

## Dental Health

The individual and public health impacts of dental disease are increasingly recognized as affecting a large proportion of the population as well as being linked with overall health status.<sup>1 2</sup> Deterioration of oral health may be secondary to other major health issues.<sup>3 4</sup> Mouth and throat diseases, such as cavities and cancer, cause pain and disability for millions of Americans. Additionally, poor oral hygiene is associated with higher levels of risk for cardiovascular disease and low grade inflammation.<sup>5</sup> Therefore, improvement of oral health may have a positive impact on general health and delay mortality.<sup>6 7</sup> Not only is lower cognitive function associated with greater deterioration of oral health,<sup>8</sup> but complete or nearly complete tooth loss may be a predictor of dementia late in life.<sup>9</sup>

Not all dental issues are pathological. For example, cosmetic changes in the appearance of the teeth may be an issue among smokers. Roughly 28% of smokers report moderate to severe levels of tooth discoloration compared to 15% of non-smokers.<sup>10</sup> Cosmetic issues may manifest as mental health problems and influence expenditure of resources for tooth “whitening” treatments and products.

Almost all oral diseases can be prevented, yet many Americans forgo routine dental care. According to a recent Gallup-Healthways poll, 34% of Americans did not see a dentist in the past year. Missouri was the 43<sup>rd</sup> worst state with 40% of respondents reporting no dental visits.<sup>11</sup> National Health Interview Surveys have shown that parental oral health seeking behaviors for themselves have an important effect on oral health seeking behaviors on behalf of their children, regardless of the child's insurance status.<sup>12</sup>

There are federal and state assistance programs for dental care, but they are limited. The Children's Health Insurance Program (CHIP) requires states to provide limited dental coverage for enrolled children up to age 19 years. The Medicaid program requires states to provide limited dental services for most Medicaid-eligible individuals aged fewer than

21 years, but there is no assistance to provide dental services to individuals aged at least 21 years. The majority of states, including Missouri, fail to ensure proper dental health and access to care for children.<sup>13</sup> Although children enrolled in Medicaid are entitled to dental services through CHIP's Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) services, it is difficult to demonstrate that they are receiving these services.<sup>14</sup> Due to the lack of routine dental service coverage under Medicare, many senior citizens are unable to afford dental care.<sup>15</sup> However, additional dental coverage for preventive care could pay off in terms of both improving the oral health of the elderly population and limiting costs of expensive non-preventive dental care for the dentate beneficiary population.<sup>16</sup>

According to the National Center for Health Statistics, approximately 73% of persons aged fewer than 65 years who have private health insurance also have some type of dental coverage.<sup>17</sup> About 80% of persons with employment-based private health insurance had dental coverage compared with 30% with directly purchased insurance. Non-Hispanic blacks are more likely to have dental insurance than non-Hispanic whites, Asians or Hispanics. As income levels increase, the percentage of persons having dental insurance increases.

Oral conditions affect the full scope of health status, yet dentistry has traditionally used specific clinical indices, such as number of teeth, to assess the impact of dental conditions. Oral Quality of Life (OQOL) measures have been developed to provide population based indices and currently are being evaluated.<sup>18</sup> Significant improvements have been made over the past four decades. For seniors, edentulism and periodontitis have declined; for adults, improvements were seen in dental caries (cavities) prevalence, tooth retention, and periodontal health; for adolescents and youths, dental sealant prevalence has increased and dental caries have decreased; however, for youths aged 2–5 years, dental caries in primary teeth have increased.<sup>19</sup> Dental caries (cavities) have declined significantly among

school-aged children since the early 1970s, yet remain the most prevalent chronic disease of childhood.

Despite these improvements, disparities in oral health are most pronounced among socioeconomically disadvantaged and racial minority groups in the United States. Data from the National Survey of American Life found that 28% of adults have fair or poor oral health, showing no significant racial differences.<sup>20</sup> Adults with lower income and less than a high school education were each about 1.5 times more likely as other adults to report fair/poor oral health. Higher levels of chronic stress, depressive symptoms, and material hardship were associated with fair/poor oral health. Low income and low educational attainment are associated with severe periodontitis, independent of neighborhood socioeconomic status.<sup>21</sup> The state of Massachusetts was the first in the nation to require children who spend more than 4 hours a day in day care centers and preschools, or who have meals in such licensed centers, brush their teeth.<sup>22</sup>

Among children, 20% of those aged 2-4 years, 50% of those aged 6-8 years, and nearly 60% of those aged 15 years have tooth decay.<sup>23</sup> Low income children are disproportionately affected with about 33% having untreated decay. This condition can lead to pain, dysfunction, school absenteeism, underweight, and poor appearance. Tooth decay is also a problem for older adults who have retained most of their teeth.

Fluoridation of community drinking water is a major factor responsible for the decline in tooth decay during the 2<sup>nd</sup> half of the 20<sup>th</sup> century and is considered one of the top 10 public health achievements in past century.<sup>24</sup> Today, 69% of persons who are served by community water supplies receive optimally fluoridated water, including residents of Kansas City.<sup>25</sup> As more fluoride became available, e.g. in toothpastes, concern arose that children were receiving too much fluoride resulting in streaks and/or spots on their teeth. Consequently, in early January 2011, the federal Department of Health and Human Services issued a new standard of 0.7 parts of fluoride per million for drinking water. The new standard replaces the 1962 standard which was 0.7

parts of fluoride per million for warmer climates to 1.2 parts of fluoride per million in cooler regions.

Despite an increase in tooth retention, tooth loss remains a problem among older adults. National data show that 8% of adults have lost all their natural teeth primarily because of tooth decay and advanced gum disease.<sup>26</sup> Absence of natural teeth is inversely associated with education; 15% of adults with fewer than 12 years of education have lost all their natural teeth compared with 3% of those with a bachelor's degree or higher. The poor and near poor are more likely to have lost all their natural teeth than those who are not poor. Among persons aged fewer than 65 years, the risk of death from all causes is 19% for persons who have lost all their natural teeth compared to 10% for persons who have not.<sup>27</sup> In Missouri, during 2002, the age-adjusted percentage of persons aged at least 65 years who had most of their natural teeth (loss of 5 or fewer teeth) was 44.6%, while 26.4% had lost all their natural teeth.<sup>28</sup> In the Kansas City metropolitan area, 19.5% of adults had lost all their natural teeth.<sup>29</sup> There also is an association between tooth loss and the number of live births a woman had, although this relationship is not moderated through dental care, psychosocial factors, or dental health damaging behaviors.<sup>30 31</sup> In general, women who receive preventive dental care have better birth outcomes than those who receive no treatment.<sup>32</sup>

Americans make about 500 million visits to dentists and an estimated \$78 billion is spent on dental services. Yet, 4.7 million children aged between 2 and 17 years (7%) had unmet dental needs because their families could not afford dental care.<sup>33</sup> Thirty-five percent of uninsured children have had no dental contact for more than 2 years compared with 17% of children on Medicaid and 13% of children with private health insurance. Hispanic children are 1.6 times as likely as white children and 1.4 times as likely as black children to have had no dental contact for more than 2 years. Insurance status is also reflected in percent of children with unmet dental needs – 23% of uninsured children, 9% on Medicaid, and 4% with private insurance. Children enrolled in Medicaid or the State Children's Health Insurance Program (SCHIP) were 1.7 times more likely to have

untreated dental caries than other children, with those enrolled in SCHIP being significantly less likely to have untreated dental caries than those en-

rolled in Medicaid.<sup>34</sup> This is due to improvements in funding for SCHIP dental services.<sup>35</sup>

## **Missouri**

The National Oral Health Surveillance System reported that 61.1% of Missourians visited a dentist or dental clinic within the past year. Of the individuals who visited a dental clinic, 61.6% had their teeth cleaned within the past year, 26.2% of persons 65+ years of age had lost all of their teeth, 27.0% of 3<sup>rd</sup> grade students had untreated tooth decay, and that 28.8% of 3<sup>rd</sup> grade students had one or more sealants on their permanent 1<sup>st</sup> molar teeth ([www.cdc.gov/nohss](http://www.cdc.gov/nohss)). Also, 79.9% of Missourians using public water systems are receiving fluoridated water.

One of the major complications of diabetes is periodontal disease. Adults with diabetes have a

higher prevalence of periodontal disease as well as more severe forms of the diseases. This contributes to impaired quality of life and substantial oral functional disability. In addition, periodontal disease has been associated with development of glucose intolerance and poor glycemic control among adults with diabetes. Behavioral Risk Factor Surveillance System (BRFSS) data show that, nationally, 67% of dentate adults with diabetes had a dental visit during the preceding 12 months.<sup>36</sup> For Missouri, the rate was 61.4% and for Kansas 78.7%. The *Healthy People 2020* national objective is to have 61.2% of dentate adults with diabetes have an annual dental visit.

## **Kansas City**

The 2004 *Health Assessment Survey* commissioned by the Kansas City Health Department found that 60% of respondents had dental health insurance ([www.kcmo.org/health](http://www.kcmo.org/health)). Of those with dental insurance, 67% had it through their employer, 25% through a governmental program, and for 8% it was self-purchased. Of all respondent households, 55% had all members covered and 45% had either no one covered or had a portion of the household not covered, usually adults.

Among survey respondents, 75% reported a dental check-up in the prior 2 years while 2% reported never having dental checkups. In addition, 33% of respondent households did not have their teeth

cleaned on a regular basis. Of those that did have their teeth cleaned, 90% were seen at a dental office, 4% at the University of Missouri's School of Dentistry, 5% at community health centers, and 0.6% at other venues. Seventy-six percent of respondents reported usually or always brushing their teeth at least twice a day.

Kansas City is fortunate to have the only dental school in the state. Of the local health departments serving the Missouri side of the metropolitan area, only the Clay County Health Department has a dental health program. The Platte County Health Department does provide emergency dental services.

## Emergency Department Visits

Dental care is the most commonly cited unmet health care need in the nation<sup>37</sup> and patients with dental complaints often go to a hospital emergency department. According to the National Centers of Health Statistics' (NCHS) National Hospital Ambulatory Medical Care Survey, an estimated 2.95 million emergency department visits were made for dental-related complaints over a 4-year period (1997-2000).<sup>38</sup> Those visits were similar in number to those for "painful urination". Patients with dental complaints were significantly more likely to have Medicaid or no health insurance (self-pay) in comparison to patients without dental complaints. Care provided typically consisted of prescribing antibiotics and analgesics along with referrals to others for follow-up.

In Kansas City, 1.7% of all emergency department visits are for dental complaints, with women and non-whites more likely to seek care.<sup>39</sup> In recent years, there has been a very significant in-

creasing trend in such visits, while the trend for all other emergency department visits was stable.<sup>40</sup> Caries accounted for 20% of the dental-related emergency department visits; pulpitis or periapical abscesses accounted for 15%; cheek, lip, jaw injury, or broken tooth for 9%; temporomandibular joint disorders for 1%, and all other dental diseases for 55%.

Emergency department charges for dental complaint visits during 2001-2006 in Kansas City were approximately \$6.9 million. Average charges were highest for temporomandibular joint disorders (\$747), followed by cheek, lip, jaw injury or broken tooth (\$549), dental caries (\$432), pulpitis or periapical abscess (\$421), and all other dental diseases (\$277). Self-pay and Medicaid constituted 70.6% (38.3% self-pay; 32.3% Medicaid) of the payment sources compared to 51% for all other types of emergency department visits.

## Children

*Healthy People 2020's* target for the prevalence of untreated dental decay in children aged between 6 and 8 years is 25.9%. There are two different local initiatives that provide information related to dental health in children, *Score 1 for Health* and the *Oral Health Surveillance Project*.

### Score 1 for Health

*Score 1 for Health* is a collaboration between the Kansas City University of Medicine and Biosciences, University of Missouri School of Dentistry and the Deron Cherry Foundation. For 2006-2007, *Score 1 for Health* reported that the rate of untreated dental decay was 37.7% among children in participating schools in the Kansas City area.<sup>41</sup> Rates for dental decay among students varied from 8% to 58% between schools. Using the percent of

children in a school who were eligible for the Free and Reduced Lunch (FRL) Program as a proxy indicator of children living in poverty or among working poor families, the collaboration found that lower socioeconomic status schools had rates 1.7 times higher than those of higher socioeconomic status schools. The dental need was 1.2 times higher among blacks and Hispanics than whites. Children aged between 8 and 10 years had the highest rates of need (40-41%). Of children referred for dental care, Hispanic families were the least likely to see a dentist (38%) compared to black (53%) and white (60%) families. Commonly identified barriers included a lack of insurance, a lack of available providers, and a lack of timely appointments.

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## Oral Health Surveillance Project

The *Oral Health Surveillance Project 2007-2008* conducted by the University of Missouri Department of Dental Public Health, with support from the REACH Healthcare Foundation, was a year-long assessment of children's oral health status in a six-county bi-state region, which included Cass, Jackson, and Lafayette counties in Missouri, and Allen, Wyandotte, and Johnson counties in Kansas. The survey examined preschool children aged 2 to 4 years, elementary school children who were aged 8 years, and middle-school children aged 12 years. The project collected clinical and behavioral data utilizing dental screening examinations and survey questionnaires.

Liang Hong, DDS, MS, PhD and Michael McCunniff, DDS, MS provided the following information on 547 children from the Jackson County portion of the study.

Of the participants, there were approximately equal numbers of boys and girls. Fifty-five percent were non-Hispanic white, 31% non-Hispanic black, and 10% Hispanic. About half of the children were eligible for FRL. In addition, 48% came from families with an annual income less than \$40,000. Sixty-two percent of parents did not have a college degree and 89% had some kind of medical insurance.

The dental examination indicated that, overall, 18% of the children had developmental enamel defects, 15% had dental fluorosis in permanent maxillary central incisors, and 3% had dental fluorosis in primary second molars. Boys and girls were equally likely to have dental caries (40% vs 39%). Age was significantly associated with caries experience with 8 year olds more likely to have caries (Table 17.1). Twelve year olds had less caries experience because their primary teeth had been lost and were not available for assessment. Non-Hispanic black children

had the highest caries rate (44%) and non-Hispanic white children the lowest (23%). While sex was not a significant factor for untreated caries, race/ethnicity was a significant factor with non-Hispanic black children (44%) being about three times more likely to have untreated caries than non-Hispanic white children (16%). Socioeconomic status as measured by participation in the FRL program and family income level, as well as parents' education level, were significantly related to children's caries experience (Tables 17.2 and 17.3).

Considering the severity of dental caries using the measure of number of decayed and filled surfaces (DFS), there was no significant difference between boys and girls. Older children, non-white children, children eligible for the FRL program, those whose parents had less education, and those from low income families had significantly more DFS.

The rate of sealant use, which is an effective preventive measure for dental caries, was very low. Overall, only 7% of children had dental sealant in at least one tooth surface. This rate was below the *Healthy People 2010* objective that 50% of children receive dental sealant. Factors such sex, race, eligibility for the FRL program, parents' education level, and family income, were not related to dental sealant use.

Only 1.5% children had dental trauma, which suggests that it is not a serious problem.

Twelve percent of children had dental erosion of the maxillary incisors. Hispanic children had the highest rate (36%), followed by non-Hispanic white children (11%) and non-Hispanic black chil-

**Table 17.1 Oral Health Surveillance Project 2007-2008 findings by age group, Jackson County, Mo**

Dental condition	Age group		
	2-4 years	8 years	12 years
Dental plaque (bacterial film on tooth surface)	78%	70%	72%
Calculus	16%	24%	24%
Gingivitis (gum inflammation)	26%	35%	35%
Dental caries experience	19%	63%	52%
Untreated cavity	14%	57%	42%
Average number of decayed, missing, or filled teeth	0.70	2.54	2.02
Average number of decayed or filled surfaces	1.26	3.86	2.88
Dental sealant	0.3%	12%	18%
Dental erosion of maxillary incisors	20%	7%	10%



**Table 17.2 Oral Health Surveillance Project 2007-2008 findings by income status, Jackson County, Mo**

Dental condition	Free/reduced lunch participants		Family income		
	Yes	No	<\$20,000	\$20-59,999	≥\$60,000
Caries experience	46%	17%	49%	29%	17%
Untreated caries	40%	11%	43%	23%	11%
Average number of decayed, missing, or filled teeth	1.89 (SD±2.77) <sup>a</sup>	0.56 (SD±1.63)	2.03 (SD±2.74)	1.01 (SD±2.09)	0.64 (SD±1.92)
Average number of decayed or filled surfaces	2.95 (SD±4.74)	0.89 (SD±3.02)	3.37 (SD±5.15)	1.98 (SD±4.24)	0.71 (SD±2.07)
Dental erosion of maxillary incisors	12%	6%	14%	12%	6%
Urgent dental care	9%	0%	9%	3%	1%

<sup>a</sup>SD = standard deviation

dren (7%). Children from low income families were more likely to have dental erosion of the maxillary incisors.

Among 12 year olds, the mean orthodontic treatment score was 5.36 (SD±2.92). Forty-four percent of these children had no orthodontic need (score 0-4), while 26% were considered as having orthodontic treatment concern (score 5-7), and 30% had a definite orthodontic treatment need (score 8-10). No socioeconomic factors were significantly related to definite orthodontic treatment need.

When it came to the degree of urgency of needed dental care, 71% of the children had no obvious dental problem, 24% needed early dental care, and 5% needed urgent dental care. The elementary school students had the highest percentage of those who needed urgent dental care, probably because vast majority of primary teeth still remained. Nine percent of non-Hispanic black children had urgent dental care need, compared to only 3% of non-Hispanic white and 1% of Hispanic children. Children from low-income families were more likely to have urgent dental care needed.

Out of the 547 children, only two did not brush their teeth. Of the children who did brush their teeth, 36% brushed their teeth once daily, 53% twice daily, and about 11% 3 times or more daily. Twenty-two percent of children flossed including 17% who flossed once daily, 4% who flossed twice daily, and 1% who flossed three times or more daily. Race/ethnicity, parents' education, and family income were not significantly associated with dental flossing behavior. Girls, older children, and those not eligible for the FRL program were significantly more likely to floss. Overall, 62% of children did not use mouth rinse. Older children, non-Hispanic black children, those not eligible for the FRL program, children whose parents had a low education attainment level, and children from low income families were significantly more likely to use mouth rinse. Disadvantaged children may be more likely to use mouth rinse because of public health programs that target them, not necessarily because their parents purchase these products.

Among those parents who returned a questionnaire survey, the primary source of drinking water for their family was unfiltered city tap water

**Table 17.3 Oral Health Surveillance Project 2007-2008 findings by parents' educational attainment level, Jackson County, Mo**

Dental condition	Parents' education level		
	<High school	Some college	≥College
Caries	42%	33%	17%
Untreated caries	36%	28%	12%
Average number of decayed, missing, or filled teeth	1.75 (SD±2.68) <sup>a</sup>	1.31 (SD±2.56)	0.50 (SD±1.42)
Average number of decayed or filled surfaces	2.87 (SD±4.89)	1.98 (SD±4.25)	0.71 (SD±2.07)
Dental erosion of maxillary incisors	12%	7%	11%
Urgent dental care	8%	3%	0.5%

<sup>a</sup>SD = standard deviation

(46%), followed by filtered city tap water (36%), bottled water (17%) and private well water (0.8%). Collectively, 82% of survey respondents used city tap water as their primary drinking water sources. Primary drinking water sources were significantly associated to any caries experience, untreated caries, or decayed and filled surfaces (DFS). Children drinking primarily city tap water had the lowest caries experience.

About 43% of children were not breastfed as an infant while 35% had been breastfed for 1-6 months, 17% for 7-12 months, and 5% for greater than 12 months. Breastfeeding had a significant effect on children's caries experiences with those who were breastfed longer having less caries experience.

Only about 11% of children did not drink fruit juice, whereas 60% drank fruit juice 1-6 times per week, and 29% drank fruit juice 1 or more times per day. Fruit juice drinks were significantly related to the caries experience. Children who consumed more fruit juice tended to have more caries experience. Similarly, about 33% of children did not drink soda pop regularly, 54% drank it 1-6 times per week, while 12% consumed soda pop at least 1 time per day. Children who drank more soda pop had a significantly higher caries experience.

Seventeen percent of parents reported their children's oral health in very good condition, 48% reported good oral health, 25% reported fair oral health, and 4% reported poor oral health. When parents were asked what specific problems their children had with their teeth, 28% reported tooth cavities, 20% reported crooked teeth or need for braces, 9% reported tooth discoloration, 5% reported gum problems, and 1% reported tooth pain. Sixty-four percent reported that their children had a regular family dentist and 80% had dental insurance. Fifty-eight percent reported that their children had a dental visit in past year, 19% had a dental visit more than one year ago; while 22% has never had a dental visit. When parents were asked for reasons for the last dental visit, 69% reported it was a routine checkup/examination or cleaning, and 5% reported their child's teeth were bothering or hurting.

Thirteen percent reported that they could not get needed dental care for their children. When parents were asked for main reason for not being able to get needed dental care for their children, the primary reason was affordability (33%), followed by no insurance (15%), difficulty getting an appointment (15%), the dentist did not take Medicaid insurance (8%), transportation problems (5%), did not know where to go (4%). Children who were older, not black, not eligible for the FRL program, from high income families, and whose parents' education attainment level was high were more likely to have visited a dentist in the past year. Children who had dental insurance coverage were significantly more likely to have had a dental visit in the past year (63% vs 45%).

### **Pediatric Dental Services**

Only 1% of the 2,700 dentists in Missouri were enrolled in Medicaid and the Missouri Children Health Insurance Program. These low percentages have resulted in a shortage of dentists in the Kansas City region willing to accept children on MC+/Medicaid (now known as Missouri HealthNet).

In 2003, Citizens for Missouri's Children released a report, *Dental Care Counts, Decay in the Heartland: A Crisis for Kansas City Children*. According to that report, only 15% of dentists in the region accepted children with MC+/Medicaid. This translated into 1 dentist for every 923 children enrolled in MC+/Medicaid. As a result, less than one-third of eligible children were screened for dental problems. The report also stated that the health care maintenance organizations under contract with the state of Missouri also had low dental screening rates.

In 2007, the REACH Healthcare Foundation and the Health Care Foundation of Greater Kansas City joined together to fund a 3-year project known as *Project Ready Smile* with the aim of having young children arrive at kindergarten with healthy teeth and mouths. This goal is to be accomplished by 1) expanding the pool of dentists willing to treat young children, 2) encouraging families to establish a dental home for themselves and their young child, and

3) educating children and families about oral health habits that should begin early in a child's life. The project encourages dentists to accept at least 5 Pro-

ject Ready Smile participants over the course of a year.

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