National Survey of Korean Dentists' Knowledge and Opinions: Dental Caries Etiology and Prevention

Hyock-soo Moon, DDS, PhD; Dai-il Paik, DDS, PhD; Alice M. Horowitz, PhD; Johng-bai Kim, DDS, PhD

Abstract

Objectives: *Dentists have the potential to influence what their patients know and do regarding dental caries prevention. The practices of dentists and what they tell their patients are influenced, in part, by their own knowledge and opinions. The purposes of this study were to determine the level of knowledge and opinions about caries etiology and prevention among Korean dentists and to describe related factors.* ***Methods:*** *A pretested, 27-item questionnaire was mailed to 2,047 dentists, selected by a stratified random sampling allocated proportionately. A postcard reminder was sent to all dentists after one week. Nonrespondents were sent additional complete mailings after three, seven, and nine weeks. The response rate was 83 percent (n=1,700 dentists).* ***Results:*** *Analysis of six factors thought to be related to knowledge about caries etiology and prevention showed that recent graduates and dentists who worked in public health centers were likely to be more knowledgeable about caries etiology and prevention than their counterparts (P<.05). In regression analysis of perceived effectiveness of caries-preventive procedures for children, recent graduates, males, and dentists who worked in public health centers tended to rate caries-preventive procedures more effective than other dentists (P<.05). Dentists who had experience with school-based preventive programs and dentists in rural areas were likely to rate caries-preventive procedures for adults more effective than other dentists (P<.05).* ***Conclusions:*** *Overall, results of this study suggest that the majority of dentists do not know current information concerning etiology and prevention of dental caries, mechanisms of action of fluoride, and effectiveness of preventive procedures for children and adults. Efforts to enhance the level of knowledge and practices of Korean dentists about caries prevention should focus on strategies to educate older graduates and female dentists, especially those in private practice. [J Public Health Dent 1998;58(1):51-56]*

Key Words: knowledge of caries etiology and prevention, perceived effectiveness of preventive procedures for children and adults, Korean dentists, national survey.

Dental caries—a disease that can be prevented—causes the majority of tooth loss among Koreans (1-3). To prevent caries, however, health care providers must know about, recommend, and use scientifically proven, available procedures (4). Moreover, these preventive procedures must be made available to the public and individuals must know about and use them. Most developed countries are experiencing a decrease in dental caries. In contrast, Korea is experiencing an increase (5-8). The mean DMFT for 12-year-old children was 2.6 in urban areas and 1.7 in rural areas in 1981 (5,6). By 1991, the DMFT index had increased to 2.9 in urban and 3.3 in rural areas (7). In 1995 the DMFT index was 2.9 in urban areas and 3.5 in rural areas (8).

The increase in dental caries is due, in part, to the low use of fluorides and pit and fissure sealants and increased consumption of sweets. Although national health care that includes oral health services has been available in Korea since 1989, a recent study showed that only about 35 percent of the population visited a dentist during the previous year (9). Currently, national health care does not reimburse for professional applications of fluorides or pit and fissure sealants. Both of these preventive procedures are being considered for inclusion under national health care insurance.

Most Koreans brush their teeth at least daily and use toothpaste (9). Until 1995, however, the brand of dentifrice purchased most often did not contain fluoride, although most other brands did (10). On a positive note, fluoride mouthrinse regimens were introduced on a limited basis in elementary schools in 1984. In addition, 12 communities (approximately 5% of the Korean population) are adjusting the fluoride in their water supplies to an optimal concentration.

No previous study has been conducted on the knowledge and opinions of Korean dentists regarding caries etiology and prevention. A few studies have been conducted among the Korean public regarding their oral health knowledge, attitudes, and practices (11-18). Those studies show that the Korean public is ill-informed about how to prevent tooth decay, a finding that helps explain the low use of fluoride dentifrice (9).

In 1995, 13,562 dentists and 8,188 private dental clinics were listed in the membership directory of the Korean Dental Association (19). Most dentists practice in private clinics. Among 940 dentists who are employed at health centers, only a few function as public health dentists; most are clinicians who provide care to patients. Advanced training courses in several specialties were established in the 1960s. However, there is no dental specialty system in Korea. Thus, most dentists with advanced training practice general dentistry.

Currently, there are 11 dental

Send correspondence and reprint requests to Dr. Horowitz, National Institute of Dental Research, National Institutes of Health, Natcher Building Room 3AN-44B, 45 Center Drive, MSC 6401, Bethesda, MD 20892-6401. E-mail: horowitza@de45.nidr.nih.gov. Drs. Moon, Paik, and Kim are affiliated with the Department of Preventive and Public Health Dentistry, College of Dentistry, Seoul National University, Seoul 110-749, Korea.
Manuscript received: 2/28/97; returned to authors for revision: 4/22/97; accepted for publication: 11/25/97.

schools in Korea. Between 1975–85 preventive and public health dentistry departments and curricula were established in all dental schools. Prior to that time, little attention was given to primary prevention in these schools. With few exceptions, most of these departments have one faculty member. Except for three schools, which include clinical preventive dentistry in dental hospitals, the curricula remain limited to third-year students, are of relatively short duration, and are didactic only.

As the leader of the oral health team, the dentist should provide accurate oral health education and recommend appropriate preventive procedures as well as dental treatment for patients and the community. Dentists are in a position to directly influence patients' knowledge and practices. Dentists' practices—that is, what preventive procedures they use and recommend and what they teach their patients, staff, and families—are influenced, in part, by their knowledge and opinions, which in turn are influenced by their formal education.

Appropriate interventions are needed to help reverse the increase in dental caries. To plan and implement appropriate health education and health promotion interventions, certain information is necessary (20). For example, epidemiologic data that defines the biomedical problem as well as data regarding knowledge, opinions, and practices of relevant health care providers and the public are needed as part of a needs assessment. Further, this kind of information can be used to help develop and implement policy. The purposes of this study were to determine the level of knowledge and opinions of caries etiology and prevention among Korean dentists and to describe associated factors.

Methods

A 27-item mail questionnaire was developed to measure dentists' knowledge and opinions about the etiology of and methods to prevent dental caries and demographics. The questionnaire was an adaptation of one used with US dentists in the 1980s (21,22).

The survey instrument was pretested with 20 dentists. After revisions, a pilot survey was conducted. After minor revisions, in June 1995 a copy of the questionnaire and a cover letter, accompanied by a preaddressed and stamped return envelope, were mailed to 2,047 dentists (about 25% of dentists whose addresses were listed in the membership directory of the Korean Dental Association). A stratified random sampling allocated proportionately was performed, even though it is not the optimal design in terms of precision of estimates. The population was stratified by age, sex, geographic location of practice (metropolitan≥500,000; urban=50,000–500,000; rural<50,000), and type of practice (private practice, public health center). The sampling procedure provided a reasonably representative sample of Korean dentists and concomitantly facilitated the use of packaged statistical programs for data processing and analysis.

Following a modified Dillman's method, a follow-up postcard reminder was sent to all dentists after one week. Nonrespondents were sent a second complete mailing three weeks after the original mailing and, to increase the response rate, a third and fourth complete mailing also were sent to nonrespondents after seven and nine weeks (23).

One summed knowledge score and two scores of perceived effectiveness were developed for the dependent variables for regression analysis. Ten

TABLE 1
Percent Distribution of Dentists' Responses to Statements on Knowledge of Etiology and Prevention of Caries

Statement	Agree/ Strongly Agree	Disagree/ Strongly Disagree	No Response
Using available techniques, it is possible to prevent the formation of most caries lesions.	88.4*	9.3	2.3
Lactobacilli play a more significant role in the initiation of smooth surface caries lesions than do *S. mutans.*	77.7	12.7*	9.6
The quantity of sugar consumed is more important in causing caries than is the frequency of sugar consumption.	17.8	79.0*	3.2
Dilute, frequently administered fluorides are more effective in caries prevention than more concentrated, less frequently administered fluorides.	88.3*	6.7	5.0
Adults benefit from the use of fluorides.	65.7*	31.2	3.1
Fructose, glucose, and sucrose are cariogenic.	78.2*	15.3	6.5
Manual removal of plaque (flossing and brushing) is more valuable for maintaining gingival health than for preventing caries.	58.2*	38.7	3.1
Incipient caries lesions (before cavitation) can be remineralized.	47.0*	49.6	3.4
It is desirable to use professional applications of fluorides for all children in areas with fluoridated water supplies.	60.3	35.9*	3.8
It is desirable to use professional applications of fluorides for all children in areas without fluoridated water.	74.8*	22.2	3.0

N=1,688.
*Correct response.

knowledge items—originally on a four-point scale of "strongly agree," "agree," "disagree" and "strongly disagree" (Table 1)—were collapsed to a dichotomous scale and subsequently classified as correct or incorrect. The number of correct answers were summed and used as the knowledge score. The two perceived effectiveness scores (consisting of 14 items for children and 12 items for adults)—originally five-point scales (Table 3)—were collapsed to four-point scales and were classified as desirable or undesirable. The perceived effectiveness scores were the sum of the number of desirable responses by dentists.

Data were analyzed using an IBM compatible computer system and the Statistical Package for the Social Sciences (SPSS) program (24). Stepwise multiple regression was used to analyze factors associated with one area of knowledge and two areas of perceived effectiveness of preventive procedures. Independent variables included sex, age group, geographic location of practice, type of practice, number of years since graduation, and experience with school-based preventive programs. A value of $P<.05$ was used as the criterion for retaining variables in the final regression model. Statistical significance of the coefficient was tested using a T-test (.05 level).

Results

Of the 2,047 dentists sampled, 1,700 responded, resulting in a response rate of 83 percent. Among the respondents, 1,545 (90.9%) were male, 155 (9.1%) were female, and 419 (24.6%) had advanced training in a specialty. All the respondents were general practitioners, however, because specialties are not recognized in Korea. Nearly one-half of the sample practiced in metropolitan areas, while 29 and 25 percent practiced in urban or rural areas, respectively.

Knowledge about Caries Etiology and Prevention. Seventy-eight percent incorrectly agreed/strongly agreed with the statement "Lactobacilli play a more significant role in the initiation of smooth surface caries than do *S. mutans*" (Table 1). Eighty-eight percent of dentists knew the importance of dilute, frequently administered fluoride in caries prevention and

TABLE 2
Relationship Between Independent Variables and Knowledge about Etiology and Prevention of Caries

Variables	Regression Coefficient (SE)	Standardized Regression Coefficient	*P*-value
Intercept	6.8852 (0.0675)		<.01
Yearssince graduation	–0.2675 (0.0042)	–0.1907	<.01
Type of practice*	–0.2212 (0.1050)	–0.0627	<.05

*Private vs health centers.

TABLE 3
Percent Distribution of Dentists' Responses to Statements on Perceived Effectiveness of Preventive Procedures in Children and Adults

Item	Very Effective/ Effective		Somewhat Effective		Not Effective		Don't Know		No Response	
	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult
School water fluoridation	55.2*		27.7		3.1		10.5		3.5	
Dietary fluoride supplements	31.8*		34.8		6.9		22.5		4.0	
Fluoride toothpaste	28.7*	22.9*	46.6	51.1	11.8	12.4	9.6	10.5	3.3	3.1
Community water fluoridation	70.2*	49.5*	16.5	30.8	2.3	7.6	8.1	9.6	2.9	2.5
Nutrition, diet counseling	64.0	56.2	22.8	30.4	6.1*	6.2*	4.1	4.5	3.0	2.7
Oral health education for home care	87.4	80.6	8.4	15.6	1.6*	0.9*	0.6	0.6	2.0	2.3
Pit and fissure sealants	83.0*	56.3*	11.3	27.3	1.4	9.2	1.6	4.3	2.7	2.9
Professional oral prophylaxis	67.4	56.7	21.1	32.6	3.1*	3.5*	4.8	4.1	3.6	3.1
Recall appointments	89.1	88.7	6.0	8.5	1.3*	0.4*	0.8	0.2	2.8	2.2
Restoration of carious teeth	83.3	88.0	12.0	9.2	1.9*	0.4*	0.1	0.1	2.7	2.3
Professional topical fluoride	60.5*	39.6*	25.2	36.6	3.3	10.6	7.9	9.7	3.1	3.5
Fluoride rinse	44.3*	30.3*	33.3	42.6	5.5	11.5	13.7	12.2	3.2	3.4
Toothbrushing	92.8	92.4	3.8	5.2	1.2*	0.2*	0.1	0.1	2.1	2.1
Flossing	59.5	67.4	23.9	24.9	6.7*	2.5*	7.1	2.4	2.8	2.8

N=1,700
*Desirable response.

the possibility of caries prevention, although only 20 percent of dentists strongly agreed with the statement. Seventy-eight percent "agreed/strongly agreed" correctly that fructose, glucose, and sucrose are cariogenic; however, less than 5 percent "strongly agreed" with the statement. Fifty-eight percent of the dentists correctly answered the item, "Manual removal of plaque (flossing and brushing) is more valuable for maintaining gingival health than for preventing caries"; however, only 10 percent of the dentists strongly agreed with the item. Only 47 and 66 percent, respectively, answered correctly regarding remineralization of incipient caries and the benefits of fluoride for adults.

Table 2 contains a summary of the regression model of factors found to be significantly related to the dentists' knowledge about etiology and prevention of caries. Two of the independent variables were included in the final model. As indicated by the relative size of the standardized beta coefficients, number of years since graduation was the variable most strongly related to dentists' knowledge about etiology and prevention of caries, followed by type of practice. Recent graduates were likely to have a higher level of correct knowledge about etiology and prevention of caries than older graduates. Dentists who worked in health centers also were likely to be more knowledgeable than those in private practice.

Perceived Effectiveness of Preventive Procedures. Respondents were asked to rate the value of mechanisms of action of fluorides in connection with caries prevention (data not shown). Only 6 percent correctly responded that remineralization of incipient caries lesions is the major mechanism of fluoride action. In contrast, 27 percent indicated that the incorporation of fluoride into the enamel of unerupted teeth to make them more resistant to acid decalcification was of great value in caries prevention.

Table 3 shows that nearly all respondents (93%) reported, undesirably, that toothbrushing is "very effective or effective" for caries prevention in children, whereas 70 percent reported community water fluoridation as "very effective or effective." Nearly 83 percent of respondents recognized the importance of sealants for children. Table 3 shows that nearly all respondents (92%) reported incorrectly that toothbrushing is "very effective or effective" for caries prevention in adults, whereas only 50 percent reported community water fluoridation as "very effective or effective." Ninety-three and 92 percent of respondents reported that toothbrushing is "very effective or effective" in children and adults, respectively. In contrast, only 30 and 23 percent of respondents reported that fluoride toothpaste is "very effective or effective."

TABLE 4
Relationship Between Independent Variables and Perceived Effectiveness of Caries-preventive Procedures for Children

Variables	Regression Coefficient (SE)	Standardized Regression Coefficient	*P*-value
Intercept	3.8542 (0.1804)		<.01
Type of practice*	0.7589 (0.1566)	0.1397	<.01
Years since graduation	–0.0178 (0.0064)	–0.0803	<.01
Sex (male vs female)	0.4218 (0.1823)	0.0611	<.05

*Public clinic vs private.

TABLE 5
Relationship Between Independent Variables and Perceived Effectiveness of Caries-preventive Procedures for Adults

Variables	Regression Coefficient (SE)	Standardized Regression Coefficient	*P*-value
Intercept	4.2358 (0.0741)		<.01
Experience w/preventive program (yes vs no)	0.1940 (0.0731)	0.0710	<.01
Geographic location of practice (metropolitan/urban vs rural)	–0.1777 (0.0777)	–0.0612	<.05

Table 4 shows results of the regression model of factors found to be significantly related to the dentists' perceived effectiveness of preventive procedures for children. Three independent variables were included in the final model. Type of practice was most strongly related to the dentists' perceived effectiveness of caries-preventive procedures for children, followed by number of years since graduation and sex. Dentists employed in public health centers were somewhat more likely to rate caries-preventive procedures for children more effective than those who practiced in private clinics. Recent graduates and male dentists were likely to rate preventive regimens more effective than did older graduates and female dentists.

Table 5 shows results of the regression model of factors found to be significantly related to the dentists' perceived effectiveness of caries-preventive procedures for adults. Two independent variables—experience with school-based preventive programs and geographic location of practice—were significantly related to the dentists' perception of effectiveness of preventive regimens for adults. Dentists who had been involved with school-based caries-prevention programs and dentists who practiced in rural areas were somewhat more likely to rate caries-preventive procedures for adults more effective than other dentists.

Opinions about Caries Prevention. Eight opinion questions were asked regarding caries prevention (Table 6). Nearly all respondents (91%) strongly agreed or agreed with the statement "Community water fluoridation should be available in communities with central water supplies." Over 95

TABLE 6
Percent Distribution of Dentists' Opinions about Prevention of Caries

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree	No Reponse
Community water fluoridation should be made available in communities with central water supplies.	29.4	61.4	5.4	0.7	3.1
When parents are unable to bear the total costs necessary for their children's preventive care, dentists should help them make some financial arrangements.	3.5	45.3	43.6	3.3	4.3
Schools provide the best way of reaching children for oral health education.	36.8	57.6	3.9	0.2	1.5
Schools provide the best way of reaching children for preventive treatments.	26.5	56.9	14.6	0.1	1.9
Insured patients, not covered for preventive procedures under their prepayment plans, usually will not accept preventive treatments.	19.8	60.8	16.1	0.8	2.5
The public is not sufficiently aware of currently available methods of caries prevention.	31.6	63.7	2.5	0.4	1.8
Dietary fluoride supplements should be made available in Korea.	7.5	66.2	20.7	1.2	4.4
Salt fluoridation should be made available in Korea.	5.4	67.2	18.6	1.2	7.6

N=1,688.

percent concurred that "The public is not sufficiently aware of currently available methods of caries prevention." The majority of respondents (94%) either agreed or strongly agreed that schools provide the best way to reach children for oral health education. Similarly, 83 percent agreed or strongly agreed that schools are the best place to reach children with preventive regimens.

Discussion

As leaders of the oral health care team, dentists have the potential to influence practices of their patients, members of their staff, family, and community. Dentists' practices are influenced by their knowledge and opinions. Correct information about the etiology and prevention of caries is a predisposing factor to help dentists make informed decisions, whether it is to use or to recommend certain preventive procedures or agents. A relatively large proportion of the respondents were not well informed about the etiology of caries nor about the benefits of fluorides in caries prevention. Likewise, a large proportion of dentists did not understand currently accepted theories of the mechanisms of action of fluoride. Overall, respondents tended to overrate the effectiveness of toothbrushing, flossing, recall appointments, and diet counseling as caries-preventive methods, while underrating the effectiveness of community water fluoridation, fluoride toothpaste, and other self-applied fluorides.

These results suggest that Korean dentists tend to have knowledge and concepts based on older theories rather than current scientific information about caries prevention. As a result, they may overemphasize to their patients the importance of oral hygiene and diet counseling and, at the same time, ignore or place less emphasis on the effectiveness of fluorides.

The concept of the importance of fluorides in caries prevention is well documented in the literature (25,26). However, this body of scientific literature is useless unless both health care providers and the public are knowledgeable about the role of fluorides in caries prevention and apply the information. The inconsistencies in knowledge and opinions on fluorides between respondents and the scientific literature must be put into a larger perspective of the overall dental community.

The information lag documented by this study is a shared problem that involves all dentists, whether they are practitioners, academicians, or in public health. The results of this study will be used to help make policy changes and to change the practices of dentists with the ultimate objective of reducing dental caries among all Koreans. For example, 29 and 61 percent of dentists strongly agreed or agreed, respectively, that community water fluoridation should be made available in communities with central water supplies. This information is currently being used to help persuade local politicians, dental societies, and water operators to implement community water fluoridation in additional communities. In contrast, the findings that dentists' perceived effectiveness regarding fluoride toothpaste and fluoride mouthrinse will be used to foster change in dentists' knowledge so that dentists will be supportive of the use of these procedures.

The association between type of practice and dentists' perceived effectiveness of caries-preventive procedures for children is a reasonable finding because public health centers tend to concentrate on preventive procedures more than do private clinics. Further, significant associations were found between dentists' perceived ef-

fectiveness of caries-preventive procedures for adults and both experience with school-based preventive programs and geographic location of practice.

The negative association between number of years since graduation and knowledge suggests that the preventive and public health courses in dental schools may be having a somewhat positive impact on recent graduates. Because dental schools are the gatekeepers of information, they are in a position to influence significantly the appropriate use of caries-preventive procedures. Studies have shown that when students are expected to be competent in and to use on a routine basis preventive procedures in dental schools, they tend to use them in practice, as well (27,28).

Dental schools should devote more time to primary prevention of caries and less to restorative measures (29). Limiting preventive dentistry and dental public health to didactic instruction for third-year dental students only, as is now practiced in most Korean dental schools, makes it clear to the students and faculty that primary prevention and the public's health simply are not important. Disease prevention and dental public health should be included in all years of the dental curricula and students should be required to have practical experience in this area. The data from this study can be used to help make this recommendation a reality.

Further, concerted efforts are needed to enhance the level of knowledge of Korean dentists about caries prevention, with a focus on strategies to educate older and female graduates, especially those in private practice including metropolitan areas. Because continuing education is mandatory in Korea, courses that focus on caries etiology and prevention should be offered in a variety of formats. Data from this study can be used to obtain funding to support these courses and also to justify policies that require dentists to take a course on caries-preventive procedures. Although increasing dentists' knowledge alone will not necessarily increase their use of preventive procedures, at least they will be more qualified to educate or recommend appropriate procedures for their patients, family, and community. This advantage could be especially beneficial to help educate patients about the need for pit and fissure sealants and operator-applied fluorides when they are covered by national health insurance, a change that is anticipated in the near future.

References

1. Park KJ. Survey on the cause of tooth loss among Koreans. J Kor Acad Dent Health 1981;5:52-4.
2. Kang SY, Kim JB. A study on the causes and needs for extraction of teeth among Koreans. J Kor Acad Dent Health 1983;7: 7-20.
3. Kim JB, Paik DI, Moon HS, Ma DS. The causes of tooth extraction in Korea. J Kor Acad Dent Health 1995;19:17-28.
4. Frazier PJ, Horowitz AM. Oral health education and promotion in maternal and child health: a position paper. J Public Health Dent 1990;50(Spec Iss):390-5.
5. Park JM. A study on the oral health status and detectable dental needs of Korean town people. J Kor Acad Dent Health 1981;5:7-33.
6. Oh SI, Kim JB. Oral health status and detectable dental needs of Korean rural people. J Kor Acad Dent Health 1981;5: 55-82.
7. Kim JB, Paik DI, Moon HS, Kim JB. A study on the oral health status of Korean people. Seoul, Korea: Department of Preventive and Public Health Dentistry, Seoul National University, 1991.
8. Kim JB, Paik DI, Moon HS. A study on the oral health status of Korean people, 1995. Seoul, Korea: Department of Preventive and Public Health Dentistry, Seoul National University, 1997.
9. Paik DI, Moon HS, Horowitz AM, Gift HC, Jeong KI, Suh SS. Knowledge of and practices related to caries prevention among Koreans. J Public Health Dent 1994;54:205-10.
10. Cho SY, Choi EG. A study on the F ion concentration of commercial dentifrices. J Kor Acad Dent Health 1984;8:109-18.
11. Lee JK, Choi EG. Survey on the knowledge concerning oral health and the condition of oral health care. J Kor Acad Dent Health 1983;7:125-33.
12. Kim JB, Kim JB. A study on the accessibility of the primary dental health care in rural residents. J Kor Acad Dent Health 1984;8:83-97.
13. Kim JB, Hwang SM, Kim MK, et al. Survey on the dental health impediments of inhabitants in Seoul. J Kor Acad Dent Health 1985;9:97-123.
14. So HH, Kim JB. A study on the toothbrushing behavior in primary schoolchildren. J Kor Acad Dent Health 1988;12: 127-34.
15. Kim KS, KIM JB. A study on the oral health expenditures in the Republic of Korea. J Kor Acad Dent Health 1989;13: 87-102.
16. Yoon KK, Chway G, Kim CY. A study on the oral health knowledge and attitudes of elementary school nursing teachers in Pusan. J Kor Acad Dent Health 1990;14: 211-20.
17. Lee HS, Lee KH, Kim SN. A study of dental health behavior in Chollabuk Do Republic of Korea. J Kor Acad Dent Health 1993;17:324-42.
18. Lee YH, Kim JB. A survey on family dental health behavior in Seoul metropolitan city. J Kor Acad Dent Health 1994;18:526-44.
19. Korean Dental Association. 1995 KDA membership directory. Seoul: Korean Dental Assocation, 1995.
20. Green LW, Kreuter MW. Health promotion planning. An educational and environmental approach. 2nd ed. Mountain View, CA: Mayfield Publishing Co., 1991.
21. Gift HC, Hoerman KC. Attitudes of dentists and physicians toward the use of dietary fluoride supplements. J Dent Child 1985;52:265-8.
22. American Dental Association Health Foundation. The role of the health professional in the delivery of caries prevention. Vol I. Dentists. Chicago: American Dental Association, 1983.
23. Dillman DA. Mail and telephone surveys. New York: John Wiley & Sons, 1978.
24. Nie NH, Hull CH, Jenkins JG, Steinbrenner K, Bent DH. SPSS; Statistical package for the social sciences. New York: McGraw-Hill, 1975.
25. Ripa LW. A half-century of community water fluoridation in the United States: review and commentary. J Public Health Dent 1993;53:17-44.
26. Ripa LW. A critique of topical fluoride methods (dentifrices, mouthrinses, operator and self-applied gels) in an era of decreased caries and increased fluorosis prevalence. J Public Health Dent 1991;51: 23-41.
27. Ripa LW. Teaching occlusal sealant therapy to dental students department of children's dentistry, State University of New York at Stony Brook. J Public Health Dent 1983;43:43-52.
28. Ripa LW, Johnson RM. Utilization of preventive dental practices by graduates of one US dental school. J Dent Educ 1991; 55:367-71.
29. Anuasavice KJ. Treatment regimens in preventive and restorative dentistry. J Am Dent Assoc 1995;126:727-40.