

## The changing dental care patterns of participants in a school-based fluoride mouthrinsing program

Alice Levinson Sposato  
Gary S. Leske, DDS, MS, MPH  
Louis W. Ripa, DDS, MS

### Abstract

*Evaluation of the pattern of dental care during a supervised weekly fluoride mouthrinsing program, using 0.2% neutral NaF, was performed by separately analyzing the changes in the decayed, filled, and missing components of the mean DMFS scores of participating elementary school children. Examinations were conducted at baseline and at yearly intervals for five academic years of mouthrinsing. Approximately 725 children in grades one to six were seen at each examination. The mean DMFS caries prevalence score decreased from 2.30 per child to 1.21, a change of 47.4%. By the third rinsing year, no child had received an emergency dental extraction of a permanent tooth because of caries. The mean number of decayed and of filled surfaces per child decreased from 1.08 and 1.20, to 0.35 and 0.86, respectively. While the percentage of decayed surfaces decreased from 46.8% to 29.0%, the percentage of filled surfaces rose from 52.0% to 71.0%. Five years after the inception of the school-based fluoride mouthrinsing program children enjoyed better dental health, because of an absolute decrease in the dental caries disease level and because of a relative increase in the restorative care provided by local dentists.*

In 1975 a school-based fluoride mouthrinsing program was initiated in the Three Village Central School District, Long Island, New York. The community is fluoride deficient ( $F \leq 0.1$  ppm). Children in the elementary schools (kindergarten through sixth grade) rinse once a week with a 0.2% sodium fluoride mouthrinse under the supervision of homeroom teachers. Each year, new kindergarten children enter the program and children promoted to seventh grade start junior high school and leave the program. To date, more than six thousand children have participated. Monitoring the effectiveness of mouthrinsing was done by annual dental examinations of random samples of the participants. The results of these examinations are compared to results of baseline examinations conducted in 1975, immediately before rinsing started.

Reductions in the caries prevalence of the permanent teeth after two, three, and four years of rinsing have been previously reported.<sup>1,2,3</sup> After four years, a caries reduction of 37% was found.<sup>3</sup> Analysis of the four-year data also revealed a change in the dental care of the rinse participants. While the absolute number of restorations per child decreased, commensurate with the decrease in the children's caries scores, the percentage of restorative care actually increased.

Alterations in the dental care of participants of mouthrinsing programs conducted in the United States have not been described previously. Therefore, it was decided to further evaluate the data from the Three Village mouthrinsing program in order to identify, in greater detail, the changes that may have occurred. The purpose of this report is to review the results of all the dental examinations (up to five years of rinsing) of the mouthrinse participants and to examine the pattern of dental care the children have received. Specifically, the DMFS caries index is analyzed over the duration of the program for the absolute and relative changes that have occurred in the decayed, missing, and filled components of the index.

### Methods and Materials

#### Examination Subjects

Approximately 125 children from each grade level in the elementary schools were selected randomly each year to receive dental examinations. Because the examinations were conducted at the beginning of the academic year and kindergarten children have just begun to rinse, they were excluded from the analysis of the program. Thus, considering absentees, analysis is based upon the yearly examination of approximately 725 children in Grades 1-6.

#### Examination Method

Visual-tactile examinations were conducted in the children's schools using a portable dental chair and light, and compressed air. The same examiner conducted all examinations. The criteria for caries were those recom-

mended at the ADA's Conference on the Clinical Testing of Cariostatic Agents.<sup>4</sup> Front surface mirrors and explorers<sup>a</sup> were used for all examinations. The findings were transcribed onto optical-scan clinical data forms by a trained recorder and processed by the Biometry Section of the NIDR.

### Data Analysis

Analysis of the data consisted of monitoring the changes in each component of the DMFS index at baseline and for each year of the rinsing program. The components of the DMFS index and their implications are outlined in Table 1.

### Results

Table 2 shows the change in caries prevalence for first- to sixth-grade children from baseline to the fifth rinsing year. Before rinsing began the mean DMFS score was 2.30. After five years of the rinse program the mean score was 1.21, a reduction of 47.4%

Table 3 shows the absolute and relative distribution of the three components of the DMFS index at each examination. On an absolute basis, all three indices decrease. In fact, the missing surface component (M) is eliminated entirely by the third rinsing year. On a relative (or percentage) basis the decayed surface component (D) decreases while the filled surface component (F) increases.

Figure 1 shows the relationship between the filled and decayed surface components, expressed as percentages of the total DMFS score, during the five years covered by this report. The missing component is not presented

<sup>a</sup> Starlite MG No. 23, Star Dental, Valley Forge, Pa.

**Table 1.** Components of the DMFS\* Index

Component	Meaning	Interpretation
D	Decayed surfaces	Represents untreated disease (caries)
M	Surfaces extracted because of caries	An indication of the level of emergency dental care. (An anterior tooth extracted because of caries is counted as four surfaces, a posterior tooth as five.)
F	Filled surfaces	Indicates the restorative care that has been provided.

\* Decayed, missing, and filled surfaces.

since it was low at baseline and was extinguished by the third rinsing year. With the elimination of the M component, the D and F components became mirror images of each other: As the F component increases the D component will show a concomitant decrease.

Figure 2 presents the filled surface component, expressed as a percentage of the total DMFS score, by grade level for the baseline and fifth rinsing year. For all grade levels, there is an increase in the relative amount of restorative care that was provided in the fifth rinsing year compared to the baseline level of care.

### Discussion

The DMFS count (and the DMFT count) is the traditional measurement used when evaluating the effectiveness of caries preventive programs. It is, however, a cumulative measure of the level of caries susceptibility in a population, and unless its components are analyzed

Exam	Decay (D) Component		Missing (M) Component		Filled (F) Component	
	Number	Percent	Number	Percent	Number	Percent
Baseline	1.08	46.8	0.03	1.20	1.20	52.0
First year	1.04	48.0	0.01	0.20	1.12	51.8
Second year	1.00	52.0	0.02	0.80	0.91	47.2
Third year	0.61	42.6	0.00	0.00	0.82	57.4
Fourth year	0.42	28.7	0.00	0.00	1.03	71.3
Fifth year	0.35	29.0	0.00	0.00	0.86	71.0

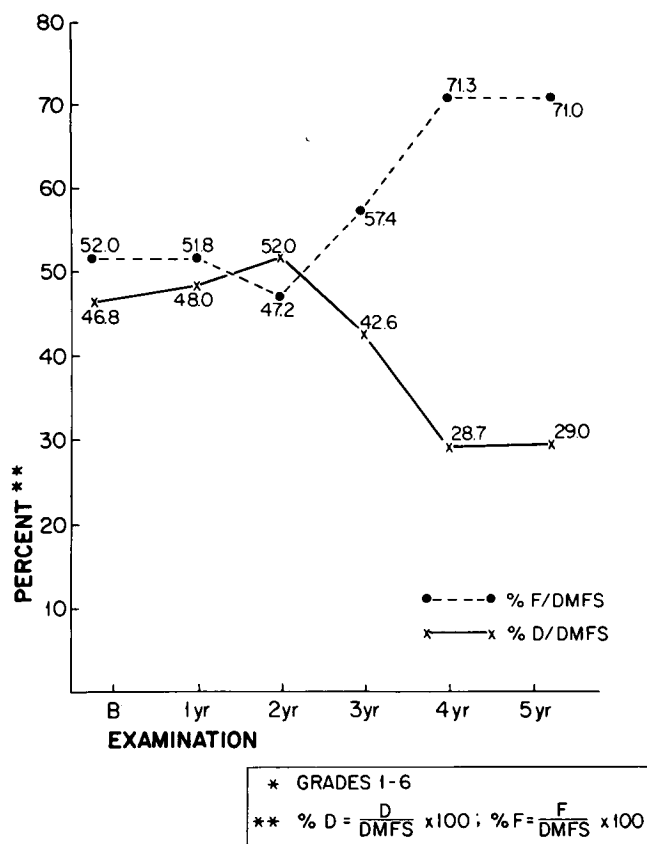
**Table 3.** Absolute and Relative Distribution of the Three Components of the Mean DMFS/Child Scores of Elementary School Rinse Participants\*

\* Grades 1-6.

Exam	Year of Exam	Number of Children Examined	$\bar{X}$ DMFS/Child	Difference from Baseline	
				Number	Percent
Baseline	1975	720	2.30	—	—
First year	1976	719	2.17	-0.13	-5.6
Second year	1977	722	1.92	-0.38	-19.8
Third year	1978	718	1.43	-0.87	-37.8
Fourth year	1979	738	1.45	-0.85	-36.9
Fifth year	1980	735	1.21	-1.09	-47.4

**Table 2.** Mean DMFS Scores of Elementary School Rinse Participants\*

\* Grades 1-6.



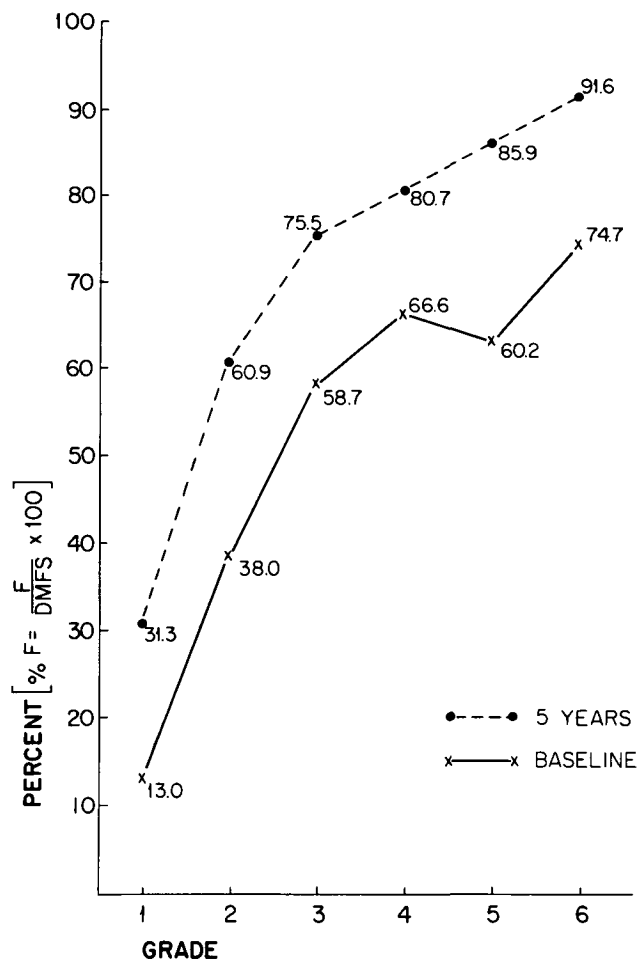
**Figure 1.** The %D/DMFS and %F/DMFS for elementary school rinse participants\* at each annual examination.

separately, it provides no indication of the level of care being provided. By examining each component separately, the changes in dental care that have occurred during the operation of the preventive program can be evaluated.

At baseline, the mean number of missing tooth surfaces per child was 0.03 (Table 3). Put into more clinical terms, this means that only one tooth had been extracted because of caries for every 150 children. This is a low figure and indicates that few children had sought emergency dental services, a finding which is consistent with the relative affluence of this particular community. Nevertheless, by the third rinsing year, the M component was zero. Of the approximately 725 children examined, no child had a permanent tooth extracted because of caries. This finding was repeated at the next two examinations.

The initial baseline DMFS score was 2.30. Fifty-two percent of that score (1.20) represented filled surfaces. With the absolute decrease in caries prevalence achieved by the fluoride mouthrinsing program, there was also a decrease in the absolute value of the F component to 0.86 (Table 3). However, the relative amount of filled tooth surfaces rose from 52.0% to 71.0%, meaning that more of the restorative needs of the children were being met.

Since the M component in the DMFS index was initially low and then was reduced to zero, it can be discounted from our considerations. The index for this



**Figure 2.** The %F/DMFS by grade level at the first (baseline) examination and after five years of rinsing.

population is essentially a DFS index. Thus, any relative change in the F component is mirrored by a reciprocal change in the D component. This reciprocal relationship is seen in Figure 1. As the filled tooth surface ratio increases, the decayed tooth surface ratio decreases. In 1975, the children's baseline caries index was comprised almost equally of treated and untreated lesions. By 1980, 71.0% of the index represented treated lesions and only 29.0% were untreated. The increase in the filled tooth surface ratio also is demonstrated in Figure 2 where baseline findings versus the findings after five years of rinsing are presented by individual grade level. The percentage of filled surfaces, since it represents the accumulated effects of an irreversible procedure, increases with time. (The single decline in the baseline figure for Grade 5 is the result of the random selection of children for examination.) Thus, at the baseline examination, 13.0% of the DMFS index of first graders represented filled surfaces while this figure was 74.7% for sixth graders. This is a high level of care. However, after five years of rinsing the filled tooth surface ratio increased to 31.3% and 91.6% for first and sixth graders, respectively.

Dunning has observed that the introduction of fluoridation in a community does not necessarily induce a

diminution in the demand for dental treatment in that community. Rather, he states that instituting water fluoridation actually may facilitate an extension of dental care to a much larger portion of the population than previously received it, and may result in the delivery of more complete maintenance care.<sup>5</sup> It is not surprising, therefore, that the relative provision of restorative care has increased for Three Village children who have experienced a caries reduction of nearly 50% since the mouthrinsing program began. Not only has the dental health of participating children been improved because of the lower caries activity associated with the protection provided by participation in the fluoride mouthrinsing program, but it also has been improved because relatively more dental care is being provided by local dentists.

The relative increase in restorative care can occur without any conscious effort by local dentists. If the level of their restorative care remains constant but the level of disease they are treating decreases, then a greater percentage of treatment needs will be met. This theory is consistent with the findings of Douglas et al. who have shown that the magnitude of restorative care does not decrease in a community with a lower caries rate.<sup>6</sup> These investigators reported that the number of restorations placed in one year by the average dentist practicing in a fluoridated community was similar to that placed by the average dentist in a nonfluoridated community. Thus, a lower caries rate and a higher relative level of care can occur concurrently.

## Summary

By analyzing the separate components of the DMFS index in a population of children who have been participating in a school-based fluoride mouthrinsing pro-

gram, a more precise indication of the changes that have been wrought since the introduction of the program can be determined. Specifically, in the Three Village fluoride mouthrinsing program, the dental health of the children has been improved by a decrease in the level of disease (caries), an increase in the relative magnitude of restorative care that has been provided, and the complete elimination of emergency dental care associated with the extraction of permanent teeth because of caries.

This investigation was supported in part by Grant #N01-DE-52460 from the National Institute of Dental Research, National Institutes of Health, Bethesda, Md. and Biomedical Research Support Grant #2S07-RR05778-05.

Ms. Sposato is program coordinator; Dr. Leske is professor and Dr. Ripa is professor and chairman, Department of Children's Dentistry, School of Dental Medicine, State University of New York at Stony Brook, Stony Brook, Long Island, N.Y. 11794. Requests for reprints should be sent to Dr. Ripa.

1. Ripa, L.W., Leske, G.S., Levinson, A. Supervised weekly rinsing with a 0.2% neutral NaF solution: results from a demonstration program after two school years. *JADA* 97:793-98, 1978.
2. Ripa, L.W., Levinson, A., Leske, G.S. Supervised weekly rinsing with a 0.2% neutral NaF solution: results from a demonstration program after three school years. *JADA* 100:544-46, 1980.
3. Ripa, L.W., Leske, G.S., Sposato, A.L., Rebich, T., Jr. Supervised weekly rinsing with a 0.2% neutral NaF solution: results from a demonstration program after four school years. *JADA* 102:482-86, 1981.
4. Radike, A.W. Criteria for diagnosis of dental caries, Proceedings of the Conference on the Clinical Testing of Cariostatic Agents. Chicago: ADA, pp 87-88, 1972.
5. Dunning, J.M. Water fluoridation in Principles of Dental Public Health, Dunning, J.M. (ed.) 3rd ed. Cambridge: Harvard University Press, 1979, pp 377-414.
6. Douglas, B.L., Wallace, D.A., Lerner, M., Coopersmith, S.B. Impact of water fluoridation on dental practice. *JADA* 84:355-67, 1972.

## Quotable Quote

Everybody knows that adults talk differently to infants than they do to other adults, and in recent years scientists have begun to suspect that the animated intonation of baby talk may play an important role in prelinguistic communication with very young children. New research reported in the September *Developmental Psychology* indicates that there is indeed a pattern to the baby talk of new mothers, with unique pitch patterns being associated with different motives and emotions. Daniel N. Stern and his colleagues at the Cornell University Medical College in New York City used a sound spectrograph to analyze the intonational "contours" of six mothers' speech during interactions with their infants. They found that the mothers used distinctive tones for different kinds of sentences — declarative sentences and questions requiring a yes-or-no answer, for example. And mothers predictably used certain pitch patterns in certain contexts: they consistently raised their pitch when trying to attract a baby's attention and tended to fluctuate their pitch in a distinctive pattern when trying to maintain a baby's gaze or smile. Although there is no evidence that very young infants can appreciate the meaning of tone in baby talk (the infants in this study were less than six months old), the findings do support the idea that pitch is used to carry information about mothers' intentions and feelings, the researchers say. Other research, they note, has indicated that mothers tend to exaggerate their intonation when the infant is two months to six months old and that infants are able, by six months, to distinguish melodies and tones. Such early patterns in pitch, they suggest, might provide a rudimentary framework for later language development.

From: Science News, Vol. 122,  
#14, 2 October 1982