



The National Institute of Dental and Craniofacial Research
A Plan to Eliminate
Craniofacial, Oral, and Dental Health Disparities



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National Institute of Dental and Craniofacial Research

A Plan to Eliminate Health Disparities

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*There has got to be some way to prevent
another generation from succumbing.*

--A young black woman physician working in an inner-city ghetto clinic

Introduction

The growth in diversity of the United States population continues apace. Today, nearly one out of every 10 U.S. residents is foreign-born, the majority of Hispanic or Asian/Pacific Islander origin. More than one out of every four Americans is black, Hispanic, or Asian/other non-Hispanic. By 2020 that proportion will increase to one out of every three Americans. By 2050 it is expected that racial and ethnic minority groups will no longer be “minorities,” but will constitute the emerging majority of the U.S. population.

It would be gratifying to report that advances in biomedical and behavioral research, culminating in such achievements as the sequencing of the human genome and other genomes in 2000, have been translated into better oral and general health and well-being for *all* Americans. They have not. Blacks, Hispanics, and American Indians/Alaska Natives have the poorest oral health of any population group. Other data, such as life expectancy and infant mortality, indicate that the general health of some of these subgroups also is poor. It is likely that the health of other population groups, such as Asians and Pacific Islanders, individuals with disabilities, and older Americans, is also compromised, but information for these groups is limited or missing altogether. Similarly lacking are good data on the health status of groups within racial or ethnic categories, such as Puerto Ricans compared to Mexican-Americans, and the many populations classified as Asian. To address these gaps in knowledge and raise the level of oral and general health of all disadvantaged groups, NIDCR has developed a plan to eliminate health disparities. The plan builds on the Institute’s earlier strategic plan, *Shaping the Future*, <http://www.nidcr.nih.gov/news/strat-plan/index.htm>, which articulates initiatives for research, research capacity, and health promotion. A focus on initiatives in these areas, concentrating on the challenges posed by population groups with less-than-optimal oral health, will allow us to marshal our intellectual and physical resources and enhance our partnerships towards eliminating health disparities.

In so doing we are affirming the NIDCR mission:

To improve and promote craniofacial, oral and dental health through research and research training.

And our vision:

To advance oral health science to meet the health needs of a complex and changing society and promote the health, education, and well-being of the Nation.

Health Disparities Defined

The complex nature of American society is mirrored in the complex meaning of health disparities. We are interpreting the term to refer to the diminished health status of population subgroups defined by demographic factors such as age and socioeconomic status (SES), geography, disability status, and behavioral lifestyles. Health disparities associated with any one or more of these factors reflect the diversity of the U.S. population by gender and age, racial or ethnic identity, educational attainment, income (measured by money and other forms of wealth), location of residence (regional and metropolitan area), disability status, and sexual orientation.¹

The Determinants of Health

None of the factors described previously, singly or in combination, can explain why some people are healthy and some people are not. Rather, there are at least four interdependent and interacting variables that are key determinants of health, namely, the unique biology of an individual, behavioral lifestyles, environment, and the organization of health care. Lifestyles, including dietary choices and the use or non-use of tobacco, alcohol, and other recreational drugs, are among the more obvious lifestyle behaviors that affect health status. The environment, especially the communities and neighborhoods where people live, can be characterized by such factors as the average levels of income and education attained. In addition, communities and neighborhoods may be more or less well served in terms of the availability, organization, and delivery of health care services. Accordingly, the NIDCR plan emphasizes that eliminating oral health disparities requires more than an understanding of the biology and lifestyle of an individual, we also must take into account the community and neighborhood where the individual lives, works, and plays, as well as the larger social, cultural, and political environment.

This approach is consonant with the health objectives for the Nation and the plans for their implementation as stated in the Department of Health and Human Services' *Healthy People 2010*. The focus in that document is on the promotion of healthy individuals *in healthy communities*. The challenge before us is to engage in the needed research and research partnerships to abolish health disparities for disadvantaged groups, wherever they may be living, so that they can attain optimal levels of health and well-being.

Oral Health Problems Affect Everyone

In order to put oral health disparities in context it is important to realize that craniofacial, oral, and dental diseases and disorders are among the most common health problems affecting all people at all stages of life. Indeed, dental diseases such as dental caries and periodontal diseases are endemic in the United States—as they are in all developed nations of the world. But the scope of diseases and disorders affecting the mouth and surrounding tissues is broader than diseases of teeth and gums. It includes birth defects such as cleft lip and palate, oral soft tissue lesions, chronic oral-facial pain conditions, oral and pharyngeal cancers, and scores of other

¹ The NIDCR definition parallels the NIH definition of health disparities as those “associated with differences in culture, language, diet, nutrition, physical activity, socioeconomic and demographic status, gender, age, and environmental pollutants and occupational hazards.”

diseases and disorders. Oral manifestations of systemic diseases--such as Sjögren's syndrome, diabetes, and HIV infection--and disease treatments--such as radiation and chemotherapy for cancer--add to the burden of oral illness. In addition, hundreds of drugs in common use have the side effect of dry mouth, depriving the oral tissues of the protective properties of saliva. This can be a problem for many older Americans.²

The oral health status of Americans is well described in *Oral Health in America: A Report of the Surgeon General* [NIH Pub No. 00-4713] released in May 2000 and summarized in Table 1. NIDCR was the lead agency in the development of the Surgeon General's report, which was charged to review the relationship between oral and general health and well-being across the life span, providing data for the population as a whole, as well as for selected population subgroups.

Craniofacial, oral, and dental diseases can devastate general health and well-being, lead to extensive pain and suffering, and exact excessive financial and social costs on the individual and on society. While there have been substantial gains in the oral health of the nation over the past generation, not all Americans have experienced the same degree of improvement. The burden of craniofacial, oral, and dental disease, particularly untreated disease, falls heaviest on lower SES groups, which include disproportionately large numbers of racial and ethnic minorities. Individuals in lower SES groups also have higher incidences of HIV infection and diabetes, diseases that increase the risk for serious oral viral, bacterial, and fungal infections.

Children in low SES families are particularly vulnerable to oral health problems. Their nutrition may be poor, their oral hygiene inadequate, and their access to oral health care lacking. Thus, they are at greater risk for experiencing more extensive, severe, and painful forms of oral diseases, as well as for the complications of untreated disease.

Millions of children have little to smile about. For them, the daily reality is persistent dental pain, endurance of dental abscesses, inability to eat comfortably or chew well, embarrassment at discolored and damaged teeth, and distraction from play and learning.

Issues of Access

A partial remedy for health disparities may lie in improving access to effective and appropriate health promotion, preventive, diagnostic, and treatment services. The research challenges here relate to identifying and eliminating barriers to health care, designing better means of care delivery, elucidating risk factors and facilitating means of risk reduction, and enhancing health-promoting and care-seeking behaviors. Educational and health promotional strategies appropriate to the social and cultural frameworks of the groups in question must be worked out, and practical issues such as the need for transportation and time off from work resolved.

An underlying issue affecting access to care and delivery of services is the cost of care. Oral health care in America is financed principally through private sources, either as out-of-pocket

² Approximately 30 percent of all medications prescribed in the United States are for persons over age 65, with an average of 8.1 medications per patient in a long-term care facility.

Table 1**THE BURDEN OF ORAL DISEASES AND DISORDERS**

Oral diseases are progressive and cumulative and become more complex over time. They can affect our ability to eat, the foods we choose, how we look, and the way we communicate. These diseases can affect economic productivity and compromise our ability to work at home, at school, or on the job. Health disparities exist across population groups at all ages. Over one third of the U.S. population (100 million people) has no access to community water fluoridation. Over 131 million children and adults lack dental insurance, almost 2.5 times the number who lack medical insurance. The following are highlights of oral health data for children, adults, and the elderly.

Children

- Cleft lip/palate, one of the most common birth defects, is estimated to affect 1 out of 600 live births for whites and 1 out of 1,850 live births for African Americans.
- Other birth defects such as hereditary ectodermal dysplasias, where all or most teeth are missing or misshapen, cause lifetime problems that can be devastating to children and adults.
- Dental caries (tooth decay) is the single most common chronic childhood disease—5 times more common than asthma and 7 times more common than hay fever.
- Over 50 percent of 5- to 9-year-old children have at least one cavity or filling, and that proportion increases to 78 percent among 17-year-olds. Nevertheless, these figures represent improvements in the oral health of children compared to a generation ago.
- There are striking disparities in dental disease by income. Poor children suffer twice as much dental caries as their more affluent peers, and their disease is more likely to be untreated. These poor-nonpoor differences continue into adolescence. One out of four children in America is born into poverty, and children living below the poverty line (annual income of \$17,000 for a family of four) have more severe and untreated decay.
- Unintentional injuries, many of which include head, mouth, and neck injuries, are common in children.
- Intentional injuries commonly affect the craniofacial tissues.
- Tobacco-related oral lesions are prevalent in adolescents who currently use smokeless (spit) tobacco.
- Professional care is necessary for maintaining oral health, yet 25 percent of children have not seen a dentist before entering kindergarten.
- Medical insurance is a strong predictor of access to dental care. Uninsured children are 2.5 times less likely than insured children to receive dental care. Children from families without dental insurance are 3 times more likely to have dental needs than children with either public or private insurance. For each child without medical insurance, there are at least 2.6 children without dental insurance.
- Medicaid has not been able to fill the gap in providing dental care to poor children. Fewer than one in five Medicaid-covered children received a single dental visit in a recent year-long study period. Although new programs such as the State Children's Health Insurance Program (SCHIP) may increase the number of insured children, many will still be left without effective dental coverage.
- The social impact of oral diseases in children is substantial. More than 51 million school hours are lost each year to dental-related illness. Poor children suffer nearly 12 times more restricted-activity days than children from higher-income families. Pain and suffering due to untreated diseases can lead to problems in eating, speaking, and attending to learning.

Adults

- Most adults show signs of periodontal or gingival diseases. Severe periodontal disease (measured as 6 millimeters of periodontal attachment loss) affects about 14 percent of adults aged 45 to 54.
- Clinical symptoms of viral infections, such as herpes labialis (cold sores), and oral ulcers (canker sores) are common in adulthood, affecting about 19 percent of adults 25 to 44 years of age.
- Chronic disabling diseases such as temporomandibular disorders, Sjögren's syndrome, diabetes, and osteoporosis affect millions of Americans and compromise oral health and functioning.
- Pain is a common symptom of craniofacial disorders and is accompanied by interference with vital functions such as eating, swallowing, and speech. Twenty-two percent of adults reported some form of oral-facial pain in the past 6 months. Pain is a major component of trigeminal neuralgia, facial shingles (post-herpetic neuralgia), temporomandibular disorders, fibromyalgia, and Bell's palsy.
- Population growth as well as diagnostics that are enabling earlier detection of cancer means that more patients than ever before are undergoing cancer treatments. More than 400,000 of these patients will develop oral complications annually.
- Immunocompromised patients, such as those with HIV infection and those undergoing organ transplantation, are at higher risk for oral problems such as candidiasis.
- Employed adults lose more than 164 million hours of work each year due to dental disease or dental visits.
- For every adult 19 years or older without medical insurance, there are three without dental insurance.
- A little less than two thirds of adults report having visited a dentist in the past 12 months. Those with incomes at or above the poverty level are twice as likely to report a dental visit in the past 12 months as those who are below the poverty level.

Older Adults

- Twenty-three percent of 65- to 74-year-olds have severe periodontal disease. Also, at all ages men are more likely than women to have more severe disease, and at all ages people at the lowest socioeconomic levels have more severe periodontal disease.
- About 30 percent of adults 65 years and older are edentulous, compared to 46 percent 20 years ago. These figures are higher for those living in poverty.
- Oral and pharyngeal cancers are diagnosed in about 30,000 Americans annually; 8,000 die from these diseases each year. These cancers are primarily diagnosed in the elderly. Prognosis is poor. The 5-year survival rate for white patients is 56 percent; for blacks, it is only 34 percent.
- Most older Americans take both prescription and over-the-counter drugs. In all probability, at least one of the medications used will have an oral side effect—usually dry mouth. The inhibition of salivary flow increases the risk for oral disease because saliva contains antimicrobial components as well as minerals that can help rebuild tooth enamel after attack by acid-producing, decay-causing bacteria. Individuals in long-term care facilities are prescribed an average of eight drugs.
- At any given time, 5 percent of Americans aged 65 and older (currently some 1.65 million people) are living in a long-term care facility where dental care is problematic.
- Many elderly individuals lose their dental insurance when they retire. The situation may be worse for older women, who generally have lower incomes and may never have had dental insurance. Medicaid funds dental care for the low-income and disabled elderly in some states, but reimbursements are low. Medicare is not designed to reimburse for routine dental care.

payments made directly to the dentist or through employment-based dental insurance benefits. While the proportion of dental expenditures covered by private dental insurance has increased in the past 20 years, approaching 50 percent, the percentage of out-of-pocket payments for dental services is over three times that for physician services. These medical care-dental care differences largely reflect that only 4 percent of the \$58 billion in total dental care costs in the U.S. in 1998 was financed publicly, predominately through federal-state Medicaid programs. Federal programs such as Medicare, were never intended to include costs of dental care (except in rare instances).

Studies have repeatedly demonstrated that insurance is a major determinant of dental utilization: 70 percent of people with private dental insurance reported seeing a dentist in the previous year, compared to 51 percent of those without dental insurance. As table 1 indicates, children from families without dental insurance are 3 times more likely to have dental needs than children with either public or private insurance. Furthermore, for each child without medical insurance, there are at least 2.6 children without effective dental coverage. Steps have been taken to improve this situation, such as the establishment of the State Children's Health Insurance Program, which can include reimbursement of costs for dental care of children in families with incomes up to twice the federal poverty level, but the fact remains that many lower SES children and families lack dental insurance.

While reducing the barriers described above will improve access to care for individuals and groups, they will only partially reduce health disparities. Ultimately, an individual's resilience or susceptibility to disease is a complex function of the interplay of genetic factors with environment and individual lifestyles. Indeed, these factors in turn can affect health-care-seeking behaviors and utilization of care.

NIDCR History of Health Disparities Activities

NIDCR has long been a leader in programs aimed at reducing health disparities in minority populations. These activities have resulted in increased support of biomedical and behavioral oral health research relevant to the health of minorities and to innovative programs to increase minority representation in research.

Research. Since 1992 the Institute has supported four Regional Research Centers on Minority Oral Health. The primary focus of these centers has been research on oral health problems prevalent among underrepresented minority populations with an eye to establishing an evidence base for the development of prevention and treatment regimens. The centers have served not only as sites of research, but also as research training centers for minority investigators. Each center represents a partnership between a minority dental school or an academic institution serving a large minority population and an institution with proven expertise in the design and conduct of oral health research. Themes for research at the four centers include: studies of orofacial injury from violence (UCLA School of Dentistry and Charles R. Drew University of Medicine and Science); dental caries, oral manifestations of HIV infection, and oral cancer

(University of Medicine and Dentistry of New Jersey and University of Connecticut School of dental Medicine); epidemiology of oral health and risk factors for periodontal disease in minority adults, microbiology of oral flora in minority groups, and genetic studies of salivary proteins (New York University College of Dentistry and Forsyth Dental Center); and oral microbiology, restorative materials research, and clinical studies of an elderly population in Nashville (Meharry Medical College and University of Alabama, Birmingham)

Research training. Over a decade ago the Institute issued a Program Announcement advertising the creation of a program to stimulate the entrance of underrepresented minorities into research careers. The program provides supplemental support for salaries and related research costs associated with the expansion of the aims of already-funded projects for faculty members. This competitive minority supplement program was subsequently adopted on an NIH-wide basis and continues to encourage involvement of underrepresented minorities in research at all stages of career development, from high school students through faculty members. NIDCR has consistently been among the top three Institutes at NIH in the proportion of extramural research funds devoted to these supplement programs (see Table 2). The distribution of minority supplement research trainees according to their stage of career development is shown in Figure 1.

Table 2 Minority Supplement Research Trainees Supported by NIDCR by Stage of Career Development

	1991	1992	1993	1994	1995	1996	1997	1998	1999
High School	1	1	1	1	0	0	0	0	1
College	2	5	3	1	3	1	3	3	1
Graduate Assistant	9	11	11	13	13	5	5	5	10
Postdoctoral	2	2	6	8	9	8	9	9	2
Investigator	15	15	12	11	7	9	12	12	9
Total	29	34	33	34	32	23	29	29	23

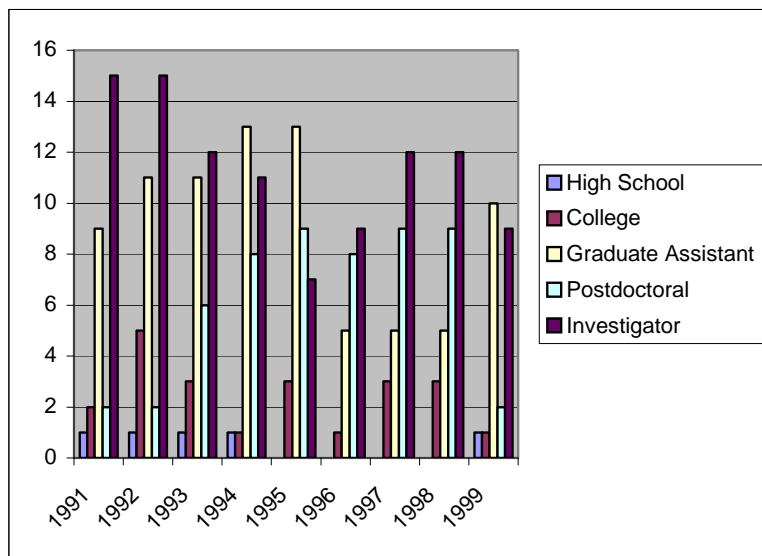


Figure 1. Distribution of Research Trainees by Stage of Career Development

Institute grantees also have made effective use of novel short-term research training programs for minority dental students in partnership with the private sector. The program has led to new career paths in oral health research for a number of participants. Other NIDCR training and career development opportunities also target minority investigators.

Collaborative Activities. The Institute's concern with oral health disparities is reflected in a number of ongoing activities conducted in collaboration with other agencies. NIDCR staff co-lead the oral health and related objectives in *Healthy People 2010*, working with colleagues in the Centers for Disease Control and Prevention (CDC), the Indian Health Service, and the Health Resources and Services Administration (HRSA). Craniofacial, oral, and dental health has been part of the nation's Healthy People research agenda since the late 1970's. Focused upon providing strategies to increase quality and years of healthy life and eliminate health disparities, the Healthy People objectives provide a framework that facilitates coordination among the research, service, education, and policy-making communities.

The Institute, as noted, was the lead agency in the development of the first Surgeon General's Report on Oral Health, *Oral Health in America*. The report emphasizes that oral health is essential to general health and well-being and identifies an extensive research agenda that will form the core of a National Oral Health Plan, now under development. As a follow-up to the report, Institute staff worked with the Surgeon General in planning a workshop in March 2000, followed by a major conference in June 2000, on children's oral health, *The Face of a Child*. The conference was attended by over 700 participants from medicine, dentistry, nursing, law, ethics, education, government, parents' groups, and the private sector. The oral health research needs identified by the participants, especially the moral imperative to eliminate health disparities and the need to integrate oral health into policy, research, professional training, and medical care, are being coordinated with other research priorities identified for this vulnerable population. NIDCR is also working with HRSA, CDC, the Health Care Financing Administration (HCFA) and other agencies on a DHHS oral health initiative aimed at coordinating oral health activities across the Department's operating divisions. Finally, the Institute, through collaborative international activities, is supporting global research that can contribute to addressing domestic health disparities. Administratively, NIDCR serves as one of the World Health Organization's Collaborating Centers for Oral Health.

The NIDCR Health Disparities Plan

Successful implementation of the three initiatives of the NIDCR Plan to Eliminate Health Disparities—research, research capacity, and information dissemination—will enable us to fill in the gaps in our understanding the specifics of health disparities and conduct research to address these disparities; build a more diverse workforce; and expedite the transfer of research advances and their adoption by the public and intermediaries such as health care providers. Initiative I, the research component, emphasizes the need to address the full scope of research, with special emphasis on vulnerable populations: basic biomedical and behavioral science research on disease epidemiology, etiology, pathogenesis, and risk factors; translational research to move basic studies into animal and other experimental models; and clinical research on preventive, diagnostic, and treatment modalities and health promotion. Health services research will be essential in order to facilitate access to care and utilization and delivery of services. Equally important will be efforts to raise the level of understanding of oral health on the part of the public, policymakers, and non-dental health care providers: why oral health is important and the means that are now available to diagnose, treat, and prevent craniofacial, oral, and dental diseases and disorders.

Several overarching research requirements have been identified if we are to succeed in achieving the objectives outlined in Initiative I. These research needs call for:

- Research to identify biomarkers of disease, which will facilitate early detection and diagnosis of disease and surrogate markers for use in clinical trials involving populations exhibiting oral health disparities.
- Population genetics, molecular epidemiology, and quantitative genetics research to identify genetic variations that underlie complex disease traits in vulnerable populations.
- Epidemiological studies of population subgroups to establish baselines for the incidence and prevalence of specific oral health problems with follow-up to track progress in reducing or eliminating identified health disparities.
- Clinical studies and trials to provide a valid and reliable evidence base for effective prevention and management of health disparities. This research can range from single-center clinical trials to multi-center office-based trials to community-based demonstration and education projects.
- Patient-oriented research to understand the bases of health disparities. These studies will explore health care utilization patterns in various ethnic and cultural groups; study the sociological, anthropological, and political underpinnings of group process and health-care-seeking behavior; and conduct economic and health outcome studies of the interaction between culture/ethnicity and access to health care and health care financing options. A major aim of this research will be to develop evidence-based outreach approaches to educate providers in the diagnosis, treatment, and prevention of craniofacial, oral and dental diseases and increase adoption of research findings into practice.

Initiative II, focused on building research capacity, draws on existing and new mechanisms to expand diversity in the oral health workforce and stimulate interest among researchers in issues

related to health disparities. Initiative III, on disseminating research findings and oral health information, employs a range of strategies for transferring information from the research community to multiple audiences, making use of extensive collaborations that exist across the components of NIH and with prospective partners in industry, academia, and the community at large.

In support of these initiatives the Institute has already put in place two strategies:

- ***Centers for Research to Reduce Oral Health Disparities.*** A Request for Applications (RFA) was issued on September 30, 1999 for Centers for Research to Reduce Oral Health Disparities (CRROHD) to be funded in FY 2001 (<http://www.nidcr.nih.gov/opportunities/rfa/index.htm>). These Centers focus on children and their caregivers. The objectives of these Centers are: (1) to support research to understand the factors involved in craniofacial, oral, and dental health disparities, and to design interventions to reduce such disparities; and (2) to develop and strengthen the national research capacity by expanding opportunities for scientists in underrepresented groups within the scientific workforce. Partners in the initiative include the National Institute of Child Health and Human Development (NICHD), the National Institute of Nursing Research (NINR), the Office of Research on Minority Health (ORMH), the Office of Research on Women's Health (ORWH), the Office of Behavioral and Social Science Research (OBSSR), HRSA, CDC and the Indian Health Service. This initiative will encourage interdisciplinary research across components of academic health centers, which will involve community-based research with state and local health departments, including health financing agencies, provide opportunities for collaboration among NIH Institutes and Centers and other federal agencies; encourage research encompassing molecular biology, translational studies, clinical studies and trials leading to the design and evaluation of interventions to treat and prevent disease; and provide research career opportunities for clinical scientists, particularly those from groups underrepresented in the scientific workforce.
- ***Data coordination.*** NIDCR is collaborating with CDC on a data coordinating center (funded in 2000) that will serve as a critical resource in consolidating health and disease data from multiple sources related to craniofacial, oral, and dental health.

The Institute has in place a formal plan for periodic reviews and evaluation of its Health Disparities Plan. These reviews will include advice and guidance by a subcommittee of the National Advisory Dental and Craniofacial Research Council, as well as input from other agencies, professional and voluntary organizations, and the public.

Initiative I: Research to Eliminate Health Disparities in 3 Critical Areas: Oral Infections; Oral and Pharyngeal Cancers; and Craniofacial Injuries and Disorders

The Institute's first research initiative addresses the research necessary to achieving the oral health objectives stated in *Healthy People 2010* and outlined in the Surgeon General's National Oral Health Plan. To facilitate the conduct of research NIDCR will expand collaborative efforts with the public and private sectors and invite partners among voluntary patient organizations, private foundations, and state and local agencies and organizations. Moreover, we are asking research grant applicants who choose to address the stated goals and objectives to specify how the anticipated effects of their research will reduce or eliminate health disparities, particularly those targeted by Healthy People 2010 objectives, and how they plan to evaluate these effects. In addition, they will be asked to describe the potential for generalizing research findings to a given community or population.

Goal 1: Eliminate Health Disparities in Oral Infections and Their Complications

The two most prevalent oral diseases are communicable infections: dental caries, associated with infection by mutans streptococci and/or lactobacilli, bacteria which produce acids that attack the hard tissues of the teeth, and periodontal diseases, which are infections associated with a number of bacterial species. The by-products of periodontopathic bacteria can destroy the tissues that support the teeth. The bacteria also trigger an inflammatory host immune response that can exacerbate tissue destruction. While dental caries can occur across the life span, periodontal diseases are more commonly seen in mature and older adults. The most severe type of periodontal disease, periodontitis, if untreated, leads to progressive loss of periodontal ligaments and the alveolar bone of the jaw, causing affected teeth to loosen and fall out. Gingivitis, a periodontal infection characterized by swollen and bleeding gums, can progress to periodontitis in some instances.

In both caries and periodontal diseases bacteria are necessary but not sufficient etiological factors. The pathological processes are complex and involve the contribution of host factors—including lifestyles (especially tobacco use), co-morbidities, medication effects, and both specific (immune-system generated) and non-specific defense mechanisms (e.g., protective components in saliva). Diet and oral hygiene also play a role. Cariogenic bacteria rely on carbohydrates for their metabolism, especially sugars. Appropriate oral hygiene, especially with the use of fluoride products and dental sealants, can protect teeth and help prevent dental caries. Thorough brushing and flossing can help prevent or reverse the milder forms of periodontal disease (gingivitis), however professional care is needed to complement home care and prevent oral infections.

The Picture for the Nation

- Dental caries is the single most common chronic childhood disease—5 times more common than asthma and 7 times more common than hay fever.

- Over 50 percent of all 5- to 9-year-old children in America have at least one cavity or filling; that proportion increases to 78 percent among 17-year-olds.
- Most adults show signs of periodontal or gingival diseases. Severe periodontal disease affects about 14 percent of adults aged 45 to 54 and 23 percent of 65-74 year olds.
- About 30 percent of adults 65 years or older are toothless (edentulous).

The Disparities

Caries

- Socioeconomic status affects the presence of dental caries. The prevalence rate is nearly 3 times higher among lower SES infants and toddlers aged 12 to 24 months, than for those in mid-to-high SES. Nearly twice as many low-SES children in the 2-year-old to 9-year-old range have at least three decayed or filled primary teeth compared to higher SES children. The rate of untreated dental caries is twice as high among low SES children than for those at higher income levels at ages ranging through adolescence. In adults, the proportion of untreated dental caries is higher among the poor than the non-poor.
- Children with the most advanced oral disease are primarily found among the poor, American Indians and other minorities, homeless and migrant populations, children with disabilities, and children with HIV infection.
- Chronically poor oral health is associated with diminished growth in toddlers and compromised nutrition.

Periodontal Disease

- At all ages people at the lowest SES levels have more severe periodontal disease. That translates to 36 percent of adults in the lower SES group 75 years old and over. At every age, the proportion of low-income individuals with severe disease is at least three times that for individuals in the highest income groups.
- A higher percentage of the poor are edentulous (toothless), a condition which may be the end stage of dental caries or periodontal disease, and also injury.
- A higher percentage of non-Hispanic black individuals at each age group exhibit at least one tooth site with severe periodontal attachment loss compared to other groups.
- Gingivitis, as measured by gingival bleeding, is more evident among Mexican-Americans than among non-Hispanic African Americans and non-Hispanic whites.
- A form of severe and rapidly progressive generalized periodontitis can occur in adolescents and adults under 35 years. Data indicate that the prevalence of early-onset periodontitis in 13-17 year olds occurs twice as often in African Americans than in Hispanics and ten times more frequently than in whites.

Objective I: Eliminate Health Disparities in Dental Caries and Complications

The trends for the nation indicate overall declines in the prevalence of dental caries in the past 25 to 30 years. The figures show a drop in the number of decayed and filled permanent teeth along

with a concomitant increase in treated teeth at all age levels. However, we lack similar systematic trend data for racially, ethnically, or SES distinct groups. Therein lies the overarching need identified earlier: The call for the design and support of epidemiologic surveys and analyses that permit monitoring and trend analysis for these population subgroups.

While dental caries is itself a disease that requires prevention and treatment, it also represents a disease with important health and behavioral sequelae that extend well beyond the oral cavity. For example, Indian Health Service data report significant negative psychosocial and behavioral consequences associated with extensive dental caries: Affected children become isolated from their peers because of the unattractive appearance of decayed or filled teeth. These youngsters also avoid smiling because they view themselves as unattractive. A similar pattern is observed in edentulous adults. In addition, school-age children with rampant dental caries experience extensive oral pain. As a result, they either miss school or, if they attend, the pain from the dental decay interferes with their ability to concentrate and learn. The research finding indicating that rampant caries can retard growth in young children may be the result of disease interfering with a child's ability to chew and ingest sufficient nutrients from a wide variety of foods. Also, there appears to be a relationship between dental caries and inner ear infections. Research is needed to determine the biological mechanisms involved.

Research supported by the NIDCR health disparities initiative will address the treatment and prevention of dental caries, not only as a way of reducing the incidence and prevalence of the disease within SES and ethnically/racially distinct groups, but also to prevent complications.

Objective II: Eliminate Health Disparities in Periodontal Diseases and Complications

Strategies to prevent periodontal diseases have emphasized the importance of reducing the quantity of periodontopathic bacteria around the gumline to a harmless level through flossing, brushing, and regular dental visits. Such activities may not be available to certain racial/ethnic minority or low SES individuals, placing them at high risk for these chronic inflammatory infections. In addition, recent research has confirmed the contribution of certain lifestyle behaviors and genetic factors in increasing the risk for these diseases:

Smoking is the number one risk factor for developing periodontitis. Therefore, efforts to reduce smoking will have a direct benefit towards reducing the incidence of periodontitis as well as other diseases. The host immune response also plays a large role in the level of protection or destruction in the oral tissues. This response seems to be genetically determined, with recent evidence suggesting that individuals who are genetically high secretors of the cytokine interleukin-1 (IL-1) are more susceptible to disease and may need more aggressive periodontal care. Development of safe and reliable test kits using IL-1 as a biomarker for genetic risk may offer the potential of tailoring treatment to those most in need.

As in the case of dental caries, there also are emerging consequences of periodontal disease that warrant increased investigations. A number of epidemiological studies indicate that mothers of low-birth-weight infants born as the result of preterm labor or premature rupture of membranes tend to have more severe periodontal disease than mothers with normal birth weight infants. Logistic regression models have demonstrated a sevenfold increase in risk of low birth weight

associated with severe periodontal diseases even when the analyses controlled for other known risk factors (e.g., smoking, race, alcohol use, age, nutrition, and genito-urinary tract infections).

In addition, recent epidemiological studies show an association between periodontitis and atherosclerosis, stroke, respiratory diseases, and diabetes. In these studies the risk for these systemic diseases in patients with periodontitis is approximately 1.5 to 2.0 fold higher than in individuals without periodontitis. The linkages proposed implicate the deleterious effects of circulating oral microbial factors and host inflammatory cytokines on vascular, lung, and heart tissue. These potent molecules may also cross the placenta or initiate a cascade of events that affect the uterus and the developing fetus. Basic research and pilot intervention studies are currently being supported by the NIDCR to characterize the association between periodontitis and these conditions, but more research is needed. The disparity in the incidence and severity of periodontal diseases in lower SES and racial/ethnic minorities puts individuals in these groups at greater risk for tooth loss as well as grave systemic consequences such as stroke and atherosclerosis. The NIDCR health disparities initiative will address both the direct and systemic aspects of periodontal disease.

Planned Research Activities

In pursuit of Objectives 1 and 2 NIDCR plans to expand existing studies and encourage new investigations on the diagnosis, prevention, and management of dental caries and periodontal diseases and their complications as it relates to reducing and eliminating health disparities. The RFA for a collaborative multi-agency initiative: *Centers for Research To Reduce Oral Health Disparities* described earlier, is an example of a mechanism and new partnerships NIDCR is employing to resolve health disparities. What follows is a representative list of research investigations planned or to be expanded. It is expected that within each area of research the major focus will be to generate new knowledge that will lead to an understanding of the basis for health disparities, their prevention, and/or their reduction/elimination. Note that several examples of relevant research apply both to caries and periodontal diseases:

- Microbial genomics of pathogenic organisms: Genome sequences will soon be available for one cariogenic organism as well as for several periodontal microbial pathogens. An analysis of these microbial genomes using novel bioinformatic methods and the coupling of expression profiling of microbial genes under different physiological conditions with expression profiling of proteins, will provide new clues for the design of non-antibiotic therapeutics that can be more effectively used in the prevention of these diseases in populations at high risk.
- Research on the mechanisms of transmission of bacteria involved in dental caries and periodontal diseases as they may lead to an understanding of differences in the incidence and prevalence of these diseases in various populations or to the design of interventions to prevent the spread of infection within and between groups.
- Research on microbial biofilm (plaque) which forms on teeth and oral surfaces. A challenge will be to delineate the signaling networks that underlie microbial communication within dental plaque and the communication between the host and the oral flora and to determine whether these factors can account for differences in risk factor for various groups of individuals. Novel agents that can disrupt the microbial biofilm must be identified using high throughput screening approaches of small organic and

protein combinatorial libraries in order to design preventives and therapeutics that can safely and effectively reduce disparities involving plaque as a destructive agent.

- Research on active vaccines for both caries and periodontal disease and associated clinical trials that include prevention of these diseases in various ethnic/racial minorities, lower SES groups and other populations at risk.
- Research on passive vaccines for dental caries, in which pre-formed antibodies, made in animals or plants, are applied directly to the teeth.
- Research on risk assessment strategies and the management of dental caries and periodontal diseases as infectious diseases based on the individual's risk status, various demographic characteristics such as race, ethnicity, SES, and neighborhood.
- Identification of human genetic variations via single nucleotide polymorphisms (SNPs) as a way of identifying possible genetic causes for complex disease in populations experiencing health disparities.
- Research to determine the efficacy and cost-effectiveness of specific caries-preventive regimens in various groups exhibiting health disparities based on an individual's level of risk (e.g., the use of the antimicrobial mouthrinse chlorhexidine and various fluoride modalities (gels, rinses, or a varnish applied to tooth surfaces) and non-fluoride modalities.
- Research to identify and characterize genetic/environmental biomarkers for risk factors and disease progression for oral infections and the development and testing of diagnostic test kits for use in groups exhibiting health disparities.
- Research to expand clinical studies of chemically modified tetracycline for use as a locally applied chemotherapeutic agent to treat periodontal disease in groups exhibiting health disparities.
- Research on Guided Tissue Regeneration to treat periodontal disease in various racial/ethnic groups exhibiting health disparities with special emphasis on potential differences among the groups in wound healing and bone formation.
- Research in biomimetics and tissue engineering to develop the next generation of bio-compatible materials that are also aesthetically acceptable to individuals within the various racial/ethnic groups.

Goal 2: Eliminate health disparities in oral and pharyngeal cancers

“The ulcer grew to the size of a dime...I then pretty much resolved to myself that, ‘hey, Rick you’ve got cancer.’ They had to take a third of my tongue—they took all the lymph glands out of the side of my neck...they ended up having to cut my jaw to get to my tongue.” Rick Bender

Oral and pharyngeal cancers are among the most debilitating and disfiguring of all malignancies. Worse, the currently available therapies (surgery, radiation, and chemotherapy) often exacerbate disfigurement and loss of function (e.g., speech, taste, swallowing, and vision). As with all cancers, there are health disparities by gender, race, and other factors. These differences may reflect host susceptibility factors as well as those related to health care utilization patterns.

The Disparities

- The incidence rate of oral and pharyngeal cancers in males is about three times higher than females (15.8 per 100,000 compared to 5.8 per 100,000).
- The average age of diagnosis for African Americans is about 10 years younger than that for whites.
- African Americans tend to have a higher proportion of pharyngeal versus oral cavity cancer than whites. Pharyngeal cancers are more difficult to diagnose.
- Newly diagnosed black males are half as likely to be diagnosed with oral and pharyngeal cancer at the local stage (19 percent) as are their white male counterparts (38 percent). Unfortunately the five-year survival rate for those diagnosed at advanced stages (22 percent) is little more than one fourth the survival rate for those diagnosed at early stages (81 percent).
- Between 1992 and 1996 the mortality rate for oral and pharyngeal cancers was twice as high for blacks (4.7 per 100,000) than for whites (2.5 per 100,000), and 2.3 times higher for black males (8.4 per 100,000) than for white males (3.7 per 100,000).
- Adults with less than 12 years of education (8.8 percent) were 2.5 times less likely than those with 13 or more years of schooling (21.8 percent) to ever have had an oral cancer examination; also blacks (10.3 percent) were 1.5 times less likely to have had an oral cancer examination than whites (15.5 percent).

The two major risk factors for oral and pharyngeal cancers are use of tobacco and alcohol, which when used together work synergistically to compound the risk. Research to elucidate a genetic basis for tobacco- and alcohol-induced cancers is growing. There are a number of enzymes that detoxify alcohol or carcinogenic components present in tobacco. Alterations in the genes coding for these enzymes, as well as combinations of inherited genetic polymorphisms, may render an individual who smokes and/or drinks more or less susceptible to the carcinogenic effects of tobacco or alcohol. Such polymorphisms may provide clues to differences in risk noted for some population subgroups. For example, a strong association was found between oral cancer in African-Americans who were heavy smokers but who lacked a specific tobacco carcinogen-detoxifying enzyme. However, no significant associations between such enzyme genotypes and oral cancer risk were observed in Caucasians. In addition, gene polymorphisms may affect the progression of disease and susceptibility to second primary cancers. NIDCR currently supports four oral cancer centers as well as a Comprehensive Oral Health Center of Discovery on oral cancer at the University of Pittsburgh. Researchers there are exploring genetic susceptibility to oral cancer through epidemiologic studies and also studying the efficacy of psychosocial intervention for oral cancer patients. At the same time, investigators are demonstrating the need to increase the public's knowledge about oral cancer risk factors and oral cancer preventive practices.

Planned Oral Cancer Research Activities

To address the health disparities related to oral and pharyngeal cancers, the research proposed includes expansion of ongoing studies in basic and clinical research and targeted community and state-based efforts aimed at risk factor reduction and/or enhanced early detection in groups exhibiting disparities in oral cancer. It is expected that within each area of research the major

focus will be to generate new knowledge that will lead to an understanding of the basis for health disparities, their prevention, and/or their reduction/elimination.

- Research aimed at elucidating the genetic basis for oral and pharyngeal cancers and their relationship to environmental factors will be expanded, including work related to these cancers as part of the NIH Cancer Genome Anatomy Project. Of particular interest is research that will lead to an understanding of molecular mechanisms as the basis for disparities in oral cancer. Aiding this work is the use of Laser Capture Microdissection techniques to study highly defined populations of normal, premalignant, and cancerous cells from oral tissue biopsies in various groups and subgroups of individuals exhibiting disparities in oral cancer.
- Research to identify biomarkers for oral cancer in blood, saliva, or oral fluids as a way of easy and early detection of oral cancer in groups at high risk.
- New emphasis will be placed upon studies to reduce the oral complications of chemotherapy and radiotherapy for all cancers, including oral and pharyngeal cancers. The oral manifestations of cancer treatment regimens include inflammation and infection of oral tissues--sufficiently severe in some cases to limit the dosage of chemotherapeutic agents or levels of radiation administered. Radiation to head and neck sites may also lead to bone necrosis. Because of the higher incidence of cancers, including oral and pharyngeal cancers, in African Americans, this population is more likely to experience the toxic side effects of therapy than whites and research should be aimed at addressing this disparity.
- Research to identify factors related to survival from oral and pharyngeal cancers (after controlling for key variables) that can be used to improve treatments and to aid in the prognostic staging of patients in high-risk groups.

Goal 3: Eliminate Health Disparities in Craniofacial Injuries and Disorders

Injuries are a major public health problem, outranking cancer and heart disease as a leading cause of death in some age groups. Craniofacial injuries in particular are a leading cause of mortality, and when they do not kill, can cause devastating disfigurement and loss of function. The leading causes of oral and craniofacial injuries are sports, violence, falls, and motor vehicle collisions. The most frequent locus for violence in Western society is the family. Domestic violence includes child abuse, spousal and elder abuse, and abuse of the disabled. Sadly, intentional injuries—attacks of violence--commonly affect the craniofacial tissues. Craniofacial disorders are a highly diverse group of disorders that include oral clefts, malformations of the skull, face, or jaws, misshapen or missing teeth, and a host of other facial traits that accompany complex syndromes. Three-fourths of all malformations seen at birth fall under the category of “craniofacial,” affecting the head, face or neck. These malformations are particularly devastating to the persons affected and their families and are typically extremely costly to treat.

Data for the Nation

- There are 20 million visits to emergency departments for craniofacial injuries every year.
- Close to 6 million orofacial injuries are treated by dentists in private offices.
- Twenty-five percent of persons aged 6 to 50 sustain anterior tooth injury.
- Nineteen percent of head and facial injuries are sports-related.

The Disparities

- Persons 24 years or younger accounted for 47.6 percent of craniofacial injury visits (CFI), but represented only 36.3 percent of the population in 1993-94.
- Males accounted for 58.3 percent of CFI visits, but make up only 48.7 percent of the population.
- Blacks accounted for more CFI visits than what might be expected given their share in the population.
- The most common craniofacial malformation – cleft lip with or without cleft palate— occurs in 1.2 per 1,000 births. The incidence of oral clefts is higher among North American Indians (3.7 per 1,000 births) and females and lower among blacks (0.5 per 1,000 live births).

Planned Research Activities

NIDCR will expand current research and encourage new studies of craniofacial injuries, including injury prevention programs targeted to the public to promote wearing protective head and face gear in sports and in operating riding vehicles. Research on the causes of abuse and ways to prevent it, with attention to social and cultural attitudes and behaviors will be essential, as will be behavioral research on ways to resolve conflict and lower the threshold for violence. At present, NIDCR research on health disparities in craniofacial injuries includes a major focus on craniofacial injuries and violence at the Regional Research Center on Minority Oral health in Los Angeles, where the research partners are the UCLA School of Dentistry and the Charles R. Drew University of Medicine and Science. The Center studies both the short-term and long-term consequences of acute and chronic orofacial injury. Their areas of concern are the increased vulnerability of minority populations to serious orofacial trauma; the increased predisposition of such populations to abnormal healing and scar formation after injury; and the disproportionate vulnerability of these populations to overt malignant disease consequent to orofacial injury. Other NIDCR research has focused on ways to improve wound healing and prevent abnormal scar formation (keloids), a problem more prevalent in African-Americans than in other subgroups and on improving the response of oral health professionals to domestic violence.

Initiative II: Enhance Research Capacity

Research Infrastructure

To build added capacity to conduct health disparities research, the Institute will enhance its training and career development programs to encourage individuals from racial and ethnic minorities and individuals from disadvantaged backgrounds to enter science careers and retain them in their career paths. NIDCR also will act to increase participation of members of these population subgroups in clinical studies and trials. These approaches are needed to assure that the research is appropriate, accepted, and ultimately adopted.

Goal 1: Enhance Research Capacity through Training and Career Development

NIDCR convened a Blue Ribbon Panel in 1999 to identify the rapidly emerging research opportunities for the 21st century and the competencies that researchers in the area of craniofacial, oral, and dental diseases need in order to address these opportunities. The report is available on the NIDCR home page,

(http://www.nidr.nih.gov/research/blueribbon/career_BRP.htm). The Panel recommended that the Institute's training programs:

- Expand the science content and enrich opportunities for interdisciplinary interactions within all training programs. New areas of interest include genomics and proteomics, informatics, molecular epidemiology, biomarker research, microbial ecology, and biomimetics/tissue engineering.
- Include appropriate training curricula in all training programs.
- Use training programs to increase the diversity of the workforce.
- Expand training opportunities at all stages of career development.

To achieve these goals, the Institute will increase efforts to recruit, develop, and retain a scientific workforce that is diverse and culturally sensitive. In addition, the Institute will emphasize the training of investigators in cultural awareness and in understanding the dimensions of health disparities.

Planned Research Training Activities

New and expanded training and career development initiatives released in FY 2000 and planned for FY 2001 call for the development of a more diverse and culturally sensitive research workforce, building upon the existing mechanisms. In summary, NIDCR:

- Now requires that all institutional training programs funded through the T or K mechanisms (T32, K12) include a comprehensive approach to recruit candidates from all population groups, including those who have not been traditionally part of the scientific workforce (FY 2000 initiative).
- Issued a FY 2000 RFA calling for training in health disparities in association with the

newly funded Centers for Research to Reduce Oral Health Disparities. These Centers are excellent venues for the training of individuals in research on health disparities and, because they include inter-institutional partnerships, can provide a network of training opportunities for both traditional and underrepresented trainee populations.

- Will issue an FY 2001 RFA for Academic Career Awards in Health Disparities Research (K07 awards) and for Minority Research Scientist Development Awards in Health Disparities (K01 Awards).
- Will seek partnerships and develop implementation plans with other federal agencies and professional organizations to enhance recruitment of racial and ethnic minorities and women and individuals with disabilities to research careers and encourage the pursuit of research focused upon eliminating health disparities.
- Address leadership training for research faculty, administrators, and policymakers.
- Will seek to create partnerships between minority institutions and NIDCR-funded research centers and grantees studying diseases that disproportionately affect minorities. These collaborations can strengthen the research infrastructure and capability of minority institutions and provide mentoring for young minority investigators in addition to enhancing research on oral health problems that disproportionately affect racial/ethnic minorities.

Goal 2: Ensure Appropriate Representation in Clinical Trials through Improved Inclusion Policies/Activities

The inclusion of individuals from all racial/ethnic, gender, and age groups in clinical trials is critical to the development of effective interventions for improving health. The objectives are to increase enrollment and retention of racial and ethnic minorities and the underserved in studies conducted at NIDCR and in NIDCR-funded clinical trials.

Planned Recruitment Activities

Division of Extramural Research and Office of Communications and Health Education staff will collaborate to:

- Identify gaps in research on effectiveness of methods and materials for recruiting and retaining participants from minority and underserved communities.
- Identify, compile, and disseminate proven communication methods and materials for recruiting and retaining participants from minority and underserved communities to aid researchers in their recruitment efforts.
- Establish and strengthen collaboration with allied groups (e.g., health voluntary organizations; minority organizations) to increase awareness by minority groups and the underserved of the purpose and value of oral health-related clinical trials, and, as appropriate, provide information concerning inclusion criteria, contact persons, informed consent, and so on, in order to increase their recruitment and retention as volunteer trial participants.

Initiative III: Information Dissemination

Narrowing the health gap and improving health status ultimately rests on advances in biomedical and behavioral research, the ability of health professionals to adopt and apply research advances, and the knowledge and acceptance of research advances by the public, providers, educators, and policymakers. Emphasis will be placed on promoting the use of evidence-based approaches, i.e., identifying those personal behaviors and clinical practices shown to be the most appropriate and effective in improving health and reducing health disparities. Toward this end, NIDCR will establish collaborations with groups committed to identifying and promoting the use of science-based clinical practices. The institute will establish linkages with the Cochrane Collaboration and the Cochrane Oral Health Group; collaborate with the Agency for Healthcare Research and Quality to support the development of systematic reviews of the literature and dissemination of evidence to clinicians; and work with other federal partners, professional organizations, societies, and voluntary organizations to promote the use of evidence emanating from the scientific literature in clinical decision-making.

Goal 1: Ensure the integration of science-based oral health messages and materials into existing federal health communication and education programs for racial/ethnic minorities and the underserved.

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- The gap between research findings and the knowledge, attitudes, and practices of the health professions and the public must be narrowed. The need for science and health literacy was highlighted in the Surgeon General's report.

Planned Activities

To accomplish this goal, Institute staff will:

- Expand collaborations with staff at other NIH components to integrate science-based oral health messages into materials and programs for racial/ethnic minorities and the underserved.
- Expand collaborations with staff in organizations outside NIH to integrate science-based oral health messages into health communication and education programs for racial/ethnic minorities and the underserved.

Goal 2: Expand outreach and promote partnerships with communities and institutions in efforts to disseminate culturally sensitive oral health communications, education programs, and information about government services.

Planned Activities

To accomplish this goal, Institute staff will:

- Identify gaps in disseminating health communication and education programs in racial/ethnic minority and underserved communities and establish plans to eliminate these gaps, including working with professional and voluntary organizations, churches, community centers, and other community organizations.
- Contact professional and voluntary organizations that address health/science/education issues for racial/ethnic minorities and the underserved to promote culturally competent communications and education programs.
- Promote collaborations with other federal agencies in support of public-private partnerships.
- Increase Internet access to NIDCR programs and activities through establishment of a bi-lingual (Spanish) NIDCR website.
- Increase outreach to organizations that promote career choices in science for racial/ethnic minority and underserved students and faculty. Sponsor student participation in programs such as the National Hispanic Youth Initiative, National African American Youth Initiative and the National Native American Hispanic Association of Colleges and Universities.
- Establish links with African American, Hispanic/Latino American, and Native American health professional organizations to exchange information and promote participation of underrepresented minority members in biomedical research.
- Explore collaborations with organizations wanting to strengthen the pipeline of minority researchers by improving science and math education in grades K through 12.

Goal 3: Ensure the development, collection, and distribution of proven oral health communication and education methods and materials for racial/ethnic minorities, individuals with disabilities, and other populations associated with health disparities, to oral health education program planners.

Planned Activities

To accomplish this goal, Institute staff will:

- Identify and disseminate proven oral health-related education approaches, programs, and materials developed by NIDCR and other NIH grantees (especially staff within NIDCR Centers for Research to Reduce Oral Health Disparities) for racial/ethnic minorities and other populations.
- Identify gaps in oral health communication and education research and conduct research on knowledge, attitudes, practices, and effective communications channels and strategies for minorities and the underserved (in coordination with the NIH National Center for Minority Health and Health Disparities); make research results available to oral health education program planners.

Implementation, Evaluation, and Guidance of the NIDCR Health Disparities Plan

The Institute's Plan to Eliminate Craniofacial, Oral, and Dental Health Disparities is an essential component of the Institute's overall Strategic Plan. Like that plan, NIDCR will make The Health Disparities Plan available on the NIDCR Web site and actively promote it to wide audiences. The cooperation and collaboration of the many organizations and institutions that constitute the oral health community—the research, education, and provider organizations, dental manufacturers and other private industry, dental academic institutions and publishers, as well as other stakeholders concerned with craniofacial, oral, and dental health and health disparities, will be essential in disseminating information about the plan's goals and objectives and in aiding in their implementation.

Formal implementation plans for the proposed activities in the plan, their evaluation, and future planning will be overseen by an Institute-wide oversight committee. The Committee will conduct periodic reviews and ensure that the plan is incorporated into the Institute's formal budget planning process and becomes a key component of the Institute's evaluation plan. In addition, implementation plans will be integrated into the regular operations of all Institute divisions, programs, and offices, as well as through the partnerships that are established. Review of the plan also will include advice and guidance by a subcommittee of the National Advisory Dental and Craniofacial Research Council, a subcommittee that will include input from other agencies, professional and voluntary organizations, and the public.

The Institute is also developing a comprehensive evaluation plan for its entire research portfolio and related programs. Assessing the effectiveness of research and other activities directed toward reducing health disparities is a key feature of this plan.