-esteem of an individual. Disorders and diseases that alter the normal pattern damages the self image and as a consequence interfere or restrict the social life of an individual. Among persons 18 years old in New York Ontario, 7% reported limiting conversation with others because of oral problems. 19% reported being embarrassed at least sometimes by the appearance or health of their teeth or mouth [33].

In a study of the burden of oral disorders in a population of adults aged 50 years it was found that; One third had problems eating, communicating and with-social interaction [42].

In the study in France in 2000,15.2% limited social contacts because of problems with teeth or dentures, 22.4%felt uncomfortable to eat in front of others [40].

2.3.7 Handicap

United States National Health Survey (NHS) measures impacts of acute conditions in terms of disability days. When a person restricts or limits his or her activities due to his illness it is a reflection of the attitude towards the illness based on social and cultural Knowledge and beliefs [45]. Annual National Health interview survey shows that there were 3.7 days of restricted activity per 100 employed persons 18 years and older in 1996 in US associated with an acute dental condition defined as a dental symptom or treatment visit.[31]. In 1981, from NHS survey in 4.87 US million acute dental conditions caused 17.7 million days of restricted activity, 6.73 million days of bed disability and 7.05 million days of work Loss [45]. US data also report that there were 1.8 million disability days or 2.7 per full time housewife for both acute and chronic conditions [45]. 25% of participants in an US study reported some time loss from work in last year. Employees of those who reported an episode of oral problem reported an average of 6.2-hour loss [46]. Subjects who have no regular dentist and those who perceived poor oral health were more than 3 times more likely to report work loss than those who have regular dentist and those who have preventive services [46.] Three days pain per person years due to dental problems were reported from a study in Britain [47].

2.4 Factors Affecting Subjective Assessment Of Oral Health Related Quality Of Life

There are various factors, which affect the subjective assessment of oral health. Oral health status is the most important determinant of subjective assessment as seen from various studies. Other perceptions about oral health, dental care seeking behavior; dietary patterns, oral hygiene, general Health and socio-demographic factors affect Oral Health and hence may also play a role Oral health related quality of life.

2.4.1 Oral Health Status

Oral health of the patient is the important factor, which affects his on her evaluation of the impact of oral disease on their quality of life. Higher levels of scores in socio-dental indicators (negative effects or disadvantages) are seen among those people with poorer oral health status. Higher OHIP scores were reported for those with more missing teeth, more retained root fragments, more untreated decay, deeper periodontal pockets and more periodontal recession [18,44]. The number of impacts (number of items scored above threshold level) and total OHIP score were found to be significantly different between those with and without oral disease [27]. Smoking and diabetes have been identified as risk factors for periodontal disease [48]. In a study done in Brazil, it was reported that those who had a problems in previous year were more likely to report adverse effects [44]. A comparison of OHIP responses among older adults in South Australia, Ontario and North Carolina, tooth loss was significantly associated with higher scores [44].

2.4.2 Perceptions About Oral Health

Many studies have used the self-rated oral health as an indicator of the perceptions of oral disease. In a national UK study it was found that there was a significant association between perception of how oral health impacts on Quality of life and dental attendance pattern [49]. Those rating their oral Health as fair or poor were more likely to

report limitations in function, pain, and other symptoms [33]. It was found that perceptions about dental Health might differ greatly from professional judgments of need. Only 42% of the elderly people judged as needing treatment thought that they required care and only 19% had actually tried to obtain care [33]. In the French study using GOHAI functional and psychosocial self-evaluation of oral health was highly associated with actual clinical status [40]. Self-perceived need for dental treatment was also reported to be significantly associated with OHIP scores [19].

2.4.3 Dental Care Seeking Patterns And Attitudes

Dental care seeking behavior plays a major role in determining the oral health status. Those who have regular checkups and treatments have better oral health. Extensive and severe periodontitis was much more prevalent in minorities and in people with less than a high school education, and among those who had seen a dentist infrequently [48]. Epidemiological studies that have used the OHIP have found that infrequent or problem motivated dental visits are related with increased levels of impact on well being [7, 18]. In many developing countries access to oral health is limited. Teeth are often left untreated or are extracted because of pain or discomfort [1].

2.4.4 Dietary Patterns

Dietary patterns have major role in the initiation and progress of caries tooth. The frequency and consistency of consumption of carbohydrates in the form of refined sugars have been implicated in dental decay. Snacking in between meals and the avoidance of sugar containing foods can be used as an indicator of preventive behavior with respect to oral disease [2, 31]. Good dietary patterns such as reduced intake of sugary and sticky food, and decreased frequency of consumption of such food significantly reduces caries activity, and therefore such individuals will have less number of caries tooth. OHIP

scores are affected by decayed tooth surfaces. Those with better dietary patterns may have less number of impacts as they may have less caries tooth.

2.4.5 Oral Hygiene

Oral hygiene is another important determinant of oral health. Those with poor oral hygiene will have poor periodontal status. Regular flossing and use of other oral hygiene aids like mouthwashes, interdentally cleaning aids can help to maintain good oral hygiene. Regular tooth brushing with fluoridated toothpaste can prevent dental caries. Good oral hygiene can prevent gingival and periodontal diseases [2,31]. This in turn would play a role in determining the OHIP score.

2.4.6 General Health

Self-perceptions can be conditioned by coexistence of other chronic and debilitating problems. The severity of one problem can be decreased due to various different concerns at a particular time [26]. Number of reported medical conditions was a significant factor associated with OHIP scores [19].

2.4.7 Socio–demographic

Higher OHIP scores were reported among socially and economically disadvantaged groups[18, 40,44]. North Carolina Blacks had highest prevalence of social impact for 41 of the OHIP items [44]. Income was consistently associated with all health status measures examined, demonstrating the scope of inequalities in oral health. In a study among above 50 years age group it was found that low-income groups had higher scores on a psychosocial impact scale after controlling for clinical, functional and experiential oral health indicators [31]. In the York study, younger individuals were as likely to be affected by their oral conditions as the older individuals [33].

Women perceived oral health as having a greater impact than men on their quality of life in general, having a greater negative impact and a greater positive impact.

Specifically women perceived oral health as causing them more pain, embarrassment, and being detrimental to their finances compared to men [38.] Gender differences were small and non significant in the impact subscale in the York study among adults, however, women were more reported to be more likely than men to report one or more problems [33]. Women also more frequently perceived oral health as enhancing their life quality, their moods, their appearance, and their general well being than men.[38, 50]. Women were also reported to be more likely to report oral and facial pain symptoms [51].

Chapter 3

Objectives and Research Methodology

3.1 Overall Objective

To find out how oral health status, knowledge, attitudes and practices are with regard to oral health, socio-demographic factors and general health that affect the Oral Health related Quality of Life.

3.1.1 Specific Objectives

- To assess the psychosocial and functional implications of oral disorders.
- To explore the ways in which socio-demographic factors, oral health problems, and self perceived needs of patients influence Oral Health related Quality of life.
- To study the knowledge, attitude and practices of patients with respect to oral health and to explore linkages with Oral Health related Quality of life.

3.2 Methodology

3.2.1 Study Design

A cross sectional study of impact of oral health on perceived well being.

3.2.2 Study Location

The study was conducted in dental care facilities in Thiruvananthapuram city. Three types of facilities were chosen to get a cross section of patients from varied background -Government Dental College, Thiruvananthapuram, Government General Hospital, and Dental Department, in Cosmopolitan Hospital

Dental College, Thiruvananthapuram is a premier teaching institution in Kerala. It has all specialty departments and offers most specialty treatments. Kerala has three government dental colleges and Dental College, Thiruvananthapuram, is the oldest instititution. The other two are in Kozhikode and Kottayam. The dental college is located

inside the Medical College campus at the entrance to the campus and was part of the Medical College till recently. However, currently it is an autonomous institution under the Directorate of Medical Education. The study was carried out in the Outpatient Clinic. Consent was obtained from the Principal to carry out the study. The Department of the Oral Medicine and Radiology runs the Outpatient clinic. New patients are registered and preliminary examination is carried out in the Outpatient Clinic. Diagnostic test and X-rays are done if indicated. Once a preliminary diagnosis is made, the patient is referred to the respective departments as indicated by the clinical treatment needs. The Department of the Oral Medicine and Radiology also does screening for oral cancer and pre cancerous lesions. It is also a referral unit where cases with oral lesions are referred to, by private dentists and from State Health Services. Patients in and around Thiruvananthapuram district as well as those from the neighboring district attend the Outpatient Clinic. Kollam District does not have a dental specialty clinic so most of the patients, who utilize the government facility in Kollam District has to come to Thiruvananthapuram for specialty treatment other than the ones offered by the Kollam Distict Hospital. The Oral and Maxillofacial unit at the Thiruvananthapuram Dental College is the only one of its stature in South Kerala.

The Dental Department at the General Hospital has a civil surgeon and an assistant surgeon. The civil Surgeon is a Prosthodontist and the assistant surgeon is qualified dentist. In addition there are residents undergoing internship. The clinic has four dental units. Patients attend the clinic mainly from the outskirts and most of the cases require extractions. Consent to carry out the study was obtained from the District Medical Officer. The Dental department consists of an Outpatient Clinic with four dental chairs and small inner dental Lab.

In both these facilities patients have to pay a very low nominal fee to use the services. The treatment is free for those below poverty line.

The Dental Department at the Cosmopolitan Hospital, Thiruvananthapuram has an Oral and Maxillofacial surgeon in charge and several consultants and a junior Dental Officer. This unit offers all specialty treatment. They also carry out orthognathic surgeries and treat maxillofacial trauma cases. Consent to carry out the study was obtained from the Chief Dental Surgeon.

3.2.3 Study Population

The study was conducted among adults 18 years and older who attended the dental care facilities during the study period. Consecutive patients who consented to participate were included. The purpose of the study was explained to the participants and their written consent was taken.

Trauma cases and mentally challenged were not included. Patients attending Dental Outpatient from State penitentiary were also excluded for security reasons.

A sample size of at least 300 was considered appropriate based on estimated prevalence of 80%, as reported by similar studies carried out in clinical settings.

3.2.4 Study Period

The study was conducted from January 1, 2004 to March 31, 2004.

3.2.5 Research Tools

A Questionnaire, semi structured interview schedule, and Clinical Examination were used to collect information (see Appendix1.3 & 1.4). The Questionnaire consisted of two parts. The first part consisted of socio-demographic details. The second part was the Oral Health Impact Profile to assess the psychosocial, and functional consequences of oral disorders. (See Appendix 1.3). The socio-demographic details and Oral Health Impact Profile was self-administrable; however, it had to be administered to subjects with

lower literary status. The interview was to collect information about perceptions about oral health status, dental care seeking patterns, dietary habits, oral hygiene habits, and general health to explore its linkages to the impact of oral disorders.

3.2.5 a) Oral Health Impact Profile (OHIP)

The Oral Health impact profile was used with the permission from the Mapi Research Institute, Lyon, France with whom the instrument is registered and from Author of Oral Health impact Profile. It consists of 49 Questions on seven functional dimensions –Functional Limitations, Physical Pain, Psychological discomfort, Physical disability, psychological Disability, Social Disability and Handicap. The instrument Oral Health Impact Profile was translated into the regional language of Kerala, Malayalam, by a professional translator. A dental professional familiar with both languages also independently translated it. The two versions were evaluated and necessary modifications made as some of the terminologies failed to convey the exact clinical conditions in Malayalam when literary translations were used. (See Appendix1.2 for English version & & 1.4 for Malayalam version).

The questions were about the oral problems and difficulties in past one year. The answers were on a Likert scale, with options of Very Often, Fairly Often, Occasionally, Hardly Ever, Never and Don't Know. Participants were instructed to circle the appropriate answer to each question. Oral Health Impact Profile inquires into seven subscales and these are scored on a Likert Scale (o=Never, 1= Hardly Ever, 2= Occasionally, 3=Fairly Often, 4= Very Often) .The responses that were circled as Don't Know were later replaced by the mean value of all valid responses for analysis. Cases with more than 9 entries in the missing or Don't Know category were discarded.

Due to the differences in the number of questions those with partial dentures or complete dentures and those with natural teeth alone was analyzed separately. There were three additional denture related questions.

An impact was recorded as present if it was reported at the threshold of occasional or more frequently. This threshold was selected so that there are sufficient impacts to facilitate analysis. The number of impacts per person is also recorded at this level. This is the **Simple Count Method.** Recording an impact in any one of the items, indicate a perceived effect of oral disorder on well being by the individual.

An additive method was also used to calculate OHIP. This involves simply summing up individual item scores. This method takes into consideration the entire scale of observations unlike the simple method where only numbers of impacts above threshold are counted.

A weighted method was also used to calculate scores. For this, individual items were multiplied with weights available from original study. Weighted scores were added to give subscale scores. The weighted subscale scores were standardized (z scores). The weighed, standardized, subscale scores were then added to give the weighed standardized total OHIP score (See Appendix 1.1 for weights).

3.2.5 b) Interview

The semi structured interview schedule comprised of details about perceptions about oral health status, dental care seeking patterns, dietary habits, oral hygiene habits, general health and was carried out by the investigator with all the study participants. Individual's perception about the state of their oral health and presence of cavities in tooth was recorded. Frequency of dental visits, reasons for last dental visit, extraction in last year, felt but unmet needs and reasons for not seeking care were explored to identify the health seeking behavior of the participant were also explored. Information about

frequency and patterns of consumption of sugary food, avoidance of sugary food and oral hygiene habits were explored to identify risk behaviors for oral disease .The individuals self perception about his or her general health, perceived linkages between general health and dental health and vice versa was also included in the interview. (See Appendix1.3 for English version of interview schedule and Appendix1.4 for Malayalam Version).

3.2.5 c) Clinical examination

Clinical examination was done to assess the oral health status. Clinical assessment was done using the modified WHO Oral Heath assessment form 1997 (See Appendix 1.4). The number of missing teeth, un-replaced spaces, decayed coronal and root surfaces, retained roots, periodontal status, prosthetic status, dentofacial anomalies, need and any other relevant condition including temporomandibular dysfunction and oral mucosal disorders were recorded. The clinical examination was done on the dental chair. Explorer and mouth mirror were used to examine teeth.

Community Periodontal Index was used to assess the periodontal status. Community Periodontal Index Probe (CPI Probe) was used to assess the periodontal status. CPI probe has a 0.5 mm ball tip with a black ring between 3.5mm and 5.5mm and rings at 8.5mm and 11.5 mm from the ball tip. The mouth is divided into sextants defined by tooth numbers 18-14,13-23,24-28,38-34,33-43 and 44-48.Index teeth 17/16,11,26/27 in upper jaw and 47/46,31,36/37 are examined. The two molar teeth in each quadrant are paired for recording and if one is missing there is no replacement. If no index teeth or tooth is present, all the remaining teeth in that sextant are examined and all the remaining teeth in that sextant are examined and the highest score is recorded as the score for the sextant. The distal surfaces of third molars are not scored. The scoring codes are given in Table No 3.1.

Table 3.1 Community Periodontal Index (CPI Score)

0	Healthy
1	Bleeding observed, directly or by using a mouth mirror after probing
2	Calculus detected during probing, but all of the black band on the probe visible
3	Pocket 4-5mm(gingival margin within the black band on the probe
4	Pocket 6mm or more (Black band on the probe not visible)
X	Excluded sextant less than two teeth present
9	Not recorded

Information on loss of attachment was also collected from the same index teeth and the codes are as given in Table No 3.2.

Table 3.2 Loss of attachment scores

0	Loss of attachment0-3mm (Cementoenamel junction (CEJ) not visible
1	Loss of attachment 4-5mm(CEJ within black band)
2	Loss of attachment 6-8mm(CEJ between the upper limit of the black band and 8.5mm ring)
3	Loss of attachment 9-8mm(CEJ between 8.5mmm and 11.5mm rings)
4	Loss of attachment 12mmm or more (CEJ beyond the 11.5mm rings)
X	Excluded sextant (Less than two teeth)
9	Not recorded (CEJ neither visible nor detectable)

Prosthetic status (Denture) and Dentofacial anomalies ranging from cleft lip to minor irregularities were recorded. The need for immediate care, pain or infection and indicated treatment needs were also recorded.

3.2.6 Variables

Dependent Variable

Impact of Oral Disorders as given by the Oral Health Impact Profile Score.

Independent Variables

1. Oral Health status

   Missing tooth, un-replaced spaces, decayed coronal surfaces, decayed root surfaces, retained roots, periodontal score (CPITN), and maximum attachment loss, dentofacial anomalies, pain or infection, any other relevant findings.

2. Self-perceptions about oral health.

3 Dental care seeking patterns.

4 Dietary factors.

1) Dietary patterns – frequency and consumption of caries promoting food.

2) Knowledge of preventive dietary methods to prevent dental decay.

5.Oral hygiene and habits.

6 Self reported General Health.

7 Socio demographic.

Age, Sex, Location, Educational Status, Occupational Status

3.2.7 Data Collection

Data was collected during the months of January up to mid February from Dental College.

The Dental Outpatient Clinic starts at 8 am in the morning. The patients are referred to various departments after preliminary diagnosis. As the treatment is on a first come first serve basis, considerable difficulty was encountered while pilot testing, as patients were unwilling to spend time for the study. The Department of Oral and Maxillofacial surgery where extractions are done closes new registrations for extractions at 11.30 in the morning to meet with the excessive demand for extractions. The problem was solved after discussions with Head of Departments who kindly consented to give priority to patients who participated in the study. The interview and clinical examination was carried out in the inner clinic of the Oral Medicine and Radiology Department adjacent to the Outpatient Clinic. The room had a dental chair and sterilizing facilities. It also had facilities for administering the questionnaire and for carrying out the interview. There is a steady flow of trauma cases, which attend the Dental Outpatient Department.

However, these cases were eliminated due to difficulty in conducting the study protocol and also because of the possibility of exaggerated responses

In General Hospital, clinical examination was done in the dental chair of the clinic and the questionnaire and interview schedule were carried out in the dental lab due to limited facilities. In Cosmopolitan hospital, clinical examination was done in the dental chair and the questionnaire and interview carried out in a separate enclosure in the waiting area.

The required sample size for the study from these various locations were estimated based on outpatient statistics for the last six months and revised as the statistics for the study period became available to meet the required sample size.

3.2.8 Data Analysis

Data was entered in excel spreadsheet. Answers were coded and recorded as required. Calculations of subscale scores and weights were applied to the required scores in excel. Analysis was done using SPSS software. OHIP scores were not normally distributed and it was root transformed and standardized for running statistical test, which assumed a normal distribution. One-way ANOVA was used to compare more than two groups. Independent t test was used to compare two groups. Multiple Logistic regressions were done with dichotomized subscale scores as dependent variable. Linear regression method was used for final model building with total OHIP scores as dependent variable. Dummy variables were used wherever necessary.

Chapter 4

Results

4.1 Socio-demographic Characters

A total of 354 subjects participated in the study. Two cases were excluded as they had more than 9 items missing or in the 'Don't Know' category in the Oral Health Impact Profile. Three hundred and fifty two cases were taken for the study. 46.59% of the participants. There were 164(46.6%)males and 188(53.4%) females. The median age was 35.5 years. 72 %of participants had attended high school or had educational above that. 3.7% had never been to school. The median age of the participants was 35.5 years (range 18-71 years. 44.9%% of the subjects were unemployed of which 19.6% were unemployed males the rest were mainly housewives. (See Table no .4.1)

Table No 4.1 Socio-demographic characteristics

	Male	Female	Total
	164 (46.6)	188(53.4)	352
Age Group			
18-25	42(48.3)	45(51.7)	87(24.7)
26-35	35(39.3)	54(60.7)	89(25.3)
36-45	27(40)	43(61.4)	70(19.9)
46-55	28(54.9)	23(45.1)	51(14.5)
56-65	21(52.5)	19(47.5)	40 (11.4)
65 and above	11(73.3)	4(26.7)	15 (4.3)
Educational Status			
Nil	4(30.8)	9(69.2)	13(3.7)
1-4 Standard	16(37.2)	27(62.8)	43 (12.2)
5-8 Standard	17(40.5)	25(59.5)	42 (11.9)
8-10 Standard	70(45.8)	83(54.3)	153(43.5)
PDC/Diploma	31(63.3)	18(36.7)	49 (13.9)
Degree	13(44.8)	16(55.2)	29 (8.2)
PG./Professional	12(54.6)	10(45.5)	22 (6.3)
Occupation			
Unemployed	31(19.6)	127(80.4)	158(44.9)
Aged/Retired	22(66.7)	11(33.3)	33 (9.4)
Students	8(47.1)	9(52.9)	17 (4.8)
Casual workers	37(67.3)	18(32.7)	55 (15.6)
Self employed	40(87)	6(13)	46 (13.1)
Salaried	25959.5)	17940.5)	42(11.93)

Note. Figures in parentheses are percentages

4.2 Location

Of the total study participants 60.2% were from the Government Dental College. The number of male and female study subjects from the three locations are given in Table No 4.2.

Table No 4.2 Sampling from various Locations

Location	Male	Female	Total
Govt. Dental College,	106(50%)	106(50%)	212(60.2%)
General Hospital	41(38.3%)	66(61.7%)	107(30.4%)
Cosmopolitan Hospital	17(51.5%)	16(48.5%)	33(9.3%)
Total	**165(46.6%)**	**189(53.4%)**	**352(100%)**

4.3 Oral Health Impact Profile (OHIP)

Of the total 354 cases that were originally taken, there were 336 people with natural teeth alone, 14 with removable partial dentures and four with complete dentures. Two cases had to be eliminated from analysis as one had incomplete responses and the others had more than nine answers in the' Don't Know' category. For the subsequent analysis of OHIP scores 334 cases with natural teeth alone were taken. For the final analyses and model building those cases with natural teeth alone were used, as the numbers in the other groups were less.

The simple Count OHIP scores take on values between 0 and 49 (See Fig No 4.1). Using the occasional threshold 330 (98.8%) of the participants recorded at least one impact. 33.2% of participants reported more than 20 impacts. The number of impacts was similar for men and women. The mean number of impacts is 16.2, standard deviation of 9.86 and median score of 14.

Additive scores ranged from 0 to 155 and the median score was 48. The mean score was 53.7, standard deviation of 31.55 and median score of 48. The Simple OHIP count and the additive counts were not normally distributed. (See Fig No 4.2). Scores on

each of the items listed in the seven dimensions is important in understanding how the oral health problem affects the individual. To quantify this they are summarized in the Table No 4.3. The table gives the number and percentages of those reporting each of the individual items at and above the threshold. The percentages are also calculated for the cutoff level at very often to fairly often to facilitate comparison with other studies.

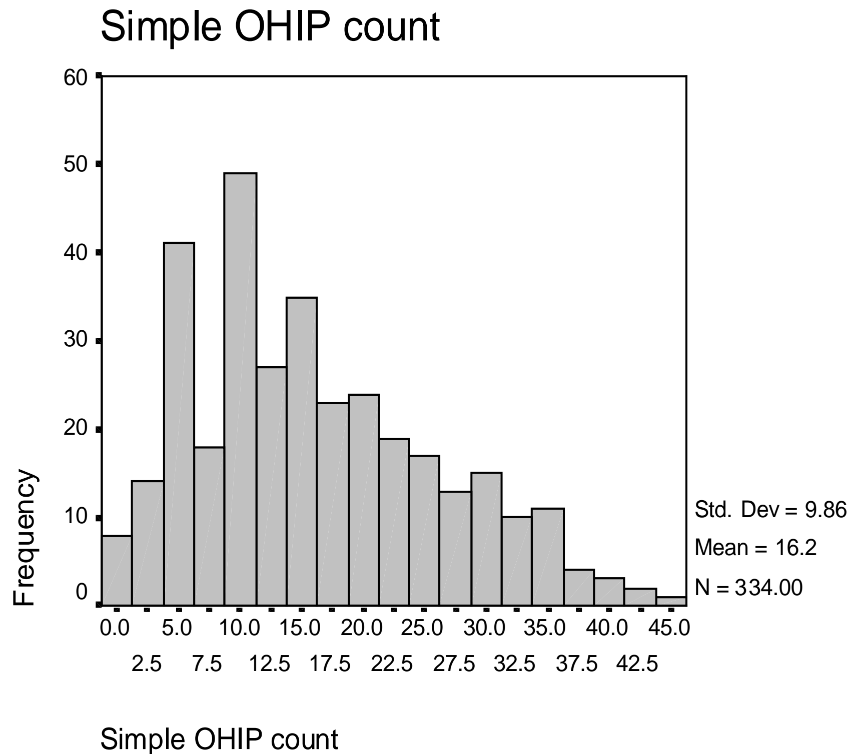


Fig 4.1

Table No 4.3 Percentage of people reporting social impact items in last one year

Social Impact Item N==334	**Very Often**	**Fairly Often**	**% Very & fairly Often**	**Occasionally**	**Impact**
Functional Limitation items					
Difficulty in chewing	25.1	17.96	43.1	22.2	65.13
Trouble pronouncing	5.4	3.9	8.8	23.05	15.9
Tooth doesn't look right	23.6	11	34.6	11.3	15.9
Appearance affected	18.1	7.6	25.7	6.3	32
Breath Stale	11.3	12.2	23.5	16.6	40.1
Taste worsened	7.9	5.3	13.2	9.4	22.6
Food catching	37.8	16.5	54.3	16.8	71.7
Digestion worsened	4.3	2.3	6.6	3.3	9.9

Table No 4. 3.Continued Percentage of people reporting social impact items in last year

Physical Pain Items	Very Often	Fairly Often	% Very & Fairly Often	Occasionally	Impact
Painful Aching	20.4	25.8	46.2	22.8	69
Sore jaw	5.2	11.3	16.5	15.3	31.8
Headaches	9.4	18.9	27	17.6	45.9
Sensitive teeth	30.8	15.4	46.2	21.5	67.7
Toothache	24.9	29.4	54.3	23.7	78
Painful gums	9.6	12.9	22.5	15	37.5
Uncomfortable to eat	17.3	13.7	31	13.4	44.4
Sore spots	7.4	9.9	17.3	16.4	33.7
Psychological Discomfort					
Worried	25.3	19	44.3	22.3	66.6
Self Conscious	17.7	11	28.7	13.1	28.7
Miserable	19.8	16.7	36.5	16.1	52.6
Uncomfortable with appearance	18.9	8.2	27.1	7.3	34.4
Tense	8.2	8.8	17	8.5	25.5
Physical Disability					
Speech unclear	5.3	5.6	10.9	9.7	20.6
Misunderstood	5.8	4.5	10.3	9	19.3
Less flavor	7.2	6.6	13.8	7.8	21.6
Unable to brush	15	11.9	26.9	21.4	48.3
Avoid eating some foods	25.8	9.4	35.2	17.9	53.2
Diet unsatisfactory	12.6	6.4	19	11.3	30.3
Avoid Smiling	12	7.2	19.2	8.1	27.3
Interrupt meals	8.2	10.3	18.5	16.9	35.4
Psychological Disability					
Sleep interrupted	10.2	10.8	21	18.5	39.5
Upset	6.9	8.1	15	8.8	23.8
Difficult to relax	10.1	13.8	23.9	21.2	45.1
Depressed	8	7.7	15.7	6.5	22.2
Concentration Affected	4.6	11.6	16.2	15	31.2
Embarrassed	8.3	8.6	16.9	11.7	28.6
Social Disability items					
Avoided going out	4.5	3.6	8.1	10.2	18.3
Less Tolerant	2.8	2.8	5.6	6.1	11.7
Trouble getting on	8.2	6.3	14.5	11.8	26.3
Irritable	5.4	6.3	11.7	13.3	25
Difficulty in doing jobs	6	11.7	17.7	19	36.7
Handicap					
General Health worse	5.8	8	13.8	12.3	26.1
Financial Loss	7.3	6.4	13.7	14.7	28.4
Unable to enjoy company	5.8	5.5	11.3	7.9	19.2
Life less satisfying	5.2	6.4	11.6	7.6	19.2
Unable to function totally	3.3	5.2	8.5	17.3	25.8
Unable to work to ones full capacity	7.2	8.1	15.3	18	33.3

4.4 OHIP Subscale - Functional, Physical and Psychosocial consequences of Oral Disorders

Subscale value for the seven functional dimensions were calculated separately. The subscale scores calculated using the additive method also showed similar trends for each subscale as in the Simple method of calculating impacts.

Subscale scores were calculated by both simple impact and additive method. The simple method recorded number of impacts in each subscale, gives an overview of the scores in each category (See Table No 4.4 a). The maximum possible impacts in each subscale are also given in the table. 95% confidence interval for the value is also given in the brackets. The maximum possible impacts in each category are also given in table.

Table No 4.4 a Simple Impact Subscale N=334

Subscale	Mean	Median	SD	Max possible value
Functional Limitation	2.89	3	1.73	8
Physical Pain	4.02	4	2.15	8
Psychological Discomfort	2.17	2	1.55	5
Physical Disability	2.47	2	2.14	8
Psychological Disability	1.84	1	1.86	8
Social Disability	1.48	1	1.39	5
Handicap	1.48	1	1.81	6

The additive method takes into account the entire range of observations .The additive subscale scores shows similar trend as the simple impact subscale score. The Table 4.4 b gives the Mean, Median, Standard Deviation, Minimum to Maximum values scored in each Subscale.

Table No 4.4 b Additive Subscale score N =334

Subscale	Mean	Median	SD	Min–Max Value	Max possible value
Functional Limitation	11.76	11.67	6.2	0-32	32
Physical Pain	12.74	12	6.9	0-32	32
Psychological Discomfort	7.24	6.21	5.37	0-20	20
Physical Disability	8.13	6	6.85	0-29	32
Psychological Disability	5.87	4	5.65	0-24	32
Social Disability	3.45	2	4.08	0-19	20
Handicap	4.51	2	5.33	0-22	24

Pie charts are used to illustrate the item wise contribution to each subscale scores. However, for the percentage and number of subjects reporting an impact refer Table No. 4.3.

Functional Limitation subscale had a 2.89 mean impact and standard deviation of 1.73. The maximum number of impacts possible was 8 if an impact was recorded for all of the eight items in this subscale. The mean additive functional subscale score was 11.76. The maximum possible score in the additive method was 32. The Fig 4.2 illustrates the item-wise contribution to the additive subscale score71.7% (items reported very often, fairly often to occasionally) reported that they had food catching in teeth.

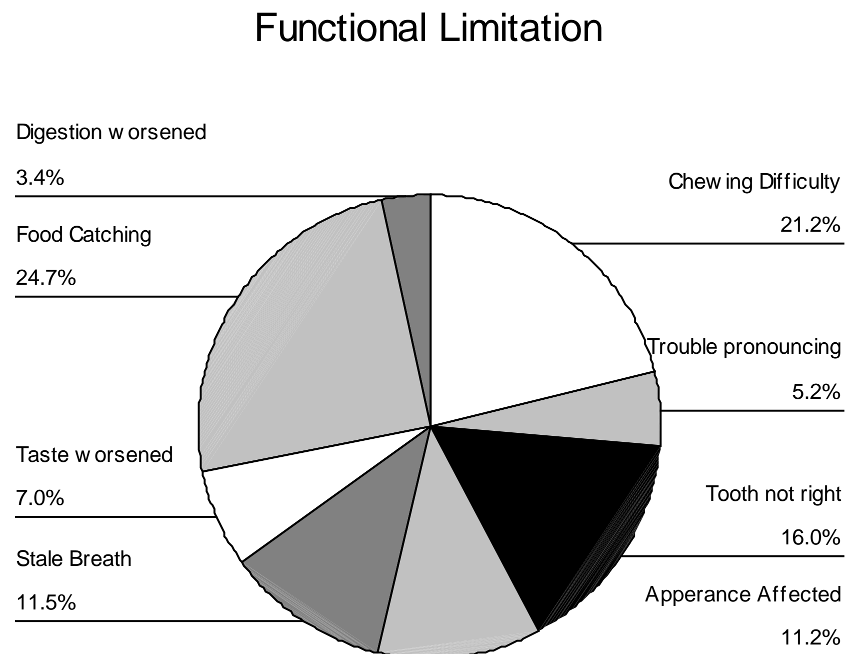


Fig 4.2

In the **physical pain subscale** mean number of impacts was 4.02. .78% recorded an impact for toothache. 67.7% reported sensitivity to heat and cold foods at or above threshold level. The mean number of impacts in this subscale was 4.02. In the additive score the mean subscale score of 12.74. The Fig 4.5 illustrates the item wise percentages to total subscale score.

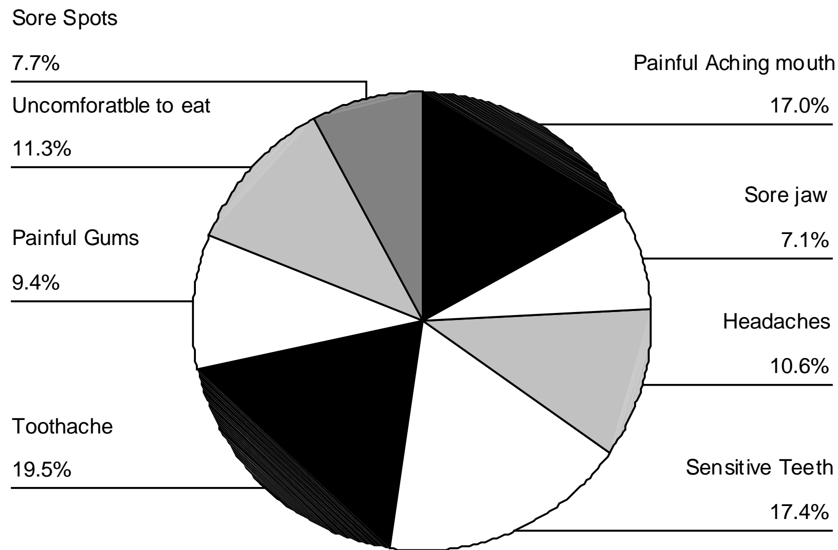


Fig 4.3

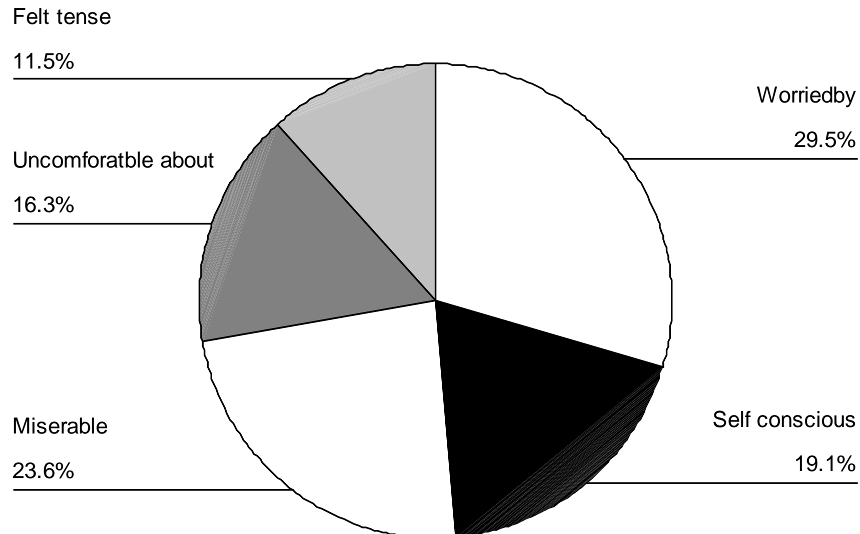


Fig 4.4

In the **psychological discomfort subscale**, 66.6% recorded an impact for being worried about dental problems, as 52.6% (Scored above threshold level) were miserable due to their dental. The mean number of impacts in psychological discomfort subscale is

2.17 (Max impact 5). The mean additive subscale score is 7.23(Max 20) Item wise percentages are illustrated in the Fig 4.4.

In the **physical disability subscale** mean number of impacts was 2.47 .The mean additive score was 8.12. 53.1% reported that they avoided eating some foods very often to occasionally because of problem with teeth.48.3% reported that they had difficulty in brushing their teeth due to problems with teeth. Item wise percentages to this additive subscale are shown in Fig 4.5.

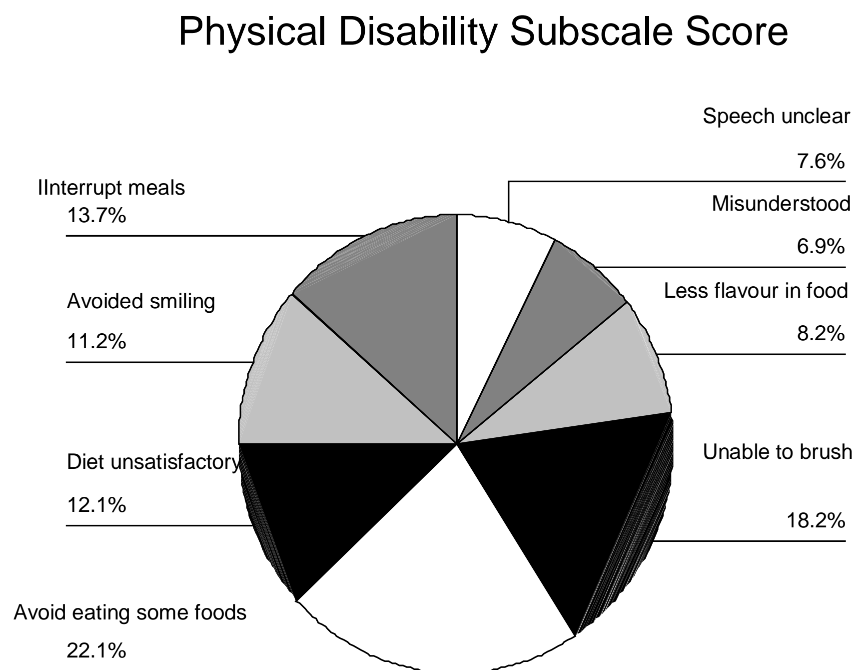


Fig 4.5

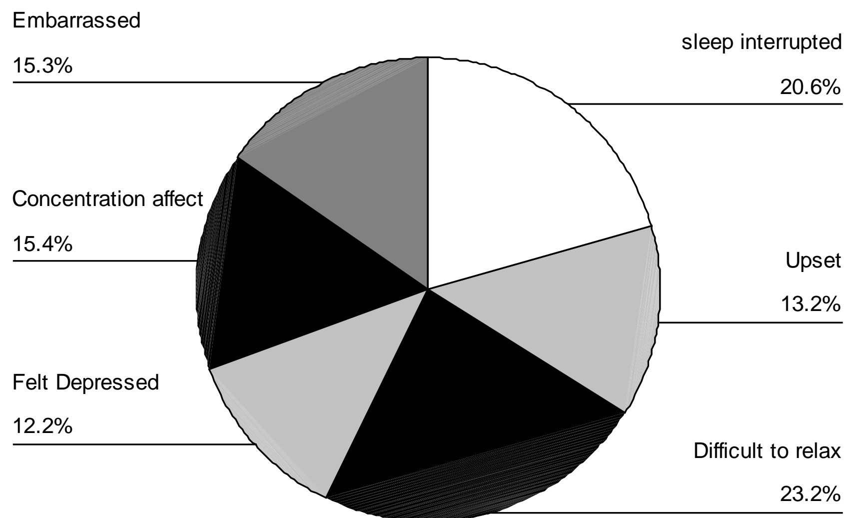


Fig 4.6

In the **psychological disability subscale** mean impact recorded was 1.84. The mean additive subscale score was 5.87. 45.1% reported that they found it difficult to relax; because of tooth problems of 39.5% recorded an impact for interrupted sleep due to dental problems. The item wise distribution of the additive psychological disability score is illustrated in the Fig 4.6.

In the **Social Disability subscale** the mean number of impacts was1.16. The mean additive subscale score was 3.45. 36.7% had difficulty in doing usual jobs and 26.3% reported that they had trouble getting along with others. The Fig 4.7 illustrates the item-wise contribution to the subscale score.

In **Handicap Subscale** mean number of impacts was1.48 and mean additive subscale score was 4.51. 33.3% reported that they were unable to work to their full capacity. For item wise distribution refer to Fig No 4.8.

Social Disability

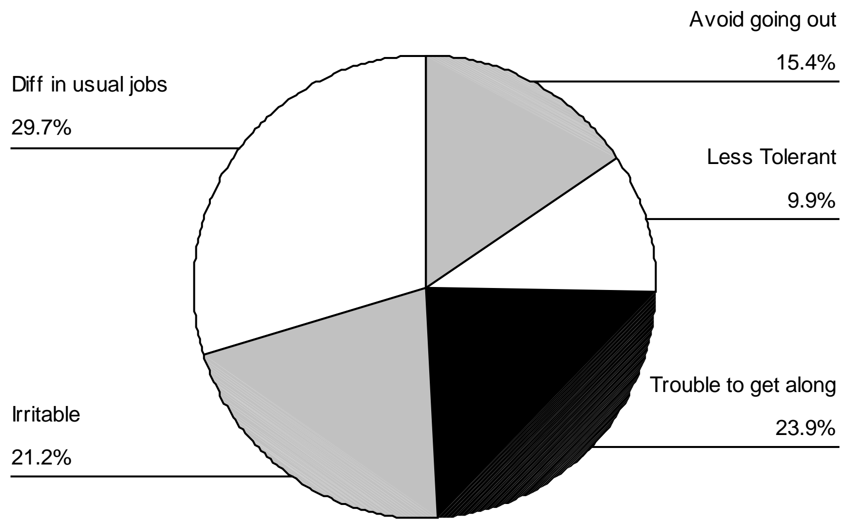


Fig 4.7

Handicap

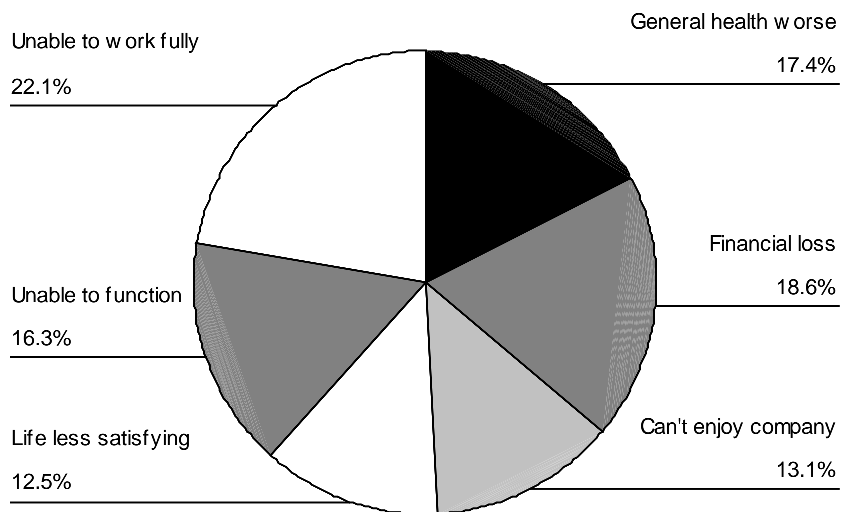


Fig 4.8

4.5 Loss Of Working Days Due To Oral Health Problem

To find out how Oral Disorders affected the functioning of the individual in affecting the person's ability to work data on number of working days lost in past one year was collected. 191(54.3%) of the total cases came in the category of Unemployed, aged or Retired. Of the 161 who were employed or students 38.5% reported workday loss. (See Table No 4.5).

Table No 4. 5 Loss of working days for the employed and students in last one year N=161

No loss	99(61.5)
1-3 days	23(14.3)
3 days –1 week	14(8.7)
More than 1 week	12(7.5)
More than 1 month	13(8.1)

Factors affecting OHIP Scores

4.6 Clinical Examination

The details of clinical examination are given in the table below. Detailed clinical examination was done for only the dentate cases. Total number of dentate cases is 350. Four of the participants were totally edentulous, 235 has one or more tooth missing (67.1%). More than half of the study participants (57.7%) had a periodontal depth of more than 4-5 mm as indicated by a scores 3 and above of CPI score which indicates moderate to severe periodontal disease.

Table No 4.6 Details of clinical examination

Clinical variable	Number (Percentages)	Mean	Median	S D	Range (Mini-Maxi)
Missing teeth	233(67%)	3.54	2	2.00	(0-31)
Un replaced spaces	218(62.64%)	1.52	1	1.66	(0-8)
Decayed Coronal surfaces	247(69.25)	1.99	2.00	1.98	(0-9)
Decayed root surfaces	91(26.14%)	.59	.00	1.44	(0-11)
Retained Roots	69(19.82)	.59	.00	1.33	(0-11)
CPI Score more than 1	311(89.37%)	2.47	3	1.13	(0-5)
Attachment loss score more than 1	141(40.51%)	.86	.00	1.29	0-4

Of those who participated in the study, 142 (40.80%) had some form of dentofacial anomaly ranging from simple crowding to severe dentofacial malformations and cleft palate. Two hundred and twenty five (64.66%) had pain or infection in their oral cavity and needed pain management and infection control.

4.7 Self perceptions About Oral Health Status

21% rated their Oral Health as good, 39.1% as average, and 39.9% as bad.67.2% reported that they had cavities in their teeth. Of those with some natural teeth 67.24 % reported that they had cavities in teeth. (See Table No 4.7).

Table No 4.7 Self-reported Oral Health

Self Rating of Oral Health	Cavity absent	Cavity present	Total
Good	26	47	73
Average	43	93	136
Bad	45	94	139
	114	234	348

4.8 Dental Care Seeking Patterns

Routine dental care is not a practice among the participants. Almost all of the dental visits made by the participants were problem motivated. 86% of the participants (304) said that they usually visited the dental practioner only if they had pain or other problem. 47 (13.3%) had never visited a dental practioner. Among the participants in the study, 61.4% of subjects said that the reason for last dental visit was pain. One fourth of participants needed other treatment like filling, treatment of gum problem or orthodontic treatment.

Only 5(1.4%) reported that they had checkups regularly. (See Table 4.8). 46% (164) reported that they had visited dentist in last one year. Of those who visited dentist in last one year 75.2% reported pain as the reason for the visit. The frequency of dental visits of the subjects is summarized in Fig 4.9.

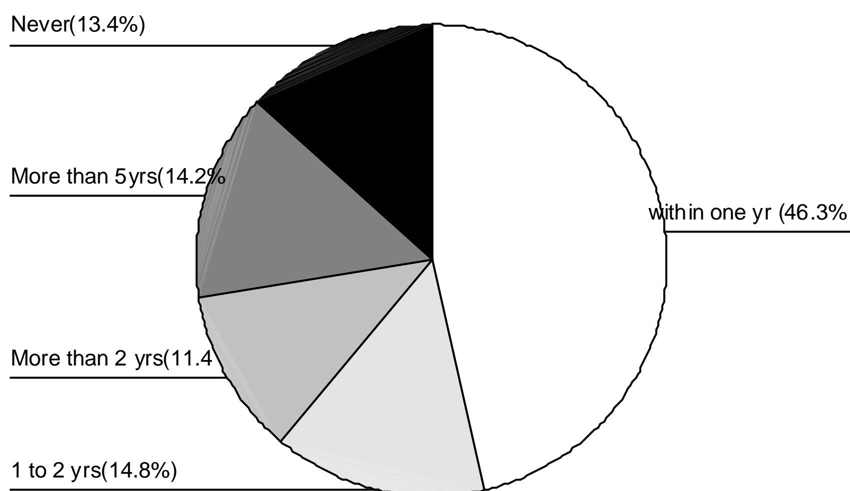


Fig 4.9

21% (74) had tooth extraction in the last year (range 1to 20). Of these 74, 21% had more than one tooth extracted in the last year, and 18.7% had more than 4 teeth extracted in the last year. 42% felt that they needed dental treatment in the last one year but was unable to do so. Among reasons given for inability to seek care were economic difficulty (24%), difficulty in coming to the facility (24%), which included, lack of accessibility due to distance, difficulty in taking time off from work, no one to accompany to no one to take care of the children. Most of these cases reported that they took over the counter medication and sometimes thought that the problem would go away and only when it came again and again did they decide to visit the dentist.

Table No4. 8 Dental visits

Dental Visits	Regular Checkups Problem motivated visits	1.4% 98.6%
Reason for last dental visit	Pain Other Reasons	61.36% 38.64%
Tooth extraction in last year		20.9%

None of the patients surveyed had dental insurance or any other benefits for their dental treatment.

4.9 Dietary Patterns And Knowledge

Dietary patterns are associated with prevalence of dental caries. Several questions were included to capture the eating habits of the subject. Frequency and patterns are given in Table No 4.3. Almost 90% of those interviewed did not practice any dietary measure to avoid caries. However, in general the consumption of sugary food and snacks was low in this group. One fourth of the participants reported that they consumed snacks in between main meals everyday, 25.9% reported that they ate sweets almost everyday or more than thrice a week .Of the total cases, 79.5% reported that they never consumed aerated soft drinks. 5.1% consumed aerated soft drinks every day or more than thrice a week and 15.3% occasionally. 22.4% of those who participated in the study had tea or coffee with sugar more than thrice a day, 64.8%two to three times in a day and 10% never consumed in the last week. It should be noted that 32(9.1%) of the cases were individuals with diabetes mellitus and hence of these 81.25% avoided consumption of tea and coffee with sugar. 89.2% reported that they never avoided sugar consumption in order to prevent tooth decay. It was observed during the interview that most of them were not aware of the fact that increased sugar consumption could lead to increase in caries tooth. 10.8% said that they avoided sugar because of tooth problem. But it should be noted that most of them avoided sugar recently because when sugary food came into contact with decayed tooth it caused considerable pain. To avoid this they reduced sugar consumption.

Table No4.9 Dietary patterns

Diet	Everyday	More than thrice in a week	Occasionally	Never
Snacks in between main meals	25%	2.8%	31.3%	40.9 %
Sugary Food	11.1%	14.8 %	42.6 %	31.5 %
Soft Drinks	2%	3.1%	15.3%	79.5 %
Tea/ Coffee with sugar	22.4%	64.8%	2.3%	10.5%
Avoid sugary food to prevent tooth decay		**Yes**	**No**	
		10.7 %	89.3 %	

4.10 Oral Hygiene Habits

Almost three fourth of the participants are practicising tooth brushing method to maintain oral hygiene. Awareness of flossing and other oral hygiene aids is low. Usage of mouthwash routinely is not a practice among this group .Of the348 cases with natural teeth, 73.01% used brush and paste to clean teeth, and 7.8% used charcoal, pepper and salt powder. 15.5% reported that they used both methods to clean teeth. The various methods and frequency of tooth cleaning are given in Table No. 4.10 a.

Table No 4.10 a Method used to clean teeth and frequency

Method	Number of times		Total
	Once a day	Twice or more	
Charcoal,/Pepper, Salt powder and hand	14	13	27
Tooth brush and Toothpaste	105	152	257
Combinations of first two methods	26	28	54
Tooth powder	1	1	2
Toothpowder and paste	2	1	3
Others	1	4	5
	149	199	348

56.53% brushed twice or more in a day. However, it should be noted that most of the subjects said that they increased the frequency of brushing recently as food lodgment caused considerable pain. Religion was mot included as a variable in the study but during the interview, Muslims reported that they cleaned their mouth and brushed their teeth

before prayers everyday (5 times a day). 65.8% of those with natural teeth reported that they used a toothpick or pin or similar sharp objects to remove food that gets lodged in between teeth.

97.4% of subjects did not know about flossing. 59.1% of participants had never heard about mouthwashes and 40.1% had heard about, or used mouthwashes.61 (17.23%) of subjects reported smoking and 27 (7.7%) reported a chewing habit. (See Table No 4.10 b).

Table no 4.10. b Usage of tooth picks, knowledge of flossing, mouthwashes and habits

Usage of tooth picks	Yes No	65.8% 34.2%
Knowledge of Flossing	Yes No	2.6% 97.4%
Knowledge of Mouthwashes	Yes No	40.1% 59.9%
Chewing Habit	Yes No	7.7% 92.3%
Smoking Habit	Yes No	17.23% 82.77%

4.11 General Health

Data regarding the self perceptions about general health, diseases and treatment were collected. General Health was rated by the individual as good, average, or worse with a score of 1,2,3 given respectively. 32% (113) of the subjects reported that their general health was good, 43.2%(152) reported average general health status and 24.7%(87) reported that their general health status as bad. (See Table No 4.4). Of the 87(24.7%) who reported bad health, 81.61% reported that they had a health problem and 41.38% of those with bad rating of health were under some form of treatment or other. There were 32 cases with diabetes mellitus of whom 31.25% reported good health, 50% average health and 18% bad health.

Table No 4.11 Self-reported General Health

Self Rating of General Health		Health problem		Under treatment	
		No	Yes	No	Yes
Good	113	93	20	97	16
Average	152	93	59	120	32
Bad	16	71	87	51	36
		202	150	268	84
Total	352	352		352	

Some questions were included to explore the perceptions of the people about their general and oral health and how each affected the other. These questions were asked to the first 100-participants. 18% thought that their general health affected their dental health. The reasons ranged from some misconceptions to scientifically proven reasons. Some of the diabetic individuals believed that their systemic disease was the reason for bad oral health and that when the sugar levels went up pus discharge and abscesses were formed. Some believed that breast-feeding had caused the tooth to crumble. Other reasons were that overall bad general health caused tooth problems also.37% reported that their dental health affected there overall well being by disrupting sleep, inability to eat and work, caused considerable suffering due to constant pain and associated headaches.

Chapter 5

Analysis of Results

5.1 OHIP

The OHIP scores were not normally distributed. For subsequent analysis the additive subscale scores were root transformed and standardized. See Fig 5.1 and Fig 5.2.

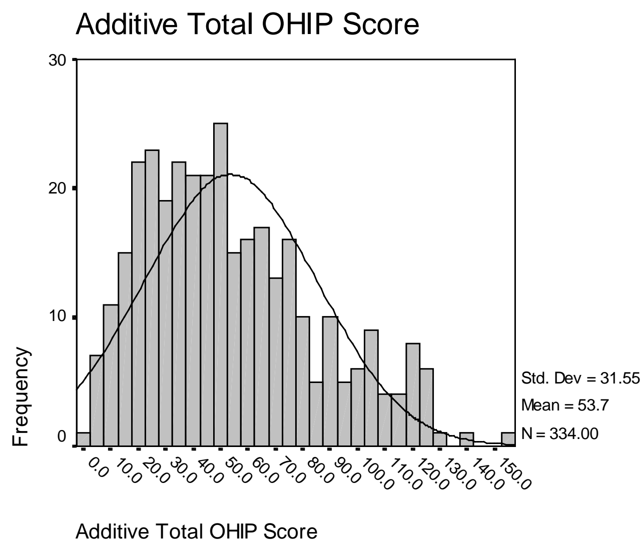


Fig 5.1

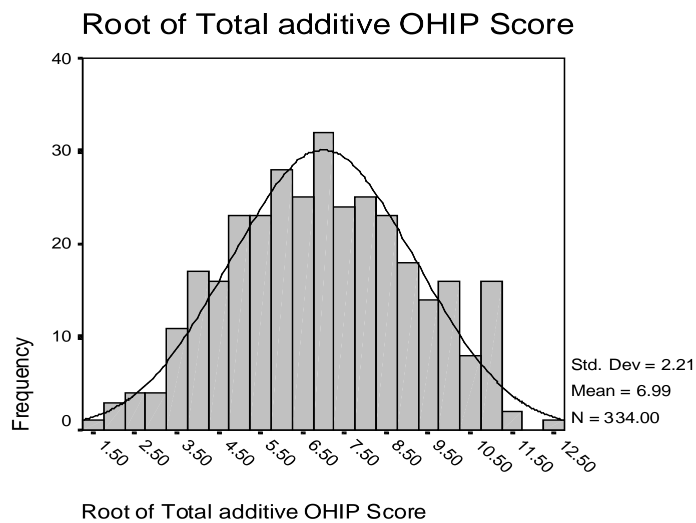


Fig 5.2

A weighted method was also used to calculate total scores. However, the weighted standardized method showed similar trends as the simple additive method in all the subsequent analysis. The root transformed standardized scores were used for one way ANOVA, independent T test and regression analysis, but in tables the simple or additive scores are used for the ease of reading, as the weighted and standardized methods have negative scores and is difficult to compare.

98% of dentate adults experienced some form of oral problem in last one year and recorded an impact. Physical pain was the most frequently reported problem. Toothache was reported by 78%, 69% reported painful aching in the mouth and 67.7% reported sensitivity to heat and cold. The next most frequent problem was in the psychological discomfort dimension. 66.6% said that they were worried about the problems with their teeth and mouth.

5.2 Oral Disease And OHIP

Total OHIP scores were higher for those who were clinically diagnosed as having oral diseases or those with more severe problems. Those with 2 or more teeth missing had a significantly higher total score (mean 62.7) as opposed to those with less than 2 teeth missing (mean 45.06) (p value of .000). Those with three or more decayed coronal tooth surfaces had significantly higher OHIP score (p value of .011). Similarly, mean scores were higher for those with attachment loss score of 1 (4-5 mm) and above, and for those diagnosed as having pain or infection. (See Table5.1). Some other clinical findings which where significant in the various subscale scores lost their significance in total OHIP scores.

Table No 5.1 Clinical findings and Total OHIP score

Clinical Finding	N=334	Mean OHIP scores	p value (T Test)
Missing teeth >=2 <2	 165 169	 62.53 45.06	.000
Decayed coronal surface >=3 <3	 111 223	 59.90 50.60	.006
Attachment Loss Score >=1 <1	 132 202	 60.93 48.96	.001
Pain / Infection Other	218 114	57.64 45.84	.000
Test was done using root transformed standardized total additive OHIP			

5.3 Oral Health Rating And OHIP

A global oral health rating scale (Good, Average and Bad) was used for subjective assessment of oral health. Total OHIP scores showed significant variations between groups who scored differently in the Oral Health Ratings. (See Table No 5.2)

Table No 5.2 Self-ratings of Oral Health and Total Additive OHIP Scores

Self rated Oral Health	Number (%)	Mean OHIP scores
Good	70(20.98)	36.07
Average	131(39.22)	47.06
Bad	133(39.82)	69.5
Pvalue.000 one way ANOVA using root transformed standardized total additive OHIP		

Those who perceived their oral health as bad had significantly higher OHIP score and the differences showed a sharp increase in OHIP scores as the ratings changed from Good to Bad.

5.4 Dental Care Seeking Patterns And OHIP

The subjects, who reported that they needed dental treatment in last year but was unable to do it, had higher OHIP scores as compared with those who felt that they did not need treatment. (See Table No5.3)

Table 5.3 Felt but unmet needs and Total OHIP scores

	Number N=334	
No Felt needs	194	45.35
Felt needs	140	65.26
p value .000 Independent T test using root transformed standardized total additive OHIP scores		

41.9% of the subjects felt that they needed dental treatment in the past year but was not able to do so. This group had a significantly higher OHIP score. (p value .000)

5.5 Dietary And Oral Hygiene Factors

Dietary factors and oral hygiene factors did not account for the differences in OHIP score.

5.6 Self perceptions About General Health And OHIP

Groups with self-rating of General Health as Good, Average and Bad levels showed significant differences in their total OHIP scores (See Table No5.4).

Table No 5.4 Self-ratings of General Health and OHIP

Self rated General Health	Number (%)	Mean OHIP score	Range (Min-Max)
Good	108(31.3)	39.92	2-125.72
Average	147(44.01)	53.97	5.34-155
Bad	79(23.65)	72.26	15-.138
p value .000 One way ANOVA using root transformed standardized total additive OHIP scores			

5.7 Socio-demographic Factors And OHIP

OHIP scores were significantly different for different educational groups. Those with lesser education (less than eight standard) had higher scores compared to those who had higher education (See Table No5.5). OHIP scores were also significantly different among the different occupational groups. (See Table No5.6)

Table No 5.5 Educational status and OHIP

Educational status	Number	Mean OHIP Score
Educational status less than eighth standard	91	49.5
Educational status–eight standard or above	243	64.7
p value.000 independent T Test using root transformed standardized total additive OHIP scores		

Table No 5.6 Occupational group and OHIP

Occupation group	Number	Mean OHIP Score
Unemployed	151	53.2
Aged/ Retired	29	43.8
Students	17	51.1
Casual workers	53	65.7
Self Employed	45	50.5
Salaried	38	49.9
p value .012 One way ANOVA using root transformed standardized total additive OHIP scores		

5.8 Location And OHIP

OHIP scores was higher among those cases from General Hospital .The Table No 5.7 gives the total additive scores from the three locations where the study was carried out. However, the p value was not significant (p value of .052).

Table No 5.7 Location and Simple OHIP Scores

Location	Number	SD	Range
Dental College	204	9.58	44
General Hospital	103	10.12	43
Cosmopolitan	27	9.13	36
Total	334	9.86	34

5.9 Oral Health And OHIP Subscales

Logistic Regression was done for each subscale with the dichotomized impact subscale scores as the dependent variable and all the clinical variables as the independent variables. The clinical variables were missing teeth, un-replaced spaces, decayed coronal surface, decayed root surface, retained roots, CPI score, attachment loss, dentofacial anomalies, pain and infection.

The median of each subscale with items reported fairly often to occasionally (simple count) were taken to divide into two categories and this was the dependent variable. A stepwise regression logistic regression was done for each subscale .The findings are summarized in Table No 5.8.

Table No 5.8 Multiple Logistic Regression Analysis of Subscale

Dependent variable	Independent variables	Odds ratio	95%CI	p value
Functional Subscale	Missing teeth 0-2	1		
	Missing tooth >=3	1.942	1.218-3.096	.005
	Pain/infection absent	1		
	Pain/infection present	2.128	1.336-3.389	.005
Physical Pain Subscale	Decayed coronal surface 0-3	1		
	Decayed coronal surface 4+	1.799	1.003-3.227	.05
	Attachment loss 0	1		
	Attachment loss 1-4	2.117	1.171-3.829	.013
	CPI csore0	1		
	CPI score1-2	2.136	.911-5.007	.081
	CPI score 3-4	2.728	1.204-6.183	.016
	Pain/infection absent	1		
	Pain/infection present	2.662	1.636-4.331	.000
Psychological Discomfort	Missing Teeth 0-2	1.		
	Missing tooth >=3	2.080	1.266-3.419	.003
	Dentofacial Anomalies Absent	1		
	Dentofacial Anomalies	1.750	1.085-2.816	.019
Physical Disability	Missing teeth 0-2	1		
	Missing tooth >=3	2.107	1.303-3.410	.002
	Pain/ infection absent	1		
	Pain/ Infection present	1.913	1.200-3.047	.006

Table No 5.8 contd.

Dependent variable	Independent variables	Odds ratio	95%CI	p value
Psychological Disability	Missing Teeth 0-2	1		
	Missing tooth >=3	2.068	1.239-3.452	.005
	Decayed Coronal Surface 0-3	1		
	Decayed Coronal Surface 4+	2.070	1.107-3.869	.023
	Pain/ infection absent	1		
	Pain/ Infection present	1.946	1.197-3.163	.007
Social Disability	Missing tooth 0-2	1		
	Missing tooth >=3	2.211	1.376-3.551	.001
	Decayed Coronal Surface 0-3	1		
	Decayed Coronal Surface 4+	1.765	1.013-3.075	.045
	Pain/ infection absent	1		
	Pain/ Infection present	1.844	1.150-2.957	.011
Handicap	Missing teeth 0-2	1		
	Missing tooth >=3	1.608	1.012-2.554	.044
	Pain/ infection absent	1		
	Pain/ Infection present	2.068	1.303-3.282	.002

5.9.1 Functional Limitation

In the functional subscale, maximum impacts (71.7%) were recorded for food catching in teeth and for difficulty in chewing (65.13%), presence of pain or infection had an odds ratio of 2.128 as compared to those who did not have pain or infection. The clinical findings validate the item scoring in the functional subscale. Those with oral disease had higher subscale scores compared to those who did not.

5.9.2 Physical Pain

In the physical pain subscale, maximum impacts were recorded for toothache (78%) and 67.7% reported sensitivity to heat and cold. Presence of pain or infections has an OR of 2.7 (p value .000) as compared to those who had no pain or infection. Presence of periodontal infection as reflected by the CPI score and attachment loss, and decayed coronal surfaces are also significant factors.

5.9.3 Psychological Discomfort

In psychological discomfort, maximum impact was recorded for being worried about dental problems and for feeling miserable (52.6%) In the regression the significant

clinical factors were dento-facial anomaly with an odd ratio of 1.750 (p value .019) and missing teeth surface (p value of .003).

5.9.4 Physical Disability

In the physical disability, maximum impacts (53.2%) were recorded for the item on restricted diet (avoiding some foods) and difficult in Brushing (48.3%). Missing tooth (p value .002) and presence of pain or infection (p value .006) were significant factors in causing physical disability due to oral disorders.

5.9.5 Psychological Disability

The highest impact in Psychological disability was recorded for difficulty in relaxing due to teeth problem (45.1%) and followed by 39.5% who recorded an impact for difficulty in sleeping because of tooth problem. In the regression analysis missing teeth (p value.005), decayed coronal surface (p value .023), pain or infection (p value of .007) were significant factors.

5.9.6 Social Disability

In the social disability subscale, maximum number of impacts (36.7%) was recorded for difficulty in doing usual jobs, because of problems with teeth or mouth. 26.3% reported trouble in getting along with other people. Missing teeth (p value .001) and decayed coronal surface, (p value .045) and presence of pain or infection (p value of .011) were the significant factors in regression.

5.9.7 Handicap

33% recorded an impact for being unable to work to full capacity in the handicap subscale and 28.4% reported financial loss due to problems with teeth and mouth. Decayed coronal surface (p value of .003), missing teeth (p value of .044), presence of pain or infection (p value .002) were the significant factors in the Handicap subscale.

5.10 Analysis of Total OHIP Score

A stepwise regression analysis was done with the all the clinical variables (missing teeth, un-replaced spaces, decayed coronal surface, decayed root surface, retained roots, CPI score, attachment loss, dentofacial anomalies, pain and infection.) and significant factors (self rating of general health, felt but unmet needs, educational and occupation group) that were identified in bivariate analysis as independent variables. Root transformed standardized additive OHIP scores as independent variable. Dummy variables were created for occupation groups and self-rating of general health to meet the criterion for least square regression.

Table No 5.9 Multivariate Least square Regression of factors affecting OHIP

Predictor variable	**Std B**	**Std Error**	**p value**
Missing Teeth	.314	.009	.000
Decayed coronal Surface	.165	.023	.000
Pin/ Infection	.137	.096	.003
Felt but unmet needs	.267	.092	.000
Occupation Group –Casual laborers*	.117	.126	.011
Occupation Group – Aged/ Retired*	-.096	.166	.039
Self Rating of General Health*	.248	.098	.000
R^2 .339	p value .000		

Dependent variable. Root transformed standardized additive total OHIP scores
* Dummy variables were used

In this regression model for overall OHIP scores, six independent variables were found to be significant with an R^2 of .339. The OHIP scores increase as the number of missing teeth, decayed coronal surface. Felt but unmet needs in past year as compared to no felt needs, casual laborers and aged or retired as compared to unemployed and self rating of general health (Average and Bad as opposed to Good), presence of pain or infection are associated with increase in OHIP scores. (See Table No 5.10).

The findings were similar when root transformed additive, standardized root transformed additive scores, and standardized weighed additive scores were used for analysis.

Chapter 6

Discussion

6.1.Discussion

The aim of the study was to assess the psychosocial and functional implications of oral disorders and the factors affecting it. The study explored linkages of the oral health measure with oral health status, dental care seeking patterns, knowledge, self-perceptions about oral health, dietary, general health factors and oral hygiene practices, and socio demographic factors. OHIP shows good validity as observed by the ease of usage of the instrument. The instrument was also able to distinguish between those with and without oral disease**.** The stepwise regression model showed that total OHIP scores was predicted by the oral disease patterns. Clinical assessment was also significantly associated with the subscale regression analysis.

98% of the subjects reported at least one or more impact due to oral health problems in the previous year. This suggests a high prevalence of dental morbidity among this group. Using the same threshold, in a hospital setting using a short form of the OHIP, 88.2 prevalence of impacts was observed in a dental care facility based study in UK [27] and 51% in a community dental survey in UK [7]. The mean number of impacts recorded in this study was 16.16 with a standard deviation of 9.86. In a community study in Australia among older adults the mean impact score was 6.89 with a standard deviation of 7.35 [44]. The higher score may be because the setting was self-selected for oral disease. The much higher prevalence of impacts in this study may also be due to the fact that dental visits are to a large extent problem based in the Indian context. This is evident from the study results, as only 1.4% reported that they had regular checkups. This is a very low figure when compared to other settings. For example, a study among adults aged 18 and over in the City of York, Toronto, 64.7% reported regular dental visits and 64.5% reported at

least one dental visit in the last six months [33]. In this study 13.4% had never visited a dentist. In one of the facilities, the general hospital, almost 100% of the procedures carried out are extractions. It was also noted that among the respondents in our study, some of those who had never visited the dentist had several teeth missing. On further probing it was noted that those tooth either decayed or became mobile and infected and fell out by itself. This gives a glimpse of the unmet needs of this population. After prolonged, recurrent episode of pain and self-treatment, patients finally come for the extractions. This is seen as an inevitable end to chronic tooth pain with acute episodes. This long-term morbidity may also account for the higher OHIP score in this group. In our study 65.3% of dentate had pain or infection in their oral cavity. This is slightly lower than another study done in a clinical setting using OHIP14, in which 69.2% patients in a study done in clinical setting using OHIP14 had pain and prevalence of impacts was 88.2% [27]. It should also be noted that though only 65.26 % reported pain as the reason for their visit, those with advanced periodontal disease and mobile tooth, did not complain of pain but of discomfort and difficulty in eating and talking.

The adult dental survey 1998 in UK shows that people who visit only in trouble are more likely to have higher OHIP Scores. The differentials in dental care seeking patterns and attitudes seem to account for the significantly higher OHIP scores in our study population. Since we do not have a comparison group of people who regularly attend a dentist it is only possible to assume that the larger impact may be due to higher number of unattended problems. As expected the subscale score were also higher when compared to other studies carried out among older adults.

Oral health rating is a direct determinant in predicting OHIP score as observed by many studies. In this study also as the rating became poor the scores became higher. As discussed earlier, dental attendance patterns is an important factor in determining the oral

health status and thereby the OHIP scores. Those with felt but unmet needs in last year had higher scores as opposed to those who did not perceive a need. This is very important from a policy perspective as a high proportion of the community feels they require dental treatment.

The three locations were chosen to get people from varied backgrounds and variations in OHIP scores were expected. However, even though the mean scores were different with highest scores for those from General Hospital, which gets a higher proportion of low-income patients, the differences across the three settings were not statistically significant. Age and sex were not found to be significant factors affecting OHIP scores in this study. Those with lower level of education and casual laborers were found to have higher OHIP scores and this finding was reported by many studies [18,44]. These factors may be directly related to socioeconomic hardship, which could account for higher scores.

Since dietary factors and oral hygiene are directly linked to caries activity we collected data on dietary patterns and oral hygiene practices. However, neither dietary factors nor oral hygiene were predictive factors in the OHIP scores. As pointed out earlier it is doubtful whether the actual patterns and practices related to diet and oral hygiene were captured by our study, and this may be the reason for absence of an association with OHIP scores. The effects of these factors are over a relatively larger period of time. Most people had modified their diets and oral hygiene practices due to the disease itself, so what were reported may not be in fact be the long-term patterns.

Very few people had knowledge of flossing and so it did not account for significant variation in OHIP scores. Similarly, mouthwashes did not account for any significant differences as most of the people were not in the practice of using mouthwashes and almost 40% had not heard about mouthwashes.

Self-rating of general health and oral health were important determinants of OHIP scores. This is probably due to the fact that all these are subjectively assessed factors. Those who have poor general health may also be having poor oral health either due to direct effect as in the case of diseases like diabetes or due to less importance given to oral health due to their other illness. Most of those who reported average to bad health also reported diseases and some were also undergoing treatment. The number of reported medical conditions was found to be a significant factor associated with the OHIP in other studies also[19, 20].

Subscale scores were predicted by the oral health status as seen by the logistic regression model. It is found that the subscale scores are sensitive to discriminate between specific oral health status and the expected social impact item. The subscale affected was also predicted by the oral disease pattern. Pain and infection was the most important factor as expected with an odd ratio of 2.662 in the physical pain subscale. The regression model for this subscale also predicts the presence of periodontal infections. Periodontal disease prevalence was very high in this group, 57.7% had periodontal pockets depth of 4-5 mm, or more. 46.2% (very often to fairly often) reported sensitivity to heat and cold in this study. However, all the subscale scores were high. Physical pain, functional limitation, and psychological discomfort recorded more number of impacts. The highest impacts were recorded in the physical pain subscale and this is validated by the clinical examination. This might be due to the fact that untreated dental caries (69.25%) and un-replaced spaces (62.64%) are more prevalent in this study group. Pain and infection leads to a two-fold increase in subscale score regression model for this subscale also predicts the presence of periodontal infections.

In the psychological discomfort subscale 66.6% reported being worried by the problem with teeth or mouth. In almost all the studies reviewed, this item recorded the

maximum impacts but the percentages of people reporting that they were worried were considerably less [44]. In many studies the next ranked item after being worried in psychological discomfort subscale was being self-conscious. However, this item ranked low in the number of impacts in our study. This may be because the feeling associated with the word ‘ self conscious’ is expressed more aptly by some other word in our study setting. Self-consciousness not being an important aspect of psychological discomfort may also be accounted by the cultural attitudes of the population here. They may have more serious problems to worry about; once the problem tooth was extracted there would be no pain. Older people accepted tooth loss as part of aging and as inevitable and hence did not seem to be bothered much by it.

In this study 40.51% of participants had some of dentofacial anomaly, a detailed classification of malocclusion was not possible. Some of the subjects were very keen to answer these questions relating to their appearance and how they felt about it. However, some subjects and were reluctant to record their discomfort with their dentofacial anomalies. As the questionnaire had to be administered to some subjects, often the answers came with explanations. The severity of the dentofacial anomalies seemed to diminish with age and among those who were married. The investigator had the opportunity to observe people with severe handicapping dentofacial deformity reporting being satisfied with their appearance. However, it was also noted that the young saw minor irregularities in an exaggerated scale. This is very relevant as in our culture appearance of teeth is very important from a social point of view.

Very often when there is an untreated and painful caries tooth, it's found that people avoid brushing the side of the mouth with the problem tooth. On oral examination one often finds the tooth and cavity in this side hidden by calculus. This leads to generalize gum infection around the tooth and on adjacent teeth. So this form of physical

disability compromises the oral health of the individual. A high proportion of subjects reported that they restricted their food choices. This may affect their nutritional status as they limit food to softer diet. In the psychological disability item the percent of respondents scoring impact level was highest for difficulty in relaxing (45.1%)and in sleep interruption (39.5%). This was not so in other studies. This again is attributable to unmet needs and pain. In other studies higher percentages recorded an impact for being upset and embarrassed. Cultural factors and attitudes could play a role here. Also high prevalence of oral pain and recurrent infections could be the reason for sleep interruption and difficulty in relaxing.

In the Social Disability 36.7% reported that they had difficulty doing jobs. The next most frequent complaint was trouble getting along with others. These are less ranking items in other studies. In the handicap subscale, 33.3% reported difficulty in working to full capacity. This item also scored considerably higher in this study.

In the final overall regression model there were highly significant association among the clinical status variables such as decayed coronal surface, missing teeth, pain or infection and OHIP scores. Regression Coefficient of .339 is much higher than reported from various models used in studies using OHIP. Regression coefficient of .19 has been reported by the Australian study using OHIP 49, and .17 by the shorter version and an R^2 of .092 among older adults from different locations [19,20,44]. This model explains 33.9% of the variation in the OHIP scores. A Regression Coefficient of .26 to .50 is considered to predict affair degree of relationship but for social science research, a value of .26 to **.**50 is considered quite high (52).

Different methods of calculating the total OHIP scores gave similar results. The simple root transformed additive scores was found to be sufficient to carry out the analysis. The weighted standardized method also gave similar results as the un weighted

ones as reported by several studies [26,27]. Pain and infection in the oral cavity is the single most significant factor, which affects the subscale scores and total scores. The study inquires into the oral well being over the past one year. This could lead to recall bias with the severity of past episodes becoming less severe and current difficulty being exaggerated. However, overall except for some shifting in the ranking of some items most of the ranking seems to be similar to studies reported from elsewhere. The item scores in this study are much higher than those reported by the North Carolina blacks who had the worst scores in a comparative study [44]. However, it should be noted that these rates are for older population. Our results though higher are comparable to studies done in UK and France[7, 40].

Sixty-seven of study participants had one or more missing tooth. The cumulative episodes of pain and infection may have much higher implications in the person's well being. Missing tooth further leads to temporomandibular joint problems and restriction in jaw movement. Episodes of pain and infection and unmet needs are very high and this points towards a need to improving curative services and providing basic oral care.

6.2 Limitations of the study

The study has been carried out in a population who has an oral disorder hence; the OHIP scores could be higher. Recall bias could have affected the study as the OHIP inquired about oral health over past year. This could also have affected the other questions in interview schedule relating to past experiences. The study settings may also have biased the subjects into over reporting their problems.

The questions were translated and adapted from a standard quality of life instrument that was developed for use elsewhere. This may have not included some questions that are relevant in this region. There is also a possibility that some of the meanings may have been lost in translation.

The implications of oral disorders on the different dimensions are limited to the questions in the Oral health impact profile. The instrument was not tested for reliability due to limitations of time and resources. Weights that were developed in the original study were used for the same reasons.

As the number of participants in the category with dentures were less it was not possible to analyze the results of those with prosthesis.

6.3 Strengths of the study

A standardized questionnaire that was adapted in many countries was used to measure the consequences of oral disorders. The questionnaire was translated to the regional language and hence was easy for the participants to understand. The semi structured interview schedule provided an opportunity to explore the various factors associated with oral health.

Clinical examination had been carried out to find out the oral health status of the individual and this was used, in addition to self rating of oral health. Clinical examination was carried out by a qualified dentist in a setting that was suitable for oral health assessment. A standardized format was used to record the clinical finding. The probe used for measuring pocket depth and attachment loss was calibrated.

The findings of OHIP were validated by the clinical findings. The instrument was able to discriminate between those with and without oral disease.

All age groups above 18 years were well represented in the sample. Participants were taken from public and private dental care facilities. The study was carried out in two types of public facilities and hence, subjects from both types, teaching institution and health facility participated in the study.

Chapter 7

Conclusions & Recommendations

7.1 Conclusion

The study shows that people do perceive oral health status to be an important determinant in of their well being. Perceived need for treatment is also high, for oral health problem was also high. However, there was lack of knowledge about preventive strategies and treatment of oral health problem once pain and infection sets in, most of the respondents seemed to think of restoration as an option. As reported by many of the subjects they often delayed coming to the health facility, this was sometimes to delay the extraction, which they often perceive it to be an inevitable consequence. Very often the respondents reported that because they were unable to take a day off for extracting the tooth they sought temporary relief by taking over the counter medications. This has resulted in recurrent infections and unnecessary sufferings. Almost half of the study participants reported that they had pain very or fairly often in the past year. Missing tooth is a major determinant of oral health related quality of life as cumulatively it leads to functional limitation and is a serious problem as it restricts the dietary choices of the individual. Among the employed study subjects many have work- day loss due to their oral health problem and this accounts for significant loss of productivity and disability.

The present study group comprised of adults aged 18 and above and we believe that the consequences of oral disorders may be much higher for the younger age group and this would have serious consequences on their growth and development. This study brings out the meanings and significance of a pathological disease status, in terms of its effect on the daily life of a person. The feelings, discomforts and difficulties that are faced by people due to their oral disorders have been quantified to enable an easier understanding of the implications of oral disorders. This makes possible an understanding

of the disease beyond those collected by the pathological disease indicators. The findings of this study show that people can be affected in different ways by their oral disorders. Some of these problems can seriously affect the life of some individuals by restricting their activities. The social, functional, and psychological well being of individuals is compromised by their oral disorders affecting the overall quality of their lives, intruding into their social interactions and even ability to earn a living. Despite having such a major impact on daily lives, oral health problems have failed to receive due attention in public health education and in policy and programmatic interventions. This is a serious oversight in the health policy of our country and in our state. Part of the problem is the lack of appropriate information on the prevalence and consequences of oral health disorders. Although the present study did not examine the prevalence of oral health problems, it is hoped that it is a humble contribution to better understanding the burden of oral health problems and their negative consequences for well being. . In a developing country context such as ours, neglect of oral health problems till a late stage also means a huge wastage of scarce resources given the high cost of dental treatment. Prevention and early interventions would be much more cost-effective, but needs acknowledgment of the seriousness as well as importance of this problem.

7.2 Recommendations

- **Strengthening of Oral Health education through school, and community based programs**

  Dental treatment is inherently expensive. Hence, it is essential that we focus on preventive programs to decrease the disease burden. It is important to create awareness about oral hygiene practices and various treatments and the importance of conserving tooth. Conservative dental treatment at early stages of the disease

can bring down the need for sophisticated dental treatment, which the community cannot afford.

- **Implementation of primary preventive strategies**

  School and community based oral health promotive programs have been found to bring down the disease burden. School Dental programs can be very effective in a state like Kerala when the percentage of children attending school is high. Incremental dental care provided at each level in school children and preventive strategies like sealants and fluoride application can bring down the disease prevalence. Incremental dental care is care provided to each class level every six months. This ensures that the child gets preventive and curative treatment every year followed by checkups at necessary intervals so that the child is able to maintain good oral health. This may be a cost-effective way of decreasing the disease burden.

- **Strengthening of Public Dental Services**

  The public dental care system should have been strengthened so that it can provide restorative and rehabilitative services. This will not only be beneficial to those from lower socioeconomic group, but it will also by itself educate the community in the about healthy practices. Dental facilities should provide more information to public regarding the preventive and curative services.

- **Inclusion of Oral health related quality of life indicators in National Oral Health surveys**

  Inclusion of such instruments would be valuable to enable policy makers to plan oral health programs in way that it meets the perceived needs of the community. This could also provide baseline information in assessing effectiveness of programs.

References

1. World Oral Health Report 2003,World Health Organisation.
2. Cynthia M. Pine, Community Oral Health Pg. 80,132.
3. Gary Slade, Anne Sanders, ICF Australian User Guide10.9, www.aihw.gov.au/publications/dis/icfaugv1/icfugv1-c06.pdf accessed on 15-5-2004.
4. National Oral Health Policy 1995,.Ministry of Health and Family welfare ,Govt of India
5. Jagadeesan M., Rotti SB, Danabalan M.: Oral health status and risk factors for dental and periodontal diseases among rural women In Pondicherry: Indian Journal of Community Medicine 2000 Jan – Mar 25(1) 31-8.
6. Hennesey C.H., Moriarty D.G., Zack M.M., Scherr PA, Brackbill R.Measuring health related quality of life for public health surveillance. Public Health Rep 1994, 109 665-72.
7. N.M. Nuttal, J.G. Steele, C.M. Pine etal, Impact of Oral Health on the people in UK in 1998, BMJ Vol.190, No3 Feb 10, 2001).
8. Cohenl & Jago, Towards formulation of socio dental indicators, Int J Health services, 6.681-687).
9. V. Ramankutty, Historical analysis of the development of health care facilities in Kerala state, India, Health Policy and Planning; 15(1) 103-109.
10. Thankappan K. R., Valiathan M.S. Health at lowcost the Kerala Model: The Lancet 1998 351:1274-5).
11. National Family Health Survey II Kerala.
12. Anil S., S. Hari, Vijayakumar T., Periodontal Conditions of selected population in Trivandrum District Kerala, India, Community Dental Oral Epidemiology, 1990,18:325.
13. Locker D., Measuring Oral Health a conceptual Framework, Community Dental Health 1988,5,3-18.
14. Pope A.M. and Tarlov, AR (1991), Disability in America, towards a National Agenda for prevention, National Academy Press, Washington DC.
15. World Health Organisation 1980.International Classification of impairment, Disabilities and Handicaps.

16. P. Finbarr Allen, Health and Quality of life outcomes, Biomedcentral 2003, 1; 40http;//www.hqlo.com/1/1/40 accessed on December 10,2003.
17. Nikitas M.K., Oral Disease and the Quality of life American Journal of Public Health 1985,75,11-12.
18. Slade G.D., ed. Measuring Oral Health and Quality of Life, Chapel Hill, University of North Carolina, dental ecology1997.
19. Slade G.D., Spencer A.J. Community Dent Health. 1994 Mar 11(1): 3-11. Development and evaluation of the Oral Health Impact Profile
20. Slade G. Derivation and Validation of short form of OHIP, COMM DENT Oral Epidemiology 1997:25:284-90).
21. Locker D., Issues in measuring change in self-perceived oral health status. Comm Dent Oral Epidemiol 1998,26:41-47.
22. Allison P., Locker D., Jokovic A., Slade G.D., A cross-cultural comparison of oral health values, J. Dent Res Feb 1999,78(2), 643-649.
23. Wong M.C., Lo EC, McMillan A.S. Validation of a Chinese version of the Oral Health Impact Profile (OHIP). Community Dent Oral Epidemiol. 2002 Dec; 30(6): 423-30.
24. A John M.T., Patrick D.L., Slade G.D. The German version of the Oral Health Impact Profile--translation and psychometric properties European J Oral Science. 2002 Dec; 110(6): 425-33.
25. Streiner D. and Norman G., Health measurement scales, a practical guide to their development and use. Oxford Open University Press 1989.
26. Allen P.F. and Locker D., Do item weights matter? An assessment using the Oral Health Impact Profile, Community Dental Health 1997, 14,133-138.
27. Robinson P.G., Giibson B., Khan F.A., Birnbaum W., Validity of two oral health related quality of life measures, Community Dent Oral Epidemiol 2003, 31:90-9.
28. S.P. McKenna, S.M. Hunt, JmcEwen, Weihing the seriousness of perceived health problems using Thurstone's method of paired comparison, International Journal of Epidemiology 10,93-97.
29. Crispin Jenkinson, Why are we weighing? A critical Examination of use of item weights in a health status Measure, Social Science Med Vol32, No12, pp, 1413-1416,1991.

30. Gift H.C., Atchison K.A., Oral Health, health and health related quality of life. Med Care 1995, Nov33 (11 Suppl): NS57-77.

31. Oral health in America, A report of the surgeon General, Chapter 6, Effects of well being and Quality of Life.

32. Kelly etal Summary UK Adult Dental Health Survey 1998.

33. Locker, MillerY. Subjectively reported oral health status in an adult population. Community Dent Oral Epidemiol 1994 Dec: 22(6): 425-30.

34. Ronald P. Strauss, Ronald J. Hunt, Understanding the value of teeth to older adults, Journal of American dental Association, Vol. 124, Jan 1993.

35. Masalu J.R., Astrom A.N., Applicability of an abbreviated version of the oral impacts on daily performances scale for use among Tanzanian students Community Dent Oral Epidemiol 2003:31:7-14.

36. Locker D. The burden of oral disorders in a population of older adults. Community Dent Health. 1992 Jun; 9(2): 109-24.

37. Anne N, Astrom, Isaac Okullo, Validity and reliability of the Oral Impacts on Daily Performance (OIDP) frequency scale: a cross sectional study of adolescents in Uganda, BiomedCentralhttp://www.biomedcentral.com/1472-6831/3/5.

38. Colman Mc Grath, Raman Bedi Understanding the value of oral health to people in Britain-important to life quality Community Dental Health (2002) 19(4): 211-4.

39. Chavers LS, Gilbert GH, Shelton BJ, Two year incidence of oral Disadvantage, a measure of oral health related quality of life, Community Dent Oral Epidemiol 2003,31:21-9.

40. S. Tubert –Jeannin ,PJ Riordan, Amorel-Papernot, Sporcheray , S Saby-Collet, Validation of an oral health quality of Life index(GOHAI) in France, Community Dental Oral Epidemiol 2003,31: 275-84.

41. Keller HH, Malnutrition in institutionalized elderly, how and why? , J am Geriatric Csoc 1993, Nov 41(11): 1212-8).

42. Locker D. The burden of oral disorders in a population of older adults. Community Dent Health 1992 Jun; 9(2): 109-24.

43. E L Dini, C Mc Grath and R Bedi, An evaluation of oral Health Quality of life (OHQOL) instrument in a Brazilian population, Community Dental Health, 2003 March 20, (1) 40-4.

44. G D Slade, AJ Spencer, D Locker RJ Hunt, RP Strauss and JD Beck, Variations in the social impact of oral conditions among Older Adults in South Australia, Ontario, and North Carolina, J dent Research 75(7) 1439-1450 July 1996.

45. Reisine, Dental health and Public Policy, American Journal of Public health, 1985, Vol 75,27-30).

46. ST Reisine, Dental Disease and work Loss, J Dent Res63 (9); 1158-1161, Sept 1984).

47. Miller J, Waste of dental pain, Intern Dent J 1978,28.66-77.

48. Oliver RC, Brown LJ, Loe H. Periodontal diseases in the United States population J Periodontol. 1998 Feb; 69(2): 269-78.

49. C. Mc Grath, and R. Bedi, M Prendergast Br Dent J 2001; March 5-10,190: 262-265 Dental attendance, oral health and the quality of life Can dental attendance improve quality of life? MARCH 10 2001, VOLUME190, NO. 5, PAGE 251.

50. Mc Grath C, Bedi R, Gender variations in the social impact of oral health J Ir Dent Assoc. 2000; 46(3): 87-91.

51. NewtonJT, CorriganM, GibbonsDE, LockerD, The self assessed Oral health status of individuals from White, Indian, Chinese and Black Carribean communities in South East England, Community Dent Oral Epidemiol 2003:31,192-90.

52. Arlene Fink. How to analyze survey data. Sage publications Page 36.

Appendix 1.1
Questions and Weights for the OHIP

	Question	Weight
Q1	Have you had difficulty <u>chewing any foods</u> because of problems with your teeth, mouth, or dentures?	1.253
Q2	Have you had trouble <u>pronouncing any words</u> because of problems with your teeth, mouth, or dentures?	1.036
Q3	Have you noticed a <u>tooth, which doesn't look right</u>?	0.747
Q4	Have you felt that your <u>appearance has been affected</u> because of problems with your teeth, mouth, or dentures?	1.059
Q5	Have you felt that your <u>breath has been stale</u> because of problems with your teeth, mouth, or dentures?	1.154
Q6	Have you felt that your <u>sense of taste</u> has worsened because of problems with your teeth, mouth, or dentures?	0.931
Q7	Have you had <u>food catching</u> in your teeth or dentures?	1.181
Q8	Have you felt that your <u>digestion has worsened</u> because of problems with your teeth, mouth, or dentures?	1.168
Q9	Have you had <u>painful aching</u> in your mouth?	1.213
Q10	Have you had a <u>sore jaw</u>?	0.937
Q11	Have you had <u>headaches</u> because of problems with your teeth, mouth, or dentures?	1.084
Q12	Have you had <u>sensitive teeth</u>, for example, due to hot or cold foods or drinks?	1.053
Q13	Have you had <u>toothache</u>?	1.361
Q14	Have you had <u>painful gums</u>?	1.088
Q15	Have you found it <u>uncomfortable to eat any foods</u> because of problems with your teeth, mouth, or dentures?	0.998
Q16	Have you had <u>sore spots in your mouth</u>?	1.264
Q17	Have you felt that your <u>dentures have not been fitting</u> properly?	1.472
Q18	Have you had <u>uncomfortable dentures</u>?	1.002

	Question	Weight
Q19	Have you been worried by dental problems?	2.006
Q20	Have you been self conscious because of your teeth, mouth, or dentures?	1.902
Q21	Have dental problems made you miserable?	2.252
Q22	Have you felt uncomfortable about the appearance of your teeth, mouth, or dentures?	1.815
Q23	Have you felt tense because of problems with your teeth, mouth, or dentures?	2.025
Q24	Has your speech been unclear because of problems with your teeth, mouth, or dentures?	1.109
Q25	Have people misunderstood some of your words because of problems with your teeth, mouth, or dentures?	1.111
Q26	Have you felt that there has been less flavor in your food because of problems with your teeth, mouth or dentures?	1.051
Q27	Have you been unable to brush your teeth properly because of problems with your teeth, mouth, or dentures?	1.068
Q28	Have you had to avoid eating some foods because of problems with your teeth, mouth, or dentures?	1.266
Q29	Has your diet been unsatisfactory because of problems with your teeth, mouth, or dentures?	1.022
Q30	Have you been unable to eat with your dentures because of problems with them?	1.351
Q31	Have you avoided smiling because of problems with your teeth, mouth, or dentures?	1.070
Q32	Have you had to interrupt meals because of problems with your teeth, mouth, or dentures?	0.952
Q33	Has your sleep been interrupted because of problems with your teeth, mouth, or dentures?	1.950

	Question	Weight
Q34	Have you been upset because of problems with your teeth, mouth, or dentures?	1.393
Q35	Have you found it difficult to relax because of problems with your teeth, mouth, or dentures?	1.646
Q36	Have you felt depressed because of problems with your teeth, mouth, or dentures?	1.936
Q37	Has your concentration been affected because of problems with your teeth, mouth, or dentures?	1.638
Q38	Have you been a bit embarrassed because of problems with your teeth, mouth, or dentures?	1.437
Q39	Have you avoided going out because of problems with your teeth, mouth, or dentures?	1.572
Q40	Have you been less tolerant of your partner or family because of problems with your teeth, mouth, or dentures?	2.555
Q41	Have you had trouble getting along with other people because of problems with your teeth, mouth, or dentures?	1.832
Q42	Have you been a bit irritable with other people because of problems with your teeth, mouth, or dentures?	2.236
Q43	Have you had difficulty doing your usual jobs because of problems with your teeth, mouth, or dentures?	1.805
Q44	Have you felt that your general health has worsened because of problems with your teeth, mouth, or dentures?	2.112
Q45	Have you suffered any financial loss because of problems with your teeth, mouth, or dentures?	1.420
Q46	Have you been unable to enjoy other people's company as much because of problems with your teeth, mouth, or dentures?	1.545
Q47	Have you felt that life in general was less satisfying because of problems with your teeth, mouth, or dentures?	1.567
Q48	Have you been totally unable to function because of problems with your teeth, mouth, or dentures?	1.879
Q49	Have you been unable to work to your full capacity because of problems with your teeth, mouth, or dentures?	1.476

Appendix 1.2

Oral Health Impact Profile

INSTRUCTIONS

THE QUESTIONNAIRE.
This questionnaire asks how troubles with your teeth, mouth or dentures may have caused problems in your daily life. We would like you to complete the questionnaire even if you have good dental health. We would like to know how often you have had each of the 49 listed problems during the LAST YEAR.

HOW TO ANSWER THE QUESTIONS.
Each question on the left hand side of the page asks you about a particular dental problem. You should think about each question in turn, and circle the answer to the right of the question, to indicate how often you have had the problem during the last year.

EXAMPLES *If you occasionally had sore spots in your mouth, you would circle the answer as shown in this example.*

Q16. Have you had any sore spots in your mouth?	VERY OFTEN	FAIRLY OFTEN	(OCCAS-IONALLY)	HARDLY EVER	NEVER	DON'T KNOW

If you have never had the problem during the last year, circle "NEVER" as follows.

Q16. Have you had any sore spots in your mouth?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	(NEVER)	DON'T KNOW

WHAT IF THE QUESTION DOES NOT APPLY?
Question 3 applies only to people who have all or some of their own teeth. If the question does not apply to you then you would answer by checking the box as follows.

EXAMPLE

Q13. Have you had a toothache?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

Does not apply - I do not have my own teeth 4 ☐

ANY QUESTIONS?
If you would like to speak to one of the researchers, please phone Kevin Moss at the School of Dentistry, phone (919) 966-2791. Once again, thank you for your help!

Appendix 1.3

ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY

GOVT. MEDICAL COLLEGE CAMPUS, THIRUVANANTHAPURAM –6950011

Researcher – **DR MANJU RENJIT**

This questionnaire is for a study on oral health, undertaken as part of my MPH thesis. The information provided will be used only for research and academic purposes. Your name will not be disclosed, only the information provided will be used .If you agree to participate in the study please answer the following questions. The information you provide is very valuable to understand about oral health status in our state. A detailed examination of your mouth will be carried out for the study. If you are feeling uncomfortable during the interview or while filling the questionnaire you are free to withdraw

I have read and understood the above information and I am willing to participate in the study Signature

Sl No ☐ Date ☐

Govt. Dental College ☐

General Hospital ☐

Multispecialty Private Clinic ☐

1.Name ☐

2. Age ☐ 3. SEX - Male ☐ Female ☐

4.Area Of Residence ☐

5.Occupation ☐

6.Educational Status ☐

If you need any clarification please ask

Please tick or write in the appropriate columns

7.a) How often do you eat something between your main meals?

About 2-3 times per day ☐ About once a day ☐

Occasionally ☐ Rarely or never ☐

7.b) How often in the past week did you eat any of the following?
Sweets like cakes, jelebi, ladoo, toffee, chocolates

About 2-3 times per day ☐ About once a day ☐

Occasionally ☐ Rarely or never ☐

7.c) How often in the past week did you drink the following?
Soft drinks like coca cola, Pepsi, Seven up

About 2-3 times per day ☐ About once a day ☐

Occasionally ☐ Rarely or never ☐

7.d) How often do you drink the following? Tea, coffee with sugar

More than 3 times per day ☐ 2-3 times in a day ☐

2-3 times in a week ☐ Rarely or never ☐

7.e) Do you try to avoid sugary foods in order to prevent dental decay?

Yes ☐

No ☐

8.a) How is your general health?

Good ☐

Moderate ☐

Poor ☐

8.b) Are you currently undergoing treatment for any health problems, If yes explain

8.c) Do you think that your general well being is affected by your dental health?

If yes how? Yes ☐

If no why? No ☐

8.d) Do you think that your dental health is affected by your general health?	
If yes how?	Yes ☐
If no why?	No ☐

9.a) How do you clean your teeth and gums?	
9.b) If you use Toothpaste, What toothpaste do you use?	

9.c) How often do you clean/brush your teeth?

Never	☐	Once a week	☐	A few times a week	☐
Once a day	☐	Twice a day	☐	After every meal	☐

9.d) How often do you floss your teeth?

Never	☐	Once a week	☐	A few times a week	☐
Once a day	☐	Twice a day	☐	After every meal	☐

9.e) How often do you use a wooden tooth pick to clean the spaces between your teeth?

Never	☐	Once a week	☐	More than 3 times a week	☐
Once a day	☐	Twice a day	☐	After every meal	☐

9.f) How often do you use a special brush, to clean the spaces between your teeth?

Never	☐	Once a week	☐	More than 3 times a week	☐
Once a day	☐	Twice a day	☐	After every meal	☐

9.g) How often do you use mouthwash?

Never	☐	Once a week	☐	More than 3 times a week	☐
Once a day	☐	Twice a day	☐	After every meal	☐

9.h) Do you smoke daily?	
	Yes ☐
	No ☐

9.i) Do you use any of the following daily Pan ☐ Betel Nut ☐ Pan Parag ☐ Gutka ☐ Any other packet preparations for Chewing If so mention the name ☐ Don't use ☐	
10.a) How do you describe your oral health? Good ☐ Moderate ☐ Poor ☐	
10.b) Do you have a dental problem explain Yes ☐ No ☐	
11.a) When was your last dental visit?	
11.b) Reason for Last visit	
11.c) How many times in past one year have you visited the dentist? Regularly (at least once per year) for check-ups ☐ Once in six months ☐ Once in three months ☐ Only when having pain of other trouble ☐ Never ☐	
11.d) If visited a dentist in the last year: Have you had a tooth taken out by a dentist during the last year? (Note: not for orthodontic reasons ie for if your tooth was taken out for putting braces please do not mention it here)	Yes ☐ No ☐
11.e) If more than one tooth has been taken out in past one year, write how many	☐
12.a) In the past year, have you taken time off work or school because of problems with your teeth or mouth or because of the need to have treatment for these problems?	Yes ☐ No ☐

12.b) *yes:* How much time did you take off? Calculate as days or hours		
12.c) Are you covered by any kind of insurance/ plan / scheme for your dental care?	Total Coverage	Partial Coverage
1. Private plan	☐	☐
2. Central	☐	☐
3 State Scheme	☐	☐
5 Not covered	☐	☐
12.d) In the last year have you been unable to do the Dental treatment that was needed If yes what was the reason?	Yes ☐	No ☐

	HOW OFTEN have you had the problem during the last year? (circle your answer)					
Q1. Have you had difficulty chewing any foods because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q2. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q3. Have you noticed a tooth which doesn't look right?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q4. Have you felt that your appearance has been affected because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q5. Have you felt that your breath has been stale because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q6. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q7. Have you had food catching in your teeth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q8. Have you felt that your digestion has worsened because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q9. Have you had painful aching in your mouth?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q10. Have you had a sore jaw?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q11. Have you had headaches because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

HOW OFTEN have you had the problem during the last year?
(circle your answer)

Question						
Q12. Have you had sensitive teeth, for example, due to hot or cold foods or drinks?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have my own teeth					
Q13. Have you had toothache?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have my own teeth					
Q14. Have you had painful gums?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q15. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q16. Have you had sore spots in your mouth?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q17. Have you felt that your dentures have not been fitting properly?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have dentures					
Q18. Have you had uncomfortable dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have dentures					
Q19. Have you been worried by dental problems?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q20. Have you been self conscious because of your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q21. Have dental problems made you miserable?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q22. Have you felt uncomfortable about the appearance of your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

	HOW OFTEN have you had the problem during the last year? (circle your answer)					
Q23. Have you felt tense because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q24. Has your speech been unclear because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q25. Have people misunderstood some of your words because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q26. Have you felt that there has been less flavor in your food because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q27. Have you been unable to brush your teeth properly because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have my own teeth					
Q28. Have you had to avoid eating some foods because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q29. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q30. Have you been unable to eat with your dentures because of problems with them?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
	Does not apply - I do not have dentures					
Q31. Have you avoided smiling because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

	HOW OFTEN have you had the problem during the last year? (circle your answer)					
Q32. Have you had to interrupt meals because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q33. Has your sleep been interrupted because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q34. Have you been upset because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q35. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q36. Have you felt depressed because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q37. Has your concentration been affected because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q38. Have you been a bit embarrassed because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q39. Have you avoided going out because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q40. Have you been less tolerant of your partner or family because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q41. Have you had trouble getting along with other people because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

	HOW OFTEN have you had the problem during the last year? (circle your answer)					
Q42. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q43. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q44. Have you felt that your general health has worsened because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q45. Have you suffered any financial loss because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q46. Have you been unable to enjoy other people's company as much because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q47. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q48. Have you been totally unable to function because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW
Q49. Have you been unable to work to your full capacity because of problems with your teeth, mouth or dentures?	VERY OFTEN	FAIRLY OFTEN	OCCAS-IONALLY	HARDLY EVER	NEVER	DON'T KNOW

Q50. Please write today's date ___ / ___ / ___
month day year

Appendix 1.5

Acronyms & Abbreviations

CEJ	Cementoenamel Junction
CPITN	Community Periodontal Index of Treatment Needs
CPI score	Community Periodontal Index score
GOHAI	Geriatric Oral Health Assessment Index
ICIDH	International Classification of Impairment, Disability and Handicap
ICF	International Classification of Function
OHIP	Oral Health Impact Profile
WHO	World Health Organization

Glossary

Calculus – deposits on tooth surface

Cementoenamel Junction - junction of the cementum, covering root surface and enamel covering crown surface

Dental Caries - decayed tooth

Decayed coronal surface-decayed crown surface

Decayed root surface - decayed in the root of the teeth

Dentulous/Dentate - teeth present

Dentofacial Anomalies - anomalies of teeth, jaw or surrounding facial structures covering the crown surface of tooth

Edentulous - total absence of teeth

Full Denture - full mouth prosthesis to replace entire dentition

Malocclusion - protrusion / crowding / spacing of deviation from normal alignment of

Perodontium - it is the connective tissue organ covered by epithelium that attaches tooth to bones of jaws

Periodontal Disease - disease of gum and tissue surrounding teeth

Partially edentulous - some teeth missing in jaws

Removable Partial Denture - prosthesis to replace some missing tooth

Unreplaced spaces - spaces left by missing tooth that are not replaced