

## Public knowledge of the prevention of dental decay and gum diseases

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### Abstract

In 1992, a mail survey was conducted among South Australians aged 10 years and older to assess the knowledge of prevention of dental caries and gum diseases and to explore its variation by sociodemographic factors. The survey provided 838 completed questionnaires. Questions were asked on perceptions of importance of a number of preventive measures, the main purpose of water fluoridation and sources of information.

Respondents rated four myths for preventing dental caries as the most important: 97 per cent rated regular tooth brushing; 87 per cent rated regular dental visits; 85 per cent rated calcium in the diet; and 78 per cent rated eating fibrous foods as definitely or probably important. Only 56 per cent of respondents rated drinking water with fluoride as definitely or probably important for preventing dental caries, and only half (50.2 per cent) identified the main purpose of water fluoridation as the prevention of decay. Respondents rated regular tooth brushing (96 per cent) and regular dental visits (87 per cent) as important for the prevention of gum diseases. However, the myth of massaging the gums was rated as important by 67 per cent. Higher percentages of females, older adults and those with lower educational attainment rated the myths for preventing caries as important. Younger people were less able to specify the main purpose for fluoridation of water supplies. The persistence of myths and the low rating of the importance of scientifically efficacious measures are major challenges for oral health promotion.

**Key words:** Prevention, dental diseases, myths, knowledge.

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### Introduction

Oral diseases continue to be prevalent health problems. In particular, dental caries and gum disease create a significant and costly burden to the Australian public.<sup>1,2</sup> A minority of children (less than 20 per

cent),<sup>3</sup> usually from more deprived backgrounds, still experience extensive dental caries, despite a significant decline in caries rates for the majority of children.<sup>4,5</sup> Adults have experienced negligible changes in caries experience and with an ageing population increasingly retaining their teeth into older age, the development of coronal and root caries remains an important health issue.

Moderate to severe periodontal pocketing was found to be present in 18 per cent of persons over 10 years of age in the National Oral Health Survey of Australia 1987/88.<sup>6</sup> An ageing and increasingly dentate population will also add substantially to the absolute number of teeth affected by periodontal disease. This situation exists despite the fact that both dental caries and gum diseases are theoretically preventable by appropriate dental health behaviours.<sup>7</sup>

The incidence of oral health problems across most age groups in the community requires a range of community and targeted individual responses. These tend to be grouped under the umbrella of oral health promotion.<sup>8,9</sup> While not sufficient alone, the conveying of information to the public remains a central theme of oral health promotion. Knowledge of effective preventive measures is one of the essential prerequisites for the practice of these measures. Information on effective preventive measures for both dental caries and periodontal diseases has been available in the dental literature for many years.<sup>10</sup> Fluoride from both fluoridated water supplies<sup>11</sup> and toothpastes containing fluoride, provide greater caries protection for smooth tooth surfaces than for pitted tooth surfaces where the use of fissure sealants is effective.<sup>12,13</sup> Studies have repeatedly found that water fluoridation forms the basis of caries prevention and maintains the decline in dental caries rates which has been achieved.<sup>14,15</sup> Water fluoridation remains the safest, most effective, cost efficient and equitable public health measure in caries prevention.<sup>11</sup> The combination of fluoride and fissure sealant strategies provides a potent tool for the prevention of dental caries.

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An individual's knowledge of preventive behaviours may be correct, as in the importance of fluoride in water supplies in the prevention of dental caries, or completely fictitious as in popular wisdom or folklore. It is the latter which is termed myth. Myths for the effective prevention of dental caries include measures such as sufficient calcium in the diet, regular tooth brushing *per se*, eating fibrous foods and regular dental visits. It has been known for at least two decades that in contrast to these myths, fluorides and fissure sealants are effective in caries prevention. However, it is acknowledged that changes in dental practice may, over time, increase the efficacy of regular dental visits in the prevention of caries.

Personal and professional plaque removal and professional calculus removal are the most widely accepted methods of prevention of gum diseases.<sup>16</sup> Fluorides, either in toothpaste or water supplies are unrelated to gum disease. While avoiding sweets may influence the rate of plaque proliferation and the composition of plaque, these impacts are secondary to plaque and calculus control. Massaging gums to harden them or to stimulate blood circulation to prevent gum disease is a myth. A good understanding of these preventive measures is needed to maintain healthy periodontal tissues ensuring retention of a functional dentition for life.

As a prerequisite to the development of more appropriate information and ways of conveying that information to the public, it is important to document existing knowledge. There is also a need to establish baselines against which changes over time can be monitored. Therefore, the objectives of this study were to assess knowledge about the prevention of dental caries and gum diseases and to explore variation in knowledge by individual sociodemographic factors.

### Material and methods

In 1992, questionnaires were mailed to all persons who had participated in the South Australian component of the National Oral Health Survey of Australia 1987/88. That survey had used a probability sample of non-institutionalized persons, five years of age and over (these people were, therefore, 10 years and over in 1992).

Respondents were asked to rate the importance of self-care preventive behaviours and of water fluoridation in relation to preventing tooth decay and in preventing gum disease, on a five-point Likert scale. The responses were then dichotomized into important (which included definitely important and probably important) and other (which included responses from neutral to definitely not important) for further analysis. Questions were also asked on the main purpose of water fluoridation and sources from which respondents obtained preventive information.

**Table 1. Age and sex distribution of respondents**

Age (years)	Male	Female	Total	%
10-19	57	50	107	12.8
20-29	52	52	104	12.4
30-39	59	86	145	17.3
40-49	53	83	136	16.2
50-59	51	63	114	13.6
60-69	68	63	131	15.6
70+	41	47	88	10.5
Missing			13	1.6
Total	381	444	838	100.0

The absolute percentage of responses to individual statements as well as the ranking of importance across all self-care preventive measures and use of fluorides, guided the interpretation of overall responses. The responses were then cross-tabulated with a number of sociodemographic factors including age, sex, and educational level. These bivariate analyses were then tested for significance by chi-square.

### Results

Completed questionnaires were received from 838 persons, a response rate of 43.9 per cent of the 1911 persons who fully participated in 1987. The age and sex distribution of respondents are shown in Table 1. The number of respondents was higher in the middle age groups with lower numbers in the younger and older age groups. There was, however, a good distribution across the age groups and by sex within each age group. For the purpose of examining associations between knowledge and age, the age categories were collapsed to 10-29 years, 30-54 years and 55+ years.

Respondents rated four myths in the prevention of dental caries as the most important (Fig. 1). Regular tooth brushing was rated as important by 97 per cent; 87 per cent rated regular dental visits; 85 per cent rated calcium in the diet and 78 per cent rated eating fibrous foods as important. In contrast,

**Table 2. Myths in the prevention of dental caries by sociodemographic factors (n=738)**

	Calcium in the diet %	Eating apples and fibrous foods %	Regular dental visits %	Regular toothbrushing and flossing %
Sex				
Male	78.7	82.2	83.7	96.3
Female	90.4*	75.9†	90.4‡	97.4
Age (years)				
10-29	81.4	69.2*	86.5	96.4
30-54	85.9	79.3	87.7	97.8
55+	87.3	88.7	87.1	95.9
Education				
Non-tertiary	85.7	80.7†	87.7	96.6
Tertiary	82.5	71.5	85.6	98.0

\*Chi-square; p<0.001.

†Chi-square; p<0.05.

‡Chi-square; p<0.01.

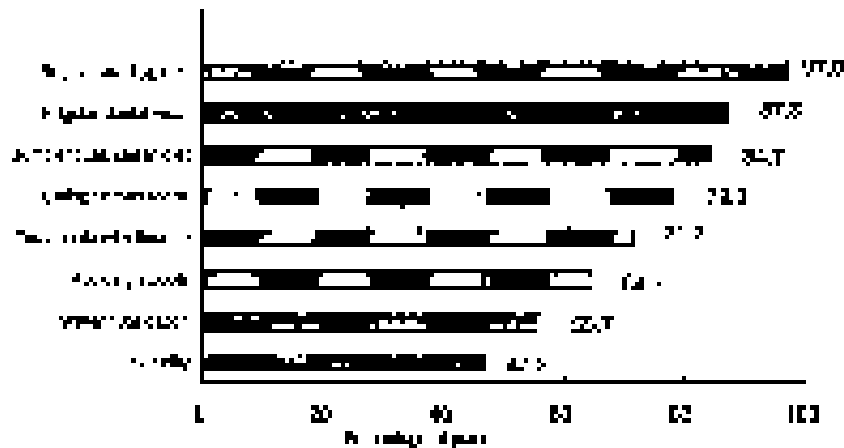


Fig. 1. – Measures rated as important in the prevention of dental caries.

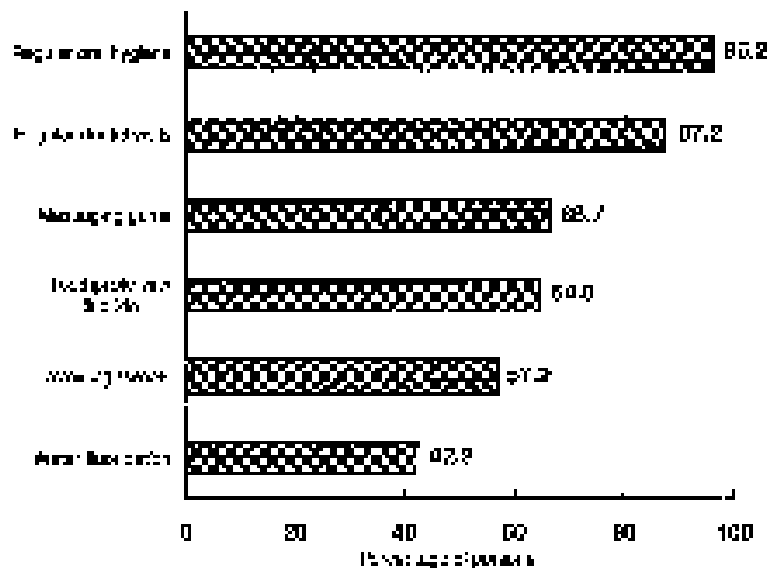


Fig.2. – Measures rated as important in the prevention of gum diseases.

effective measures such as toothpaste with fluoride and water fluoridation were rated as important by only 72 per cent and 56 per cent respectively.

Table 2 shows the results of the bivariate associations of the four myths with sociodemographic variables. Females were significantly more likely than males to regard sufficient calcium in the diet

and visits to the dentist as important in the prevention of caries. However, significantly fewer females rated eating apples and fibrous foods as important than males. Similarly, older persons and those who had

**Table 3. Myths in the prevention of periodontal disease by sociodemographic factors (n=738)**

	Massaging the gums %
Sex	
Male	62.3*
Female	70.5
Age (years)	
10-29	60.4
30-54	69.7
55+	68.5
Education	
Non-tertiary	66.8
Tertiary	68.3

\*Chi-square; p<0.05.

**Table 4. Purpose of water fluoridation (good for teeth or to prevent decay) by sociodemographic factors (n=733)**

	Know purpose of water fluoridation %
Age (years)*	
10-29	61.1
30-54	77.4
55+	68.3
Language†	
English	71.4
Other	47.1
Education‡	
Non-tertiary	67.5
Tertiary	77.2

\*Chi-square; p<0.001.

†Chi-square; p<0.01.

‡Chi-square; p<0.05.

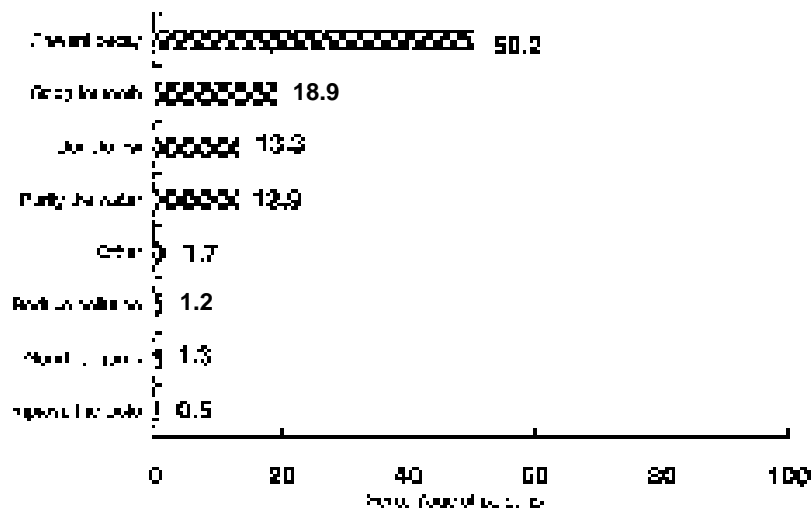


Fig. 3. – Main purpose of water fluoridation.

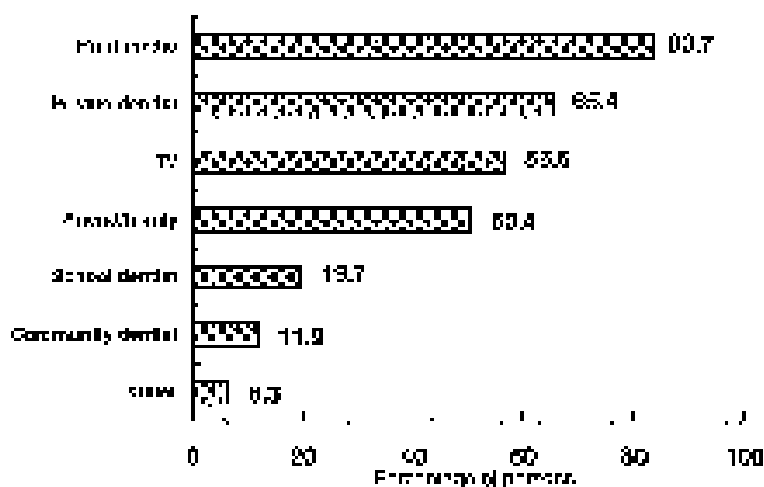


Fig.4. – Sources of preventive information.

not received a tertiary education rated the myth of eating apples and fibrous foods as important in the prevention of dental caries. None of the sociodemographic variables tested was significant in bivariate analyses of the importance of regular tooth brushing and flossing in relation to prevention of dental caries, with over 95 per cent of all sociodemographic groups rating tooth brushing as important.

Most respondents were able to correctly rate regular brushing and flossing (96 per cent) and regular dental visits (87 per cent) as important in the prevention of gum diseases (Fig. 2). However the myth of massaging the gums was regarded as important by 67 per cent of respondents. Other measures not considered relevant to the prevention of gum disease were rated important by high percentages of respondents. For example, using toothpaste with fluoride was rated as important by 65 per cent and water fluoridation by 42 per cent of respondents.

Table 3 shows the bivariate associations of those who regarded the massaging of the gums as important

in the prevention of gum diseases. Females were significantly more likely than males to regard this measure as important.

Responses to the question ‘What do you think is the main purpose of water fluoridation?’ are shown in Fig. 3. Prevention of decay (decay) was correctly identified as the main purpose of water fluoridation by 50 per cent of respondents and an additional 19 per cent responded that it was good for teeth. However, about 30 per cent did not know the main purpose of water fluoridation.

The bivariate associations of persons who identified the purpose of water fluoridation as the prevention of decay or good for teeth were investigated. The results are presented in Table 4. A significantly lower percentage of younger people (ages 10-29), those who speak a language other than English at home, and those without tertiary education were able to specify the main purpose for fluoridation of water supplies.

Respondents reported the sources of information for their knowledge of preventive behaviours (Fig. 4).

It should be noted that multiple responses were possible. Over 80 per cent of respondents reported that a source of preventive information was the print media, 65 per cent private dental practitioners, 56 per cent television and 50 per cent friend or family.

## Discussion

Major differences exist between the general public's knowledge of the prevention of dental diseases and current scientific knowledge. High percentages of the public ascribe importance to myths in the prevention of caries and gum diseases. A number of socio-demographic factors were significantly associated with the rating of myths as important. These included sex, with higher percentages of females ascribing importance to myths. This is possibly related to the role females continue to play as the bearers of family traditions. However, as they are also more likely to take primary responsibility for children's health, their lack of knowledge is of concern.

Age was also associated with ascribing importance to myths, with older adults more likely to hold erroneous views on effective preventive methods. This is perhaps more understandable, but again of concern when considered in conjunction with the increased risk of dental disease in the increasingly dentate older adult population.

Lower educational attainment was associated with a higher frequency of crediting myths with importance. This is consistent with other studies which have shown associations between lower educational attainment and poorer health outcomes,<sup>17</sup> and lower educational attainment and lower utilization of health services.<sup>18</sup> The finding in this study is consistent with other findings in relation to educational level and health.

There are some methodological issues which may limit interpretation of the above findings. It is possible that respondents did not distinguish between tooth brushing *per se* and the use of toothpaste with fluoride, despite the presentation of the two issues in separate categories. Similarly, visiting a dentist may have been identified with clinical preventive measures, including fissure sealant placement or topical fluoride application, and hence may have been regarded as preventive.

It should be noted that the sample consisted of respondents to a five year follow-up survey and should therefore be regarded as compliant respondents, perhaps more interested in dental matters than the general population. This possible response bias towards dentally interested persons would tend to over-estimate the knowledge of appropriate preventive measures in the population.

The results in this study show that people rate drinking water with fluoride as much less important

in the prevention of dental caries than other preventive measures or myths, and that younger people, those who speak a language other than English at home, and those without tertiary education are significantly less likely to know the purpose of water fluoridation. Every effort needs to be made to promote the importance of fluorides and, in particular, water fluoridation. In general, the lack of knowledge demonstrated raises the issue of the level at which oral health messages are pitched and the need for better targeting of oral health promotion.

The above data confirm the findings of Corbin and co-workers<sup>19</sup> that people are unable to distinguish between preventive messages according to the diseases which the measures are designed to prevent. For example, tooth brushing and dental visits which have been promoted by health professionals were regarded as much more important than the use of fluoride in the prevention of dental caries; whereas fluoride was regarded as important in the prevention of gum diseases by many people. Gift *et al.*<sup>20</sup> have found that dentists and physicians over-emphasize oral hygiene measures relative to the use of fluorides and fissure sealants. This lack of appreciation for the critical importance of fluorides in preventing tooth decay is of concern at two levels: firstly, that individuals may opt for water sources such as bottled water which bypasses the protective effect of fluoridated water; and secondly, that public support for fluoridation of water supplies may be jeopardized by lack of knowledge of the purpose and effectiveness of water fluoridation. In recent years there has been very little public information on the issue. Given the detrimental health consequences for the population in the absence of fluoridation and the moves towards privatization of water supplies in some States, the lack of understanding in some sections of the community of the crucial role of water fluoridation is worrying.

Respondents' acknowledgement of the importance of newspapers and magazines as a source of information should alert those involved in oral health promotion to the importance of accurate information in the print media. The second most frequently reported source of information was private dentists. Mention was also made of school and community dental services. The dental profession, if it is to promote preventive dentistry effectively, must know and communicate the scientifically proven methods of prevention to patients, particularly the role of fluorides.

The lack of community knowledge demonstrated in this study raises the issue of promotion of oral health messages and the level at which health messages are pitched. Appropriate targeting of oral health promotion is required to address the misconceptions demonstrated, so that effective preventive measures

can be maximized at both an individual and community level. Targeting the less knowledgeable groups within the community and the health professions, and the appropriate use of both print and electronic media are important areas on which to focus.

There is a major responsibility on oral health researchers and professionals to communicate their findings to the community, for as noted by Corbin *et al.*: 'This suboptimal and inconsistent pattern of knowledge about oral diseases and their prevention can be expected to limit effective disease prevention efforts on both an individual and a community level.'<sup>19</sup>

### Conclusions

There is a stark contrast between the Australian public's knowledge of caries prevention and scientifically accepted methods. A higher percentage of persons rate myths as more important than efficacious preventive measures. In the prevention of gum diseases, knowledge of preventive measures was more accurate, although one myth was still rated as important by many respondents.

Correct information on preventive measures should be particularly targeted to women, older people and those with lower educational attainment. Younger people, those with a first language other than English, and those with lower levels of education are also less likely to know the purpose of water fluoridation.

The persistence of myths, together with the low rating of the importance of scientifically efficacious methods in the prevention of dental caries, are a challenge for oral health promotion for the dental profession and the wider community.

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### References

1. Crowley S, Antioch K, Carter R, *et al.* The cost of diet related disease in Australia. Canberra: Australian Institute of Health and Welfare and National Centre for Health Program Evaluation, 1992.
2. Australian Institute of Health and Welfare. Health expenditure bulletin. Number 11. Canberra: Australian Institute of Health and Welfare, 1995.

3. Davies MJ, Spencer AJ, Slade GD. Factors related to caries experience of children in Australia. *J Dent Res* 1995;74:410.
4. Spencer AJ, Davies MJ, Slade GS, Brennan D. Caries prevalence in Australasia. *Int Dent J* 1994;44:415-423.
5. Davies MJ, Spencer AJ. The child dental health survey Australia 1993. Adelaide: Australian Institute of Health and Welfare Dental Statistics and Research Unit, The University of Adelaide, 1995.
6. Barnard P. National oral health survey of Australia 1987-88. Canberra: Australian Government Publishing Service, 1991.
7. Axelsson P, Lindhe J, Nyström B. On the prevention of caries and periodontal disease. Results of a 15 year longitudinal study in adults. *J Clin Periodontol* 1991;18:182-189.
8. Brown RH, Treasure ET. Inequities in oral health: implications for the delivery of care and health promotion. *N Z Dent J* 1992;88:132-138.
9. Horowitz AM. Effective oral health education and promotion programs to prevent dental caries. *Int Dent J* 1982;33:171-181.
10. Sutton R, Sheiham A. The factual basis of dental health education: a review. *J Can Dent Assoc* 1985;51:367-380.
11. National Health and Medical Research Council. The effectiveness of water fluoridation. Canberra: Australian Government Publishing Service, 1991.
12. Ripa LW. The current status of pit and fissure sealants; a review. *J Can Dent Assoc* 1985;51:367-380.
13. National Institute of Dental Research. Proceedings of a National Institutes of Health Consensus Development Conference on Dental Sealants in the Prevention of Tooth Decay. *J Dent Educ* 1984;48:126-131.
14. Slade GD, Davies MJ, Spencer AJ, Stewart-JF. Associations between exposure to fluoridated drinking water and dental caries experience among children in two Australian states. *J Public Health Dent* 1995;55:218-228.
15. Stephen KW, McCall DR, Tullis-JI. Caries prevalence in northern Scotland before, and 5 years after, water defluoridation. *Br Dent J* 1987;163:324-326.
16. Løe H, Kleinman DV, eds. Dental plaque control measures and oral hygiene practices. Oxford: IRL Press, 1986.
17. Dooland M. Improving dental health in Australia. National health strategy background paper no. 9. Melbourne: National Health Strategy Group, 1992.
18. Roberts-Thomson KF, Brennan DS, Spencer AJ. Social inequality in the use and comprehensiveness of dental services. *Aust J Public Health* 1995;19:80-85.
19. Corbin SB, Maas WR, Kleinman DV, Backinger CL. 1985 NHIS findings on the public knowledge and attitudes about oral diseases and preventive measures. *Public Health Rep* 1987;102:53-60.
20. Gift HC, Larach D, Brunelle JA. Public knowledge of fluoride status and purpose. *J Dent Res* 1991;70:489.

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