

Oral health and its determinants among Mongolian dentists

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This study compares the dental health of dentists with that of their population counterparts, and relates dentists' oral health to oral health behavior and professional preventive knowledge and orientation. A questionnaire requesting information on the dentists' oral health, preventive knowledge, and orientation and oral health behavior, was targeted at all actively practicing dentists ($n = 250$) in the Mongolian capital of Ulaanbaatar. A self-reported dentigram served as the basis for assessing dental health, while the 1996 National Oral Health Survey provided data for comparison with population counterparts. The response rate was 98%. Compared to their general-population counterparts, younger dentists exhibited a similar level of caries experience (DMFT) and missing teeth (MT), whereas older dentists exhibited a lower level. In all age groups, mean numbers of decayed teeth (DT) among dentists were much smaller than for their population counterparts, whereas mean numbers of filled teeth (FT) were much higher. Of all, 81% reported brushing their teeth twice daily or more, 62% used fluoride-containing toothpaste always or almost always, and 52% consumed sugar-containing foods between main meals less than once a day. The better oral health behavior of dentists was best explained by their greater preventive knowledge and their better dental health by better oral health behavior in logistic models. It is concluded that among these dentists there is room for improvement of their own oral health behavior. Towards this end, specially designed continuing education courses could serve to improve dentists' health-related knowledge and change their oral self-care behavior. □ *Dental health; dentist; knowledge; oral health behavior; oral self-care*

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Behavioral aspects of oral diseases are becoming more crucial in oral health promotion (1). There are numerous theories and models explaining health-related behavior (for review, cf. 2, 3). In this study, we based the analysis of our data on the International Collaborative Study II model (4), which postulates that an individual's oral health outcome is affected by system-level and individual-level factors. We assumed that, for dentists, professional training and education would outweigh differences in factors involving personal characteristics. Health-related knowledge, attitudes, and beliefs acquired through professional education could therefore be the most significant individual level factors influencing their intermediate and final oral health outcomes. In any society, dental professionals should thus be a model group regarding oral health.

Our aims were: 1) to examine the dental health status of dentists and to compare it with that of their population counterparts, and 2) to relate dentists' oral health to their oral health behavior and professional preventive knowledge and orientation. We hypothesized that dentists with better orientation and greater knowledge of preventive care would have better oral hygiene behavior and dental service utilization, and thus enjoy better dental and gingival health.

Materials and methods

Background

Dental education in Mongolia began in 1961 and

followed the path of stomatology. Based on a diploma in general medicine, this method considers oral medicine as equivalent to any other medical specialization (5). Nowadays, the Dental School at the Mongolian National Medical University (MNMU) has a 5-year training program. The first 2 years are dedicated mainly to the study of basic and biomedical science and the following 3 years to dental science. In 1997, Mongolia had 375 practicing dentists, 250 of them practicing in the capital city, Ulaanbaatar (6).

Data collection

A questionnaire-based survey was carried out among all dentists ($n = 250$) practicing in Ulaanbaatar. The response rate was 98% over a 5-week period. The questionnaire comprised a series of questions designed to investigate dentists' orientation and knowledge of preventive care, oral health behavior, and background data such as age, gender, and work experience. A dentigram (dental chart) was included for dental health status, and a close-ended question inquired about gum bleeding. The survey instrument was originally written in English and later translated into Mongolian. Pre-testing of the questionnaire was done among 10 Mongolian dentists of various ages and lengths of working experience in December 1999 and then discussed with them. After revision, in May 2000, one of the authors (BT) delivered the final version to the participants along with a letter explaining the voluntary

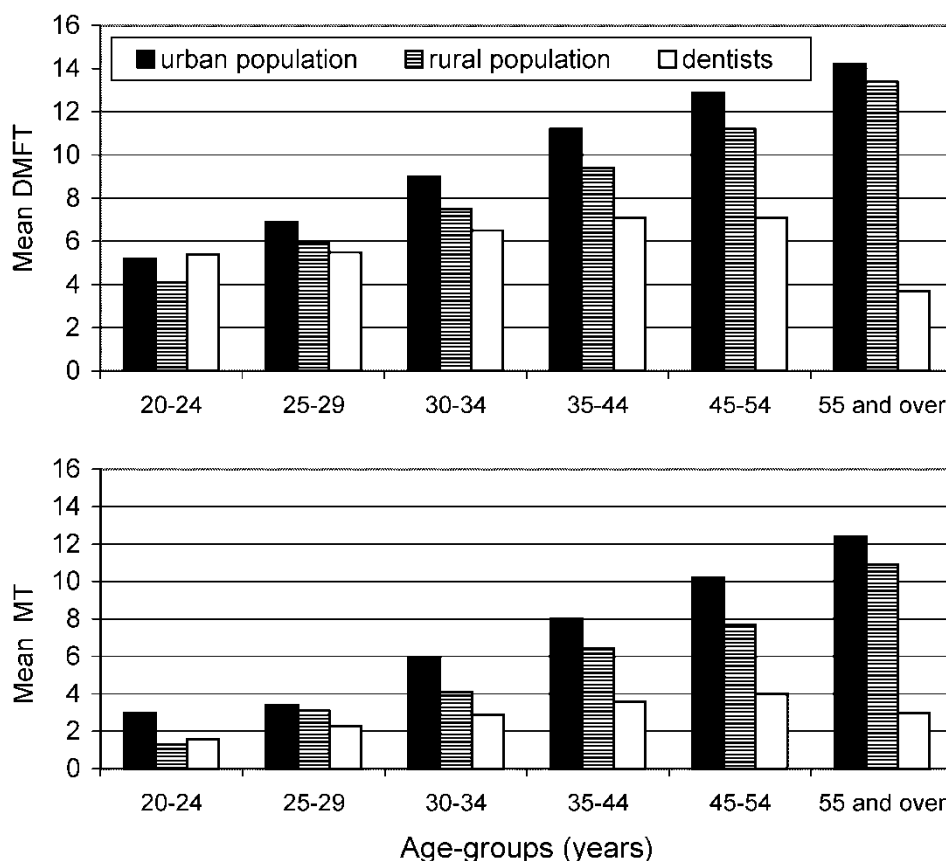


Fig. 1. Comparison of dentists' ($n = 245$) mean numbers of DMFT and MT with those of their urban ($n = 171$) and rural ($n = 286$) counterparts in the general population, by age-group.

and confidential nature of the dentists' participation in the survey.

Study subjects

The mean age of respondents was 35 years ($n = 245$), ranging from 23 to 60; 83% were female. Mean length of working experience was 10 years, ranging from a few months to 38 years. The dentists' work-related background characteristics have been described earlier (7). The comparison group ($n = 457$) included urban ($n = 171$) and rural ($n = 286$) population counterparts of the same ages. These data came from the National Oral Health Survey (NOHS), 1996. The NOHS included 1242 subjects aged between 2 and 76 years from 6 of the 18 provinces of Mongolia and the capital city, Ulaanbaatar, representing rural and urban areas, respectively. Four calibrated dentists carried out the clinical examinations for the NOHS using the WHO Oral Health Assessment method (1989).

Questions and variables for dentists' data

Oral health status (final oral health outcome variables)

was assessed with a self-completed dentigram and a report on gingival bleeding. Based on these, the DMFT index, excluding 3rd molars, was calculated and gingival health was dichotomized, i.e. never had gingival bleeding versus all others.

Oral health behavior (intermediate oral health outcome variables) included dentists' oral self-care (OSC) and dental service utilization. A combination of questions on tooth-brushing frequency, use of fluoride-containing toothpaste, and consumption of sugar-containing food between main meals served to determine OSC. Originally, these questions contained between four and seven alternative answers, which were then combined into two or three. Recommended oral self-care (ROSC) was defined as including brushing the teeth twice or more daily, using fluoride-containing toothpaste always or almost always, and consuming sugar-containing food between meals less than once a day (8–10). Dental service utilization was determined by the reason for the most recent dental visit, a regular check-up, as the reason, being considered as preventive care use, while all others as curative care use.

Knowledge of preventive care was assessed by 14 statements relating to the role of fluorides, frequency of sugar consumption, sugar-free chewing gum and xylitol,

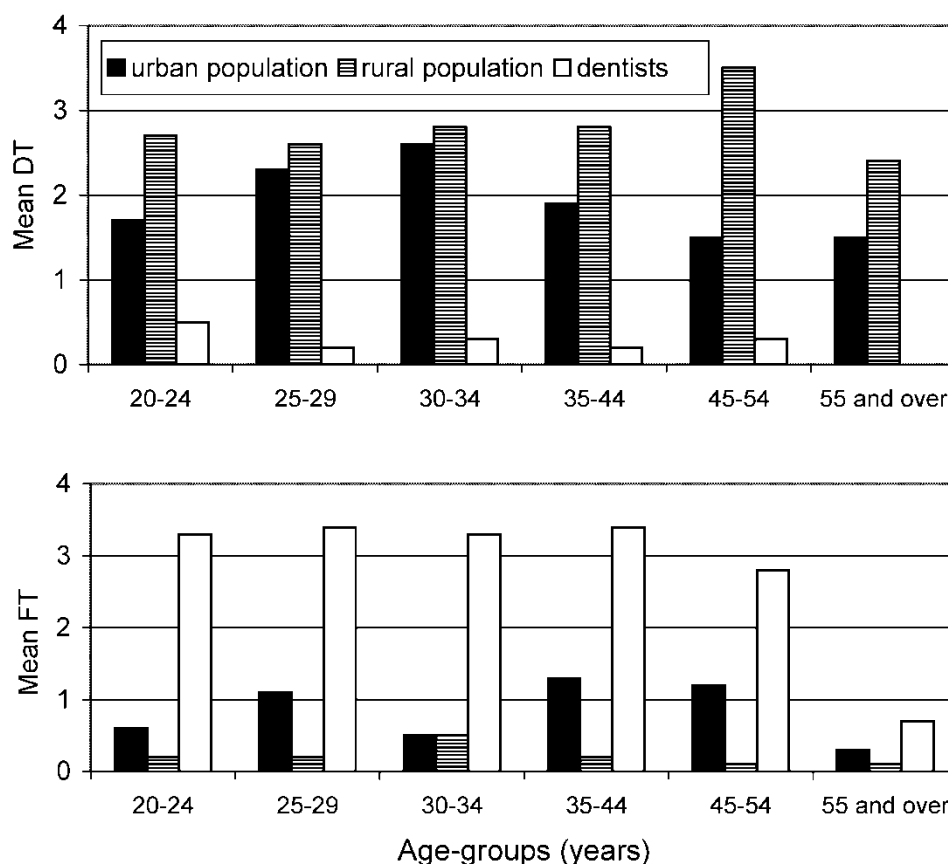


Fig. 2. Comparison of dentists' ($n = 245$) mean numbers of DT and FT with those of their urban ($n = 171$) and rural ($n = 286$) counterparts in the general population, by age-group.

and use of sealants in preventing dental decay, and to etiology of gingivitis. Answers were given on a 5-point Likert scale. For further analysis, each answer was assigned points from 0 to 4, with greater points for greater knowledge, and the sum of these was calculated for each dentist to represent that dentist's knowledge score. The quartiles of theoretical scores, with a maximum of 56, provided the criteria for subgrouping dentists. The highest (Q4) quartile included those respondents with scores of 43 to 56.

Preventive orientation was determined by the statement 'Preventive training and practice should be increased both in undergraduate education and in dental practice'. Answers ranged over a 5-point scale, with higher scores corresponding to a more positive orientation.

Statistical evaluation

Statistical evaluation was performed by means of the chi-square test. Odds ratios were calculated as a two-by-two cross-product. Logistic regression models (11) were fitted to the data, dichotomizing dentists' intermediate (oral health behavior) and final oral health outcome (dental and gingival health status) variables. Dependent

variables for the models were 'ROSC' for oral self-care, 'preventive care use' for dental service utilization, being 'free of DT' for dental health, and 'never had gingival bleeding' for periodontal health, taken one at a time. As explanatory factors, preventive knowledge and orientation served as continuous variables and oral self-care and utilization of dental service as categorical or qualitative variables. Evaluation of goodness-of-fit was carried out using the Hosmer-Lemeshow test (11).

Results

On average, dentists reported having 24.9 (standard deviation (s) = 2.9) teeth, of which 0.3 (s = 0.8) were decayed (DT), 3.2 (s = 3.2) filled (FT), and 21.5 (s = 4.6) sound (ST). The maximum numbers of DT, MT, and FT were 6, 18, and 17, respectively. The dentists' mean DMFT was 6.4 (s = 4.4) and mostly located in molars and premolars. Dentists' mean numbers of DMFT and MT were similar to those of their urban and rural population counterparts in younger age groups, but were smaller in older age groups (Fig. 1). Mean numbers of DT among the dentists were significantly smaller than those of both their

Table 1. Factors related to being 'free of decayed teeth (DT = 0)' or 'never had gum bleeding (NGB)' among Mongolian dentists ($n = 245$)

Parameters	Oral health status					
	All		DT = 0		NGB	
	<i>n</i>	%	%	<i>P</i> *	%	<i>P</i> *
Professional factors						
Preventive knowledge				0.498		0.700
Highest quartile of scores	122	51	89		48	
Below highest quartile	123	49	86		51	
Preventive orientation				0.774		0.171
Preventively oriented	220	90	86		50	
Not preventively oriented	25	10	88		36	
Oral health behavior						
Oral self-care:						
1. Toothbrushing frequency				0.513		0.862
Twice or more daily	199	81	85		49	
Once or less often daily	46	19	89		48	
2. Use of fluoridated toothpaste				0.217		0.586
Always or almost always	153	62	88		50	
Quite often or seldom	92	38	83		48	
3. Sugar consumption				0.358		0.342
Less than once a day	126	51	88		46	
Once or more often daily	119	49	84		52	
Dental service utilization				0.002		0.192
Preventive care use	86	35	95		46	
Curative care use	159	65	81		55	

*Statistical evaluation by chi-square test: difference by dental (DT = 0 vs DT > 0) and gingival (NGB vs earlier or now GB) status.

urban and rural population counterparts in all age groups, whereas those of filled teeth were notably greater (Fig. 2).

Eighty-one percent of the dentists reported brushing their teeth twice or more daily, 62% used fluoride-containing toothpaste always or almost always, and 52%

consumed sugar-containing foods between meals less than once a day. The ROSC was achieved by 24% of the dentists.

Regarding knowledge of preventive care, 50% of all dentists belonged to Q4, 48% to Q3, 2% to Q3, and none

Table 2. Associations of Mongolian dentists' ($n = 245$) oral health outcome variables with selected parameters, by means of four logistic regression models

Dependent variable and parameters	ES*	SE†	<i>P</i>	OR	CI 95%
Model 1: Recommended oral self-care					
Preventive knowledge	0.068	0.029	0.02	1.1	1.0–1.1
Preventive orientation	0.259	0.180	0.15	1.3	0.9–1.8
Preventive care use	0.234	0.327	0.46	1.3	0.7–2.4
Constant	–5.007	1.340			
Model 2: Preventive care use					
Preventive knowledge	0.066	0.025	0.01	1.1	1.0–1.1
Preventive orientation	–0.198	0.138	0.15	0.8	0.6–1.1
Recommended oral self-care	0.227	0.317	0.48	1.3	0.7–2.3
Constant	–2.863	1.110			
Model 3: Free of decayed teeth					
Preventive knowledge	0.052	0.033	0.11	1.1	0.9–1.1
Preventive orientation	0.027	0.203	0.90	1.0	0.7–1.5
Recommended oral self-care	1.479	0.558	0.01	4.4	1.4–13.1
Preventive care use	–0.240	0.464	0.60	0.8	0.3–1.9
Constant	–0.714	1.383			
Model 4: Never gingival bleeding					
Preventive knowledge	0.008	0.023	0.74	1.0	0.9–1.0
Preventive orientation	0.107	0.134	0.42	1.1	0.9–1.4
Recommended oral self-care	0.378	0.276	0.17	0.7	0.9–2.5
Preventive care use	–0.426	0.310	0.17	1.4	0.4–1.2
Constant	–0.748	1.007			

Goodness-of-fit test significance $P > 0.05$ for all four models.

*Estimate of strength; †standard error.

to Q1 for theoretical scores of knowledge. Concerning preventive orientation, 50% strongly agreed, 40% agreed, and the rest disagreed with the statement.

Concerning dental service utilization, 75% of the most recent visits occurred within the year prior to this survey. Of all visits, 35% were regular check-ups, regardless of the reported time since the most recent visit, and thus were considered preventive care use of dental service. Compared to those that occurred over 1 year previously, the visits within the year prior to the survey tended to be regular check-ups ($P = 0.001$; OR = 1.4, CI 95% 1.2–1.7).

Table 1 indicates associations of dentists' professional factors and oral health behavior to dental and gingival health status. Dentists who reported a check-up as the reason for their most recent dental visit (preventive care use) were significantly more likely to be free of decayed teeth ($P = 0.002$, OR = 4.8, CI 95% 1.6–14.0). No other variables were associated with a dentist's belonging to 'free of DT' or 'never gum bleeding' group ($P > 0.05$).

When dentists' oral health behavior variables were explained by selected factors in models 1 and 2 (Table 2), preventive knowledge was the statistically significant factor for 'recommended oral self-care' behavior ($P = 0.02$) and for 'preventive care use' of dental service ($P = 0.01$), respectively. When dentists' oral health outcome variables were explained in models 3 and 4, ROSC behavior was the statistically significant factor for 'free of decayed teeth' ($P = 0.01$), and no factors were significant for 'never gum bleeding' ($P > 0.05$), respectively.

Discussion

In general, global data on dentists' oral health status and behavior are rare; an exception being data among Danish (12) and American dentists (13). No previous study has been carried out on Mongolian dentists' oral health and behavior. The results of this study are a good representation of dental practitioners in the capital city, but may offer too optimistic a picture of dentists across Mongolia. The high response rate indicates Mongolian dentists' interest in preventive issues.

A pre-formulated and pre-tested questionnaire with simple wording and close-ended questions with multiple-choice answers was the instrument for data collection. Helöe (14) has reported that because of difficulties in the wording of questions, the definition of concepts, and symptoms of disease, the validity of estimates on teeth and gingival disease using self-reported questionnaires varies. In the present study, however, these difficulties were considered insignificant because the study subjects were themselves dental professionals. Nevertheless, a tendency to report socially more accepted habits than their actual behavior still remains.

As expected, Mongolian dental professionals enjoyed better dental health than their population counterparts in terms of MT at older ages, and DT and FT at all ages. Maximum numbers of MT and DT among Mongolian

dentists were similar to those among Danish dentists (12), whereas those of FT were smaller. Among the dentists, means of DT and FT were significantly lower than those reported for Norwegian lay adults in 1994 (15). The mean number of DMFT among dentists aged 35 to 44 was smaller than that of lay adults of similar ages from Germany, Japan, New Zealand, Poland, and the USA (ranging from 12.3 to 20.9) (4). The average number of teeth was almost the same as (24.9 vs 24.8), but that of ST was much greater (21.5 vs 15.7) than the number reported for adults aged 16 and over in the UK in 1998 (16). The location of past and present caries experience showed a pattern frequently met, with molars and premolars most affected.

Concerning tooth-brushing frequency, the percentage of daily brushers (97%) was similar to that of lay people from Germany, Japan, New Zealand, the USA, Poland (4), the UK (96%) (16), and Finland (91%) (17, 18). As expected, female and male dentists in Mongolia reported a similar tooth-brushing frequency due partly to the effect of professional dental education, contrasting to what has been found among lay people; women enjoy better oral health than men (18–20).

Though the vast majority of the dentists had visited a dentist within 1 year prior to this survey, the proportion of those who did so for preventive care was small. The percentage of those who visited a dentist within 1 year was similar to that of lay adults from Denmark and Sweden (80%) (21), Germany (80%) and Baltimore, USA (75%) (4), but higher than that of lay adults from Lithuania (43–60%) (22), China (23–24%) (23), Japan (42%), New Zealand (56%), Poland (56%), Navajo and Lakota, USA (42% and 52%) (4), and Finland (27–49%) (18).

Among lay people, changes in knowledge, attitudes, and beliefs are not causally related to changes in behavior (24–26). However, this is expected to be the case among dentists, due to their professional education and training. The results of the logistic regression analysis of this study coincide with findings of a review on oral health promotion (27), which concluded that greater knowledge is associated with better behavior. Supporting our hypothesis, the present results revealed that dentists' greater knowledge was associated with their better OSC, and better OSC was associated with better dental health.

In conclusion, there is room for improvement of oral health behavior among Mongolian dentists. To this end, oral health promotion among Mongolian dental professionals should focus on deepening their knowledge of preventive care and improving OSC behavior, for example through specially designed continuing education courses. Such education programs should emphasize the significance of scientifically proven modern methods of oral prevention. Moreover, this could potentially benefit their patients' oral health, since main oral diseases can be prevented and controlled.

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References

1. Inglehart M, Tedesco LA. Behavioural research related to oral hygiene practices: a new century model of oral health promotion. *Periodontology* 2000;195:8:15–23.
2. Daly B, Watt RG, Batchelor P, Treasure ET. *Essential dental public health*. 1st ed. Oxford: Oxford University Press; 2002. p. 14–6, 169–76.
3. Sögaard AJ. Theories and models of health behaviour. In: Schou L, Blinkhorn AS, editors. *Oral health promotion*. 1st ed. Oxford: Oxford Medical Publications; 1993. p. 27–57.
4. Chen M, Andersen RM, Barmes DE, Leclercq MH, Lytle CS. A second international collaborative study. Geneva: WHO; 1997. p. 7–10, 57–9, 61–7, 117–21.
5. Banoczy J. The evolution of dental education: a European perspective. *J Dent Educ* 1993;57:634–6.
6. Mongolian National Oral Health Policy Document. Ulaanbaatar: Ministry of Health and Welfare; 1997. p. 1–16.
7. Tseveenjav B, Vehkalahti MM, Murtomaa H. Attendance at and self-perceived need for continuing education among Mongolian dentists. *Eur J Dent Educ* 2003;8:1–6.
8. Glavind L, Nyvad B. The scientific basis for oral health recommendations for self care. In: Gjermo P, editor. *Promotion of self care in oral health*. Oslo: Dental Faculty; 1986. p. 77–95.
9. Honkala E. Oral health promotion with children and adolescents. In: Schou L, Blinkhorn AS, editors. *Oral health promotion*. Oxford: Oxford Medical Publication; 1993. p. 169–87.
10. Holbrook WP, Arnadottir IB, Takazoe I, Birkhed D, Frostell G. Longitudinal study of caries, cariogenic bacteria and diet in children just before and after starting school. *Eur J Oral Sci* 1995;103:42–5.
11. Hosmer DW, Lemeshow S. *Applied logistic regression*. 1st ed. New York: Wiley Interscience; 1989. p. 140–5.
12. Jensen K. Dental health among Danish dentists. *Tandlaegebladet* 1970;74:26–33 (English summary).
13. Christen AG, Meffert RM, Cornyn J, Tiecke RW. Oral health of dentists: analysis of panoramic radiographic survey. *JADA* 1967;75:1167–8.
14. Helöe LA. Comparison of dental health data obtained from questionnaires, interviews and clinical examination. *Scand J Dent Res* 1972;80:495–9.
15. Holst D, Schuller AA. Oral health changes in an adult Norwegian population: a cohort analytical approach. *Community Dent Oral Epidemiol* 2000;28:102–11.
16. Kelly M, Steele J, Nuttall N et al. *Adult dental health survey: oral health in the United Kingdom 1998*. 1st ed. London: HM: Stationery Office; 2000. p. 13–150.
17. Murtomaa H, Metsäniitty M. Trends in toothbrushing and utilization of dental services in Finland. *Community Dent Oral Epidemiol* 1994;22:231–4.
18. Helakorpi S, Patja K, Prättälä R, Aro AR, Uutela A. *Health behaviour and health among the Finnish adult population, Spring 2002*. Helsinki: Publication of the National Public Health Institute. B12/2002; 2002. p. 60–3.
19. Sögaard AJ. Present state of dental health knowledge, attitude and behaviour, and developmental trends in Scandinavia. In: Gjermo P, editor. *Promotion of self-care in oral health*. Oslo: Dental Faculty; 1986. p. 53–70.
20. Vehkalahti M, Paunio I. Occurrence of root caries in relation to dental health behaviour. *J Dent Res* 1988;67:911–4.
21. Kronström M, Palmqvist S, Söderfeldt B, Vigild M. Utilization of dental health services among middle-aged people in Sweden and Denmark. *Acta Odontol Scand* 2002;60:276–80.
22. Petersen PE, Aleksejuniene J, Christensen LB, Eriksen HM, Kalo I. Oral health behaviour and attitudes of adults in Lithuania. *Acta Odontol Scand* 2000;58:243–8.
23. Lo EC, Lin HC, Wang ZJ, Schwarz E. Utilization of dental services in Southern China. *J Dent Res* 2001;80:1471–4.
24. Rayant GA. Relationship between dental knowledge and tooth cleaning behaviour. *Community Dent Oral Epidemiol* 1979;7:191–4.
25. Kay EJ. Props and pitfalls in oral health promotion in the practice. *Dent Update* 1999;25:112–6.
26. Schou L. The relevance of behavioural sciences in dental practice. *Int Dent J* 2000;50:324–32.
27. Sprod AJ, Anderson R, Treasure ET. *Effective oral health promotion: literature review*. Technical Report N20. London: Health Promotion Wales; 1996.

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