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# THE STATE OF RURAL ORAL HEALTH: A LITERATURE REVIEW

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## SCOPE OF PROBLEM

- Nationally, rural areas record higher rates of people 65 and older with total tooth loss than do their urban counterparts. Among the four regions, only in the Midwest is this rural rate exceeded by the small metropolitan counties.<sup>8</sup>
- Shortages of dentists are much greater in rural areas in all four regions of the country.<sup>8</sup>
- Dental visits within the past year tend to be lower among 18-64 year old people in rural areas than in urban areas across all four regions of the country.<sup>8</sup>
- Dental shortages were identified as major rural health concerns among state offices of rural health.<sup>19</sup>
- Dental conditions are “ambulatory-care-sensitive” conditions.<sup>20</sup>

## GOALS AND OBJECTIVES

The goal of the Healthy People 2010 oral health focus area is to prevent and control oral and craniofacial disease, conditions, and injuries, and improve access to related services.<sup>2</sup> The preceding statement, from the Surgeon General’s Report on Oral Health, provides the first national acknowledgement that oral health is an important component of overall health:

...Oral health means much more than healthy teeth...Oral health is integral to general health. You cannot be healthy without oral health. Oral health and general health should not be interpreted as separate entities.”<sup>1</sup>

This report describes methods to address the following Healthy People objectives:<sup>2</sup>

- 21-1. Reduce the proportion of children and adolescents who have dental caries experience in their primary or permanent teeth.
- 21-2. Focus on untreated dental caries. The objective is to reduce the proportion of children, adolescents, and adults with untreated dental decay.
- 21-3. Increase the proportion of adults who have never had a permanent tooth extracted because of dental caries or periodontal disease.
- 21-4. Reduce the proportion of older adults who have had their natural teeth extracted.
- 21-5. Reduce periodontal disease.
- 21-6. Increase the proportion of oral and pharyngeal cancers detected at the earliest stage.
- 21-7. Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers.
- 21-8. Increase the proportion of children who have received dental sealants to their molar teeth.
- 21-9. Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water.
- 21-10. Increase the proportion of children and adults who use the oral health care system each year.
- 21-12. Increase the proportion of low-income children and adolescents who received any preventive dental service during the past year.
- 21-13. Increase the proportion of school-based health centers with an oral health component.
- 21-14. Increase the proportion of local health departments and community-based health centers, including community, migrant, and homeless health centers that have an oral health component.

Several definitions are pertinent to the discussion of oral health in the United States:

- *Dental caries* is defined as tooth decay or a disease of the teeth resulting in damage to the tooth structure and is typically a disease of children. Children tend to have increased incidence of smooth surface and pit and fissure lesions, while adults tend to have increased incidence of root caries.<sup>2, 21</sup>
- *Periodontal disease* is defined as an inflammation of the gums involving the bones and is typically an adult issue.<sup>21</sup>
- *Edentulism* is defined as loss of natural teeth.

### **IDENTIFIED BY PEOPLE LIVING IN RURAL AREAS AS A HIGH PRIORITY ISSUE FOR THEM**

According to the Rural Healthy People 2010 survey, oral health ranked in fifth place among the 28 Healthy People 2010 focus areas, receiving priority ratings from about 35 percent of the respondents.<sup>3</sup> It was rated as a priority most frequently by state organizations, rural health centers and clinics, and local public health agencies; it was least frequently identified as a priority by hospitals. The differences are statistically significant. No significant differences emerged in this regard across geographic regions.

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### **PREVALENCE AND DISPARITIES IN RURAL AREAS**

While safe and effective prevention measures exist for the most common dental diseases,<sup>1</sup> i.e., dental caries and periodontal diseases, there are disparities in access to and utilization of these measures. The recent report released by the United States Surgeon General, *Oral Health in America: A Report of the Surgeon General*,<sup>1</sup> has brought national attention to oral health disparities in our nation's population.

These disparities are most evident in the incidence and prevalence of dental caries and periodontal diseases. To a lesser degree, these disparities also exist in oral and pharyngeal cancers and other craniofacial disorders.

The disturbing concern is that these disparities now exist in spite of major improvements in the oral health of Americans over the past 40 to 50 years.

Dental caries is the most common chronic disease suffered by children.<sup>1</sup>

Understanding the scope of the oral health issue facing the United States begins with focusing on the state of children's oral health. Dental caries is the most common chronic disease suffered by children—five times more prevalent than asthma and seven times more prevalent than hay fever.<sup>1</sup> More than 50 percent of all children experience dental caries by the age of eight years. About 80 percent of all children have dental caries by age 18.<sup>4</sup> In addition to its prevalent nature, dental caries is typically irreversible. Compounding the problem is the fact that 25 percent of children in the U.S. have not seen a dentist by age six.<sup>1</sup> It is estimated that more than 51 million school hours are lost annually due to dental-related problems.<sup>1</sup>

Since 1970, however, the incidence of dental caries in permanent teeth has significantly decreased in school-aged children. The proportion of untreated dental caries in permanent teeth among school-aged children has been decreasing steadily over the past 30 years. This decline can be attributed to several factors. First, the percentage of school-aged children with dental sealants on permanent teeth has increased over the past few years. This increase in sealant usage is due to increased use of the procedure by dental providers, increased coverage by dental insurance, and educated parents. Second, since 1980, the proportion of the U.S. population with fluoridated community water supplies has increased to approximately 60 percent. Nonetheless, over 100 million Americans do not have fluoridated community water supplies.<sup>1</sup>

A disparity in prevalence of dental caries exists across socioeconomic and geographic subgroups in the population.

Low-income children have two times greater prevalence of dental caries when compared to other children. In

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addition, low-income children have a significantly greater amount of untreated decay than other children. While dental sealants have been proven effective in reducing the incidence of dental caries among children, only 3 percent of poor children have dental sealants compared to 23 percent of children overall.<sup>2</sup> Racial disparities are also striking. Among children, 36 percent of African Americans and 43 percent of Hispanics have untreated dental caries, compared to 26 percent of Caucasians.<sup>2</sup> Hispanic children have the greatest number of dental caries in primary teeth when compared to all other children.<sup>5</sup> Among all the people over the age of two years in the U.S., 44 percent visit a dentist once a year, of which, 50 percent are non-Hispanic whites, 30 percent Hispanic, and 27 percent non-Hispanic blacks.<sup>2</sup>

Periodontal disease is positively correlated with age across all socioeconomic and geographic subgroups in the population. Periodontal disease is more frequently found in African Americans and low-income adults. Men are more likely to develop destructive periodontal disease than females. Thirty-five percent of adults with less than a high school education have periodontal disease compared to 28 percent of high school graduates, and only 15 percent of those high school graduates with some college.<sup>5</sup>

Other oral health issues falling in this category include cleft lip and palate as well as oral and pharyngeal cancers. (Note: These two subjects are not treated in depth in this discussion due to space limitations.) Cleft lip and palate occurs in one in every 600 live births in whites and one in every

1,850 live births in African Americans.<sup>1</sup> Oral and pharyngeal cancers account for approximately 2 to 4 percent of all cancer cases in the United States.<sup>6</sup> The most common site of occurrence is the tongue, accounting for approximately 30 percent of all oral and pharyngeal cancers, followed by the lip (17 percent), and the floor of the mouth (14 percent). Overall, men have an incidence rate 2.6 times that of women with 14.8 per 100,000 versus 5.8 per 100,000 among women. Blacks have a higher rate than whites (12.4 per 100,000 and 9.7 per 100,000, respectively). In particular, black males have the highest reported rates. The rates among black and white females are similar.<sup>9</sup>

Oral health has received little attention in rural health research. Of the existing research, more research has been conducted across and among racial and ethnic subgroups.<sup>22</sup> An assumption that can be made is that oral health disparities that exist in urban areas are at least as severe, if not more pronounced, in rural areas. This assumption is based on poverty, limited supply of dental care providers, and inadequate transportation.

The available research, though limited, supports this assumption. A distinct disparity is seen in the survey data between urban and rural areas, revealing dental caries among children

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and adults to be more prevalent in rural populations than in urban populations. In 1999, rural adults were less likely than urban adults to have had a dental visit in the past year. Within urban areas, 67.1 percent of the total survey sample had a dental visit in the past year. In rural areas, only 58.3 percent of the sample survey had a dental visit in the past year. This finding illustrates the difference in access that exists in urban and rural areas.

Studies have also indicated that children in rural areas have more dental caries experience than urban children.<sup>7</sup> For example, one study of the oral health status of children attending public schools in Oklahoma focused on the level of dental caries experienced in the Native-American population in comparison to non-Indian children. Native Americans live predominantly in the rural areas and are dependent on the public health care delivery system. Results for white and Native-American children ages five to six years and children 15 to 17 years revealed the prevalence and severity of caries in Native-American children are significantly greater.<sup>23</sup>

The age-adjusted prevalence rate of edentulism, total tooth loss, in the United States is also higher in rural areas than in urban areas.<sup>8</sup> Although edentulism is more prevalent among low income than high-income people, those in rural areas are more likely to have such loss.

### **IMPACT OF THE CONDITION ON MORTALITY**

About 30,000 new cases of oral and pharyngeal cancers are diagnosed annually, along with the occurrence of about 7,500 deaths.<sup>9</sup> While being a relatively rare occurrence, these cancers carry one of the lowest survival rates of all. Eighty-two percent of these patients will survive at least one year after diagnosis, while only 50 percent will have a survival of greater than five years.<sup>10</sup> The five-year survival rate is 58 percent for whites compared to that of African Americans, whose rate is much lower at 34 percent.<sup>9</sup> (See the Cancer chapter for additional information regarding cancer.)

### **IMPACT OF THE CONDITION ON MORBIDITY**

It is important to continue to recall that oral health directly affects general health. Oral diseases and conditions are not limited to the oral cavity and supporting structures but affect the entire body and body systems.

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A case-control study was conducted to determine the risk factors for cerebrovascular ischemia. Suspected risk factors included chronic or recurrent respiratory infections, ear-nose-throat infections, and dental infections. Study results indicated that cases of cerebrovascular ischemia (ischemic stroke) had statistically significantly worse dental status and more severe periodontitis than controls. After adjusting for age, socioeconomic status, and established risk factors, poor dental status was significantly associated with cerebrovascular ischemia.<sup>24</sup>

Periodontitis has been suggested as a risk factor for coronary heart disease. Studies have been performed to investigate the association between periodontitis and arteriosclerosis and coronary heart disease. Current evidence does not confirm that periodontitis is a risk factor for coronary heart disease, but an association seems to exist.<sup>25, 26</sup> Studies have found a relationship between periodontal disease and carotid artery intima-media wall thickness. This indicates that periodontitis may have an etiologic role in arteriosclerosis.<sup>27</sup>

### **CONTRIBUTOR TO MANY OTHER HEALTH PROBLEMS**

Many oral diseases have been linked to other medical problems. These medical problems include preterm low birth weight babies, cardiovascular disease, diabetes, and respiratory disease. Recent research has suggested an association between preterm and low birth weight babies and periodontal disease. Retrospective studies have shown that expectant mothers with periodontal disease have a three to seven times greater chance of having a preterm low birth weight baby than mothers who did not have periodontal disease.<sup>28</sup> Prospective studies have suggested that mothers with periodontal disease may have a higher risk for preterm low birth weight babies.<sup>29</sup> A recent study of pregnant African-American mothers indicates that a significant association exists between low birth weight deliveries and serum antibodies against periodontal-disease-causing-bacteria.<sup>30</sup> (Refer to the Maternal, Infant, and Child chapter for further information on preterm and low birth weight babies.)

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Periodontal disease has been linked with diabetes mellitus. (Refer to the Diabetes chapter for more information on diabetes.) Evidence indicates that diabetes mellitus, a risk factor for severe periodontal disease, commonly is found in patients with periodontal disease. This trend suggests a relationship between these two disease processes. In fact, studies have shown that elimination of periodontal disease can improve treatment and control of diabetes.<sup>31</sup>

Respiratory and oral infections have been thought to be related for many years, due to anatomic proximity and physiological functioning. A study of national data has indicated that people with confirmed acute or chronic respiratory disease had poorer oral hygiene scores than subjects without respiratory disease. This association was confirmed after adjusting for age, race, gender, and smoking status.<sup>32</sup>

## **BARRIERS**

Overall, the trend in the proportion of persons who experienced a dental visit in the past year has remained constant over recent years, and the same is true for most subgroups. But, disparities across subgroups in the population are observable across urban/rural areas, race, ethnic group, age, and income level. The causes of the oral health disparity between urban and rural areas can be traced to several factors that can be categorized as access to care and utilization, economic, and dental resources.

### **Access and Utilization**

Access to care, defined as “the timely use of personal health services to achieve the best possible outcomes,”<sup>20</sup> is a major determinant of oral health and general health. The challenges to improving access to care in rural areas constitute a long list. These are lack of dentists, inadequate supply of dentists who accept Medicaid or other discounted fee schedules, reluctance by dentists to participate in managed care programs, socioeconomic nature of rural populations (poverty, low educational attainment, cultural differences, lack of transportation), and absence of a coordinated screening and referral network.<sup>11</sup>

Ability-to-pay, including access to health and dental insurance, is an important determinant of receiving adequate and necessary dental care. According to the Surgeon General’s Report, children with dental insurance are 2.5 times more likely to receive dental care than children without dental insurance. However, less than 20 percent of children with Medicaid insurance coverage receive one dental visit each year.<sup>1</sup> Often, Medicaid insurance does not include dental insurance coverage, or there is a lack of providers accepting Medicaid dental insurance.

Race differences show a disparity in the proportion of persons who had a dental visit in the past year.<sup>12</sup> In 1999, the percentage of whites who had a dental visit in the last year equaled 67.1 percent. At the same time, among blacks, only 56.1 percent had a dental visit the past year. A similar lower percentage of American Indians or Alaska Natives reported dental visits at 56.2 percent in 1999. When ethnic groups are evaluated, white, non-Hispanics have the greatest proportion of persons who had a dental visit the past year.<sup>12</sup>

Age-based disparities also exist. This disjoint can be described by reviewing the trends in dental visits from 1997 to 1999 in the United States across age groups.<sup>33</sup> Overall, 65.2 percent of people two years of age and over (this is equivalent to the total number of expected people who should visit a dentist) had a dental visit in the past year. Specifically, the percentage of individuals having a dental visit in the past year are as follows: for ages two to 17, 72.6 percent in 1999; for adults ages 18 to 64, 64.6 percent in 1999; and for persons 65 years and older, 55 percent in 1999.<sup>33</sup> These proportions are directly affected by access to care.

### **Economic Factors**

Income level is a major factor contributing to utilization of access to care. Adults living in poverty (income at 200 percent of the federal poverty level or below) are less likely to receive dental care than wealthier adults. Among people who are considered non-poor (incomes 200 percent or greater than the Bureau of the Census poverty threshold), 72 percent had a dental visit the past year.<sup>12</sup> Among the near



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poor (incomes of 100 percent to less than 200 percent of the poverty threshold), the percentage dropped to 48.5 percent in 1999. Among the poor (incomes below the poverty threshold), the percentage is even lower at 46.2 percent having a dental visit the past year.<sup>12</sup>

Income has a dominant effect on access, ameliorating much of the disparity across racial and ethnic groups. That is, more modest differences in percentages having a dental visit in the last year were found in people who are poor—whites, non-Hispanics (49.9 percent), blacks, non-Hispanics (46.7 percent), and Hispanics (41.9 percent).<sup>33</sup>

### **Dental Workforce Issues**

Dental workforce supply is an important determinant of oral health status because of the need for trained professionals to provide therapeutic and preventive care. Here again, rural disparities exist. The distribution of dentists in large metropolitan areas is over 60 per 100,000. In rural cities the ratio is 40 dentists per 100,000; and in rural non-city areas, it decreases to about 30 per 100,000 population. This disparity may become more serious as the supply of dentists is decreasing due to declining numbers of dental students and an increase in the number of retiring dentists.<sup>13</sup>

### **KNOWN CAUSES OF THE CONDITION OR PROBLEM SO EFFECTIVE INTERVENTIONS OR SOLUTIONS CAN BE IDENTIFIED**

Cigarette smoking is a significant risk factor for periodontal disease.<sup>2</sup> In spite of significant decreases in cigarette smoking among adults during the 1950s and 1960s,<sup>34</sup> this trend has now reached equilibrium. In 1998, rural adults represented a greater proportion of cigarette smokers (31 percent males and 27 percent females) compared to adults in urban areas (25 percent males and 20 percent females). (Refer to the Tobacco section for more information.)

Regarding oral cancers, various potential risk factors exist that increase one's likelihood of developing these diseases. The greatest of these are alcohol consumption and tobacco usage. About 75 percent of

all cases are attributed to the usage of either smoked or smokeless tobacco.<sup>6</sup> Smoking increases the chances of the occurrence anywhere in the oral cavity; pipe smoking increases the chances of the occurrence in the lips where the pipe stem has contact, and smokeless tobacco increases the likelihood of cancer developing in the cheek, gums, or inner lip.<sup>35</sup> Those who consume alcohol regularly are at a six times higher risk of developing oral cancer, and if this consumption is accompanied with tobacco use, the risk increases. Other risk factors that can increase one's oral cancer risk are exposure to ultraviolet light, oral irritation, vitamin A deficiency, and Human Papillomavirus infection.<sup>35</sup>

### **PROPOSED SOLUTIONS OR INTERVENTIONS THAT ARE FEASIBLE IN RURAL COMMUNITIES**

Partnerships between states and dental providers have been attempted to increase access to care through Medicaid. In Washington, a pilot program to provide dental services in private offices to Medicaid children was conducted by the state and the dentists in the community.<sup>36</sup> After one year, 37 percent of enrolled Medicaid children made at least one visit to the dentist, compared to 12 percent of children not enrolled in the program. This indicates that expanded access to care is effective in introducing children to the dental care delivery system.

“Health commons” is an approach that has been used for low-income rural populations.<sup>14</sup> “Health commons” is a creative, community-based approach that is designed to develop collaborative activities in an attempt to solve oral health problems in disadvantaged populations. “Health commons” sites are integrated primary care practices that include medical, dental, behavioral, social, and public health services. To be successful, a “health commons” approach requires comprehensiveness to enhance dental service capacity, expand the available dental workforce, develop interdisciplinary primary care teams at the community-based sites, and formulate oral health policy. The interdisciplinary nature of this approach allows for the inclusion of dental services in the primary care model, giving access to

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dental care for uninsured, low-income rural populations.

It is proposed that programs such as Project Head Start should be expanded to target areas in which children demonstrate unmet need. In fact, children who participate in Head Start have been found to have high rates of dental caries.<sup>15</sup> Head Start program guidelines provide for education, health care, parent involvement, and social services. The specific program standards for direct dental services include: a) oral examination, b) treatment to relieve pain, discomfort, or infection, c) restoration of carious lesions, d) needed pulp therapy, e) extraction, when appropriate, and f) removal of dental plaque.<sup>37</sup>

At the same time, there are recognized barriers to Head Start-based dental programs that result in children not receiving needed dental care. These barriers have been determined to be: a) lack of parent participation, b) no available private transportation, c) parents' perception of quality of care, d) distance to providers, e) transportation costs, f) lack of adequate funding, g) limited hours of operation, and h) no available health services in the community.<sup>38</sup> In any case, it has been proposed that such programs must provide more than screening and necessary care, and move toward a comprehensive, integrated treatment program.<sup>15</sup>

### **Dental Insurance Reforms**

Dental insurance or public assistance may be important to address rural disparities in oral health. About 55 percent of the U.S. population are covered by private dental insurance.<sup>39</sup> Recent studies have demonstrated that children with dental insurance are more likely to receive needed dental care than uninsured children.<sup>40</sup> Children with dental insurance have more dental visits, and a greater proportion have three or more visits.<sup>39</sup>

Medicaid is designed to provide dental benefits for the medically indigent population. Many have stated that Medicaid expenditures are inadequate, with less than 1 percent of expenditures used for dental treatment.<sup>41</sup> Less than 20 percent of all Medicaid children receive preventive dental services each

year.<sup>16</sup> Additionally, Medicaid programs in most states do not provide any adult dental services.

Expansion of Medicaid coverage and improvement of access to Medicaid dental services could have a beneficial effect in eliminating the disparity seen in rural areas. A study of unmet dental need in Medicaid children found a high prevalence of dental caries among those who regularly utilized dental services, but a relatively low level of unmet need. The study results indicate that Medicaid children who use dental services, a small proportion of the entire study sample, had less unmet dental need.<sup>42</sup>

Expansion of Medicaid alone may not be the answer to the disparity of dental caries experience between low-income and other children. Research indicates that children with Medicaid dental coverage are less likely to receive a dental visit than children with private dental insurance.<sup>43</sup> This indicates that expansion may need to be accompanied with modification in the design of the Medicaid dental program.

### **Fluoridation**

The systemic and topical beneficial effect of fluoride has been documented for many years. Fluoridated community water supplies reduce the incidence and prevalence of dental caries in a population at a very cost-effective price.<sup>44, 45</sup> Benefits from fluoridated community water supplies have been reported to range from an 11 to 40 percent reduction in dental caries.<sup>17</sup>

Fluoridation of community water supplies in urban areas is very common, although this may not be feasible in rural areas. In these cases, delivery of fluoride in other media is recommended. Research has shown that caries prevention programs that use both systemic and topical fluorides result in a significant decrease in the prevalence of dental caries.<sup>46</sup> Topical fluoride application occurs through the use of toothpastes, mouth rinses, and professionally applied gels.

One approach that is useful in implementing fluoridated community water supplies is the

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community diagnosis process.<sup>47</sup> This process includes collection of community-specific primary data on oral health status of school-aged children. The data indicate the need for caries-preventive measures that can be used to answer the controversy of community-wide public health interventions. The community diagnosis process results in information for presentation to lawmakers, stakeholders, and other decision makers who are affected by public health measures.

### **Dental Sealants**

Dental sealants have been proven to be a cost-effective dental-caries-preventive strategy. Research shows that dental caries in sealed permanent teeth are significantly less likely than in unsealed teeth. One study found that permanent molar surfaces with dental sealants were 50 percent less likely to have dental decay.<sup>48</sup> This study also determined that dental sealant usage is most beneficial in those children and adolescents who are at risk for occlusal caries.

### **Dental Professionals Supply**

For the past decade, the federal government has used health professional shortage areas (HPSAs) and medically underserved areas (MUAs) as designations for intervention. Through the National Health Service Corps (NHSC), health care providers have been placed in identified need areas. But, results indicate that this distribution of providers has not been effective in addressing the oral health needs of those people in the underserved areas.<sup>49</sup>

Given the decreasing trend in the number of dental care professionals, other health care professionals must be included in the dental team. A coordinated, collaborative effort is needed to address the disparity in oral health status throughout the nation. Several potential efforts include pediatricians and others in the oral health care of children.

Pediatricians may be able to help in improving the oral health status of low-income and rural children by participating in oral health prevention during well-child care visits. These children have difficulty

obtaining needed dental treatment, with less than 20 percent of Medicaid-eligible children under 21 years receiving preventive dental services.<sup>16</sup> Most pediatricians feel that they should play an important role in children's preventive dental programs, but they lack the requisite knowledge to be an effective member of the dental team. To facilitate training, medical education must include information about oral health, including growth and development, in medical school, residency training, and continuing education courses.<sup>50</sup>

Another method is the expansion of school-based dental services. This expansion would involve the education and training of school nurses and the establishment of school-based dental clinics. These school-based dental care centers would be most important in dental health education and dental sealant programs.

Regarding oral and pharyngeal cancers, over three-fourths of these cancers are present in areas readily visible or palpable during an oral examination. Regular examinations by a health professional offer primary and secondary prevention opportunities by diagnosing the cancer in its early stages.<sup>18</sup> Eliminating or reducing the exposure to the risk factors along with having regular oral exams may greatly reduce the likelihood of developing either of these deadly diseases.

### **COMMUNITY MODELS KNOWN TO WORK**

See the Models for Practice section in Volume 1 for a catalog of models.

### **OTHER FINDINGS**

A population that is often forgotten in the disparity discussion is the special needs population. People with developmental disabilities and complex health problems may face additional barriers to dental care because of the attitude of policymakers and dental providers toward this population. The more obvious physical condition is given primary attention, with oral health issues ignored.



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There are currently an estimated 54 million people who are defined as having a disability according to the Americans with Disabilities Act. Of these, approximately 7.5 million have mental retardation, and more than 4.5 million people have seizure disorders.<sup>51</sup>

The common overall oral health finding for persons with developmental disabilities is poor oral hygiene, characterized by a) extensive gingivitis, b) gross calculus deposits, c) high prevalence of periodontal disease, and d) dental caries experience similar to the general population.<sup>52</sup> People with special needs are not a homogenous group, i.e., oral hygiene and oral health status contrasts sharply across the severity of the developmental disability.<sup>53</sup> Barriers to provision of the appropriate level of care include a) physical restrictions, b) financial constraints, c) and willingness of the dentist to treat special needs people.<sup>54</sup>

A compounding problem is that the level of disabilities may result in the need for a hospital setting for the delivery of dental services. Providing oral health care for people with disabilities is a difficult task. Special needs populations usually require approximately 20 percent more time for completing a dental treatment plan.<sup>55, 56</sup> Studies of people with mental retardation living in a long-term care setting showed that 40 percent of the people could be treated with local anesthesia, with the remaining requiring pre-operative sedation or general anesthesia.<sup>57</sup> The need for hospital care is not a problem in urban areas, but it is unusual to locate hospital dental services for an underserved rural special needs population.<sup>58</sup>

Elderly people are another population that exhibits oral health disparity. The elderly population living in long-term care facilities have similar oral health needs as people with developmental disabilities. As age increases in the elderly population, there is an associated increase in prevalence of physical and mental disabilities. This results in dependence on others to maintain oral hygiene and oral health.<sup>59</sup> Persons living in long-term care environments are two times more likely to be edentulous and have

fewer restored teeth. This same trend is seen in people with developmental disabilities.

## SUMMARY AND CONCLUSIONS

The literature is quite clear in describing the oral health disparity that exists in the United States today. Despite the fact that the overall oral health status has improved in this nation over the past 30 years, there is a stark contrast in oral health and dental caries experience among specific subgroups in the population. Groups lagging behind include rural populations, racial and ethnic minorities, low-income populations, elderly, and special needs populations.

A major contribution to this disparity seems to be access to care. There are many determining factors for access to care, including income, educational attainment, area of residence, dental workforce, and dental insurance. An interaction effect exists among these factors, compounded by specific subgroup characteristics. Many efforts have been undertaken to improve access to care, with some success. Lessons can be learned from these past efforts. No one intervention is likely to successfully eliminate the existing oral health disparity in the United States.

## REFERENCES

1. U.S. Department of Health and Human Services (DHHS). *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. DHHS, National Institute of Dental Craniofacial Research, National Institutes of Health, 2000.
2. U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd ed., With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000.
3. Gamm, L.; Hutchison, L.; Bellamy, G.; et al. Rural healthy people 2010: Identifying rural health priorities and models for practice. *Journal of Rural Health* 18(1):9-14, 2002.

4. Kaste, L.M.; Selwitz, R.H.; Oldakowski, R.J.; et al. Coronal caries in the primary and permanent dentition of children and adolescents 1-17 years of age: United States, 1988-1991. *Journal of Dental Research* 75:631-641, 1996.
5. Cho, I. Disparity in our nation's health: Improving access to oral health care for children. *New York State Dental Journal* 66(9):34-37, 2000.
6. Centers for Disease Control and Prevention (CDC). Oral Cancer: Deadly to Ignore. 2002. <<http://www.cdc.gov/OralHealth/factsheets/oc-facts.htm>>June 4, 2002.
7. U.S. Public Health Service, Bureau of Health Professions. *Health status of minorities and low-income groups*, 3rd ed. U.S. DHHS, 1991.
8. Eberhardt, M.S.; Ingram, D.D.; Makuc, D.M.; et al. Urban and Rural Health Chartbook. *Health, United States, 2001*. Hyattsville, MD: National Center for Health Statistics, 2001.
9. Silverman, S. Demographics and occurrence of oral and pharyngeal cancers. The outcomes, the trends, the challenge. *Journal of the American Dental Association* 132:7S-10S, 2001.
10. American Cancer Society (ACS). What are the key statistics about oral cavity and oropharyngeal cancer? 2001. <[http://www.cancer.org/eprise/main/docroot/cricri\\_2\\_3x?dt=60](http://www.cancer.org/eprise/main/docroot/cricri_2_3x?dt=60)>June 4, 2001.
11. National Rural Health Association. *Rural Clinician Quarterly* 10(2), 2001.
12. Burt, B.A., and Eklund, S.A. *Dentistry, Dental Practice, and the Community*, 5th ed. Philadelphia, PA: W.B. Saunders Co., 1999, 205-206, 237-258.
13. U.S. DHHS. *Oral Health in America: A Report of the Surgeon General-Executive Summary*. Rockville, MD: U.S. DHHS, National Institute of Dental Craniofacial Research, National Institutes of Health, 2000.
14. Beetstra, S.; Derksen, D.; Ro, M.; et al. A "health commons" approach to oral health for low-income populations in a rural state. *American Journal of Public Health* 92(1):12-13, 2002.
15. Edelstein, B.L. Access to dental care for Head Start enrollees. *Journal of Public Health Dentistry* 60(3):221-229, 2000.
16. U.S. DHHS. *Children's dental services under Medicaid: Access and utilization*. (OEI-09-93-00240). San Francisco, CA: U.S. DHHS, Office of Inspector General, 1996.
17. Newburn, E. Effectiveness of water fluoridation. *Journal of Public Health Dentistry* 49:279-289, 1989.
18. CDC. Current trends examinations for oral cancer—United States, 1992. *Morbidity and Mortality Weekly* 43(11):198-200, 1994.
19. National Rural Health Research Center Director's Meeting. *Research Opportunities for Rural Health Research Centers and State Office of Rural Health*. Washington, DC, March 5, 2001.
20. Institute of Medicine. Appendix D: Ambulatory-care-sensitive conditions and referral-sensitive surgeries. *Access to health care in America*. Washington, DC: National Academy Press, 1993, 219-222.
21. National Library of Medicine. Dental Caries. 2001. <<http://www.nlm.nih.gov/medlineplus/ency/article/001055.htm>>June 3, 2002.
22. North Carolina Rural Health Research Program. *Race and Place: Urban-rural differences in health for racial and ethnic minorities*. Chapel Hill, NC: University of North Carolina, 2000.
23. Grim, C.W.; Broderick, E.B.; Jasper, B.; et al. A comparison of dental caries experience in Native American and Caucasian children in Oklahoma. *Journal of Public Health Dentistry* 54(4):220-227, 1994.

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24. Grau, A.J.; Buggle, F.; Ziegler, C.; et al. Association between acute cerebrovascular ischemia and chronic and recurrent infection. *Stroke* 28:1721-1729, 1997.
25. Beck, J.D.; Offenbacher, S.; Williams, R.; et al. Periodontitis: A risk factor for coronary heart disease? *Annals of Periodontology* 3(1):127-141, 1998.
26. Beck, J.D.; Pankow, J.; Tyroler, H.A.; et al. Dental infections and atherosclerosis. *American Heart Journal* 138(5 Pt 2):S528-533, 1999.
27. Beck, J.D.; Elter, J.R.; Heiss, G.; et al. Relationship of periodontal disease to carotid artery intima-media wall thickness: The atherosclerosis risk in communities (ARIC) study. *Arteriosclerosis, Thrombosis, and Vascular Biology* 21(11):1816-1822, 2001.
28. Jeffcoat, M. Adverse pregnancy outcomes: Implications for clinical practice and intervention strategies. In: *The periodontal-systemic connection: A state-of-the-science symposium*. American Academy of Periodontology (AAP)/National Institute of Dental and Craniofacial Research (NIDCR), 76, 2001.
29. Offenbacher, S. Periodontitis and prematurity, low birth weight and preeclampsia. *The periodontal-systemic connection: A state-of-the-science symposium*, AAP/NIDCR, 75, 2001.
30. Dasanayake, A.P.; Boyd, D.; Madianos, P.N.; et al. The association between Porphyromonas gingivalis-specific maternal serum IgG and low birth weight. *Journal of Periodontology* 72(11):1491-1497, 2001.
31. Grossi, S.G., and Genco, R.J. Periodontal disease and diabetes mellitus: A two-way relationship. *Annals of Periodontology* 3(1):51-61, 1998.
32. Scannapieco, F.A.; Papandonatos, G.D.; and Dunford, R.G. Associations between oral conditions and respiratory disease in a national sample survey population. *Annals of Periodontology* 3(1):251-256, 1998.
33. Centers for Disease Control and Prevention, National Center for Health Statistics. *National Health Interview Survey, 1997-1999*. Hyattsville, MD: Public Health Service, 2000.
34. U.S. Public Health Service (PHS). *Smoking and health. Report of the Advisory Committee to the Surgeon General of the Public Health Service*. PHS Publication No. 1103. U.S. Department of Health, Education, and Welfare, Public Health Service, 1964.
35. ACS. What are the risk factors for oral cavity and oropharyngeal cancer? 2001. <[http://www.cancer.org/eprise/main/docroot/cricri\\_2\\_3x?dt=60](http://www.cancer.org/eprise/main/docroot/cricri_2_3x?dt=60)>June 4, 2002.
36. Milgrom, P.; Hujoel, P.; Grembowski, D.; et al. Making Medicaid child dental services work: A partnership in Washington state. *Journal of the American Dental Association* 128(10):1440-1446, 1997.
37. Jones, D.B.; Schlife, C.M.; and Phipps, K.R. An oral health survey of Head Start children in Alaska: Oral health status, treatment needs, and cost of treatment. *Journal of Public Health Dentistry* 52(2):86-93, 1992.
38. Giambruno, C.; Cowell, C.; Barber-Madden, R.; et al. The extent of barriers and linkages to health care for Head Start children. *Journal of Community Health* 22(2):101-114, 1997.
39. Waldman, H.B. Pediatric dentistry and national health insurance: A more than favorable opportunity. *Journal of Dentistry for Children* 61(5-6):361-364, 1994.
40. Lave, J.R.; Keane, C.R.; Lin, C.J.; et al. The impact of lack of health insurance on children. *Journal of Health and Social Policy* 10(2):57-73, 1998.

41. Isman, R., and Ishman, B. *Access to oral health services in the United States: 1997 and beyond*. Chicago, IL: Oral Health America, 1997.
42. Robison, V.A.; Rozier, R.G.; and Weintraub, J.A. Dental caries and treatment need in schoolchildren related to Medicaid enrollment. *Journal of Public Health Dentistry* 57(3):163-170, 1997.
43. Manski, R.J.; Edelstein, B.L.; and Moeller, J.F. The impact of insurance coverage on children's dental visits and expenditures, 1996. *Journal of American Dental Association* 132(8):1137-1145, 2001.
44. Fos, P.J. Is there anything good in our drinking water? *New Orleans Health and You* 1(1):1987.
45. Fos, P.J., and Pittman, J.P. Caries reduction efficacy of fluoride via a community water supply. *Journal of Dentistry for Children* 53(3):219-222, 1986.
46. Gillcrist, J.A.; Collier, D.R.; and Wade, T. Dental caries and sealant prevalence in school children in Tennessee. *Journal of Public Health Dentistry* 52(2):69-74, 1992.
47. Brumley, D.E.; Hawks, R.W.; Gillcrist, J.A.; et al. Successful implementation of community water fluoridation via the community diagnosis process. *Journal of Public Health Dentistry* 61(1):28-33, 2001.
48. Dennison, J.B.; Straffon, L.H.; and Smith, R.C. Effectiveness of sealant treatment over five years in an insured population. *Journal of American Dental Association* 131(5):597-605, 2000.
49. United States General Accounting Office. *Health care access: Opportunities to target programs and improve accountability*. Pub. No. GAO/HEHS-97-204. Washington, DC: U.S. Government Printing Office, 1997.
50. Lewis, C.W.; Grossman, D.C.; Domoto, P.K.; et al. The role of the pediatrician in the oral health of children: A national survey. *Pediatrics* 106(6):e84, 2000.
51. U.S. Bureau of Maternal and Child Health. *Oral health America, ideals to reality: A guide for establishing oral health 2000 consortia for states and community*. Washington, DC: U.S. Bureau of Maternal and Child Health, 1997, 33-36.
52. Connick, C.M.; Fos, P.J.; and Barsley, R.J. Women's oral health in a special needs population. In: Studen-Pavlovich, D. and Ranalli, D.N., eds. *Women's Oral Health*, Philadelphia, PA: Dental Clinics of North America, W.B. Saunders, 2001.
53. Kendall, N.P. Differences in dental health observed within a group of non-institutionalized mentally handicapped adults attending day centers. *Community Dental Health* 9(1):31-38, 1992.
54. Beck, J.D., and Hunt, R.J. Oral health status in the United States: Problems of special patients. *Journal of Dental Education* 49(6):407-426, 1985.
55. Nunn, J.H. The dental health of mentally and physically handicapped children: A review of the literature. *Community Dental Health* 4(2):157-168, 1987.
56. Jurek, G., and Reid, W. Oral health of institutionalized individuals with mental retardation. *American Journal on Mental Retardation* 98(5):656-660, 1994.
57. Gibson, G.B., and Swanson, A.E. Developing an undergraduate hospital dentistry program. *Journal of Dental Education* 55(11):738-742, 1991.
58. Siegal, M.D. Dentists reported willingness to treat disabled patients. *Special Care Dentistry* 5(3):102-108, 1985.
59. Slade, G.D.; Locker, D.; Leake, J.L.; et al. Differences in oral health status between institutionalized and non-institutionalized adults. *Community Dentistry and Oral Epidemiology* 18(5):272-276, 1990.

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