

# Fluoride sources and dental attendance habits among adults in communities with optimal and low water fluoride concentrations

Ann-Marie Wiktorsson, Thore Martinsson and Mikael Zimmerman

Department of Cariology and Department of Oral Diagnosis, Karolinska Institutet, Stockholm, Sweden

Wiktorsson A-M, Martinsson T, Zimmerman M. Fluoride sources and dental attendance habits among adults in communities with optimal and low water fluoride concentrations. *Acta Odontol Scand* 1991;49:159-162. Oslo. ISSN 0001-6357.

The aim of this study was to obtain data on local fluoride supply, dental attendance, and dental care habits in two sociologically similar municipalities with optimal, 1.0 ppm, and low, 0.3 ppm, water fluoride concentrations, respectively. The participants in the study were 30- to 40-year-old lifetime residents in the two municipalities: 569 individuals from the 1-ppm fluoride community and 466 from the low-fluoride community. There were no intergroup differences in the fluoride mouthrinse utilization rate of 1%. Fluoride toothpaste was much more common in the low-fluoride area. In the 1-ppm fluoride area more people drank tea, and they went more regularly to the dentist. It is suggested that dental attendance habits and various fluoride sources should be taken into account in studies evaluating the effect of fluoride in drinking water. □ *Fluoride toothpaste; mouthrinsing; questionnaire; tea*

*Ann-Marie Wiktorsson, Department of Cariology, Karolinska Institutet, Box 4064, S-141 04 Huddinge, Sweden*

Studies of the influence of fluoridated water on caries incidence in adults have not generally taken into account other potentially modifying factors such as supplementary sources of fluoride and dental attendance habits (1-5). Since the 1970s, fluoride supply, mainly in toothpaste, has increased. Use of fluoride toothpaste is regarded as probably the major factor contributing to the reduction in caries incidence, not only in Sweden but also in most other developed countries (6, 7). During this period an increasing trend towards routine topical fluoride treatments for adults at recall appointments has also been noted (8, 9).

To study the influence of fluoride in water on dental health, it is important to analyze not only other sources of fluoride, such as toothpastes and the diet, but also the frequency of dental visits.

The aim of this study was to obtain data on local fluoride supply and dental attendance habits in two sociologically similar municipalities with low and optimal water fluoride concentrations, respectively.

## Materials and methods

In the county of Uppsala, in Sweden, there are two municipalities in farming districts in which the inhabitants have a similar social structure, namely Uppsala, with an optimal water fluoride concentration of 1.0 ppm, and Enköping, with a low water fluoride concentration of 0.3 ppm.

The material comprised subjects born and raised in Uppsala or in Enköping. Among people born between 1939 and 1951, every third individual from Uppsala (group U) and all individuals in Enköping (group E) were selected from the Central Census Register (DAFA-SPAR). Group U comprised 1020 subjects, and Group E 800.

The selection was evenly distributed in accordance with age and sex, with no difference between the two groups.

In conjunction with an offer of a dental health examination, all 1820 subjects were in May 1982 sent a questionnaire seeking the following information: social security number, including date of birth; place of

Table 1. Number of questionnaires issued and completed

	Uppsala		Enköping		Total	
	n	%	n	%	n	%
Issued						
Men	534	52.4	427	53.4	961	52.8
Women	486	47.6	373	46.6	859	47.2
Total	1020	100.0	800	100.0	1820	100.0
Frequency of replies						
Men	285	53.4	233	54.6	518	53.9
Women	284	58.4	233	62.5	517	60.2
Total	569	55.8	466	58.3	1035	56.9

birth; use of fluoride toothpaste; use of fluoride mouthrinses; tea consumption; and dental attendance and date of last dental visit.

Of the 1820 questionnaires, 1153 were completed by the subjects and returned; 71 were returned marked 'not known at this address'.

Screening of the 1153 questionnaires showed that 158 subjects did not wish to avail themselves of proffered dental health examination; 40 of these people had, however, completed the questionnaire, and these data have been included in the study (Table 1). The age and sex distribution of the final participants did not differ from those of the selected subjects.

Table 2. Social group: distribution by sex and residential area

	Uppsala		Enköping		Total	
	n	%	n	%	n	%
Group I + II						
Men	167	58.6	127	54.5	294	56.8
Women	164	57.7	130	55.8	294	56.9
Total	331	58.2	257	55.2	588	56.8
Group III						
Men	110	38.6	103	44.2	213	41.1
Women	101	35.6	88	37.8	189	36.6
Total	211	37.1	191	41.0	402	38.8
Occupation not stated						
Men	8	2.8	3	1.3	11	2.1
Women	19	6.7	15	6.4	34	6.5
Total	27	4.7	18	3.8	45	4.4

Table 3. Use of fluoride toothpaste: distribution by sex and residential area

	Uppsala		Enköping		Total	
	n	%	n	%	n	%
Always						
Men	102	36.0	154	66.4	256	49.4
Women	132	46.8	174	75.0	306	59.2
Total	234	41.4	328	70.7	562	54.3
Never						
Men	38	13.4	9	3.9	47	9.1
Women	32	11.4	6	2.6	38	7.4
Total	70	12.4	15	3.2	85	8.2

Ninety-six per cent reported their occupation. This factor was used to indicate social group. Social groups I and II (the upper and the middle classes) dominated, with no significant difference in distribution in the two municipalities (Table 2).

For the statistical analyses the chi-square test was applied.

## Results

### Use of fluoride toothpaste

Ninety-nine per cent of the subjects answered this question, and 54% stated that they 'always' used fluoride toothpaste (Table 3). Significantly more people in group E used fluoride toothpaste (71% versus 41%;  $p < 0.001$ ). In both groups the utilization rate was highest for women. A higher per-

Table 4. Tea consumption: distribution by sex and residential area

	Uppsala		Enköping		Total	
	n	%	n	%	n	%
Daily						
Men	119	41.9	81	35.1	200	38.6
Women	116	41.0	75	32.3	191	36.9
Total	235	41.5	156	33.7	391	37.8
Never						
Men	21	7.4	17	7.3	38	7.3
Women	12	4.2	22	9.4	34	6.6
Total	33	5.8	39	8.4	72	7.0

Table 5. Dental attendance habits: distribution by sex and residential area

	Uppsala		Enköping		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Emergency care only						
Men	19	6.7	36	15.5	55	10.6
Women	8	2.8	20	8.6	28	5.4
Total	27	4.7	56	12.0	83	8.0
Regular annual visits						
Men	192	67.4	132	56.7	324	62.5
Women	243	85.6	174	74.7	417	80.7
Total	435	76.4	306	65.7	741	71.6

centage of subjects in group U stated that they 'never' used fluoride toothpaste (12%, compared with only 3% in group E).

*Use of fluoride mouthrinses*

This question was answered by 98%, and less than 1% claimed to use a fluoride mouthrinse regularly (once daily or weekly). 'Occasional' use was reported by 3%. There were no significant differences between the groups.

*Tea consumption*

This question was answered by 99.5%; 38% drank tea daily (Table 4). Tea consumption was significantly ( $p < 0.05$ ) lower in group E (34%). Around 55% drank tea irregularly, and only 7% claimed that they never drank tea; that is, around 92% received fluoride from tea more or less frequently.

*Dental attendance*

All subjects answered this question. Regular, annual dental visits were significantly more frequent for Uppsala subjects ( $p < 0.001$ ; Table 5) and were for both groups more frequent among women than men. The lowest frequency of regular dental attendance occurred among men in group E (57%). Around 93% of the subjects had visited a dentist during the previous 2 years (group U, 94%, and group E, 91%).

**Discussion**

There is usually a relatively high dropout rate for questionnaire investigations. In the present study the dropout rate was 36% in both groups, despite a written reminder. People who had left the district are included among the dropouts; many more people had left Uppsala than Enköping. The criteria for selection excluded people who had left the district. If these people are excluded from the original material, the true dropout figure was around 34%, evenly distributed between the groups.

Our dropouts may include subjects with lack of interest, regular dental attenders who were not interested in a dental health examination, and subjects with full dentures or fear of dentistry. The reasons for dropping out were not assessed. Classification into social group is based on the subject's occupation (10). Because it is difficult to separate social groups I and II when only written information on occupation is available, these two groups were combined. The analysis confirmed the assumption that Uppsala and Enköping communities are sociologically similar, with social groups I and II dominating.

Less frequent use of fluoride toothpaste in Uppsala than in Enköping probably reflects the fact that residents of Uppsala are very conscious of the fluoride content of the domestic water supply—that is, an effect of the fluoridation debate in the local press.

The dental health examination revealed that most of the subjects had received prescriptions for fluoride mouthrinses. The striking discrepancy between prescription rate and reported use indicates that fluoride mouthrinses are not particularly appropriate for adults.

Tea is a source of fluoride. About 38% drank tea daily, with a significant difference between the regions. It should be noted that those who stated that they drank only herbal tea were not included among the tea drinkers, and those who drank both ordinary tea and herbal tea were included in the group of occasional tea drinkers.

In 1982, when the questionnaires were evaluated, the availability of dental care in

the two regions was limited. Thus, subjects who were regular dental attenders showed an interest in maintaining their dental health, and this reflected a high degree of dental awareness. Regular dental attendance generally includes preventive dental care, particularly caries-preventive measures such as fluoride varnishing or other topical fluoride applications. Such fluoride supplements were not assessed.

About 93% of the subjects had visited a dentist during the last 2 years. More women than men were regular dental attenders. The high frequency of regular attenders (72%) could be explained by a high degree of dental awareness in social groups I and II (11, 12).

Significantly more women than men (81% versus 63%) reported regular, annual dental visits, implying a higher degree of dental awareness among women in both the Uppsala and the Enköping material. This sex difference explains that twice as many men as women sought dental care only as an emergency. The same applied to occasional visits for single fillings.

The results of the present study indicate that adults in the optimal fluoride area went more regularly to the dentist, drank more tea, but used less fluoride toothpaste. These findings indicate that modifying factors should be taken into account in studies evaluating the effect of fluoride in drinking water on dental health.

*Acknowledgements.*—This study was supported by grants from Patentmedelfonden för Odontologisk Profylaxforskning (Swedish Patent Revenue Fund), the

Faculty of Odontology, Karolinska Institutet, the Swedish Dental Society, and the Sigröd de Verdier Memorial Fund.

## References

1. Englander HR, Wallace DA. Effects of naturally fluoridated water on dental caries in adults. *Publ Health Rep* 1962;77:887-93.
2. Ericsson SY. Cariostatic mechanisms of fluorides: clinical observations. *Caries Res* 1977 (suppl 1):2-41.
3. Forrest JR, Parfitt GJ, Bransby ER. The incidence of dental caries among adults and young children in three high and three low fluoride areas in England. *Month Bull Minist Health* 1951;10:104-11.
4. Jackson D, Murray JJ, Fairpo CG. Lifelong benefits of fluoride in drinking water. *Br Dent J* 1973;134:419-22.
5. Murray JJ. Adults dental health in fluoride and nonfluoride areas. *Br Dent J* 1971;131:391-95, 437-42.
6. Glass RL. Fluoride dentifrices: the basis for the decline in caries prevalence. *J R Soc Med* 1986;79(suppl 14):15-17.
7. Möller IJ. Den cariesförebyggande effekten av fluorholdige tandpastaer. *Scanodont* 1974;2:12-23.
8. Clark DC. A review on fluoride varnishes: an alternative topical fluoride treatment. *Community Dent Oral Epidemiol* 1982;10:117-23.
9. Ripa LW. Professionally (operator) applied topical fluoride therapy: a critique. *Clin Prevent Dent* 1982;4:3-10.
10. Socioekonomisk indelning (SEI). SCB: Meddelanden i samordningsfrågor. 1982;4. Reprinted 1984. Chapter 6.1, Table 6.1.
11. Håkansson J. *Dental care habits, attitudes towards dental health and dental status among 20-60 years old individuals in Sweden*. Malmö: University of Lund, 1978.
12. Hamp SE, Gamsäter G, Faresjö T, Nilsson T. *The Munkhagen interdisciplinary studies*. Linköping: University of Linköping, 1982.