Oral health-related quality of life in Norwegian adults

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Dedicated to

Gorm,

Emilie and Karoline

Tusener på tusener
av mennesker
har studert sykdom.
Nesten ingen
har studert helse.
Adelle Davis (1904-74)

CONTENTS

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This is an historical milestone for the dental hygiene profession. I am one of the first two Norwegian dental hygienists completing the degree of Doctor of Philosophiae at the University of Oslo.

Kari Elisabeth Dahl
Oslo, June 2011

List of papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals. The following papers (I-III) are submitted in partial fulfilment of the requirements for the Degree of *Philosophiae Doctor* at the Faculty of Dentistry, School of Dental Hygiene and Oral Health, University of Oslo, Norway.

I. Kari Elisabeth Dahl, Nina J. Wang, Irene Skau, Kerstin Öhrn. Oral health-related quality of life and associated factors in Norwegian adults. Acta Odontol Scand. (doi:10.3109/00016357.2010.549502) Early online 2011

II. Kari Elisabeth Dahl, Nina J. Wang, Dorthe Holst, Kerstin Öhrn. Oral health-related quality of life among adults 68 to77 years old in Nord-Trøndelag, Norway.
Int J Dent Hygiene 2011; 9:87-92

III. Kari Elisabeth Dahl, Nina J. Wang, Kerstin Öhrn. Does oral health matter in people`s daily life? Oral health-related quality of life in adults 35 to 47 years of age in Norway.
In manuscript

The studies were approved by the Ethical Research Committee in Norway.

Abbreviations

ANOVA	Analysis of Variance
CI	Confidence Interval
DIP	Dental Impact Profile
HRQoL	Health-Related Quality of Life
HUNT	The Nord-Trøndelag health study
OIDP	Oral Impacts on Daily Performance
OHIP	Oral Health Impact Profile
OHRQoL	Oral Health-Related Quality of Life
OR	Odds Ratio
REK	Regional Ethical Committee Mid-Norway
SDI	Socio-Dental Indicator
SSB	Statistics Norwegian
TNS	Norwegian Gallup Institute
WHO	World Health Organization

Abstract

Objectives

The general aim of this thesis was to describe oral health-related quality of life (OHRQoL) in adults in the county of Nord-Trøndelag and in a national representative sample of Norwegian adults. A further goal was to study whether oral-health related quality of life is associated with clinical dental health, use of dental services, oral hygiene behaviours and demographic variables.

The use of clinical measures only to assess the oral status of individuals has been criticized because such measures fail to consider functional and psychosocial aspects of health and do not adequately reflect functions, concerns and perceived needs of individuals. In addition, in dentistry there is a growing interest in assessing patients' experiences of disease and treatment on physical, psychosocial and social functions in daily life, often labelled as oral health-related quality of life (OHRQoL). Studies in this area are few in Norway.

Materials and methods

Three cross-sectional studies were conducted, one nationwide quantitative questionnaire study including a stratified representative random sample of 20 to 80 year old individuals and two combined quantitative questionnaire and clinical examination studies, based on random samples of adults in the county of Nord-Trøndelag. The questionnaires included demographic questions (age, sex and length of education), dental visits, dental hygiene habits, self-rated oral health and general health and satisfaction with oral health. OHRQoL was assessed with Oral Health Impact Profile-14 (OHIP-14) in Studies I and II and with Dental Impact Profile (DIP) in Study III. Clinical dental health was assessed with counts of the number of teeth and the number of teeth with dental carious lesions.

Results

Oral health is of importance to most people. It is necessary for the masticatory function, but is also of great importance for psychological comfort and social relations. The majority of the participants reported at least one oral problem assessed with OHIP-14. The most frequently reported problems were physical pain, psychological discomfort and psychological disability. Most of the participants rated their oral health as good and were satisfied with their oral health. However, those who rated their oral health as very poor reported the poorest OHRQoL. The youngest individuals, individuals with few remaining teeth and those who visited the dental services on an irregular basis reported poorer OHRQoL than did other individuals. There was a relationship between the number of decayed teeth and OHRQoL in the middle-aged generation, which was not found among the elderly.

Conclusions

This research shows that most adults reported oral health to be important for masticatory functions and confirms that oral health also has impacts on other aspects of life. Those who practiced good dental health habits, rated their oral health as good or had many teeth present, reported their oral health to have positive effects on their quality of life.

1. Introduction

Oral health influences overall health, well-being and quality of life. The oral cavity and the teeth affect many aspect of life, such as eating, laughing, speech and appearance. Nevertheless, individuals' perceptions of oral problems and oral treatment are not always taken into consideration in dental treatment or in dental research.

The relationship between disease and health is of theoretical and practical importance. As Figure I indicates, diseases and health are not points on a continuum but independent dimensions of human experience. While they are related in the sense that they often overlap, they are not necessarily co-incident and may be experienced separately.

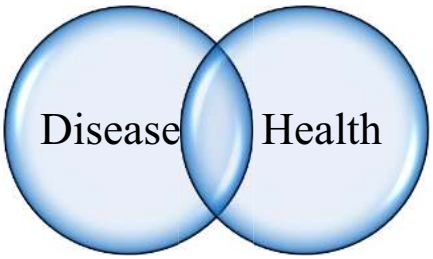

Figure 1. Relationship between health and disease (Locker 1997).

Disease does not necessarily have an influence on health and poor health may not have its origins in pathological conditions. This model indicates that disease is only one of many threats to health (Locker 1997).

There is a growing consensus that disease measured by professionals is conceptually and empirically not the same as illness and health self-assessed by participants (Ingelhart, Bagramian 2002). It is hereby of interest to study associations between

oral status measured by dental professionals and individuals' own perceptions of oral health, and in addition oral health related quality of life (OHRQoL).

A major task of the dental hygienist is to inspire and guide patients to adopt and maintain health habits that promote oral health, prevent disease, and support OHRQoL and, when disease occurs, to facilitate successful treatment. In order to encourage individuals to adopt a healthy lifestyle, it is of importance to capture individuals' perspectives of oral health and OHRQoL. This thesis concerns OHRQoL in Norwegian adults.

1.1 Health models

Two commonly used models which describe health and disease are the biomedical (naturalistic) model and the biopsychosocial (humanistic) model (Sarafino 2002). The biomedical model of health has a pathogenic perspective (WHO ICIHD 1980), while the biopsychosocial model consists of a holistic and salutogenic perspective and is based on promotion of well-being (Antonovsky 1979, Berg et al., 2006). In the salutogenic perspective, the focus is to explore the reasons for people staying healthy, despite different influences, instead of examining why they get diseases (Antonovsky 1984).

In the biomedical model, all diseases are considered to be of physical origin and can be explained by disturbances in physiological processes caused by injury, biochemical imbalance or infection, which result in change in the body's structure and balance. This model assume that disorders can be repaired or replaced and are separate from psychological and social processes of the mind. Consequently, if the cause of a disorder is eliminated, the individual will gain health. This model emphasizes the use of numerical measurements and physical data to study health. Health is considered as absence of disease. Knowledge in medicine and science expanded quickly in the nineteenth and the twentieth century due to the development of the microscope and antiseptics, which contributed to the biomedical model (Sarafino 2002). However, many diseases are chronic and have multifactorial causes and the risk factors for

developing disease can have both biological and behavioural origins, and are thereby dependent on lifestyle. The main oral diseases, dental caries and periodontal disease, are to a high degree, dependent on lifestyle.

The biopsychosocial model has a broader perspective on health by adding the influence of psychological and social factors to biological factors (Engel, 1980). In addition to biological factors such as genetic processes and the person`s physiological functions, psychosocial factors such as behavioural or mental processes involve cognition, emotion, and motivation. Disease is described as an interaction between symptoms that affect everyday life, a person and a situation (Gannik 2005). Health, from a biopsychosocial perspective, is more than merely the absence of disease or infirmity. It is a complete state of physical, mental and social well-being and is directly related to the fulfilment of human needs (WHO 1948, Nordenfelt 1991, Darby, Walsh 1993, Medin, Alexandersson 2000). WHO extended the definition to include health as a resource which can realize wishes, satisfy needs and enable the individual to change and interact with her or his surroundings (WHO 1986).

1.2 Definitions of oral health

There are several definitions of oral health, among which the definition from WHO 2000 uses a biopsychosocial model (WHO 2000). “Oral health is well-being of the oral cavity, including the dentition and its supporting structures and tissues – the absence of disease and the optimal functioning of the mouth and its tissues, in a manner which preserves the highest level of self-esteem and inter-professional relationship.”

The present summary is based on the above definition of oral health including individual`s experiences of oral status. Clinical oral status refers to diseases and clinical findings measured by dental professionals. Oral health and dental health are used interchangeably when they are referenced in the literature.

Clinical oral status

The oral status of the adult population in Norway has improved significantly over the last 30 years. Several cross-sectional studies on dental caries among adults have been

performed in the county of Trøndelag (Bærum et al. 1984; Schuller et al. 1998, Holst et al. 2005, 2007, Holst 2008) and in Oslo (Bjertness et al. 1986, 1990). The studies from Trøndelag have shown that the number of teeth with dental caries has been reduced by 50% from 1973 to 2006 and the number of remaining teeth has increased from 20 to 27 (Schuller 1998, Holst 2007). Oral status in older age groups improved also. In 1975, 50% of the participants over 60 years were edentulous, while in 2002 this proportion had decreased to approximately 15%. In 2002, 50% had more than 20 remaining teeth (Nasjonalt folkehelseinstitutt. Rapport 2009).

Periodontal status

The proportion of 35 year-olds in Oslo with periodontitis decreased from 22% in 1984 to 8% in 2003, findings which are also in agreement with those from a Swedish population (Hugoson et al. 2008). The incidence of severe periodontitis was higher in non-Western immigrants than in Western immigrants and ethnic Norwegians (Skudutyte-Rysstad 2007).

The changes in oral status among adults in Norway during recent decades are in line with the changes in other Western countries.

Individual perception of oral health

Oral health includes the person´s experiences and goes beyond the clinical oral status measured by dental professionals (Axtelius, Söderfeldt 2004). There is limited information on patients' oral health in Norway. In this thesis, oral health and dental health will be used synonymously, even though oral health can be seen as a broader concept than dental health. In a nationwide study from 2004, 63-69% of individuals 70 years and older living at home rated their oral health as good and 9% rated their oral health as poor (Ambjørnsen 2002, Holst 2005). In 2004, 75% of individuals with university education reported good dental health, compared with 60% of high school graduates (Holst 2008). Oral health is mostly assessed with a single-item global health question: "how do you rate your oral health?" often with a five point Likert scale providing response options. Such single item measures provide summery of how

people perceive their health and may be as useful as more complex multi-item scales and indexes in health status assessments (Locker, Allan 2007, Eckbäck et al. 2008, 2009, 2010).

1.3 Health-related quality of life (HRQoL)

Quality of life is a complex concept used in medical and social science literature. A definition of quality of life, consistent with health promotion theory and practice, has been developed by the Centre for Health Promotion at the University of Toronto, Canada. It states: "quality of life is concerned with the degree to which a person enjoys the important possibilities of life" (Raphael et al. 1994). The definition respects the autonomy of the individual and acknowledges that people provide information about what is in their own best interests. The term health–related quality of life (HRQoL) was constructed to give precision to the loose use of the term quality of life in medical contexts (Patrick, Erikson 1993, Albrecht, Fitzpatrick, 1994).

There are different approaches to HRQoL and different ways to operationalize and measure HRQoL. There is consensus that the concept refers to the physical, psychosocial and social function in daily life and the impact of disease and treatment on the individual's ability to function. HRQoL can only be assessed by the individual himself or herself (Abeles et al. 1994).

In some definitions, health and health-related quality of life are synonymous. In spite of this, there is an increasing recognition that health-related quality of life refers to something broader than health conditions. Health problems can impact on quality of life, but it is not necessary that they do so. It is often assumed that poor health means poor quality of life, but many people with chronic disabling disorders rate their quality of life more highly than healthy persons (Allison et al. 1999, Holst et al. 2005, 2007, 2011) (Fig. 2).

Figure 2. Relationship between health, disease and quality of life (Locker 1988).

1.4 Oral health-related quality of life (OHRQoL)

OHRQoL is a multidimensional concept like HRQoL and concerns quality of life related specifically to oral health and disease (Fig. 3). There is a growing interest in OHRQoL and an increasing number of studies assessing OHRQoL (Ingelhart et al. 2002, Locker, Gibson 2005, Lathi et al. 2008, Einarson et al. 2009).

Studies have shown that poor oral health has negative impact on daily life for substantial proportions of older people (Tsakos et al. 2004, Locker 1997, Åstrøm et al. 2006). The negative impacts have been shown to be particularly evident among elderly individuals who did not use dental services on a regular basis (Afonso-Souza et al. 2002, Einarson et al. 2009, Holst et al. 2011). In contrast, Swedish studies (Hågglin et al. 2000, Einarson et al. 2009) have found that young women reported the poorest OHRQoL. In Finland, Lahti and co-workers (Lahti 2008) found that older individuals reported poorer OHRQoL, but young people with low education and those with missing teeth that had been replaced by removable dentures rated their OHRQoL as poor. There is limited knowledge of OHRQoL in Norway.

Recent studies have reported relatively weak relationships between clinical indicators of oral disease and OHRQoL, providing paradoxical evidences of discordance between

professionally assessed and self-rated oral health status (Locker, Slade 1994, Locker, Gibson 2005). There is an association between the number of teeth present and OHRQoL (Nutall et al. 2001, Locker, Miller 1994, Steel et al. 2004, Locker, Slade 1994, Locker, Gibson 2005, Åstrøm et al. 2006). Those with fewer teeth reported poorer OHRQoL. In addition, several studies have reported that people with more severe periodontitis rated their OHRQoL poorer than those who had less periodontitis, but there is no linear association (Åslund et al. 1997, Needleman 2004, Ng SKS 2006).

Little is known on the impact of dental caries on OHRQoL. Acharya and co-workers reported that decayed, missing and filled teeth (DMFT) were correlated with OHRQoL in an Indian population, but the correlation was based mainly on missing teeth (Acharya 2008). There is a paucity of studies on the relationship between OHRQoL and clinical oral status in Norway.

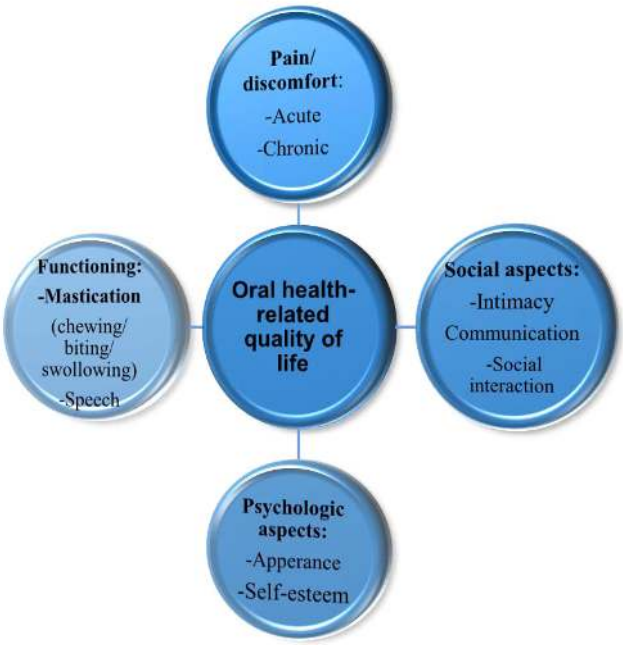

Figure 3. The main components of OHRQoL (Ingelhart and Bagramin 2002).

1.5 Measures of OHRQoL

It is complicated to assess OHRQoL because it is a multidimensional concept dealing with oral health and its effect on well-being (Locker 1988, 1994, Robinson 2003). Considerable efforts have been invested by research groups to develop instruments and questionnaires to assess the impacts of diseases on well-being and quality of life (Locker 1997, Ingelhart, Bagramian 2002, Slade, Spencer 1994, Strauss, Hunt 1993). The majority of the instruments focus on problems in the oral cavity and few assess the positive effects of oral status on OHRQoL. The instruments have been used in addition to single global oral health measures in the assessment of OHRQoL. With few exceptions, their application has been limited to cross-sectional studies, with the aim of establishing psychometric properties and estimating the prevalence of oral impacts in populations of different socioeconomic status and with different oral conditions (Slade et al. 1996, Baker et al. 2006). The items most frequently reported to be specifically influenced by oral health are pain, chewing and biting, eating, smiling and laughing, feeling comfortable and appearance (Gilbart et al. 1993).

The most widely used instrument is the Oral Health Impact Profile (OHIP), and its shortened version (OHIP-14). The questionnaire measures the impact of oral problems and covers physical, psychological and social dimensions of daily living. It is divided into seven dimensions, each with two items. The responses are scored on a five point Likert scale, from never to very often. The responses in the present studies (I and II) never indicated the highest possible OHRQoL. In contrast, the Dental Impact Profile (DIP) examines people`s assessment of both positive and the negative effects of oral health on daily life. The Dental Impact Profile measures the effects of oral health and covers physical, psychological and social dimensions of life in general (Strauss, Hunt 1993). It was constructed to indicate how life quality is affected, diminished or enhanced by oral health and oral structures, but is rarely used.

2. Aims

The overall aim of this thesis was to investigate oral health-related quality of life in Norwegians adults.

The specific aims were:

To study associations between oral health-related quality of life assessed with the Oral Health Impact Profile (OHIP-14) and demographic factors, number of teeth present, dental visits, dental health behaviour and self-rated oral health in a representative sample of Norwegian adults, aged 20 to 80 years old (Paper I).

To study how oral health-related quality of life, assessed by Oral Health Impact Profile (OHIP-14), was related to the clinically recorded number of teeth and dental caries experience, self-rated dental health and satisfaction with dental health in adults 68-77 years of age (Paper II).

To study the effect of oral health on aspects of daily life measured by the Dental Impact Profile in 35 to 47 year old individuals in Norway and to study association between reported effects and demographic variables, clinical oral health, subjectively assessed oral health, general health and oral health behaviour. A further aim was to analyse whether the original subscales of the Dental Impact Profile were similar to the subscales found in a Norwegian population 35 to 47 years of age (Paper III).

3. Materials and methods

3.1 Design

The studies were descriptive and comparative cross-sectional studies. A design overview of Papers I-III is provided in Table I. The data were collected through questionnaires and clinical examinations.

Table I. Overview of study design and measurements

Paper	Design	Measurements
I	Cross-sectional study on a stratified random sample	Questionnaire, OHIP 14
II	Cross-sectional study on a stratified random sample	Questionnaire, OHIP-14, clinical measurements
III	Cross-sectional study on a stratified random sample	Questionnaire, DIP, clinical measurements

3.2 Participants

In Study I, the sample was drawn from a stratified group from the national population register, based on age, gender and place of residence. Within each stratum, a proportional random sample was drawn and the final sample comprised of 3 538 inhabitants. Residents in institutions were not included. To ensure a sufficiently high response rate from participants aged 80 years and older, the questionnaire was mailed to a larger proportion of participants in this age group than their actual proportion of the population. The datasets are representative of the non-institutionalized adult population. The distribution of participants by demographic factor corresponded well with the Norwegian population. Overall, 2438 persons

returned the questionnaire and 2180 (69%) answered all the questions in the questionnaire.

Studies II and III included a random sample of adults in the county of Nord-Trøndelag in central Norway. A sample was drawn from four municipalities comprising 129 000 inhabitants. A stratified randomization was used with regard to the municipalities Levanger, Steinkjer, Verdal and Stjørdal. The selection procedure was computerized and the sample was randomly selected from the birth cohorts 1929-1938 (Study II) and 1971-1962 and 1960-1959 (Study III) using the birth registry. In Study II, an invitation to participate was sent to 250 people and 151 (60%) accepted to participate. In Study III, 400 persons were invited and 249 (62%) accepted to participate (Table II).

3.3 Questionnaires

All questionnaires included demographic questions (age, sex and length of education), dental visits, dental hygiene habits, self-rated oral health, self-rated general health and satisfaction with oral health. The time frame was the last 12 months. Number of teeth was assessed by the participants themselves in Study I and by dental professionals in Studies II and III.

Self-rated oral health and self-rated general health were measured by the question: “How do you rate your oral health/general health?” Satisfaction with oral health was measured by the question: ”How satisfied are you with your teeth/ dentures?” The responses were given using a five point Likert-scale from very poor/very dissatisfied to very good /very satisfied.

OHRQoL was assessed with OHIP-14 in Studies I and II and with DIP in Study III. The OHIP-14 is a 14 item questionnaire which assesses impacts of oral conditions on people’s OHRQoL and has previously been tested and found to be valid, reliable and precise (Ingelhart 2002, Locker 1994, Slade 1997). The participants were asked to respond according to the frequency of impacts on a 5-point Likert scale (never = 0, seldom = 1, sometimes = 2, fairly often = 3, and very often = 4). The overall OHIP-14

score was calculated by adding the scores from the 14 items giving a scale from 0 to 56 with higher score indicating poorer OHRQoL (Table II).

The DIP is a 25-items questionnaire which assesses the effect of oral health on daily life with three response options: positive, negative or no effect. It is divided in four subscales: eating, health/wellbeing, social relations and romance, with five to nine items in each subscale and has previously been tested and found to be valid, reliable and precise (Strauss, Hunt 1993) (Table II).

Table II. Description of the study participants age, gender and education.

	Study I	**Study II**	**Study III**
Number of eligible subjects n	3 538	250	400
Number of participants n (%)	2 438 (69)	151(60)	242(62)
Sex			
Females n (%)	1 078 (49)	77 (51)	118 (49)
Males n (%)	1 102 (51)	74 (49)	124 (51)
Age			
Mean (SD)	NA	72.1 (2.8)	42.3 (3.9)
Range	20-80	68-77	35-47
Education			
< 8 years	10	54	0
8-12 years	43	29	64
>12 years	47	17	36

3.4 Clinical examination

All clinical examinations were performed by one experienced dentist and one experienced dental hygienist, who were calibrated beforehand. The numbers of teeth and numbers of teeth with dental caries were recorded. Dental caries experience was registered using the decayed missing filled teeth (DMFT) index according to the WHO criteria (World Health Organization Oral health care systems). A tooth was registered as decayed when caries extended into the dentin. The third molar was not included to enable comparison with previous studies.

3.5 Procedure

Study I was a cross-sectional Norwegian national study initiated by TNS Gallup (TNS Gallup, Norway) in 2004. A questionnaire (Appendix I) including a reply-paid envelope was sent by ordinary mail in the spring to a sample of inhabitants aged 20 years or older. No reminder was sent.

Studies II and III were cross-sectional studies based on selected birth cohorts in 4 counties in Nord-Trøndelag. In 1973 an international collaborative health study (WHO-ICS-I) that were initiated by the World Health Organization used samples from the birth cohorts 1962-1971, 1959-1960 and 1929-1938 (World Health Organisation 1985). Samples from these birth cohorts have previously been examined in 1983, 1994 and 2006. Studies I and II were based on random samples from the same birth cohorts. The selected participants were invited to participate in the study by an invitation letter with general information about the study (Appendix II). All non-participants (Studies II and III) were contacted by phone. Examination of participants was performed during October and November 2006 and comprised a clinical examination free of charge at the dental clinics in the Public Dental Service and a self-administered questionnaire (Appendix II). The participants completed the questionnaire in the dental clinic before the clinical examination.

3.6 Statistical analyses

The data analyses were based on the respondents who answered all the questions in questionnaires. The software SAS version 9.0 was used for study I and SPSS for Windows version 16.0, SPSS Inc. Chicago, III, USA for study II and III. An overview of the statistical analyses is given in Table III. A p-value <0.05 was considered as statistically significant.

Table III. Overview of statistical methods

Study	**Statistical methods**
I	Student`s *t*-test ANOVA, Bonferroni test for post-hoc comparisons Chi-square test Multivariate logistic regression
II	Pearsons Chi-square with Yates and Fisher`s exact test ANOVA Spearman's rho
III	Student`s *t*-test Chi-square test Multivariate logistic regression Factor analyses

3.7 Ethical considerations

Participation was voluntary and written informed consent was obtained from all participants in Studies II and III. All data were confidential. The Nord-Trøndelag studies were approved by the Regional Ethical Committee Mid-Norway (ref. 4.2006. 250 - date 06.04.06) for Research Ethics, Oslo Norway. TNS Gallup has a general licence to collect data in population studies.

4. Results

4.1 Paper I. Oral health-related quality of life and associated factors in Norwegian adults

The aim of this study was to investigate associations between oral health-related quality of life assessed with the Oral Health Impact Profile (OHIP-14) and demographic factors, number of teeth present, dental visits, dental health behaviour and self-rated oral health in a representative sample of 20-80 year old Norwegians. The mean OHIP-14 score was 4.1 (SD = 6.2). No problems related to oral health-related quality of life were reported by 35% of the respondents. The most frequently reported problems were: physical pain (56%), psychological discomfort (39%) and psychological disability (30%). When the effects of all independent variables were analysed in multivariate analysis, self-rated dental health, frequency of dental visits, number of teeth, age and sex were significantly ($p<0.05$) associated with the prevalence of having problems and often having problems reported on the OHIP-14 scale. Self-rated dental health had the strongest association with having problems (OR = 4.5, CI 3.4 - 6.0) and with having problems often (OR= 4.0, CI 2.7 - 5.8). Dental health behaviours, use of floss, toothpicks and oral rinse were not associated with having problems related to oral health-related quality of life in multivariate analyses. ***Conclusions.*** In this Norwegian adult sample, self-rated dental health, frequency of dental visits, number of teeth, age and sex were associated with having problems estimated using the Oral Health Impact Profile (OHIP-14).

4.2 Paper II. Oral health-related quality of life among adults 68-77 years old in Nord-Trøndelag, Norway

The aim of this study was to investigate how clinical recorded dental health, self-rated dental health and satisfaction with dental health were related to oral health-related quality of life (OHRQoL) assessed by Oral Health Impact Profile (OHIP-14) in 68-77 years old. A total of 151 individuals completed a questionnaire on self-rated dental

health, satisfaction with dental health and the short form of Oral Health Impact Profile (OHIP-14). The number of teeth present and teeth with dental caries were recorded by clinical examination. In total, 63% of the individuals rated their dental health as good and 59% were satisfied with their dental health. Using the OHIP-14, 42% reported no problems or no oral discomfort. The proportion of individuals reporting problems or discomfort varied between 13% and 43%, depending on the dimensions of OHIP-14. The most frequently reported problems were physical pain (43%), psychological discomfort (28%) and psychological disability (28%). Individuals who rated their dental health as poor and those who were dissatisfied with their dental health had significantly lower oral health-related quality of life than other individuals. The study showed a relationship between self-evaluations of dental health and OHRQoL in 68 to 77 years old. Individuals with few teeth reported lower OHRQoL than others but no association between clinical caries status and OHRQoL was found.

4.3 Paper III. Does oral health matter in people`s life? Oral health-related quality of life in adults 35 to 47 years of age in Norway

The aim of the present study was to assess the effect of oral health on aspects of daily life measured by the Dental Impact Profile in 35 to 47 year old individuals in Norway, and to study associations between reported effects and demographic variables, clinical oral health, subjectively assessed oral health, subjectively assessed general health and oral health behavior. Items most frequently reported to be positively or negatively influenced by oral health were: chewing and biting, eating, smiling and laughing, feeling comfortable and appearance. Only 1% reported oral health to have no effects on daily life. Individuals with fewer than two decayed teeth, individuals who rated their oral health as good, or who practised good oral health behaviour, reported significantly more positive effects than others on oral quality of life. When the variables were included in multivariate analysis, none was statistically significant. The subscales of the Dental Impact Profile when used in adults were somewhat different than the originally suggested subscales. **Conclusions**. This study showed that most adults felt oral health to be important for masticatory function and confirmed that oral health also had impacts on other aspects of life.

5. Discussion

5.1 Methodological issues

This thesis is based on data collected in three cross-sectional studies. Stratified random sampling was used and data collected by oral clinical examination and self-administered questionnaires. Paper I is based on data collected by use of a self-reported quantitative questionnaire. Papers II and III used data collected by self-reported questionnaires and clinical examinations.

5.1.1 Subjects

The participants were selected in two ways. The participants in Paper I were randomly selected from the total population of 20 to 80 year old Norwegians. The sample was drawn from a stratified population in the national registry based on age, sex and place of residence. Within each stratum, a proportional random sample was drawn. The datasets are representative of the non-institutionalized adult population. The distribution of participants by demographic factors corresponded well with that of the Norwegian population. The response rate was 69%, evenly distributed among the age groups. The participants in the second study were based on samples from the birth cohort 1929 to 1938 and the sampling procedure had been examined in earlier years in Nord-Trøndelag. The sampling selected using the same procedure before and is regarded as representative of a Norwegian population. The response rate was 60.4%. The third study was based on samples from the birth cohorts 1962 to 1971 and 1959 to 1960 and the sampling procedure had been examined in earlier years in Nord-Trøndelag. The response rate was 62%.

No statistically significant difference was found between those who participated and those who declined to participate with regard to age and sex in Studies II and III. Obtaining high response rates usually lowers the probability of serious non-response bias (Lesaffre et al. 2009). A response rate between 60% and 69% must be regarded as

acceptable today. The sampling procedure and the acceptable response rate indicate that the results may be regarded as representative for the Norwegian population.

5.1.2 Questionnaires - validity

An instrument is said to be valid if it measures what it purports to measure (McDowell and Newell 1996).

In all papers, questionnaires were used to assess self-rated oral health, dental visits, oral hygiene habits and demographic variables. To assess OHRQoL, the OHIP-14 was used in Papers I and II and the Dental Impact Profile in Paper III.

The OHIP-14 is a well known questionnaire, and has been found to be valid and reliable (Locker 1994, Slade 1997). It is widely used and, having been translated into several languages, it is consequently useful for comparisons between countries. In all papers, there was clear agreement between self-rated oral health and the scores on the instruments used to measure OHRQoL. Those who rated their oral health as good reported a better OHRQoL, which strengthens the validity of the questionnaires used to assess OHRQoL. In addition, there was agreement between number of teeth and OHRQoL a finding, which has been reported in many studies (Nutall et al. 2001, Steel et al. 2004, Locker, Gibson 2005, Åstrøm et al. 2006). This further strengthens the validity. The Dental Impact Profile has been used only once before but its development has been thoroughly described and was found to be valid and reliable (Strauss et al. 1993). The factor analysis in the present study resulted in a somewhat different pattern than the original subscales. The original subscales were constructed based on a factor analysis in an elderly population in North Carolina, USA and the authors hypothesized that the impact of teeth or dentures on a person's life would be age dependent and reflect the different values and experiences of various cultural groups. It was also reported, in the development of the instrument, that most of the use of the instrument was based on the total score and not on subscales. The responses in the present study correspond with participants' assessments of their own oral health. Those who assessed their oral health as good reported to a greater

extent that oral health had a positive effect on their daily life. The results of the new subscales seem reasonable, as the great majority of respondents reported that oral health had an effect on the eating subscales but the effect on life in general was reported to a much lesser extent. The question used regarding self-rated oral health is an often used question and a five point Likert scale seems to give enough variety for the respondents to rate their oral health.

5.1.3 Questionnaires - reliability

A test is reliable to the extent that repeated measurements made under constant conditions will give the same results and is thus concerned with the degree of consistency or accuracy with which it measures an attribute (Moser, Kalton 1979, Polit, Hungler 1991). Measurement error plays a key role in reducing reliability; a reliable instrument minimizes the error component and maximizes the true component of a score. In Paper I, the age group 60-69 years reported an OHIP-14 score of 3.4 which is exactly the same as reported in Paper II (68-77 years of age), This strengthen the reliability of the OHIP-14.

Cronbach's alpha was applied to assess the internal consistency reliability estimation in both Paper I and Paper III with acceptable result. In Paper III, the Cronbach`s alpha values of the subscales were between 0.75 and 0.90 indicating the high internal consistency reliability of the Dental Impact Profile inventory.

5.1.4 Clinical examination

The clinical examination was carried out by a dentist and a dental hygienist (KED) in a fully equipped dental clinic using a mirror and a probe. No radiographs were used, to enable comparison with previous studies and also because radiographs for epidemiological studies are seldom ethical, they expose people to radiation with no personal benefit. A calibration session was performed prior to the studies in which three patients were examined independently by the two examiners and the results were identical. The numbers of teeth present in the mouth and the numbers of teeth with dental caries were recorded. Dental caries was recorded using the DMFT index

according to WHO criteria. A tooth was registered as decayed when caries extended into the dentine. The number of decayed teeth was used to indicate the caries status of the remaining teeth. This is a well known and commonly used index and the two examiners were experienced dental professionals, which strengthens the reliability of the clinical measurements. In Paper I, each respondent assessed the number of teeth present, a method which has been reported to be reliable (Bulin et al. 2002, Heløe 1972). The magnitude of the present correlations, the consistent findings and the conclusions harmonizing with the applied theories all indicate an acceptable reliability and validity of the findings.

5.2 Discussion of major findings

The results of these studies indicate that oral health is of importance for most adults. It has implications for masticatory function and is also related to psychological comfort and contributes to social relations. Physical pain was the most frequently reported oral problem both in the nationwide sample study of adults in Papers I and in the elderly sample studied in Paper II. In Paper III, oral health was most frequently reported to have impact on the items related to eating. Even though people rated their oral health as good, many still reported problems related to OHRQoL.

Psychological discomfort and disability were reported to be the second and third most frequently reported problems in Papers I, II and III, and oral health was reported to have effects on many aspects of social relations and health/wellbeing among 46% to 50% of the respondents in Paper III.

Associations between number of natural teeth present and OHRQoL have been studied previously (Nutall et al. 2001, Steel et al. 2004, Åstrøm et al. 2006). In the present work, the association between number of teeth and OHRQoL was found both in the national sample and in the elderly (Paper I and Paper II). It has previously been reported that number of teeth present was the most important factor influencing OHRQoL for individuals with few remaining teeth (Acharya 2008). Association between number of natural teeth and OHRQoL was not found in the present study of

the middle aged (35 to 47 years) sample. In this age group the majority of the participants had more than 23 teeth. Individuals who have retained almost all their teeth may have other values and perceptions than individuals with fewer teeth.

In the present studies, the association between sex and OHRQoL varied. Women reported poorer OHRQoL than men in the representative sample of 20 to 80 year old Norwegians in Paper I, but the opposite was found in the sample of 68 to 78 year olds in Paper II. In Paper III, where a different instrument was used to assess OHRQoL, no statistically significant difference between men and women could be found in the middle aged generation (35 to 47 years). In a Swedish study on the same age group as in paper I (20 to 80 years), women also reported poorer OHRQoL (Einarson et al. 2009). One possible explanation for the tendency that women report poorer OHRQoL than men may be that they care more about their health and their appearance and hereby are more conscious about their oral health.

The association between education and OHRQoL was studied in three different samples in this thesis. In the national sample of 20 to 80 year olds, individuals with higher education reported better OHRQoL. The tendency was the same for 68 to 78 years old, even though the difference was not statistically significant. In the 35 to 47 years of age sample, the pattern was the same as for 68 to 78 year-olds. The present results are in line with those of previous studies and confirm that level of education is associated with OHRQoL (Ekbäck et al. 2010, Tsakos et al. 2009).

A large proportion of the adults reported satisfaction with their oral health in these studies. Of the participants in the national sample of 20 to 80 year olds, 71% rated their oral health very good or good compared with 62% in the study of the elderly (68 to 77 year olds) and 95% of the middle aged (35 to 47 years of age). The results seem reasonable, since the youngest generation has more remaining teeth and less experience of dental caries, indicating that the individuals' ratings follow the dental status measured by dental professionals, even though there is no clear linear relationship. A total of 59% of the elderly reported satisfaction with their oral health. This is somewhat fewer than in a study by Ekbäck and co-workers 2009, which

reported that 77% of 65-year-old Norwegian participants rated their oral health as satisfactory. In that study, the responses were dichotomized into satisfied or not satisfied while the responses in the present study were categorized as satisfied, neither-nor, or dissatisfied. In the middle aged (35 to 47 years), 85% reported satisfaction with their oral health (Paper III).

The impact of oral health problems does decline with increasing age, according to the results in Paper I. The youngest adults, 20 to 40 years of age, in Norway reported more problems related to quality of life than did older adults. There was association between the numbers of decayed teeth and OHRQoL in the age group 35 to 47 years (Paper III), which was not confirmed in the older generation (Paper II). This may indicate that the older generation seems to accept their health status to a greater extent than do younger people. Oral impacts and subjective oral health may have different meanings for individuals of different ages. The youngest age group may have high expectations. They may consider what they see as being normal and acceptable for a given age and specific circumstances, and when the experience falls short of expectations, there is an impact on quality of life (Carr et al. 2001, Locker, Gibson 2005). Younger individuals without caries experience may be more sensitive to pain and, furthermore, they may be more aware of appearance, often very important for young people. The results are in line with those of a Swedish study, which reported problems more often in the youngest age group (Einarson et al. 2009). Åstrøm et al. studied the influence of age, numbers of missing teeth and socio-demographic factors among 16-79 year olds in Norway and observed enhanced OHRQoL with rising age after controlling for dental status (Åstrøm et al. 2006). This indicates that being satisfied with oral health is a matter of clinical condition as well as of social, cultural and behavioural circumstances.

In all three studies in the present thesis, associations between self-assessed oral health and OHRQoL were found, even though two different instruments, OHIP-14 and the Dental Impact Profile, were used. An important difference between the instruments is that in the OHIP-14 questionnaire, the focus was on oral problems, while, in the Dental Impact Profile, the positive influence of oral health on OHRQoL

was also assessed. When the Dental Impact Profile was used, in the younger adult group, the majority of the respondents stated that oral health had positive effects on their daily life. This is a finding which appears to be in conflict with the findings in Paper I, where the younger adults reported most frequent problems assessed with OHIP-14. When using OHIP-14, it is only possible to capture whether there have been problems in relation to oral health, but with the Dental Impact Profile, the questioning is different, giving raise to slightly different answers. Individuals who have had pain in their oral cavity would report the pain as an oral problem in OHIP-14 but may not consider it a negative effect in the Dental Impact Profile if it did not prevent them from eating. It is consequently likely that the choice of questionnaire may influence the results and it would be of interest to use both questionnaires in the same population to capture the different perspectives on OHRQoL. Independently of the questionnaire, the results of these studies showed that adults care about their oral health and that oral health is important to their quality of life.

In order to encourage individuals to adopt a healthy lifestyle, it is of importance to consider the individual's perspective of oral health and OHRQoL.

5.3 Conclusion

The studies reported in this thesis showed that most adults reported oral health to be important for masticatory function and confirm that oral health also has impacts on other aspects of life.

The major conclusions of the present study are as follows:

- Being female, of younger age, rating one's oral health as poor, visiting a dental professional irregularly and having few remaining teeth were associated with poorer OHRQoL estimated by OHIP-14 in a representative sample of Norwegian adults 20 to 80 years of age.

- Among elderly, those who rated their oral health as poor, who were dissatisfied with their oral health or who had few remaining teeth, reported lower OHRQoL than others.
- Most middle aged adults reported oral health to be important for masticatory function and, in addition, that oral health had impacts on other aspects of life. Individuals who rated their oral health as good had few teeth with dental caries and those who practised good dental hygiene habits reported that oral health had positive effects on daily life to a greater extent than did other individuals.

5.4 Further research

There is a growing consensus that disease measured by professionals is conceptually and empirically not the same as illness and health self-assessed by the individual. It is therefore of interest to study further associations between oral health assessed by dental professionals using clinical measures and the individuals' perceptions of oral health.

This thesis highlights the need of further knowledge on the influence of oral health promotion, prevention and treatment on OHRQoL

The patient's perception of oral problems and oral treatments are not always reflected in dental treatment and dental research, despite the fact that oral health influences overall health and well-being and the quality of life. The oral cavity and the teeth affect many aspects of life, such as eating, laughing, communication and appearance. The patient's perspective is thus important for successful treatment. It would be interesting to follow OHRQoL over time to investigate whether OHRQoL increases as dental disease decreases.

In a salutogenic perspective, the focus is on exploring the reasons why people stay healthy, instead of examining why they get diseases. Therefore it is necessary to continue the discussion of and the development of the health and disease concept.

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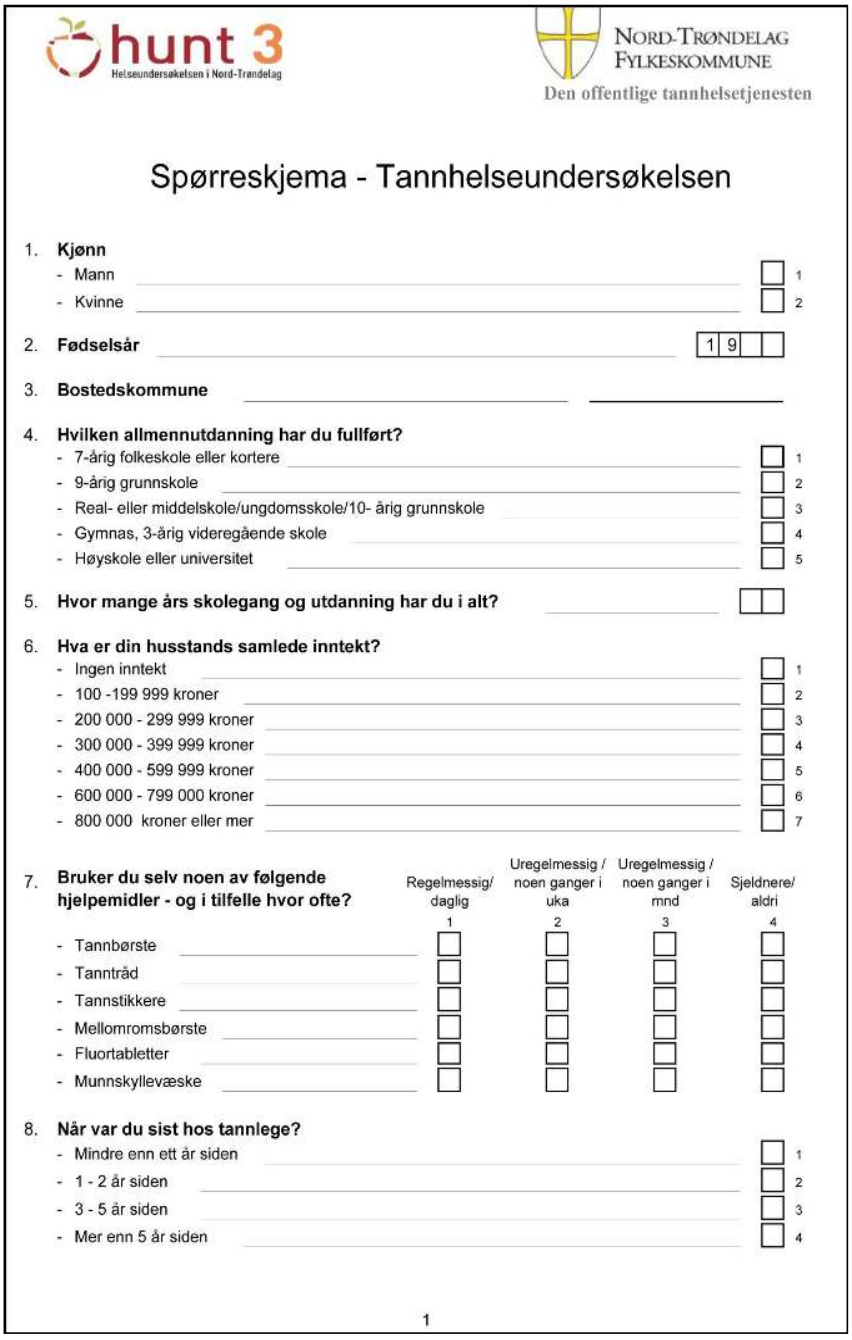
7. APPENDICES I-II

APPENDICES I



hunt 3
Helseundersøkelsen i Nord-Trøndelag

NORD-TRØNDELAG FYLKESKOMMUNE
Den offentlige tannhelsetjenesten

Spørreskjema - Tannhelseundersøkelsen

1. **Kjønn**
   - Mann ☐ 1
   - Kvinne ☐ 2

2. **Fødselsår** 1 9 ☐ ☐

3. **Bostedskommune** _____ _____

4. **Hvilken allmennutdanning har du fullført?**
   - 7-årig folkeskole eller kortere ☐ 1
   - 9-årig grunnskole ☐ 2
   - Real- eller middelskole/ungdomsskole/10- årig grunnskole ☐ 3
   - Gymnas, 3-årig videregående skole ☐ 4
   - Høyskole eller universitet ☐ 5

5. **Hvor mange års skolegang og utdanning har du i alt?** ☐☐

6. **Hva er din husstands samlede inntekt?**
   - Ingen inntekt ☐ 1
   - 100 -199 999 kroner ☐ 2
   - 200 000 - 299 999 kroner ☐ 3
   - 300 000 - 399 999 kroner ☐ 4
   - 400 000 - 599 999 kroner ☐ 5
   - 600 000 - 799 000 kroner ☐ 6
   - 800 000 kroner eller mer ☐ 7

7. **Bruker du selv noen av følgende hjelpemidler - og i tilfelle hvor ofte?**	Regelmessig/ daglig 1	Uregelmessig / noen ganger i uka 2	Uregelmessig / noen ganger i mnd 3	Sjeldnere/ aldri 4
- Tannbørste	☐	☐	☐	☐
- Tanntråd	☐	☐	☐	☐
- Tannstikkere	☐	☐	☐	☐
- Mellomromsbørste	☐	☐	☐	☐
- Fluortabletter	☐	☐	☐	☐
- Munnskyllevæske	☐	☐	☐	☐

8. **Når var du sist hos tannlege?**
   - Mindre enn ett år siden ☐ 1
   - 1 - 2 år siden ☐ 2
   - 3 - 5 år siden ☐ 3
   - Mer enn 5 år siden ☐ 4

1

9. **Når var du sist hos tannpleier?**
   - Mindre enn ett år siden ☐ 1
   - 1 - 2 år siden ☐ 2
   - 3 - 5 år siden ☐ 3
   - Mer enn 5 år siden ☐ 4
   - Har aldri vært hos tannpleier ☐ 5

10. **Hvis det er mer enn 2 år siden du var hos tannlege/tannpleier, hva er da grunnen ?**
   - Jeg har ikke blitt innkalt ☐ 1
   - Det er lang ventetid hos tannlegen/tannpleieren ☐ 2
   - Jeg har ikke hatt tid ☐ 3
   - Jeg har ikke hatt behov ☐ 4
   - Jeg har ikke prioritert det ☐ 5
   - Andre årsaker: _____

11. **På hvilken måte kommer du i kontakt med tannlege/tannpleier?**
   - Blir innkalt av tannlege/tannpleier ☐ 1
   - Tar selv kontakt når jeg har behov ☐ 2
   - Bruker ikke å gå til tannlege/tannpleier så ofte ☐ 3

12. **Dersom du har en innkallingsavtale, hvor ofte innkalles du?**
   - Det kan variere fra gang til gang ☐ 1
   - Hver 6. måned eller oftere ☐ 2
   - Hver 7. til hver 12. måned ☐ 3
   - Hver 13. til hver 18. måned ☐ 4
   - Hver 19. til hver 24. måned ☐ 5
   - Hvert annet år eller sjeldnere ☐ 6

13. **Har du i løpet av de siste 2 årene utsatt å gå til tannlege/tannpleier fordi du ikke hadde råd?**
   - Ja ☐ 1
   - Nei ☐ 2

14. **Dersom du har vært til behandling i løpet av de siste 2 årene:**
   - Utførte du den behandlingen tannlegen/tannpleier anbefalte ☐ 1
   - Utførte du rimeligere behandling enn anbefalt ☐ 2
   - Avsto du fra behandlingen på grunn av høye utgifter ☐ 3

15. **Hvor fornøyd er du med tennene dine/protesen din på en skala fra 1 til 5?**

	Svært misfornøyd				Svært fornøyd
	1	2	3	4	5
	☐	☐	☐	☐	☐

16. **Hvor mye har du betalt totalt for din egen tannbehandling de siste 12 månedene?**
   - Ingenting (ikke vært hos tannlege/tannpleier) ☐ 1
   - Ingenting (har fått kostnadene dekket) ☐ 2
   - Mindre enn 500 kroner ☐ 3
   - 500-1000 kroner ☐ 4
   - 1001 - 2000 kroner ☐ 5
   - 2001- 4000 kroner ☐ 6
   - 4001 - 6000 kroner ☐ 7
   - 6001 - 10 000 kroner ☐ 8
   - 10 001 - 15 000 kroner ☐ 9
   - Mer enn 15 000 kroner ☐ 10

17. **Hvor mye har du betalt totalt for din egen tannbehandling de siste 2 årene?**

- Ingenting (ikke vært hos tannlege/tannpleier) ☐ 1
- Ingenting (har fått kostnadene dekket) ☐ 2
- Mindre enn 500 kroner ☐ 3
- 500-1000 kroner ☐ 4
- 1001 - 2000 kroner ☐ 5
- 2001- 4000 kroner ☐ 6
- 4001 - 6000 kroner ☐ 7
- 6001 - 10 000 kroner ☐ 8
- 10 001 - 15 000 kroner ☐ 9
- Mer enn 15 000 kroner ☐ 10

18. **Hvordan vurderer du din tannhelse og din generelle helsetilstand på en skala fra 1 - 5?**

	Meget dårlig 1	Dårlig 2	Verken god eller dårlig 3	God 4	Meget god 5
- Jeg vurderer min tannhelse som…	☐	☐	☐	☐	☐
- Jeg vurderer min generelle helsetilstand som…	☐	☐	☐	☐	☐

19. **Hvor fornøyd/misfornøyd er du med følgende forhold ved siste tannbehandlig:**

	Svært misfornøyd 1	2	3	4	5	Svært fornøyd 6	Vet ikke 7
- Den fysiske tilgjengeligheten til kontoret/klinikken	☐	☐	☐	☐	☐	☐	☐
- Ventetiden for å få time	☐	☐	☐	☐	☐	☐	☐
- Tilgjengelighet på telefon	☐	☐	☐	☐	☐	☐	☐
- Muligheten for å få akutt hjelp	☐	☐	☐	☐	☐	☐	☐
- Serviceinnstillingen	☐	☐	☐	☐	☐	☐	☐
- Faglig dyktighet	☐	☐	☐	☐	☐	☐	☐
- Evne til å snakke et lett forståelig språk	☐	☐	☐	☐	☐	☐	☐
- Evne til å lytte til deg	☐	☐	☐	☐	☐	☐	☐
- Evne til å ta deg og dine plager på alvor	☐	☐	☐	☐	☐	☐	☐
- Evne til å gi smertefri behandling	☐	☐	☐	☐	☐	☐	☐
- I hvilken grad du har en fast tannlege å forholde deg til	☐	☐	☐	☐	☐	☐	☐
- Informasjon om behandlingen og hva som feiler/feilte deg	☐	☐	☐	☐	☐	☐	☐
- Informasjon om hva behandlingen vil koste	☐	☐	☐	☐	☐	☐	☐
- Råd og behandling	☐	☐	☐	☐	☐	☐	☐
- Behandlingsresultatet	☐	☐	☐	☐	☐	☐	☐
- Geografisk avstand til kontoret/klinikken	☐	☐	☐	☐	☐	☐	☐
- Den samlede pris	☐	☐	☐	☐	☐	☐	☐

20. **Hvis du fortsatt har egne tenner, hvilke ønsker har du for tennene dine:**

	Ja, absolutt 1	Ja 2	Vet ikke 3	Mulig 4	Nei 5
- Har du ønske om å beholde tennene dine hele livet?	☐	☐	☐	☐	☐
- Regner du med å beholde tennene dine hele livet?	☐	☐	☐	☐	☐
- Tror du at du er i stand til å betale utgiftene ved å ta vare på dine egne tenner hele livet?	☐	☐	☐	☐	☐
- Får du den hjelp du trenger fra tannlege/tannpleier for å ta vare på tennene hele livet?	☐	☐	☐	☐	☐

Spørsmål 21, 22 og 23 besvares kun av deltakere i alderen 68-77 år:

(Hvis du er i alderen 35-44 år eller 46-47 år, gå til spørsmål 24)

21. **Nedenfor stilles noen spørsmål om du i løpet av det siste året har hatt problemer eller ubehag på grunn av dine tenner eller proteser (gebiss) eller på grunn av andre forhold i munnen**

	Aldri 1	Sjelden 2	Av og til 3	Ganske ofte 4	Ofte 5	Vet ikke 6
- **Har du på grunn av dine tenner, forhold i munnen eller protesen:**						
- opplevd at mat har gitt deg ubehag	☐	☐	☐	☐	☐	☐
- hatt en dårlig kost/kostsammensetning	☐	☐	☐	☐	☐	☐
- måttet avbryte måltider	☐	☐	☐	☐	☐	☐
- hatt vanskeligheter med å uttale ord eller lage spesielle lyder	☐	☐	☐	☐	☐	☐
- **Har din smakssans blitt endret/dårligere på grunn av dine tenner, forhold i munnen eller protesen**	☐	☐	☐	☐	☐	☐
- **Har du på grunn av dine tenner, forhold i munnen eller protesen:**						
- følt deg usikker	☐	☐	☐	☐	☐	☐
- følt deg spent eller stresset	☐	☐	☐	☐	☐	☐
- hatt problemer med å slappe av	☐	☐	☐	☐	☐	☐
- følt deg sjenert	☐	☐	☐	☐	☐	☐
- **Har du i løpet av det siste året hatt smerte eller vondt i tennene, i munnen eller på grunn av protesen**	☐	☐	☐	☐	☐	☐
- **Har du på grunn av dine tenner, forhold i munnen eller protesen:**						
- vært irritabel overfor andre mennesker	☐	☐	☐	☐	☐	☐
- hatt vanskeligheter med dine vanlige gjøremål	☐	☐	☐	☐	☐	☐
- følt at livet i sin alminnelighet var mindre tilfredsstillende	☐	☐	☐	☐	☐	☐
- ikke kunnet fungere i hverdagen	☐	☐	☐	☐	☐	☐

22. **Har du hatt problemer eller ubehag på grunn av munntørrhet i løpet av det siste året?**

- Ja ☐ 1
- Nei ☐ 2

23. **Har du behov for mer tannbehandling enn vanlig på grunn av medisiner du tar?**

- Ja ☐ 1
- Nei ☐ 2
- Tar ikke medisin ☐ 3

Spørsmål 24 besvares kun av deltakere i alderen 35-44 år og 46-47 år:

24. **Nedenfor stilles noen spørsmål om hvordan dine tenner og tannhelse påvirker ditt daglige liv.**

Har tenner og tannhelse en positiv, en negativ eller ingen betydning for deg i forhold til:

	Positiv betydning 1	Ingen betydning 2	Negativ betydning 3
- om du føler deg vel	☐	☐	☐
- om du er trygg i forhold til andre	☐	☐	☐
- om du kan spise	☐	☐	☐
- om du kan smake maten	☐	☐	☐
- å leve et langt liv	☐	☐	☐
- om du kan tygge	☐	☐	☐
- ditt utseende i møte med andre	☐	☐	☐
- ditt humør	☐	☐	☐
- å kunne kysse	☐	☐	☐
- din generelle helse	☐	☐	☐
- å delta i ulike aktiviteter	☐	☐	☐
- å utføre jobben din godt	☐	☐	☐
- din appetitt	☐	☐	☐
- å kunne smile og le	☐	☐	☐
- å være sexy	☐	☐	☐
- ditt ansikt slik det ser ut	☐	☐	☐
- ditt sosiale liv	☐	☐	☐
- gleden over et måltid	☐	☐	☐
- å kunne snakke	☐	☐	☐
- din ånde	☐	☐	☐
- valget av hva du vil spise	☐	☐	☐
- å kunne glede seg over livet	☐	☐	☐
- kjærlighetslivet	☐	☐	☐
- trivsel	☐	☐	☐
- din vekt	☐	☐	☐

Takk for hjelpen!

APPENDICES II

Den offentlige tannhelsetjenesten

Invitasjon til deltakelse i tannhelseundersøkelsen

Fra høsten 2006 fram til sommeren 2008 inviteres alle i Nord-Trøndelag som er 13 år og eldre til ny stor helseundersøkelse. En del av denne helseundersøkelsen er en tannhelseundersøkelse. Den kommer for mange før selve helseundersøkelsen. Du er invitert til å delta.

Hvem kan delta i gratis tannhelseundersøkelse?

Til denne undersøkelsen inviteres kvinner og menn i aldersgruppen 35-44 år, 46-47 år og 68-77 år, som bor i Steinkjer, Levanger, Stjørdal, Verdal. I alt blir omtrent 650 personer invitert.

Hva går undersøkelsen ut på?

Hvis du ønsker å delta, vil du bli innkalt til en enkel og smertefri tannhelseundersøkelse på den offentlige tannklinikken i din hjemkommune. Vi undersøker tenner og tannkjøtt, og tar to røntgenbilder. Du vil i tillegg bli bedt om å svare på et spørreskjema om tannhelse og behov for tannhelsetjenester. Har du tannproteser er du like velkommen. Undersøkelsen varer omtrent 15 minutter.

Bakgrunn for undersøkelsen

Hensikten med tannhelseprosjektet er å følge utviklingen i tannhelsen hos voksne trøndere. Det er siden 1973 gjennomført flere slike undersøkelser i Nord-Trøndelag. Vi er denne gangen også spesielt interessert i å undersøke voksne sitt syn på verdien av å ha egne tenner, og hva det betyr for deres livskvalitet.

Konsekvenser for deg

Undersøkelsen er helt smertefri og innebærer ingen risiko. Etter undersøkelsen får du et sett med tannpleiemidler. Undersøkelsen er gratis og dine reiseutgifter vil bli

refundert opp til kr 100. Hvis du er bevegelseshemmet, eller må ha følge, dekkes opp til kr 200 av reiseutgiftene.

Opplysningene som blir samlet inn, blir avidentifisert og lagret i HUNT forskningssenters databank og behandlet på samme måte som andre opplysninger du gir HUNT 3. Alle medarbeidere har taushetsplikt. HUNT 3 er godkjent av Datatilsynet og Regional komité for medisinsk forskningsetikk.

Frivillig

Deltakelse i studien er frivillig. Vi håper at du ønsker å delta. Du står fritt til å trekke deg fra undersøkelsen når du ønsker det, uten å gi en begrunnelse.

Undersøkelsen foregår i samarbeid med Den offentlige tannhelsetjenesten i Nord-Trøndelag. Undersøkelsen erstatter ikke den vanlige innkallingen til tannlege eller tannpleier, men kommer i tillegg.

Med vennlig hilsen

Dorthe Holst
professor

Kari Strand
fylkestannlege

Hvis du har spørsmål til undersøkelsen kan du ringe;

1) Prosjektleder: Professor Dorthe Holst, Seksjon for samfunnsodontologi, Det odontologiske fakultet, Universitetet i Oslo.
Kontakttelefon: 22 84 03 88. E-post: dorthe.holst@odont.uio.no
2) Fylkestannlege Kari Strand, tlf 74 11 12 28
3) HUNT forskningssenter, Verdal, tlf 74 07 51 80
4) Den klinikken du er invitert til

8. PAPERS I-III

I

II

III

Does oral health matter in people`s daily life?

Oral health-related quality of life in adults 35 to 47 years of age in Norway

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Running title: Oral health-related quality of life in adults

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Tables: 3

Abstract:

Objective: The aim of the present study was to assess the effect of oral health on aspects of daily life measured by the Dental Impact Profile in 35 to 47 year old individuals in Norway, and to study associations between reported effects and demographic variables, clinical oral health, subjectively assessed oral health, general health and oral health behavior. **Material and methods**: A stratified randomized sample of 249 individuals received a questionnaire regarding demographic questions, dental visits, oral hygiene habits, self-rated oral health and general health, and satisfaction with oral health. The Dental Impact Profile measured the effects of oral health on daily life. Teeth present and caries experience were registered by clinical examination. Bi- and multivariate analyses and factor analysis were used. **Results**: Items most frequently reported to be positively or negatively influenced by oral health were: chewing and biting, eating, smiling and laughing, feeling comfortable and appearance. Only 1% reported no effects of oral health. Individuals with fewer than two decayed teeth, individuals who rated their oral health as good or practiced good oral health habits reported more positive effects than others on oral quality of life ($p \leq 0.05$). When the variables were included in multivariate analysis, none was statistically significant. The subscales of The Dental Impact Profile were somewhat different than the originally suggested subscales. **Conclusions**: This study showed that most adults reported oral health to be important for masticatory functions and confirmed that oral health also had impacts on other aspects of life.

Keywords: adult, Dental Impact Profile, epidemiology, oral health-related quality of life, self-rated oral health.

Introduction

The use of only clinical measures to assess oral health of individuals has been criticized because they fail to consider functional and psychosocial aspects of health and do not adequately reflect the functioning, concerns and perceived needs of individuals [1-4]. It is hereby of interest also to include patients' assessment of their wellbeing in the term oral health. In addition, there is a growing interest in dentistry also to assess the influence of oral health on daily life, often labelled oral health-related quality of life (OHRQoL) [5-10].

In Norway, it has been shown using the Oral Health Impact Profile (OHIP-14), that younger individuals, women, those with few teeth, those who rated their oral health as poor and those who visited dentists less often reported more problems than others [11]. The OHIP-14 like many other OHRQoL questionnaires focus primarily on oral problems and seek to clarify how people believe their oral conditions may result in functional limitations and problems. It is further of interest to assess possible positive influence of oral health on people's daily life.

The Dental Impact Profile (DIP) measures the effects of oral health on life in general and covers physical, psychological and social dimensions [12]. It was constructed to indicate how life quality is affected, diminished or enhanced by oral health and oral structures. The Dental Impact Profile was intended to serve as an indicator of the importance or salience of oral health to an individual or a population. The concept behind the Dental Impact Profile is that oral health has measurable positive and negative impacts on peoples' lives. It is a simple questionnaire to answer, but not well known nor frequently used in studies. Strauss and Hunt, who developed the Dental Impact Profile, were of the opinion that understanding the value of oral health is important in marketing dental services and motivating patients to seek oral health care [12]. They found, in a

population of older adults in North Carolina, that the most positive effects of oral health were on appearance to others and on eating [12].

The prevalence of dental caries has decreased in Norway as in several other countries [13-18] but it is not known if this has impact on individuals daily life. There is a paucity of studies on the relationship between clinical oral health and OHRQoL in Norway. Both Åstrøm et al. and Dahl et al. found that there was association between number of teeth and oral health-related quality of life [11, 19], but Dahl et al. showed that number of teeth with decay not was associated with OHRQoL assessed with OHIP-14 in a population of older adults [10] In contrast, Acharaya and co-workers reported in an Indian population that dental caries experience, DMFT was associated with OHIP-14 scores. However, the association was based mainly on missing teeth, supporting the findings that number of teeth are of importance for OHRQoL [20]. The aim of the present study was to assess the effect of oral health on aspects of daily life measured by the Dental Impact Profile in 35 to 47 year old individuals in Norway, and to study associations between reported effects and demographic variables, clinical oral health, subjectively assessed oral health, general health and oral health behavior. A further aim was to analyse whether the original subscales of the Dental Impact Profile were similar to the subscales found in a Norwegian population 35 to 47 years of age.

Materials and methods

Participants

A random sample was drawn from four municipalities comprising 129 000 inhabitants in the county of Nord-Trøndelag, Norway [21]. The selection procedure was computerised and the sample was randomly selected from the birth cohorts 1971-1962 and 1960-1959 using the birth register. Participants were offered an oral health examination free of

charge at dental clinics in the Public Dental Service. Invitations to participate and information about the study were sent to 400 individuals.

Overall, 249 individuals (62%) accepted to participate in the study. All non-participants were contacted by phone; 53 had moved from the area, 49 stated that they did not have time to participate, 27 were not interested and 22 were impossible to contact. No statistically significant differences could be found between participants and non-participants regarding age or gender. Of the 249 participants, six individuals did not answer all questions in the Dental Impact Profile and one individual was edentulous. These individuals were excluded from the analyses. The final number of 242 individuals was thus included in the analyses. Written informed consent was obtained from all participants. The study was approved by the Regional Ethical Committee Mid-Norway (ref 4.2006. 250 - date 06.04.06) and approved by the Norwegian Research Council.

Data collection

Data were collected in October and November 2006 and comprised clinical examination and self-administered questionnaire. The participants completed the questionnaire in the dental clinic before the oral examination.

Questionnaire

The questionnaire included questions regarding demographic questions (age, sex and length of education), oral health behaviour (dental visits, oral rinsing and inter-proximal cleaning), subjectively assessed oral health (self-rated oral health and satisfaction with oral health) and self-rated general health. Education was measured by number of years in school and dichotomised into 12 years or less and more than 12 years.

Frequency of dental visits was assessed with the question: “Have you visited the dentist/dental hygienist at least once per year during the last 5 years?” The responses were “yes” or “no” and labelled regularly or irregularly. Oral hygiene behaviour was

assessed with the questions: “How often do you brush your teeth, and do you use dental floss, tooth picks, inter-dental brush, fluoride tablets and/or oral rinse?” The responses were monthly or more often (daily, weekly or monthly) and less often than monthly (less often or never). The responses regarding dental floss, toothpicks and inter-dental brush were condensed into one variable: inter-proximal cleaning.

Subjectively assessed oral health was assessed with the two questions: “How do you rate your oral health” and “how satisfied are you with your oral health?” The responses were given on a 5-point Likert scale ranging from very poor/dissatisfied to very good/satisfied. The responses were dichotomized into good (very good, good, neither nor, satisfied, very satisfied) and poor (poor, very poor, dissatisfied, very dissatisfied).

Self-rated general health was assessed with the question: “How do you rate your general health?” The responses were given on a five-point Likert scale ranging from very poor to very good. The responses were dichotomized into good (very good, good, neither nor,) and poor (poor, very poor).

The impact of oral health on quality of life was assessed using the Dental Impact Profile. This is a 25-items questionnaire with three response alternatives; positive, negative or no effect. The time frame was the last 12 months. The original Dental Impact profile was divided into four subscales: eating, health/wellbeing, social relations and romance, with five to nine items in each subscale.

The Dental Impact profile was translated into Norwegian by an experienced researcher and was back-translated independently by two dental researchers with English as their first langue. The translations were very similar to the original Dental Impact Profile.

Clinical examination

The clinical examinations were performed by one dentist and one dental hygienist in a fully equipped dental clinic using mirror and a probe. A calibration session was performed prior to the study in which three patients were examined independently and the results were identical. Number of teeth present in the mouth and number of teeth with dental caries were recorded. Number of teeth was dichotomised into 1 to 22 and 23 to 28 teeth. Dental caries experience was registered using the DMFT-index according to the WHO criteria [22] A tooth was registered as decayed when caries extended into the dentin. The third molar was not included to enable comparison with previous studies.

Statistical analyses

Data analyses were performed using SPSS, version 16.0. Associations between categorical variables were tested using Pearson's Chi-square. Differences in numbers of positive effects were analysed with Student`s *t*-test. The variables (decayed teeth, self-rated oral health, inter-proximal cleaning) that bivariately had significant associations with numbers of positive effects reported in the Dental Impact Profile were entered into multivariate regression analysis with the Dental Impact Profile score as dependent variable. The internal consistency reliability between the 25 items and within each of the four subscales was assessed using Cronbach's alpha. An explorative factor analysis was applied using principal component analyses (PCA) with oblique varimax rotation to identify underlying factors that explain patterns of correlations between the 25 items in the Dental Impact Profile. *P*-values less than 0.05 were considered statistically significant.

Results

The mean age of the respondents was 42.3 (SD = 3.9) years, mean number of teeth was 27 (SD 2.4) and mean DMFT was 14.9 (SD 5.5) (range 0-28). The sample included 49%

women and 51% men. A total of 64% had 12 years or fewer of education. Most individuals had 23 teeth (95%) or more and fewer than two decayed teeth (84%). Most individuals (69%) visited a dental clinic regularly, and 97% brushed their teeth on a daily basis. Inter-proximal cleaning was performed monthly or more often by 89% and oral rinse was used monthly or more often by 31%. The majority (96%) of the individuals rated their general health as good, 95% rated their oral health as good, and 83% were satisfied with their oral health (Table I).

The mean number of items on the Dental Impact Profile reported to have positive effect on daily life was 19 out of 25 items. Table I shows the number of positive effects reported on the Dental Impact Profile according to the independent variables. The individuals with fewer than two decayed teeth reported positive effects on more items of the Dental Impact Profile (19.6 items) than individuals with two or more decayed teeth (17.3 items) ($p = 0.03$). Individuals who rated their oral health as good reported more items to be positively affected (19.5 items) than those who rated their oral health as poor (14.7 items) ($p < 0.01$). Individuals who reported inter-proximally cleaning monthly or more often reported more items to have positive effects on daily life (19.5 items) than those who reported inter-proximal cleaning less often (17.0 items) ($p =0.04$).

When the variables decayed teeth, self-rated oral health, and inter-proximal cleaning, the variables bivariately associated with number of positive effects reported on the Dental Impact Profile, were included in multivariate analysis, none of the variables was statistically significantly associated with the number of positive effects reported (results not shown).

The numbers and proportions of individuals reporting positive, negative or no effect for each item on the Dental Impact Profile are shown in Table II. In all items in the questionnaire more than 50% of the individuals reported that oral health had effect with

the exception of the item “weight” which only 37% considered to be affected by oral health (Table II). A total of 230 individuals (95%) reported positive effects on at least one item, while only 3% of the individuals reported that one or more item were negatively affected. Only three individuals, 1%, reported no effects at all of oral health on the items in the Dental Impact Profile.

The items most frequently reported to be influenced, either positively or negatively, by oral health were: chewing and biting, eating, smiling and laughing, feeling comfortable and appearance to other people (Table II). The same items were most frequently reported to be positively influenced by oral health. However, feeling comfortable was the item most individuals (3%) reported to be negatively affected by oral health.

The internal consistency reliability within the subscales ranged from 0.78 to 0.83 measured by Cronbach`s alpha (Table II). The mean proportion of individuals who reported positive, negative or no effects of oral health according to the original subscales is shown in Table II. In the subscale eating on average 85% of the individuals reported positive effects on each items, while in the other subscales on average 71% to 77% reported positive effects on each items in the subscale. The greatest variation in the proportion of individuals (range 37-91%) reporting positive effects on the items within one subscale were in the subscales health/wellbeing. The greatest variations in the proportion of individuals reporting negative effects within one subscale were in the subscale health/wellbeing (range 0-3%) (Table II).

The factor analysis resulted in four subscales with partly different items included compared with the original subscales (Table III). The fourth subscale was labelled life in general and items from the original subscale romance were mostly included in the new subscale social relations (Table III). The internal consistency of reliability, assessed by

Cronbach`s alpha, was higher in these new subscales (0.75 – 0.90). On average, 77% of the respondents reported that oral health had a positive effect on the items included in the subscale eating, 50% in the subscale health and wellbeing and 46% in the subscale social relation, while on average only 26% of the individuals reported that oral health had positive effect on the items in the subscale life in general (Table III). The variations within the subscales were smaller in the new subscales compared with the original subscales except for the subscale life in general.

Discussion

This is the first comprehensive epidemiological study measuring the impact of oral health on life in general assessed with the Dental Impact Profile among individuals in Norway. The main finding from the present study was that the great majority of individuals 35 to 47 years of age reported that oral health had an influence on daily life, indicating that they consider oral health to be important for quality of life in general. All items included in the Dental Impact Profile with the exception of weight were considered to be influenced by oral health by at least 50% of the respondents.

The study used the Dental Impact Profile to measure both positive and negative impacts of oral health on quality of life. This instrument was constructed for use in the elderly and has not previously been used in younger adults. The results of this study indicate that, used in 35 to 47 year olds, the instrument showed acceptable validity and reliability. Individuals who rated their oral health as good and those who had fewer decayed teeth reported more positive effects of oral health on daily life, which strengthen the validity. The internal consistency reliability for all items in the instrument and within the subscales was in the range 0.78 to 0.83, measured by Cronbach's alpha, which is similar to the results reported by Strauss and Hunt [12].

The original subscales were constructed based on a factor analysis in an elderly population in North Carolina, USA and the authors hypothesized that the impact of teeth and dentures on a person's life would be age dependent and reflect values and experiences of various cultural groups. The factor analysis showed that in a Norwegian group of adults a somewhat different sub-classification of items appeared. There was a greater difference in the proportion of positive effects between the new subscales (Table III). In addition, the variation within the new subscales was smaller, indicating that the new subscales suited the present population better.

It seems reasonable that the great majority reported that oral health positively affected aspects of eating and that oral health was of less importance for life in general including items such as weight, success at work and attendance at activities. This indicates that many individuals find that other factors than oral health is of more importance for these aspects of daily life.

The great majority of respondents reported that oral health had positive effects on many aspects of daily life in the separate items. The items related to eating were the functions that most of participants reported to be positively affected. This was an expected finding, as teeth are directly involved in chewing and biting, and thus enjoyment of eating. In addition and as expected, aesthetic aspects of oral health were considered important and were reported by more than 90% of the individuals to have impacts on smiling and appearance. These findings indicate that, in the clinical setting, the perceived importance of oral health on function and aesthetics could be used to motivate patients to comply with oral advice and treatment plans.

An important finding in this study was that very few individuals (3%) reported negative effects of oral health on daily life. In 8 of 25 aspects of daily life, no negative effects at all were reported and, in the remaining aspects of daily life, very few reported

negative effects. This is in contrast to the results Strauss et al. found in a study using a sample of older adults in which more than 10% of the respondents reported negative effects in twelve out of twenty-five items in the Dental Impact Profile [12]. This may indicate that individuals in the present age group (35 to 47 years of age) were more satisfied with their oral health and considered teeth to have more positive effects on quality of life than to older people. The sample in the present study was fairly homogenous in regard to age, education, clinical oral health and use of dental services. This younger age group may not have experienced many oral problems. The majority had a complete dentition and few carious lesions, which may be the reason for reporting fewer negative effects of oral health than older people. However, in a recently published study on OHRQoL assessed with OHIP-14 in the age group 30 to 49 years, 38 to 44% reported problems in the oral cavity and 10 to 12% reported frequent problems [11]. Still the majority in the present study considered that the oral health had a positive effect on their daily life. This supports the conclusion that oral health plays an important role in the daily life.

In this study the individuals with fewer than two decayed teeth reported more positive effects on quality of daily life than those with more decayed teeth. The number of decayed teeth seemed in the present population to impact daily life in contrast to previous findings in an older age group in Norway [10]. The results indicate that the documented decrease in dental caries prevalence in adults [13] have a positive effect on the quality of life experienced by the individuals.

In this study, individuals who rated their oral health as good, reported positive effects on more aspects of daily life than other individuals. The individuals who reported that their oral health was good, appear to have the opinion that good oral health

contribute positively to their health-related quality of life. This emphasizes the value of promoting good oral health and preventing oral diseases.

In this study, individuals who reported that they cleaned their teeth inter-proximally often reported more positive effects on daily life than others. It is plausible that individuals who experience positive effects value their oral health more highly and consequently perform inter-dental cleaning more often than others.

Even though the bivariate associations did not reach statistical significanse in the multivariate analysis in this, these results showed that self-rated oral health, number of decayed teeth and oral hygiene habits had effects on daily life and studies should be done with larger sample to further explore the multivariate associations.

Knowledge about why and how oral health matters in daily life is useful to pinpoint the topics that motivate individuals to adopt optimal oral health behaviours. More research is needed regarding the frames of reference people use in constructing their responses to questions designed to assess oral health perceptions [23], and interviews, which permit qualitative analysis would be a suitable method. It is not possible to assess more complex and comprehensive perceptions using questionnaire.

In conclusion, this study showed that most adults reported oral health to be important for masticatory functions and confirmed that oral health also has impacts on other aspects of daily life. Those who rated their oral health as good had few teeth with dental caries and those who practiced good oral hygiene behaviour reported more often that oral health had positive effects on daily life than did other individuals.

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Table I. Number (mean and SD) of positive effects reported on the Dental Impact Profile. Proportion of individuals reporting positive effects on all 25 items according to the independent variables (n=242).

			Number of positive effects			Individuals with 25 positive effects	
	n	%	mean	SD	P-value	%	P-value
Sex					0.46		0.07
Female	118	49	19.5	6.4		25	
Male	124	51	18.9	5.5		16	
Education					0.26		0.55
≤12 years	154	64	18.9	6.1		20	
>12 years	88	36	19.8	5.7		23	
Number of teeth					0.46		0.58
1-22 teeth	11	5	17.9	7.8		27	
23-28 teeth	231	95	19.3	5.9		20	
Decayed teeth					0.03		0.39
0-1	204	84	19.6	5.8		22	
>1	38	16	17.3	6.4		28	
Dental visits					0.45		0.20
Regular	168	69	19.0	6.0		19	
Irregular	74	31	19.7	5.8		26	
Satisfaction with oral health					0.91		0.14
Satisfied	201	83	19.5	5.3		19	
Dissatisfied	41	17	17.8	8.4		29	
Self-rated oral health					<0.01		0.98
Good	229	95	19.5	5.8		21	
Poor	13	5	14.7	7.2		21	
Self-rated general health					0.88		0.12
Good	233	96	19.3	5.9		22	
Poor	9	4	15.9	6.8		0	
Inter-proximal cleaning					0.04		0.77
Monthly or more often	215	89	19.5	5.7		21	
More seldom than monthly	27	11	17.0	7.7		19	
Oral rinsing					0.58		0.39
Monthly or more often	74	31	19.5	6.1		24	
More seldom than monthly	168	69	19.1	5.9		19	

Table II. Number and proportions of individuals reporting, positive, negative and no effects according to item in the Dental Impact Profile item. Mean proportion of individuals reporting positive effects on each item in the subscale and Cronbach`s alpha for each original subscales (n = 242).

Items	Individuals reporting effect							Cronbach`s alpha
	Mean positive effects on items in the subscale	Positive		Negative		No		
	%	n	%	n	%	n	%	
Eating	85							0.78
1 Eating		228	94	2	1	12	5	
2 Chewing and biting		230	95	5	2	7	3	
3 Enjoyment of eating		194	80	2	1	46	19	
4 Food you chose to eat		184	76	5	2	53	22	
5 Tasting		194	80	2	1	46	19	
Health/wellbeing	71							0.80
6 Feeling comfortable		220	91	7	3	15	6	
7 Enjoyment of life		179	74	0	0	63	26	
8 General happiness		213	88	2	1	27	11	
9 General health		191	79	3	1	48	20	
10 Appetite		157	65	3	1	82	34	
11 Weight		90	37	2	1	150	62	
12 Living a long life		155	64	0	0	87	36	
Social relation	77							0.83
13 Appearance to others		218	90	2	1	22	9	
14 Facial appearance		211	87	2	1	29	12	
15 Smiling and laughing		225	93	2	1	15	6	
16 Moods		191	79	2	1	49	20	
17 Speech		198	82	0	0	44	18	
18 Breath		198	82	0	0	44	18	
19 Attendance at activities		126	52	2	1	114	47	
20 Success at work		121	50	0	0	121	50	
21 Having confidence around others		191	79	3	1	48	20	
Romance	76							0.79
22 Social life		184	76	0	0	58	24	
23 Romantic relationships		184	76	0	0	58	24	
24 Having sex appeal		170	70	2	1	70	29	
25 Kissing		198	82	0	0	44	18	

Table III Subscales adjusted according to the factor analysis with number and proportion of individuals reporting positive, negative and no effects according to item in the Dental Impact Profile. Mean proportion of individuals reporting positive effects on each item within the subscale and Cronbach's alpha for the new subscales (n=242).

		Individuals reporting effect						
Nr* items	Mean positive effects on items in the subscale	Positive		Negative		No		Cronbach's alpha
	%	n	%	n	%	n	%	
Eating	77							0.75
1 Eating		228	94	2	1	12	5	
5 Tasting		194	80	2	1	46	19	
2 Chewing and biting		230	95	5	2	7	3	
Health/Wellbeing	50							0.86
9 General health		191	79	3	1	48	20	
3 Enjoyment of eating		194	80	2	1	46	19	
17 Speech		198	82	0	0	44	18	
18 Breath		198	82	0	0	44	18	
4 Food you chose to eat		184	76	5	2	53	22	
7 Enjoyment of life		179	74	0	0	63	26	
23 Romantic relationship		184	76	0	0	58	24	
Social relation	46							0.90
6 Feeling comfortable		220	91	7	3	15	6	
21 Having confidence in others		191	79	3	1	48	20	
13 Appearance to other people		218	90	2	1	22	9	
16 Moods		191	79	2	1	49	20	
25 Kissing		198	82	0	0	44	18	
15 Smiling and laughing		225	93	2	1	15	6	
24 Having sex appeal		170	70	2	1	70	29	
14 Facial appearance		211	87	2	1	29	12	
22 Social life		184	76	0	0	58	24	
8 General happiness		213	88	2	1	27	11	
Life in general	26							0.80
12 Living a long life		155	64	0	0	87	36	
19 Attendance at activities		126	52	2	1	144	47	
20 Success at work		121	50	0	0	121	50	
10 Appetite		157	65	3	1	82	34	
11Weight		90	37	2	1	150	62	

Oral health-related quality of life in Norwegians adults

By Kari Elisabeth Dahl

ERRATA are in italics and underlined

Paper I. Oral health-related quality of life and associated factors in Norwegian adults

Page 2. Table I.
Sex (%)
Female *49%*
Male *51%*

Paper III. Does oral health matter in people`s daily life.
Results;

Page 8.
In all the items in the questionnaire more than 50% of the individuals reported that oral health had *positive* effect *on daily life*.

Page 9.
In the subscale eating on average, *59*% of the individuals reported positive effects on *all* items, while in the other subscales, on average, *28*% *to 56*% reported positive effects on *all* items in the subscale. The greatest variation in the proportion of individuals (range 37-*95*%) reporting positive effects on *all* items within.....

Page 17 Table II.
Sum positive effects (%)

Eating	*59*
Health/wellbeing	*28*
Social relation	*35*
Romance	*56*