

IN BRIEF

- National study of the impact of oral health on the quality of life.
- The majority of the British public perceived their oral health as affecting their life quality.
- Age and gender norms for the OHQoL-UK[®] measure are presented.
- Age, social class and number of teeth appear to be key factors influencing the impact oral health status has on life quality.

Population based norming of the UK oral health related quality of life measure (OHQoL-UK[®])

C. McGrath¹ and R. Bedi²

Objectives The aims of this study were to establish normative age-gender values for the UK oral health related quality of life measure (OHQoL-UK[®]) in Britain and to provide a local reference for its interpretation. In addition, to identify key factors associated with oral health related quality of life in the UK.

Materials and methods A national survey conducted with the assistance of the Office for National Statistics involving a random probability sample of 2,718 households. Participants were interviewed about their oral health status. The impact of oral health on quality of life was measured using the 16 item OHQoL-UK measure.

Results The response rate was 68% (1,838/2,718). The majority (75%, 1,378/1,838) perceived their oral health as affecting their life quality and did so across a wide range of domains. Age-gender norm values are presented. Variations in OHQoL-UK scores were apparent in relation to socio-demographics: age ($P < 0.05$), social class ($P < 0.01$), and self-reported oral health status: number of teeth possessed ($P < 0.01$).

Conclusions The impact of oral health on the life quality of Britons was substantial, in both positive and negative ways and associated with socio-demographic and oral health (self-reported) factors. National norm values presented should provide a reference source for meaningful interpretation of similar data and local studies.

Despite the dramatic improvements in oral health over the past few decades, oral diseases remain relatively prevalent compared with other disease states.¹ Symptoms that arise from oral disease, such as toothache, are among the most common health problems and a large number of school and work days are lost due to oral health problems and/or their treatments.^{2,3} Increasingly too, the public's attitudes and behaviours towards oral health are changing, with

a greater emphasis on retaining natural teeth and obtaining an aesthetic and functional dentition.⁴ This has resulted in increased demands for cosmetic and private dental care.⁵ Essentially, although oral health states are rarely fatal or their treatments potentially 'life saving' they can have a considerable physical, social and psychological impact and ultimately affect the day to day living and life quality of individuals and the public.⁶ Over the past decade there has been an explosion of interest in conceptualizing, developing and assessing the impact of oral health on life quality.⁷ Two things are required in order to measure the impact of oral health on life quality in clinical practice and research.⁸ The first is a valid and reliable instrument; evidence supporting a measure's validity, reliability, acceptability, discriminatory power and sensitivity on a wide variety of patient groups so that it can be used as assessment or outcome tool.

The second is a norm reference for the population studied. Oral health related quality of life is relative rather than absolute and the results of any oral health related quality of life measurement need to be interpreted in the light of what is 'normal' for the same population.

The aim of this study was to establish the normative values for the *United Kingdom Oral Health related Quality of Life Measure* (OHQoL-UK[®]) in Britain, so that we could have a local reference for meaningful interpretation of this oral health related quality of life measure. In addition, the study aimed to identify key factors associated with oral health related quality of life in Britain.

METHODS

Study group

This study was carried out with the assistance of the Office for National Statistics, employing their 'omnibus' household surveys. From the national postcode address file 3,000 addresses were selected in a multistage sampling process; 2,718 of which were eligible addresses, the others being unoccupied buildings. Trained interviewers sought to carry out a face-to-face interview with an adult respondent at each household address selected.

Data collection

The interview focused on assessing participants' perceptions of the impact of their oral health status on their quality of life, using the 16-item *UK Oral Health related Quality of Life Measure*, OHQoL-UK. This instrument was developed using the pub-

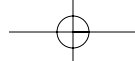
¹Associate Professor, Periodontology and Public Health, Faculty of Dentistry, Prince Philip Dental Hospital, University of Hong Kong, Hospital Road, Hong Kong; ²Professor and Head, WHO Collaborating Centre for disability, culture and oral health. National Centre for Transcultural Oral Health, Eastman Dental Institute for Oral Health Care Sciences, University College London

*Correspondence to: Dr Colman McGrath, Associate Professor, Periodontology and Public Health, Faculty of Dentistry, Prince Philip Dental Hospital, University of Hong Kong, Hospital Road, Hong Kong
E-mail: McgrathC@hkucc.hku.hk

Refereed paper

Received 03.10.01; Accepted 27.06.02

© British Dental Journal 2002; 193: 521-524



RESEARCH

Table 1 Profile of the study groups

Socio-demographic profile	Number (%)
<i>Age group</i>	
16 – 24-year-olds	179 (10)
25 – 34-year-olds	355 (19)
34 – 44-year-olds	343 (19)
45 – 54-year-olds	290 (16)
55 – 64-year-olds	255 (14)
65 – 74-year-olds	224 (12)
Aged 75 and older	192 (10)
<i>Gender</i>	
Male	818 (45)
Female	1,020 (55)
<i>Social class</i>	
Higher (I, II, IIINM)	991 (54)
Lower (IIIM, IV, V)	781 (43)
Uncategorised	66 (04)
<i>Oral health status (self reported)</i>	
<i>Number of teeth</i>	
20 or more	1,283 (70)
Less than 20 more than 10	183 (10)
Less than 10	372 (20)

lic's views in the UK to identify key areas of oral health related quality of life.⁹ The measure performed well in a local London survey demonstrating good psychometric properties in terms of validity and reliability.¹⁰ The simpler unweighted version, (*OHQoL-UK*) asks participants 'What effect does your teeth, gums, mouth and/or false teeth have on each of the 16 key areas' – 'very bad (score 1), bad (score 2), none (score 3), good (score 4) or very good (score 5)'. Summing up responses from each of the 16-items can produce overall *OHQoL-UK* scores ranging from 16 to 80. This simple unweighted version of the measure was used because weighting the UK oral health related quality of life instrument does not appear to improve its psychometric properties.¹¹

In addition, participants were asked about how many teeth they possessed and some socio-demographic information was collected: age, gender and social class (based on *Registrar's General Classification* of occupation).

Data analysis

A weighting factor was applied to the data to correct the unequal probability of selection caused by interviewing only one adult per household. The response rate to the survey was calculated and simple frequency distributions of responses to each item were produced. Overall *OHQoL-UK* was computed and mean *OHQoL-UK* scores with 95% confidence intervals (CI) were produced for each age-gender group. Associations between *OHQoL-UK* scores and socio-demographic factors (age, gender and social class) and self-reported number of teeth possessed were explored in bivariate analysis using *t* test for independent samples. Following on, a binary variable was produced based on national median *OHQoL-UK* scores to indicate 'reduced' oral health related quality of life (1 = below median population value, 0 = median population value or above). The combined effects of age, gender, social class and number of teeth (self-reported) on this binary variable was investigated in logistic regression analysis (*forward wald*).

RESULTS

Response rate and sample

The overall response rate to the survey was 68% with 1,838 people throughout the United Kingdom participating in the study. Twenty-two per cent (605) declined to take part in the survey, 8% (229) of households could not be contacted during the study period and 2% (46) of interviews were discarded because of incomplete quality of life sections. The majority of respondents claimed they had more than 20 teeth (70%, 1,283). The socio-demographic profile of the study group and self-reported oral health status information (number of teeth possessed) is presented in Table 1. The age, gender and social class profile of the study group was similar to the most recent UK census information.¹²

Perceived impact of oral health on life quality

The majority (75%, 1,378/1,838) of the public perceived their oral health as impacting on their life quality. Low 'floor' and 'ceiling' scores were observed with 1% (15/1,838) having lowest possible scores (of 16) and 2% (34/1,838) having highest possible scores (of 80). The public perceived oral health's influence on life quality predominantly through its effect on their appearance (66%, 1,211/1,838), comfort (63%, 1,162/1,838) and eating (62%, 1,148/1,838); these and other aspects of body function at a personal level are shown in Table 2. However some social or psycho-

Table 2 Perceived ways in which oral health affects quality of life

OHQoL-UK	Very bad effect	Bad effect	No effect	Good effect	Very good effect
	% (number)	% (number)	% (number)	% (number)	% (number)
Comfort	2 (28)	7 (122)	37 (676)	35 (645)	20 (366)
Breath odour	1 (23)	6 (102)	45 (816)	28 (509)	21 (388)
General health	<1 (06)	5 (83)	42 (775)	38 (692)	15 (282)
Eating	1 (20)	8 (138)	38 (690)	30 (556)	24 (434)
Appearance	2 (27)	6 (117)	34 (627)	38 (697)	20 (370)
Speech	<1 (07)	4 (70)	53 (566)	31 (560)	13 (235)
Relax or sleep	<1 (07)	4 (72)	69 (1261)	20 (360)	8 (138)
Smiling or laughing	1 (13)	6 (107)	43 (795)	32 (596)	18 (327)
Confidence	1 (14)	5 (90)	51 (939)	30 (544)	14 (251)
Mood	1 (10)	3 (60)	64 (1,166)	26 (472)	7 (130)
Carefree manner	<1 (05)	3 (58)	63 (1,152)	26 (474)	8 (149)
Personality	<1 (3)	2 (37)	66 (1,209)	24 (448)	8 (139)
Work	<1 (05)	2 (28)	70 (1,298)	20 (366)	8 (141)
Social life	1 (09)	3 (46)	57 (1,040)	28 (519)	12 (224)
Finances	1 (14)	7 (127)	78 (1,433)	11 (196)	4 (68)
Romantic relationships	2 (31)	1 (16)	58 (1,068)	25 (452)	15 (271)

Table 3 Normative values of the OHQoL-UK® measure by age/gender groups in the UK

Age		Mean	SD	95% CI		Percentiles		
				lower	upper	25th	50th	75th
16-24	Female (n = 102)	56.58	9.54	54.70	58.45	48.0	54.0	64.0
	Male (n = 77)	55.56	9.61	53.38	57.74	48.0	55.0	64.0
	Female + male (n = 179)	56.14	9.56	54.73	57.55	48.0	55.0	64.0
25-34	Female (n = 209)	58.67	11.19	57.14	60.19	48.0	60.0	66.0
	Male (n = 146)	55.01	9.18	53.51	56.52	48.0	55.0	62.0
	Female + male (n = 355)	57.16	10.55	56.06	58.27	48.0	57.0	64.0
35-44	Female (n = 200)	57.65	10.54	56.18	59.12	48.0	58.5	65.0
	Male (n = 143)	56.33	10.19	54.64	58.01	48.0	54.0	64.0
	Female + male (n = 343)	57.10	10.40	55.99	58.20	48.0	57.0	64.0
45-54	Female (n = 138)	55.78	11.68	53.82	57.75	48.0	54.0	64.25
	Male (n = 152)	56.21	10.39	54.55	57.88	48.0	54.5	64.0
	Female + male (n = 290)	56.01	11.00	54.74	57.28	48.0	54.0	64.0
55-64	Female (n = 124)	54.01	10.33	52.17	55.84	48.0	50.5	62.0
	Male (n = 131)	55.48	10.06	53.74	57.22	48.0	52.0	63.0
	Female + male (n = 255)	54.77	10.20	53.51	56.02	48.0	51.0	62.0
65-74	Female (n = 121)	53.30	8.19	51.82	54.77	48.0	50.0	58.0
	Male (n = 103)	53.46	8.20	51.85	55.06	48.0	50.0	58.0
	Female + male (n = 224)	53.37	8.18	52.29	54.45	48.0	50.0	58.0
75 and older	Female (n=126)	51.91	7.99	50.50	53.32	48.0	49.0	55.0
	Male (n = 66)	50.85	6.64	49.22	52.48	47.0	48.0	52.25
	Female + male (n = 192)	51.55	7.55	50.47	56.62	48.0	49.0	55.0

Table 4 Variations in oral health related quality of life: regression analysis

Dependent variable	Regression coefficient	Standard error	Odds ratio	95% Confidence interval	P value
Reduced OHQoL-UK (0 = median score or above, 1 = below median score)					
Age group (0=<65, 1= 65+)	0.28	0.14	1.32	1.03, 1.75	< 0.05
Social class (0=lower, 1=higher)	0.35	0.10	1.42	1.17, 1.73	< 0.01
Teeth (0=<20, 1=20 or more)	0.75	0.13	2.12	1.64, 2.73	< 0.001
Gender (0=male, 1=female)					> 0.05

logical aspects were also prevalent, such as oral health's influence on confidence (49%, 899/1,838), social life (43%, 798) and romantic relationships (42%, 770). Across all aspects, the public perceived their oral health status as enhancing rather than detracting from life quality. Mean, standard deviation, 95% confidence interval, median and 25th and 75th percentiles of the OHQoL-UK scores by different age-gender groups are produced in Table 3. Bivariate analysis identified associations between OHQoL-UK scores and socio-demographic factors: age ($P < 0.01$) and social class ($P < 0.01$), as well as variations related to self-reported oral health status: number of teeth possessed ($P < 0.01$). These are shown in Figure 1. When the combined effects of age, gender, social class and number of teeth possessed (self-reported) on oral health related quality were examined in regression analysis, marked disparities remained evident (Table 4). Controlling for other factors, older people were more likely to have reduced oral health related quality of life compared with younger adults ($P < 0.05$, OR=1.32, 95%CI 1.03, 1.75). Manual and unskilled workers were more likely to have reduced oral health related quality of life compared with professional and non-manual workers ($P < 0.01$, OR =1.42, 95%CI 1.17, 1.73). Those reporting to have less than 20 teeth were more likely to have reduced oral health related quality of life compared with those possessing 20 or more natural teeth ($P < 0.01$, OR=2.12, 95%CI 1.64, 2.73).

DISCUSSION

Increasingly, there is an interest in assessing the impact of oral health on life quality from a national perspective. The recent adult dental health survey provides national norms for the short form oral health impact profile, OHIP-14¹³ and it is important that other national norms data be available for other measures to provide meaningful interpretation of local studies and facilitate international comparisons. The impact of oral health on life quality in Britain was immense, with three-quarters of the population perceiving that their oral health impacted on their life quality, substantially more than findings from the recent adult dental survey.¹³ This most probably relates to differences in underlying concept and dimensions of the two instruments, as the instruments are somewhat similar in item content. OHIP-14 is based on a previous World Health Organization's (WHO) model of health: *disease-impairment-disability-handicap*, focusing on the burden of disease (wholly negative).¹⁴ Whereas the UK oral health-related quality of life is based on the more recently revised WHO model of health: *'structure-function-activity-participation'*, focusing on both disease and health states (negative and positive).¹⁵ This new model of health reflects social understanding that health (and oral health) affects people in both positive and negative ways and thus both enhances and reduces life quality.

RESEARCH

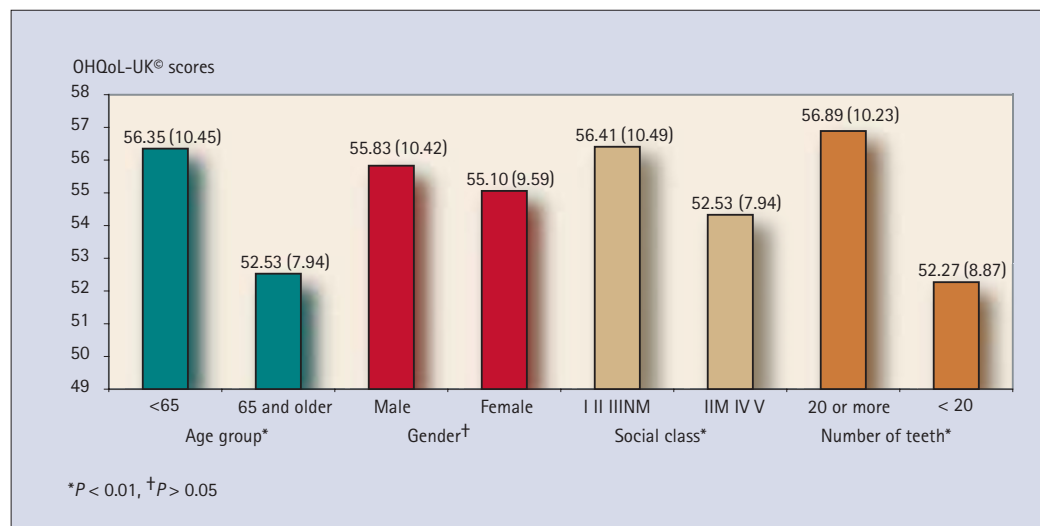


Figure 1 Variations in OHQoL-UK® scores: bivariate analysis

The low floor (% with lowest possible score) and low ceiling (% with highest possible score) effect of the measure suggests that the instrument should be sensitive to detect deterioration and improvements at a population level. The 95% confidence intervals of the mean scores for the age-gender groups were narrow, suggesting that the instrument is sensitive in detecting group differences. This should enable the population based norming data to be a valuable reference for meaningful interpretation of local epidemiological or practice based oral health related quality of life assessment and research. In addition, it provides a useful source for comparing changes in oral health related quality of life in Britain at a population level over time and also for international comparisons. As to how long such population norms data can be representative of the public's view of oral health remains unknown. However, psychosocial measure of oral health has been shown to be stable over time if clinical oral health status does not deteriorate.⁷ Age and social class gradients in perceived impact of oral health status on life quality were evident, having accounted for self-reported number of teeth. The effect of age on life quality is widely reported.¹⁶ The ageing process brings with it an increase in a lifetime's experiences of chronic oral diseases and physiological oral changes with associated deterioration in oral function, and likely negative social and psychological influences. The effects of social class on oral health related quality of life also remained evident having accounted for age, gender and self-reported oral health status. This is as expected, given the polarization of oral health problems among lower social class groups,¹⁷ but it may also relate to social class expectations of oral health and/or their positive oral health behaviour, including use of dental services that warrants further research. Information about oral health relied on self-reported number of teeth possessed and denture status, and although this may not be ideal, there is ample evidence to suggest that people are very adept at providing such information.¹⁸ Moreover, it supports the findings of the recent UK adult dental health survey, in that most people in Britain appear to be retaining 20 or more of their teeth.¹⁹ Retaining 20 or more teeth emerged as a key factor in determining the impact of oral health on life quality and should remain a key objective in oral health strategies in the UK. In conclusion, the

majority of the British public perceived their oral health as affecting their life quality and did so in a wide variety of ways (domains). Age-gender population norms are provided and this should enable interpretation of oral health related quality of life information. Age, social class and number of teeth retained appear to be key factors influencing the impact that oral health status has on life quality among UK adults.

- Barnes D E. The oral health challenge at the dawn of the third millennium. *Br Dent J* 1994; **177**: 387-390.
- Reisine S T. Dental disease and work loss. *J Dent Res* 1984; **63**: 1158-1161.
- Shepherd M A, Nadanovsky P, Sheiham A. The prevalence and impact of dental pain in 8-year-old school children in Harrow, England. *Br Dent J* 1999; **187**: 38-41.
- Bradnock G, White D A, Nuttall N M, Morris A J, Treasure E T, Pine C M. Dental attitudes and behaviours in 1998 and implications for the future. *Br Dent J* 2001; **190**: 228-232.
- Morley J. The role of cosmetic dentistry in restoring a youthful appearance. *J Am Dent Assoc* 1999; **130**: 1166-1172.
- Gift H C, Atchison K A, Dayton C M. Conceptualizing oral health and oral health-related quality of life. *Soc Sci Med* 1997; **44**: 601-608.
- Slade G D, ed. *Measuring oral health and quality of life*. Chapel Hill: University of North Carolina, Dental Ecology 1997.
- McGrath C, Bedi R. The value and use of 'quality of life' measures in the primary dental care setting. *Prim Dent Care* 1999; **6**: 53-57.
- McGrath C, Bedi R, Gilthorpe M S. Oral health related quality of life – views of the public in the United Kingdom. *Community Dent Health* 2000; **17**: 3-7.
- McGrath C, Bedi R. An evaluation of a new measure of oral health related quality of life – OHQoL-UK(W)®. *Community Dent Health* 2001; **18**: 138-143.
- McGrath C, Bedi R. Why are we 'weighting'? An assessment of a self-weighting approach to measuring oral health related quality of life. *Community Dent Oral Epidemiol* in press
- Office of Population Census and Surveys. *The 1991 United Kingdom census*. London: HMSO, 1992.
- Nuttall N M, Steele J G, Pine C M, White D, Pitts N B. The impact of oral health on people in the UK in 1998. *Br Dent J* 2000; **190**: 121-126.
- World Health Organization. *International Classification of Impairments, disability and handicap*. Geneva: WHO, 1980.
- World Health Organization. *International Classification of Functioning and Disability: ICDH-2*. Geneva: WHO, 1998.
- Slade G D, Spencer A J, Locker D, Hunt R J, Strauss R P, Beck J D. Variations in the social impact of oral conditions among older adults in South Australia, Ontario, and North Carolina. *J Dent Res* 1996; **75**: 1439-1450.
- Watt R, Sheiham A. Inequalities in oral health: a review of the evidence and recommendations for action. *Br Dent J* 1999; **187**: 6-12.
- Gilbert G H, Duncan R P, Kulley A M. Validity of self-reported tooth counts during a telephone screening interview. *J Public Health Dent* 1997; **57**: 176-80.
- Steele J G, Treasure E, Pitts N B, Morris J, Bradnock G. Total tooth loss in the United Kingdom in 1998 and implications for the future. *Br Dent J* 2000; **189**: 598-603.