
New Opportunities for Enhancing Oral Health: Moving Toward the 1990 Objectives for the Nation

STEPHEN B. CORBIN, DDS, MPH
DUSHANKA V. KLEINMAN, DDS, MScD
J. MICHAEL LANE, MD, MPH

Dr. Corbin is Acting Chief, Dental Disease Prevention Activity, and Dr. Lane is Director, Center for Prevention Services, both of the Centers for Disease Control. Dr. Kleinman is Chief, Planning and Evaluation Section, Office of Planning, Evaluation, and Communications, National Institute of Dental Research, National Institutes of Health.

Tearsheet requests to Stephen B. Corbin, DDS, MPH, Dental Disease Prevention Activity, CDC, Rm. 17A-22, Parklawn Bldg., Rockville, MD 20857.

Synopsis

In July 1983, the Assistant Secretary for Health reviewed progress toward achievement of a dozen national objectives in fluoridation and dental health. These 12 objectives, classified under the categories of improved oral health status, reduced risk factors, increased public and professional awareness, improved services and protection, and improved surveillance-evaluation systems, hold promise for improved oral health in this country. It is noteworthy that the objective that 40 percent of

9-year-old children be caries-free in their permanent dentition has been accomplished (51 percent of 9-year-olds were caries-free according to a 1979-80 National Institute of Dental Research study). Still, dental caries is highly prevalent among teenaged children, and gingival and periodontal conditions are highly prevalent among children and adults.

A number of highly effective methods are available for preventing dental decay in children as well as adults; they include community or school water fluoridation, the use of multiple forms of supplemental fluorides, avoidance of frequent consumption of foods that are high in sugar content, and the use of adhesive pit and fissure sealants. Personal use and professional provision of these methods in appropriate combinations can contribute significantly to future improvements in oral health. Meticulous personal oral hygiene practices combined with periodic professional care are the currently available means of protecting periodontal health.

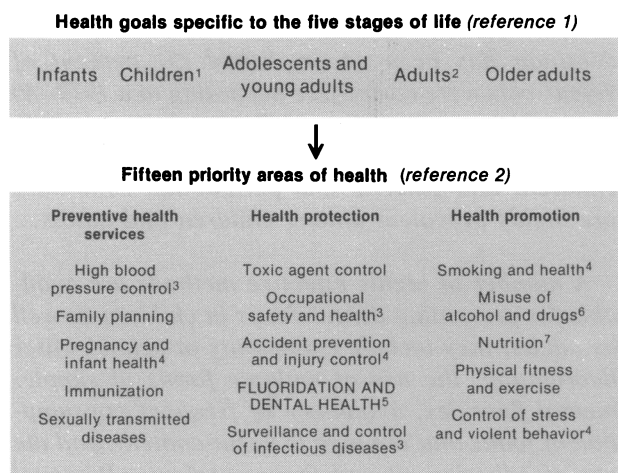
Through increased collaboration among various governmental, academic, and corporate entities, as well as active participation by individuals, the achievement of a number of these objectives becomes feasible to the benefit of national productivity, health care financing, and the quality of life for Americans.

IN THE FOREWORD TO "Healthy People," the Surgeon General's July 1979 report on health promotion and disease prevention, the Secretary of Health, Education, and Welfare stated that the purpose of the report was "to encourage a second public health revolution in the history of the United States" (1). The first revolution had been the struggle against infectious diseases at the turn of the century. The Secretary stressed that the report represented "an emerging consensus among scientists and the health community that the Nation's health strategy must be drastically recast to emphasize the prevention of disease." Establishing broad health goals and 15 actions appropriate at 5 stages of life, the report acknowledged oral diseases and conditions as important problems for both children and adults. The development of specific objectives to be achieved by 1990 or earlier led to publication of a

companion volume, "Promoting Health/Preventing Disease." Of the 226 objectives described, 14 relate directly to oral health (2). Figure 1 provides an orientation to the oral health-related content of the 15 priority areas.

With the important exception of oral cancers, most oral diseases and conditions are not life-threatening. They are, however, life-limiting. For example, the 1981 U.S. National Health Interview Survey reported 17.7 million days of restricted activity, 6.73 million days of bed disability, and 7.05 million days of work loss as a result of 4.87 million dental conditions (3). For every acute dental condition reported, almost 1½ days were lost from work. Oral diseases and conditions also result in pain, disfigurement, and difficulty in tasting, chewing, or swallowing, and can contribute to systemic health problems.

Figure 1. Oral health orientation to the 1990 objectives



¹Caries, periodontal diseases, and community water fluoridation are mentioned.

²Periodontal diseases are mentioned.

³Dental care providers can contribute to the achievement of the objectives in these areas.

⁴Activities in these areas could benefit the nation's oral and craniofacial health.

⁵Includes 12 oral health objectives.

⁶One objective addresses the public's increased awareness of risks to head and neck cancers.

⁷One objective addresses the public's increased awareness of the role of dietary factors in dental caries.

Annual expenditures for the treatment of oral diseases amount to well over \$20 billion (4). Of the 13 leading health problems in the nation, dental diseases rank second in total direct costs. The time needed for dental care and treatment is estimated to be as high as 81.8 million days annually (5).

The major oral diseases in America, highly prevalent in children and adults, are dental caries (tooth decay) and periodontal diseases (gum diseases). The 1979–80 National Caries Prevalence Survey of U.S. School Children, aged 5 to 17, showed that the average child has at least 1 dental caries lesion in permanent teeth by age 8, 4 by age 12, and 11 by age 17 (6). That same survey revealed that 92 percent of the children had mild or moderate gingival treatment needs (7). With respect to adult periodontal diseases, in the 1971–74 Health and Nutrition Examination Survey (HANES) of the National Center for Health Statistics (NCHS), 31 percent of U.S. adults 18 to 79 years old had destructive periodontal disease and 25 percent had gingivitis (8). These HANES findings also disclosed that 10.7 percent of the population aged 6 to 74 years were missing all their teeth. One study showed that for 1975–76 more than 9.5 million persons received medical care each of these years for craniofacial injuries (9). In addition, 1981 data showed that 27,000 new cases of oral cancer are diagnosed annually, and 9,000 cancer deaths attributable to this cause occur (10).

The 12 specific objectives for the nation's oral health that were developed in 1979 for the fluoridation and dental health priority area (2a) acknowledge the magnitude of the oral health problem and

build upon a variety of oral health promotion and disease prevention activities. In parallel to the other 14 priority areas, these objectives are grouped into 1 of 5 categories—reduced risk factors, increased public-professional awareness, improved services-protection, improved health status, and improved surveillance-evaluation systems.

Thus, process activities are directed toward reducing known risk factors of oral diseases and conditions, to improving the number and type of preventive services available to the public, and to increasing the awareness of both the public and the profession of disease etiology, pathogenesis, and the methods of prevention that can contribute toward the outcome of improved health status. The fifth category is the monitoring and surveillance of outcomes as well as the evaluation of the processes that may lead to these outcomes.

In July 1983 a review of the progress toward achieving the specific targets and goals enumerated under the fluoridation and dental health objectives was conducted with the Assistant Secretary for Health. Presentations were made by representatives of the Centers for Disease Control (CDC, the lead agency), the National Institutes of Health (NIH), and the Health Resources and Services Administration (HRSA), and by the Chief Dental Officer, Public Health Service. These agencies, coordinated by CDC, are currently conducting a midcourse review of the objectives. The following discussion presents an overview of the selected areas and issues related to the fluoridation and dental health objectives from 1980 to 1985. In addition, a number of Federal activities are described, and some additional considerations presented, that could advance the goal of improving oral health in America and aid in monitoring oral health status.

Healthy Teeth

a. By 1990, the proportion of nine-year-old children who have experienced dental caries in their permanent teeth should be decreased to 60 percent. (In 1971–74, it was 71 percent.)

This objective has been surpassed. The 1979–80 National Caries Prevalence (NCP) Survey of U.S. School Children conducted by the National Institute of Dental Research (NIDR) showed that only 49 percent of 9-year-olds—rather than the 60 percent targeted for 1990—had experienced caries in their permanent teeth (personal communication from Janet Brunelle, NIDR, 1985). However, caries in permanent teeth was more prevalent in older children as demonstrated by this survey; 73 percent

of the 12-year-olds and 89 percent of the 17-year-olds had experienced dental caries. The NCP Survey also showed a one-third reduction in caries prevalence for U.S. school children aged 5 to 17 compared with the National Center for Health Statistics' 1971-74 Health and Nutrition Examination Survey data (6,8). Figure 2 depicts the differences between age-specific data for both surveys in terms of decayed, missing, and filled tooth surfaces, the standard index for assessing caries experience for both surveys. The caries decline was observed in all regions of the country, and the regional differences in caries prevalence noted in the past continued, with variations existing between Standard Metropolitan Statistical Areas (SMSA) and non-SMSAs (fig. 3). In addition, in the 1979-80 NCP Survey, almost 37 percent of school children were found to be caries-free. A followup of the NCP Survey is planned for fiscal year 1986 and should shed further light on these findings.

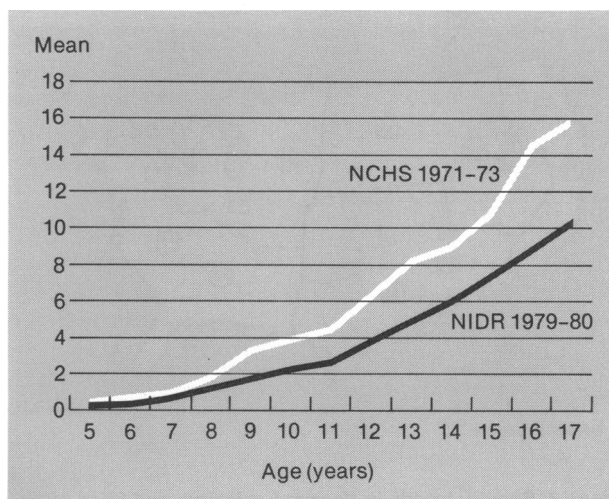
The most current national caries prevalence data on U.S. adults were obtained by NCHS's HANES I in 1971-74 (8). Compared with the NCHS Health Examination Survey (HES) for 1960-62, mean scores for decayed, missing, and filled teeth demonstrated varying trends in specific age groups (reference 11 and fig. 4). In the national Adult Oral Health Survey now underway, dental caries as well as indicators of periodontal health and disease are being examined. The results of this survey, expected in fiscal year 1987, will provide data for further analysis of trends.

Several statewide surveys also have shown a decline in caries prevalence in children and young adults (12,13). Analyses of the reasons for this decline have emphasized the role of fluoride in various forms. Preliminary analyses from the 1983 Dental Care Supplement of the National Health Interview Survey indicate that 94 percent of people who use a dentifrice use a brand that contains fluoride (personal communication, Denny Klein, National Center for Health Statistics, 1984). Also, over-the-counter fluoride-containing mouthrinses are now widely available.

h. By 1990, at least 95 percent of the population on community water systems should be receiving the benefits of optimally fluoridated water. (In 1975, it was 60 percent.)

Progress toward achieving this objective is proceeding more slowly. As new public water systems are added to existing systems, the size of the population served, as well as the percentage of all persons served by public water, increases. If new public

Figure 2. Mean decayed, missing, and filled permanent tooth surfaces for children aged 5-17 years, United States



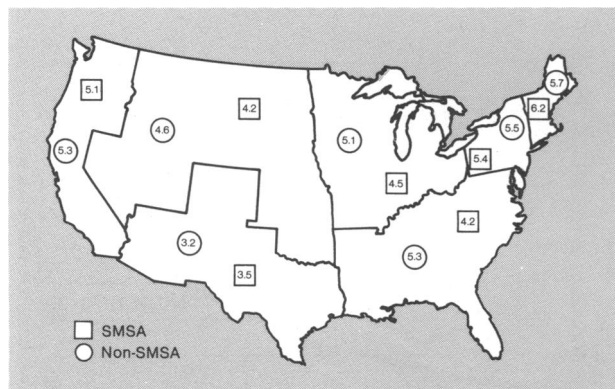
SOURCES: 1971-73 National Center for Health Statistics Survey, unpublished data, and reference 6. NOTE: Figure 2 is adapted from reference 14, p. 78.

water systems are developed and do not incorporate fluoridation, as is often the case in small systems serving fewer than a thousand individuals, this failure will contribute to a downward trend in the percent of population on public water systems that have access to fluoridated water. Nevertheless, the total number of persons receiving the benefits of optimally fluoridated drinking water has been increasing steadily. Figure 5 reflects these trends. Approximately 123 million Americans now have access to drinking water with dentally significant levels of fluoride (0.7 parts per million or greater). Some 58.5 percent of the population on public water supplies are so served (14).

i. By 1990, at least 50 percent of school children living in fluoride-deficient areas that do not have community water systems should be served by an optimally fluoridated school water supply. (In 1977, it was about 6 percent.)

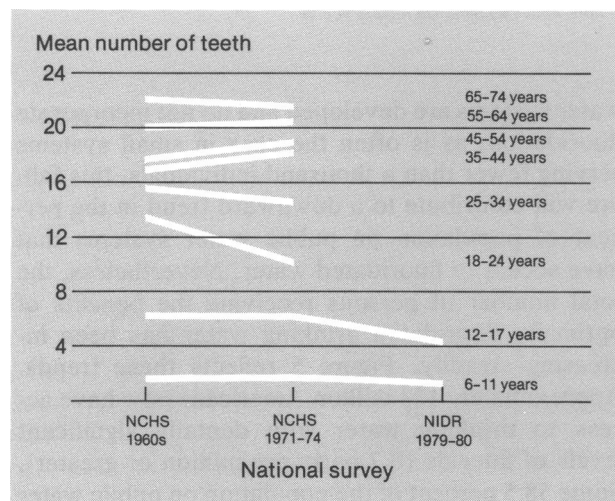
Trends in school water fluoridation are difficult to determine. The problem lies in establishing the absolute number of school children for whom this is an appropriate preventive service. In some instances, schools may stop fluoridating water separately as community water systems improve or expand to include schools. Obviously, no benefit is lost when the community water system is fluoridated at an optimal level. However, the reverse situation also can happen. A formerly fluoridated school water system can be incorporated into a nonfluoridated community water system with the resulting loss of fluoride benefits. In 1975, fluoridated school water

Figure 3. Mean decayed, missing, and filled permanent tooth surfaces for U.S. children according to classification of residence, 1979-80



SOURCE: Reference 6.

Figure 4. Secular trends in decayed, missing, and filled teeth



SOURCE: Reference 11.

was available to 124,475 students in 383 schools (15). By 1980, the numbers had increased to 167,863 students in 500 schools (16). Data concerning the number of school-aged children who are not served by public water systems and who live in fluoride-deficient areas are not available.

j. By 1990, at least 65 percent of school children should be proficient in personal oral hygiene practices and should be receiving other needed preventive dental services in addition to fluoridation. (Baseline data unavailable.)

It is not possible to define the degree of attainment for this objective, as the total range of required preventive services is not easily specified. A variety of school-based caries preventive programs are in existence. It has been reported that up to 12 million

children in schools, preschools, and day care centers are participating in self-applied fluoride programs (this includes fluoride mouthrinsing and fluoride supplement programs (17)). Data from the 1983 Association of State and Territorial Health Officers' survey indicate that slightly more than 3 million school children are reported by 43 States to be participating in fluoride mouthrinse programs (18). The vast majority of these children live in nonfluoridated areas.

Another preventive service that would appropriately be included under objective j is adhesive dental sealants. The report of the December 1983 NIH-sponsored Consensus Development Conference on Dental Sealants reaffirmed the safety and effectiveness of these materials (19). By adhering to the pitted and fissured surfaces of teeth, dental sealants form a physical barrier to bacteria and food debris. In this way they protect the very areas of teeth shown to be most vulnerable to dental caries. Recent manufacturers' figures show a dramatic increase in sales for 1984 over 1983 (20).

d. By 1990, no public elementary or secondary school (and no medical facility), should offer highly cariogenic foods or snacks in vending machines or in school breakfast or lunch programs.

For decades, the contributory role of sucrose in the development and progression of dental caries lesions has been delineated, and efforts to lower the consumption of sugars and sugar-containing products have been undertaken for many years. These efforts have been particularly aimed at school-age children, many of whom are highly prone to dental caries. The objective calls for school and medical facilities to be devoid of vending machines offering cariogenic snacks. While laudable in principle, achievement of this objective is difficult at best, until the cariogenic potential of foods is quantified and the availability of certain foods is controlled in public and medical institutions. At this time an approach toward the common goal of caries prevention may be to offer alternative foods known to be minimally cariogenic, cariostatic, or noncariogenic.

f. By 1990, at least 95 percent of school children and their parents should be able to identify the principal risk factors related to dental diseases and be aware of the importance of fluoridation and other measures in controlling these diseases. (Baseline data unavailable.)

Additional work is needed to increase professional and public awareness of caries preventive measures. A 1977 survey showed that 51 percent of U.S.

adults did not know the purpose of water fluoridation (21). A recent study of beliefs about dental health also showed that the general public ranked oral hygiene and professional care ahead of fluoride in controlling dental caries (22). In 1981–82 a survey of caries prevention practices of dentists and pediatricians showed that 88 percent of dentists believed it was possible to prevent most dental caries, and an overwhelming majority regarded the use of fluorides in water supplies as the single most effective preventive measure (23). Additionally from the same study, 60 percent of dentists and 80 percent of pediatricians prescribed dietary fluoride supplements for child patients living in nonfluoridated areas. At that time, most dentists and pediatricians were not aware of the value of dental sealants in preventing pit and fissure caries in molar teeth.

The 1985 NCHS Health Interview Survey's Health Promotion/Disease Prevention Supplement contains five questions concerning public awareness of risk factors related to oral health that will establish a partial baseline for 1990. Also, the 1986 supplement to the NCHS Health Interview Survey includes several additional questions concerning public oral health knowledge. Findings from these later surveys should add to the assessment of progress toward the 1990 objectives.

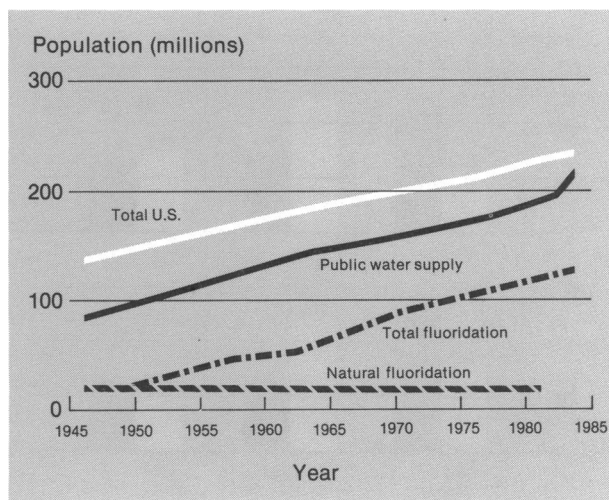
Healthy Periodontal Structures

b. By 1990, the prevalence of gingivitis in children 6 to 17 years should be decreased to 18 percent. (In 1971–74, the prevalence was about 23 percent.)

The trends for periodontal diseases are not as clear as those for dental caries. The prevalence of gingivitis in children aged 6–17 years was 23 percent, according to the 1971–74 NCHS HANES I findings (8). No national survey has included this condition since that time. However, several statewide surveys using varying criteria for judging the prevalence of gingivitis have been conducted. Using the criterion of having at least one tooth with gingivitis, the 1976–77 North Carolina Dental Survey researchers found 44 percent of 5–19-year-olds with gingivitis (12). In the 1980 Iowa Survey of Oral Health, which used gingival bleeding as a criterion, 19 percent of 6–17-year-olds had gingivitis (24).

c. By 1990, in adults the prevalence of gingivitis and destructive periodontal disease should be decreased to 20 percent and 21 percent respectively. (In 1971–74, for adults aged 18 to 74 years, 25 percent had gingivitis and 23 percent had destructive periodontal disease.)

Figure 5. Fluoridation growth, by population, United States, 1945–84



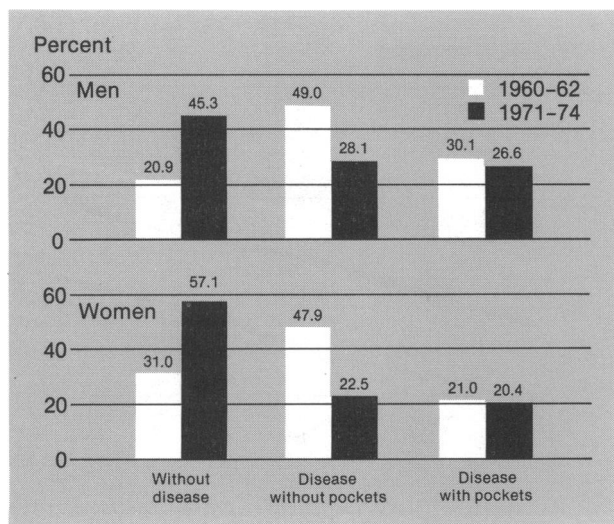
NOTE: Figure 5 is adapted from reference 14, p. 79.

While the mean periodontal index scores obtained from national probability samples of adults did not change appreciably between 1960–62 and 1971–74, the percentage of adults without disease increased from 26.1 percent to 51.4 percent over this period of time (25). For age groups over 35, increases were noted in the prevalence of destructive periodontal disease. The percentage of all adults with disease with periodontal pockets, an indicator of the destructive form of the disease, decreased marginally, whereas the percentage of adults with disease without pockets decreased significantly. Figure 6 shows differences for men and women. In addition, improvements in oral hygiene status were observed.

Consideration must be given to shifts in the profile of the U.S. population, specifically the increase in percentages and numbers of older adults. As tooth mortality due to dental caries is reduced, the total number of teeth at risk for the periodontal diseases and for other types of dental caries, such as root surface caries, increases along with the length of time that these are at risk. However, even if the average amount of disease per person does not change, the magnitude of the oral disease problem nationally will remain significant.

Progress toward the 1990 objectives for improved gingival and periodontal health for children and adults will be assessed within this decade. The planned followup of the NCP Survey of school children will provide national data on gingival conditions as well as dental caries. Also, as stated earlier, the national survey of the oral health status of adults now underway will provide a third point of reference for the examination of trends.

Figure 6. Periodontal disease status in U.S. adults, 18-79 years, 1960-62 and 1971-79



SOURCE: reference 25.

g. By 1990, at least 75 percent of adults should be aware of the necessity for both thorough personal oral hygiene and regular professional care in the prevention and control of periodontal disease. (In 1972, only 52 percent knew of the need for personal oral hygiene and only 28 percent were aware of the need for dental checkups.)

Progress toward increasing the public's awareness of the prevention and control of periodontal diseases is unknown. As mentioned earlier, the 1985 Health Promotion/Disease Prevention Supplement of the NCHS National Health Interview Survey will provide needed data. Plaque control is the critical preventive measure for gingivitis and, at present, it is the predominant mode of prevention for destructive periodontal disease. In addition, periodic professional debridement is a beneficial adjunct for preventing the initiation and recurrence of destructive periodontitis. Unfortunately, plaque control programs directed at school-aged children show minimal short-term and no long-term benefit in improving oral hygiene or reducing the incidence of gingivitis (26).

It must also be remembered that only a little more than one-half of the U.S. population visits a dentist in a year (27). Since one-half of these visits are estimated to be for dental emergencies or chief complaints, the attainment of routine, periodic professional prophylaxis is clearly not the norm for the average American citizen. However, the provision of prophylaxis may be part of the series of visits given in the course of restorative treatment.

Healthy Oral Tissues

As stated earlier, 9.5 million persons received medical care for craniofacial injuries for each of 2 years studied (1975-76). Oral cancers and trauma involving the head, neck, and areas around the mouth can result in severe disability, disfigurement, pain, and even death. Generally these conditions are difficult and costly to treat. Facial injuries from automobile accidents are large contributors to head and neck morbidity. The increased mandatory as well as voluntary use of seatbelts, State laws mandating the use of child restraints, stricter laws concerning drunk driving, and control of substance abuses could contribute to a decline in the incidence of this type of injury.

e. By 1990, virtually all students in secondary schools and colleges who participate in organized contact sports should routinely wear proper mouth guards. (Baseline data unavailable.)

Sports injuries to the face and head are a growing area of concern in light of large and ever expanding participation in various contact sports at elementary, junior high school, high school, and college levels. The use of facial protectors, such as face masks in football and facial screens in hockey as well as properly fitted mouthguards of appropriate construction, can minimize head and neck traumas. Fractured teeth and bones, dislocated jaws, and traumatized temporomandibular joints can be avoided if organized sports programs mandate, and parents and coaches enforce, the use of facial protection and mouthguards.

Although it is not possible to assess the progress made toward this objective, several national organizations, such as the National High School Federation, National Collegiate Athletic Association, and Amateur Hockey Association of the United States, have mandatory mouthguard rules (28). Also, although the oral and facial injuries that occur incidentally through noncontact sports and accidents on the playground are often unavoidable, proper monitoring of playground activities and selection of appropriate and safe playground equipment by administrators could help minimize risk.

Although not mentioned in a specific objective, oral carcinomas are a major health problem. The incidence of oral carcinomas and the resultant mortality have remained fairly constant for a number of years. In 1985, an estimated 29,000 persons will be newly diagnosed as having oral cancers (29). Nine and a half thousand fatalities attributable to oral

cancer will occur in 1985 (29). Early diagnosis of oral cancers is essential in order to improve chances for successful treatment. Thorough soft tissue examinations during routine dental appointments and institutionally or community-based screening programs can also be quite effective if targeted at high-risk populations. Unfortunately, many of the persons most susceptible to oral cancers are older adult denture wearers who generally feel little need for dental checkups.

Since tobacco usage in the form of smoking or smokeless tobacco (for example, snuff) has been implicated along with excessive alcohol consumption in the development of oral cancers, declines in the excessive use of these substances could contribute to a decline in the incidence of and mortality from oral cancers. Recently, much attention has been paid by the dental profession to the increased use of smokeless tobacco in this country. Estimates of smokeless tobacco use run as high as 22 million, and users have been noted as young as children in the early elementary grades (30). Rural use is high, with some American Indian communities showing a utilization rate of more than 50 percent among junior high-school-aged children (31). Snuff use, traditionally thought to be a habit practiced in the rural South and Midwest, seems to be increasing among urban residents in the East and West. Use of smokeless tobacco has been indicted as a potential carcinogen and cause of periodontal problems, leukoplakias, tooth abrasion, and staining of teeth. Effective health promotion efforts aimed particularly at school-aged children are needed to stem the rise in the use of this substance.

Toward Surveillance and Evaluation

k. By 1990, a comprehensive and integrated system should be in place for periodic determination of the oral health status, dental treatment needs and utilization of dental services (including reason for and costs of dental visits) of the U.S. population.

l. By 1985, systems should be in place for determining coverage of all major dental public health preventive measures and activities to reduce consumption of highly cariogenic foods.

Oral health status, dental treatment needs, use of dental services, and public health preventive measures are periodically assessed for the U.S. population. A variety of organizations in the public and private sectors are involved. However, an issue to be addressed is whether the existing and planned efforts are "comprehensive and integrated." With

regard to monitoring the 1990 objectives, current and planned oral disease prevalence surveys will provide data critical to the assessment of improved health status. In addition, the data on public knowledge, attitudes, and practices being collected by the NCHS Health Interview Survey should indicate changes in public awareness and add information on self-reported behavior. However, national data are needed to evaluate objectives under the categories of reduced risk factors and improved services/protection.

Federal Efforts

Oral health promotion and disease prevention activities are well represented in a number of Public Health Service agencies (as well as within other Federal dental programs). As fluoridation remains the backbone of a dental public health program, the Dental Disease Prevention Activity at CDC continues to be a national focus for efforts to fluoridate community and school water supplies. In collaboration with other Federal and State programs, as well as private sector organizations, CDC seeks to update scientific evidence on the safety and effectiveness of water fluoridation in preventing dental caries and communicates these findings throughout the government, to public and private organizations, and to the lay public. In addition, CDC promotes the adoption of other methods of preventing oral diseases such as pit and fissure sealants and adjunctive fluoride therapies.

The Health Resources and Services Administration—through programs operated in the Indian Health Service, Bureau of Health Care Delivery and Assistance, Bureau of Health Professions, and Bureau of Health Maintenance Organizations and Resources Development—actively promotes community and school water fluoridation and provides technical assistance for a variety of health promotion and disease prevention activities. Over 400 water fluoridation installations are currently serving American Indian and Alaska Native communities. National Health Service Corps dentists serving in community health centers and migrant health centers provide dental care and oral disease prevention services in 313 separate sites around the country. Many communities are receiving Federal support for community water fluoridation activity from Preventive Health Block Grant funds that are made available to States. Additionally, resources are provided in many States for oral health services, both preventive and curative, through the Maternal and Child Health Block Grant mechanism.

The National Institute of Dental Research supports and conducts research on the epidemiology, etiology, pathogenesis, diagnosis, treatment, and prevention of oral diseases and conditions as well as supporting research in manpower development and training programs. A major contribution by the NIDR to the 1990 objectives has been the support, conduct, and analysis of nationwide oral health surveys to augment data available from the National Center for Health Statistics. In addition, health promotion and science transfer activities at the NIDR continue to be expanded. Efforts include consensus development conferences, films, pamphlets, continuing education conferences, and publications for the public, health professions, and the research community. Most recently, the NIDR has helped to develop films for the public on periodontal diseases and continues to pursue a wide range of activities on the appropriate use of fluorides, sealants, and other caries preventives.

Activities related to dental sealants provide an example of a joint thematic approach to the promotion of an effective caries prevention measure by the Public Health Service and professional organizations. The findings and recommendations of the aforementioned Consensus Development Conference on Dental Sealants have accelerated professional and public support for sealants. The NIDR, in addition to cosponsoring this conference, has developed posters and a public service announcement on dental sealants, among other related activities. Additional promotion of sealants has come through the American Dental Association, American Public Health Association, American Association of Public Health Dentistry, and other national health organizations. In 1984, the Surgeon General issued a position statement noting the safety and effectiveness of sealants and encouraging their use in public and private programs. Within the Indian Health Service, a survey has been conducted of supervisory dentists to determine knowledge, attitudes, and practices regarding sealants.

To deal with the higher caries prevalence found among American Indian and Alaska Native children, compared with the U.S. average, all areas of the Indian Health Service (IHS) have stepped up dental disease prevention efforts, resulting in rapidly increasing use of pit and fissure sealants as well as in greater compliance with recommended levels of community water fluoridation and increased use of fluoride supplements. Since fiscal year 1981, the provision of sealants has increased eighteenfold in the IHS and has increased more than 300 percent from FY 1983 to 1984. The CDC has provided sup-

port for the IHS and Massachusetts Health Research, Inc., to examine the impact of pit and fissure sealants on both patient and provider practices when they are added as a benefit to existing dental insurance plans. The information gained from this study should provide valuable insights for structuring public and privately supported sealant programs.

The PHS effort in relation to the 1990 oral health objectives has been broad-based. Activities during the past several years have emphasized the development of implementation strategies, the establishment of priorities, the generation of data to assess progress, and the establishment of evaluation criteria. Paralleling these activities have been the routine monthly reports for the Health Promotion/Disease Prevention Calendar as well as the annual documentation of activities and monies directed toward these objectives.

At the progress review meeting with the Assistant Secretary for Health in July 1983, emphasis was placed on the prevention of periodontal diseases, the need for expanding caries preventive measures to include dental sealants, and the continued importance of obtaining, analyzing, and reporting oral disease prevalence data. This meeting served to highlight priority objectives beyond the three addressing dental caries prevalence, community water fluoridation, and school water fluoridation, which were described in the September 1983 PHS Implementation Plan (32).

Looking at the objectives from the point of view of their impact on education in the health professions, HRSA convened a meeting of dental consultants in FY 1984 to develop recommendations for public health and primary care. A conference entitled "The Future of Oral Health: Phase IV. Defining Criteria and Methods for Setting Objectives" was conducted by the Chief Dental Officer in June 1984 to examine indicators for measuring change and to discuss definitions of criteria related to health policy, dental services, demography, and oral health status. Currently, all sponsoring agencies of the oral health objectives are participating in the midcourse review of the 1990 effort. Progress made toward the objectives will be evaluated, improvements will be suggested, and initial objectives for the year 2000 will be developed.

Future Needs and Directions

As acknowledged in the introduction to "Promoting Health/Preventing Disease" (2), the need for data and the expected returns from ongoing re-

search will affect both the measurement of progress and the achievement of the oral health objectives by 1990. Current studies such as the investigation of antiplaque and antimicrobial compounds and the development and testing of improved dental sealants and new fluoride-containing agents and vehicles, as well as the development of interventions to enhance the adoption of oral disease preventive methods by the public and the profession, will strengthen the current prevention armamentarium.

The need to establish monitoring criteria for the objectives and to clarify the wording of some objectives has been identified. Objective j, which states that school children should be receiving "other needed preventive dental services . . .," is an example of the requirement for greater specificity. In addition, the scope of the oral health objectives—which now include and emphasize a limited number of diseases and conditions and target populations—could be broadened. An indicator for orofacial injuries and oral cancer would be appropriate, as well as the need to target efforts toward particular high-risk populations and healthy individuals at all stages of life—from healthy infants and adolescents to healthy young and older adults.

To make major gains in oral health by the year 1990, extensive collaboration will be necessary among Federal, State, and local public health components, professional organizations, private practitioners, and the public. Federal components such as the CDC, NIH, and HRSA can continue to contribute greatly as they have to date, as well as expand their efforts to include other Federal dental programs such as those within the Department of Defense and the Veterans Administration. The private sector, through organizations such as the American Dental Association, National Dental Association, American Association of Public Health Dentistry, American Public Health Association, and American Dental Hygienists Association, can do much by providing promotion, sharing technical information, and supporting appropriate educational activities for dental providers and the lay public. In addition, groups such as the Children's Defense Fund and health interests in business and industry can provide momentum in critical arenas.

The state of the nation in 1985 in relation to oral health will be more specifically documented in the coming years. A number of mechanisms to collect the needed data are now in place, and additional opportunities to bring relevant data to bear will be sought. Much has been learned from the process to date. As Zwick stated in an article reviewing the establishment of goals for national health, "The

goals and standards are designed to educate, affect attitudes, and influence subsequent actions. In these three processes, their symbolic value may be more important than the specific details . . ." (33) The very existence of these objectives encourages efforts to work collectively toward the enhancement of the oral health of all Americans.

References

1. Public Health Service: Healthy people: the Surgeon General's report on health promotion and disease prevention. DHEW Publication No. (PHS) 79-55071. U.S. Government Printing Office, Washington, DC, July 1979.
2. Public Health Service: Promoting health/preventing disease: objectives for the nation. U.S. Government Printing Office, Washington, DC, fall 1980; (a) p. 54.
3. Reisine, S. T.: Dental health and public policy: the social impact of dental disease. *Am J Public Health* 75: 27-30, January 1985.
4. National health expenditures 1983. *Health Care Financing Rev* 6: 7, December 1984.
5. Fritz, M. E., and Rundle, D. G.: Closing the gap—dental disease. Health policy project report. Carter Center (Emory University, Atlanta, GA 30322), September 1984.
6. National Institutes of Health: The prevalence of dental caries in United States children 1979-1980: the National Dental Caries Prevalence Survey. DHHS Publication No. (NIH) 82-2245, December 1981.
7. National Institutes of Health: Dental treatment needs of United States children 1979-1980: the National Dental Caries Prevalence Survey. DHHS Publication No. (NIH) 83-2246, December 1982.
8. National Center for Health Statistics: Basic data on dental examination findings of persons 1-74 years. U.S. 1971-74. *Vital Health Stat* [11] No. 214, DHEW Publication No. (PHS) 79-1662, May 1979.
9. National Institutes of Health: Challenges for the eighties, National Institute of Dental Research long range research plan FY 1985-89. DHHS Publication No. (NIH) 85-860, December 1983.
10. National Cancer Institute: Cancer incidence and mortality in the United States—SEER—1973-81. DHHS Publication No. (NIH) 85-1837, Bethesda, MD, revised 1984.
11. Douglass, C. W., and Gammon, M. D.: The epidemiology of dental caries and its impact on the operative dentistry curriculum. *J Dent Educ* 48: 547-555 (1984).
12. Hughes, J. T., Rozier, R. G., and Ramsey, D. L.: Natural history of dental diseases in North Carolina, 1976-1977. Carolina Academic Press, Durham, NC, 1982.
13. DePaola, P. F., et al.: A dental survey of Massachusetts school children. *J Dent Res* 61: 1356-1360, November 1982.
14. Perspectives in disease prevention and health promotion. Dental caries and community water fluoridation trends—United States. *MMWR* 34: 77-80, Feb. 15, 1985.
15. Centers for Disease Control: Fluoridation census 1975. Atlanta, GA, April 1977.
16. Centers for Disease Control: Fluoridation census 1980. Atlanta, GA, June 1984.
17. National Institutes of Health: Preventing tooth decay: a guide for implementing self-applied fluorides in school settings. DHHS Publication No. (NIH) 82-1190, revised December 1981.

18. Bednarsch, H., and Connelly, G.: Preliminary report on fluoride mouthrinse programs of state and local health departments. Paper presented at 112th Annual Meeting of the American Public Health Association, Anaheim, CA, Nov. 11-15, 1984.
19. Proceedings. National Institutes of Health Consensus Development Conference. Dental sealants in the prevention of tooth decay. J Dent Educ 48 (supp): 1-133, February 1984.
20. Tysowsky, G., and Frazier, P. J.: Pit and fissure sealants: manufacturers' marketing strategies. Paper presented at 112th Annual Meeting of the American Public Health Association, Anaheim, CA, Nov. 11-15, 1984.
21. U.S. General Accounting Office: Reducing tooth decay—more emphasis on fluoridation needed. HRD-79-3. U.S. General Accounting Office, Washington, DC, Apr. 13, 1979.
22. O'Neill, H. W.: Opinion study comparing attitudes about dental health. J Am Dent Assoc 109: 910-915, December 1984.
23. Prevention in the dental office: results of a preventive dentistry survey. J Am Dent Assoc 108: 809-817, May 1984.
24. The Iowa survey of oral health: 1980. A joint project of the University of Iowa College of Dentistry and the Iowa Dental Association, Iowa City, IA, 1982.
25. Douglass, D. W., Gillings, D., Sollecito, W., and Gammon, M.: National trends in the prevalence and severity of the periodontal diseases. J Am Dent Assoc 107: 403-412, September 1983.
26. Kiyak, H. A., and Mulligan, K.: Behavioral research related to oral hygiene practices. Paper presented at Dental Plaque Control Measures and Oral Hygiene Practices Workshop. Bethesda, MD, Feb. 26-28, 1985.
27. National Center for Health Statistics: Dental visits, volume and interval since last visit, United States, 1978 and 1979. DHHS Publication No. (PHS) 82-1566. Vital Health Stat [10] No. 138 (1982).
28. Castaldi, C. R.: Injuries to the teeth. In Sports injuries, the unthwarted epidemic. PSG Publishing Company, Inc., Littleton, MA, 1981, pp. 147-157.
29. 1985 Cancer facts and figures. American Cancer Society, New York, 1985.
30. Harper, S.: In tobacco, where there is smokeless fire. Advertising Age 51: 85 (1980).
31. Mecklenberg, R.: Statement on smokeless tobacco by Chief Dental Officer, USPHS. Presented at Massachusetts State Health Department Hearings on Smokeless Tobacco, Boston, Feb. 6, 1985.
32. Promoting health/preventing disease. Public Health Service implementation plans for attaining the objectives for the nation. Public Health Rep 98: (supp) September-October 1983.
33. Zwick, D.: Establishing national health goals and standards. Public Health Rep 98: 416-425, September-October 1983.

Assessment of Schistosomiasis in the Dominican Republic

CURT R. SCHNEIDER, PhD
ROBERT A. HIATT, MD, PhD
EMILE A. MALEK, PhD
ERNESTO RUIZ-TIBEN, PhD

The authors were consultants to the U.S. Agency for International Development (USAID) and members of the 1980 ad hoc field team. Dr. Schneider is currently Public Health Team leader with the University of Michigan Gambia River Basin Studies and Visiting Research Scientist at the Center for Research on Economic Development, University of Michigan; Dr. Hiatt is Epidemiologist with the Department of Medical Methods Research, the Permanente Medical Group, Oakland, CA; Dr. Malek is Director of the Laboratory of Schistosomiasis and Medical Malacology of the Tulane University Medical Center, New Orleans; Dr. Ruiz-Tiben is Chief of the Helminthic Diseases Branch, Division of Parasitic Diseases, Center for Infectious Diseases, Centers for Disease Control, Atlanta. Logistic and material support were provided by Dr. Oscar Rivera, Health and Nutrition Officer, USAID, Santo Domingo.

The following persons contributed information for this report: Mercedes Vargas de Gómez, Faculty of Science, and Dr. Jesús M. Álvarez Vicioso, Faculty of Plant and Veterinary Sciences, Autonomous University of Santo Domingo; Anayomeda L. Moreta, Director of the Aquatic Area, Botanical Garden, Santo Domingo; Dr. José M. Herrera, Liaison Loan Coordinator, Secretaría de Estado de Salud Pública y Asistencia Social (SES-PAS), USAID, Santo Domingo; Dr. Gilberto A. Rivera Ortiz,

Medical Director of Health Region V, Dominican Republic; Dr. Amaury Méndez Silfa, Director of the Hato Mayor Health Sub-center; Dr. Rafael Brugal Montoya, former Director, Center for Eradication of Bilharzia (CEB); Mauricio Abad, CEB Technician. In San Juan, Puerto Rico, the following persons assisted in analyzing stools: Wilda B. Knight, Myriam Vélez, Gilda Pérez Oronoz, and Rafael Hernández Colón. The work was supported by USAID contract AID-SOD-PDC-C-0162.

Tearsheet requests to Dr. Ruiz-Tiben, Division of Parasitic Diseases, Center for Infectious Diseases, Centers for Disease Control, Atlanta, GA 30333.

Synopsis

Active transmission of intestinal schistosomiasis is currently limited to the southeastern part of the Dominican Republic. A population-based stool survey in 1980 detected 4 asymptomatic individuals among 114 selected at random in 2 towns and a rural community in El Seibo Province.

The distribution of the transmitting snail, Biomphalaria glabrata, considerably exceeds that of Schistosoma mansoni, extending to the National District and capital city of Santo Domingo and well into certain central valley provinces. There is evidence that transmission sites have shifted during the past three decades because of urban development, molluscicidal activities and, perhaps, introduction of competing mollusks.